# HEATER & AIR CONDITIONER

# SECTION HA

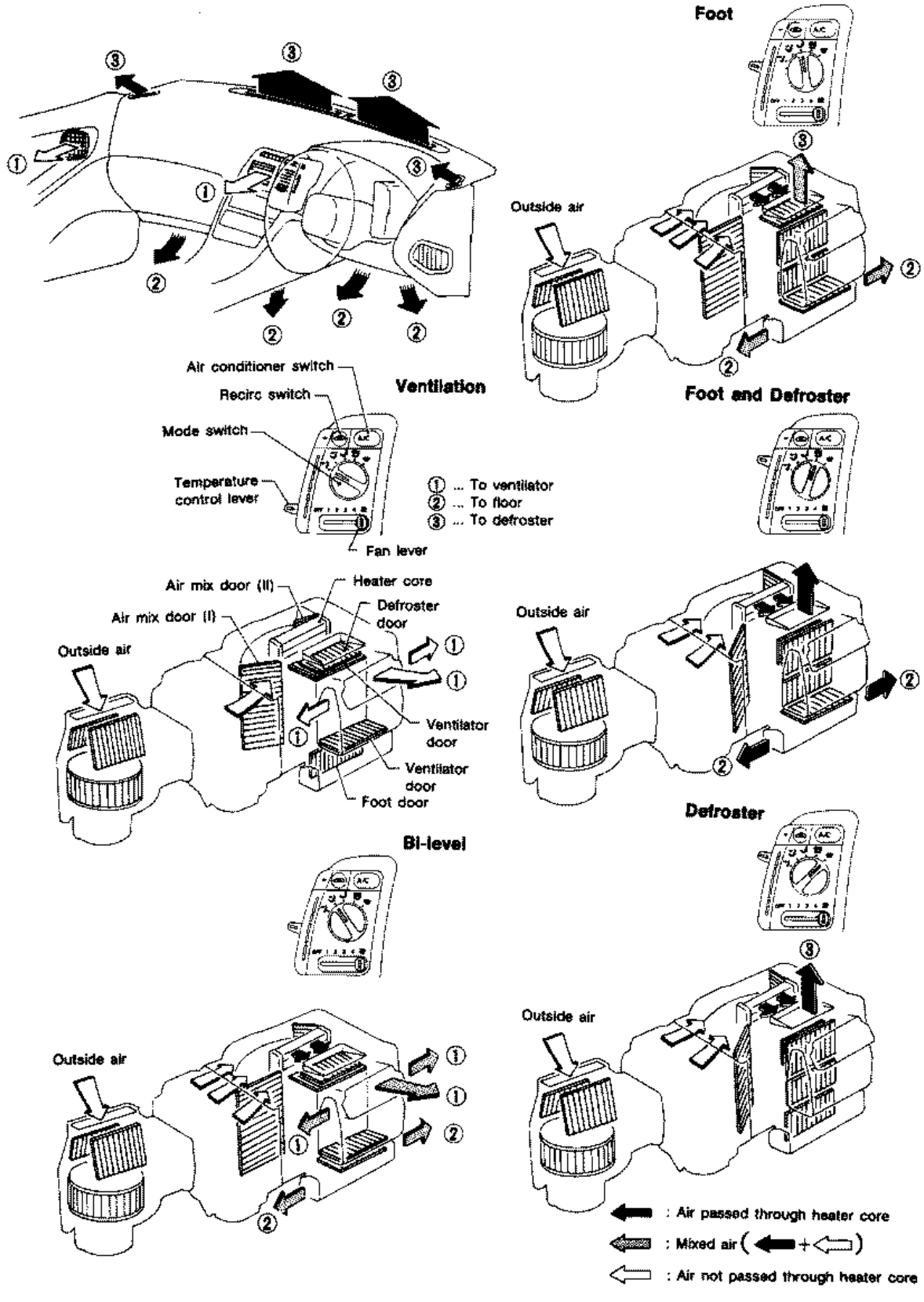
## CONTENTS



**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".**

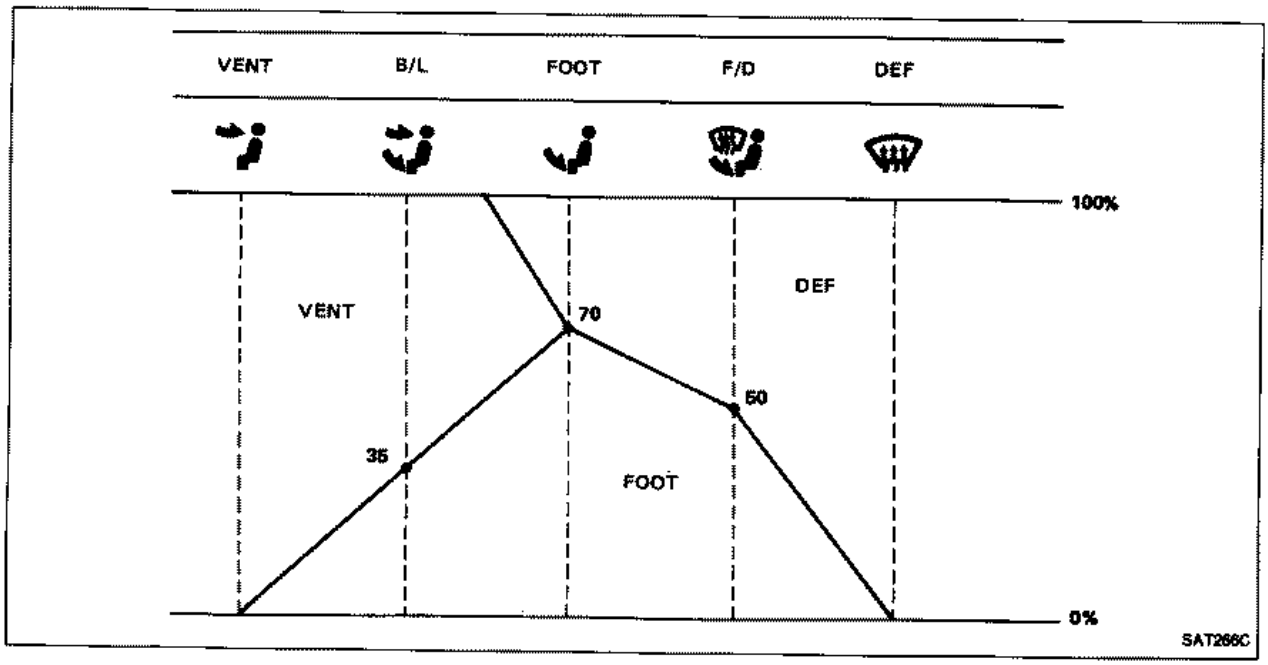
## Air Flow



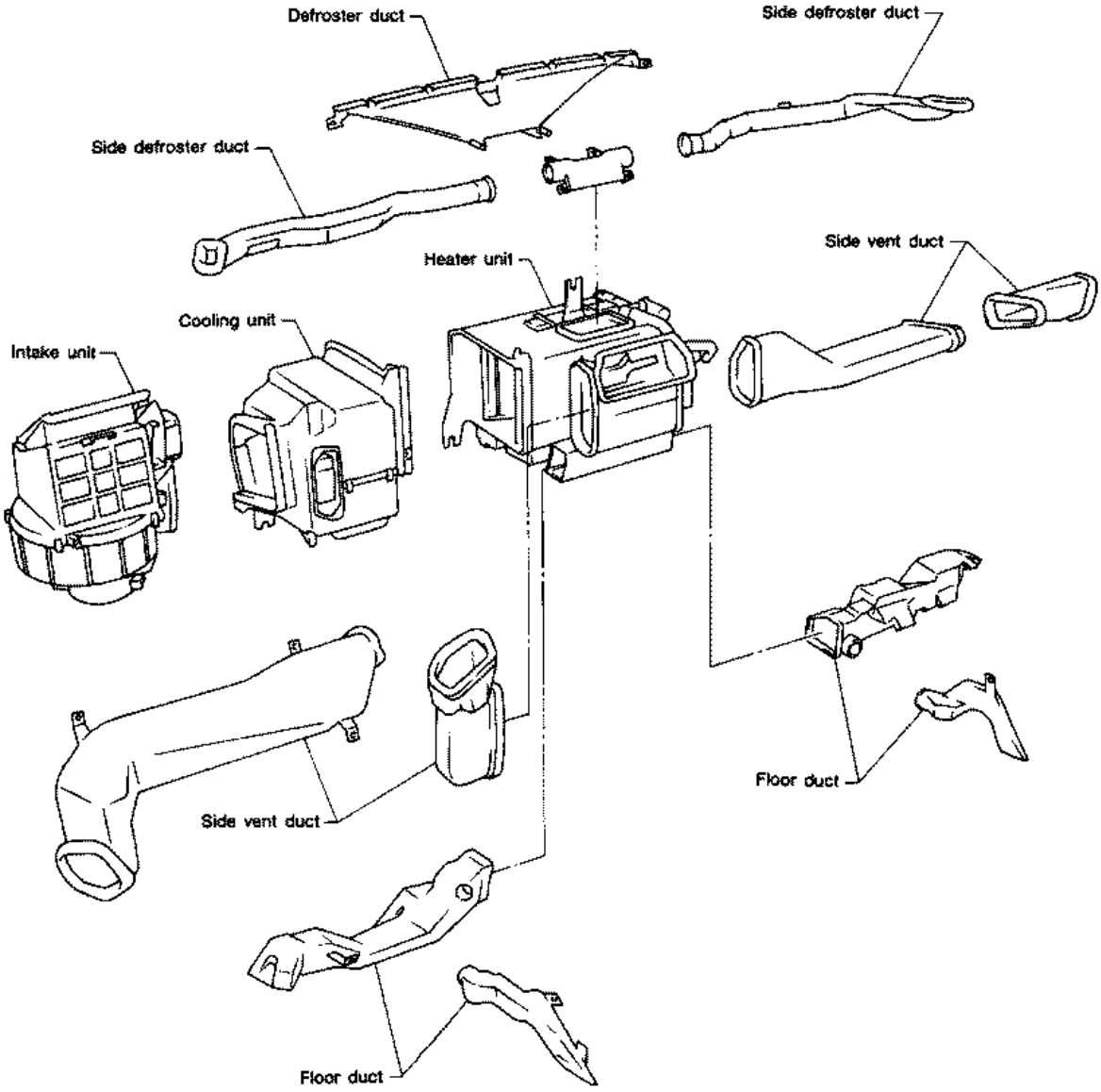

SHA604C

## Air Flow (Cont'd)

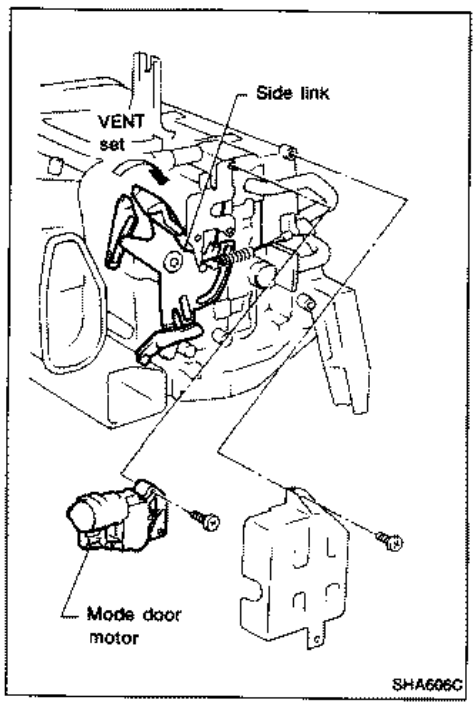
### AIR DISTRIBUTION RATIOS



## Component Layout



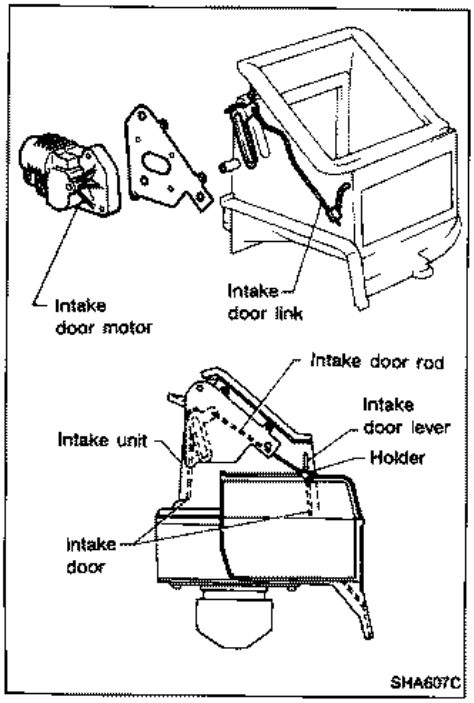

SHA605C




## Control Rod Adjustment

### MODE DOOR

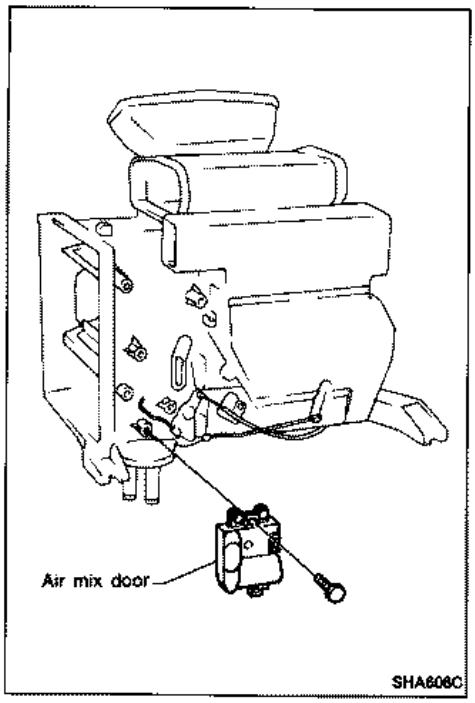
1. Move side link by hand and hold mode door in VENT mode.
2. Install mode door motor on heater unit and connect it to harness.
3. Turn ignition switch to ACC.
4. Turn VENT switch ON.
5. Attach mode door rod to side link rod holder.
6. Check that when DEF position is selected, only DEF door is at full-open position, and when VENT position is selected, only VENT door is at full-open position.




### INTAKE DOOR

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

## Control Rod Adjustment (Cont'd)




### AIR MIX DOOR

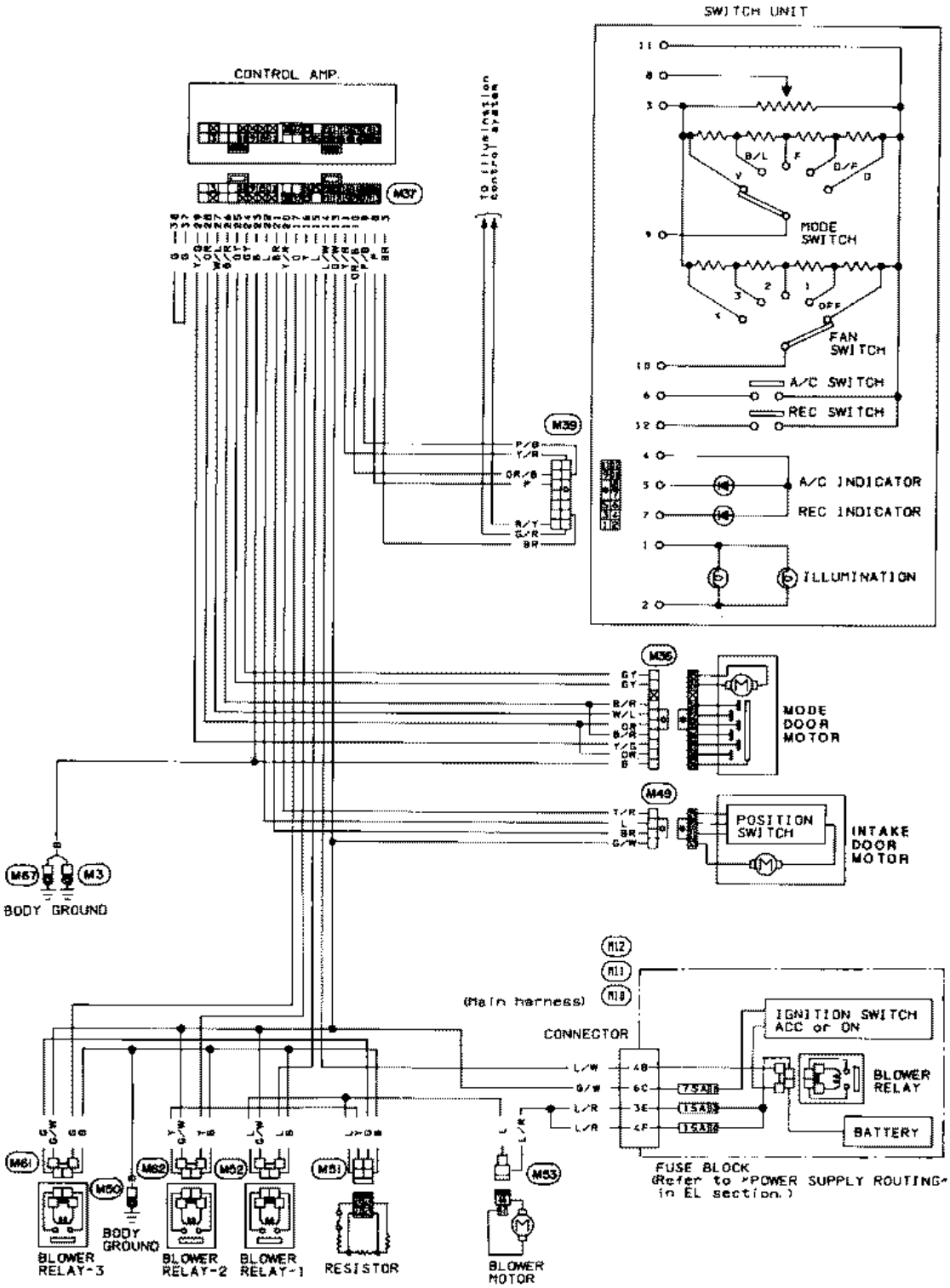
1. Connect harness to air mix door motor and set temperature control lever at full-cold position.
2. Set air mix doors I and II at full-cold position and fasten door rod.
3. Check that when temperature control lever is at full-cold, both doors are at full-cold position, and when temperature control lever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

### WATER COCK CONTROL CABLE

Clamp cable at full-close position when air mix doors I and II are at full-cold position, and full-open position when air mix doors I and II are at full-hot position.

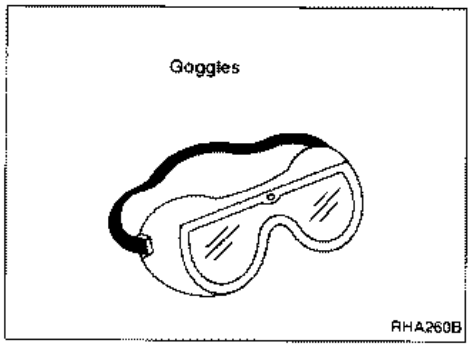
## Wiring Diagram

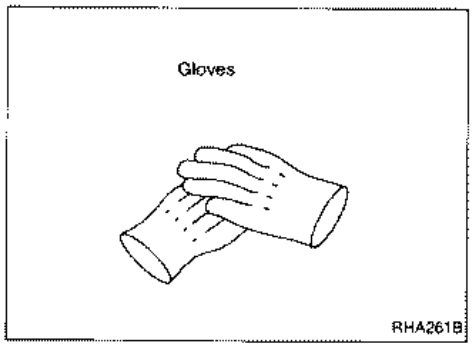
### R.H. DRIVE MODEL

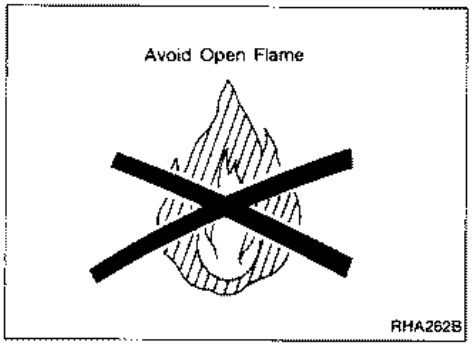


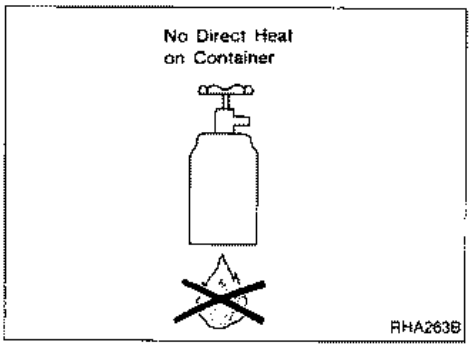


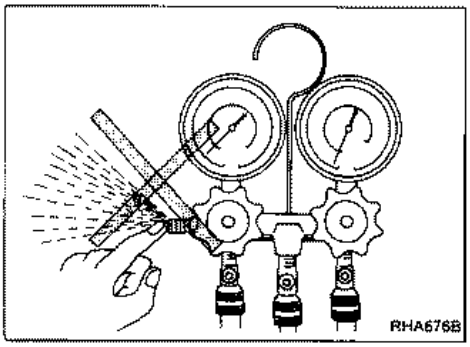

SHA690C



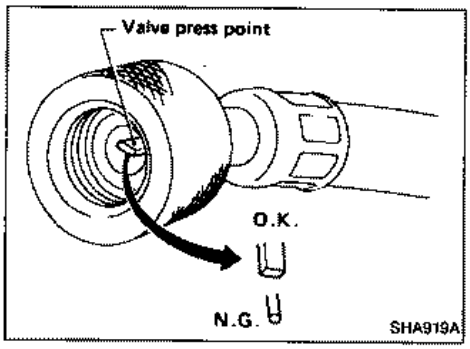

## PRECAUTIONS FOR THE HANDLING OF REFRIGERANT

- **Always wear eye protection when working around the system.**
- **Always be careful that refrigerant does not come in contact with your skin.**
- **Keep refrigerant containers stored below 40°C (104°F) and never drop from high places.**
- **Work in well-ventilated area because refrigerant gas evaporates quickly and breathing may become difficult due to the lack of oxygen.**
- **Keep refrigerant away from open flames because poisonous gas will be produced if it burns.**
- **Do not increase can temperature beyond 40°C (104°F) in charging.**
- **Do not heat refrigerant container with an open flame. There is a danger that container will explode.**

**CAUTION:**

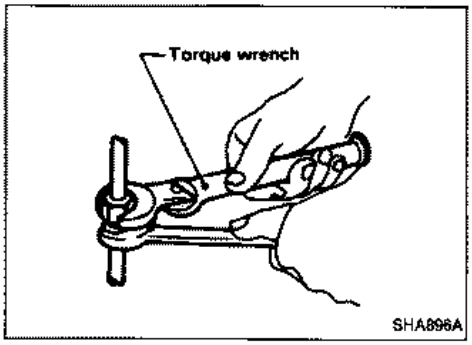
- **Do not use steam to clean surface of condenser or evaporator. Be sure to use cold water or compressed air.**
- **Compressed air must never be used to clean a dirty line.**

- **Do not release refrigerant into the atmosphere.**



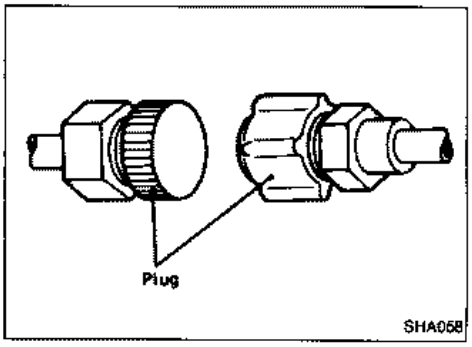

- **Do not use manifold gauge whose press point shape is different from that shown. Otherwise, insufficient evacuating may occur.**

- **Do not over-tighten service valve cap.**
- **Do not allow refrigerant to rush out. Otherwise, compressor oil will be discharged along with refrigerant.**

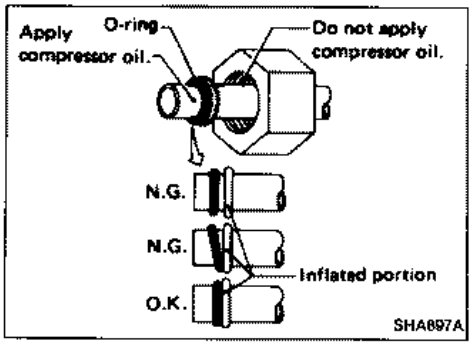



**WARNING:**
**Gradually loosen discharge side hose fitting, and remove it after remaining pressure has been released.**
**CAUTION:**
**When replacing or cleaning refrigerant cycle components, observe the following.**

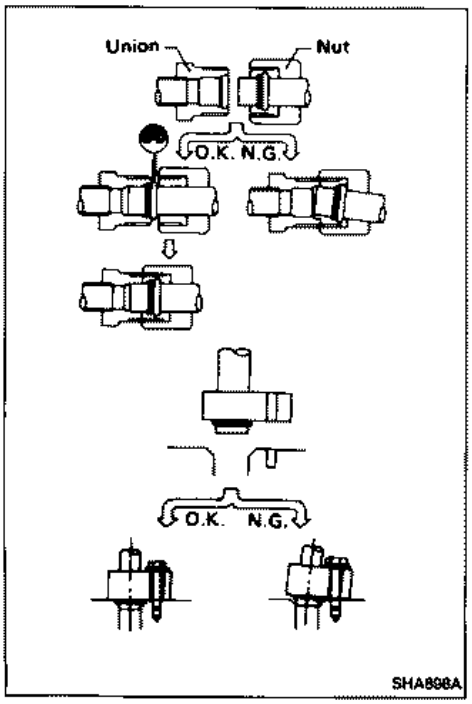
- **Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.**
- **When connecting tubes, always use a torque wrench.**




- **After disconnecting tubes, plug all openings immediately to prevent entrance of dirt and moisture.**




- **Always replace used O-rings.**
- **When connecting tube, apply compressor oil to portion shown in illustration. Be careful not to apply oil to threaded portion.**
- **O-ring must be closely attached to inflated portion of tube.**

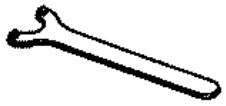
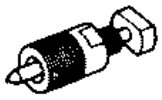
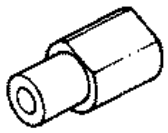
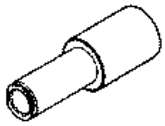
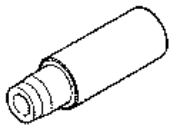
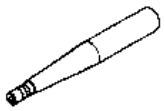


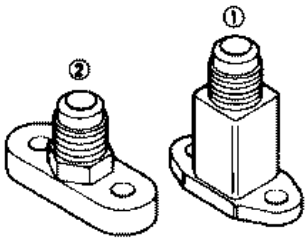
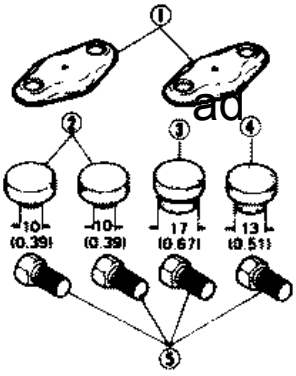

- **After inserting tube into union until O-ring is no longer visible, tighten nut to specified torque.**
- **After connecting line, conduct leak test and make sure that there is no leakage from connections. If a gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections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

## SPECIAL SERVICE TOOLS

### MJS170 model

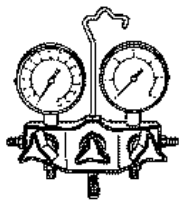
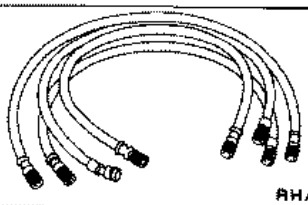
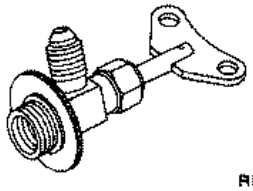
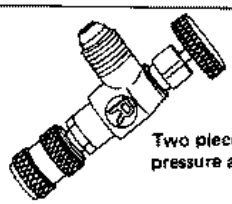
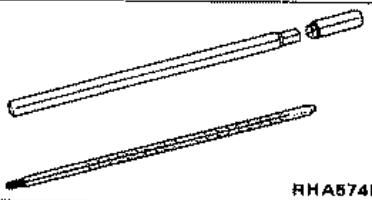
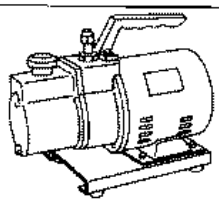
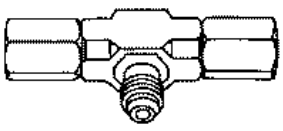
*: Special tool or commercial equivalent

| Tool name<br>Tool number | Description | |
|---|---|---|
| Clutch disc wrench<br>KV99412302* |  | Removing shaft nut and clutch disc |
| Clutch disc puller<br>KV994C5780 |  | Removing clutch disc |
| Shaft handle socket<br>KV99412329* |  | Rotating compressor shaft |
| Shaft seal remover<br>KV99403043 |  | Removing and installing shaft seal |
| Shaft seal installer<br>KV99403042 |  | |
| Shaft seal pilot<br>KV99403041* |  | Installing shaft seal |
| Allen socket<br>KV99412330* |  | Removing rear cover |
| Cylinder head remover<br>KV994C5785* |  | Removing rear cylinder head |

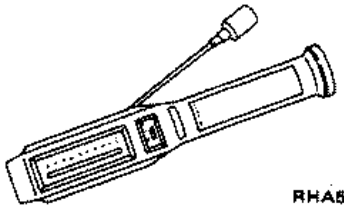
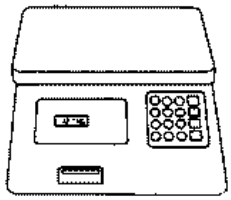
| Tool name<br>Tool number | Description | |
|---|---|---|
| Oil separator kit<br>KV994A9690 |  | Separating oil from refrigerant |
| KV992C5079<br>Adapter connector A<br>① KV992C5081<br>Adapter connector B<br>② KV992C5082 |  | Using separate oil |
| Charge nozzle<br>KV994C1552 |  | Charging refrigerant into compressor |
| Blind cover set<br>KV994C4548<br>Blind cover<br>① KV994C4531<br>Gasket<br>② KV994C4532<br>Gasket (Useless)<br>③ KV994C4533<br>Gasket (Useless)<br>④ KV994C4534<br>Bolt<br>⑤ KV994C4559 |  <br>Unit: mm (in) | Blind cover |

## Service Tools

### RECOMMENDED TOOLS

| Tool name | Description | |
|---|---|---|
| Manifold gauge (3-valve type) |  RHA570B | Discharging, evacuating and charging refrigerant |
| Charging hose (Four) |  RHA571B | Discharging, evacuating and checking refrigerant |
| Charge valve |  RHA572B | Discharging and charging refrigerant |
| Adapter valve |  Two pieces on each high pressure and low pressure line RHA573B | Evacuating and charging |
| Thermometer |  RHA574B | Checking temperature |
| Vacuum pump |  RHA575B | Evacuating refrigerant |
| Joint adapter (T-type) |  RHA576B | Charging refrigerant |

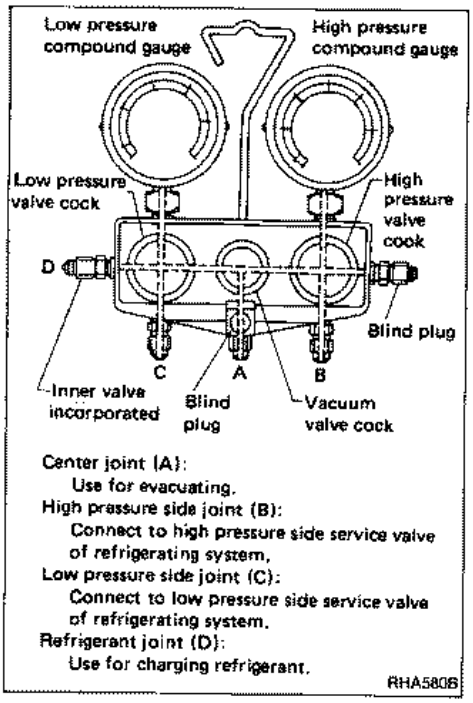
## Service Tools (Cont'd)

| Tool name | Description | |
|---|---|---|
| Gas leak detector |  RHA577B | Charging refrigerant leaks |
| Charging cylinder |  RHA578B | Checking amount of refrigerant and charging refrigerant |
| Weight scale |  RHA579B | Checking amount of refrigerant |

**For details of such handling methods, refer to the instruction Manual attached to each of the service tools.**

## Service Tools (Cont'd)

### HANDLING METHOD AND STRUCTURE




Center joint (A):
Use for evacuating.
High pressure side joint (B):
Connect to high pressure side service valve of refrigerating system.
Low pressure side joint (C):
Connect to low pressure side service valve of refrigerating system.
Refrigerant joint (D):
Use for charging refrigerant.

RHA580B

### Manifold gauge

The manifold gauge is used to measure the operating pressure accurately in the high pressure and low pressure lines of the refrigerating system.
The high pressure gauge measures from –101.3 kPa (–1,013 mbar, –760 mmHg, –29.92 inHg) to 2,942 kPa (29.4 bar, 30 kg/cm$^2$, 427 psi), and the low pressure gauge measures generally from –101.3 kPa (–1,013 mbar, –760 mmHg, –29.92 inHg) to 1,471 kPa (14.7 bar, 15 kg/cm$^2$, 213 psi).

**CAUTION:**

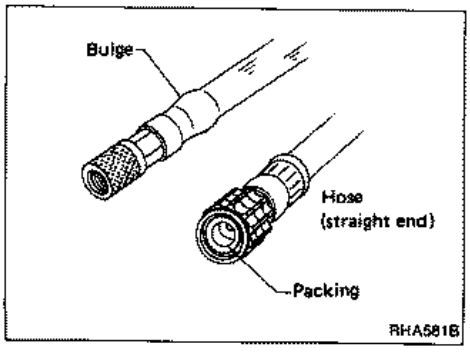
- **When installing the gauge to the refrigerating system, use utmost care not to mistake high pressure and low pressure line connections. (Wrong connections will lead to a damaged gauge.)**
- **Before evacuating, confirm that the gauge has a negative pressure scale. (If not, the gauge will be damaged.)**

### Charging hose

1. Completely tighten the high pressure valve, low pressure valve and vacuum pump valve cocks of the gauge manifold.
2. Connect the charging hoses to the high and low pressure lines.
3. Connect the charging hose fitted with a valve core to the refrigerant canister.
4. Connect the charging hose to the vacuum pump.

**The high and low pressure hoses are color coded to prevent wrong connection.**

| | |
|---|---|
| High pressure line hose | Red |
| Low pressure line hose | Yellow |
| Refrigerant canister hose | Blue or green (with valve core) |
| Vacuum pump hose | Blue or green |

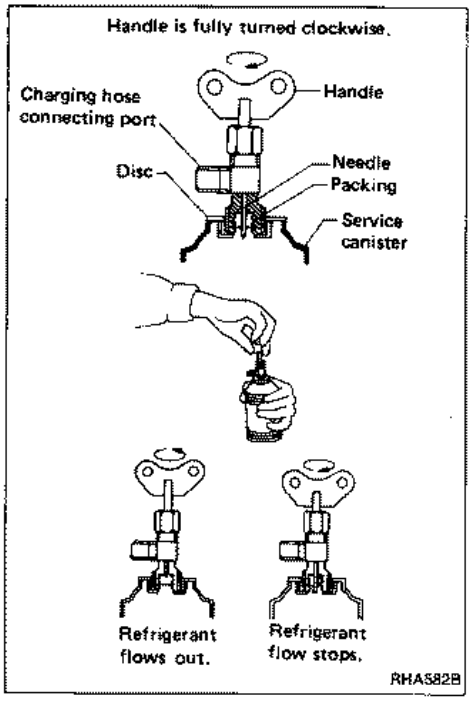



RHA581B

**CAUTION:**

- **Check each hose for cracks. If found, discard the hose.**
- **Do not use any hose if bulges are found.**
- **Check the rubber packing. If any deterioration or cracks are found, replace it with a new one.**

## Service Tools (Cont'd)



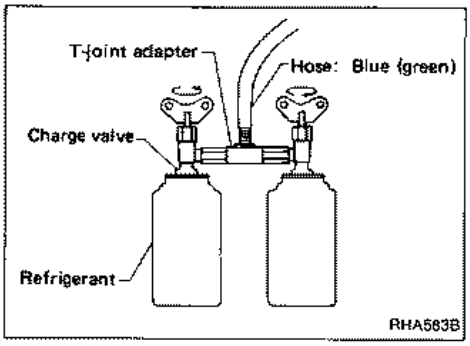

### Charge valve

The charge valve is used to charge the refrigerant into the system from the service canister through the gauge manifold. Attach this valve to the head of a service canister by screwing it on. Then turn the handle clockwise to pierce the canister to allow the refrigerant to flow into the refrigerating system.

**CAUTION:**

**Check the packing for any sign of deterioration or cracks. If any abnormalities are found, replace it with a new one.**

1. Turn the charge valve handle counterclockwise to fully retract the needle, and then attach the charge valve to the service canister. Note that leakage will occur if the charge valve is attached to the canister without retracting the needle.
2. Securely fit the charge valve to the head of the service canister by turning it. Then turn the handle slowly clockwise to make a hole in the canister with the needle.
3. Turn the handle counterclockwise to retract the needle, and the refrigerant will flow into the gauge manifold through the hole. To stop the flow of the refrigerant, turn the handle clockwise to close the hole with the needle.

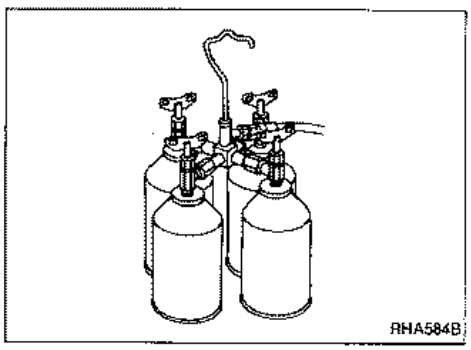



### Connecting T-joint adapter

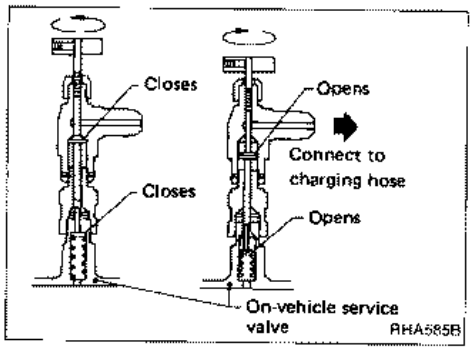
The T-joint adapter is used to connect two refrigerant canisters so that air purging and the accompanying discharge of refrigerant into the atmosphere can be eliminated when recharging the refrigerant. If only one service canister is sufficient to charge the refrigeration system, do not use this T-joint adapter.

1. Turn the handle of each charge valve fully counterclockwise, and attach the valve to a refrigerant canister.
2. Connect the T-joint adapter to both charge valves so that two refrigerant canisters are connected as shown.
3. Connect the charging hose with valve core to the T-joint adapter. Connect the valve core end of the charging hose to the manifold gauge.

**If more than three service canisters are needed for charging, use a cross joint adapter to connect four service canisters.**



## Service Tools (Cont'd)




### Installing the adapter valve

Install the adapter valve to each of the high pressure and low pressure service valves so that air purging from the charging hose can be omitted. This also ensures that refrigerant leakage upon disconnection of the hose can be prevented.

1. Before connecting the adapter valve to the on-vehicle service valve, turn the adapter valve handle fully counterclockwise to retract the pin.

**CAUTION:**

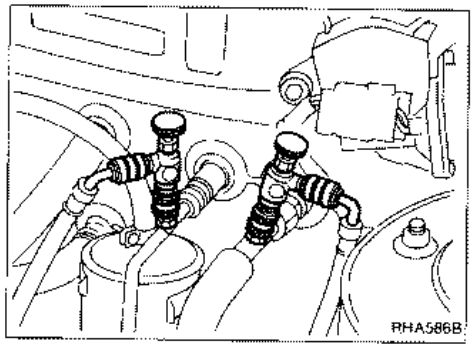
**Check the packing for any sign of deterioration or cracks. If any abnormality is found, replace the packing with new.**

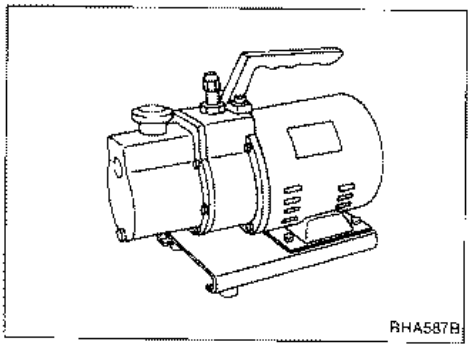
2. Connect the charging hose to the adapter valve.

**Turning the handle clockwise will cause the on-vehicle service valve pin to be pushed open by the adapter valve pin, thus opening the refrigerant passage.**

**Turning the handle counterclockwise will close the passage.**

**Before removing the adapter valve from the on-vehicle service valve, be sure to fully turn the handle counterclockwise to shut off the refrigerant passage.**

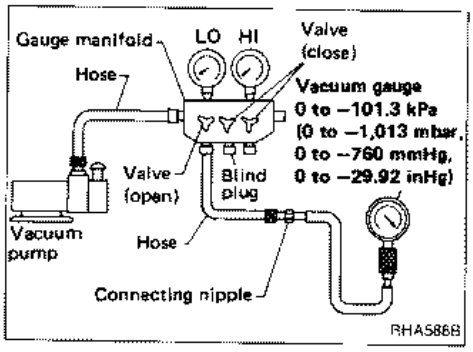



### Vacuum pump

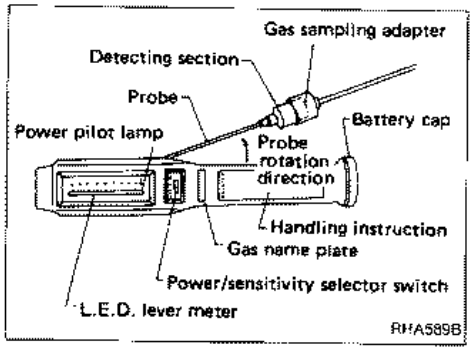
The vacuum pump is used to purge air and moisture from the inside of the refrigeration system by evacuation, thereby ensuring proper functioning of the air conditioner system.

**Check the vacuum pump to see that the vacuum pump capacity is greater than −100.0 kPa (−1,000 mbar, −750 mmHg, −29.53 inHg).**




### Vacuum pump performance check procedure

1. Connect the vacuum gauge to the system.
2. Run the vacuum pump, and check to see that the needle pointers of the gauge manifold and vacuum gauge move smoothly, indicating a similar value.
3. After running the vacuum pump for two or three minutes, read the vacuum gauge. The measured value indicates the vacuum pump capacity.



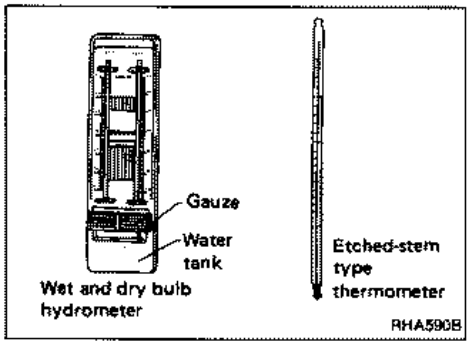

### Gas leak detector

The gas leak detector is used to check whether the refrigeration system is leaking. The detector is available in two types; halide torch or electrical. The features of these gas leak detectors are listed on the next page.

## Service Tools (Cont'd)

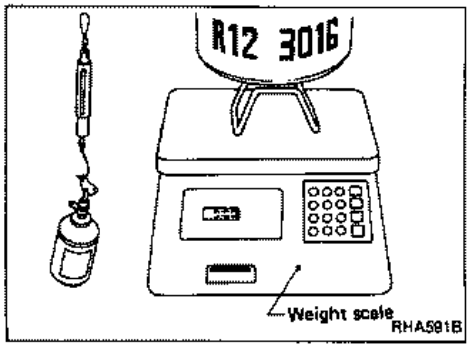
| Type | | Detection ability | Features |
|---|---|---|---|
| Halide torch | | 200 g (7.05 oz)/year (thin green) | • Low price<br>• Low sensitivity<br>• Less safe because of the use of flame for detection |
| Electrical | Discharge type (Suction type) | 3 - 50 g (0.11 - 1.76 oz)/year | • Easy handling<br>• Medium sensitivity<br>• Each point needs two or more seconds for detection. |
| | Positive ion emission type (Suction type) | 2 g (0.07 oz)/year | • High sensitivity<br>• High price<br>• Warm-up time is needed because a heater is incorporated. |
| Other simple checking method: Change in vacuum when evacuating | | 1 kg (2 lb)/month; if 13.3 kPa (133 mbar, 100 mmHg, 3.94 inHg) change in vacuum is detected in 10 minutes. | • Can be used easily in refrigerant charging operation.<br>• Detection ability is very low with vacuum gauge in gauge manifold. |

- **Leakage inspection of a refrigeration system needs a sensitivity greater than 20 g (0.71 oz)/year.**
- **The actual amount of leak is estimated at 5 to 10 times the detected amount.**
- **Insufficient cooling may be felt if leakage exceeds 150 to 200 g (5.29 to 7.05 oz).**




### Temperature gauge

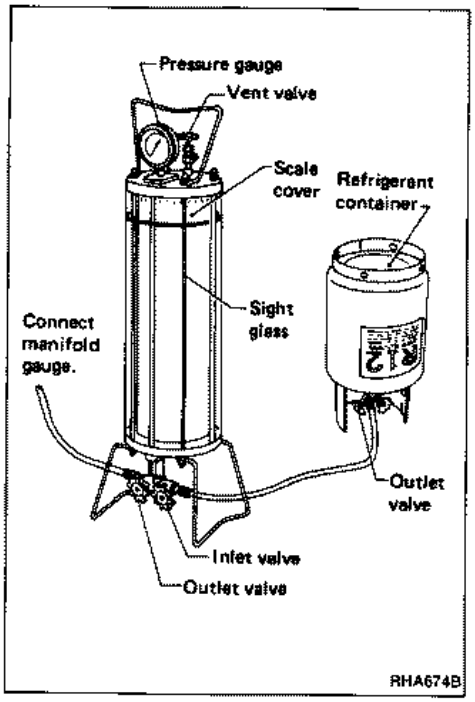
Use to check the air conditioner performance. An etched stem type thermometer may be used. A hygrometer must also be used because the air conditioner performance depends on the humidity.




### Scale

Measure the weight of the refrigerant to determine how much the refrigerant is charged.

## Service Tools (Cont'd)




### Charging cylinder

The charging cylinder is used to correctly measure the amount of refrigerant to be charged.

**Features**

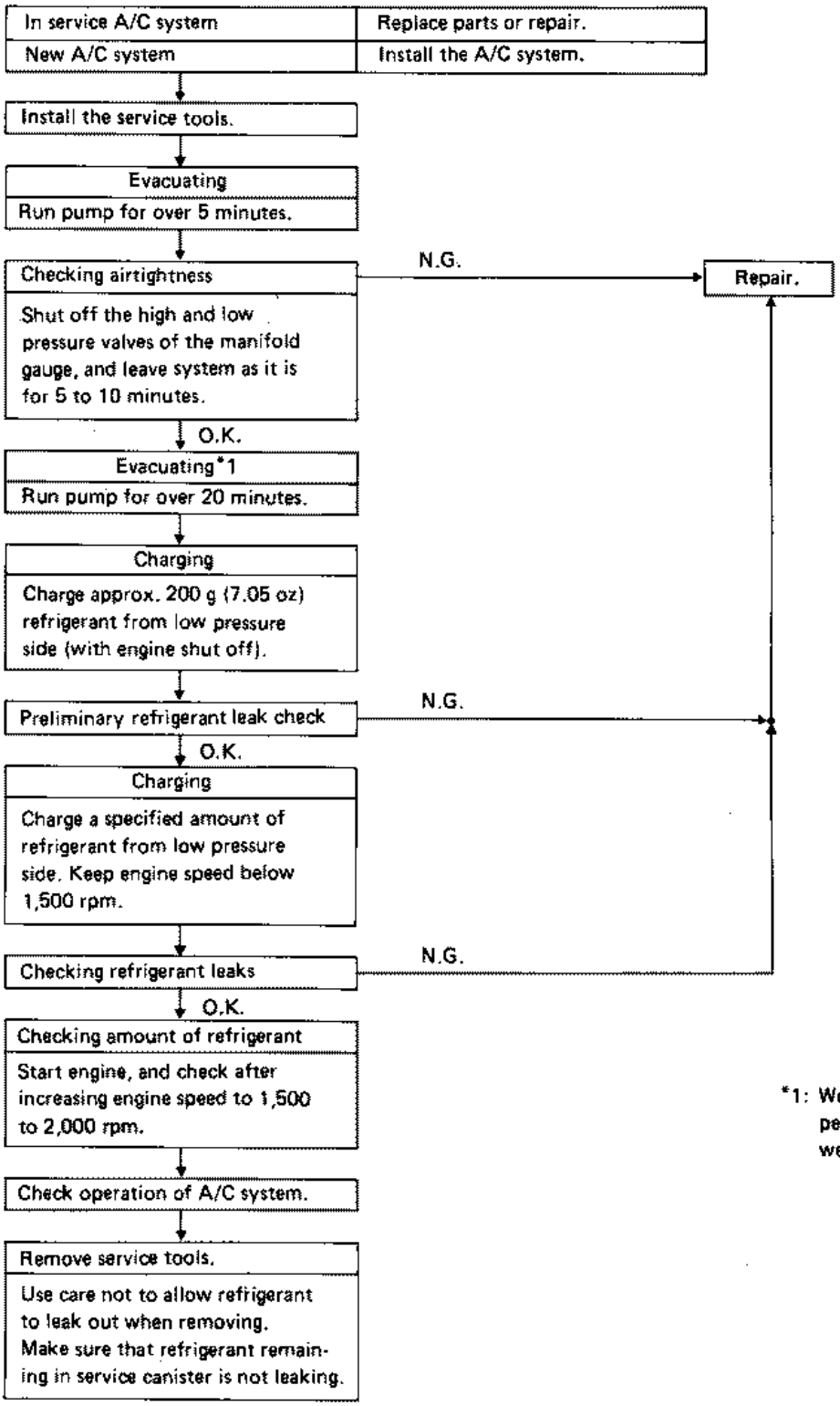
- With the charging cylinder, the operator can measure correctly the amount of refrigerant to be charged into the system.
- Change in the refrigerant volume due to a change in temperature and pressure can be supplemented, and this ensures correct charging of refrigerant.

**CAUTIONS:**

- **Never attempt to carry the charging cylinder containing refrigerant.**
- **Do not put the charging cylinder in a hot place. If the temperature and pressure of the refrigerant in the cylinder increase, the safety valve will be pushed open and the refrigerant will be released into the atmosphere.**
- **Do not expose the cylinder to the direct sunlight.**
- **Do not over-charge the refrigerant so that it exceeds the maximum limit of the cylinder.**
- **Do not charge the cylinder with more refrigerant than is needed.**

## Refrigerant Charging Procedure

### WORK PROCEDURE

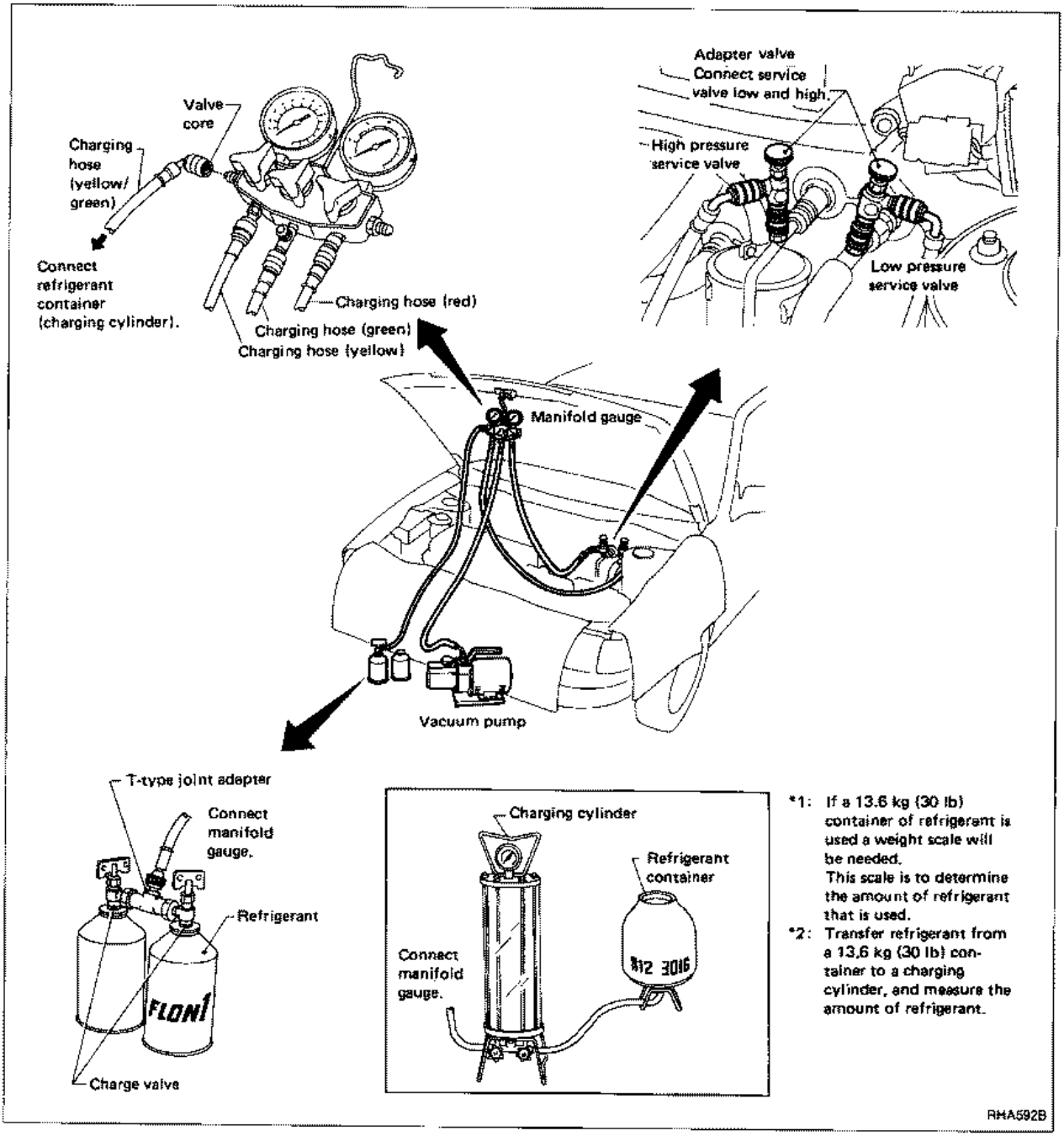



*1: Working operation depends upon the performance of the pump and the weather.

## Refrigerant Charging Procedure (Cont'd)

### SETTING OF SERVICE TOOLS

**Make sure that the service tools are set as indicated below and that no refrigerant is leaking.**




*1: If a 13.6 kg (30 lb) container of refrigerant is used a weight scale will be needed.
This scale is to determine the amount of refrigerant that is used.

*2: Transfer refrigerant from a 13.6 kg (30 lb) container to a charging cylinder, and measure the amount of refrigerant.

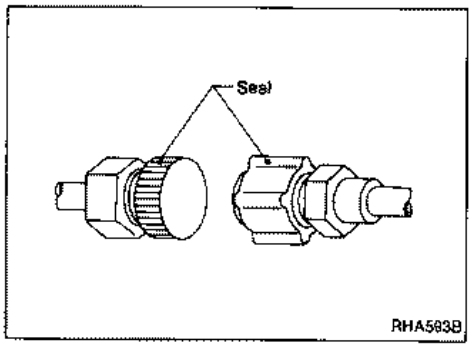
RHA592B

## Evacuation

### Why evacuation is needed

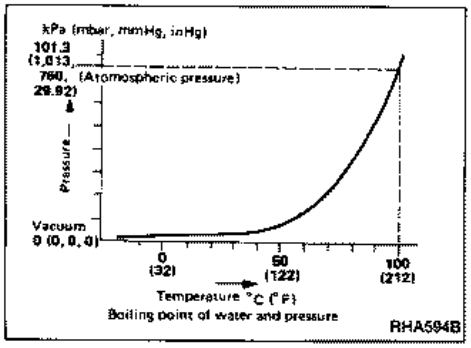
When installing a car air conditioner, it is essential to completely remove air and water from the inside of the refrigeration system beforehand. This process is called evacuation. If the air conditioner is operated without completely removing these substances, the following abnormalities may result.

- Poor cooling due to reduction in the thermal exchange rate in condenser
- Moisture recirculating together with the refrigerant through the refrigeration system freezes at the port of the cold expansion valve. This impedes the normal refrigerant flow, thus lowering the cooling efficiency.
- The refrigerant reacts with water chemically, generating corrosive hydrochloric acid thus causing corrosion to the refrigeration system components.




**CAUTION:**

- **When installing an air conditioner in the vehicle, the pipes must be connected as the final stage of the operation. The seal caps of the pipes and other components must not be removed until their removal is required for connection.**
- **Before installing any air conditioner component that has been stored in a cool location to a vehicle that has been exposed to the hot sun, leave the component as it is for some time in a hot location with its seal cap unremoved. This step is necessary to prevent condensation of moisture inside the cold component.**
- **Thoroughly remove moisture from the refrigeration system before charging the refrigerant.**




### Relation between boiling point of water and atmospheric pressure

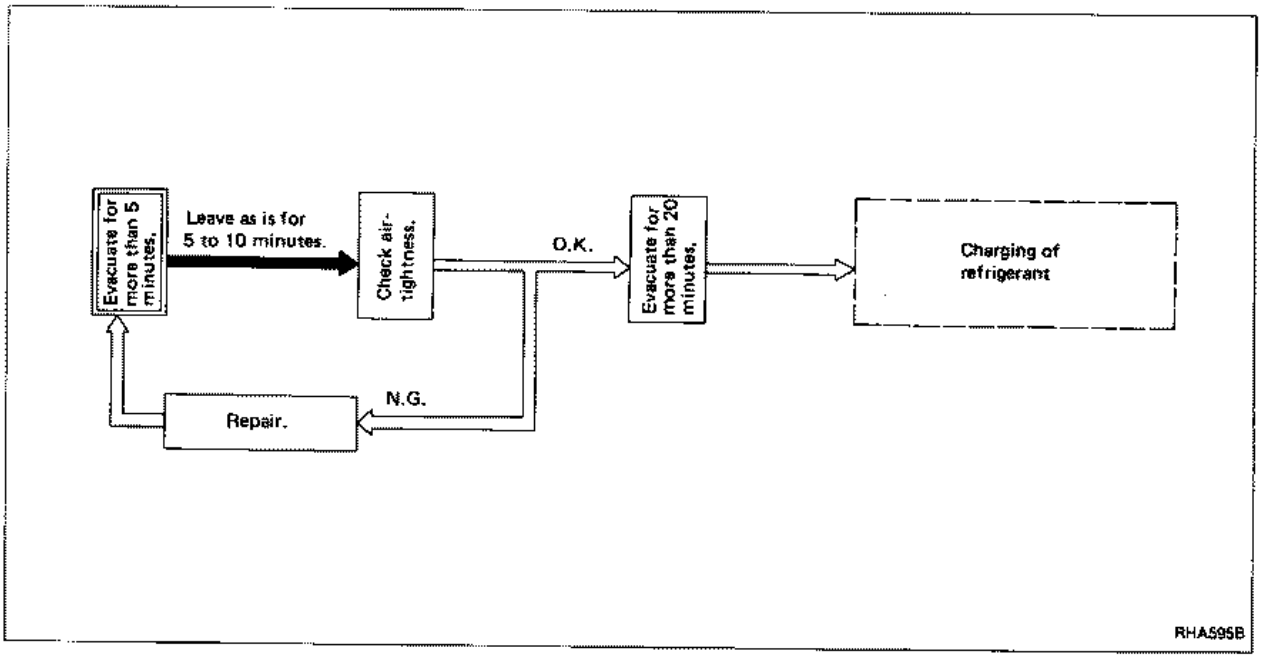
Water boils at 100°C (212°F) under normal atmospheric pressure. The boiling point lowers with the atmospheric pressure. This characteristic of water is utilized to purge it from the system. The pressure inside the refrigeration system is lowered by a vacuum pump so that water can evaporate at a normal temperature. The water vapor is then discharged to the outside together with the air.

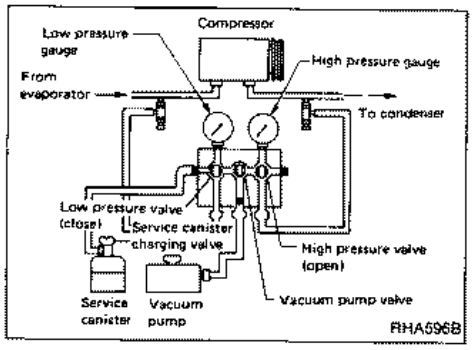
## Evacuation (Cont'd)

### Vacuum pump

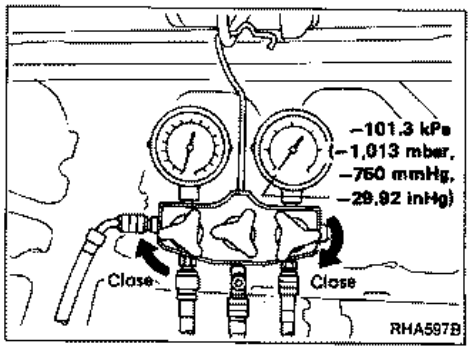
The degree of evacuation greatly affects the cooling capacity of the air conditioner and the service life of the refrigeration system components. However, use of a vacuum pump having insufficient capacity results in prolonged evacuation. It is necessary to use a vacuum pump with a sufficiently large capacity and also to maintain the pump to ensure its original pumping capacity.

### EVACUATION PROCEDURE



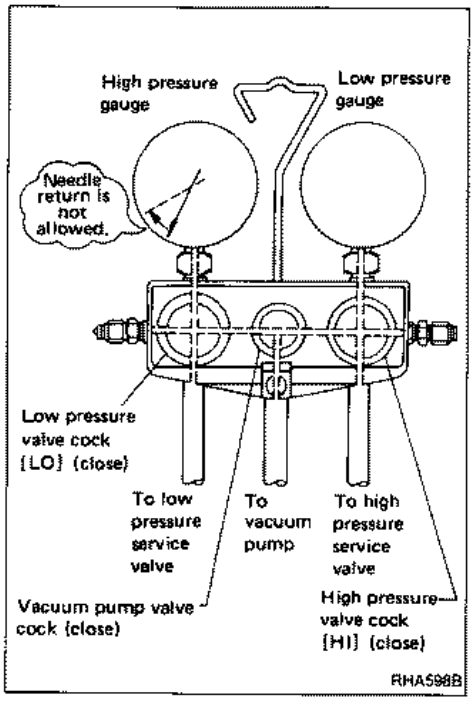




1. Completely tighten the low pressure and high pressure adapter valves.
   Tightening of the valves opens the service canister valve.
2. Open the high and low pressure valves and vacuum pump valve of the gauge manifold.
3. Run the vacuum pump.




4. Perform evacuation for more than five minutes to stabilize the vacuum inside the system. Check to ensure that the low pressure gauge indicates −98.6 to −101.3 kPa (−986 to −1,013 mbar, −740 to −760 mmHg, −29.13 to −29.92 inHg).
5. Shut off the high and low pressure valves and vacuum pump valve of the gauge manifold.

## Evacuation (Cont'd)




### CHECKING AIRTIGHTNESS

1. Shut off the high and low pressure valves and vacuum pump valve of the gauge manifold, and leave the system as it is for 5 to 10 minutes.
2. Make sure that the needle of the low pressure gauge will not move back toward the atmospheric pressure side (gauge pressure 0).

**If any reverse movement is noted, it indicates poor system airtightness. Service the system until airtightness is complete. If pressure changes approx. 13.3 kPa (133 mbar, 100 mmHg, 3.94 inHg) in 10 minutes, the refrigerant in the system will be exhausted in about one month.**

### MAINTENANCE

If inadequate airtightness is detected, check and service the following portions:

| Leak from pipe joints | Leak from gauge manifold |
|---|---|
| • Contaminated, damaged, or deformed O-ring<br>• No oil applied when connecting pipe<br>• Excessive or insufficient tightening of pipe joint | • Malfunctioning hose<br>• Improper installation of gauge<br>• Malfunctioning valve<br>• Malfunctioning packing |

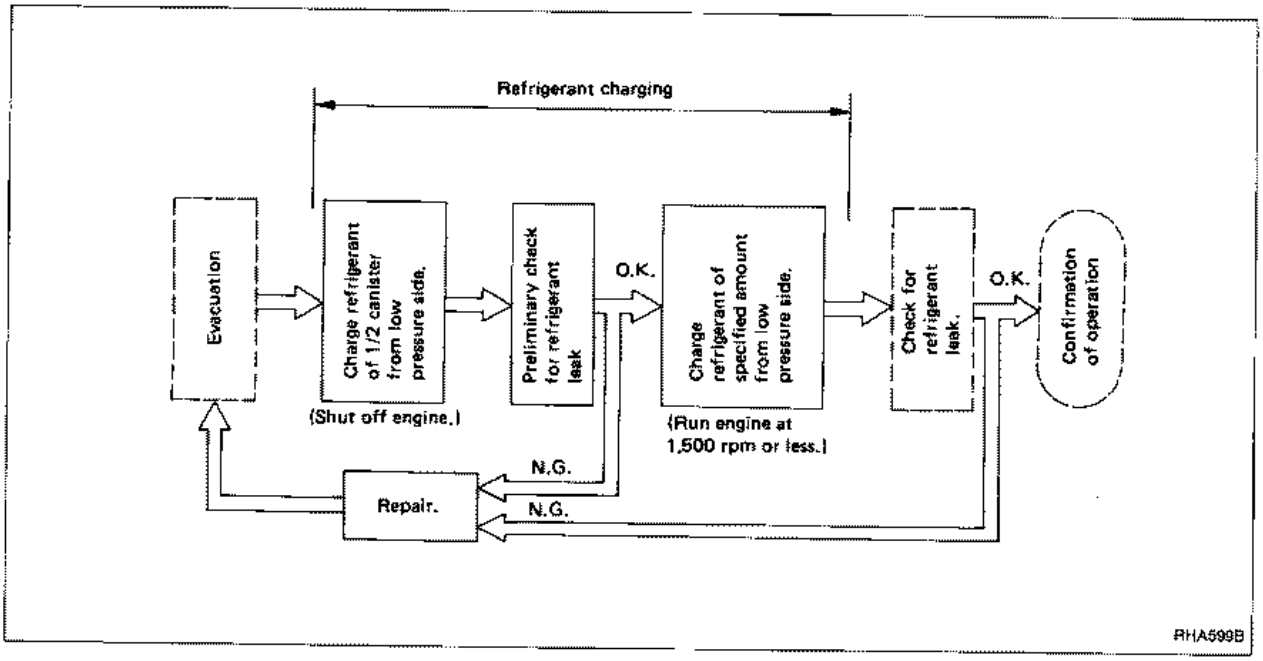
### EVACUATION

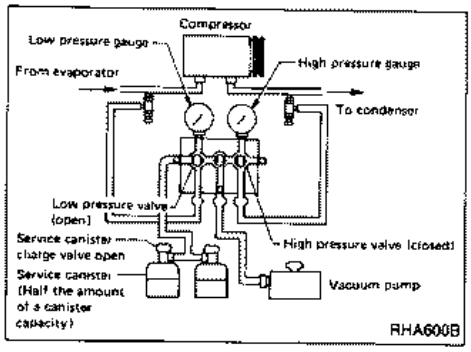
If no abnormality is found during the airtightness check, perform evacuation again for more than 20 minutes.

1. Run the vacuum pump.
2. Open the high and low pressure valve and vacuum pump valve of the gauge manifold.
3. Evacuate for more than 20 minutes.
4. Close the high and low pressure valves and vacuum pump valve of the gauge manifold.

## Charging Refrigerant

### Procedure




### PRELIMINARY CHARGING PROCEDURE

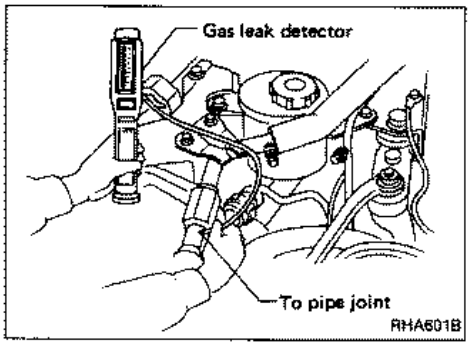
This operation is performed to check the refrigerant leakage and to protect the compressor.

1. Turn the charge valve handle to open a hole in the service canister to allow the refrigerant to flow through the gauge manifold.
2. Open the low pressure valve of the gauge manifold, and charge the refrigerant into the system from the low pressure side.
3. After charging approx. 200 g (7.05 oz) of refrigerant, shut off the low pressure valve.

**CAUTION:**

- **The refrigerant charging operation must be performed after shutting off the engine. If the compressor is operated with an insufficient amount of refrigerant, the compressor may seize up due to a lack of return of the compressor oil.**
- **Do not shake nor hold the refrigerant canister upside down.**

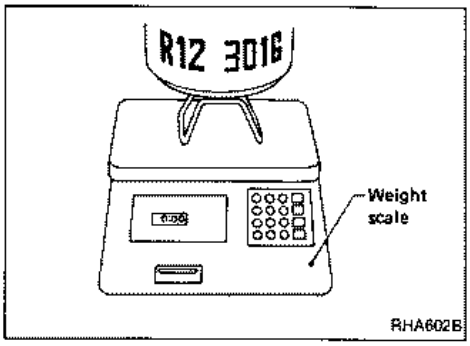
## Charging Refrigerant (Cont'd)




### PRELIMINARY CHECK FOR REFRIGERANT LEAKS

1. Make sure that the gauge manifold valve is closed.
2. Check for refrigerant leak from each connector in the system using the leak detector.

**At this point, the pressure in the system is not high. Only large amounts of refrigerant leak due to loose pipe joints, etc. can be detected.**




### CHARGING REFRIGERANT

1. Make sure that the valves of the gauge manifold are closed.
2. Start the engine, and run the compressor.
3. Slowly open the low pressure valve of the gauge manifold.
4. Charge the specified amount of refrigerant.

**The charged amount of refrigerant can be determined by subtracting the weight of the canister measured after charging from its weight measured before charging.**

**WARNING:**

**Never attempt to open the high pressure valve while the engine is running. If opened, the pressure in the refrigerant canister will increase, thus causing an explosion.**

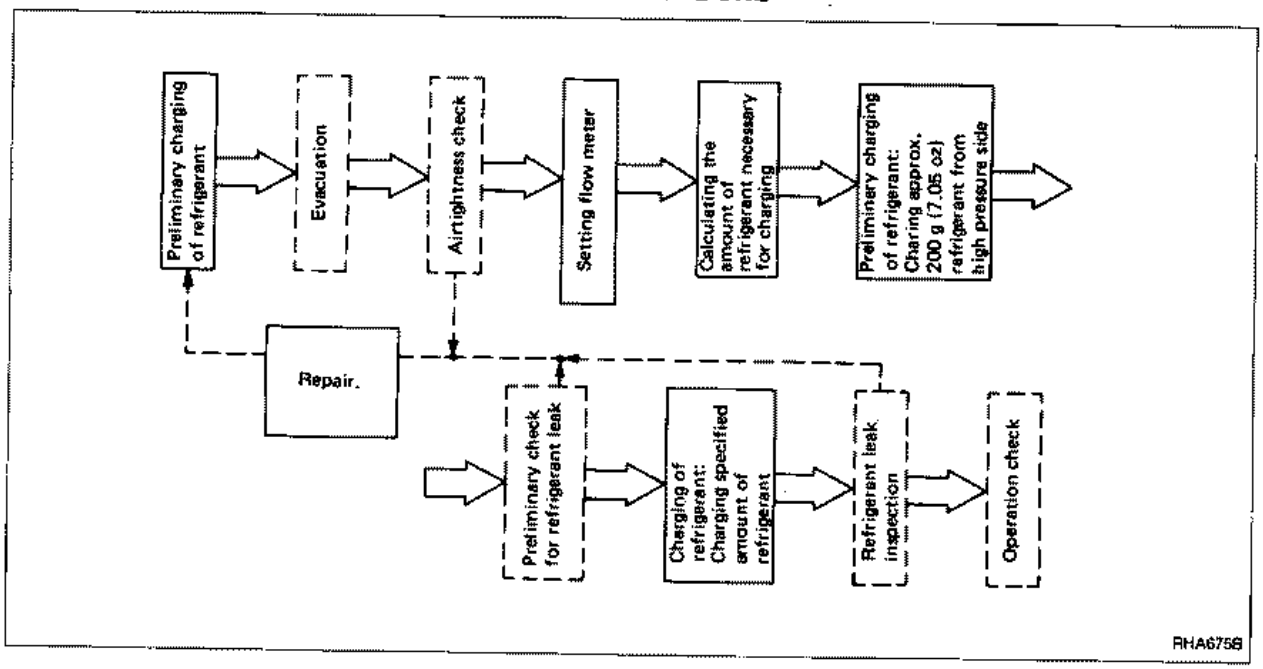
### CHARGING REFRIGERANT WITHOUT USING T-JOINT ADAPTER

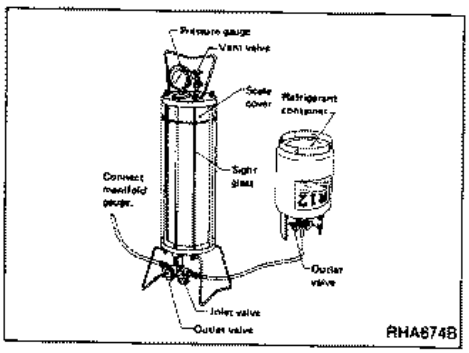
If the service canister used for charging is empty, replace the canister with a new one, and proceed as follows:

1. Make sure by shaking the canister that no refrigerant is left inside.
2. Shut off all the valves of the gauge manifold.
3. Disconnect the charge valve from the emptied canister, and attach it to a new service canister.
4. Run the vacuum pump, and open the vacuum valve (center) of the gauge manifold to purge air from the inside of the hose.
5. Run the vacuum pump for approx. 30 seconds.
6. Shut off the vacuum valve (center) and stop the vacuum pump.
7. Unseal the new canister, and open the charge valve.
8. Open the low pressure valve to charge the refrigerant into the system.

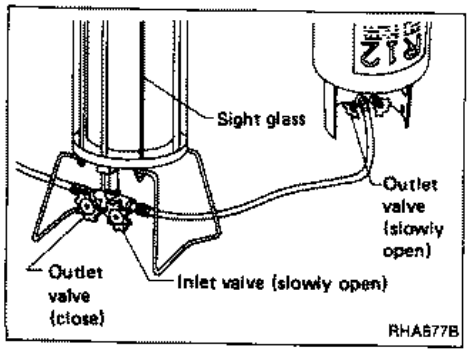
## Charging Refrigerant — Charging cylinder

### WORK PROCEDURE




Install the charging cylinder correctly to the vehicle.
Refer to "SETTING OF SERVICE TOOLS" in "Refrigerant Charging Procedure".

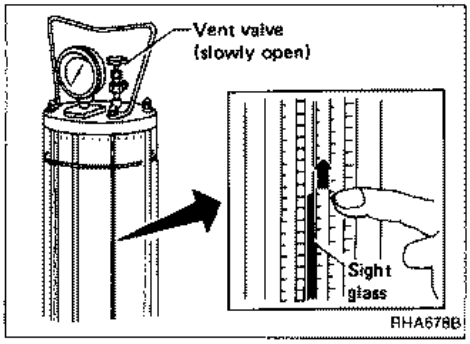



### PRELIMINARY CHARGING OF REFRIGERANT-1

1. Make sure that the inlet and outlet valves of the charging cylinder are closed.
2. Slowly open the outlet valve of a refrigerant container [13.6 kg (30 lb)].
3. Slowly open the inlet valve of the charging cylinder.

**The refrigerant will flow into the sight glass of the charging cylinder as the valve is opened.**

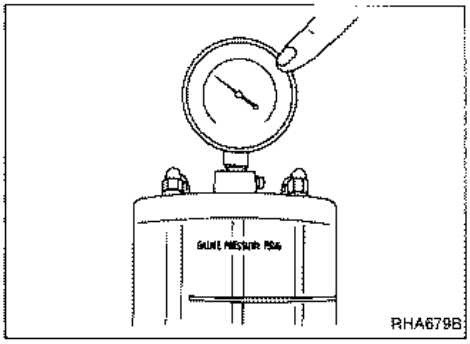
## Charging Refrigerant — Charging cylinder (Cont'd)




4. Slowly open the upper vent valve to release pressure from the charging cylinder. While doing so, continue charging until the required amount of refrigerant is reached.

**The refrigerant volume changes with the temperature and pressure. It is necessary to charge refrigerant with a little more than the required amount (indicated on the sight glass).**
**Refer to the CAUTION label attached on the vehicle, or to the Service Manual.**

5. Close the inlet valve and upper vent valve of the charging cylinder.

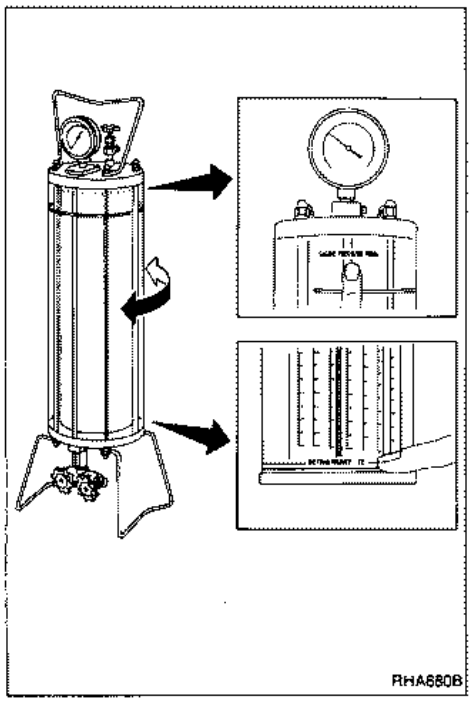



6. Turn on the heater switch (the charging cylinder is provided with a heater.)

**The refrigerant charging time can be reduced by heating the refrigerant to increase its pressure. In this case, do not allow the pressure in the cylinder to rise higher than 1,030 kPa (10.30 bar, 10.5 kg/cm$^2$, 150 psi). (If pressure rises above this level, turn off the heater.)**
**The pressure in the charging cylinder can be measured by the upper pressure gauge.**

### EVACUATION AND AIRTIGHTNESS CHECK

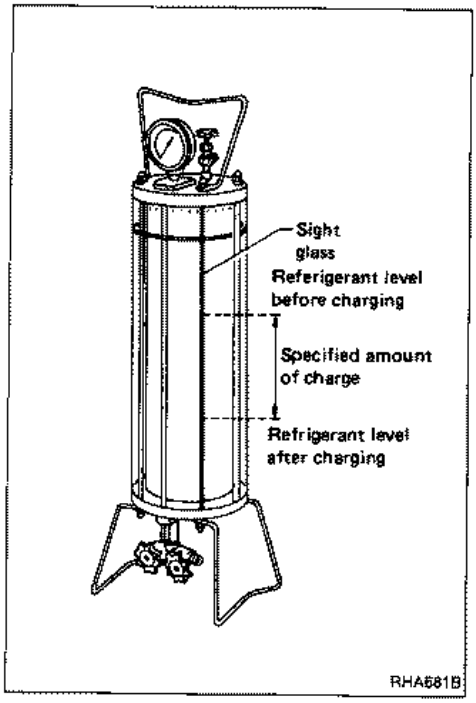
Refer to "EVACUATION" and "CHECKING AIRTIGHTNESS" in "Evacuation".




### SETTING OF FLOW METER

1. Rotate the charging cylinder main body until the scale for R12 is at the correct position on the sight glass.
2. Read the charging cylinder pressure gauge.
3. Rotate the charging cylinder so that the scale of the charging cylinder agrees with the pressure value indicated on the pressure gauge.
4. Open the outlet valve of the charging cylinder.

## Charging Refrigerant — Charging cylinder (Cont'd)

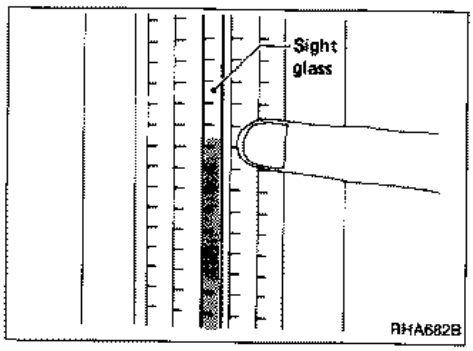



### CALCULATING CHARGING AMOUNT OF REFRIGERANT

1. Record the amount of refrigerant in the sight glass before charging.
2. Subtract the required amount of refrigerant (charge quantity specified for the vehicle) from the amount of refrigerant recorded in step 1. Charge refrigerant into the system until the remaining value equals to the value indicated on the sight glass.

**Example:**

Level in sight glass: 3 lb 8 oz
Charge specification (from Service Manual) 2.0 - 2.4 lb.
Calculate charge quantity into lb and oz as follows: 1 lb = 16 oz, and 0.1 lb = 1.6 oz, so that 2.0 lb = 32 oz, 2.4 lb = 32 + (4 x 1.6) = 32 + 6.4 = 38.4, round off to 38. Therefore our charge quantity will be between 32 and 38 oz, or 2 lb 0 oz to 2 lb 6 oz.
Subtract 2 lb 6 oz from the level in the sight glass (3 lb 8 oz) = 1 lb 2 oz.
This will be our ending point.




### PRELIMINARY CHARGING OF REFRIGERANT-2

1. Slowly open the high pressure side valve of the manifold gauge to charge refrigerant from the high pressure side.
2. Close the high pressure valve after charging approx. 200 g (7.05 oz) refrigerant.

**CAUTION:**

**The refrigerant in the charging cylinder is kept in the liquid state, so the refrigerant should be charged from high pressure side. Do not start the engine with the high pressure valve kept open.**

### PRELIMINARY CHECK FOR REFRIGERANT LEAKS

Refer to "PRELIMINARY CHECK FOR REFRIGERANT LEAKS" in "Charging Refrigerant".

### CHARGING REFRIGERANT

1. Slowly open the high pressure valve of the manifold gauge, and charge the calculated amount of refrigerant in "CALCULATING CHARGING AMOUNT OF REFRIGERANT".

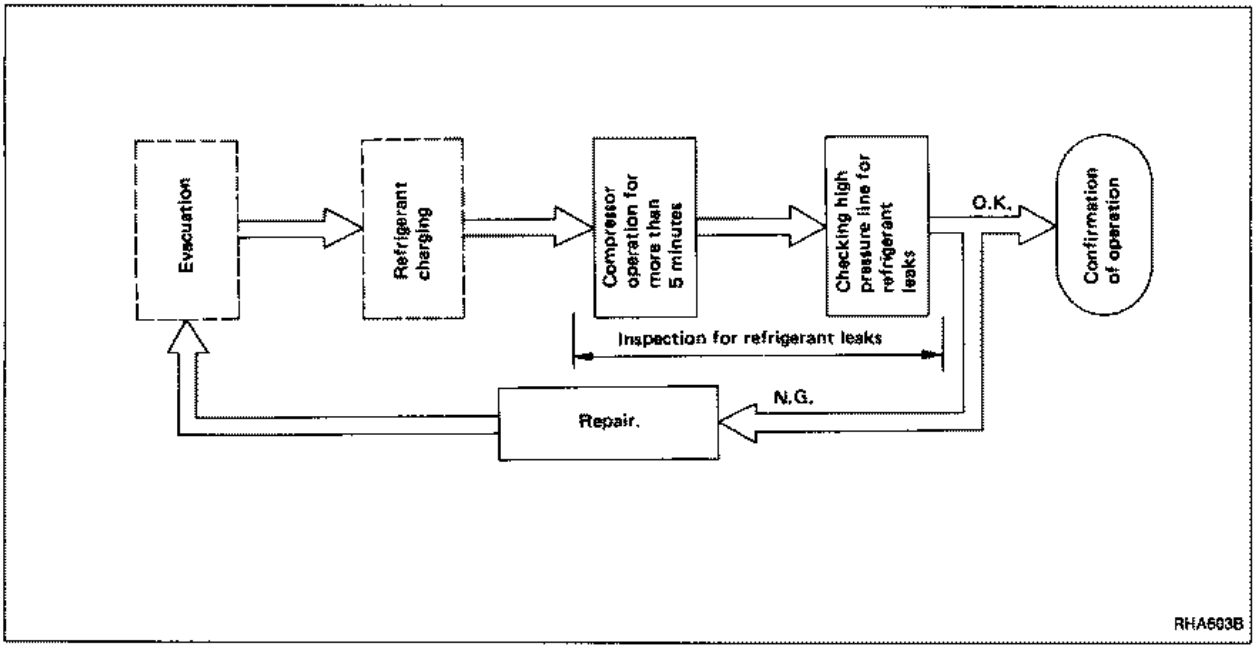
**CAUTION:**

**The refrigerant in the charging cylinder is kept in the liquid state, so the refrigerant should be charged from high pressure side. Do not start the engine with the high pressure valve kept open.**

2. Close the high pressure valve of the manifold gauge.
3. Make sure that the calculated amount of refrigerant is in the sight glass.
4. Close the charging cylinder outlet valve.
5. Turn off the heater if it is on (when using heater equipped type).

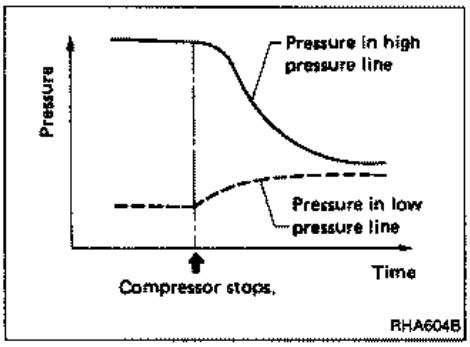
## Inspection for Refrigerant Leaks

### WORK PROCEDURE




To facilitate inspection for refrigerant leaks, establish the following conditions:

- Start the engine.
- Run the air conditioner.
- Set the blower fan control to MAX.
- Set the temperature control to FULL COLD.
- Run the refrigerant system for more than 5 minutes after setting the above-mentioned conditions (to circulate the refrigerant through the system).




**Refrigerant leaks should be checked immediately after stopping the engine, beginning with the high pressure line, using a gas leak tester. This is because the pressure in the high pressure line drops gradually after the refrigerant circulation stops while the pressure in the low pressure line rises gradually as shown in the graph. Leaks can be detected easily when pressure is high.**

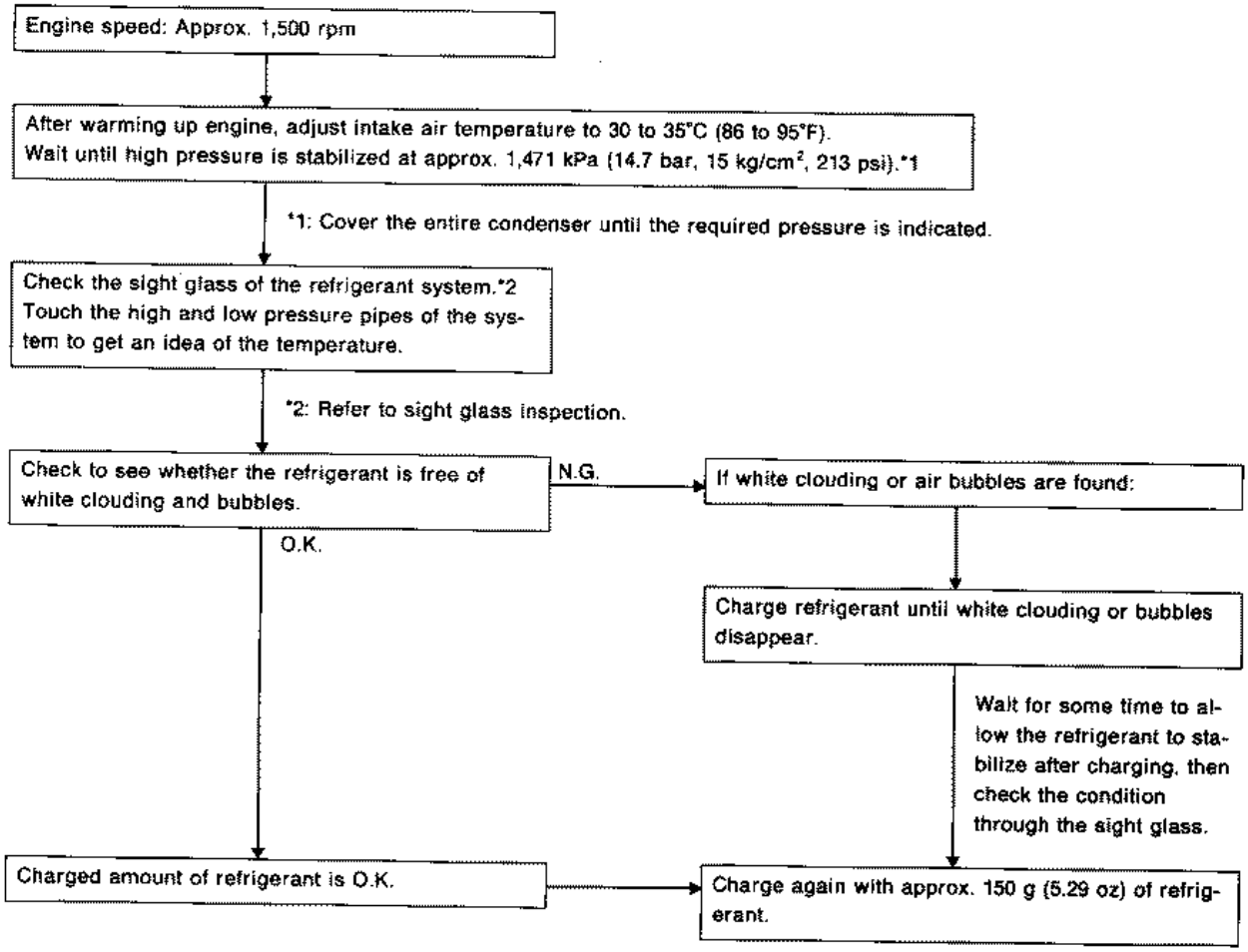
## Confirmation of Amount of Charged Refrigerant

The amount of refrigerant charged into the system can be observed through the sight glass by watching the flow of the refrigerant and by reading the high pressure and low pressure manifold gauges under the following conditions:

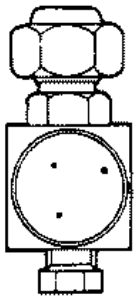
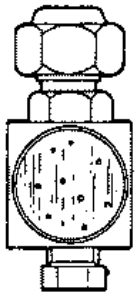
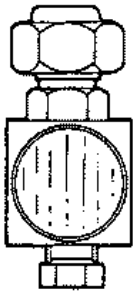
### CONDITIONS

- Door window: Open
- A/C switch: ON (Manual Air Conditioner)
- Auto switch: ON (Auto Air Conditioner)
- TEMP. setting: Max. COLD (Manual Air Conditioner)
  LO (Auto Air Conditioner)
- FAN speed: 4 (Manual Air Conditioner)
  HI (Auto Air Conditioner)
- Check sight glass after a lapse of about five minutes.

### WORK PROCEDURE



## Confirmation of Amount of Charged Refrigerant (Cont'd)

| Check item \ Amount of charge | Appropriate | Refrigerant is insufficient | Almost no refrigerant | Overcharged, or air in system |
|---|---|---|---|---|
| Temperature of high and low pressure pipes | High pressure side is hot while low pressure side is cold. | High pressure side is warm and low pressure side is somewhat cold. | No difference is felt between high and low pressure sides. | High pressure side is very hot. |
| Flow of refrigerant viewed through sight glass | Mostly transparent. Occasionally some bubbles are seen when engine rpm is increased or decreased.  | Bubbles are always flowing. Refrigerant is cloudy.  | Nothing is visible.  | If overcharged, no bubbles are seen. If there is air in the system, large bubbles are seen. |
| Pressure | Normal high pressure: 1,373 - 1,765 kPa (13.7 - 17.7 bar, 14 - 18 kg/cm$^2$, 199 - 256 psi) Normal low pressure: 147 - 294 kPa (1.47 - 2.94 bar, 1.5 - 3 kg/cm$^2$, 21 - 43 psi) | Both high and low pressure values are insufficient. | High pressure value is very small. | Both high and low pressure values are excessive. |
| Action to take | **Air bubbles may be generated when the receiver drier strainer is clogged, or when the expansion valve is opened excessively.** | Add refrigerant after checking for leaks. | Check the refrigerant system. | Stop the compressor and extract excessive refrigerant. If air is found, perform evacuation, then charge the specified amount of refrigerant. |

**a. The bubbles seen through the sight glass are influenced by the ambient temperature. Since the bubbles are hard to see in comparatively low temperatures below 20°C (68°F), it is possible that a slightly larger amount of refrigerant would be filled if supplied according to the sight glass.**

**When the STV (for the auto air conditioning system) activates at an ambient temperature of less than 20°C (68°F), bubbles can sometimes be seen through the sight glass. However, the amount of refrigerant is correct if the following conditions are met:**

**(1) The air vent temperature is less than 7°C (45°F) as per the performance chart (HA-28).**

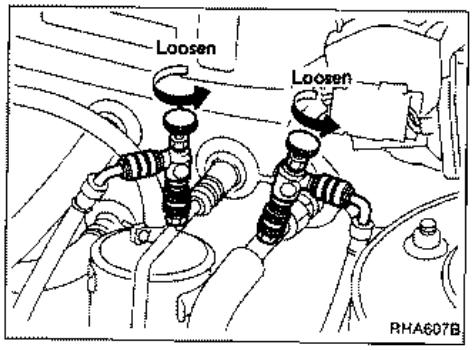
**(2) Bubbles disappear under the following conditions:**

- **Door windows: Closed**
- **Auto switch: ON**
- **TEMP. setting: 40**
- **FAN speed: HI**
- **REC. switch: ON**

**Check sight glass after a lapse of about five minutes.**

**Recheck the amount when it exceeds 20°C (68°F). At higher temperatures the bubbles are easy to see.**

**b. When the screen in the receiver drier is clogged, the bubbles will appear even if the amount of refrigerant is normal. In this case, the outlet side pipe of the receiver drier becomes considerably cold.**



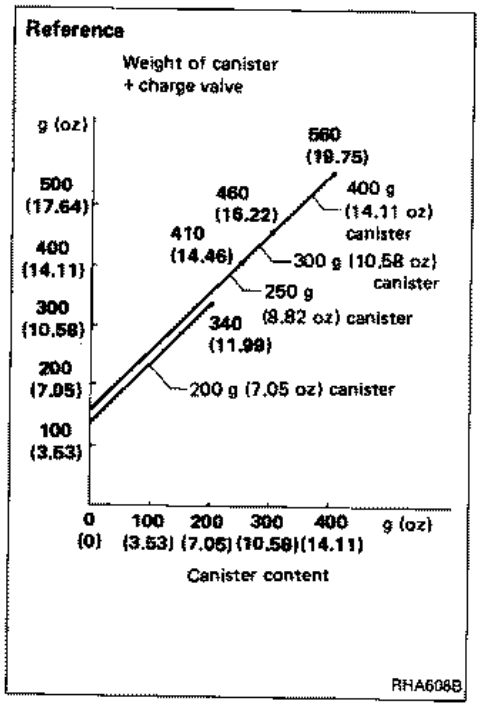

## Recovery Procedure

### REMOVAL OF REFRIGERANT CHARGING DEVICE

1. Completely loosen the adapter valves of the low pressure and high pressure lines.
   The inner valve of the adapter valve will prevent the refrigerant from leaking out.
2. Remove both the high-pressure and low-pressure side adapter valves from the on-vehicle service valve.

**If adapter valve is not used for charging, proceed as follows to minimize the refrigerant discharge into the atmosphere.**

3. Loosen the nut of the low pressure charging hose while pressing it against the service valve to prevent refrigerant leakage.
4. After loosening the nut, quickly remove the charge valve from the service valve.
5. Wait until the high pressure gauge indication drops to below 981 kPa (9.8 bar, 10 kg/cm$^2$, 142 psi), then similarly disconnect the high pressure charging hose.




### DISPOSAL OF RESIDUAL REFRIGERANT

Securely shut off each of the charge valves, adapter valves and manifold gauge valves to prevent the residual refrigerant from leaking out. Keep these valves in a safe location for the next charging.

**The amount of refrigerant remaining in a service canister can be estimated from the Table shown here. It is recommended that a label be attached indicating the remaining amount in the canister.**

## Control Switches

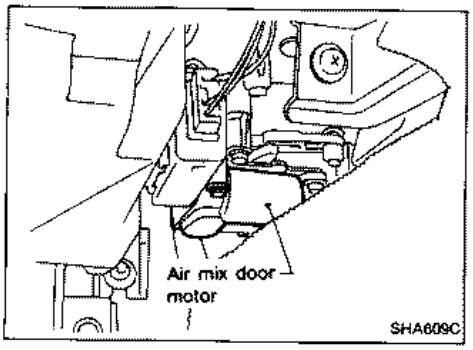
### SWITCHES AND THEIR CONTROL FUNCTIONS

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

*1: Compressor is operated by thermo control amp. and E.C.C.S. control unit.
*2: Depending on mode switch position.
*3: When vent mode is selected, REC switch function is as in the following chart:
*4: Depending on A/C switch position.
*5: Depending on REC switch position.

| | | REC: ON | REC: OFF |
|---|---|---|---|
| A/C SW | ON | REC | REC/FRE |
| | OFF | REC | FRE |

SHA267C

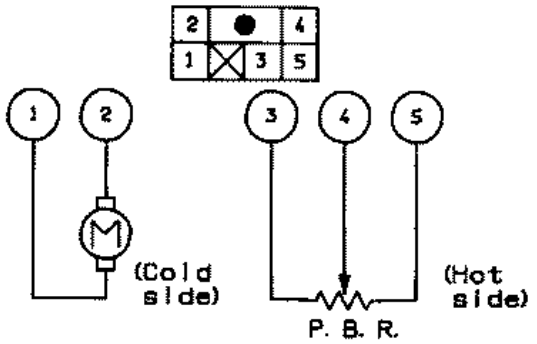



## Specifications

### AIR MIX DOOR MOTOR

The air mix door motor is attached to the heater unit. It rotates, opening the air mix door to the position set by the temperature control lever.
Motor rotation is conveyed through shafts and linkages. The air mix door position is fed back to the control amplifier by the Potentio Balance Resistor (P.B.R.) built into the air mix door motor.

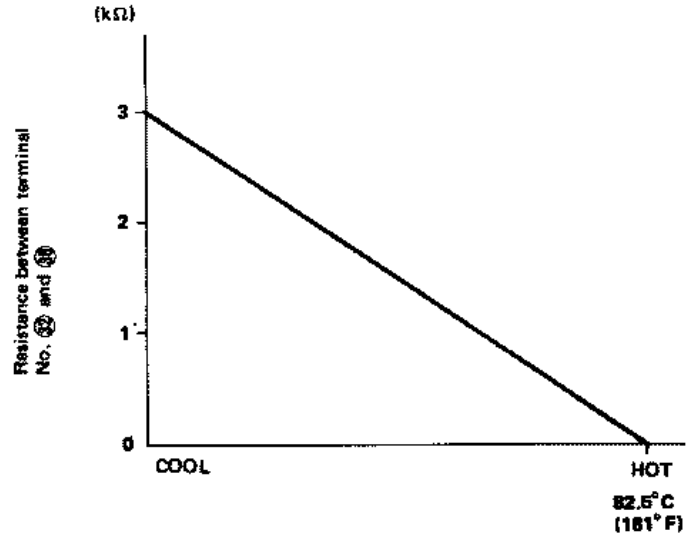
**Air mix door motor operation**




| 1 | 2 | Air mix door operation | Direction of lever movement |
|---|---|---|---|
| ⊕ | ⊖ | COLD → HOT | Clockwise (Toward passenger compartment) |
| ⊖ | ⊖ | STOP | STOP |
| ⊖ | ⊕ | HOT → COLD | Counterclockwise (Toward engine compartment) |

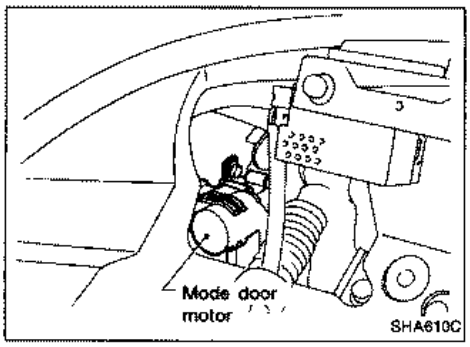
SHA637C

**Characteristics of P.B.R.**



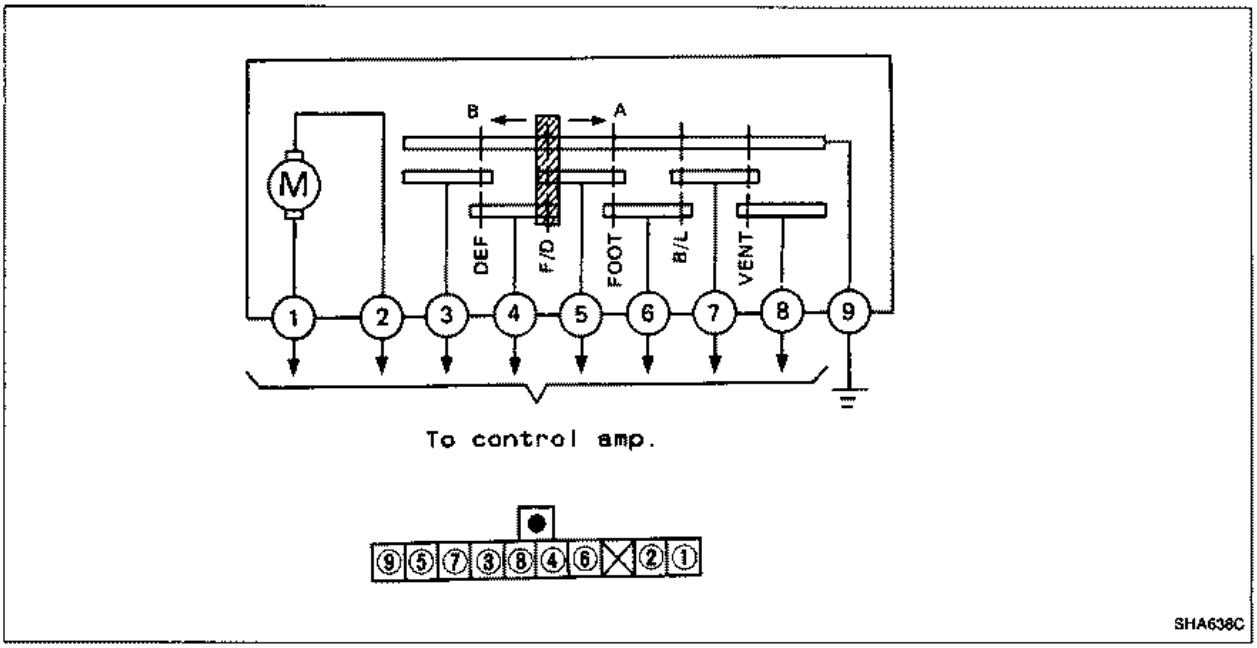

SHA270C

## Specifications (Cont'd)

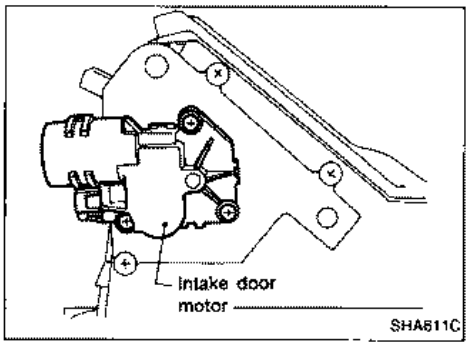



### MODE DOOR MOTOR

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

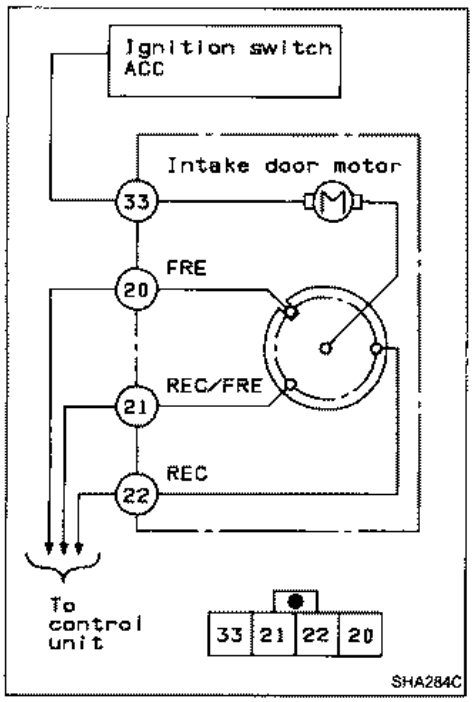


## Specifications (Cont'd)




### INTAKE DOOR MOTOR

The intake door motor is installed on the side portion of the intake unit. Using a rod and link it opens and closes the intake door. When the REC switch is ON (OFF), the ground line of the intake door motor is switched from terminal ㉑ to ㉒ (㉒ to ㉑). This causes the motor to start because the position switch contacts built into it are now set to the current flow position. The contacts turn along with the motor. When they reach the non-current flow position, the motor will stop. The motor always turns in the same direction. (FRE→REC→REC/FREC)



## Acceleration Cut System

This system is controlled by the E.C.C.S. control unit.
When the engine is heavily overloaded, the compressor is turned off for several seconds to reduce overloading.

## Water Cock Control System

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

## Refrigeration Cycle

### REFRIGERANT FLOW

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser, the receiver drier, through the evaporator, and back to the compressor.
Refrigerant evaporation through the evaporator coil is controlled by an externally equalized expansion valve, located inside the evaporator case.

### FREEZE PROTECTION (For manual air conditioner)

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

### FREEZE PROTECTION (For auto air conditioner)

When the A/C is switched on, the compressor runs continuously, and the evaporator pressure is controlled by a suction throttle valve (S.T.V.) to prevent freeze up.

### REFRIGERANT SYSTEM PROTECTION

#### Low-pressure switch

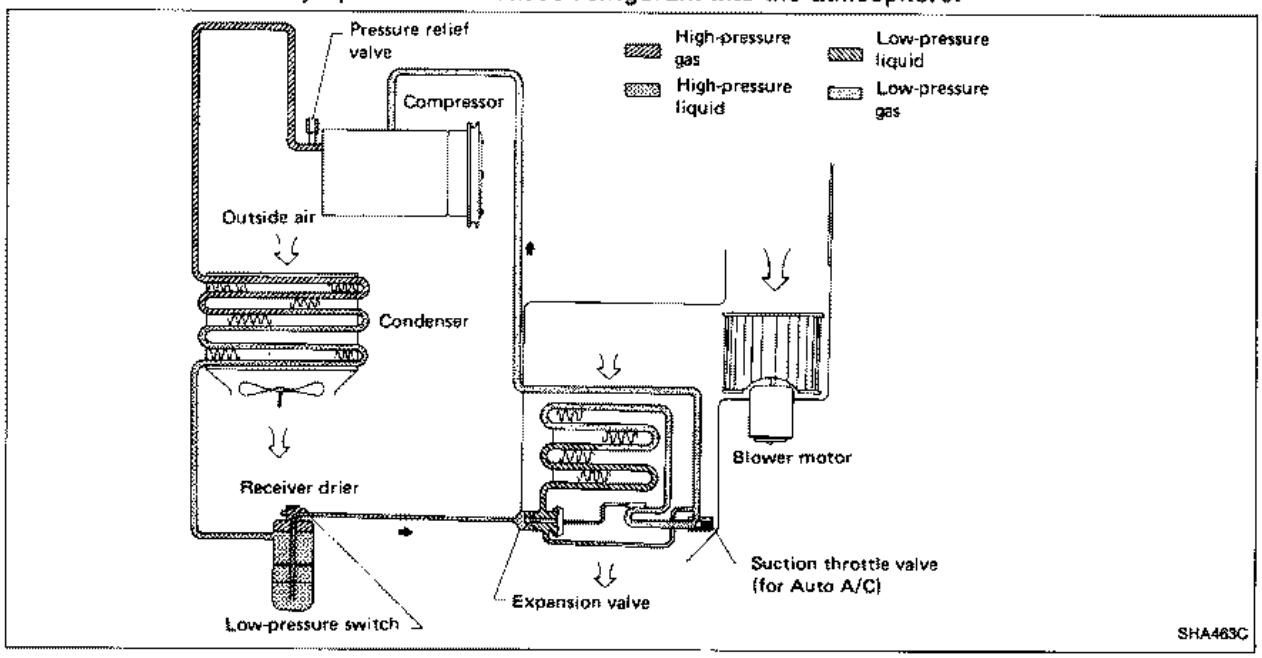
The refrigerant system is protected against excessively low pressures by the low-pressure switch, located on the receiver drier. If the system pressure falls below the specifications, the low-pressure switch opens to interrupt compressor operation.

#### Fusible plug

Opens at temperature above 105°C (221°F), thereby discharging refrigerant to the atmosphere. If this plug is melted and opened, check the refrigerant line and replace the receiver drier.

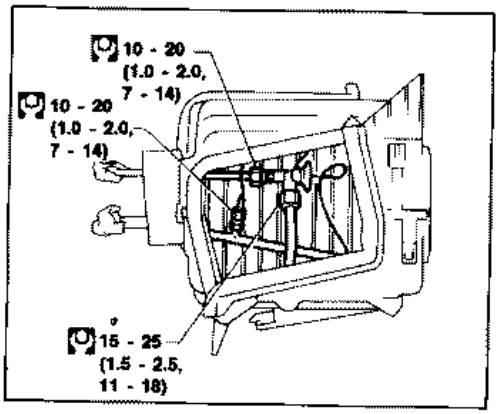
#### Pressure relief valve

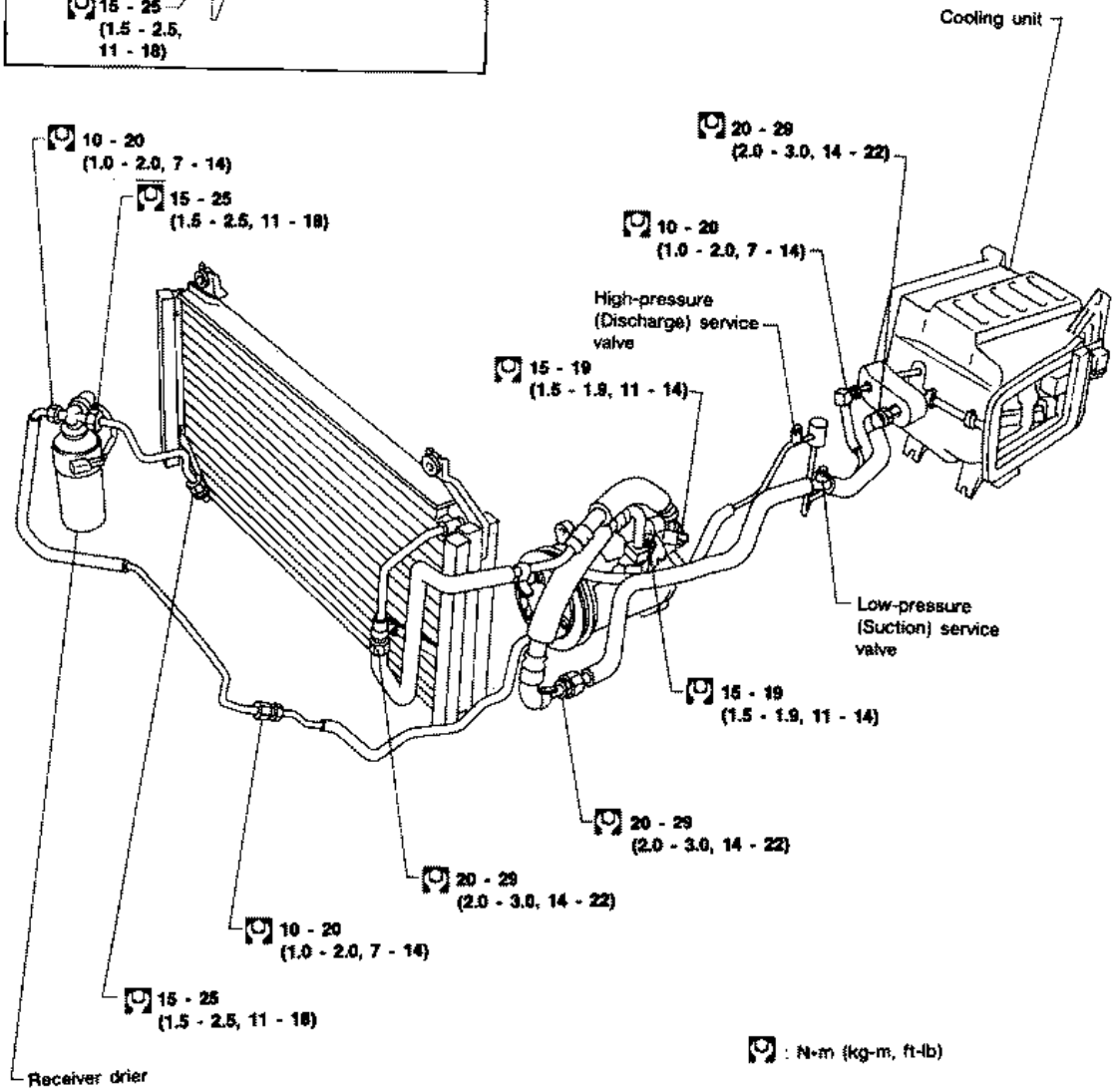
The refrigerant system is also protected by a pressure relief valve, located on the end of the high pressure flexible hose near the compressor. When the pressure of refrigerant in the system increases to an abnormal level [more than 3,727 kPa (37.3 bar, 38 kg/cm$^2$, 540 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



## Refrigerant Lines

**FOR AUSTRALIA**

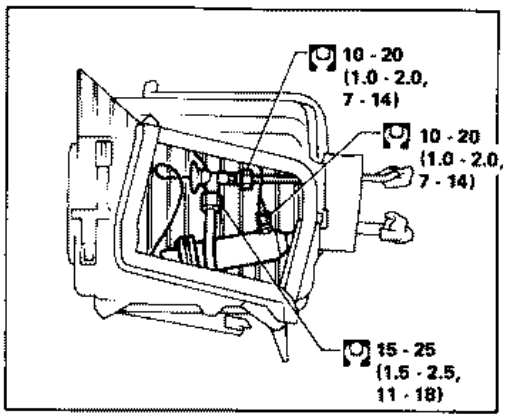


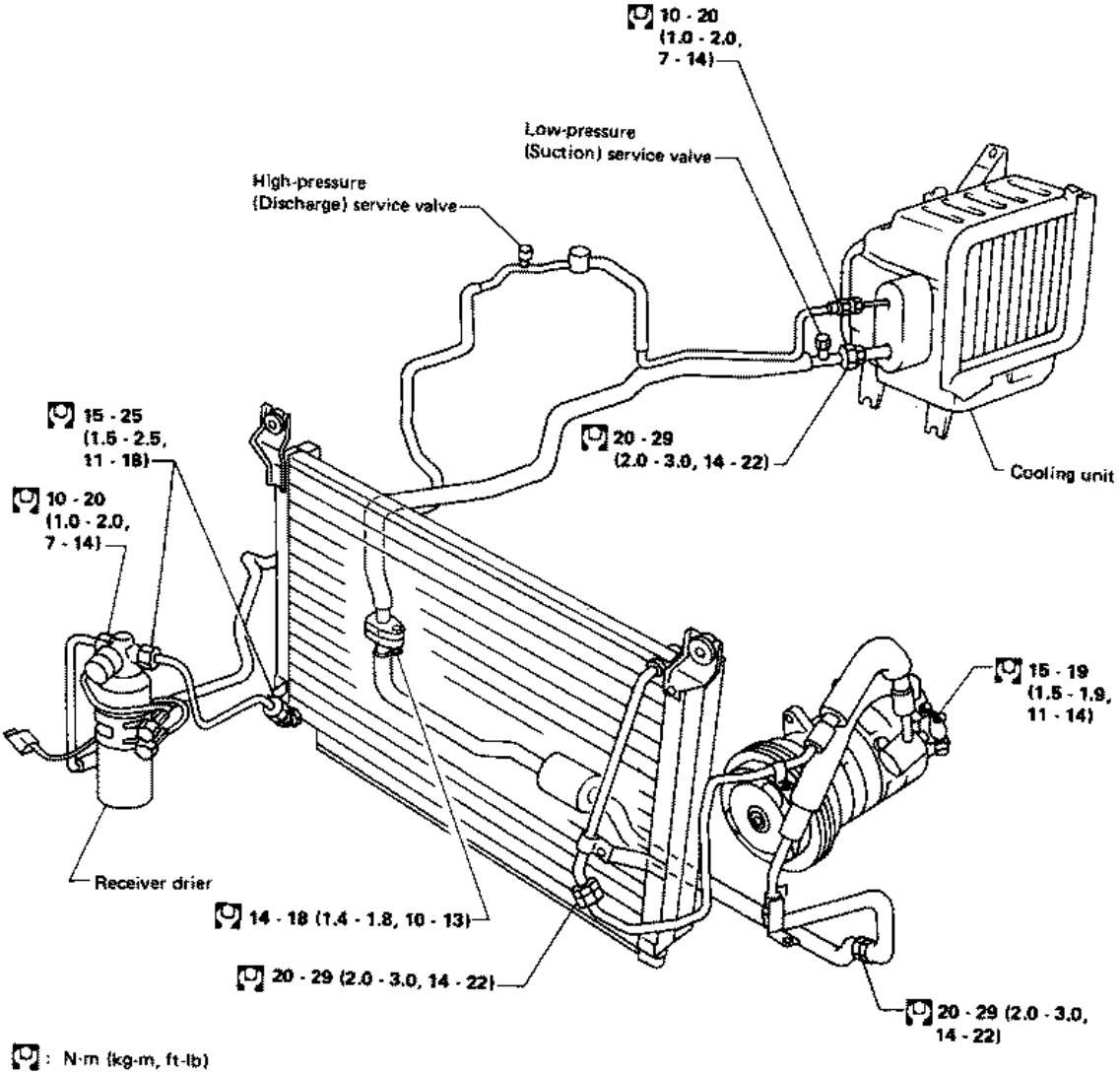




SHA613C

## Refrigerant Lines (Cont'd)

### L.H.D. MODEL FOR EUROPE



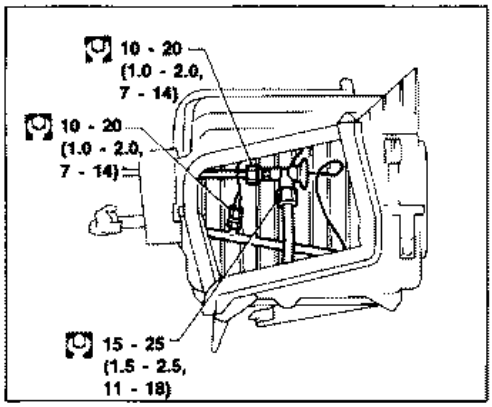



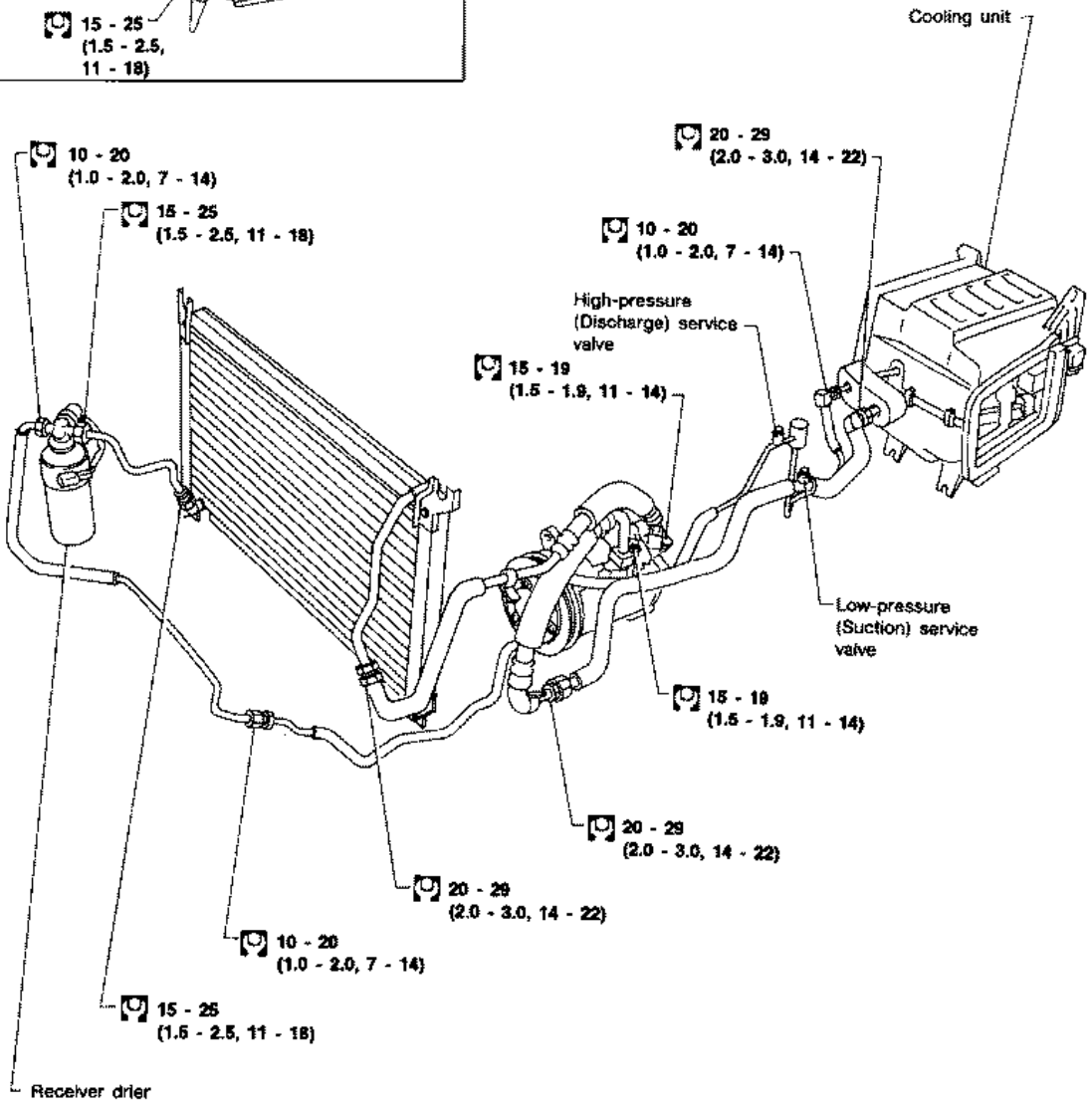

: N·m (kg-m, ft-lb)

SHA527C

## Refrigerant Lines (Cont'd)

### R.H.D. MODEL FOR EUROPE

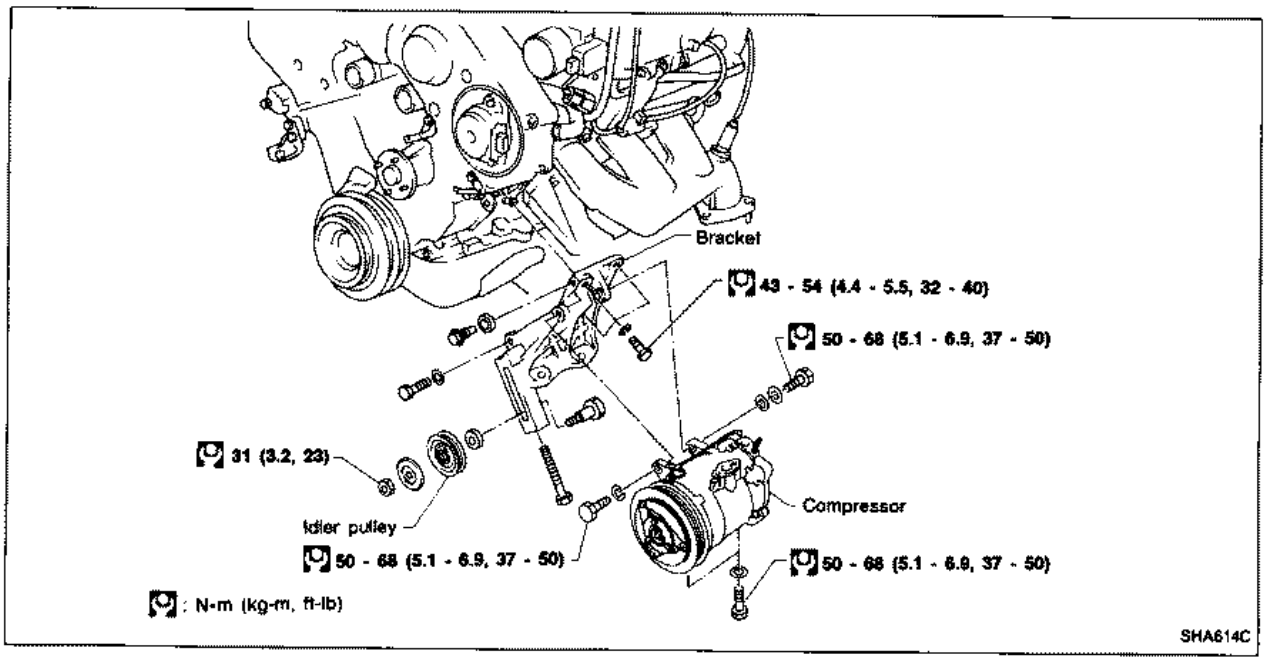



: N·m (kg-m, ft-lb)

SHA718C

## Compressor Mounting




## Belt Tension

- Refer to section MA.

## Fast Idle Control Device (F.I.C.D.)

- Refer to section EF & EC.

## Performance Chart

### TEST CONDITION — For Manual Air Conditioner

Testing must be performed as follows:

Vehicle location: Indoors or in the shade (in a well ventilated place)
Doors: Closed
Door windows: Open
Hood: Open
TEMP. lever position: Max. COLD
Mode switch: (Ventilation) set
REC switch: (Recirculation) set
FAN lever position: Max. position
Engine speed: 1,500 rpm
Time required before starting testing after air conditioner starts operating: More than 10 minutes

### TEST READING

### For Australia

**Recirculating-to-discharge air temperature table**

| Inside air (Recirculating air) at blower assembly inlet | | Discharge air temperature at center ventilator °C (°F) |
|---|---|---|
| Relative humidity % | Air temperature °C (°F) | |
| 50 - 60 | 20 (68) | 6.5 - 7.2 (44 - 45) |
| | 25 (77) | 11.0 - 12.0 (52 - 54) |
| | 30 (86) | 15.6 - 16.8 (60 - 62) |
| | 35 (95) | 20.3 - 21.6 (69 - 71) |
| 60 - 70 | 20 (68) | 7.2 - 7.9 (45 - 46) |
| | 25 (77) | 12.0 - 12.9 (54 - 55) |
| | 30 (86) | 16.8 - 17.9 (62 - 64) |
| | 35 (95) | 21.6 - 22.9 (71 - 73) |

**Ambient air temperature-to-compressor pressure table**

| Ambient air | | High-pressure (Discharge side) kPa (bar, kg/cm$^2$, psi) | Low-pressure (Suction side) kPa (bar, kg/cm$^2$, psi) |
|---|---|---|---|
| Relative humidity % | Air temperature °C (°F) | | |
| 50 - 70 | 20 (68) | 1,079 - 1,324 (10.79 - 13.24, 11.0 - 13.5, 156 - 192) | 105.9 - 129.5 (1.059 - 1.295, 1.08 - 1.32, 15.4 - 18.8) |
| | 25 (77) | 1,196 - 1,461 (11.96 - 14.61, 12.2 - 14.9, 173 - 212) | 146.1 - 178.5 (1.461 - 1.785, 1.49 - 1.82, 21.2 - 25.9) |
| | 30 (86) | 1,373 - 1,687 (13.73 - 16.87, 14.0 - 17.2, 199 - 245) | 187.3 - 228.5 (1.873 - 2.285, 1.91 - 2.33, 27.2 - 33.1) |
| | 35 (95) | 1,589 - 1,942 (15.89 - 19.02, 16.2 - 19.8, 230 - 282) | 229.5 - 280.5 (2.295 - 2.805, 2.34 - 2.86, 33.3 - 40.7) |
| | 40 (104) | 1,804 - 2,197 (18.04 - 21.97, 18.4 - 22.4, 262 - 319) | 269.7 - 329.5 (2.697 - 3.295, 2.75 - 3.36, 39.1 - 47.8) |
| | 45 (113) | 1,991 - 2,442 (19.91 - 24.42, 20.3 - 24.9, 289 - 354) | 308.9 - 377.6 (3.089 - 3.776, 3.15 - 3.85, 44.8 - 54.7) |

## Performance Chart (Cont'd)

**TEST CONDITION — For Auto Air Conditioner**

Testing must be performed as follows:

| | |
|---|---|
| Vehicle location: | Indoors or in the shade (in a well ventilated place) |
| Doors: | Closed |
| Door windows: | Open |
| Hood: | Open |

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

| | |
|---|---|
| Mode door: | VENT |
| Intake door: | REC |
| Air mix door: | Full-cold |
| Compressor: | ON |
| Blower motor: | 12V |

Set up self-diagnosis STEP 2 and set code No. "66".

## Performance Chart (Cont'd)

### VG30DETT engine L.H.D. model

**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) | 7.0 - 7.8 (45 - 46) |
| | 25 (77) | 11.6 - 12.7 (53 - 55) |
| | 30 (86) | 16.5 - 17.7 (62 - 64) |
| | 35 (95) | 21.3 - 22.7 (70 - 73) |
| | 40 (104) | 26.2 - 27.8 (79 - 82) |
| 60 - 70 | 20 (68) | 7.8 - 8.7 (46 - 48) |
| | 25 (77) | 12.7 - 13.8 (55 - 57) |
| | 30 (86) | 17.7 - 18.9 (64 - 66) |
| | 35 (95) | 22.7 - 24.1 (73 - 75) |
| | 40 (104) | 27.8 - 29.6 (82 - 85) |

**Ambient air temperature-to-compressor pressure table**

| Ambient air | | High-pressure (Discharge side) kPa (bar, kg/cm$^2$, psi) | Low-pressure (Suction side) kPa (bar, kg/cm$^2$, psi) |
|---|---|---|---|
| Relative humidity % | Air temperature °C (°F) | | |
| 50 - 70 | 20 (68) | 785 - 961 (7.85 - 9.61, 8.0 - 9.8, 114 - 139) | 68.6 - 103.0 (0.686 - 1.030, 0.70 - 1.05, 10.0 - 14.9) |
| | 25 (77) | 912 - 1,108 (9.12 - 11.08, 9.3 - 11.3, 132 - 161) | 118.7 - 150.0 (1.187 - 1.500, 1.21 - 1.53, 17.2 - 21.8) |
| | 30 (86) | 1,128 - 1,383 (11.28 - 13.83, 11.5 - 14.1, 164 - 201) | 167.7 - 205.0 (1.677 - 2.050, 1.71 - 2.09, 24.3 - 29.7) |
| | 35 (95) | 1,353 - 1,657 (13.53 - 16.57, 13.8 - 16.9, 196 - 240) | 213.8 - 260.9 (2.138 - 2.609, 2.18 - 2.66, 31.0 - 37.8) |
| | 40 (104) | 1,579 - 1,922 (15.79 - 19.22, 16.1 - 19.6, 229 - 279) | 258.9 - 315.8 (2.589 - 3.158, 2.64 - 3.22, 37.5 - 45.8) |
| | 45 (113) | 1,795 - 2,207 (17.95 - 22.07, 18.3 - 22.5, 260 - 320) | 304.0 - 372.7 (3.040 - 3.727, 3.10 - 3.80, 44.1 - 54.0) |

## Performance Chart (Cont'd)

### VG30DETT ENGINE R.H.D. MODEL

**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) | 7.0 - 7.8 (45 - 46) |
| | 25 (77) | 10.2 - 11.4 (50 - 53) |
| | 30 (86) | 15.2 - 16.5 (59 - 62) |
| | 35 (95) | 20.4 - 21.5 (69 - 71) |
| | 40 (104) | 25.4 - 26.7 (78 - 80) |
| 60 - 70 | 20 (68) | 7.8 - 8.6 (46 - 47) |
| | 25 (77) | 11.4 - 12.4 (53 - 54) |
| | 30 (86) | 16.5 - 17.6 (62 - 64) |
| | 35 (95) | 21.5 - 22.8 (71 - 73) |
| | 40 (104) | 26.7 - 28.0 (80 - 82) |

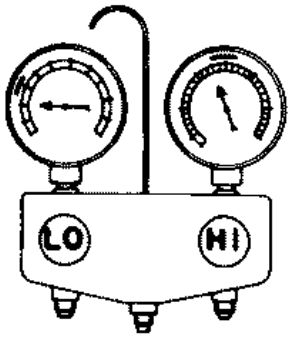
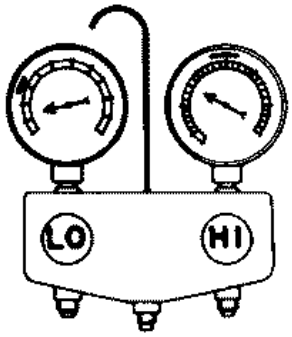
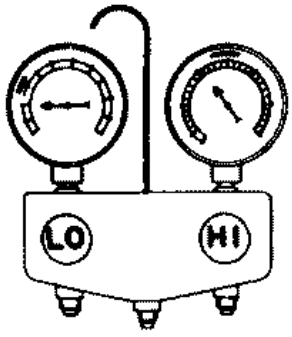
**Ambient air temperature-to-compressor pressure table**

| Ambient air | | High-pressure (Discharge side) kPa (bar, kg/cm$^2$, psi) | Low-pressure (Suction side) kPa (bar, kg/cm$^2$, psi) |
|---|---|---|---|
| Relative humidity % | Air temperature °C (°F) | | |
| 50 - 70 | 20 (68) | 1,098 - 1,353 (10.98 - 13.53, 11.2 - 13.8, 159 - 196) | 122.6 - 152.0 (1.226 - 1.520, 1.25 - 1.55, 17.8 - 22.0) |
| | 25 (77) | 1,265 - 1,559 (12.65 - 15.59, 12.9 - 15.9, 183 - 226) | 156.9 - 194.2 (1.569 - 1.942, 1.60 - 1.98, 22.8 - 28.2) |
| | 30 (86) | 1,451 - 1,785 (14.51 - 17.85, 14.8 - 18.2, 210 - 259) | 185.4 - 226.5 (1.854 - 2.265, 1.89 - 2.31, 26.9 - 32.8) |
| | 35 (95) | 1,608 - 1,981 (16.08 - 19.81, 16.4 - 20.2, 233 - 287) | 220.7 - 269.7 (2.207 - 2.697, 2.25 - 2.75, 32.0 - 39.1) |
| | 40 (104) | 1,765 - 2,158 (17.65 - 21.58, 18.0 - 22.0, 256 - 313) | 247.1 - 313.8 (2.471 - 3.138, 2.52 - 3.20, 35.8 - 45.5) |
| | 45 (113) | 1,942 - 2,373 (19.42 - 23.73, 19.8 - 24.2, 282 - 344) | 274.6 - 362.9 (2.746 - 3.629, 2.80 - 3.70, 39.8 - 52.6) |

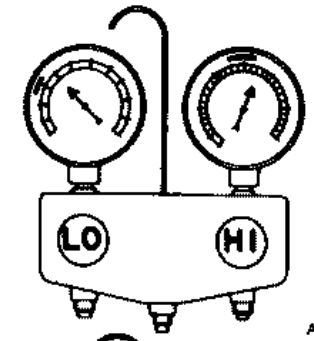
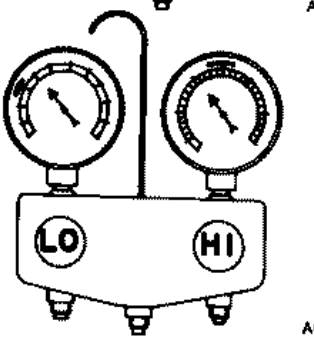
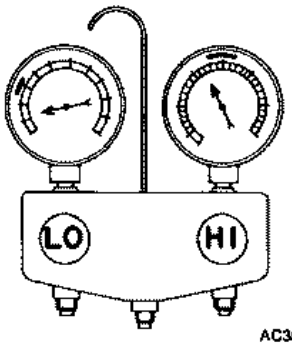
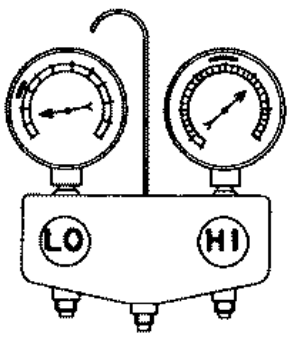
## Performance Test Diagnoses

Characteristics revealed by the manifold gauge readings for the air conditioning system are shown in the following table.
For how to do the performance test, refer to the item "Performance Chart".

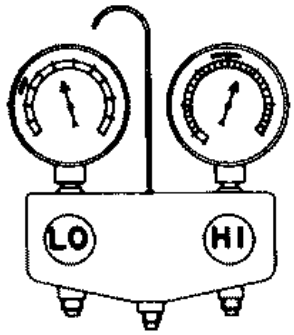
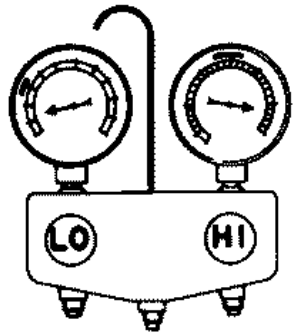
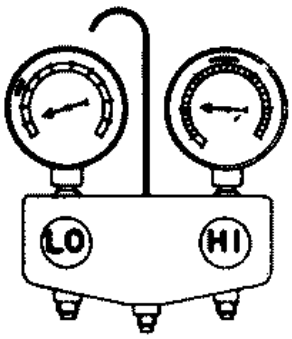
**In the following table, the portion marked on each gauge scale indicates the range which shows that the air conditioning system is in good order. This range is described in Performance Chart.**

| Condition | | Probable cause | Corrective action |
|---|---|---|---|
| **INSUFFICIENT REFRIGERANT CHARGE** | | | |
|  AC352A | Insufficient cooling.<br>Bubbles appear in sight glass. | Refrigerant is low, or leaking slightly. | 1. Leak test.<br>2. Repair leak.<br>3. Charge system.<br>**Evacuate, as necessary, and recharge system.** |
| **ALMOST NO REFRIGERANT** | | | |
|  AC353A | No cooling action.<br>A lot of bubbles or something like mist appears in sight glass. | Serious refrigerant leak. | **Stop compressor immediately.**<br>1. Leak test.<br>2. Discharge system.<br>3. Repair leak(s).<br>4. Replace receiver drier if necessary.<br>5. Check oil level.<br>6. Evacuate and recharge system. |
| **MALFUNCTIONING EXPANSION VALVE** | | | |
|  AC354A | Slight cooling.<br>Sweat or frosting on expansion valve inlet. | Expansion valve restricts refrigerant flow.<br>• Expansion valve is clogged.<br>• Expansion valve is inoperative.<br>Valve stuck closed.<br>Thermal bulb has lost charge. | If valve inlet reveals sweat or frost:<br>1. Discharge system.<br>2. Remove valve and clean it. Replace it if necessary.<br>3. Evacuate system.<br>4. Charge system.<br>If valve does not operate:<br>1. Discharge system.<br>2. Replace valve.<br>3. Evacuate and charge system. |

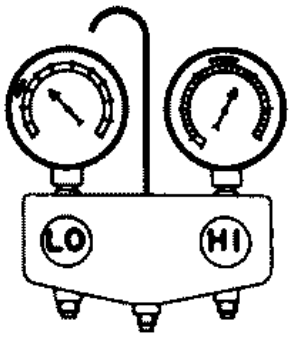
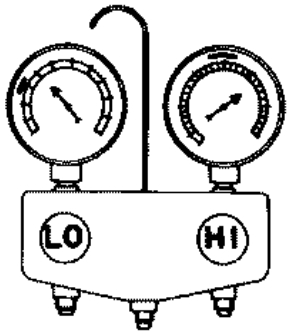
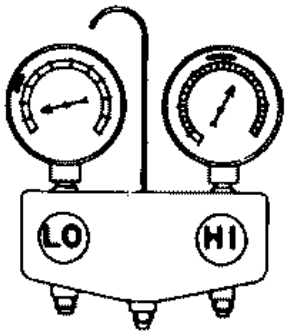
## Performance Test Diagnoses (Cont'd)

| Condition | | Probable cause | Corrective action |
|---|---|---|---|
|  AC355A | Insufficient cooling.<br>Sweat on suction line. | Expansion valve allows too much refrigerant through evaporator. | Check valve for operation. If suction side does not show a pressure decrease, replace valve. |
|  AC356A | No cooling.<br>Sweat or frosting on suction line. | Malfunctioning expansion valve. | 1. Discharge system.<br>2. Replace valve.<br>3. Evacuate and charge system. |
| **MALFUNCTIONING SUCTION THROTTLE VALVE** | | | |
|  AC357A | Insufficient cooling.<br>Frosted evaporator. | Suction throttle valve is inoperative. | 1. Discharge system.<br>2. Replace valve.<br>3. Evacuate and charge system. |
|  AC358A | Insufficient cooling. | Suction throttle valve restricts refrigerant flow. | 1. Discharge system.<br>2. Replace valve.<br>3. Evacuate and charge system. |

## Performance Test Diagnoses (Cont'd)

| Condition | | Probable cause | Corrective action |
|---|---|---|---|
| **MALFUNCTIONING CONDENSER** | | | |
|  AC361A | No cooling action: engine may overheat.<br>Bubbles appear in sight glass of drier.<br>Suction line is very hot. | Usually a malfunctioning condenser. | • Check fan belt and fluid coupling<br>• Check radiator fan motor.<br>• Check condenser for dirt accumulation.<br>• Check engine cooling system for overheating.<br>• Check for refrigerant overcharging.<br>**If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.** |
| **HIGH-PRESSURE LINE BLOCKED** | | | |
|  AC362A | Insufficient cooling.<br>Frosted high-pressure liquid line. | Drier clogged, or restriction in high-pressure line. | 1. Discharge system.<br>2. Remove receiver drier or strainer and replace it.<br>3. Evacuate and charge system. |
| **MALFUNCTIONING COMPRESSOR** | | | |
|  AC363A | Insufficient cooling. | Internal problem in compressor, or damaged gasket and valve. | 1. Discharge system.<br>2. Remove and check compressor.<br>3. Repair or replace compressor.<br>4. Check oil level.<br>5. Replace receiver drier.<br>6. Evacuate and charge system. |

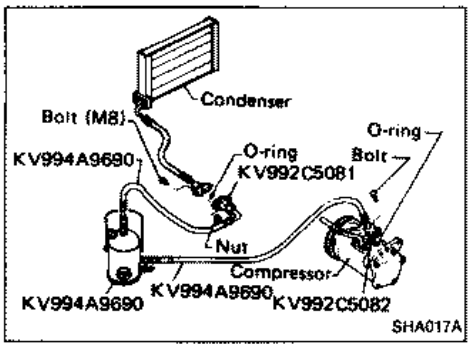
## Performance Test Diagnoses (Cont'd)

| Condition | | Probable cause | Corrective action |
|---|---|---|---|
| **TOO MUCH OIL IN SYSTEM (Excessive)** | | | |
|  AC364A | Insufficient cooling. | Too much oil circulates with refrigerant, causing the cooling capacity of the system to be reduced. | Refer to COMPRESSOR OIL for correcting oil level. |
| **AIR IN SYSTEM** | | | |
|  AC359A | Insufficient cooling.<br>Sight glass shows occasional bubbles. | Air mixed with refrigerant in system. | 1. Discharge system.<br>2. Replace receiver drier.<br>3. Evacuate and charge system. |
| **MOISTURE IN SYSTEM** | | | |
|  AC360A | After short operation, suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As a warning of this, reading vibrates around 39 kPa (0.39 bar, 0.4 kg/cm$^2$, 6 psi). | Drier is saturated with moisture. Moisture has frozen in expansion valve. Refrigerant flow is restricted. | 1. Discharge system.<br>2. Replace receiver drier (twice if necessary).<br>3. Evacuate system completely. (Repeat 30-minutes evacuating three times.)<br>4. Recharge system. |

## Checking and Adjusting

**The oil used to lubricate the compressor is circulating with the refrigerant.**
**Whenever replacing any component of the system or a large amount of gas leakage occurs, add oil to maintain the original amount of oil.**

**Total amount of oil in the system:**
**150 mℓ (5.3 Imp fl oz)**

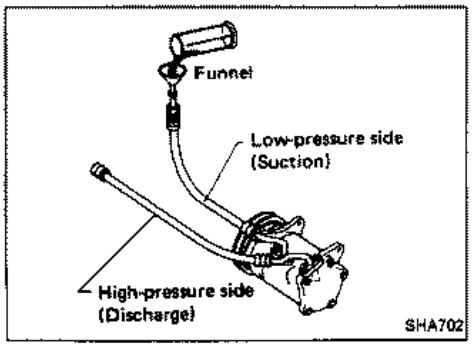



1. Connect oil separator KV994A9690 between compressor discharge side and condenser.
2. Evacuate and charge the system.
3. Operate compressor at engine idling with air conditioner set for maximum cooling and high fan speed.
4. Stop compressor operation after 10 minutes.

**CAUTION:**
**Never allow engine speed to exceed idling speed.**
**Do not continue compressor operation for more than 10 minutes.**

5. Disconnect oil separator and connect refrigerant line to original positions.
6. Disconnect low flexible hose from compressor suction valve.
7. Add new oil from compressor suction port.

**Amount of oil to be added:**
**120 mℓ (4.2 Imp fl oz)**




- **About 30 mℓ (1.1 Imp fl oz) of oil remains unremoved in the system.**

8. After adding oil, rotate compressor clutch by hand 5 to 10 turns.
9. Connect refrigerant line and evacuate and charge system.
10. Conduct leak test and performance test.
11. Gradually loosen drain cap of oil separator to release residual pressure. Remove cap and drain oil.
12. To prevent formation of rust and intrusion of moisture or dust, perform the following before placing oil separator kit into storage.

1) Cap each opening of flexible hose and double union securely.
2) Cap oil separator, evacuate it from service valve, and charge refrigerant.

**When oil contains chips or other foreign material. After air conditioner system has been flushed with refrigerant replace receiver drier. Then pour in 150 mℓ (5.3 Imp fl oz) of oil into air conditioner system.**

## IF OIL SEPARATOR IS NOT AVAILABLE

Add oil accordance with the table below.

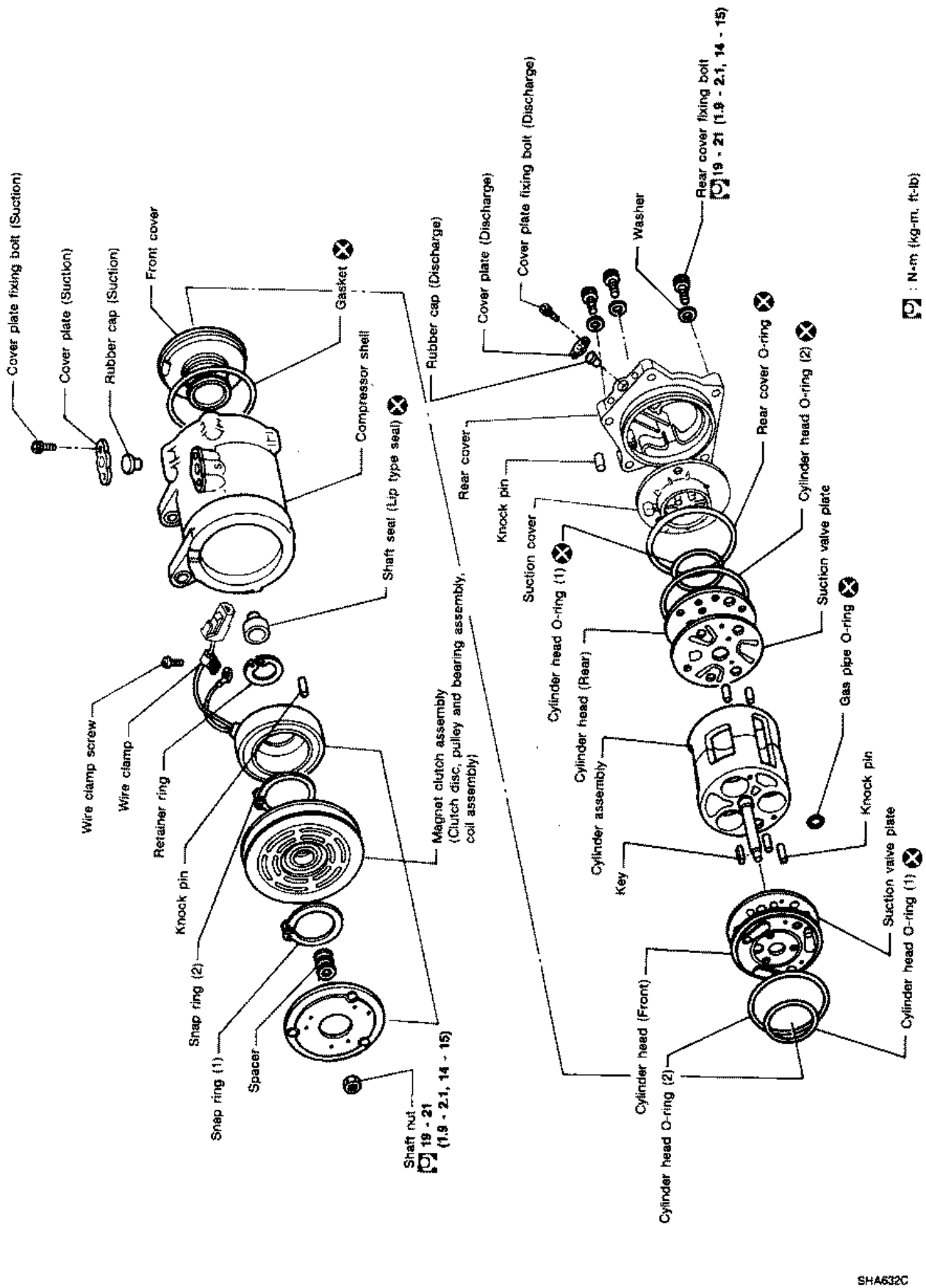
| Condition | | Amount of oil to be added mℓ(Imp fl oz) |
|---|---|---|
| Replacement of compressor | | 1. Remove all oil from new and old compressors.*<br>2. Charge new compressor with the same amount of oil as was in the old compressor. |
| Replacement of front cooling unit | | 70 (2.5) |
| Replacement of rear cooling unit | | 15 (0.5) |
| Replacement of cool box | | 10 (0.4) |
| Replacement of receiver drier (liquid tank) | | 10 (0.4) |
| Replacement of condenser | There is no sign of oil leakage from condenser. | 10 (0.4) |
| | There are evidences of a large amount of oil leakage from condenser. | 60 (2.1) |
| Replacement of flexible hose or pipe | There is no sign of oil leakage. | Oil need not be added. |
| | There are evidences of a large amount of oil leakage. | 60 (2.1) |
| Gas leakage | There is no sign of oil leakage. | Oil need not be added. |
| | There are evidences of a large amount of oil leakage. | 60 (2.1) |

*: Remove compressor oil as follows.

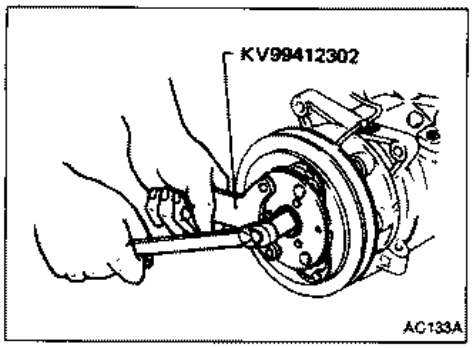
1. **With the compressor upside down, completely drain the oil through the suction port (from the embossed letter "s" mark side).**
2. **When the oil stops flowing out, rotate the clutch hub two or three times to completely drain the oil.**

## Precautions

- Plug all openings to prevent moisture and foreign matter from entering.
- Do not leave compressor on its side or upside down for more than 10 minutes.
- When replacing or repairing compressor, check compressor oil level in system.
- When replacing with a new compressor, drain specified oil from new compressor. Refer to COMPRESSOR OIL.
- Be sure there is no oil or dirt on frictional surface of clutch disc and pulley.
- When replacing compressor clutch, be careful not to scratch shaft or bend pulley.
- When replacing compressor clutch assembly, do not forget BREAK-IN OPERATION.
- When storing a compressor, be sure to fill it with refrigerant to prevent rust formation. Add refrigerant at the low-pressure side and purge air at the high-pressure side, while rotating shaft by hand.
- When installing shaft seal, O-ring and gaskets, apply compressor oil sparingly to the contact surface. Do not reuse them.
- After replacement or repairs, conduct a Leak Test.


Cover plate fixing bolt (Suction)
Cover plate (Suction)
Rubber cap (Suction)
Front cover
Gasket
Compressor shell
Shaft seal (Lip type seal)
Rubber cap (Discharge)
Cover plate (Discharge)
Cover plate fixing bolt (Discharge)
Rear cover fixing bolt
19 - 21 (1.9 - 2.1, 14 - 15)
Washer
Rear cover
Rear cover O-ring
Cylinder head O-ring (2)
Knock pin
Suction cover
Cylinder head O-ring (1)
Cylinder head (Rear)
Suction valve plate
Gas pipe O-ring
Cylinder assembly
Key
Knock pin
Suction valve plate
Cylinder head O-ring (1)
Cylinder head (Front)
Cylinder head O-ring (2)
Wire clamp screw
Wire clamp
Retainer ring
Knock pin
Snap ring (2)
Snap ring (1)
Spacer
Magnet clutch assembly (Clutch disc, pulley and bearing assembly, coil assembly)
Shaft nut
19 - 21 (1.9 - 2.1, 14 - 15)
: N·m (kg-m, ft-lb)

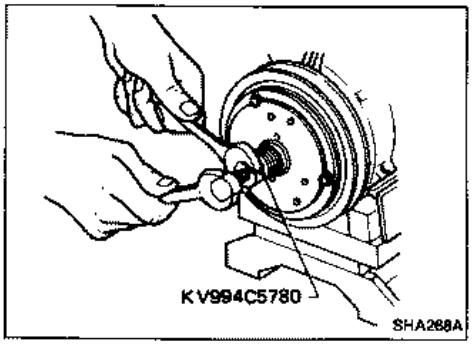
SHA632C



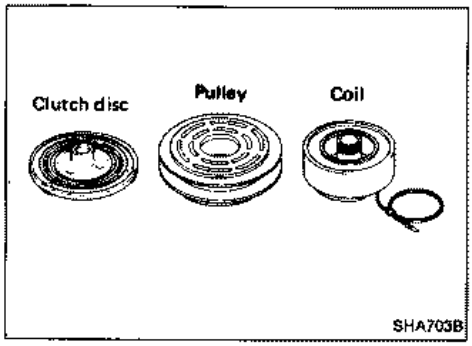

## Compressor Clutch

### REMOVAL

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




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




### INSPECTION

#### Clutch disc

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

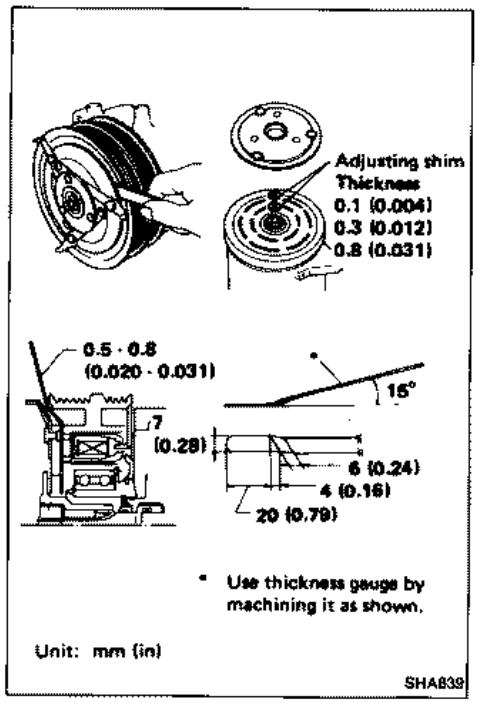
#### Pulley

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

#### Coil

Check coil for loose connection or cracked insulation.

## Compressor Clutch (Cont'd)




### ADJUSTMENT

- When assembling clutch disc, adjust disc-to-pulley clearance with shims.

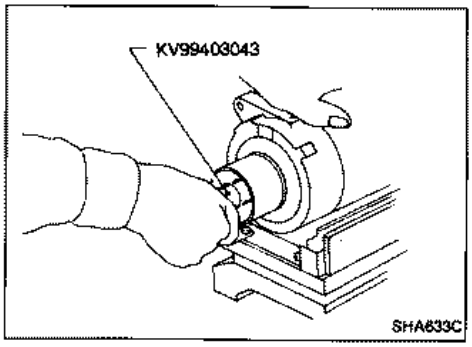
### BREAK-IN OPERATION

When replacing compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch about thirty times. Break-in operation raises the level of transmitted torque.

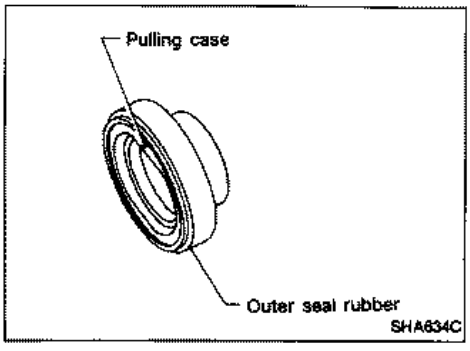
## Shaft Seal

### REMOVAL

- Before disassembling, be sure to measure the amount of oil. After assembling, charge with the same amount of new oil.



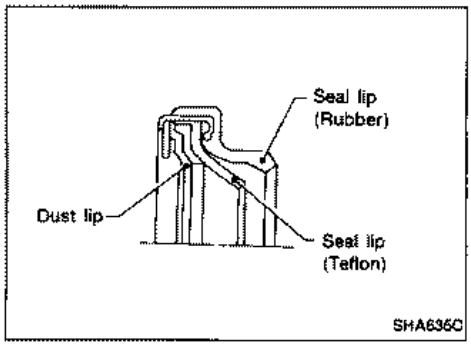

- With Tool KV99403043, remove shaft seal by hooking the pulling case.



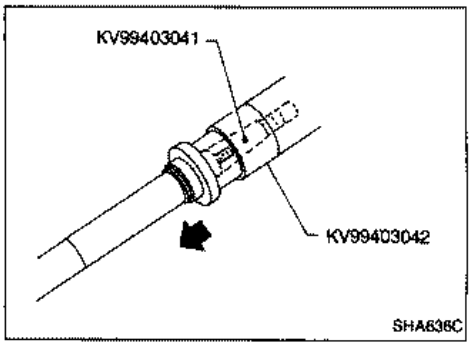

### INSPECTION

- Check the outer seal rubber for scars and hardening.

## Shaft Seal (Cont'd)



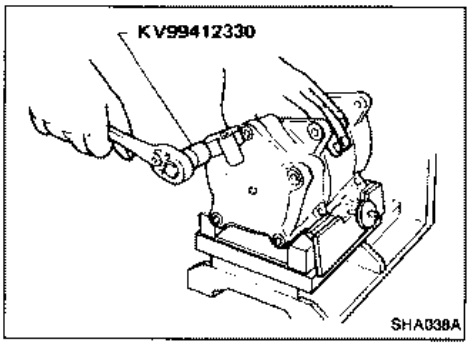

- Check the seal lips for scars and wear.




### INSTALLATION

- When installing shaft seal;

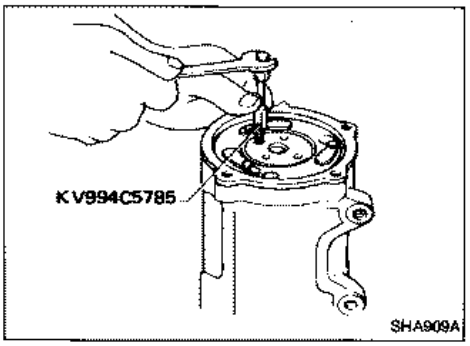
1) Cap shaft seal pilot to the top end of compressor shaft.
2) Using shaft seal installer, insert shaft seal.




## Cylinder Head, Valve and Cylinder

### REMOVAL (Rear)

- Using Allen socket, remove rear cover.

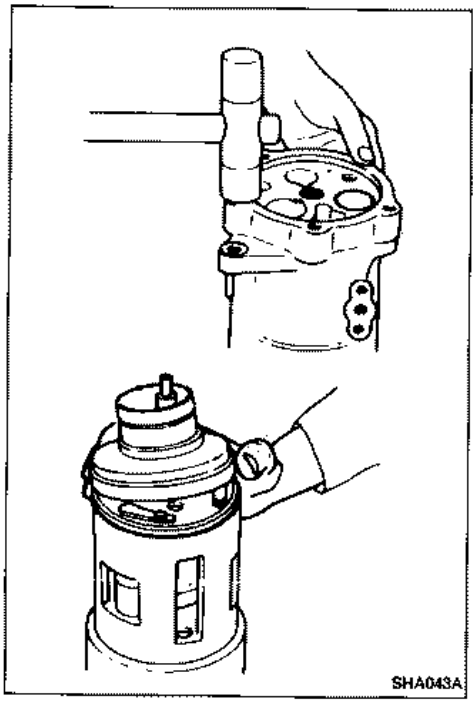



- Using cylinder head remover, remove rear cylinder head.

### INSPECTION

- Check suction valve plate and cylinder head for sings of damage.

## Cylinder Head, Valve and Cylinder (Cont'd)

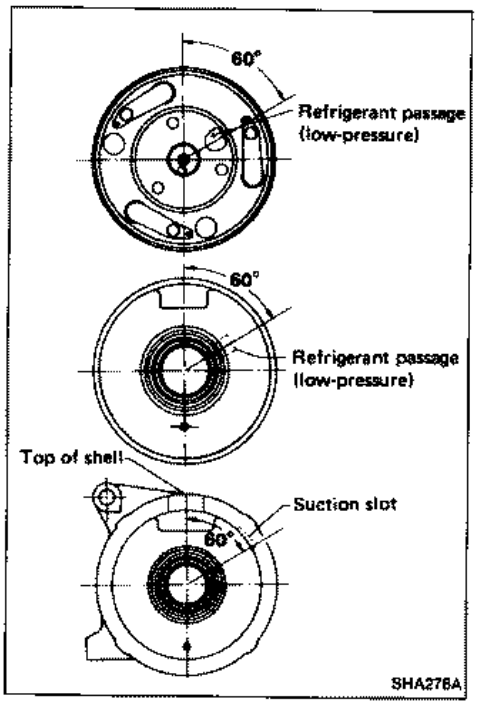



### REMOVAL (Front)

- With the front facing downward, support compressor shell. Using a plastic mallet, tap at the rear end of the shell flange, driving shell straight downward.
- Detach front cover from cylinder assembly.

### INSPECTION

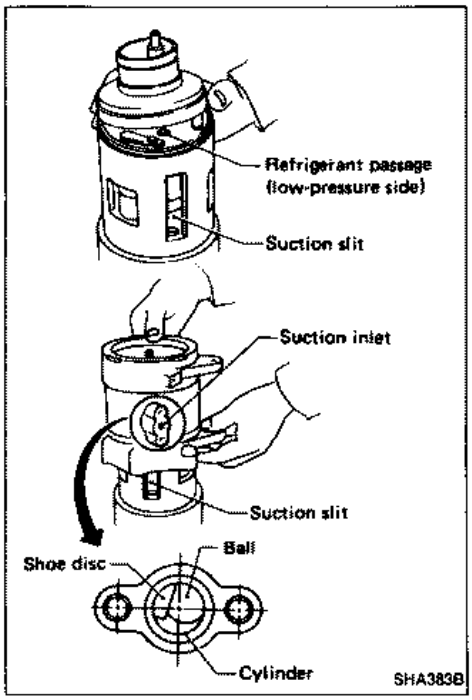
- Check suction valve plate and cylinder head for signs of damage.
- Check to make sure contact surfaces of cylinders, compressor shaft and compressor shell are free from any sign of scratches.



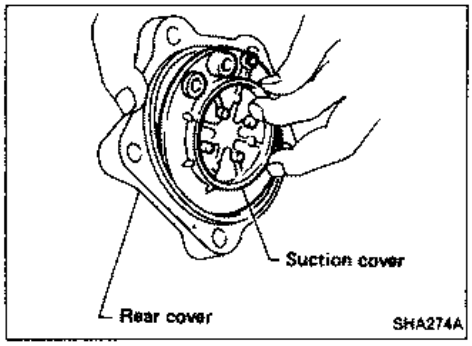

### INSTALLATION

1. Front cover must be installed so that the cutout portions of front cover and shell are aligned.
   For this purpose, install front cover on cylinder head so that angle between threaded hole in front cover and low-pressure side refrigerant passage in cylinder head is about 60°.

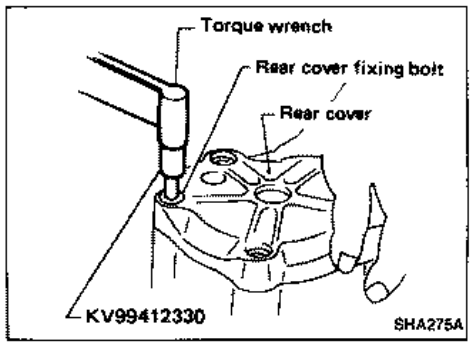
## Cylinder Head, Valve and Cylinder (Cont'd)



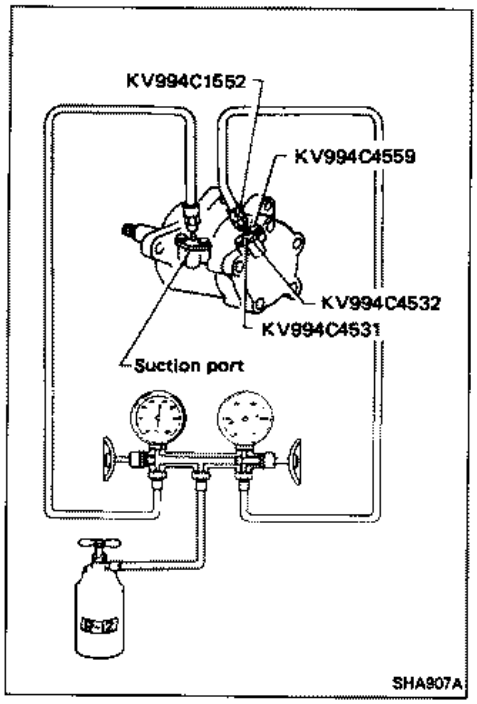

2. When installing shell on cylinder, adjust position of shell so that suction inlet of shell opens in the same direction as suction slit of cylinder visible in suction inlet by removing suction valve.




- When installing suction cover to rear cover, align knock pin.



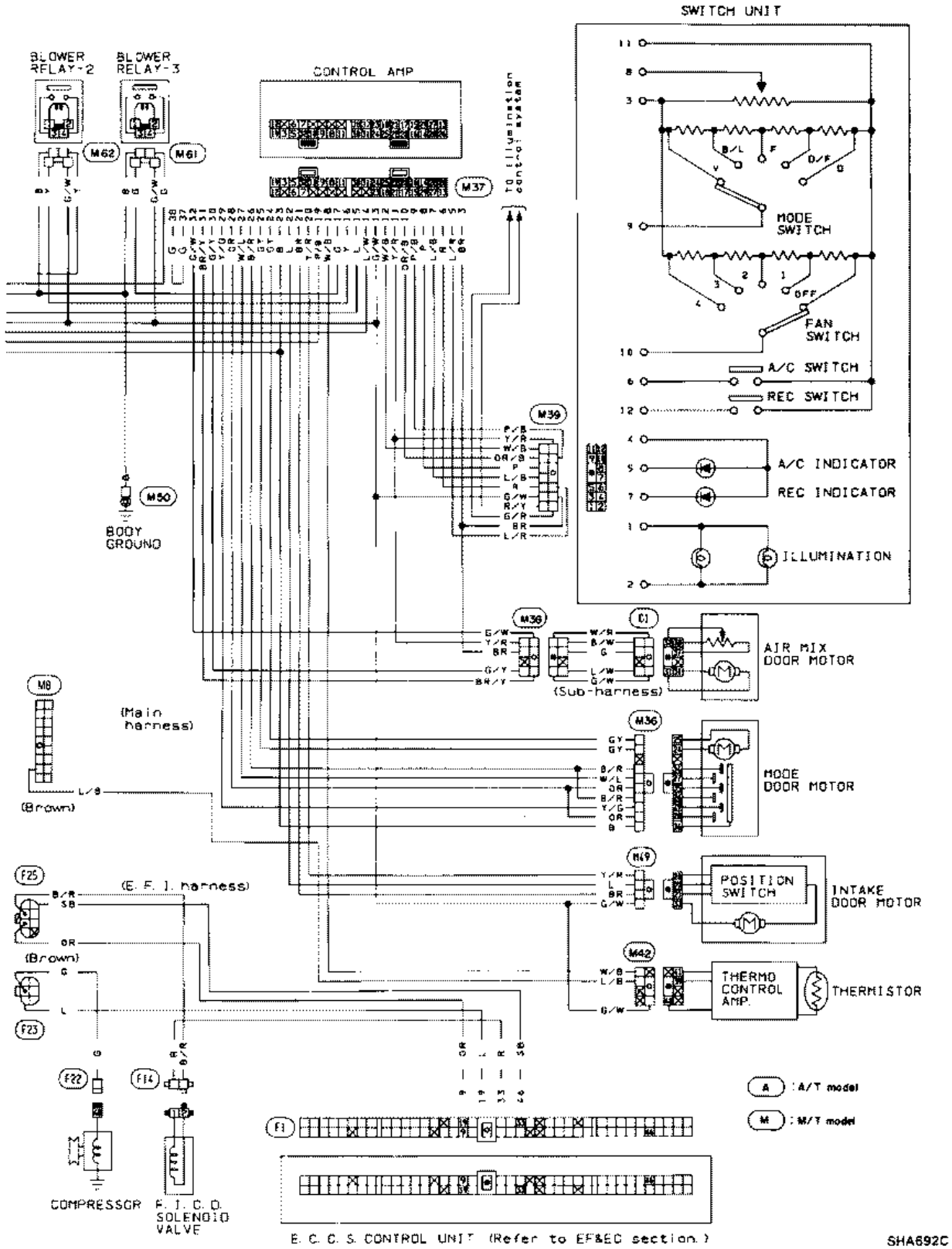

- Using Allen socket, install rear cover.




## Leak Test

- Charge refrigerant from suction side and evacuate air from discharge side. Then conduct leak test.

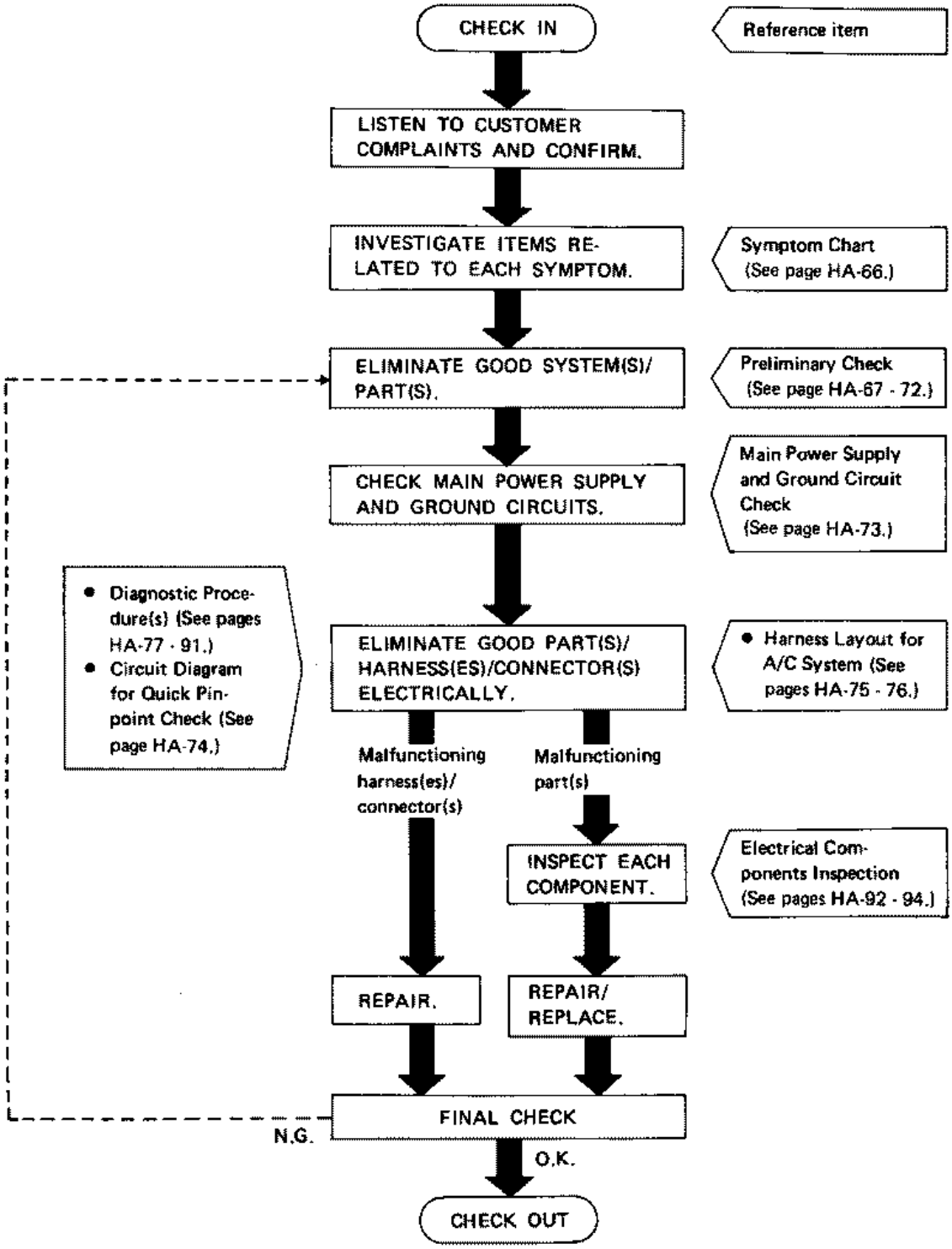
## Wiring Diagram (Cont'd)



## Contents

## How to Perform Trouble Diagnoses for Quick and Accurate Repair

### WORK FLOW



## Symptom Chart

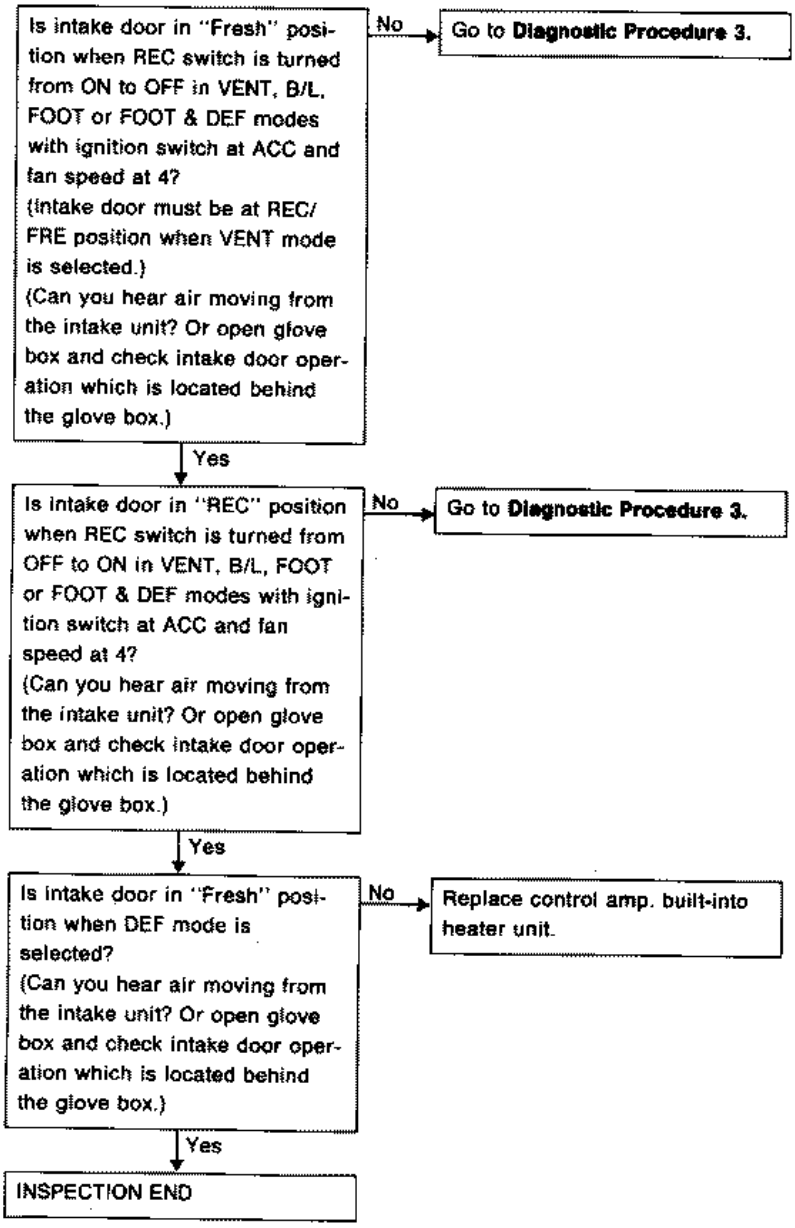
### DIAGNOSTIC TABLE

| PROCEDURE | Preliminary check | | | | | | Diagnostic Procedure | | | | | | Main power supply and Ground circuit check | | Electrical components inspection | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| REFERENCE PAGE | HA-67 | HA-68 | HA-69 | HA-70 | HA-71 | HA-72 | HA-77 | HA-79 | HA-81 | HA-82 | HA-86 | HA-90 | HA-73 | — | HA-92 | HA-92 | HA-92 | HA-93 | HA-93 | HA-93 | HA-94 | HA-94 | — | — | — | — | — |
| SYMPTOM | Preliminary check 1 | Preliminary check 2 | Preliminary check 3 | Preliminary check 4 | Preliminary check 5 | Preliminary check 6 | Diagnostic procedure 1 | Diagnostic procedure 2 | Diagnostic procedure 3 | Diagnostic procedure 4 | Diagnostic procedure 5 | Diagnostic procedure 6 | Control amp. | Fuses | Fan switch | Blower motor | Blower resistor | A/C switch | Low pressure switch | RELAYS | MODE switch | THERMO CONTROL AMP. | Air mix door motor | Mode door motor | Intake door motor | Compressor | Harness |
| A/C does not blow cold air. | | ❶ | | | | | ○ | | | ○ | | ○ | ○ | ○ | | ○ | ○ | | ○ | ○ | | | | | | ○ | ○ |
| Insufficient heating | | | | | | ❶ | ○ | | | | | ○ | ○ | | | ○ | ○ | | | | | | ○ | | | | ○ |
| Blower motor does not rotate. | | ❶ | | | | | ❷ | | | | | | ○ | ○ | | ○ | ○ | | | | | | | | | | |
| Air outlet does not change. | | | | ❶ | | | | ❷ | | | | | ○ | ○ | | | | | | | ○ | | | ○ | | | ○ |
| Intake door does not change in VENT, B/L or FOOT modes. | | | | | | | | | ❶ | | | | ○ | ○ | | | | | | | | | | | ○ | | ○ |
| Intake door is not set at "FRESH" in DEF mode. | ❶ | | | | | | | | ○ | | | | ○ | ○ | | | | | | | | | | | ○ | | ○ |
| Magnet clutch does not engage when A/C switch and fan switch are ON. | | ❶ | | | | | | | | ❷ | | | | | | | | | ○ | ○ | | ○ | | | | ○ | |
| Magnet clutch does not engage in FOOT & DEF or DEF mode. | | ❶ | ❷ | | | | | | | ○ | | | | ○ | ○ | | | ○ | ○ | ○ | | | | | | ○ | ○ |
| Illumination or indicators on switch panel do not come on. | | | | | | | | | | | ❶ | | | ○ | | | | | | | | | | | | | ○ |
| Noise | | | | | ❶ | | | | | | | | | | | | | | | | | | | | | | |

## Preliminary Check

### PRELIMINARY CHECK 1

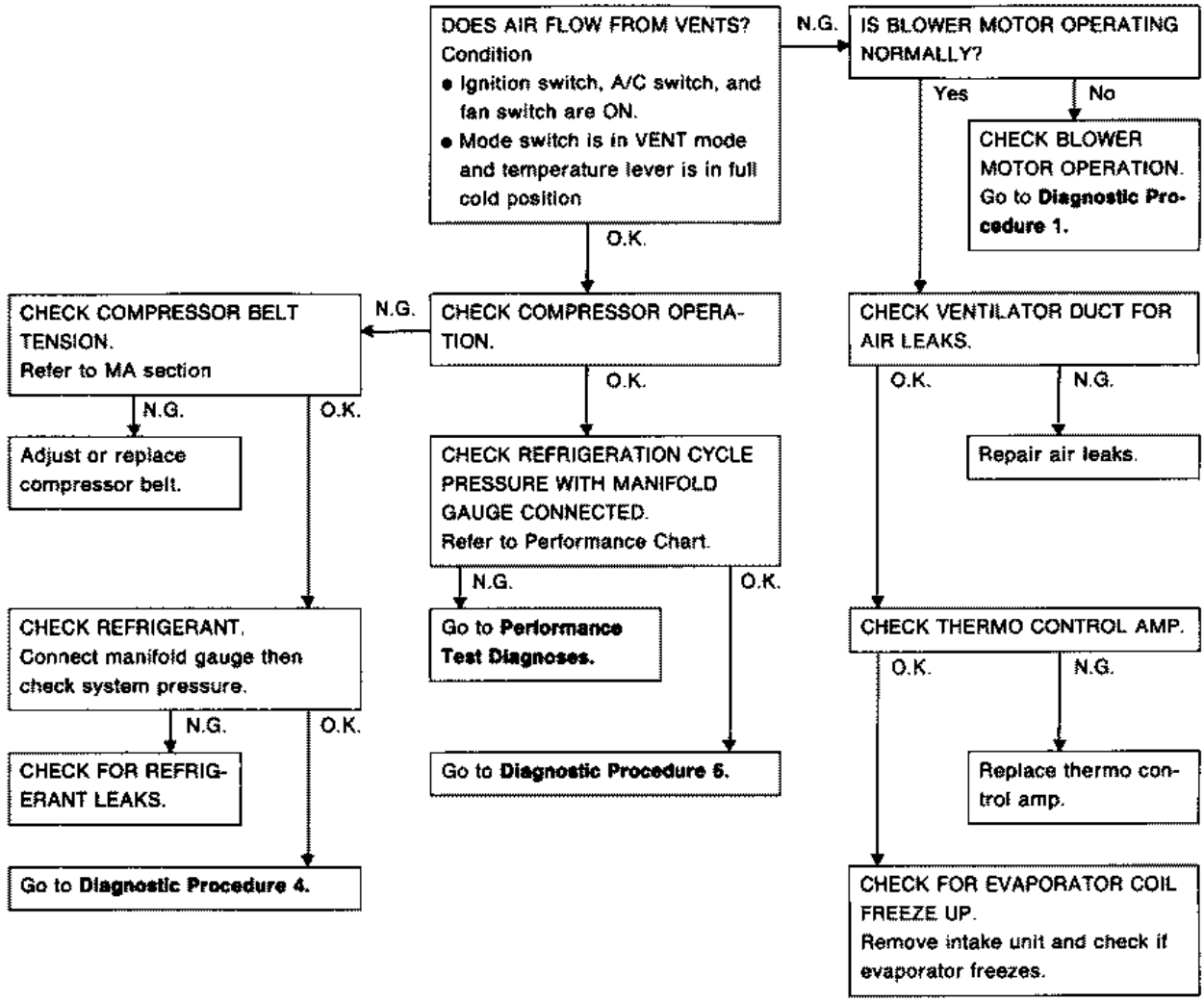
**Intake door is not set at "FRESH" in DEF mode.**



## Preliminary Check (Cont'd)

**PRELIMINARY CHECK 2**

**A/C does not blow cold air.**

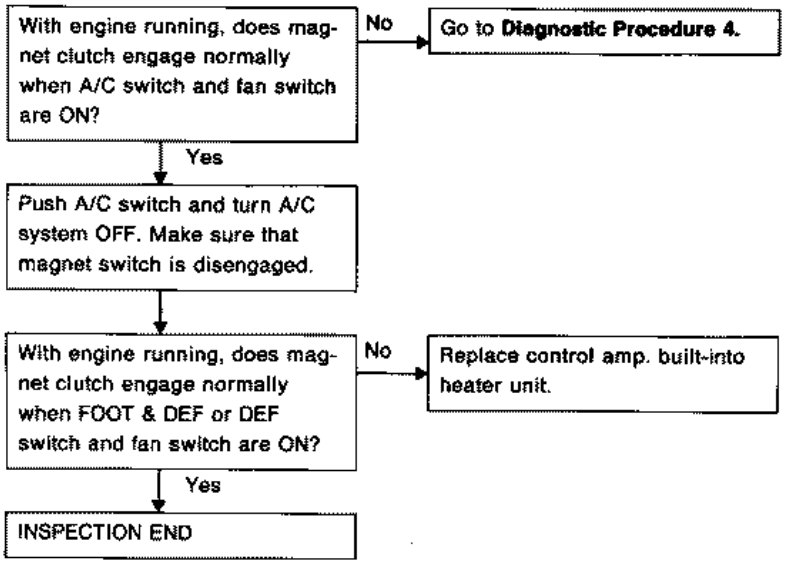


## Preliminary Check (Cont'd)

### PRELIMINARY CHECK 3

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

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



## Preliminary Check (Cont'd)

### PRELIMINARY CHECK 4

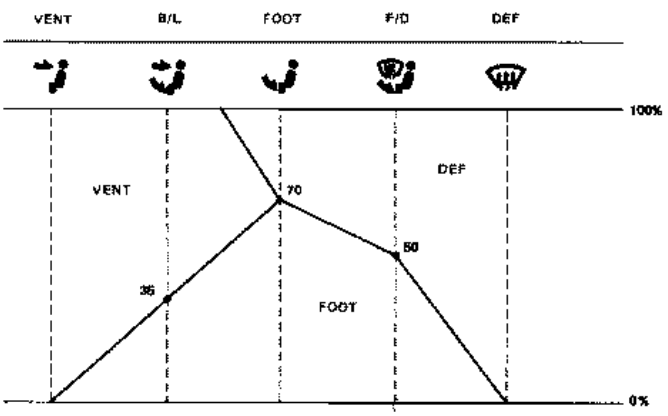
**Air outlet does not change.**

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

No → Go to **Diagnostic Procedure 2**

| Switch | | Air outlet |
|---|---|---|
| Mode | | VENT |
| | | FOOT & VENT |
| | | FOOT & DEF |
| | | FOOT & DEF |
| | | DEF |

**AIR DISTRIBUTION RATIOS**



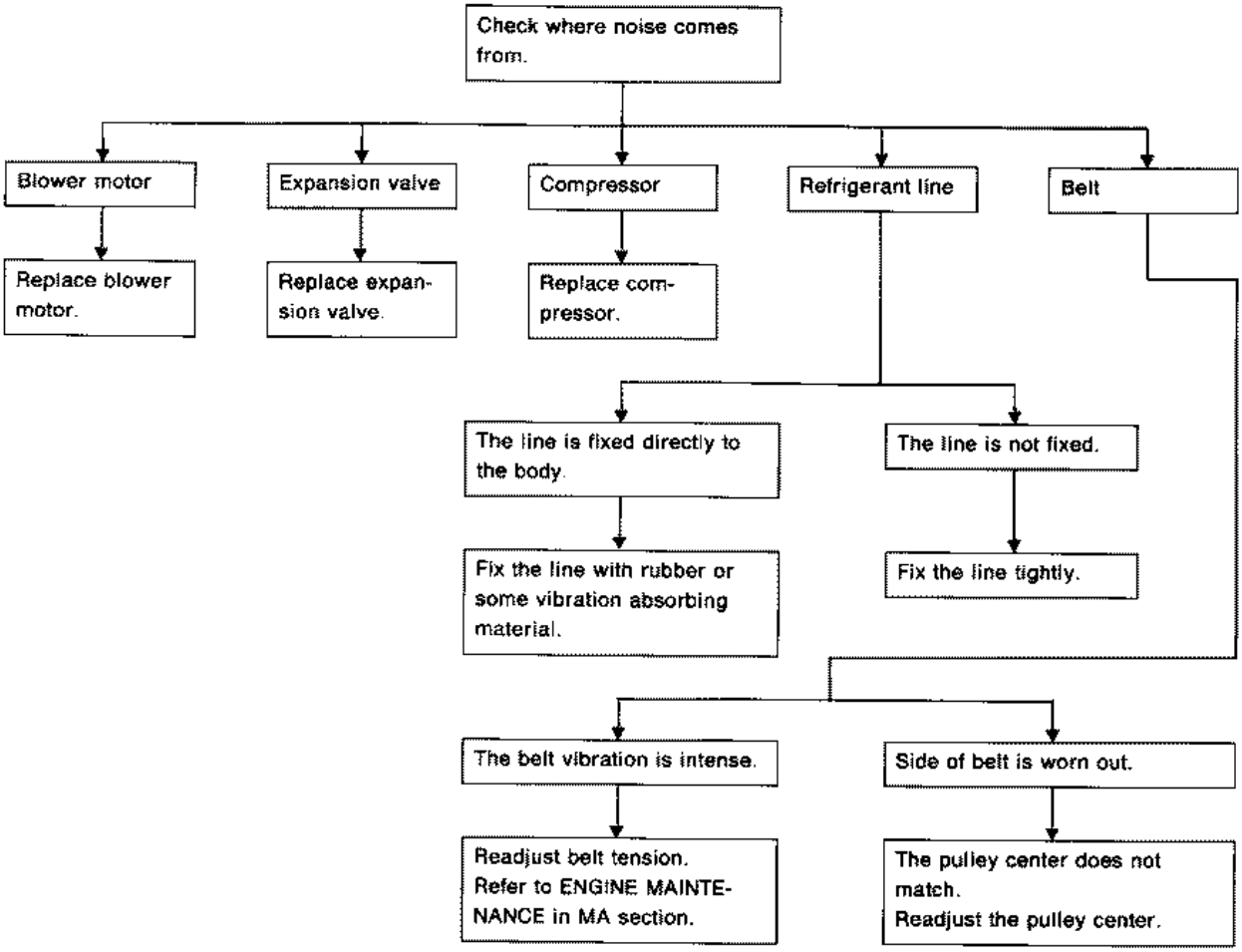

Yes

INSPECTION END

## Preliminary Check (Cont'd)

**PRELIMINARY CHECK 5**

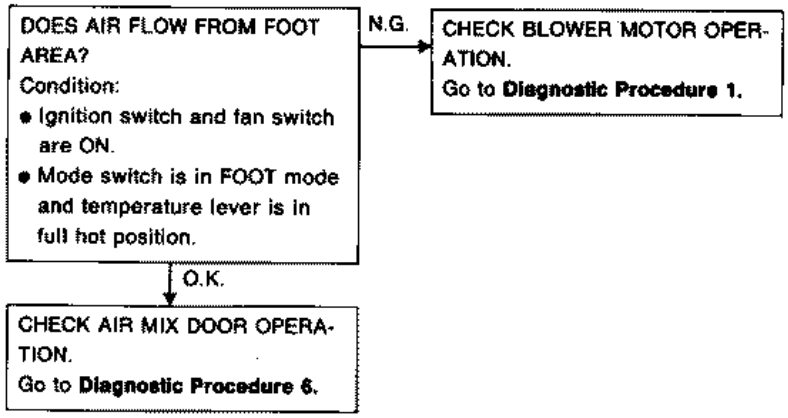
**Noise**



## Preliminary Check (Cont'd)

### PRELIMINARY CHECK 6

**Insufficient heating**



## Main Power Supply and Ground Circuit Check

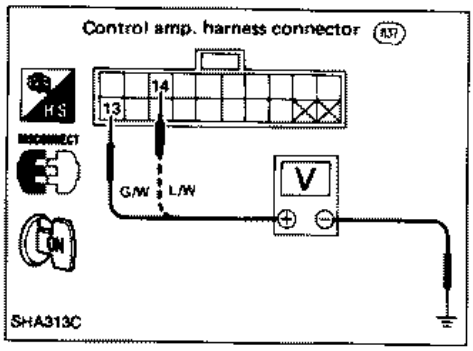
### POWER SUPPLY CIRCUIT CHECK FOR A/C SYSTEM

Check power supply circuit for air conditioning system.

**Refer to "POWER SUPPLY ROUTING" in section EL and A/C ELECTRICAL CIRCUIT.**

### CONTROL AMP. REMOVAL

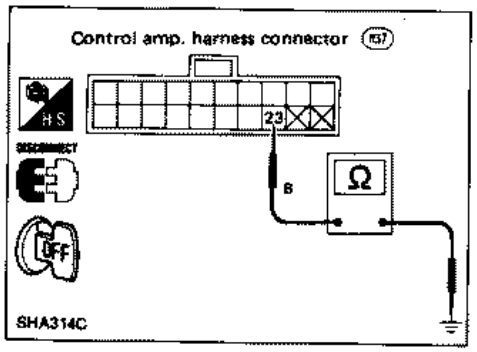
1. Remove driver side instrument lower lid.
2. Remove vent duct.
3. Remove control amp. with harness connected.




### CONTROL AMP. CHECK

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

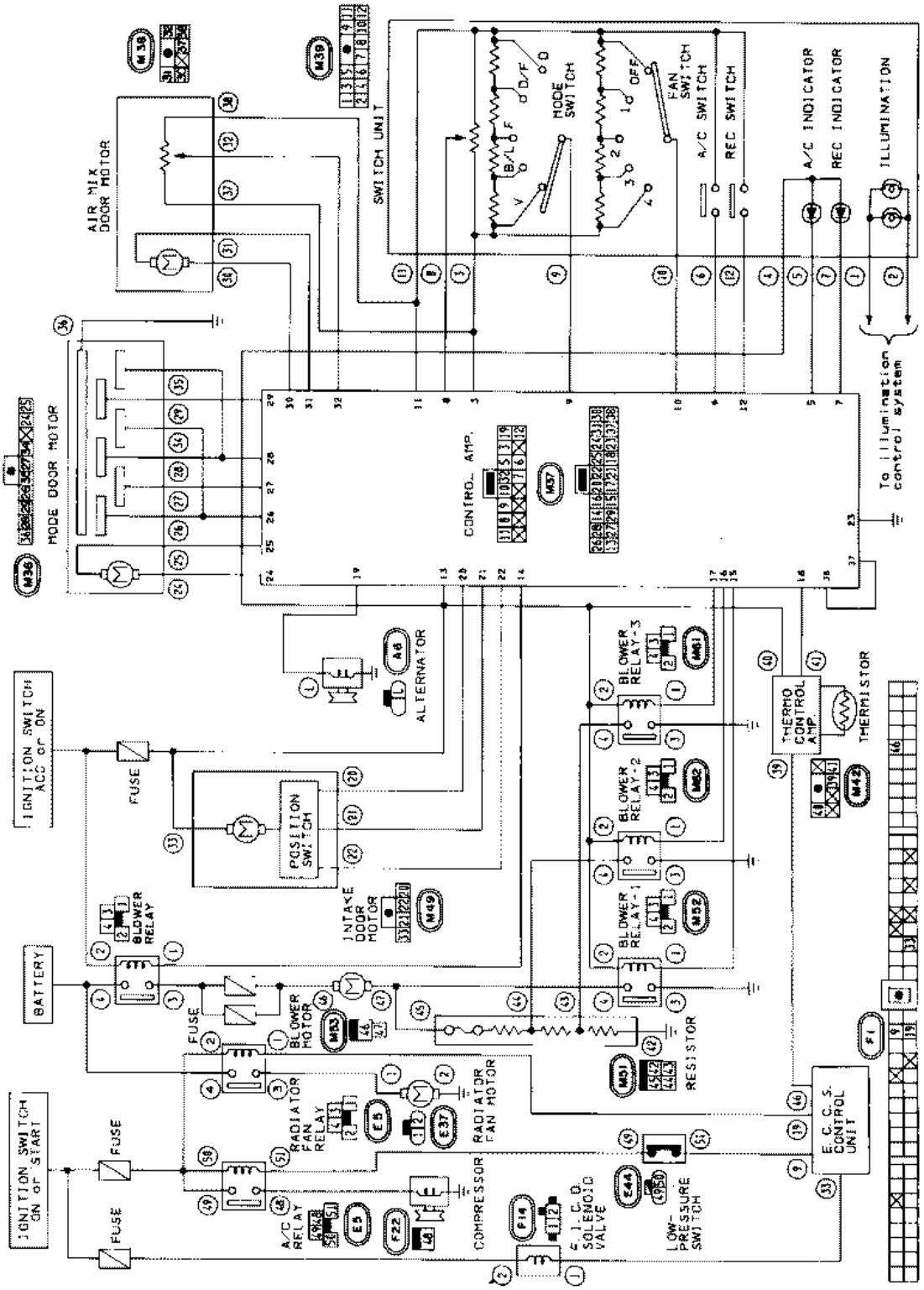
| Voltmeter terminal | | Voltage |
|---|---|---|
| ⊕ | ⊖ | |
| ⑬ | Body ground | Approximately. 12V |
| ⑭ | | |




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

1. Disconnect control amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check continuity between terminal No. ㉓ and body ground.

## Circuit Diagram for Quick Pinpoint Check

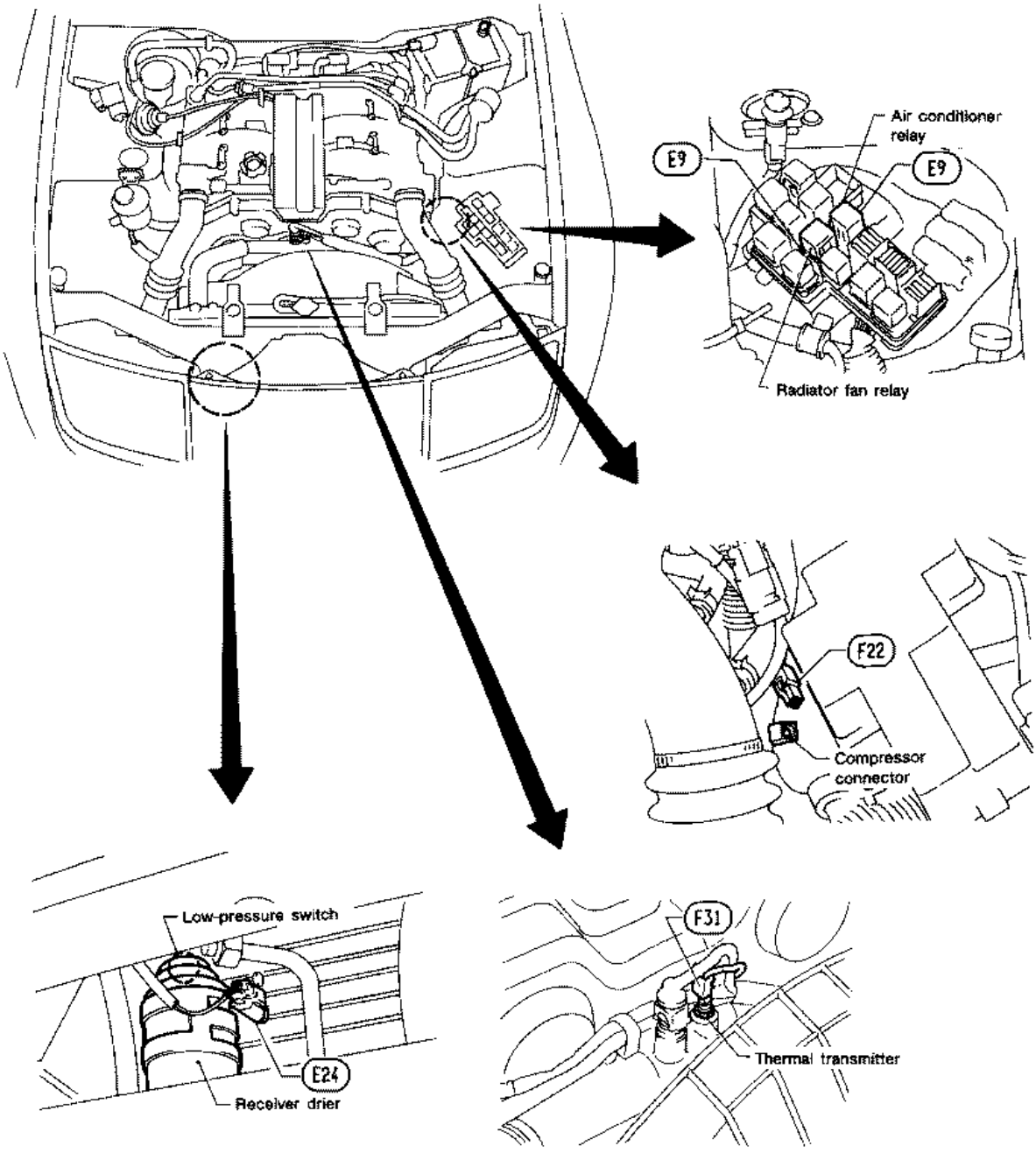



- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle " ◎ " are connected to the harness side connectors shown in the "Harness Layout for A/C System". (See pages HA-75 - 76.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle " ○ ".

SHA693C

## Harness Layout for A/C System

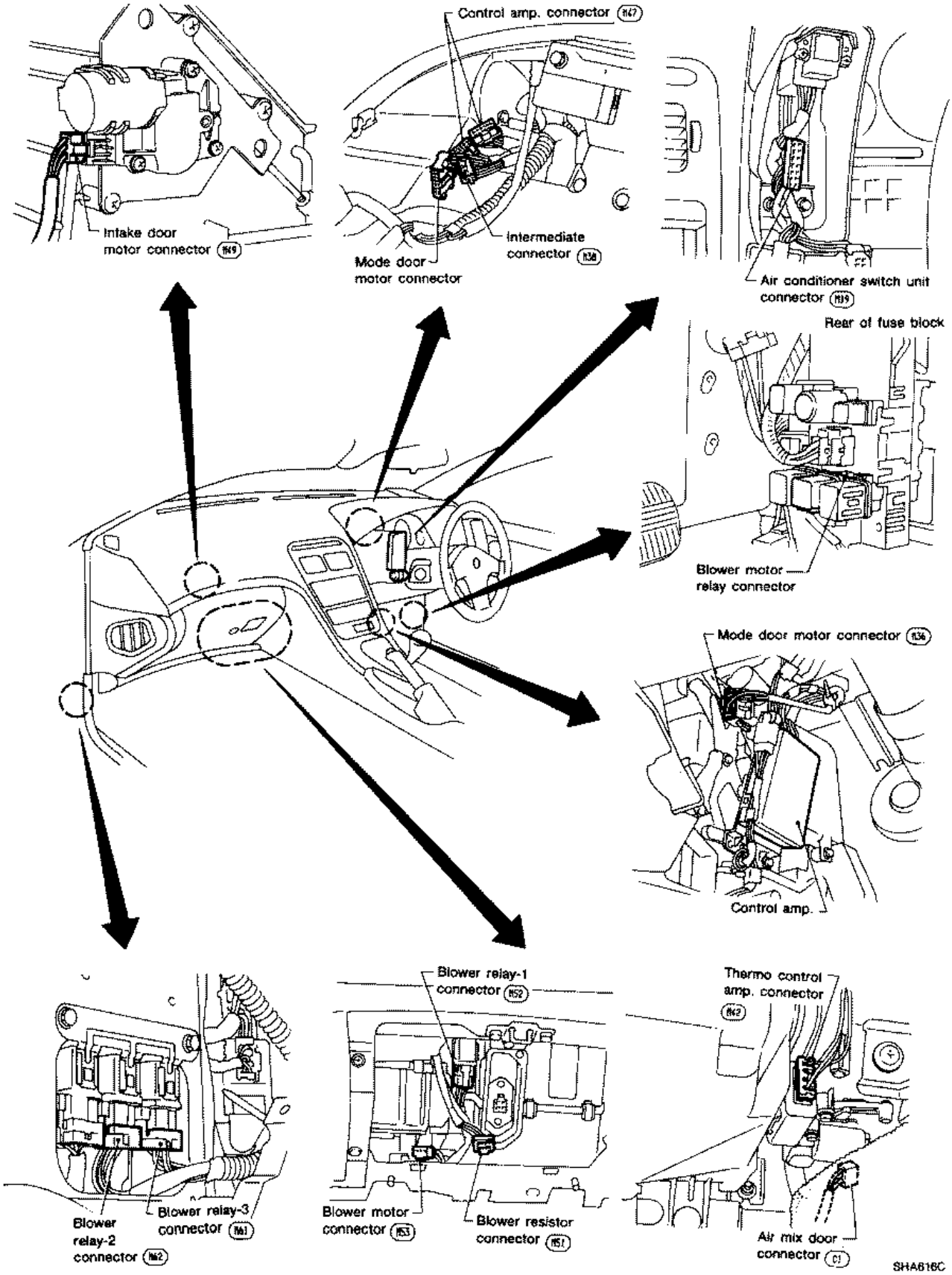
**ENGINE COMPARTMENT**




SHA615C

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

### PASSENGER COMPARTMENT



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

## Diagnostic Procedure 1

**SYMPTOM: Blower motor does not rotate.**

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

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

→ 2 → Ⓑ (Go to next page.)
→ 3 → Ⓒ (Go to next page.)
→ 4 → Ⓓ (Go to next page.)
→ 5 → Ⓔ (Go to next page.)

→ 1

**A**

CHECK POWER SUPPLY FOR BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approximately 12 volts exist between blower motor harness terminal No. (46) and body ground?

N.G. → Check fuses at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.)

O.K.

**B**

Check circuit continuity between blower motor harness terminal No. (47) and body ground.

N.G. → Reconnect blower motor harness connector.

O.K.

CHECK BLOWER MOTOR. (Refer to Electrical Components Inspection.)

N.G.

Replace blower motor.

**C**

CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND RESISTOR.
Do approximately 12 volts exist between resistor harness terminal No. (45) and body ground?

N.G. → Disconnect blower motor and resistor harness connectors.

**D**

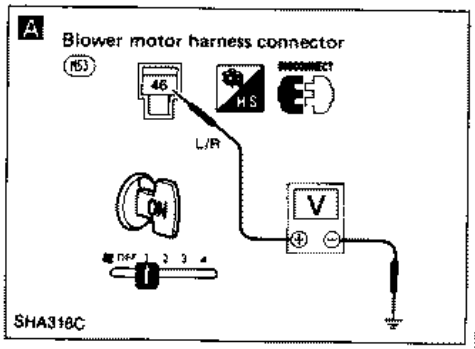
Note: Check circuit continuity between blower motor harness terminal No. (47) and resistor terminal No. (45).

O.K.

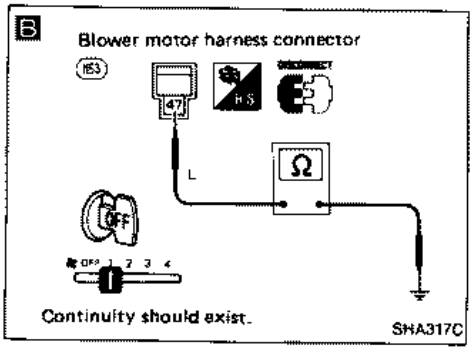
Ⓐ (Go to next page.)

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

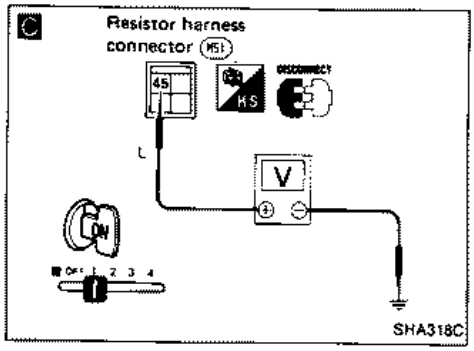
**A**



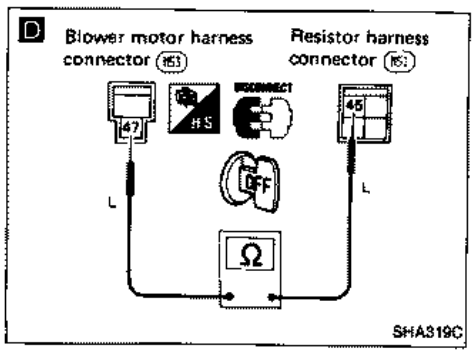

**B**




**C**

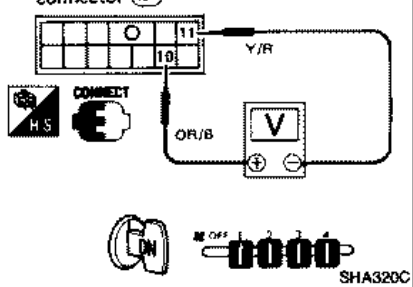



**D**



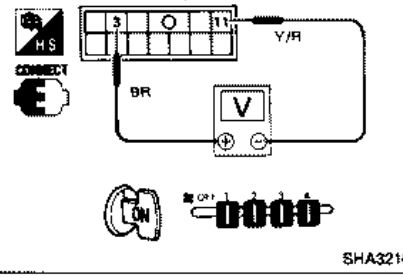
## Diagnostic Procedure 1 (Cont'd)

E Switch unit harness connector (M9)



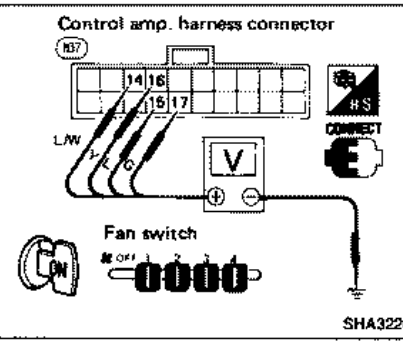

SHA320C

F Switch unit harness connector (M9)




SHA321C

G Control amp. harness connector (M7)




SHA322C

(A) 1 CHECK RESISTOR AFTER DISCONNECTING IT. (Refer to Electrical Components Inspection.)

(B) 2 (C) 3 (D) 4 (E) 5

O.K. → Reconnect resistor harness connector.

N.G. → Replace resistor.

E 2 3 4 5 CHECK FAN SWITCH CIRCUIT. Do normal volts exist between switch unit harness connector terminal?

| Flow chart No. (Fan SW position) | Terminal No. ⊕ | Terminal No. ⊖ | Normal voltage (Approx.) |
|---|---|---|---|
| 2 (1) | ⑩ | ⑪ | 2V |
| 3 (2) | | | 3V |
| 4 (3) | | | 4V |
| 5 (4) | | | 5V |

N.G. → F Do approx. 5 volts exist between control panel terminals No. ③ and No. ⑪?

O.K. → Replace fan switch.

O.K. → G CHECK CONTROL AMP. HARNESS TERMINAL VOLTAGE. Do approximately 12 volts or 0 volts exist between control amp. harness terminals No. ⑭, ⑮, ⑯ or ⑰ and body ground?

| Flow chart No. | Terminal No. | Fan SW operation ON | Fan SW operation OFF |
|---|---|---|---|
| 2 | ⑭ | 0V | Approx. 12V |
| 3 | ⑰ | 0V | Approx. 12V |
| 4 | ⑯ | 0V | Approx. 12V |
| 5 | ⑮ | 0V | Approx. 12V |

N.G. → Replace control amp.

O.K. → Replace blower motor.

## Diagnostic Procedure 2

**SYMPTOM: Air outlet does not change.**

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

**A**

CHECK MODE DOOR MOTOR POSITION SWITCH.
Measure voltage between switch unit harness connector terminals No. ⑨ and ⑪.

| Mode switch | Terminal No. ⊕ | Terminal No. ⊖ | Voltage (Approx.) |
|---|---|---|---|
| VENT | ⑨ | ⑪ | 5V |
| B/L | | | 4V |
| FOOT | | | 3V |
| F/D | | | 2V |
| DEF | | | 0V |

N.G. → Disconnect switch unit harness connector.

**B**

Do approximately 5 volts exist between switch unit harness connector terminal No. ③ and ⑪.

N.G. → **C**

O.K. → Replace switch unit.

**C**

Do approximately 5 volts exist between control amp. harness connectors No. ③ and ⑪.

N.G. → Replace control amp.

O.K. → Repair harness or connector.

O.K. → **D**

**D**

Measure voltage between control amp. harness connector terminals No. ⑨ and ⑪.

| Mode switch | Terminal No. ⊕ | Terminal No. ⊖ | Voltage (Approx.) |
|---|---|---|---|
| VENT | ⑨ | ⑪ | 5V |
| B/L | | | 4V |
| FOOT | | | 3V |
| F/D | | | 2V |
| DEF | | | 0V |

N.G. → Repair harness or connector.

O.K. → **E**

**E**

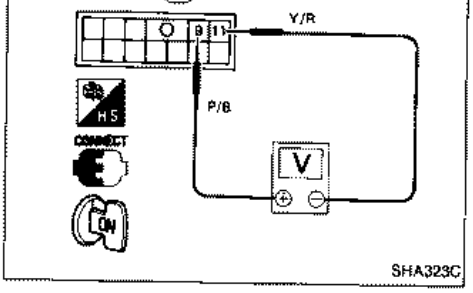
CHECK BODY GROUND CIRCUIT FOR MODE DOOR MOTOR.
Does continuity exist between mode door motor harness connector terminal No. ㊱ and body ground?

N.G. → Repair harness or connector.

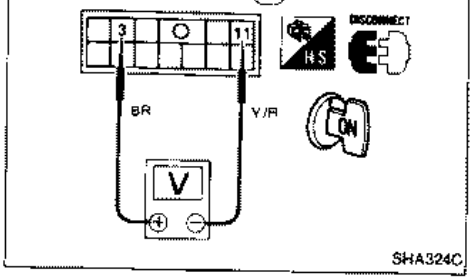
O.K. → Ⓐ

(Go to next page.)

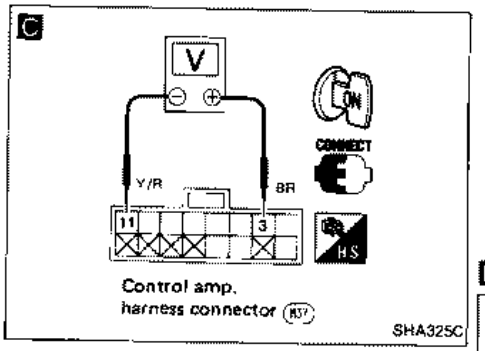
**A** Switch unit harness connector (M39)



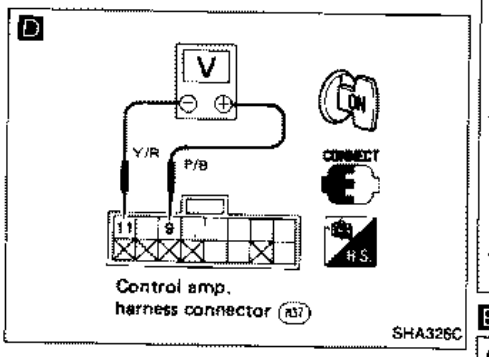

**B** Switch unit harness connector (M39)



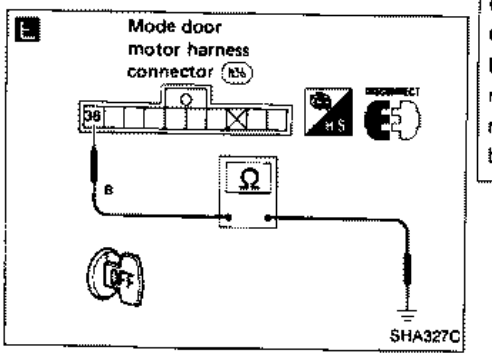

**C**




**D**

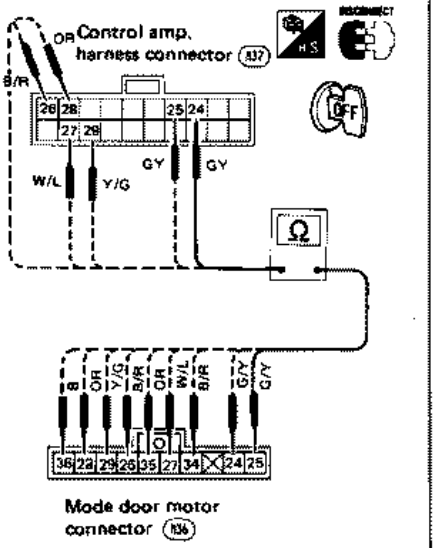



**E** Mode door motor harness connector (M36)



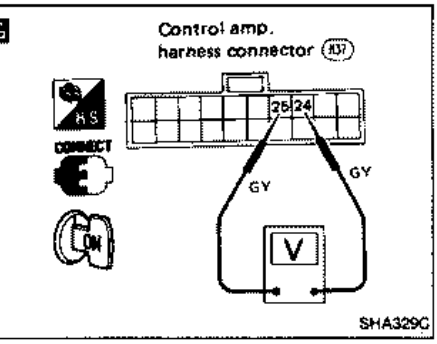
## Diagnostic Procedure 2 (Cont'd)

F




SHA328C

G




SHA329C

Ⓐ

F

Check circuit continuity between each terminal on control amp. and mode door motor. — N.G. → Repair harness or connector.

| Terminal No. | | Continuity |
|---|---|---|
| Control amp. | Mode door motor | |
| ㉔ | ㉔ | Yes |
| ㉕ | ㉕ | |
| ㉖ | ㉖ and ㉞ | |
| ㉗ | ㉗ | |
| ㉘ | ㉘ and ㉟ | |
| ㉙ | ㉙ | |

O.K.

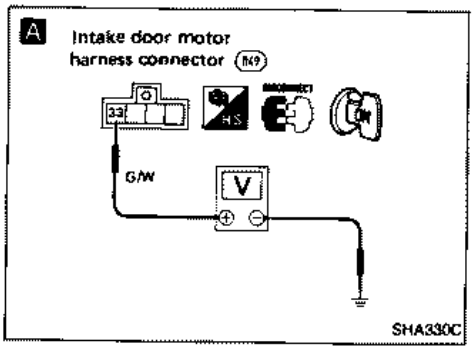
G

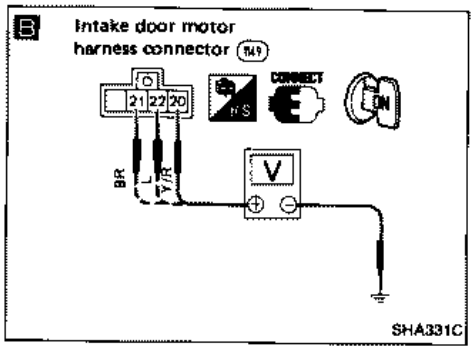
CHECK FOR OUTPUT OF CONTROL AMP.
Do approximately 12 volts exist between control amp. harness terminals No. ㉔ and ㉕ when mode is switched from "VENT" to "DEF" or when mode is switched from "DEF" to "VENT"? — N.G. → Replace control amp.

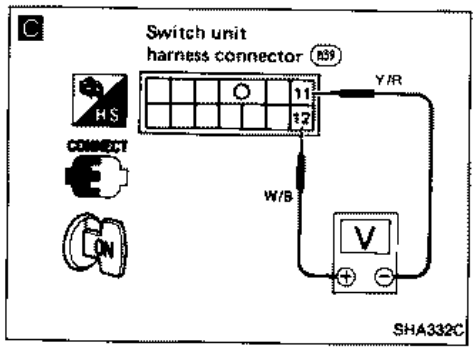
| Terminal No. | | Mode door motor | |
|---|---|---|---|
| ㉔ | ㉕ | Mode door operation | Direction of linkage rotation |
| ⊖ | ⊖ | Stop | Stop |
| ⊖ | ⊕ | VENT → DEF | Counter-clockwise |
| ⊕ | ⊖ | DEF → VENT | Clockwise |

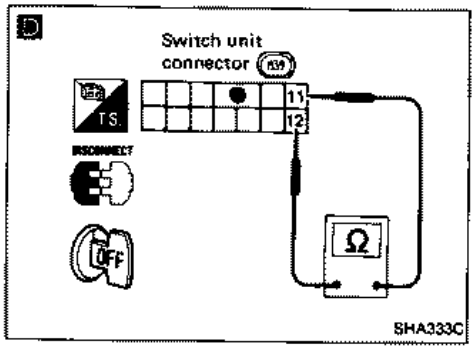
O.K.

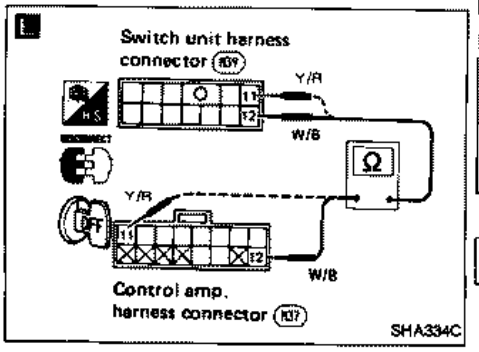
Replace mode door motor.




## Diagnostic Procedure 3

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

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

**A**

CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR.
Disconnect intake door motor harness connector.
Do approximately 12 volts exist between intake door motor harness terminal No. ㉝ and body ground?

N.G. → Check intake door motor power supply circuit continuity.

O.K. ↓

**B**

Select VENT mode and check the voltage between intake door motor harness terminals No. ⑳, ㉑, ㉒ and body ground.

| A/C switch | REC switch | Mode | Terminal voltage (Approx.) ⑳ | ㉑ | ㉒ |
|---|---|---|---|---|---|
| ON | ON | REC | 12V | 12V | 0V |
| ON | OFF | REC/FRE | 12V | 0V | 12V |
| OFF | OFF | FRE | 0V | 12V | 12V |

N.G. → **C**

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

| A/C switch | Terminal No. ⑥ | ⑪ | Voltage (Approx.) |
|---|---|---|---|
| Switch pressed | ⊕ | ⊖ | 0V |
| Switch free | | | 5V |

N.G. → Disconnect control panel connector.

O.K. → Replace control amp.

O.K. ↓

Replace intake door motor.

**D**

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

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

N.G. → Replace control panel.

O.K. ↓

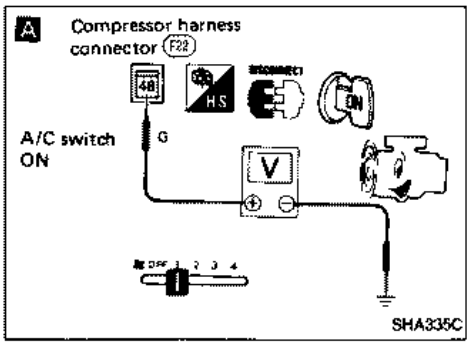
**E**

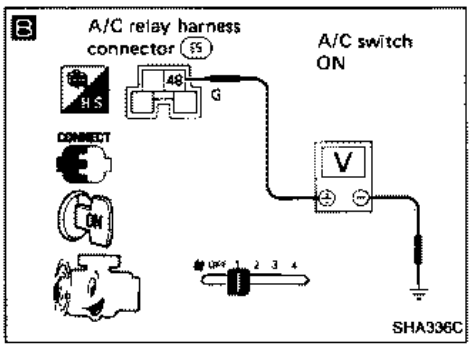
Check circuit continuity between control panel harness terminal No. ⑫ (⑪) and control amp. harness terminal No. ⑫ (⑪).

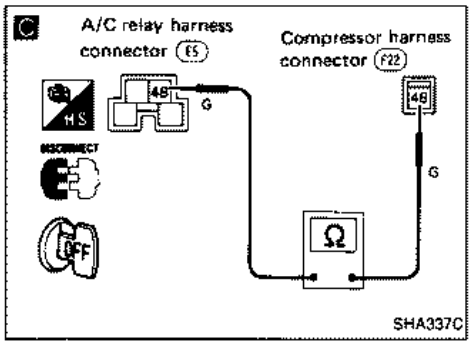
N.G. → Repair harness or connector.

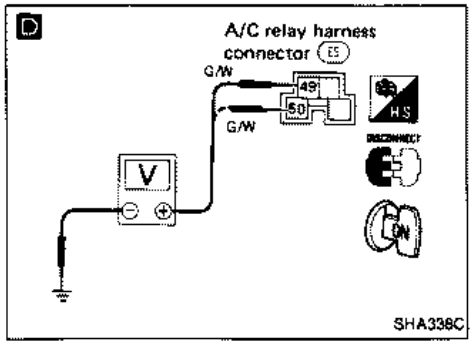
O.K. ↓

Replace control amp.




## Diagnostic Procedure 4

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

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

A

CHECK POWER SUPPLY FOR COMPRESSOR.
Disconnect compressor harness connector.
Do approximately 12 volts exist between compressor harness connector terminal No. (48) and body ground?

O.K. → Check magnet clutch coil.

N.G. → Replace magnet clutch.
Refer to COMPRESSOR — Model MJS170 (HITACHI make).

N.G. → B

B

CHECK A/C RELAY OPERATION.
Do approximately 12 volts exist between A/C relay harness connector terminal No. (48) and body ground?

N.G. → D

O.K. → Disconnect A/C relay harness connector.

C

Note: Check circuit continuity between A/C relay harness connector terminal No. (48) and compressor harness connector terminal No. (48).

D

CHECK POWER SUPPLY FOR A/C RELAY.
Disconnect A/C relay.
Do approximately 12 volts exist between A/C relay harness terminals No. (49), (50) and body ground?

O.K. → CHECK A/C RELAY AFTER DISCONNECTING IT.
(Refer to Electrical Components Inspection.)

N.G. → CHECK POWER SUPPLY CIRCUIT AND FUSE AT FUSE BLOCK.
(Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.)

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

N.G. → Replace A/C relay.

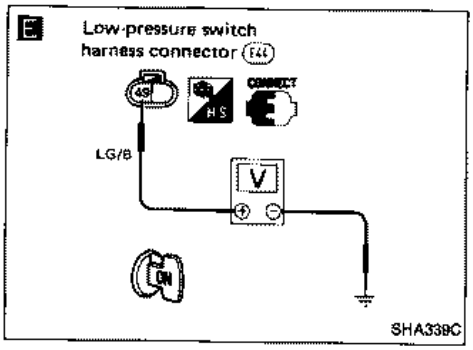
O.K. → Reconnect A/C relay.

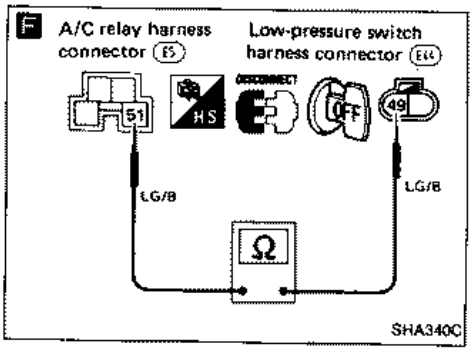
→ (A)

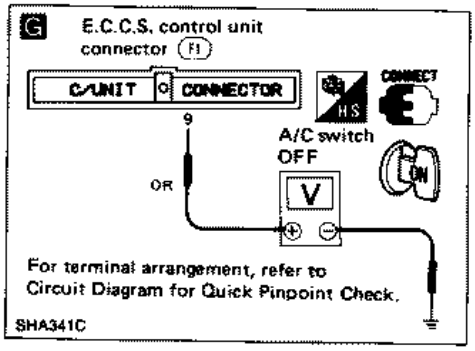
(Go to next page.)

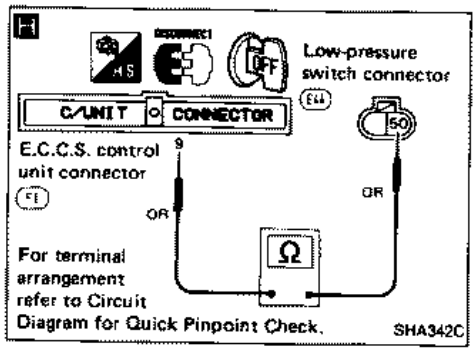
**Note:**
**If the result is N.G. after checking circuit continuity, repair harness or connector.**

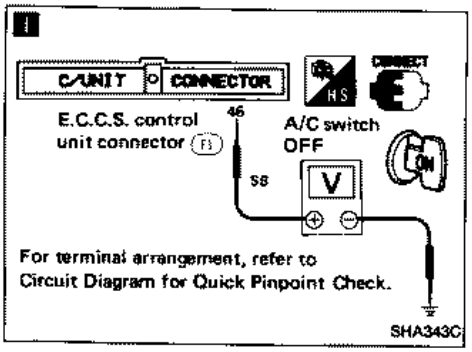
## Diagnostic Procedure 4 (Cont'd)




Ⓐ

**E** CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approximately 12 volts exist between low-pressure switch harness connector terminal No. ㊾ and body ground?

N.G. → **F** Check circuit continuity between A/C relay harness connector terminal No. ㊶ and low-pressure switch harness connector terminal No. ㊾.

O.K. ↓

**G** Do approximately 12 volts exist between E.C.C.S. control unit harness terminal No. ⑨ and body ground?

N.G. → **H** Check circuit continuity between low-pressure switch harness connector terminal No. ㊿ and E.C.C.S. control unit harness connector terminal No. ⑨.

Note

O.K. ↓

Note: CHECK LOW-PRESSURE SWITCH.
(Refer to Electrical Components Inspection.)

N.G. ↓

Replace low-pressure switch.

O.K. ↓

**I** Do approximately 8 to 9 volts exist between E.C.C.S. control unit harness connector terminal No. ㊻ and body ground?

N.G. → CHECK E.C.C.S. CONTROL UNIT.
(Refer to EF & EC section.)

O.K. ↓

Disconnect thermo control amp. harness connector.

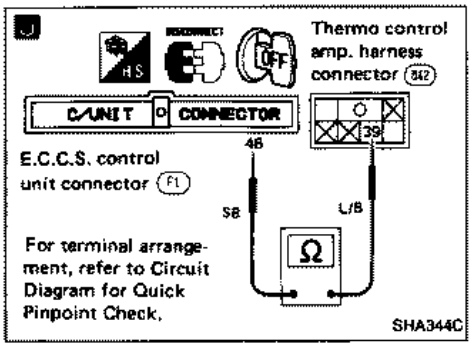
O.K. ↓

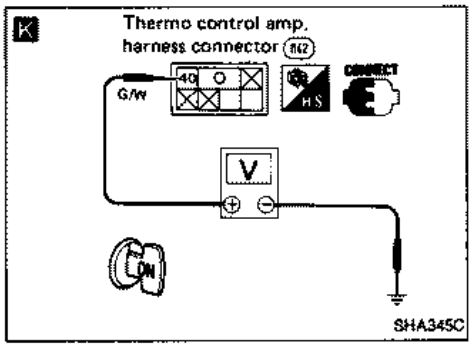
Ⓑ

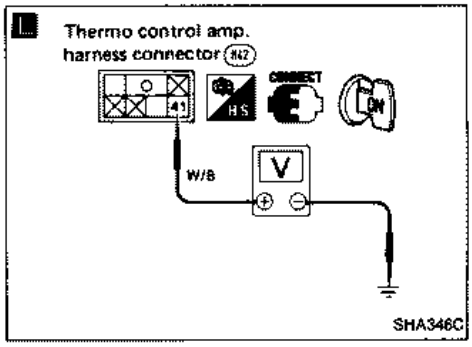
(Go to next page.)

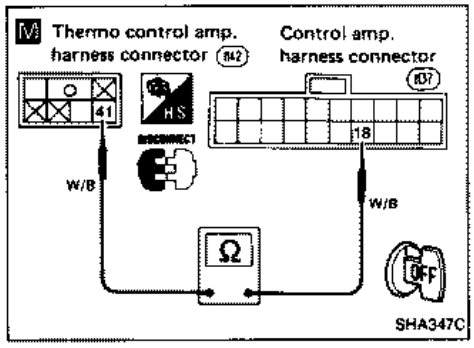
**Note:**
**If the result is N.G. after checking circuit continuity, repair harness or connector.**

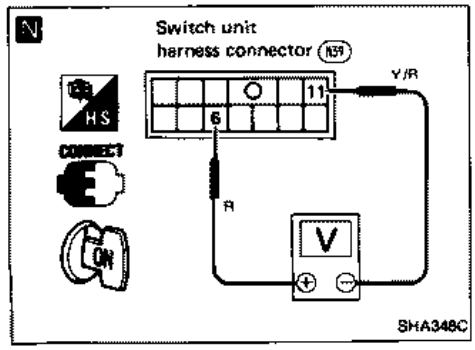
## Diagnostic Procedure 4 (Cont'd)




Ⓑ

**J** Note

Check circuit continuity between thermo control amp. harness connector terminal No. ㊴ and E.C.C.S. control unit harness connector terminal No. ㊻.

O.K.

**K** CHECK POWER SUPPLY FOR TEHRMO CONTROL AMP.
Do approximately 12 volts exist between thermo control amp. harness connector terminal No. ㊵ and body ground?

N.G. → CHECK POWER SUPPLY CIRCUIT AND FUSE AT FUSE BLOCK.
(Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.)

O.K.

**L** Is the voltage between thermo control amp. harness connector terminal No. ㊶ and body ground approximately 0V?

N.G. → Replace thermo control amp.

O.K.

**M** Note

Check continuity between thermo control amp. harness connector terminal No. ㊶ and control amp. harness connector terminal No. ⑱.

O.K.

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

| REC switch | Terminal No. ⑫ | Terminal No. ⑪ | Voltage (Approx.) |
|---|---|---|---|
| Switch pressed | ⊕ | ⊖ | 0V |
| Switch free | ⊕ | ⊖ | 5V |

N.G. → Disconnect switch unit connector.

O.K.

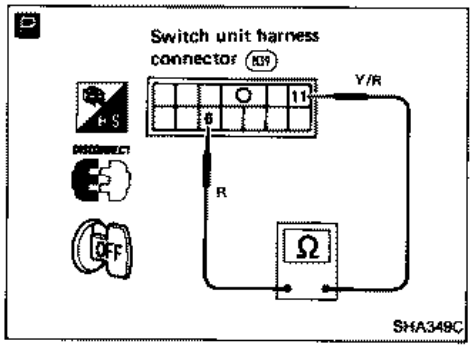
Replace control amp.

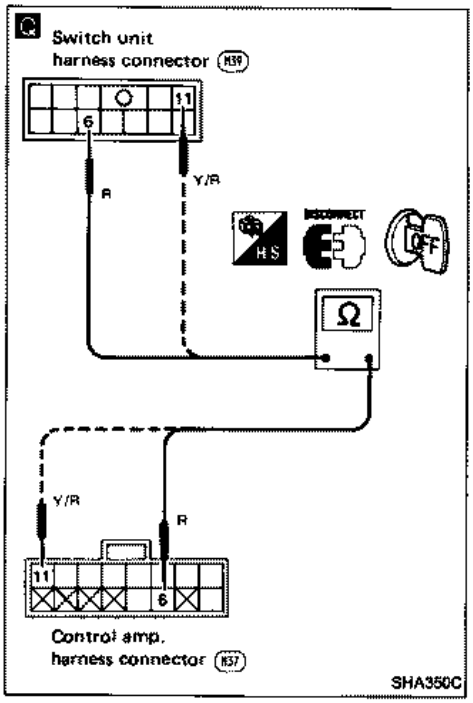
Ⓒ

(Go to next page.)

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

## Diagnostic Procedure 4 (Cont'd)




Ⓒ

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

N.G. → Replace switch unit.

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

O.K.

Note

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

O.K.

Replace control amp.

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

## Diagnostic Procedure 5

**SYMPTOM: Illumination or control panel indicators do not come on.**

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

Turn ignition switch and lighting switch ON.

↓

CHECK ILLUMINATION AND INDICATORS.

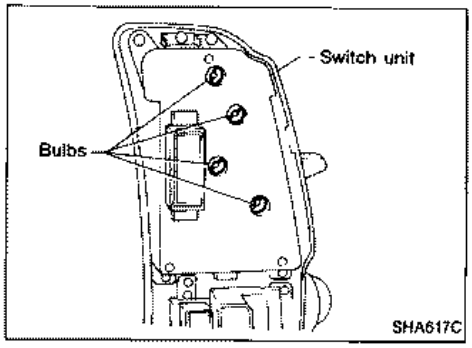
- Turn A/C, REC and fan ON.
- Rotary VENT, B/L, FOOT, F/D and DEF switches in order.
- Check for incidents and follow the repairing methods as shown.

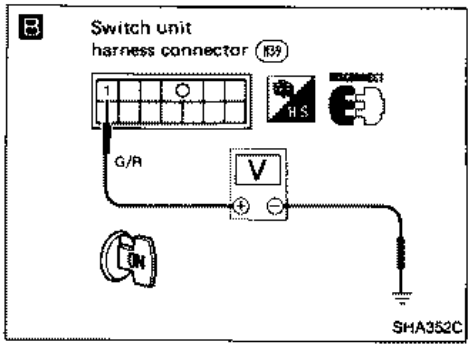
| INCIDENT | | | How to repair |
|---|---|---|---|
| ILL Control panel | A/C | REC | |
| X | O | O | Go to DIAGNOSTIC PROCEDURE 5-1. |
| O | X | O | Go to DIAGNOSTIC PROCEDURE 5-2. |
| O | O | X | Go to DIAGNOSTIC PROCEDURE 5-3. |
| O | X | X | Go to DIAGNOSTIC PROCEDURE 5-4. |

O: Illumination or indicator comes on.
X: Illumination or indicator does not come on.

## Diagnostic Procedure 5 (Cont'd)

### DIAGNOSTIC PROCEDURE 5-1




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

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

O.K. ↓

Turn ignition switch and lighting switch OFF.

A ↓

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

N.G. → Replace illumination bulb(s).

O.K. ↓

B

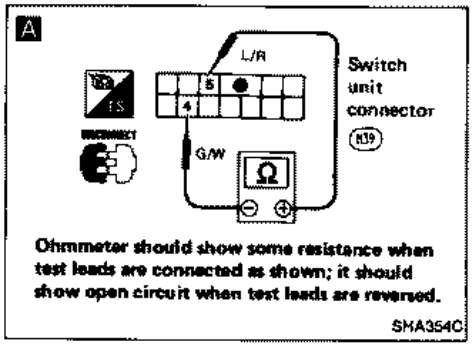
CHECK POWER SUPPLY FOR ILLUMINATION WITH LIGHTING SWITCH ON.
Do approximately 12 volts exist between switch unit connector harness terminal No. ⓕ and body ground?

N.G. → CHECK POWER SUPPLY FOR ILLUMINATION SYSTEM. Refer to Illumination/Wiring Diagram in EL section.

O.K. ↓

CHECK TIME CONTROL SYSTEM.
Refer to TIME CONTROL SYSTEM in EL section.

## Diagnostic Procedure 5 (Cont'd)




### DIAGNOSTIC PROCEDURE 5-2

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

N.G. → Go to **Diagnostic Procedure 4.**

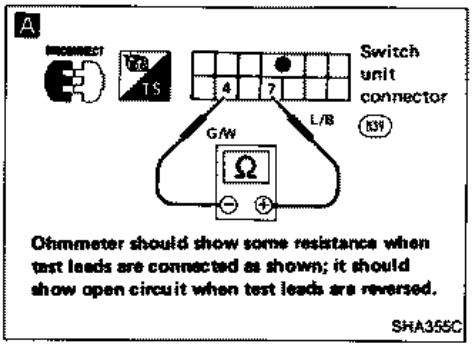
O.K. ↓

A

Check circuit continuity of L.E.D.

N.G. ↓

Replace switch unit.




### DIAGNOSTIC PROCEDURE 5-3

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

N.G. → Go to **Diagnostic Procedure 3.**

O.K. ↓

A

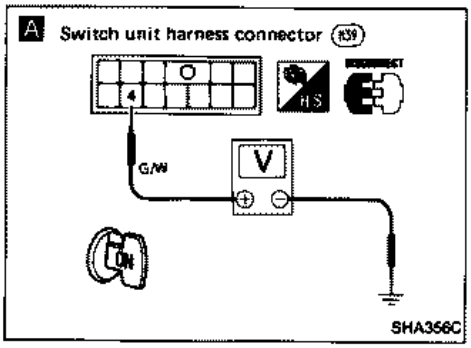
Check circuit continuity of L.E.D.

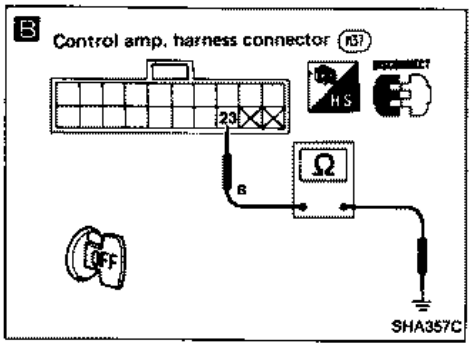
N.G. ↓

Replace control panel.

## Diagnostic Procedure 5 (Cont'd)

### DIAGNOSTIC PROCEDURE 5-4




Turn ignition switch and lighting switch OFF.

↓

Disconnect switch unit harness connector.

↓

A

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

N.G. → Check harness of switch unit power supply circuit. (Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.)

O.K. ↓

B

CHECK BODY GROUND CIRCUIT FOR CONTROL AMP.
Does continuity exist between control amp. harness connector terminal No. ㉓ and body ground?

O.K. ↓

Replace control amp.

## Diagnostic Procedure 6

**SYMPTOM: Temperature of air outlet does not change.**

A

CHECK TEMPERATURE CONTROL LEVER.
Measure voltage between control panel harness connector terminals No. ⑧ and ⑪.

| Temp. control lever | Terminal No. ⊕ | Terminal No. ⊖ | Voltage (approx.) |
|---|---|---|---|
| Full hot | ⑧ | ⑪ | 5V |
| Full cold | ⑧ | ⑪ | 0V |

N.G. → Disconnect control amp. harness connector.

E

Check if approximately 5 volts exist between control panel harness connector terminals No. ⑧ and ⑪.

N.G. → Replace control amp.

O.K. → Ⓐ (Go to next page.)

O.K. →

B

Measure voltage between control amp. harness connector terminals No. ⑧ and ⑪.

| Temp. control lever | Terminal No. ⊕ | Terminal No. ⊖ | Voltage (approx.) |
|---|---|---|---|
| Full hot | ⑧ | ⑪ | 5V |
| Full cold | ⑧ | ⑪ | 0V |

O.K. →

C

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

| Terminal No. Control amp. | Terminal No. Air mix door motor | Continuity |
|---|---|---|
| ㉚ | ㉚ | Yes |
| ㉛ | ㉛ | |
| ③ | ㊲ | |
| ㉜ | ㉜ | |
| ① | ㊱ | |

N.G. → Repair harness or connector.

O.K. →

D

CHECK FOR CONTROL AMP. OUTPUT.
Check if 12 volts exist between control amp. harness connector terminals No. ㉚ and ㉛ when temp. control lever is moved.

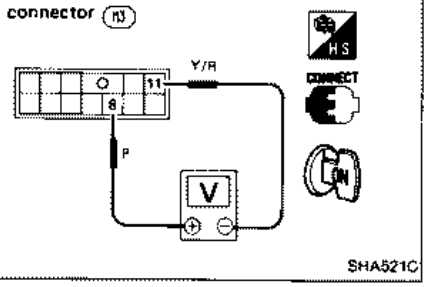
| Terminal No. | Terminal No. | Air mix door motor: Air mix door operation | Direction of linkage rotation |
|---|---|---|---|
| ㉚ | ㉛ | | |
| ⊖ | ⊖ | Stop | Stop |
| ⊖ | ⊕ | Cold → Hot | Counter-clockwise |
| ⊕ | ⊖ | Hot → Cold | Clockwise |

N.G. → Replace control amp.

O.K. → Replace air mix door motor.

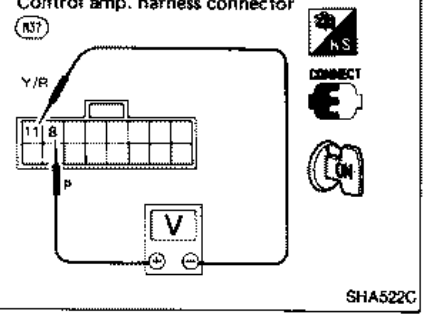
A

Control panel harness connector (M3)



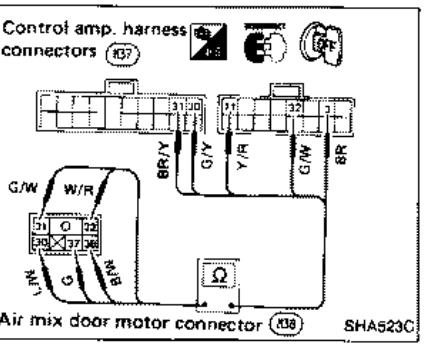

B

Control amp. harness connector (M37)



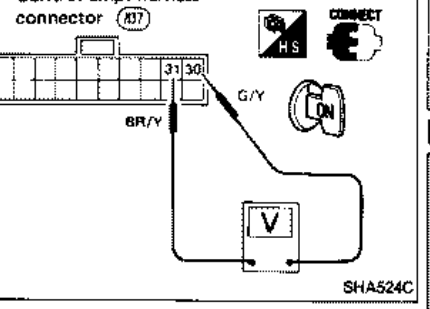

C

Control amp. harness connectors (M37)



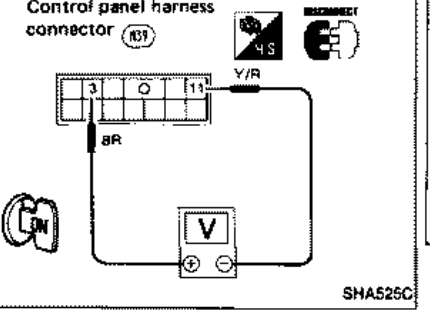

D

Control amp. harness connector (M37)

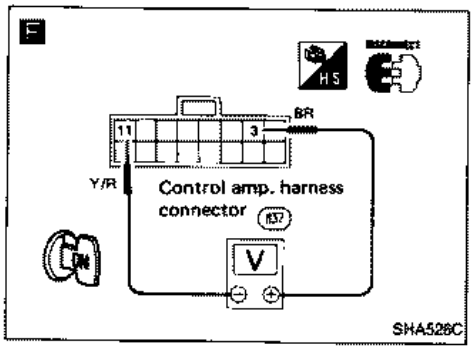



E

Control panel harness connector (M31)



## Diagnostic Procedure 6 (Cont'd)




F

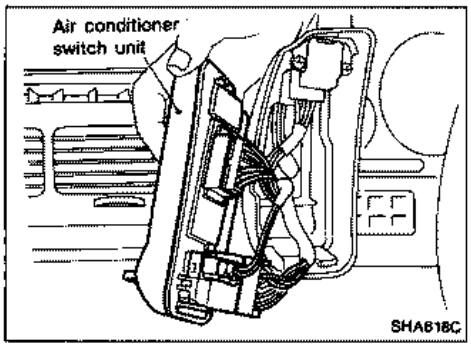
Ⓐ

Check if approximately 5 volts exist between control amp. harness connector terminals No. ③ and ⑪.

N.G. → Replace control amp.

O.K. ↓

Repair harness or connector.

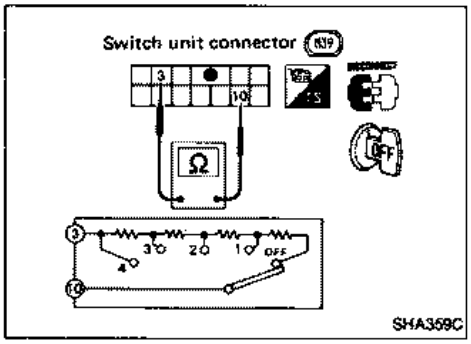


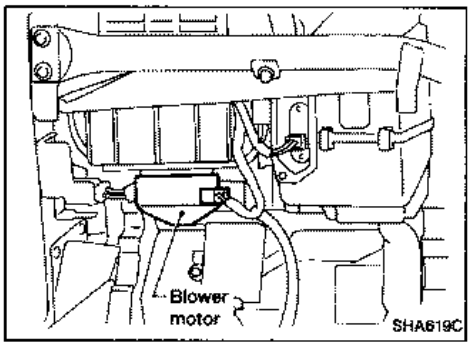

## Electrical Components Inspection

### FAN SWITCH

Check resistance between terminals at each switch position.

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

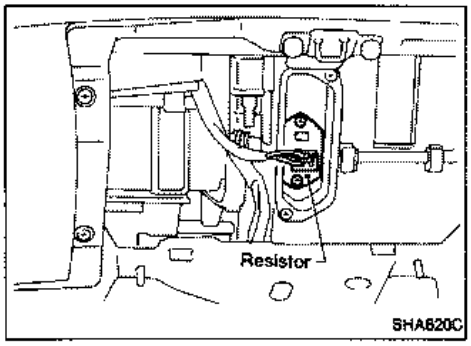



### BLOWER MOTOR

Confirm smooth rotation of the blower motor.

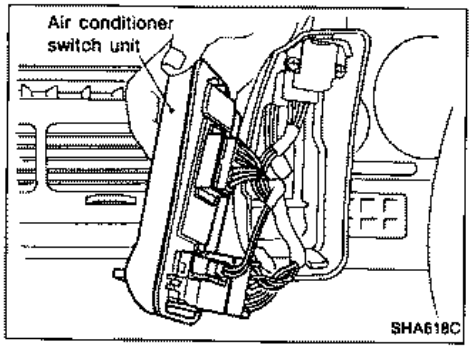
- Ensure that there are no foreign particles inside the intake unit.




### BLOWER RESISTOR

Check continuity between terminals.

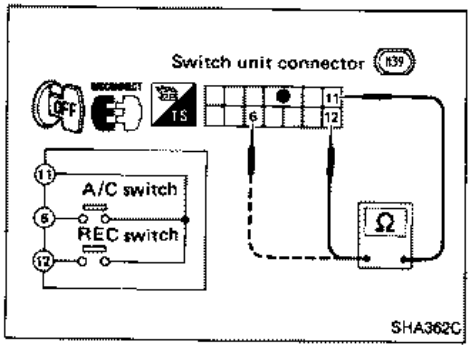
## Electrical Components Inspection (Cont'd)

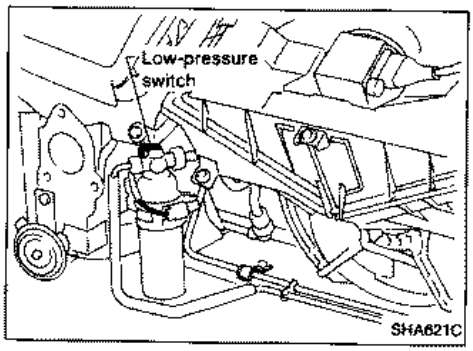



### A/C SWITCH

Check continuity between terminals at each switch position.

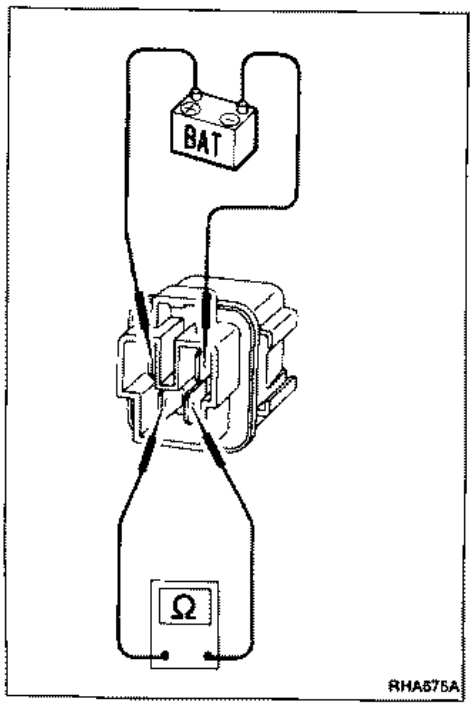
| Switch condition | Terminal No. | | Continuity |
|---|---|---|---|
| While A/C switch is pushed | ⑥ | ⑪ | Yes |
| While REC switch is pushed | ⑫ | ⑪ | Yes |




### LOW-PRESSURE SWITCH

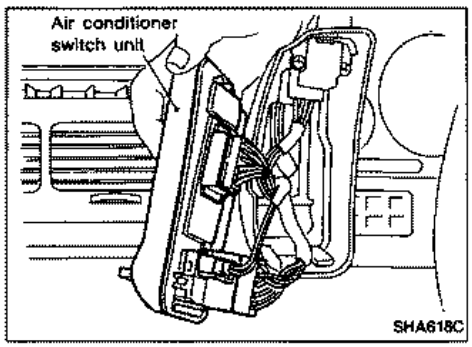
| High-pressure side line pressure kPa (bar, kg/cm², psi) | Operation | Continuity |
|---|---|---|
| 196 (1.96, 2.0, 28) | Turn OFF | Does not exist |
| 206 (2.06, 2.1, 30) | Turn ON | Exist |




### RELAY

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

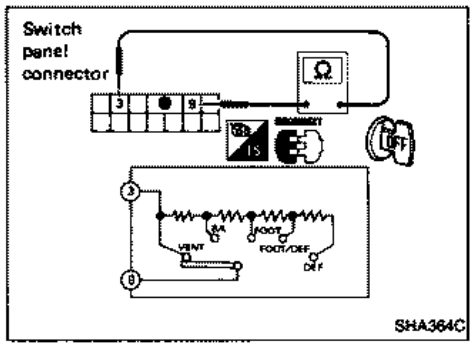
## Electrical Components Inspection (Cont'd)

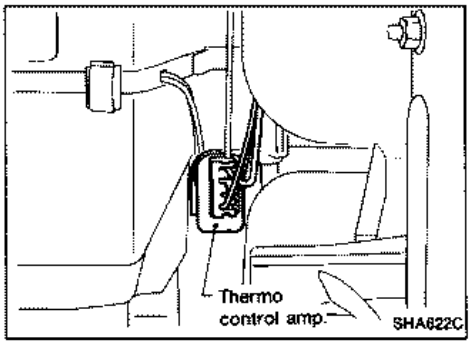



### MODE SWITCH

Check resistance between terminals at each switch position.

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




### THERMO CONTROL AMP.

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

| Evaporator outlet air temperature °C (°F) | Thermo control amp. operation | Voltage (Approx.) |
|---|---|---|
| Decreasing to 3.0 (37) | Turn OFF | 12V |
| Increasing to 4.5 (40) | Turn ON | 0V |

## Features

### OUTLET AIR TEMPERATURE CONTROL (Air mix door control)

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

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

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

### FAN SPEED CONTROL

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

### INTAKE DOOR CONTROL

The A.T.C. system adjusts the intake door position once every sixty seconds. The system is programmed to take in outside air as much as possible.

### OUTLET DOOR CONTROL

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

### COMPRESSOR MAGNET CLUTCH CONTROL

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

### SELF-DIAGNOSTIC SYSTEM

The A.T.C. system contains an on-board diagnostic system which can be used to check the A.T.C. system sensors and motors and any trouble data stored in the memory.

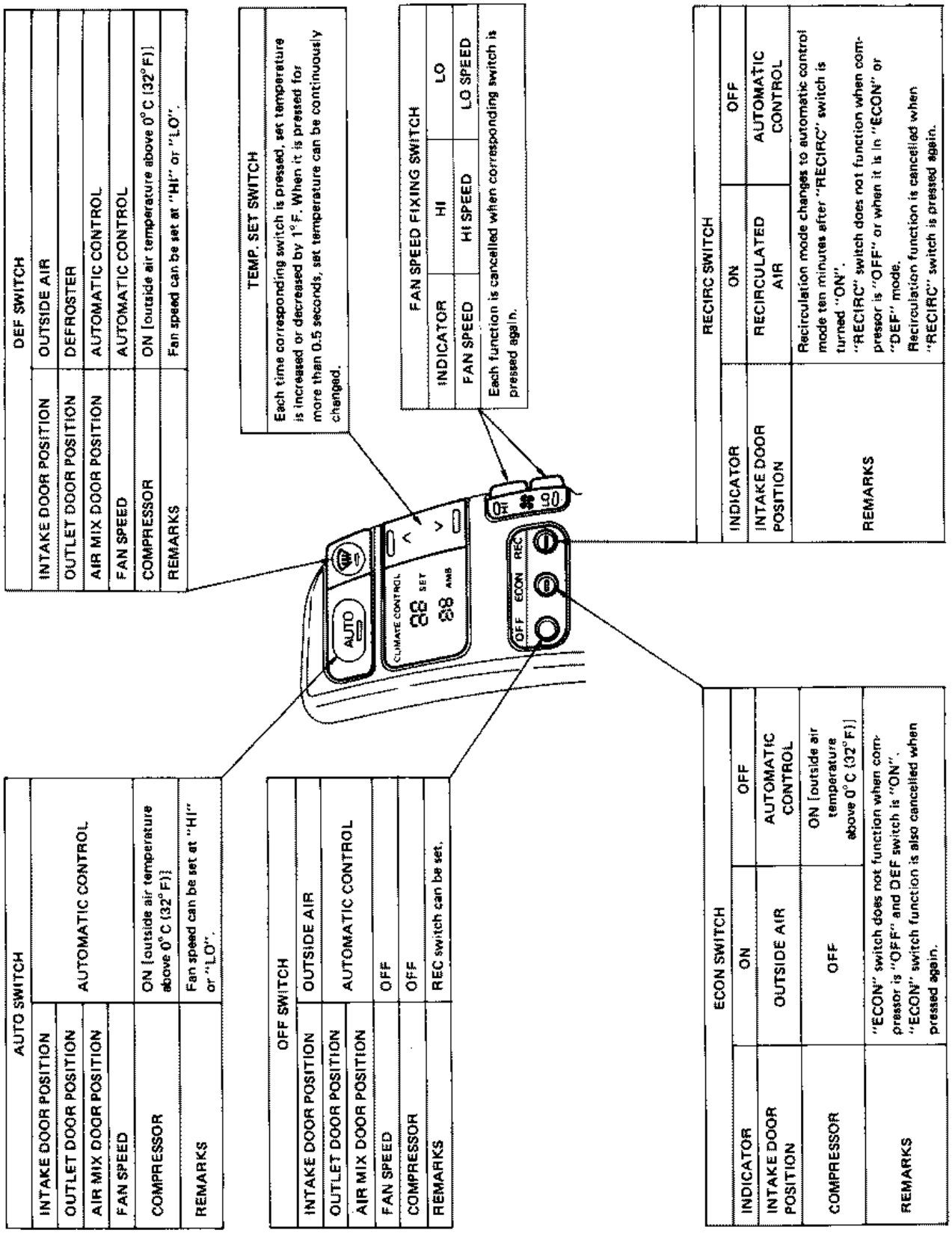
Pushing the "AUTO" and "OFF" switches at the same time for more than 5 seconds will give the self-diagnostic mode. There are 4 kinds of self-diagnostic systems (STEP 1 to STEP 4). Each step can be accessed by pushing the "AUTO" switch. The functions of each step are as follows:

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

*: **Target temperature**

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

## Switch Functions on Control Unit




| AUTO SWITCH | |
|---|---|
| INTAKE DOOR POSITION | AUTOMATIC CONTROL |
| OUTLET DOOR POSITION | |
| AIR MIX DOOR POSITION | |
| FAN SPEED | |
| COMPRESSOR | ON [outside air temperature above 0°C (32°F)] |
| REMARKS | Fan speed can be set at "HI" or "LO". |

| OFF SWITCH | |
|---|---|
| INTAKE DOOR POSITION | OUTSIDE AIR |
| OUTLET DOOR POSITION | AUTOMATIC CONTROL |
| AIR MIX DOOR POSITION | |
| FAN SPEED | OFF |
| COMPRESSOR | OFF |
| REMARKS | REC switch can be set. |

| ECON SWITCH | | |
|---|---|---|
| INDICATOR | ON | OFF |
| INTAKE DOOR POSITION | OUTSIDE AIR | AUTOMATIC CONTROL |
| COMPRESSOR | OFF | ON [outside air temperature above 0°C (32°F)] |
| REMARKS | "ECON" switch does not function when compressor is "OFF" and DEF switch is "ON". "ECON" switch function is also cancelled when pressed again. | |

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

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

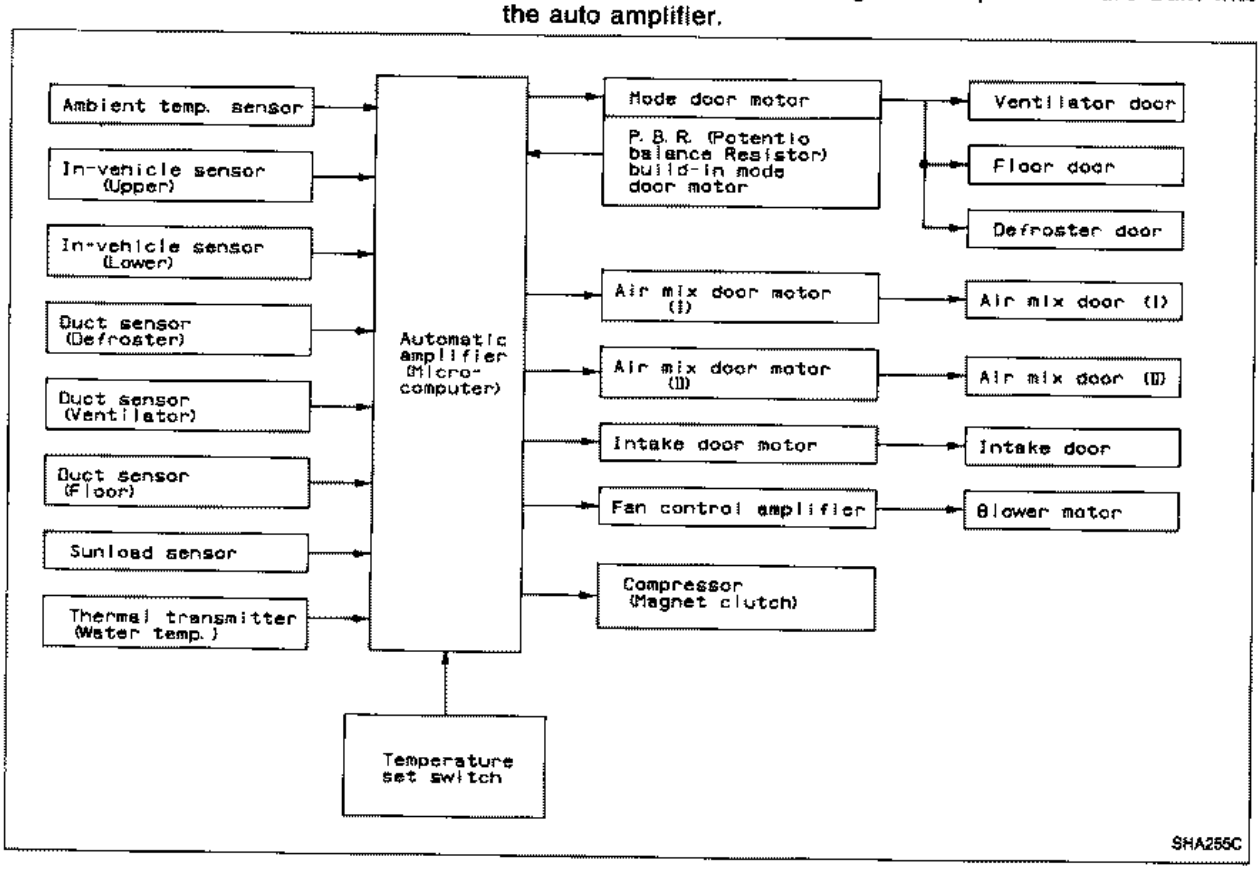
| FAN SPEED FIXING SWITCH | | |
|---|---|---|
| INDICATOR | HI | LO |
| FAN SPEED | HI SPEED | LO SPEED |
| Each function is cancelled when corresponding switch is pressed again. | | |

| RECIRC SWITCH | | |
|---|---|---|
| INDICATOR | ON | OFF |
| INTAKE DOOR POSITION | RECIRCULATED AIR | AUTOMATIC CONTROL |
| REMARKS | Recirculation mode changes to automatic control mode ten minutes after "RECIRC" switch is turned "ON". "RECIRC" switch does not function when compressor is "OFF" or when it is in "ECON" or "DEF" mode. Recirculation function is cancelled when "RECIRC" switch is pressed again. | |

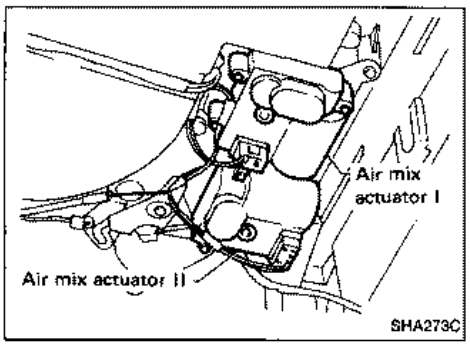
## Specifications

### AUTO AMPLIFIER

The auto amplifier has a built-in microcomputer which processes information from the A.T.C. system sensors. Signals are sent from the auto amplifier to activate the A.T.C. system depending upon the information sent by these sensors and the set temperature selected on the switch panel.
The A.T.C. system's self-diagnostic capabilities are built into the auto amplifier.



## Specifications (Cont'd)

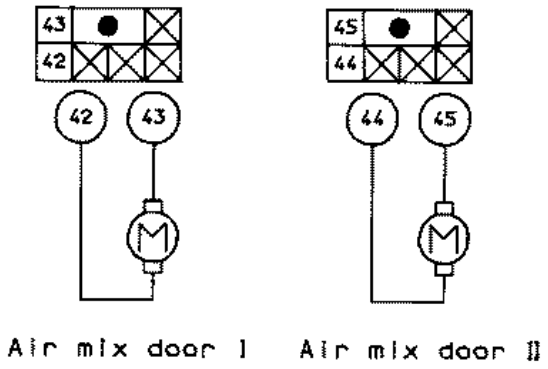



### AIR MIX DOOR I and II MOTORS

**Component and related parts**

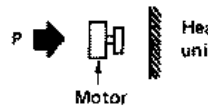
- Auto amplifier
- Air mix door motors
- In-vehicle sensors (upper and lower)
- Duct sensors (vent, floor, defroster)
- Ambient sensor
- sunload sensor

**Operation of air mix door I and II motors**




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

*:




"Direction of lever movement" is as viewed from arrow P

SHA274C

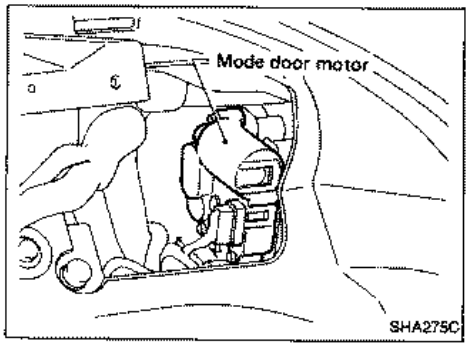
**System operation**

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

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

## Specifications (Cont'd)

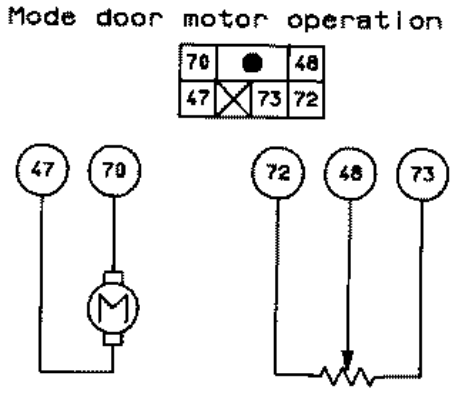
### MODE DOOR MOTOR




**Component and related parts**

- Auto amplifier
- Mode door motor with potential ballast resister (P.B.R.)
- Lower in-vehicle sensor
- Ambient sensor
- Sunload sensor

**Mode door motor operation**




| ⑰ | ⑩ | Mode door operation | Direction of side link rotation |
|---|---|---|---|
| ⊖ | ⊕ | VENT → DEF | Clockwise |
| ⊖ | ⊖ | STOP | STOP |
| ⊕ | ⊖ | DEF → VENT | Counterclockwise |

SHA276C

**System operation**

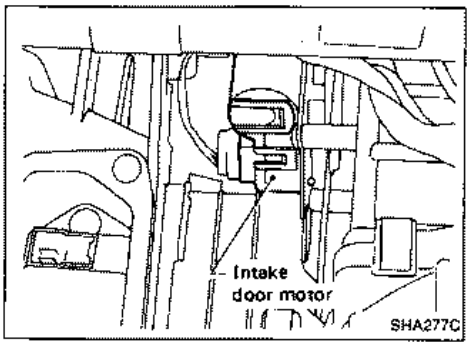
The mode door motor is attached to the heater unit. The motor operates a cam assembly which moves the air outlet doors. The auto amplifier controls air distribution to the VENT, DEF and FOOT outlets. Outlet door position is conveyed to the auto amplifier by the P.B.R. built into the mode door motor.

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

When the set temperature is decreased or when the sunload is increased, the air flow volume from the vent outlets is increased.

## Specifications (Cont'd)

### INTAKE DOOR MOTOR

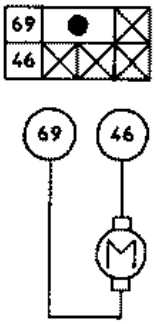



**Component and related parts**

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

**Intake door operation**

Intake door operation




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

SHA278C

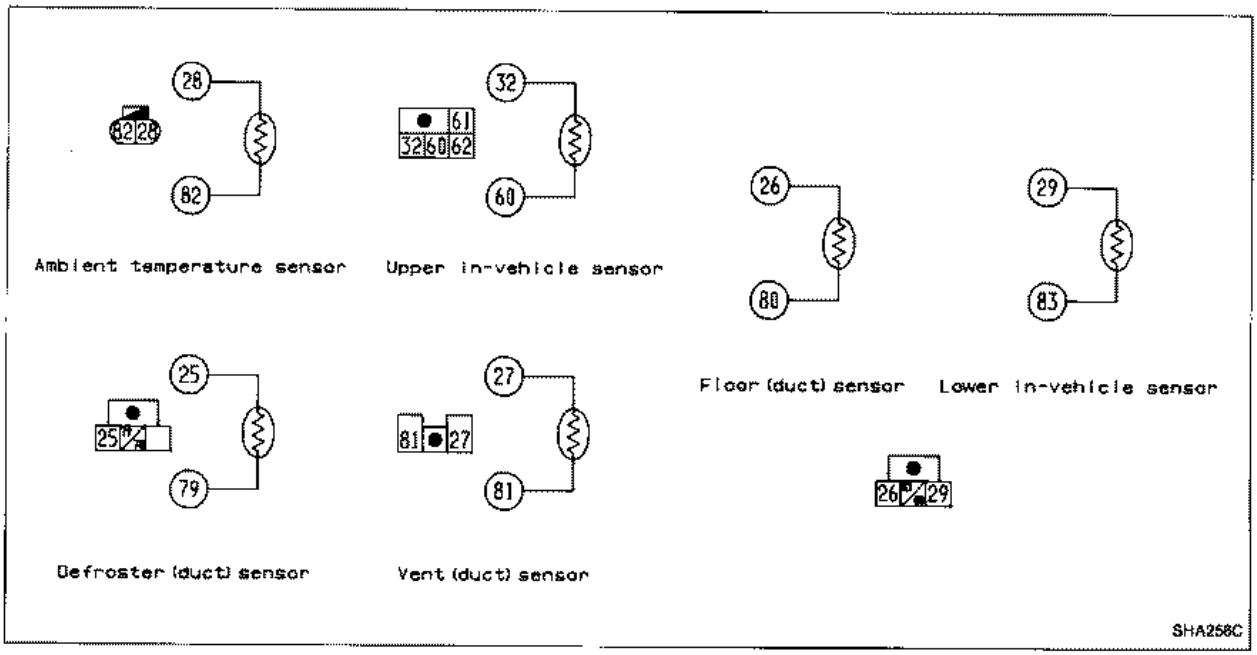
**System operation**

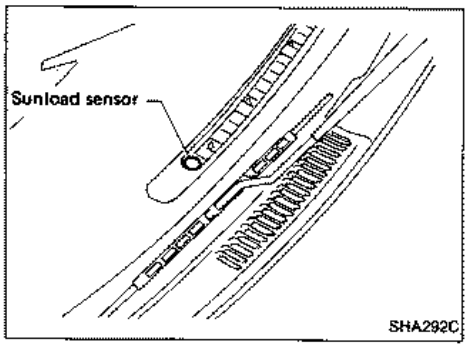
The intake door motor is attached to the air intake unit. Intake door position is controlled approximately once every minute, according to the difference between target and actual vent air temperatures. When the actual outlet air temperature is higher than the target vent air temperature, the intake door will gradually shift toward the recirculation-air side. When the outlet air temperature reaches the target outlet air temperature, the intake door will gradually shift toward the fresh air side. However, when the ambient temperature is lower than 20°C (68°F), 100% fresh air is taken is regardless of outlet air temperatures.

When the compressor is "OFF" the auto amplifier sets the intake door at the "FRESH" position except when the "RECIRC" switch is "ON".

## Specifications (Cont'd)

### TEMPERATURE SENSORS



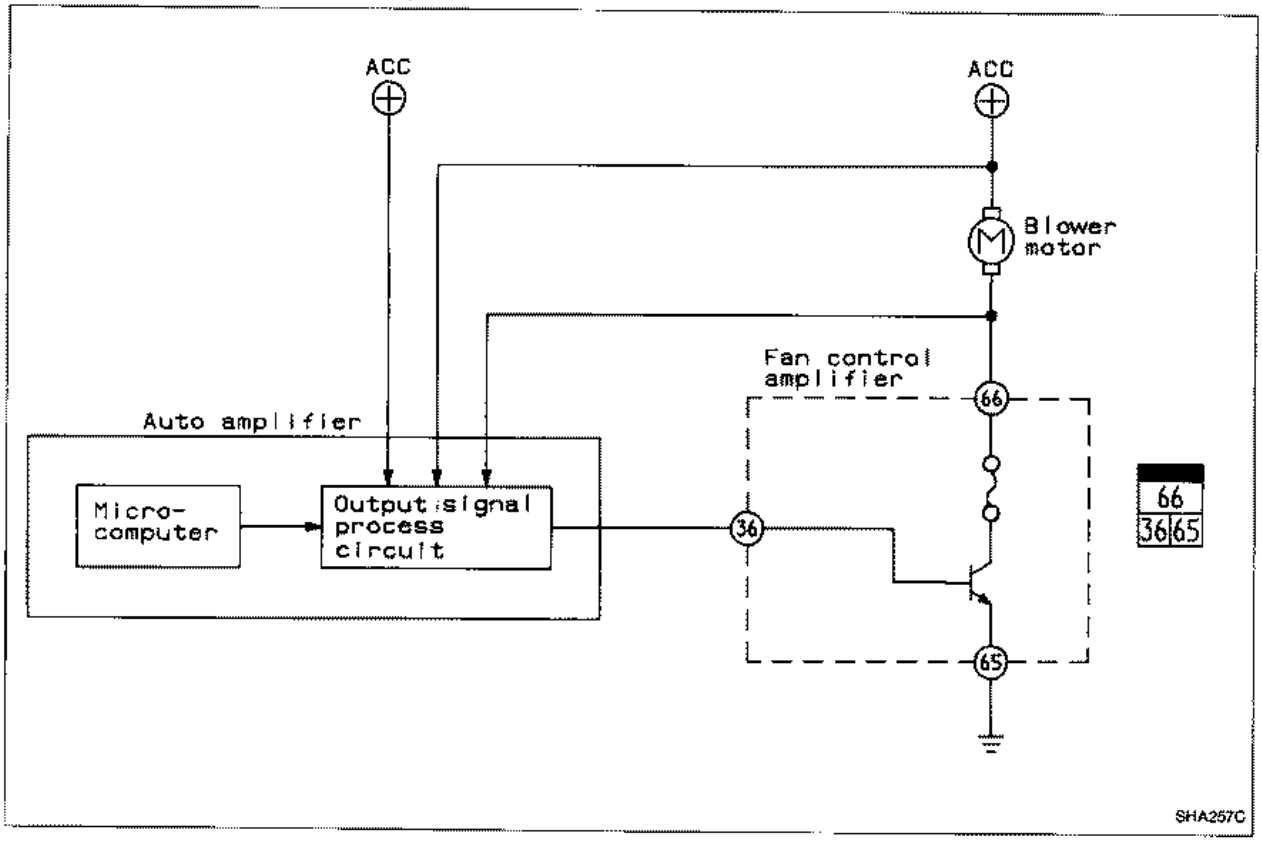

### SUNLOAD SENSOR

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

## Specifications (Cont'd)

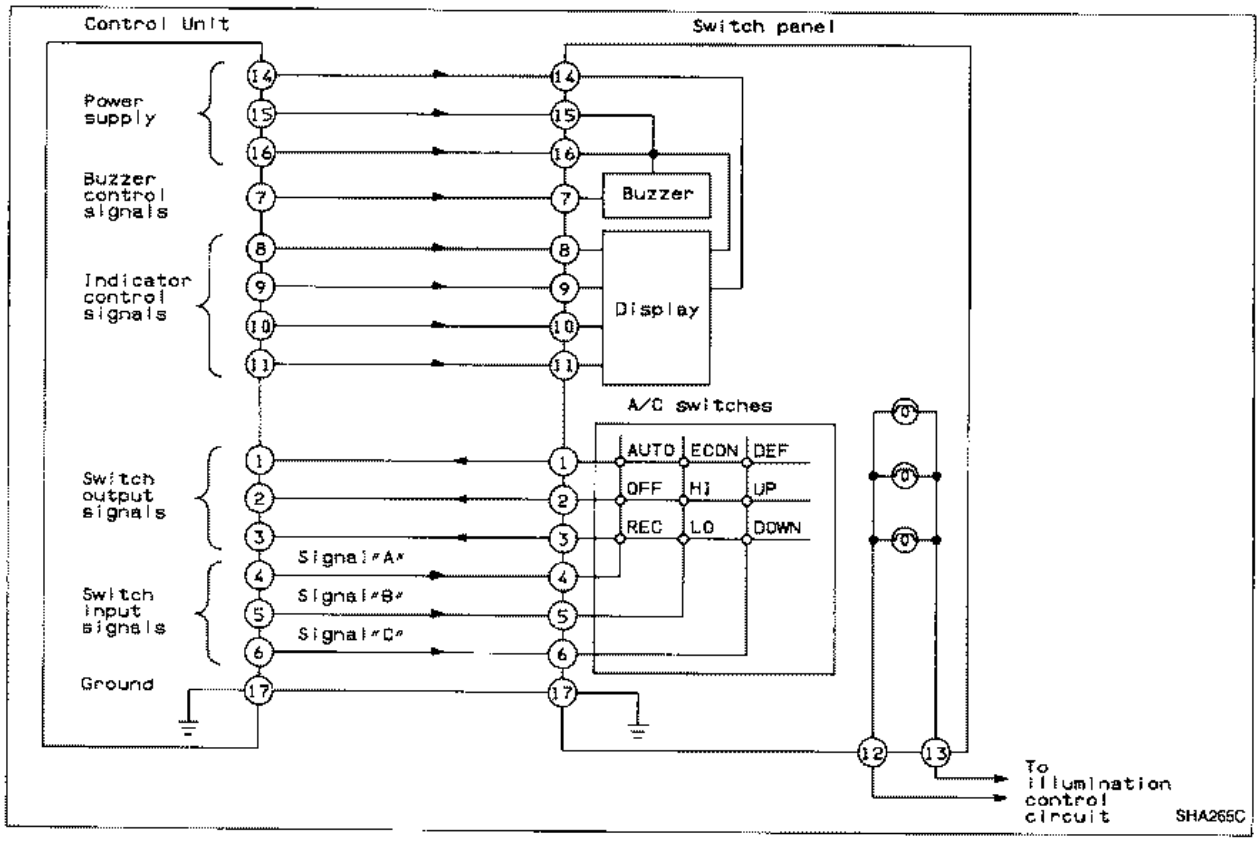
### FAN CONTROL AMPLIFIER

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



## System Operation

### SWITCH PANEL




**System operation**

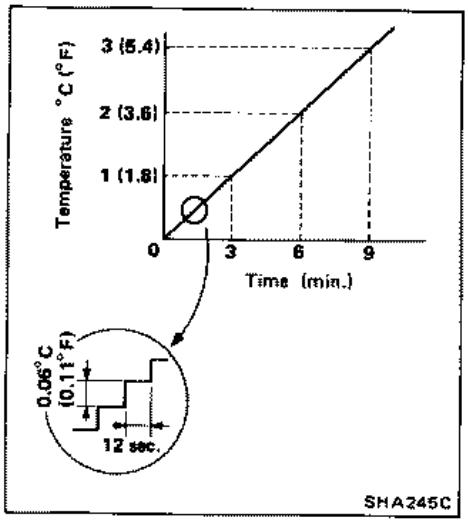
Except for illumination lamp terminals ⑫ and ⑬, the switch panel is operated by signals emitted from the control unit. There are three categories of signals.

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

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

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

## System Operation (Cont'd)



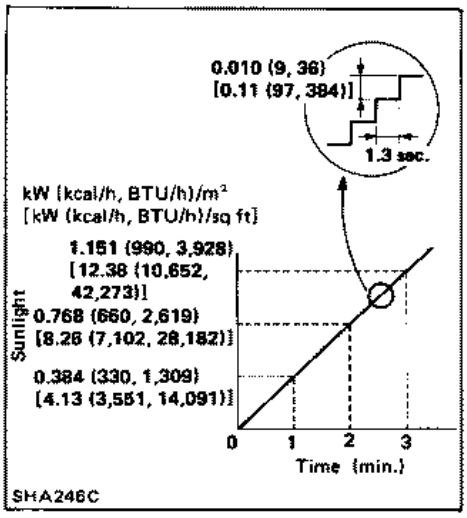

### AMBIENT TEMPERATURE INPUT PROCESS

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

**Temperature decreases are not processed through the time delay circuit.**

**Example:**

In the case of a signal stop after high-speed cruising, the ambient temperature will rises suddenly.
The ambient temperature input process functions at this time to prevent unpleasant air conditioning system changes.



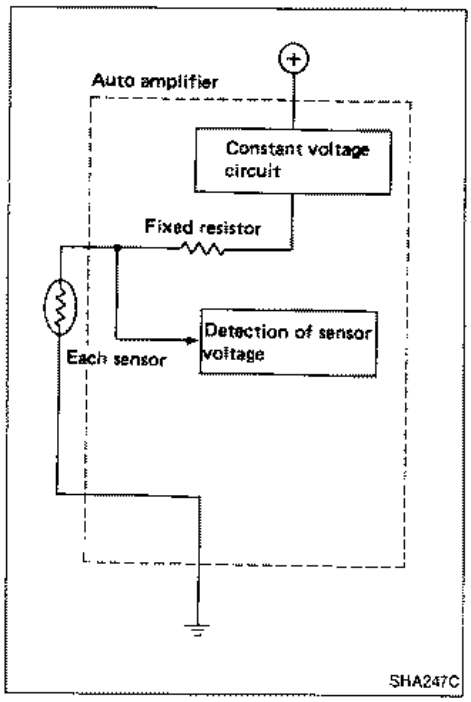

### SUNLOAD INPUT PROCESS

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

**Example:**

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

## System Operation (Cont'd)




### SENSOR INPUT PROCESS

A fixed resistor is built into the auto amplifier. 12V DC is converted to 5V DC by the constant voltage circuit where it is then applied to the ground line of the auto amplifier by the fixed resistor and sensors. The auto amplifier monitors the voltage between each sensor and the fixed resistor. The resistance of each sensor varies according to temperature.
Accordingly, the voltage at each sensor varies according to the temperature. The voltage signal is processed by the auto amplifier for A.T.C. system operation.

### STARTING FAN SPEED AND OUTLET DOOR CONTROL

#### Component parts

Starting fan speed and outlet door control components are:

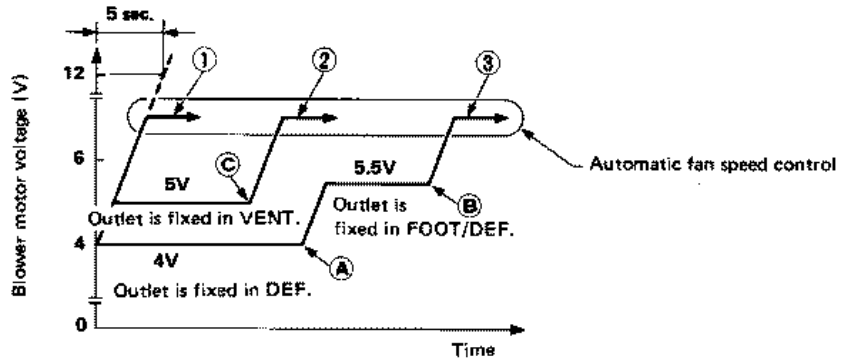
- Auto amplifier
- Fan control amplifier
- In-vehicle sensors (Upper and Lower)
- Duct sensor (Defroster, Ventilator and Floor)
- Ambient sensor
- sunload sensor
- Thermal transmitter (Engine coolant temperature sensor)

#### System operation

- Fan speed control
  At a set temperature of 25°C (77°F), when the upper compartment temperature is below 21°C (70°F) and the outlet duct temperature is lower than 35°C (95°F), the fan starts at minimum flow rate. As the discharge air temperature increases, the air flow rate increases to bring the compartment temperature to the target level as quickly as possible.
  When the ambient temperature is above 40°C (104°F), fan air flow rate is at full volume.
  As interior temperature begins to reach the target temperature, fan speed decreases.
  Under heavy sunload conditions, fan speed is increased to maintain uniform interior temperature. Fan speed also increases if the set temperature is decreased.
- Outlet door control
  At a set temperature of 25°C (77°F), when the upper in-vehicle temperature is lower than 21°C (70°F) and all of the outlet air temperatures are lower than 35°C (95°F), the system starts with the minimum airflow rate in the defroster mode. When defroster duct temperature rises above 35°C (95°F), the air outlet mode changes from the defroster mode to the DEF/FOOT mode. When floor duct temperature exceeds 40°C (104°F), the starting fan speed control and outlet door control mode is replaced by the normal automatic control mode. When the upper in-vehicle temperature is far greater than the lower in-vehicle temperature because of a large sunload, the system starts with the ventilator mode, which is replaced by the automatic control mode as the coolant temperature and outlet air temperature increases.

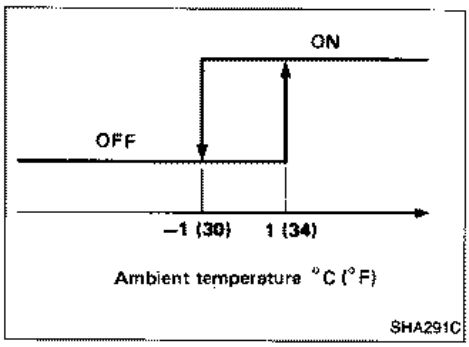
## System Operation (Cont'd)

### Starting fan speed and outlet door control specifications




① : When both upper and lower in-vehicle temperatures are much higher than set temperature.
② : When upper in-vehicle temperature is higher than set temperature.
③ : When upper in-vehicle temperature is lower than set temperature.
Ⓐ : VG30DE engine model
When DEF duct temperature rises above 35°C (95°F)
VG30DE engine model
When DEF duct temperature rises above approximately 20°C (68°F)
(Exact temperature depends on ambient temperature.)
Ⓑ : VG30DE engine model
When FLOOR duct temperature rises above 40°C (104°F)
VG30DETT engine model
When FLOOR duct temperature rises above approximately 36°C (97°F)
(Exact temperature depends on ambient temperature.)
Ⓒ : When water temperature rises above 40°C (104°F) and difference between outlet air temperature and target temperature is lower than 5°C (9°F).

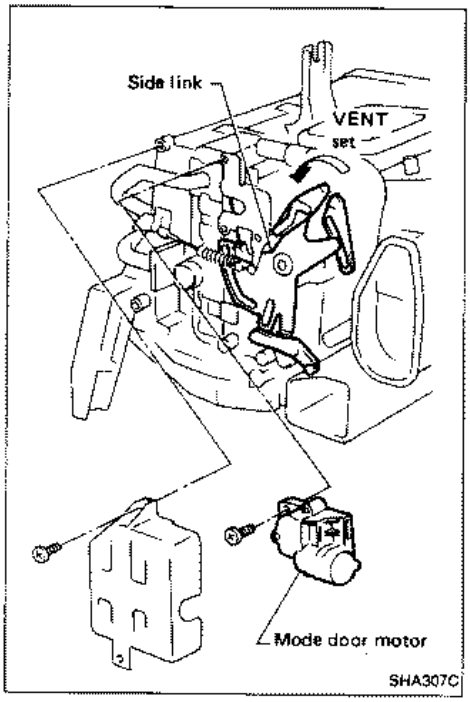
SHA290C

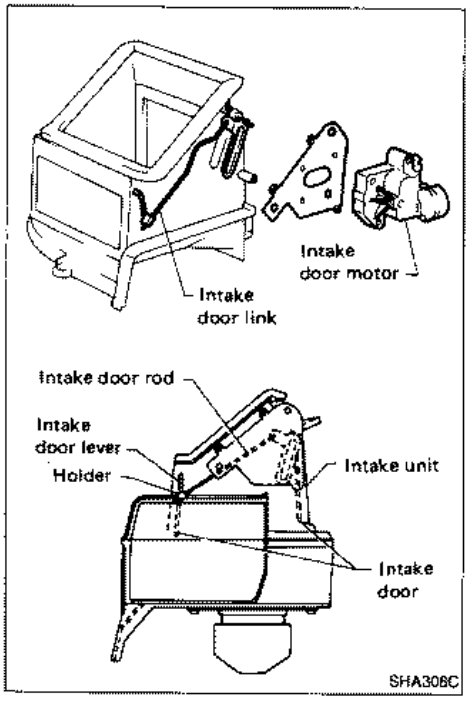



SHA291C

### MAGNET CLUTCH CONTROL

The auto amplifier controls compressor operation by the ambient temperature and signals from the E.C.C.S. unit.
The auto amplifier will turn the compressor "ON" or "OFF" as determined by a signal detected by the ambient temperature sensor.




## Control Rod Adjustment

### MODE DOOR

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

| MODE DOOR POSITION | Code No. |
|---|---|
| VENT | 6X |

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

| Code No. | 3X | 4X | 5X | 6X |
|---|---|---|---|---|
| Mode door position | DEF | HEAT | B/L | VENT |

### INTAKE DOOR

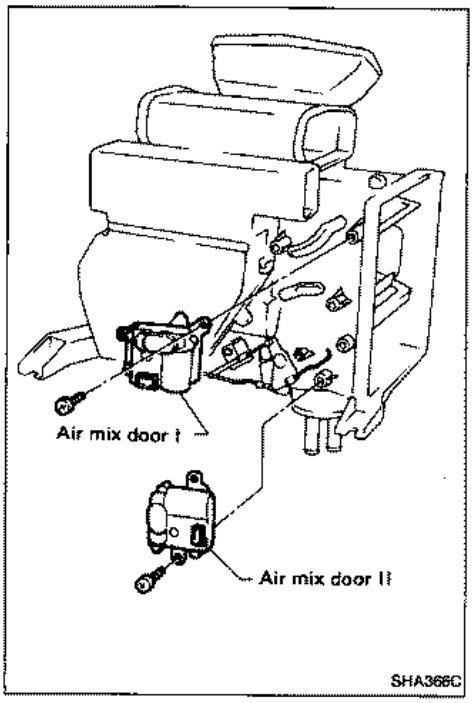
1. Install intake door motor on intake unit.
2. Connect intake door motor to harness.
3. Turn ignition switch to ACC.
4. Set up "ACTIVE TEST" mode with CONSULT or set up self-diagnosis STEP 2.
5. Set INTAKE DOOR position as in the following table.

| INTAKE DOOR POSITION | Code No. |
|---|---|
| REC | 6X |

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

| Code No. | 3X | 4X | 5X | 6X |
|---|---|---|---|---|
| Intake door position | Outside air | | Partial outside air | Recirculation |

## Control Rod Adjustment (Cont'd)




### AIR MIX DOOR

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

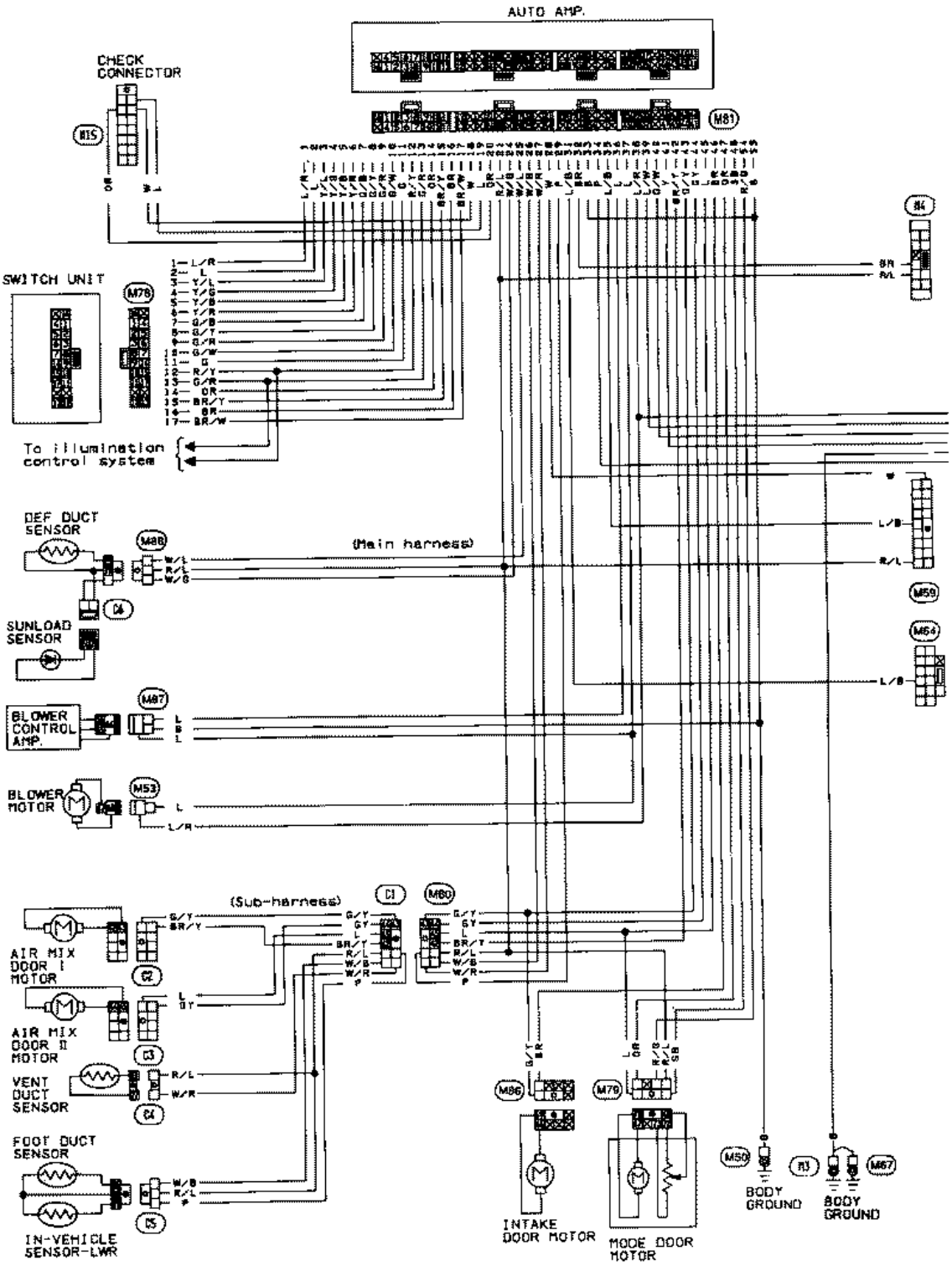
### WATER COCK CONTROL CABLE

Clamp cable at full-close position when air mix door II is at full-cold position, and full-open position when air mix door II is at full-hot position.

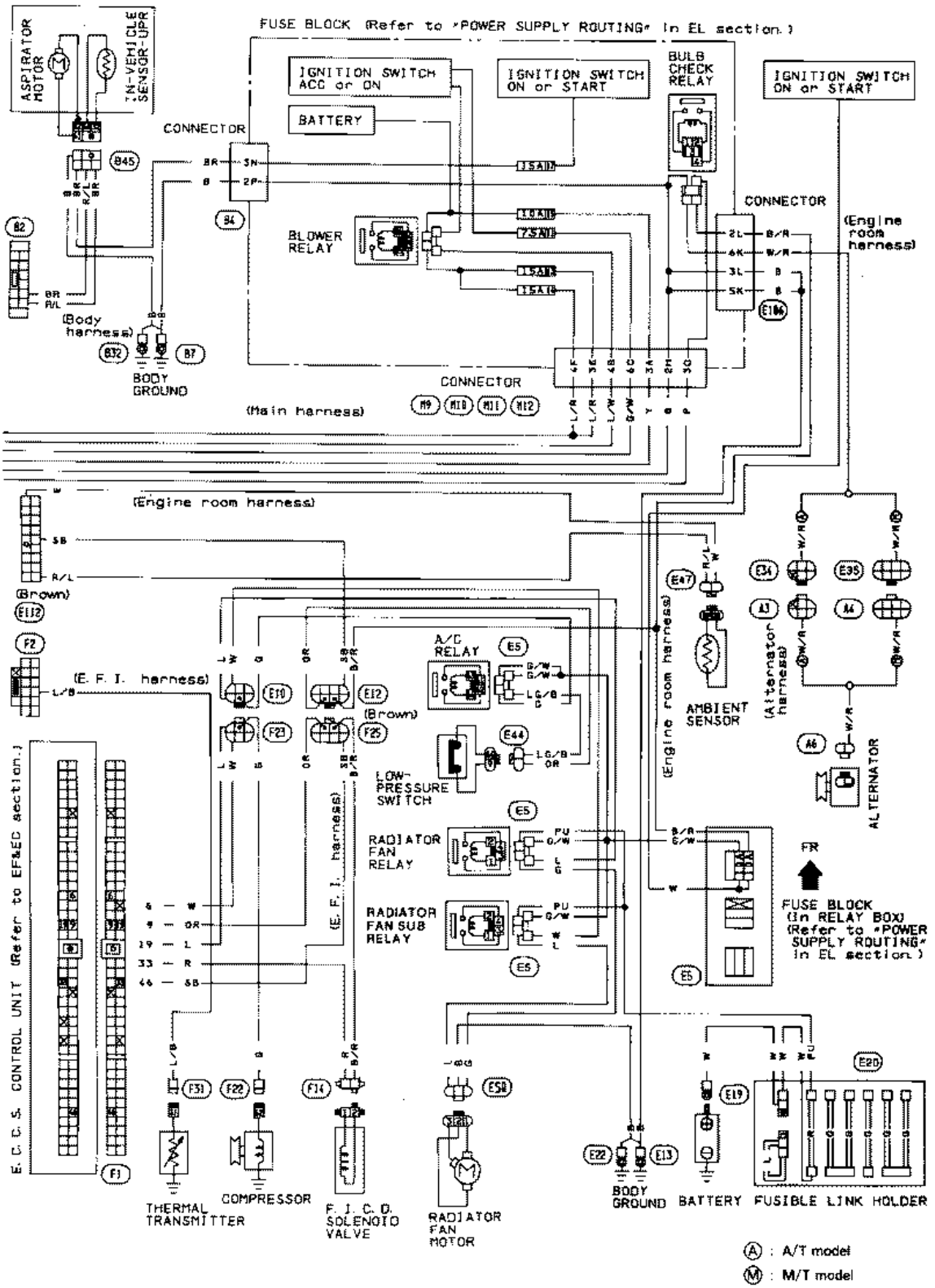
NOTE

## Wiring Diagram

### L.H. DRIVE MODEL



## Wiring Diagram (Cont'd)



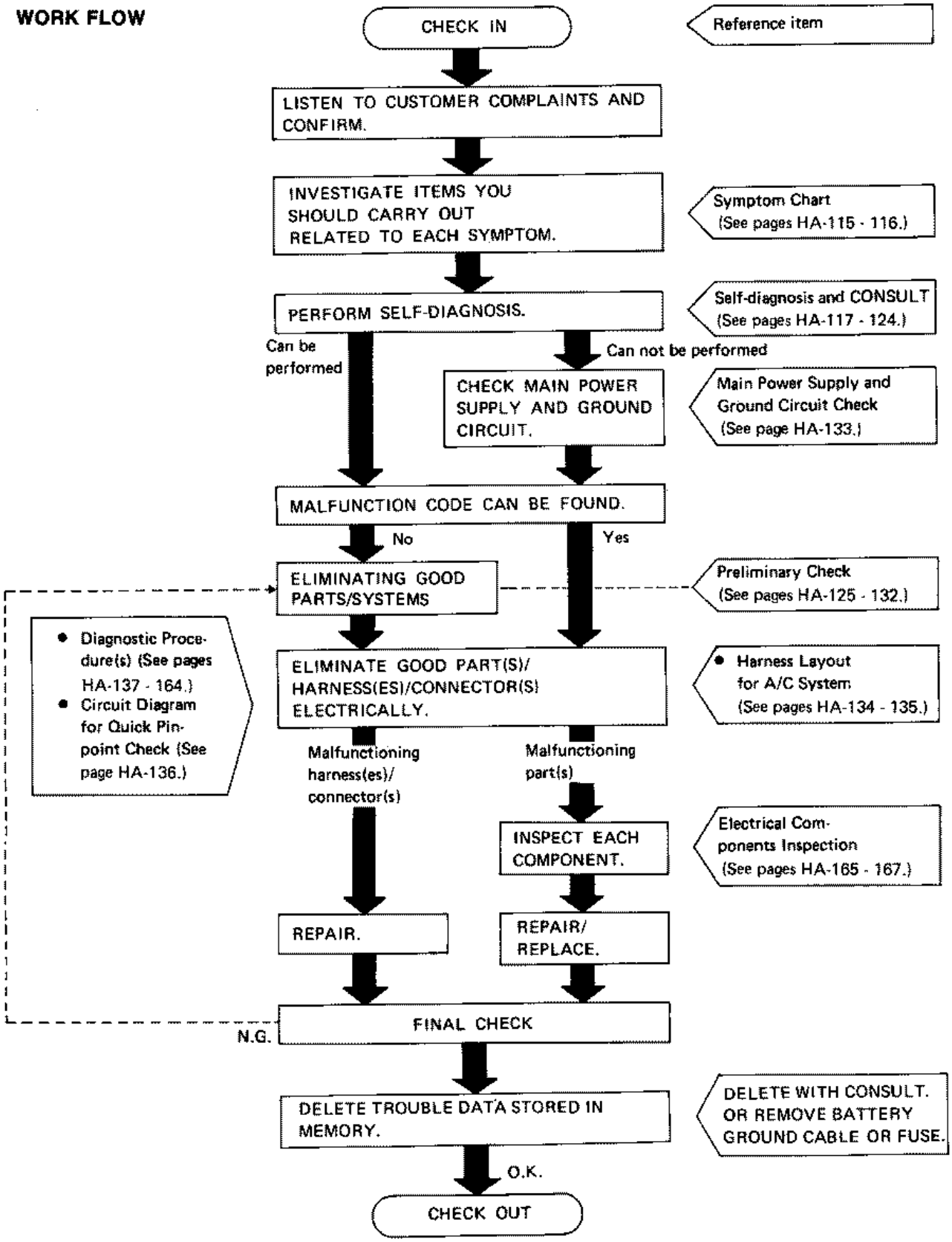

SHA694C

## Contents

## Contents (Cont'd)

## How to Perform Trouble Diagnoses for Quick and Accurate Repair

**WORK FLOW**



## Symptom Chart

### DIAGNOSTIC TABLE

| Symptom | Possible cause | Diagnostic procedure |
|---|---|---|
| Air outlet does not change | • Mode door motor not operating correctly<br>• Inaccurate sensor input<br>• No output to mode door motor from auto amplifier | Proceed to Preliminary check 1, then to Diagnostic procedures 17 and 18 if air mix door is malfunctioning. |
| Intake door does not change | • Intake door motor or mechanism malfunctioning<br>• Inaccurate sensor input<br>• No output to intake door motor from auto amplifier | Proceed to Preliminary check 2, if intake door is malfunctioning, go to Diagnostic Procedure 16. |
| Insufficient cooling | • Compressor clutch not engaged<br>• Air mix door motors not working properly<br>• Condenser fan inoperative<br>• Low freon level | Proceed to Preliminary check 3. If air mix doors do not operate properly, go to Diagnostic procedure 15.<br>Check compressor clutch operation and freon level of system. |
| Discharged air temperature does not change | • Air mix doors do not operate correctly<br>• Incorrect sensor input | Proceed to Preliminary check 7. |
| Noise | • Compressor belt tension<br>• Compressor component malfunction<br>• Blower motor interference<br>• Radiator cooling fan interference | Proceed to Preliminary check 8. |
| Air conditioner control switch panel illumination does not come on | • Blown fuse<br>• Loose or open in harness<br>• Blown bulb | Proceed to Diagnostic procedure 20. |
| Insufficient heating | • Coolant temperature is low<br>• Air mix doors not in correct position<br>• Incorrect sensor input | Proceed to Preliminary check 4. If air mix doors do not operate correctly, go to Diagnostic procedure 15. |
| Blower motor operation is malfunctioning | • Blower motor is not receiving power<br>• Vents may be obstructed<br>• Motor does not spin freely<br>• Air intake obstructed<br>• Blown fuse<br>• Malfunctioning blower relay | Proceed to Preliminary check 5. If blower motor is malfunctioning, go to Diagnostic procedure 25. |
| Magnet clutch does not engage | • Blown fuse<br>• A/C relay inoperative<br>• Open in wiring<br>• Open ambient sensor circuit<br>• Low freon level<br>• Malfunctioning clutch assembly | Proceed to Preliminary check 6, then Diagnostic procedure 19 if clutch is malfunctioning. |

## Symptom Chart (Cont'd)

| Symptom | Possible cause | Diagnostic procedure |
|---|---|---|
| No display on A/C switch panel | • Blown fuse<br>• Malfunctioning bulb | Proceed to Diagnostic procedure 20. |
| Set temperature and ambient temperature do not appear on display window | • Malfunctioning switch unit<br>• Open in circuit<br>• Malfunctioning auto amplifier | Proceed to Diagnostic procedure 21. |
| When air conditioner switch is operated, if does not beep | • Malfunctioning A/C switch<br>• Open in harness or connector<br>• Malfunctioning auto amplifier | Proceed to Diagnostic procedure 22. |
| Set and ambient temperature do not appear in display and indicator lamp (L.E.D.) does not come on | • Open in harness<br>• Malfunctioning switch panel<br>• Malfunctioning auto amplifier | Proceed to Diagnostic procedure 23. |
| Switches do not work | • Malfunctioning switch panel<br>• Open in harness<br>• Malfunctioning auto amplifier | Proceed to Diagnostic procedure 24. |

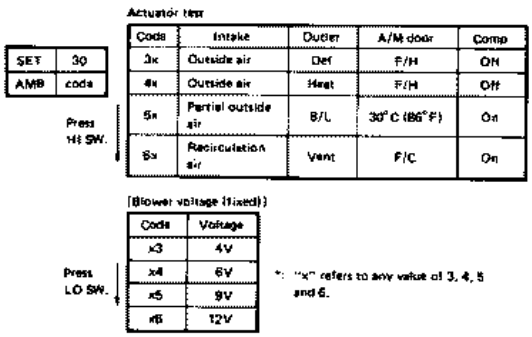
## Self-diagnosis

### CONSULT AND ONBOARD SELF-DIAGNOSTIC SYSTEM

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

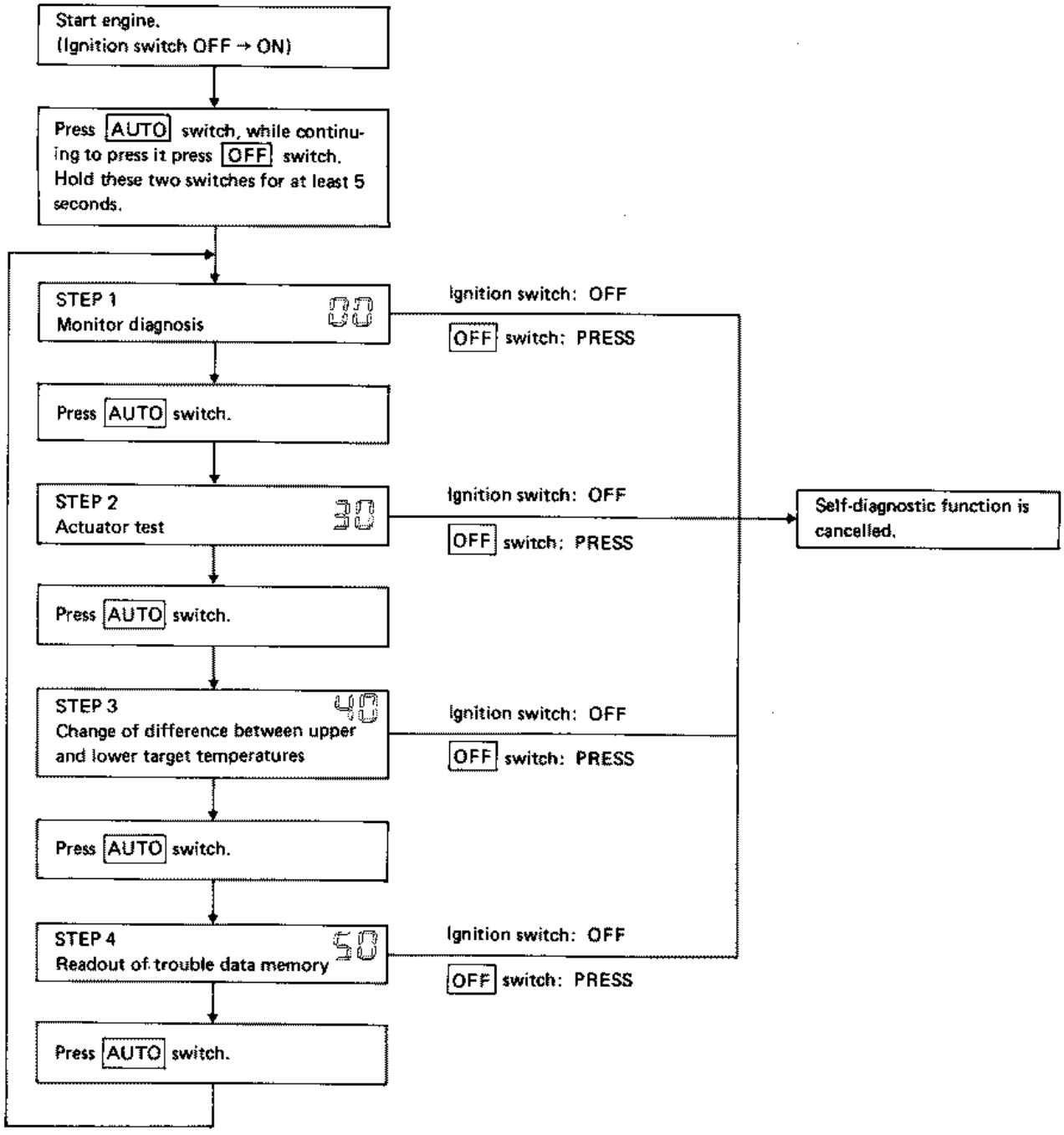
| ITEM | MONITOR | | CHANGE PARAMETER | | READOUT OF TROUBLE DATA STORED IN MEMORY | |
|---|---|---|---|---|---|---|
| | CONSULT | ONBOARD | CONSULT | ONBOARD | CONSULT | ONBOARD |
| Ambient temp. | ○ | ○ | | | ○ | ○ |
| In-vehicle temp. (Upper) | ○ | ○ | | | ○ | ○ |
| In-vehicle temp. (Lower) | ○ |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

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



## Self-diagnosis (Cont'd)

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



## Self-diagnosis (Cont'd)

### CHECKING PROCEDURE

Note

Start engine.

Check if SET and AMB data (VFD display) illuminate.

No → Faulty wiring or VFD

Yes

Set in self-diagnostic mode.
(Press AUTO switch, while continuing to press it press OFF switch. Hold these two switches for at least 5 seconds.)

Check if air conditioner operates and SET "00" appears.

No → Faulty "AUTO" or "OFF" switch

Yes

STEP 1 — SET 0 0 SENSOR MONITOR

Identification data of each sensor is shown.

Press HI switch or LO switch.

Press AUTO switch.

STEP 2 — SET 3 0 ACTUATOR TEST

Code No. of actuators test pattern is indicated on display.

Press HI switch or LO switch.

Ⓐ

| SET | Code |
|---|---|
| AMB | data |

**Sensor monitor**

| Code | Item | Temperature variation range (When compartment temperature is stabilized) |
|---|---|---|
| 00 | Ambient temperature | −30 to 45°C (−22 to 113°F) |
| 01 | Upper compartment temperature | 18 - 30°C (64 - 86°F) |
| 02 | Lower compartment temperature | 20 - 35°C (68 - 95°F) |
| 03 | DEF outlet air temperature | 5 - 70°C (41 - 158°F) |
| 04 | VENT air temperature | 5 - 40°C (41 - 104°F) |
| 05 | FLOOR outlet air temperature | 20 - 70°C (68 - 158°F) |
| 06 | Sunload | *1 0 - 1,047 kW (0 - 900 kcal/h, 0 - 3,571 BTU/h)/m² (0 - 11.26 kW (0 - 9,684 kcal/h, 0 - 38,430 BTU/h)/sq ft) |
| 07 | Water temperature | *2 20°C (68°F) or 80°C (176°F) |
| 08 | MODE door voltage | 0 - 5V |
| 09 to 16 | Internal data | ... |

Press HI SW. / Press LOW SW.

*1: Indication figure is one tenth of the value in kcal/h unit.
*2: When coolant temperature is below 40°C (104°F) indicates 20°C (68°F).
When coolant temperature is above 40°C (104°F) indicates 80°C (176°F).

| SET | 30 |
|---|---|
| AMB | code |

**Actuator test**

| Code | Intake | Outlet | A/M door | Comp |
|---|---|---|---|---|
| 3x | Outside air | Def | F/H | Off |
| 4x | Outside air | Heat | F/H | Off |
| 5x | Partial outside air | B/L | 30°C (85°F) | On |
| 6x | Recirculation air | Vent | F/C | On |

Press HI SW.

(Blower voltage (fixed))

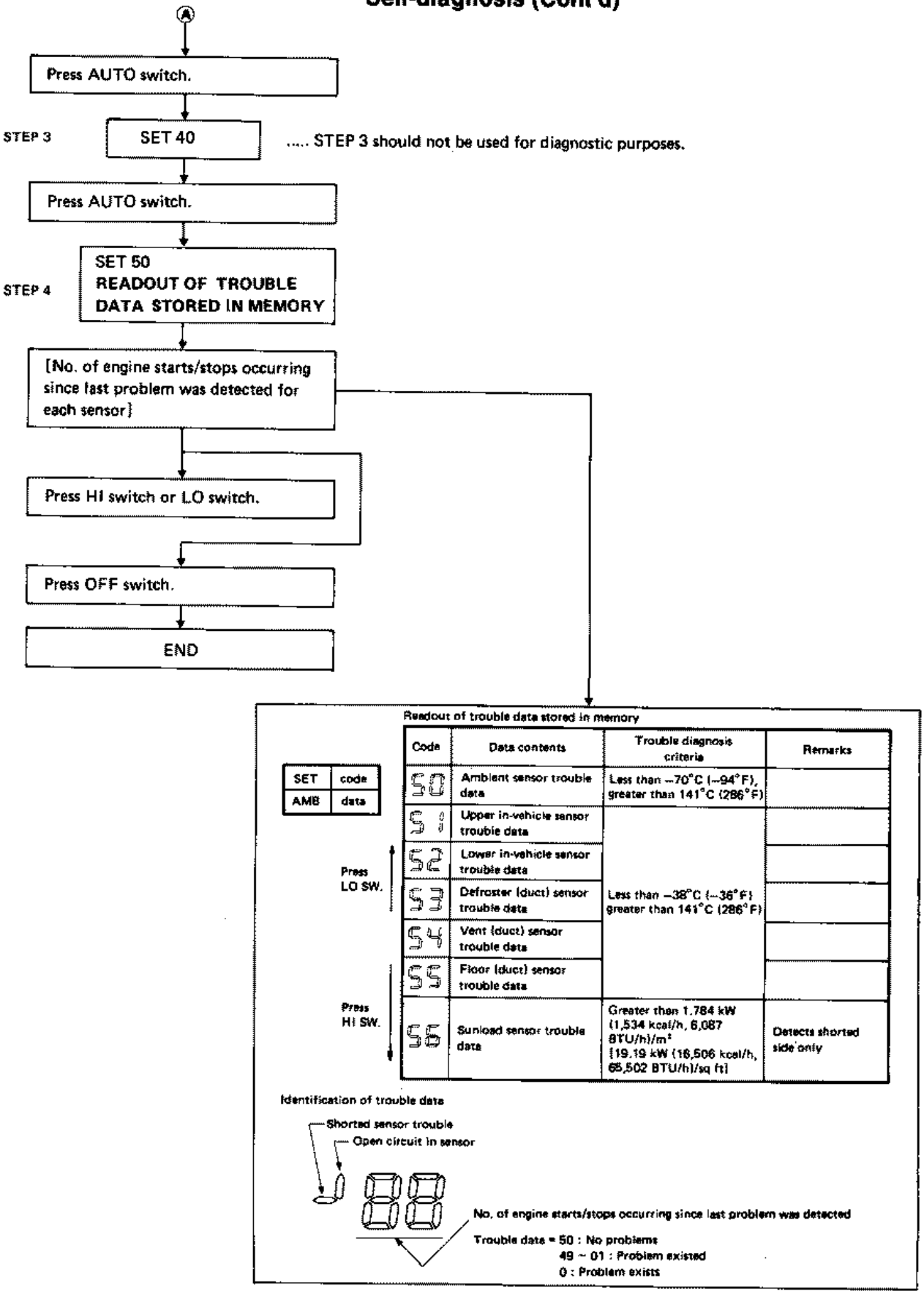
| Code | Voltage |
|---|---|
| x3 | 4V |
| x4 | 6V |
| x5 | 9V |
| x6 | 12V |

Press LO SW.

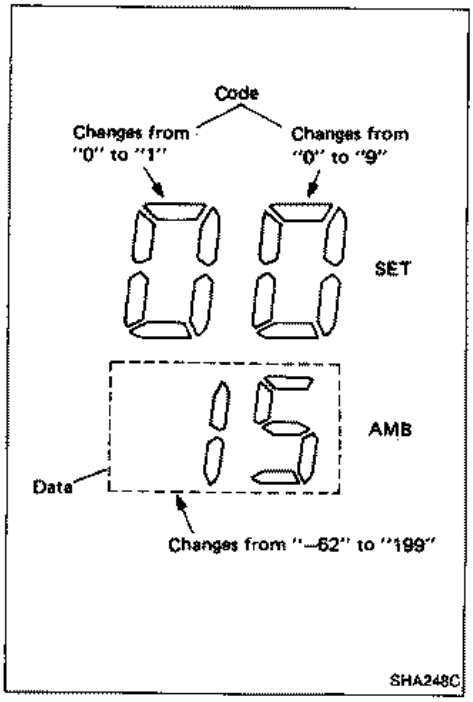
*: "x" refers to any value of 3, 4, 5 and 6.

Note:
1. Without engine running, STEP 1 and 2 are not useful for some case because compressor not operate.
2. While in the self-diagnosis mode, set temperature switch functions remain as usual.

## Self-diagnosis (Cont'd)



## Self-diagnosis (Cont'd)



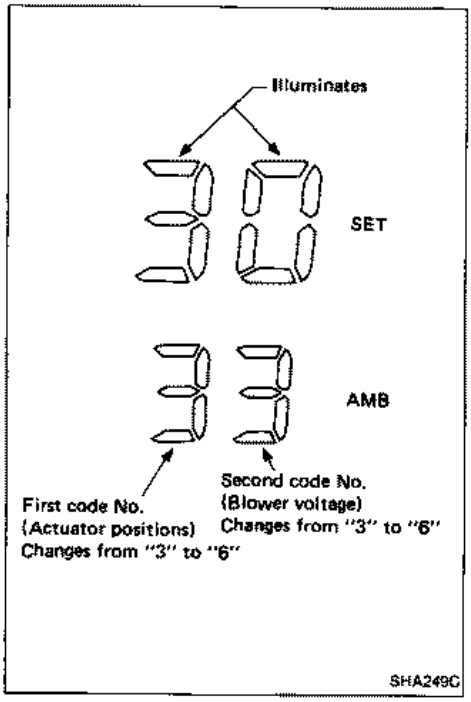

### STEP 1: MONITOR DIAGNOSIS

In STEP 1 mode, "00" and "data", respectively appear in SET and AMB section of display.

Each time the "HI" switch is pressed, the code number in the SET section advances one number, and data corresponding with the code number appears in the AMB section. Each time the "LO" switch is pressed, the code number reduces by one number, and data corresponding with the code number appears in the AMB section.

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

* For cross-reference of code number and corresponding data, refer to "Monitor Diagnosis" in STEP 1.




### STEP 2: ACTUATOR TEST

In STEP 2 mode, "30" and "33" respectively appear in the SET and AMB sections of the display.

When the "HI" switch is pressed one time, the first code advances. This code returns to "3" after it reaches "6". Similarly, when the "LO" switch is pressed one time, the second code advances one number. After the code number "6" appears, it returns to "3".

## Self-diagnosis (Cont'd)

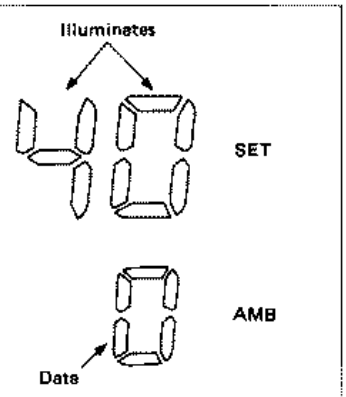
During inspection in STEP 2 mode, the auto amplifier will forcefully transmit an output to the affected actuators in response to the code No. shown on the display, as indicated in the table below.
Checks must be made for improper operation visually, by listening to any noise, or by touching air outlets with your hand, etc.

| First code No. / Actuator | 3 | 4 | 5 | 6 |
|---|---|---|---|---|
| Mode door | DEF | HEAT | B/L | VENT |
| Intake door | FRE | FRE | 50% FRE | REC |
| Air mix door | Full Hot | Full Hot | 30°C (86°F) | Full Cold |
| Compressor | OFF | OFF | ON | ON |

Operating condition of each actuator cannot be checked by indicators.

| Second code No. / Blower motor | 3 | 4 | 5 | 6 |
|---|---|---|---|---|
| Voltage | 4V | 6V | 9V | 12V |

* 1) First and second codes can be set independently.
2) When first code "5" appears, air mix door activates.
A stabilized outlet temperature 30°C (86°F) is reached after air mix door has been operating for approximately one minute.




Changes of upper and lower target compartment temperatures
"°C" specifications: "–20" to "20"
"°F" specifications: "–36" to "36"
SHA250C

### STEP 3:AUXILIARY MECHANISM

Changes of difference between upper and lower target temperatures.

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

In STEP 3 mode, "40" and "0" (if this number is changed, the corresponding number appears) respectively appear in the SET and AMB sections of the display.
Each time the "HI" switch is pressed, the number in the AMB section advances. This number will increase up to 20 for °C specifications and 36 for °F specifications. Each time the "LO" switch is pressed, the number decreases. This number decreases to –20 for °C specifications and –36 for °F specifications.
For °C specifications, pressing the "HI" or "LO" switch each time increases or decreases the data number by "1" degree (and by "1" through "3" degrees for °F specifications).

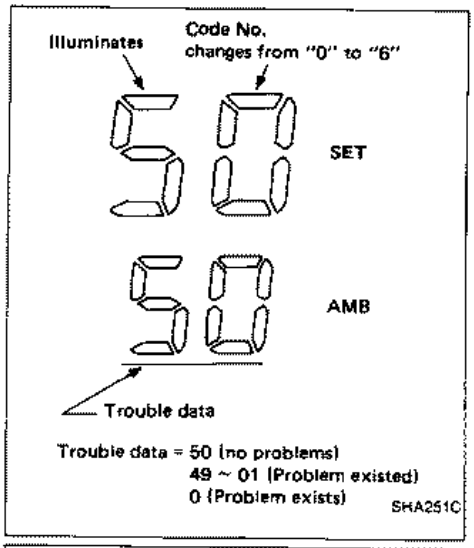
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| °C specifications | Data | –20 | — — — | –1 | 0 | 1 | — — — | 20 |
| | Difference between upper and lower target temperatures | –2.0°C | — — — | –1°C | 0°C | 0.1°C | — — — | 2.0°C |
| °F specifications | Data | –36 | — — — | –2 | 0 | 2°C | —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

Difference between upper and lower target temperatures changed in the preceding procedure is kept until the next change is done or the battery cable is removed.

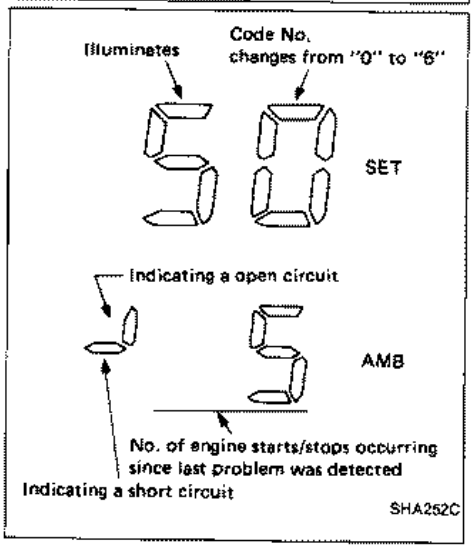
## Self-diagnosis (Cont'd)

### STEP 4: READOUT OF TROUBLE DATA STORED IN MEMORY

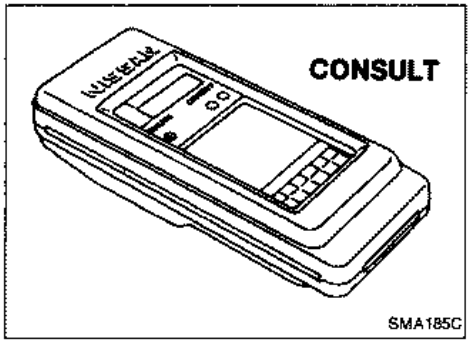
In STEP 4 mode, "50" and "trouble data" respectively appear in the SET and AMB sections.
Each time the "HI" switch is pressed, the code number advances by one number. After it reaches "6", it will return to "0".
Each time the "LO" switch is pressed, the code number reduces by one number. After it reaches "0", it will return to "6".




When the sensor becomes inoperative, number of engine starts/stops occurring since last problem was detected, appears in the AMB section of the display.
Open circuit or short circuit is indicated by " 0 " or "=".



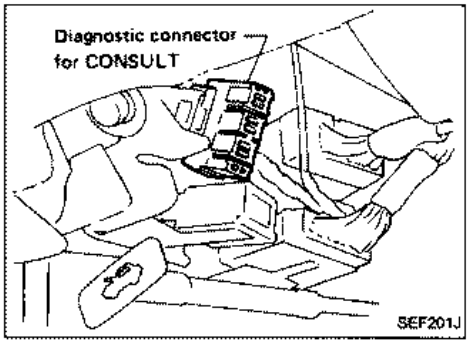

| Code No. | Sensor | Open circuit | Short circuit |
|---|---|---|---|
| 58 | Ambient sensor | Less than −70°C (−94°F) | Greater than 141°C (286°F) |
| 57 | Room upper sensor | Less than −38°C (−36°F) | Greater than 141°C (286°F) |
| 52 | Room lower sensor | Less than −38°C (−36°F) | Greater than 141°C (286°F) |
| 53 | DEF duct sensor | Less than −38°C (−36°F) | Greater than 141°C (286°F) |
| 54 | VENT duct sensor | Less than −38°C (−36°F) | Greater than 141°C (286°F) |
| 55 | Floor duct sensor | Less than −38°C (−36°F) | Greater than 141°C (286°F) |
| 56 | Sunload sensor | Open circuit can not be detected by self-diagnosis. | Greater than 1.784 kW (1,534 kcal/h, 6,087 BTU/h)/m$^2$ [19.19 kW (16,506 kcal/h, 65,502 BTU/h)/sq ft] |



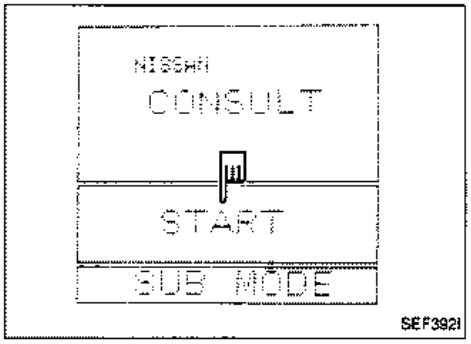

## Consult

### CONSULT INSPECTION PROCEDURE

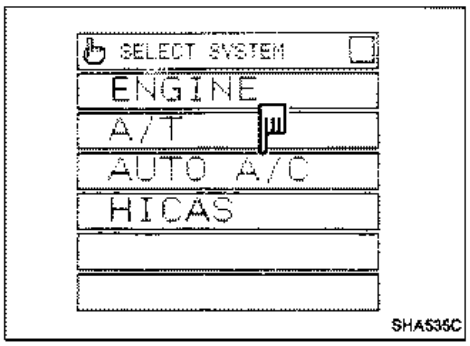
1. Turn off ignition switch.
2. Connect "CONSULT" to diagnostic connector.
   (Diagnostic connector is located in left dash side panel.)




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

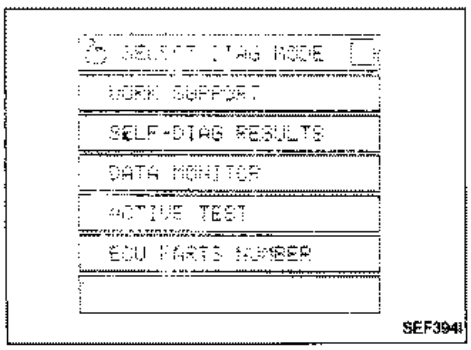



5. Touch "AUTO A/C".




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

**For further information, read the CONSULT Operation Manual.**



## Preliminary Check

### PRELIMINARY CHECK 1

**Air outlet does not change.**

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

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

| CONSULT indication | Self-diagnosis code No. | data | How to repair | Reference page |
|---|---|---|---|---|
| Ambient sensor circuit is open | 50 | 0 | Go to Diagnostic procedure 2. | HA-138 |
| Ambient sensor circuit is shorted. | 50 | — | Go to Diagnostic procedure 3. | HA-139 |
| Upper in-vehicle sensor circuit is open. | 51 | 0 | Go to Diagnostic procedure 4. | HA-140 |
| Upper in-vehicle sensor circuit is shorted. | 51 | — | Go to Diagnostic procedure 5. | HA-141 |
| Lower in-vehicle sensor circuit is open. | 52 | 0 | Go to Diagnostic procedure 6. | HA-142 |
| Lower in-vehicle sensor circuit is shorted. | 52 | — | Go to Diagnostic procedure 7. | HA-143 |
| Defroster (duct) sensor circuit is open. | 53 | 0 | Go to Diagnostic procedure 8. | HA-144 |
| Defroster (duct) sensor circuit is shorted. | 53 | — | Go to Diagnostic procedure 9. | HA-145 |
| Vent (duct) sensor circuit is open. | 54 | 1 | Go to Diagnostic procedure 10. | HA-146 |
| Vent (duct) sensor circuit is shorted. | 54 | — | Go to Diagnostic procedure 11. | HA-147 |
| Floor (duct) sensor circuit is open. | 55 | 0 | Go to Diagnostic procedure 12. | HA-148 |
| Floor (duct) sensor circuit is shorted. | 55 | — | Go to Diagnostic procedure 13. | HA-149 |
| Sunload sensor circuit is shorted. | 56 | — | Go to Diagnostic procedure 14. | HA-150 |

When malfunctioning sensor circuit, ambient sensor, in-vehicle sensor, and duct sensors are suspected, it is useful to check temperature detected by each sensor with self-diagnosis STEP 1 to confirm the temperature is within normal range before performing Diagnostic Procedures.

O.K. ↓

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

| Set mode | DEF | HEAT | B/L | VENT |
|---|---|---|---|---|
| Code No. | 3X | 4X | 5X | 6X |
| Air outlet | DEF | FOOT/ DEF | FOOT/ VENT | VENT |

Refer to **AIR DISTRIBUTION.**

O.K. ↓

Air outlet control system is normal.
Refer to **Outlet door control specification.**

N.G. →

CHECK SIDE LINK MECHANISM.
Refer to **DOOR CONTROL — Auto Air Conditioner.**

N.G. → Repair or adjust.

O.K. ↓

Go to **Diagnostic Procedure 17 or 18.**

## Preliminary Check (Cont'd)

### PRELIMINARY CHECK 2

**Intake door does not change.**

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

N.G. →

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

| CONSULT indication | Self-diagnosis code No. | data | How to repair | Reference page |
|---|---|---|---|---|
| Ambient sensor circuit is open. | 01 | 0 | Go to Diagnostic procedure 2. | HA-138 |
| Ambient sensor circuit is shorted. | 01 | ∞ | Go to Diagnostic procedure 3. | HA-139 |
| Upper in-vehicle sensor circuit is open. | 02 | 0 | Go to Diagnostic procedure 4. | HA-140 |
| Upper in-vehicle sensor circuit is shorted. | 02 | ∞ | Go to Diagnostic procedure 5. | HA-141 |
| Lower in-vehicle sensor circuit is open. | 03 | 0 | Go to Diagnostic procedure 6. | HA-142 |
| Lower in-vehicle sensor circuit is shorted. | 03 | ∞ | Go to Diagnostic procedure 7. | HA-143 |
| Defroster (duct) sensor circuit is open. | 04 | 0 | Go to Diagnostic procedure 8. | HA-144 |
| Defroster (duct) sensor circuit is shorted. | 04 | ∞ | Go to Diagnostic procedure 9. | HA-145 |
| Vent (duct) sensor circuit is open. | 05 | 0 | Go to Diagnostic procedure 10. | HA-146 |
| Vent (duct) sensor circuit is shorted. | 05 | ∞ | Go to Diagnostic procedure 11. | HA-147 |
| Floor (duct) sensor circuit is open. | 06 | 0 | Go to Diagnostic procedure 12. | HA-148 |
| Floor (duct) sensor circuit is shorted. | 06 | ∞ | Go to Diagnostic procedure 13. | HA-149 |
| Sunload sensor circuit is shorted. | 07 | ∞ | Go to Diagnostic procedure 14. | HA-150 |

When malfunctioning sensor circuit, ambient sensor, in-vehicle sensor, and duct sensors are suspected, it is useful to check temperature detected by each sensor with self-diagnosis STEP 1 to confirm the temperature is within normal range before performing Diagnostic Procedures.

O.K. ↓

CHECK INTAKE DOOR MOTOR.
Set up "ACTIVE TEST" mode with CONSULT.
or
Set up self-diagnosis STEP 2.

Does intake air change according to each ordered position?

| Set position | FRE | | FRE/REC | REC |
|---|---|---|---|---|
| Code No. | 3X | 4X | 5X | 6X |
| Air intake | FRE | | FRE/REC | REC |

O.K. ↓

Intake door control system is normal.
Refer to **Intake door control specification.**

N.G. →

CHECK INTAKE DOOR ROD or LEVER MECHANISM.
Refer to **DOOR CONTROL — Auto Air Conditioner.**

N.G. → Repair or adjust.

O.K. ↓

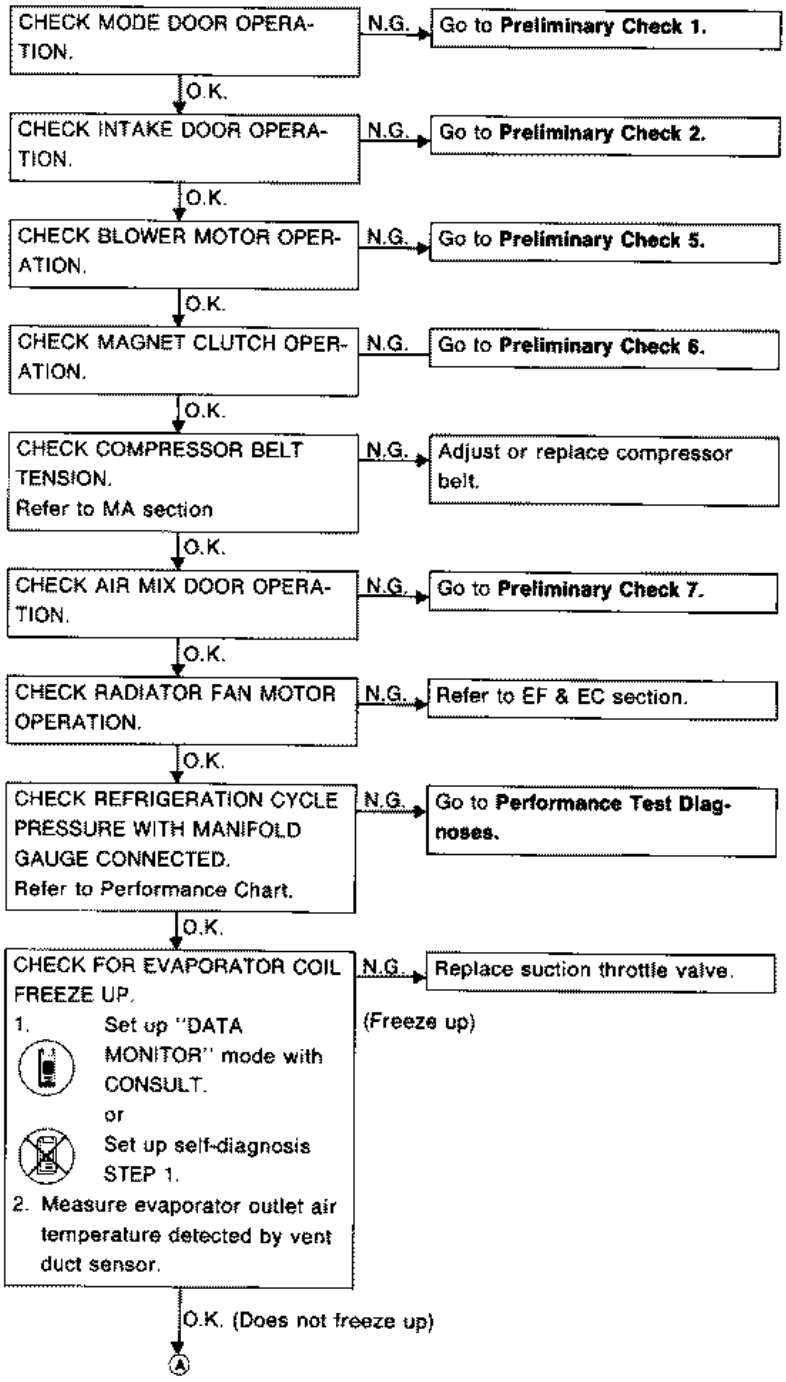
Go to **Diagnostic Procedure 16.**

## Preliminary Check (Cont'd)

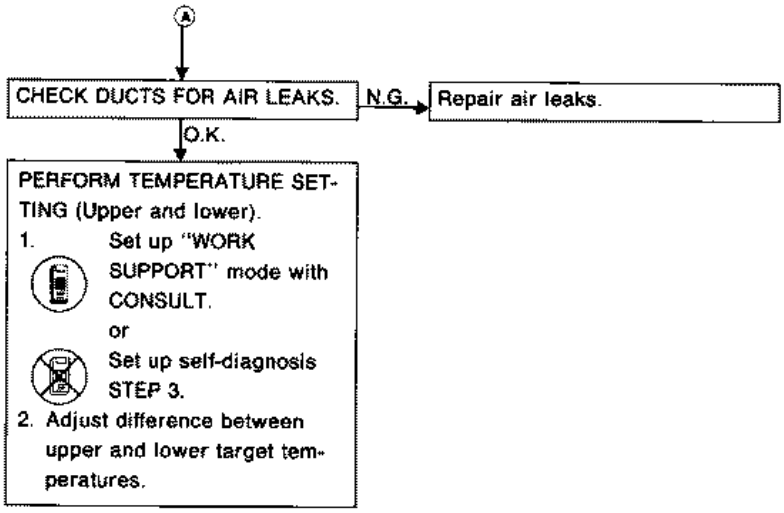
### PRELIMINARY CHECK 3

**Insufficient cooling**

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



## Preliminary Check (Cont'd)

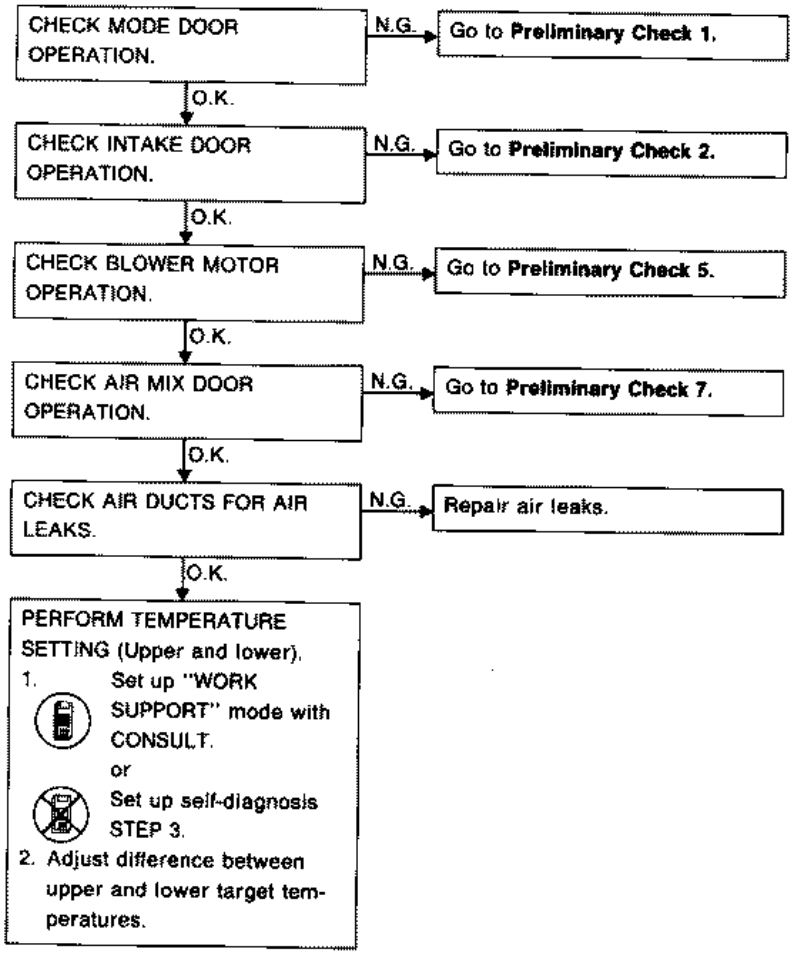


## Preliminary Check (Cont'd)

### PRELIMINARY CHECK 4

**Insufficient heating**

- Check coolant level, engine temperature and heater hoses and read out self-diagnosis result with CONSULT or perform self-diagnosis STEP 4 before referring to the following flow chart.



## Preliminary Check (Cont'd)

### PRELIMINARY CHECK 5

**Blower motor operation is malfunctioning.**

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

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

| CONSULT indication | Self-diagnosis code No. | data | How to repair | Reference page |
|---|---|---|---|---|
| Ambient sensor circuit is open. | 53 | 0 | Go to Diagnostic procedure 2. | HA-138 |
| Ambient sensor circuit is shorted. | 53 | – | Go to Diagnostic procedure 3. | HA-139 |
| Upper in-vehicle sensor circuit is open. | 56 | 0 | Go to Diagnostic procedure 4. | HA-140 |
| Upper in-vehicle sensor circuit is shorted. | 56 | – | Go to Diagnostic procedure 5. | HA-141 |
| Lower in-vehicle sensor circuit is open. | 57 | 0 | Go to Diagnostic procedure 6. | HA-142 |
| Lower in-vehicle sensor circuit is shorted. | 57 | – | Go to Diagnostic procedure 7. | HA-143 |
| Defroster (duct) sensor circuit is open. | 58 | 0 | Go to Diagnostic procedure 8. | HA-144 |
| Defroster (duct) sensor circuit is shorted. | 58 | – | Go to Diagnostic procedure 9. | HA-145 |
| Vent (duct) sensor circuit is open. | 54 | 0 | Go to Diagnostic procedure 10. | HA-146 |
| Vent (duct) sensor circuit is shorted. | 54 | – | Go to Diagnostic procedure 11. | HA-147 |
| Floor (duct) sensor circuit is open. | 55 | 0 | Go to Diagnostic procedure 12. | HA-148 |
| Floor (duct) sensor circuit is shorted. | 55 | – | Go to Diagnostic procedure 13. | HA-149 |
| Sunload sensor circuit is shorted. | 56 | – | Go to Diagnostic procedure 14. | HA-150 |

When malfunctioning sensor circuit, ambient sensor, in-vehicle sensor, and duct sensors are suspected, it is useful to check temperature detected by each sensor with self-diagnosis STEP 1 to confirm the temperature is within normal range before performing Diagnostic Procedures.

O.K.

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

| Set fan speed | 4V | 6V | 9V | 12V |
|---|---|---|---|---|
| Code No. | X3 | X4 | X5 | X6 |
| Fan speed | Lo | Middle Lo | Middle HI | HI |

O.K.

N.G. → Go to **Diagnostic Procedure 25.**

Is engine coolant temperature below 40°C (104°F) and foot duct temperature below 30°C (86°F)?

N.G. → Blower motor operation is normal.
Refer to **Fan speed control specification.**

O.K.

IS BLOWER MOTOR CONTROLLED UNDER FAN STARTING SPEED CONTROL?
Refer to **Starting fan speed control specification.**

No → Check engine temperature sensor control circuit.
Refer to EF & EC section.

Yes

Blower motor operation is normal.

## Preliminary Check (Cont'd)

### PRELIMINARY CHECK 6

**Magnet clutch does not engage.**

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

N.G. →

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

| CONSULT indication | Self-diagnosis code No. | data | How to repair | Reference page |
|---|---|---|---|---|
| Ambient sensor circuit is open | 57 | 0 | Go to Diagnostic procedure 2. | HA-138 |
| Ambient sensor circuit is shorted. | 57 | ∞ | Go to Diagnostic procedure 3. | HA-139 |
| Upper in-vehicle sensor circuit is open. | 51 | 0 | Go to Diagnostic procedure 4. | HA-140 |
| Upper in-vehicle sensor circuit is shorted. | 51 | ∞ | Go to Diagnostic procedure 5. | HA-141 |
| Lower in-vehicle sensor circuit is open. | 52 | 0 | Go to Diagnostic procedure 6. | HA-142 |
| Lower in-vehicle sensor circuit is shorted. | 52 | ∞ | Go to Diagnostic procedure 7. | HA-143 |
| Defroster (duct) sensor circuit is open. | 53 | 0 | Go to Diagnostic procedure 8. | HA-144 |
| Defroster (duct) sensor circuit is shorted. | 53 | ∞ | Go to Diagnostic procedure 9. | HA-145 |
| Vent (duct) sensor circuit is open. | 54 | 0 | Go to Diagnostic procedure 10. | HA-146 |
| Vent (duct) sensor circuit is shorted. | 54 | ∞ | Go to Diagnostic procedure 11. | HA-147 |
| Floor (duct) sensor circuit is open. | 55 | 0 | Go to Diagnostic procedure 12. | HA-148 |
| Floor (duct) sensor circuit is shorted. | 55 | ∞ | Go to Diagnostic procedure 13. | HA-149 |
| Sunload sensor circuit is shorted. | 56 | ∞ | Go to Diagnostic procedure 14. | HA-150 |

When malfunctioning sensor circuit, ambient sensor, in-vehicle sensor, and duct sensors are suspected, it is useful to check temperature detected by each sensor with self-diagnosis STEP 1 to confirm the temperature is within normal range before performing Diagnostic Procedures.

O.K. ↓

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

| Set magnet clutch operation | ON | | OFF | |
|---|---|---|---|---|
| Code No. | 3X | 4X | 5X | 6X |
| Magnet clutch operation | ON | | OFF | |

O.K. ↓

Magnet clutch control system is normal.
Refer to **MAGNET CLUTCH CONTROL.**

N.G. →

CHECK REFRIGERANT.
Connect manifold gauge then check system pressure.

N.G. → Check for refrigerant leaks.

O.K. ↓

Go to **Diagnostic Procedure 19.**

## Preliminary Check (Cont'd)

### PRELIMINARY CHECK 7

**Discharged air temperature does not change.**

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

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

| CONSULT indication | Self-diagnosis code No. | data | How to repair | Reference page |
|---|---|---|---|---|
| Ambient sensor circuit is open. | 50 | 0 | Go to Diagnostic procedure 2. | HA-138 |
| Ambient sensor circuit is shorted. | 50 | – | Go to Diagnostic procedure 3. | HA-139 |
| Upper in-vehicle sensor circuit is open. | 51 | 0 | Go to Diagnostic procedure 4. | HA-140 |
| Upper in-vehicle sensor circuit is shorted. | 51 | – | Go to Diagnostic procedure 5. | HA-141 |
| Lower in-vehicle sensor circuit is open. | 52 | 0 | Go to Diagnostic procedure 6. | HA-142 |
| Lower in-vehicle sensor circuit is shorted. | 52 | – | Go to Diagnostic procedure 7. | HA-143 |
| Defroster (duct) sensor circuit is open. | 53 | 0 | Go to Diagnostic procedure 8. | HA-144 |
| Defroster (duct) sensor circuit is shorted. | 53 | – | Go to Diagnostic procedure 9. | HA-145 |
| Vent (duct) sensor circuit is open. | 54 | 0 | Go to Diagnostic procedure 10. | HA-146 |
| Vent (duct) sensor circuit is shorted. | 54 | – | Go to Diagnostic procedure 11. | HA-147 |
| Floor (duct) sensor circuit is open. | 55 | 0 | Go to Diagnostic procedure 12. | HA-148 |
| Floor (duct) sensor circuit is shorted. | 55 | – | Go to Diagnostic procedure 13. | HA-149 |
| Sunload sensor circuit is shorted. | 56 | – | Go to Diagnostic procedure 14. | HA-150 |

When malfunctioning sensor circuit, ambient sensor, in-vehicle sensor, and duct sensors are suspected, it is useful to check temperature detected by each sensor with self-diagnosis STEP 1 to confirm the temperature is within normal range before performing Diagnostic Procedures.

O.K.

CHECK AIR MIX DOOR OPERATION.
Set up "ACTIVE TEST" mode with CONSULT.
or
Set up self-diagnosis STEP 2.
Check if discharge air temperature changes as in following chart.

| | | | | |
|---|---|---|---|---|
| Set discharge air temperature | Full Hot | | 30°C (86°F) | Full Cool |
| Code No. | 3X | 4X | 5X | 6X |
| Discharge air temperature | Full Hot | | 30°C (86°F) | Full Cool |

O.K. → Air mix door control system is normal.
Refer to **Specification of air mix door control.**

N.G. → CHECK AIR MIX DOOR MECHANISM.
Refer to **DOOR CONTROL.**

N.G. → Repair or adjust.

O.K. → Go to **Diagnostic Procedure 15.**

### PRELIMINARY CHECK 8

**Noise**

Refer to page HA-71.

## Main Power Supply and Ground Circuit Check

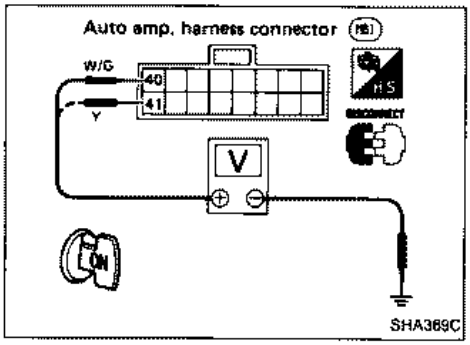
### POWER SUPPLY CIRCUIT CHECK FOR A/C SYSTEM

Check power supply circuit for air conditioning system.

**Refer to "POWER SUPPLY ROUTING" in section EL and A/C ELECTRICAL CIRCUIT — Auto Air Conditioner.**

### AUTO AMP. REMOVAL

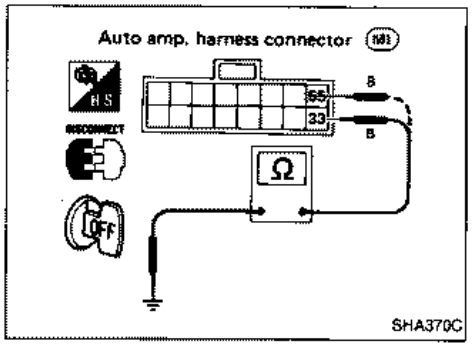
1. Remove driver side instrument lower lid.
2. Remove vent duct.
3. Remove auto amp. with harness connected.




### AUTO AMP. CHECK

1. Disconnect auto amp. harness connectors.
2. Connect voltmeter from harness side.
3. Measure voltage across terminal No. (40) or No. (41) and body ground.

| Voltmeter terminal | | Voltage (Approx.) |
|---|---|---|
| ⊕ | ⊖ | |
| (40) | Body ground | 12V |
| (41) | | |

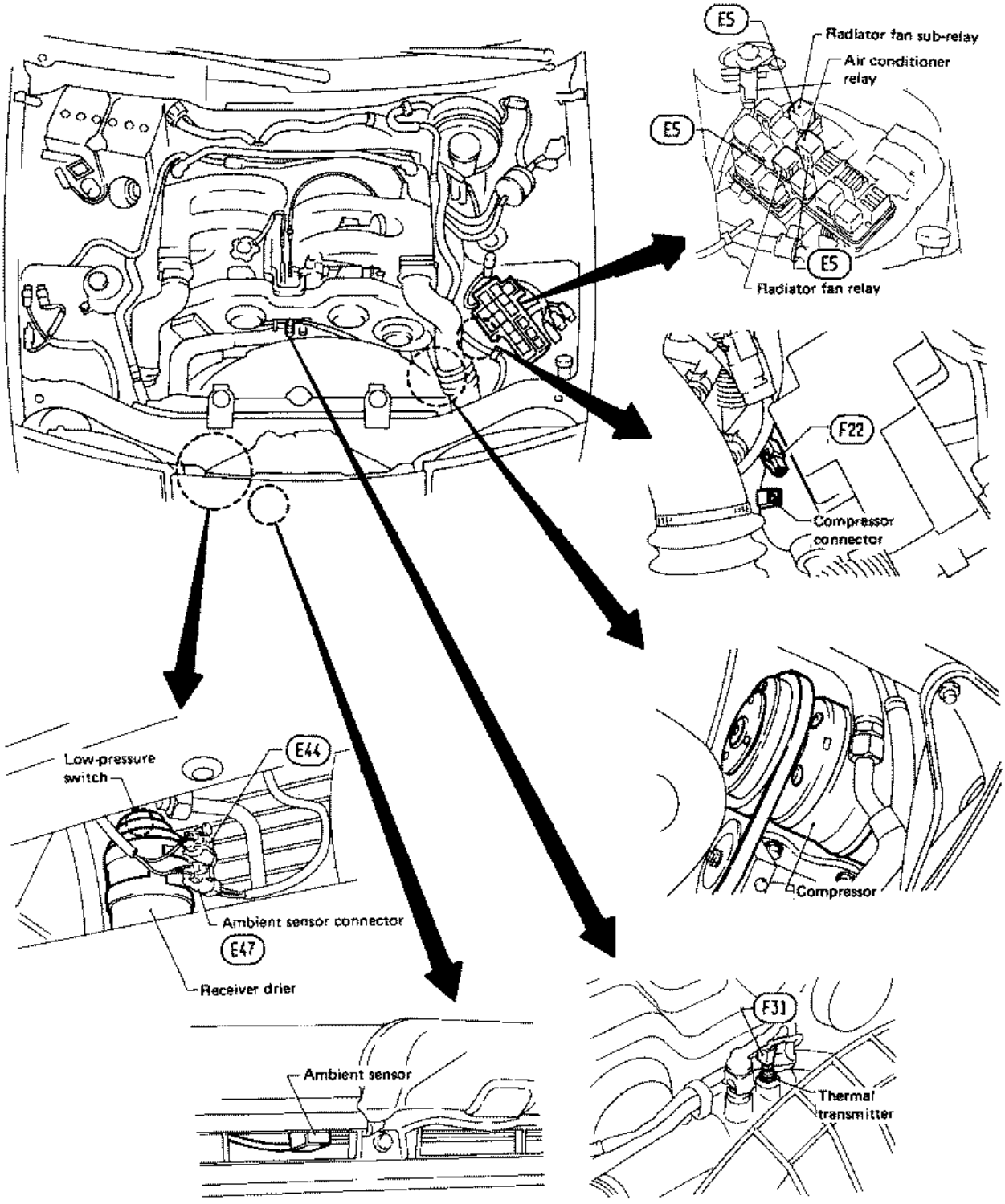



**Check body ground circuit for control unit with ignition switch OFF**

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

## Harness Layout for A/C System

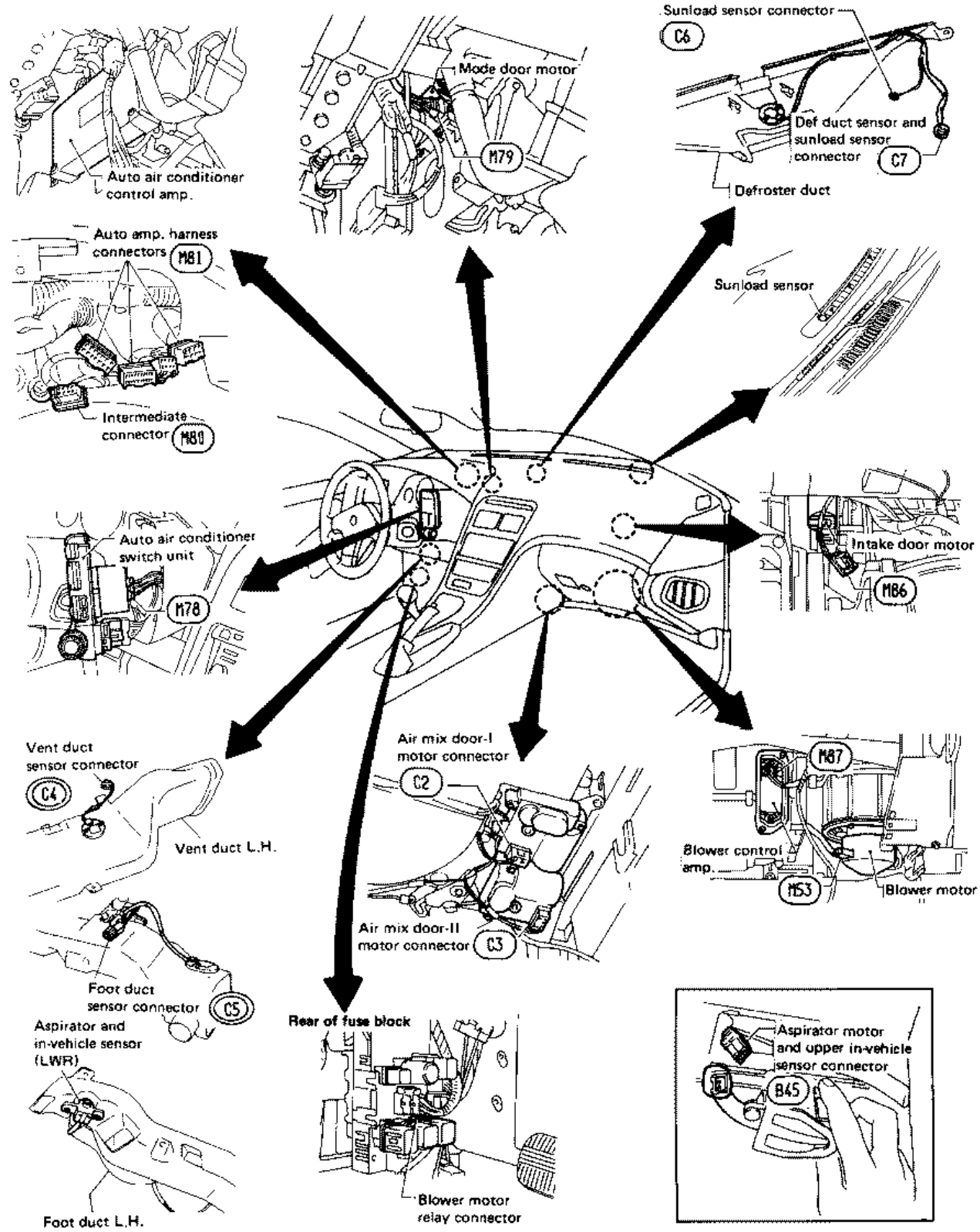
**Engine compartment**




SHA726C

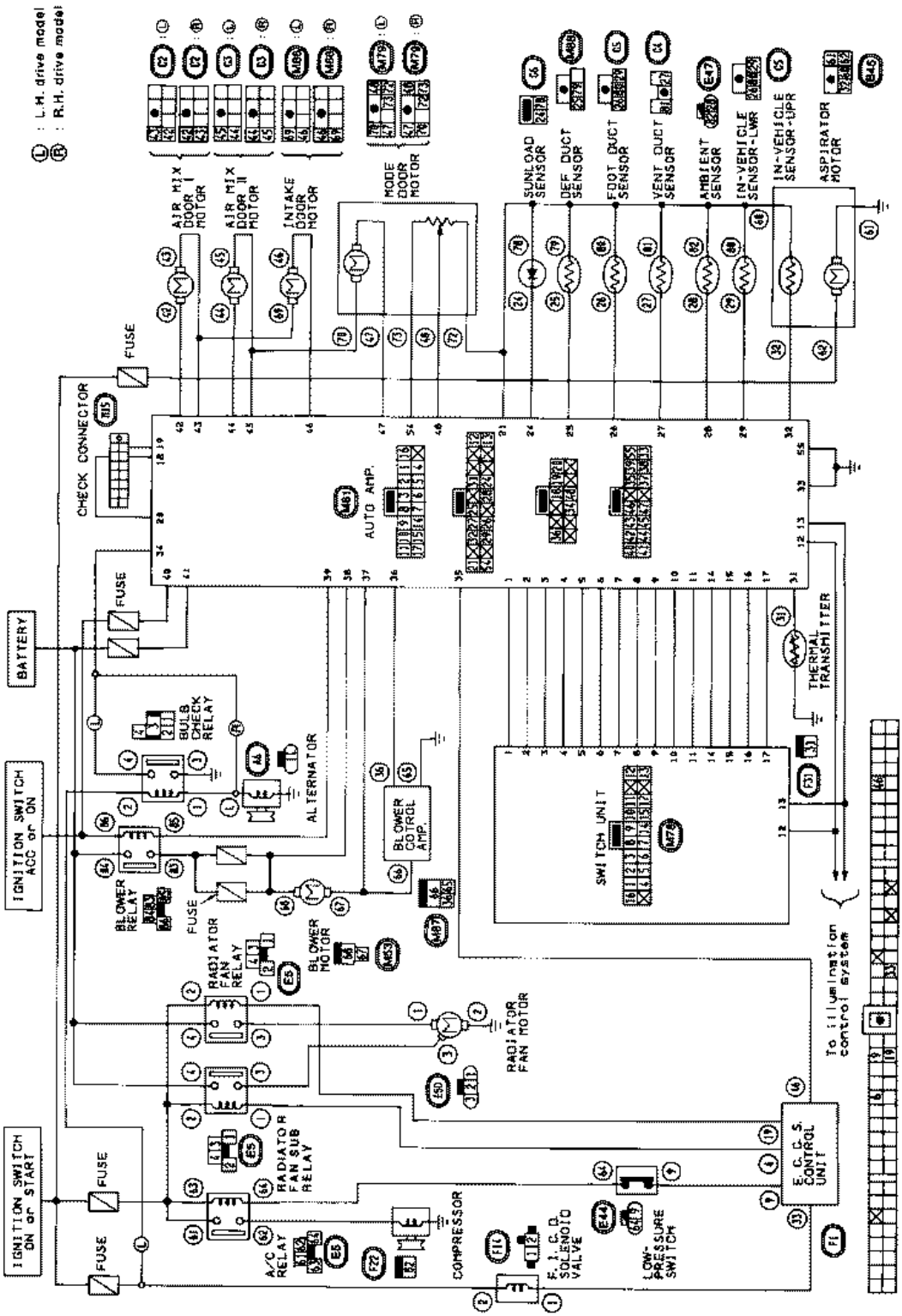
## Harness Layout for A/C System (Cont'd)

### Passenger compartment




SHA543C

## Circuit Diagram for Quick Pinpoint Check




- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle " ◎ " are connected to the harness side connectors shown in the "Harness Layout for A/C System". (See pages HA-134 - HA-135.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle " ○ ".

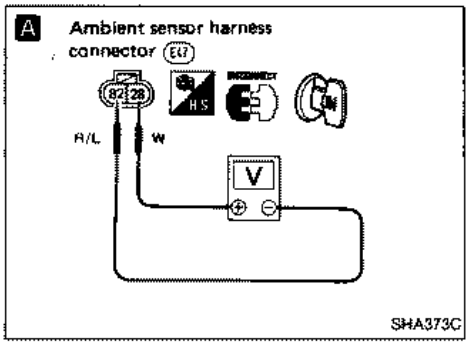
SHA696C

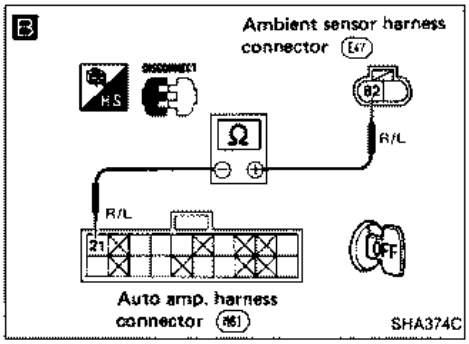
## Diagnostic Procedure 1

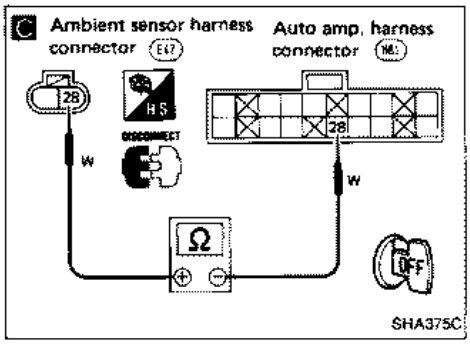
**SYMPTOM: Self-diagnosis detects intermittent short or open circuit in each sensor circuit.**

Check each connector connection as shown in the following table, and check the condition of each wire.

| Malfunctioning circuit | Connector No. to be checked | | | |
|---|---|---|---|---|
| | Main harness | Engine room harness | Body harness | A/C sub-harness |
| Ambient sensor | | | | |
| (L.H.D. model) | M59 M81 | E47 E112 | | |
| (R.H.D. model) | M8 M81 | E47 E103 | | |
| Upper in-vehicle sensor | | | | |
| (L.H.D. model) | M4 M81 | | B2 B45 | |
| (R.H.D. model) | M5 M81 | | B3 | |
| Lower in-vehicle sensor | M80 M81 | | | C1 C5 |
| DEF duct sensor | M81 M88 | | | |
| VENT duct sensor | M80 M81 | | | C1 C4 |
| Floor duct sensor | M80 M81 | | | C1 C5 |
| Sunload sensor | M81 M88 | | | C6 C7 |




## Diagnostic Procedure 2

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

A

CHECK AMBIENT SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP.
Disconnect ambient sensor harness connector.
Do approximately 5 volts exist between ambient sensor harness connector terminal No. 28 and 82?

N.G. → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between ambient sensor harness connector terminal No. 28 and auto amp. harness connector terminal No. 28.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B Note

Check circuit continuity between ambient sensor harness connector terminal No. 82 and auto amp. harness connector terminal No. 21.

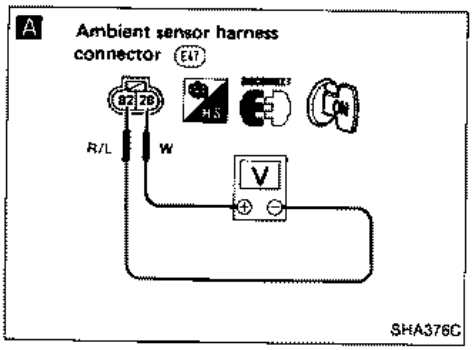
O.K. →

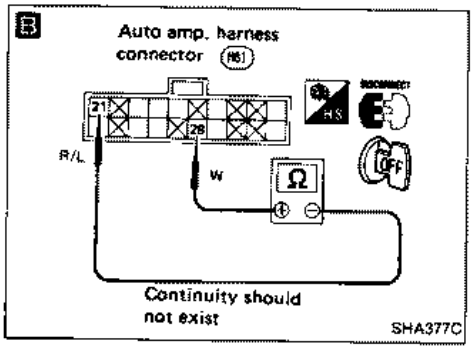
CHECK AMBIENT SENSOR. (Refer to Electrical Components Inspection.)

N.G. → Replace ambient sensor.

O.K. → Replace auto amp.

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




## Diagnostic Procedure 3

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

A

CHECK AMBIENT SENSOR CIRCUIT BETWEEN AMBIENT SENSOR AND AUTO AMP.
Disconnect ambient sensor harness connector.
Do approximately 5 volts exist between ambient sensor harness connector terminal No. (28) and (62)?

N.G. → Disconnect auto amp. harness connector.

B

Note: Check the circuit between auto amp. harness connector terminal No. (28) and (21) is not shorted.

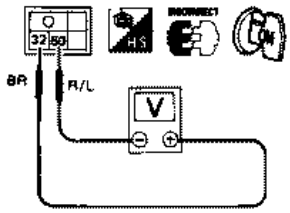
O.K. → Replace auto amp.

O.K. → CHECK AMBIENT SENSOR. (Refer to Electrical Components Inspection.)

N.G. → Replace ambient sensor.

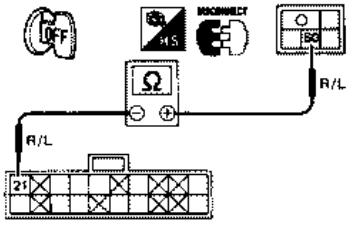
O.K. → Replace auto amp.

A In-vehicle upper sensor harness connector (B45)




SHA378C

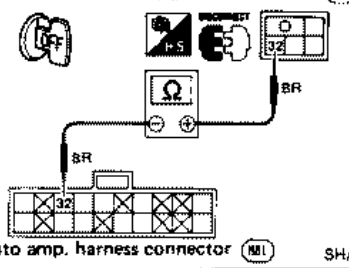
B In-vehicle upper sensor harness connector (B45)




Auto amp. harness connector

SHA379C

C In-vehicle upper sensor harness connector (B45)




Auto amp. harness connector (M81)

SHA380C

## Diagnostic Procedure 4

**SYMPTOM: Upper in-vehicle sensor circuit is open. (CONSULT or self-diagnosis STEP 4 indicates this.)**

A

CHECK IN-VEHICLE UPPER SENSOR CIRCUIT BETWEEN IN-VEHICLE UPPER SENSOR AND AUTO AMP.
Disconnect in-vehicle upper sensor harness connector.
Do approximately 5 volts exist between in-vehicle upper sensor harness connector terminal No. (32) and (60)?

N.G. → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between in-vehicle upper sensor harness connector terminal No. (32) and auto amp. harness connector terminal No. (32).

O.K. → Replace auto amp.

O.K.

B Note

Disconnect auto amp. harness connector.
Check circuit continuity between in-vehicle upper sensor harness connector terminal No. (60) and auto amp. harness connector terminal No. (21).

O.K.

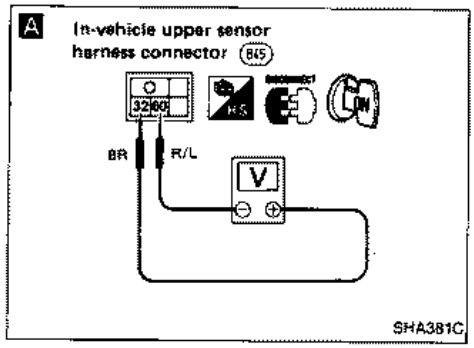
CHECK IN-VEHICLE UPPER SENSOR.
(Refer to Electrical Components Inspection.)

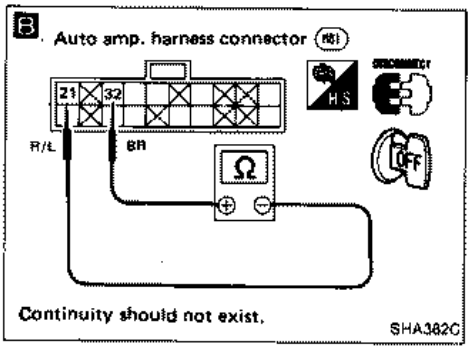
N.G. → Replace in-vehicle upper sensor.

O.K.

Replace auto amp.

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




## Diagnostic Procedure 5

**SYMPTOM: Upper in-vehicle sensor circuit is shorted. (CONSULT or self-diagnosis STEP 4 Indicates this.)**

A

CHECK IN-VEHICLE UPPER SENSOR CIRCUIT BETWEEN IN-VEHICLE UPPER SENSOR AND AUTO AMP.
Disconnect in-vehicle upper sensor harness connector.
Do approximately 5 volts exist between in-vehicle upper sensor harness connector terminal No. ㉜ and ㊿?

N.G. → Disconnect auto amp. harness connector.

B

Check the circuit between auto amp. harness connector terminal No. ㉜ and ㉑ is not shorted. (Note)

O.K. → Replace auto amp.

O.K. →

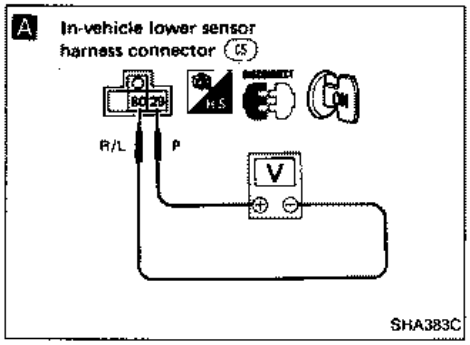
CHECK IN-VEHICLE UPPER SENSOR.
(Refer to Electrical Components Inspection.)

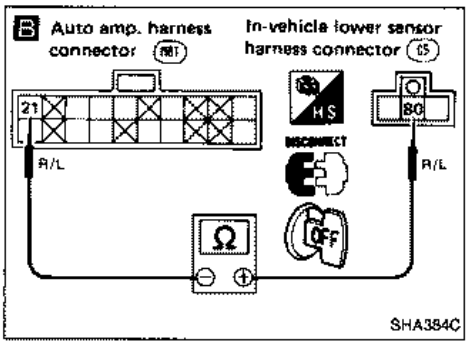
N.G. → Replace in-vehicle upper sensor.

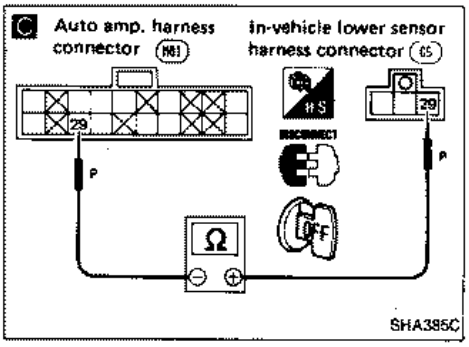
O.K. →

Replace auto amp.

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




## Diagnostic Procedure 6

**SYMPTOM: Lower in-vehicle sensor circuit is open. (CONSULT or self-diagnosis STEP 4 indicates this.)**

**A**

CHECK IN-VEHICLE LOWER SENSOR CIRCUIT BETWEEN IN-VEHICLE LOWER SENSOR AND AUTO AMP.
Disconnect in-vehicle lower sensor harness connector.
Do approximately 5 volts exist between in-vehicle lower sensor harness connector terminal No. ㉙ and ㊽?

N.G. → Disconnect auto amp. harness connector.

**C** Note

Check circuit continuity between in-vehicle lower sensor harness connector terminal No. ㉙ and auto amp. harness connector terminal No. ㉙.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

**B** Note

Check circuit continuity between in-vehicle lower sensor harness connector terminal No. ㊽ and auto amp. harness connector terminal No. ㉑.

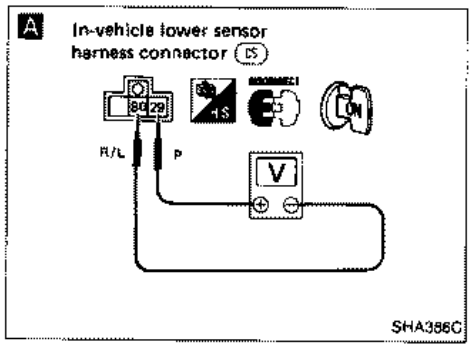
O.K. →

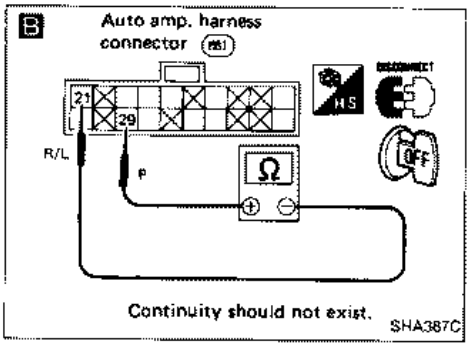
CHECK IN-VEHICLE LOWER SENSOR.
(Refer to Electrical Components Inspection.)

N.G. → Replace in-vehicle lower sensor.

O.K. → Replace auto amp.

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




## Diagnostic Procedure 7

**SYMPTOM: Lower in-vehicle sensor circuit is shorted. (CONSULT or self-diagnosis STEP 4 indicates this.)**

A

CHECK IN-VEHICLE LOWER SENSOR CIRCUIT BETWEEN IN-VEHICLE LOWER SENSOR AND AUTO AMP.
Disconnect in-vehicle lower sensor harness connector.
Do approximately 5 volts exist between in-vehicle lower sensor harness connector terminal No. (29) and (80)?

N.G. → Disconnect auto amp. harness connector.

B

Check the circuit between auto amp. harness connector terminal No. (29) and (21) is not shorted. (Note)

O.K. → Replace auto amp.

O.K. →

CHECK IN-VEHICLE UPPER SENSOR.
(Refer to Electrical Components Inspection.)

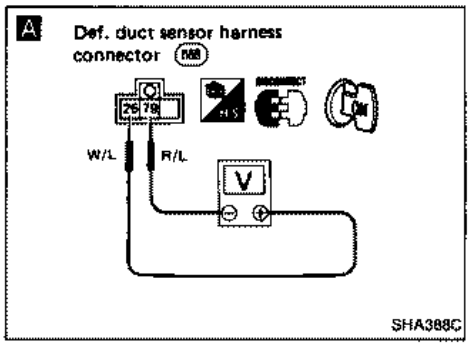
N.G. → Replace in-vehicle lower sensor.

O.K. →

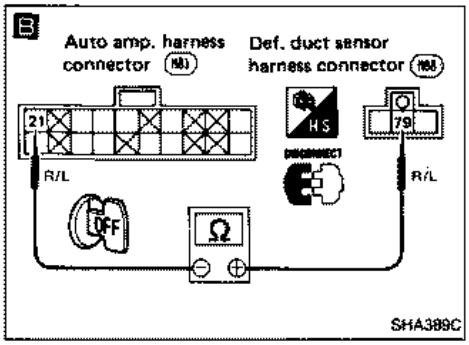
Replace auto amp.

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

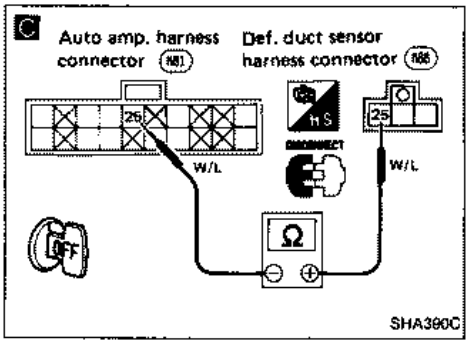
A




B




C




## Diagnostic Procedure 8

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

A

CHECK DEF. DUCT SENSOR CIRCUIT BETWEEN DEF. DUCT SENSOR AND AUTO AMP.
Disconnect def. duct sensor harness connector.
Do approximately 5 volts exist between def. duct sensor harness connector terminal No. 25 and 79?

N.G. → Disconnect auto amp. harness connector.

C Note
Check circuit continuity between def. duct sensor harness connector terminal No. 25 and auto amp. harness terminal No. 25.

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

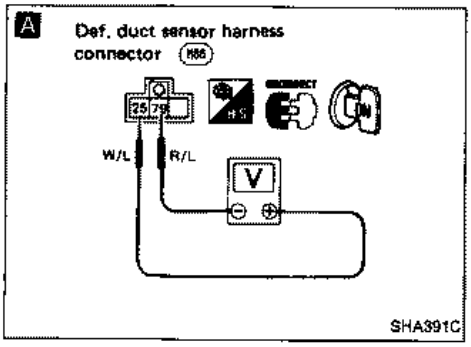
B Note
Check circuit continuity between def. duct sensor harness connector terminal No. 79 and auto amp. harness connector terminal No. 21.

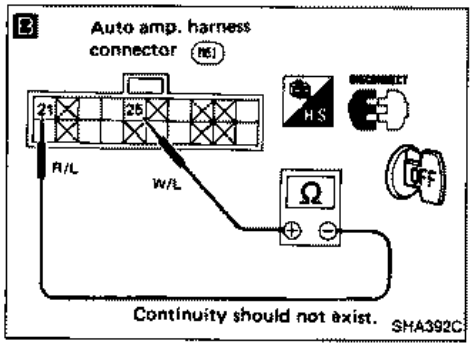
O.K. →
CHECK DEF. DUCT SENSOR. (Refer to Electrical Components Inspection.)

N.G. → Replace def. duct sensor.

O.K. → Replace auto amp.

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




## Diagnostic Procedure 9

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

A

CHECK DEF. DUCT SENSOR CIRCUIT BETWEEN DEF. DUCT SENSOR AND AUTO AMP.
Disconnect def. duct sensor harness connector.
Do approximately 5 volts exist between def. duct sensor harness connector terminal No. (25) and (79)?

N.G. → Disconnect auto amp. harness connector.

B

Note

Check the circuit between auto amp. harness connector terminal No. (25) and (21) is not shorted.

O.K. → Replace auto amp.

O.K. ↓

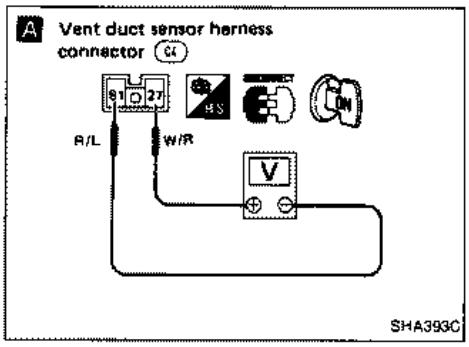
CHECK DEF. DUCT SENSOR. (Refer to Electrical Components Inspection.)

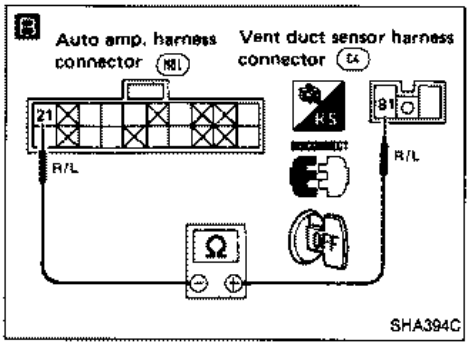
N.G. → Replace def. duct sensor.

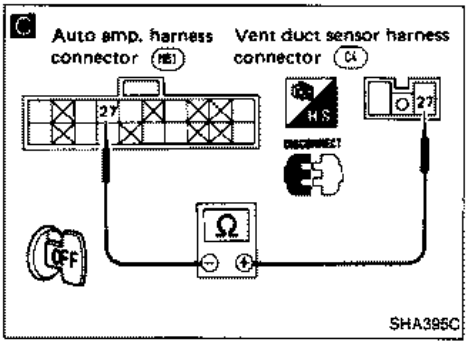
O.K. ↓

Replace auto amp.

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




## Diagnostic Procedure 10

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

A

CHECK VENT DUCT SENSOR CIRCUIT BETWEEN VENT DUCT SENSOR AND AUTO AMP.
Disconnect vent duct sensor harness connector.
Do approximately 5 volts exist between vent duct sensor harness connector terminal No. (27) and (61)?

N.G → Disconnect auto amp. harness connector.

C Note

Check circuit continuity between vent duct sensor harness connector terminal No. (27) and auto amp. harness connector terminal No. (27).

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

B Note

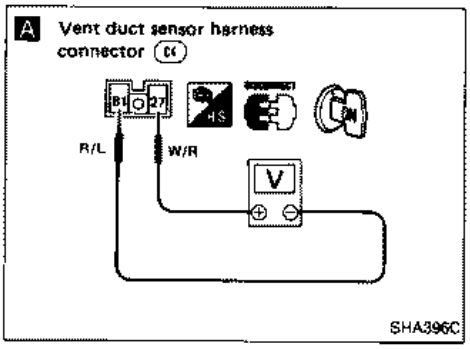
Check circuit continuity between vent duct sensor harness connector terminal No. (61) and auto amp. harness connector terminal No. (21).

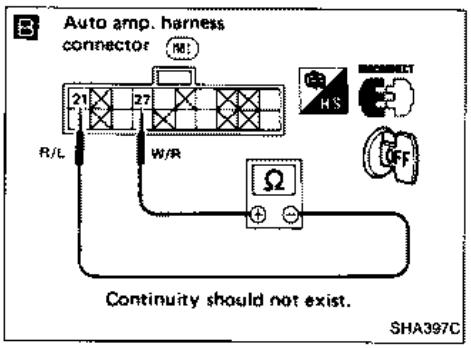
O.K. → CHECK VENT DUCT SENSOR. (Refer to Electrical Components Inspection.)

N.G → Replace def. duct sensor.

O.K. → Replace auto amp.

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




## Diagnostic Procedure 11

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

A

CHECK VENT DUCT SENSOR CIRCUIT BETWEEN VENT DUCT SENSOR AND AUTO AMP.
Disconnect vent duct sensor harness connector.
Do approximately 5 volts exist between vent duct sensor harness connector terminal No. (27) and (61)?

N.G. → Disconnect auto amp. harness connector.

B

Note

Check the circuit between auto amp. harness connector terminal No. (27) and (21) is not shorted.

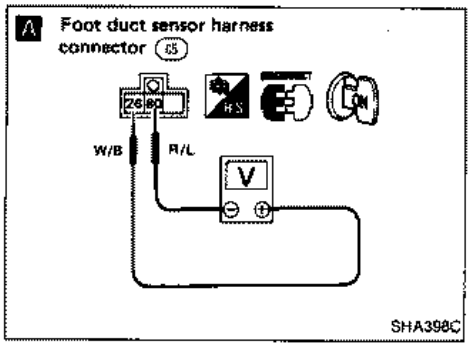
O.K. → Replace auto amp.

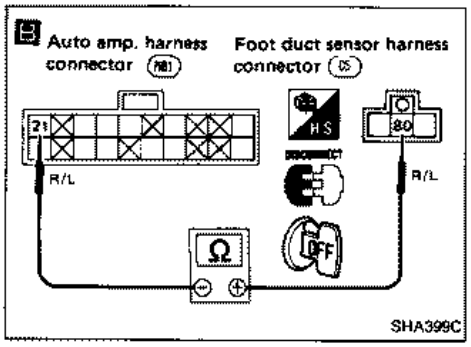
O.K. → CHECK VENT DUCT SENSOR. (Refer to Electrical Components Inspection.)

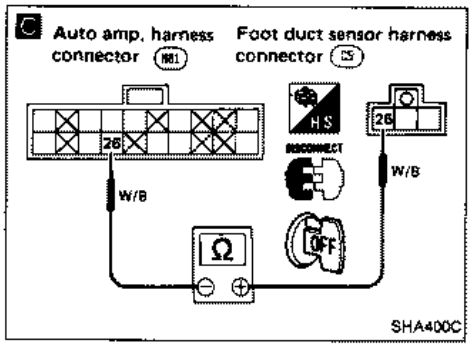
N.G. → Replace vent duct sensor.

O.K. → Replace auto amp.

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




## Diagnostic Procedure 12

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

**A**

CHECK FOOT DUCT SENSOR CIRCUIT BETWEEN FOOT DUCT SENSOR AND AUTO AMP.
Disconnect foot duct sensor harness connector.
Do approximately 5 volts exist between foot duct sensor harness connector terminal No. (26) and (86)?

N.G. → Disconnect auto amp. harness connector.

**C** Note

Check circuit continuity between foot duct sensor harness connector terminal No. (26) and auto amp. harness connector terminal No. (26).

O.K. → Replace auto amp.

O.K. → Disconnect auto amp. harness connector.

**B** Note

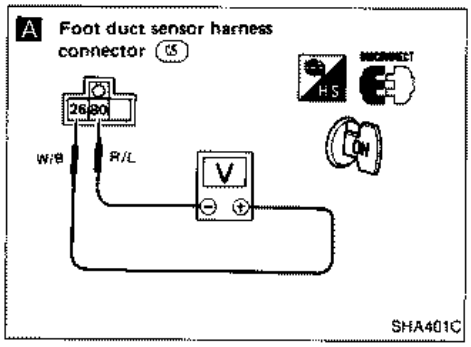
Check circuit continuity between foot duct sensor harness connector terminal No. (86) and auto amp. harness connector terminal No. (21).

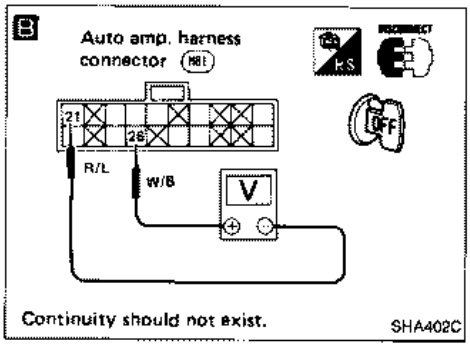
O.K. → CHECK FOOT DUCT SENSOR. (Refer to Electrical Components Inspection.)

N.G. → Replace foot duct sensor.

O.K. → Replace auto amp.

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




## Diagnostic Procedure 13

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

A

CHECK FOOT DUCT SENSOR CIRCUIT BETWEEN FOOT DUCT SENSOR AND AUTO AMP.
Disconnect foot duct sensor harness connector.
Do approximately 5 volts exist between foot duct sensor harness connector terminal No. (26) and (30)?

N.G. → Disconnect auto amp. harness connector.

B

Note

Check the circuit between auto amp. harness connector terminal No. (26) and (21) is not shorted.

O.K. → Replace auto amp.

O.K. ↓

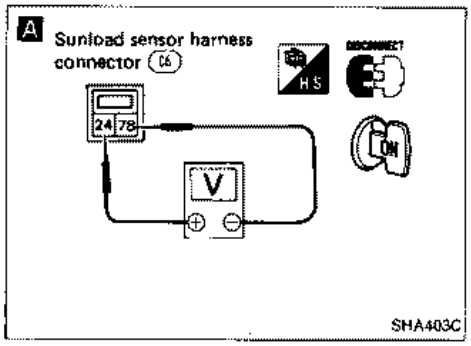
CHECK FOOT DUCT SENSOR. (Refer to Electrical Components Inspection.)

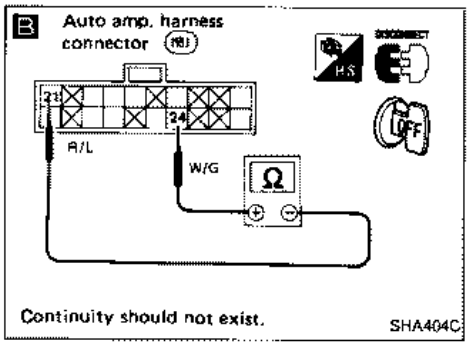
N.G. → Replace vent duct sensor.

O.K. ↓

Replace auto amp.

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




## Diagnostic Procedure 14

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

A

CHECK SUNLOAD SENSOR CIRCUIT BETWEEN SUNLOAD SENSOR AND AUTO AMP.
Disconnect sunload sensor harness connector.
Do approximately 5 volts exist between sunload sensor harness connector terminal No. (24) and (78)?

N.G. → Disconnect auto amp. harness connector.

B

Note

Check the circuit between auto amp. harness connector terminal No. (24) and (21) is not shorted.

O.K. ↓

Replace auto amp.

O.K. ↓

CHECK SUNLOAD SENSOR.
(Refer to Electrical Components Inspection.)

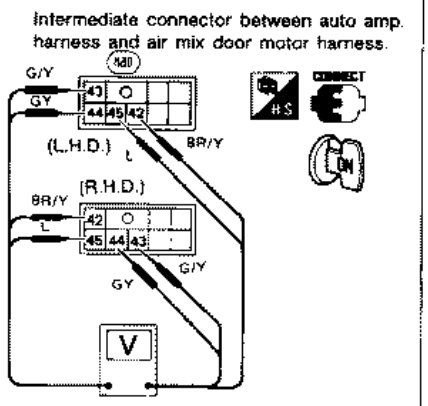
N.G. → Replace sunload sensor.

O.K. ↓

Replace auto amp.

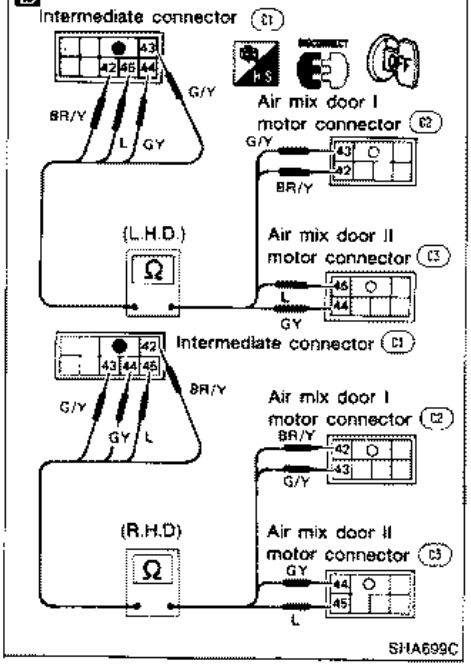
**Note:**
**If the result is N.G. after checking circuit continuity, repair harness or connector.**

A



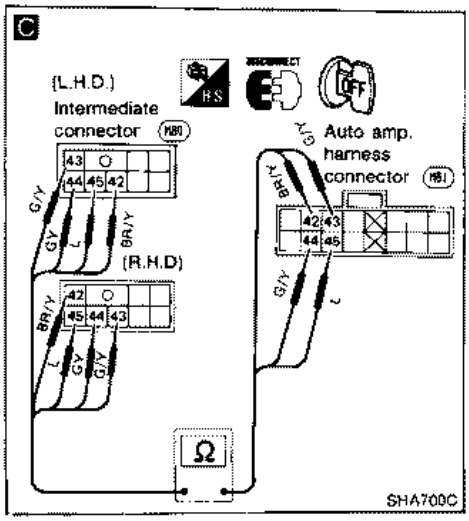

SHA698C

B




SHA699C

C




SHA700C

## Diagnostic Procedure 15

**SYMPTOM: Air mix door does not operate normally.**

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

**A**

CHECK FOR SIGNALS TO AIR MIX DOOR MOTOR.

Set up "ACTIVE TEST" mode with CONSULT.

Set up self-diagnosis STEP 2.

Set air mix door position as shown in the following chart.

Check if approximately 10V exists for 3 seconds every 10 seconds between each terminal.*

| Air mix door position | Code No. | Terminal No. Air mix door I ⊕ | Air mix door I ⊖ | Air mix door II ⊕ | Air mix door II ⊖ |
|---|---|---|---|---|---|
| Full-Hot | 3X | 42 | 42 | 43 | 44 |
| Full-Cool | 6X | 42 | 43 | 44 | 45 |

N.G. → **C**

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

| Intermediate connector | Auto amp. connector | Continuity |
|---|---|---|
| 42 | 42 | Yes |
| 43 | 43 | Yes |
| 44 | 44 | Yes |
| 45 | 45 | Yes |

O.K. → Replace auto amp.

N.G. → Repair harness or connector.

O.K.

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

Remove heater unit assembly.

**B**

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

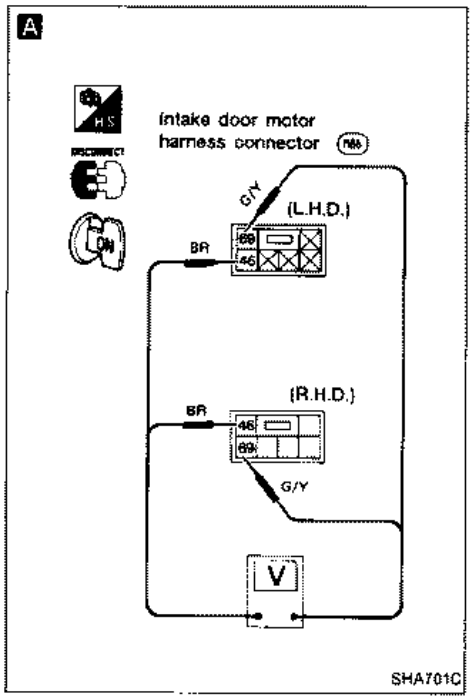
| Intermediate connector | Air mix door I motor connector | Continuity |
|---|---|---|
| 42 | 42 | Yes |
| 43 | 43 | Yes |

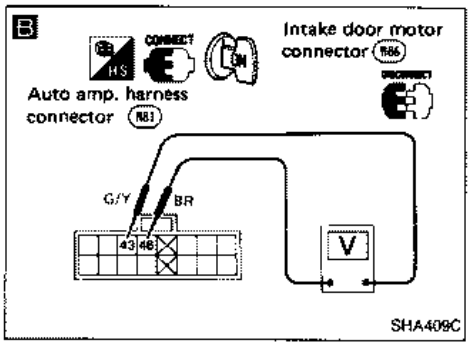
| Intermediate connector | Air mix door II motor connector | Continuity |
|---|---|---|
| 44 | 44 | Yes |
| 45 | 45 | Yes |

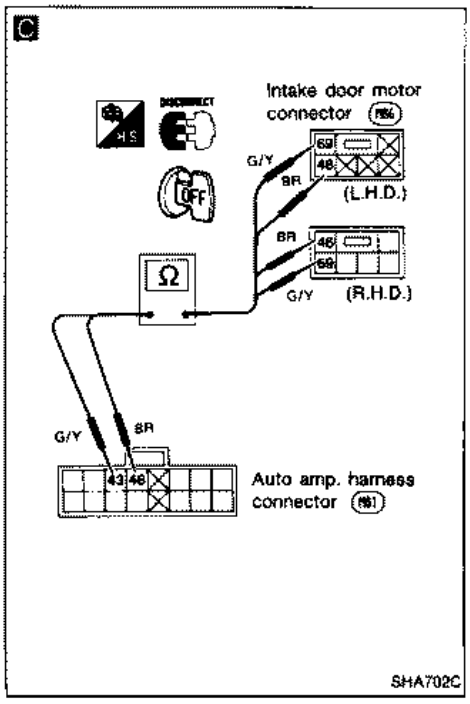
O.K. → Repair harness or connector.

O.K.

Replace air mix door motor.




## Diagnostic Procedure 16

**SYMPTOM: Intake door does not operate normally.**

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

**A**

CHECK FOR SIGNALS TO INTAKE DOOR MOTOR.
Disconnect intake door motor harness connector.
Set up "ACTIVE TEST" mode with CONSULT.
Set up self-diagnosis STEP 2.
Set intake door position as shown in the following chart.
Check if approximately 10V exists for 2.5 seconds between each terminal.

| Intake door position | Code No. | Terminal No. ⊕ | Terminal No. ⊖ |
|---|---|---|---|
| 5X → 6X | FRE/REC → REC | 46 | 69 |
| 6X → 3X | REC → FRE | 69 | 46 |

N.G. →

**B**

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

| Intake door position | Code No. | Terminal No. ⊕ | Terminal No. ⊖ |
|---|---|---|---|
| 5X → 6X | FRE/REC → REC | 46 | 43 |
| 6X → 3X | REC → FRE | 43 | 46 |

O.K. ↓

Replace intake door motor.

N.G. ↓

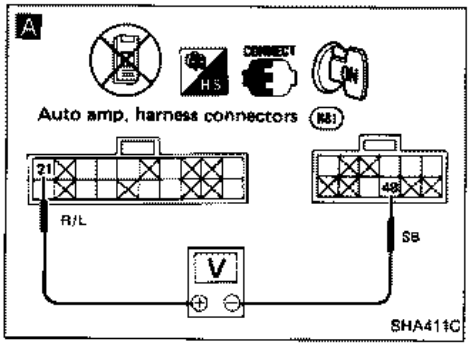
Replace auto amp.

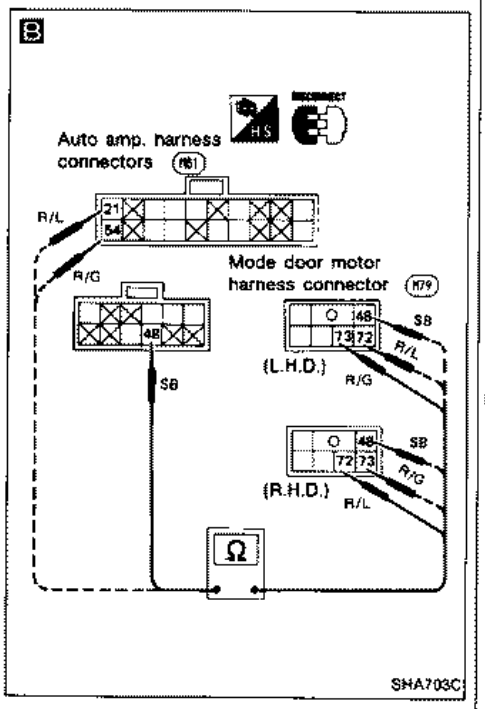
**C**

Check continuity between auto amp. harness connector terminal No. 46 and intake door motor harness connector terminal No. 46.
Check auto amp. harness connector terminal No. 43 and intake door motor harness connector terminal No. 69.

N.G. ↓

Repair harness or connector.




## Diagnostic Procedure 17

**SYMPTOM: Mode door does not operate normally.**

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

**A**

CHECK P.B.R. CIRCUIT

Set up "ACTIVE TEST" mode with CONSULT.

Set up self-diagnosis STEP 2.

Set mode door motor as shown in the following chart.

Check P.B.R. voltage with data monitor function in "ACTIVE TEST" mode.

| Mode door position | P.B.R. voltage (approx.) |
|---|---|
| DEF | 4.8V |
| FOOT/DEF | 2.5V |
| B/L | 1.1V |
| VENT | 0V |

Check if voltage between auto amp. harness connector terminals ㊽ and ㉑ varies from approximately 5V to approximately 0V according to mode door position varies.

| Code No. | Voltage ㊽ (⊖) | Voltage ㉑ (⊕) |
|---|---|---|
| 3X | 4.8V | |
| 4X | 2.5V | |
| 5X | 1.1V | |
| 6X | 0V | |

N.G. → CHECK MODE DOOR MOTOR. Refer to Electrical Components Inspection.

O.K. → **B**

N.G. → Replace mode door motor.

**B**

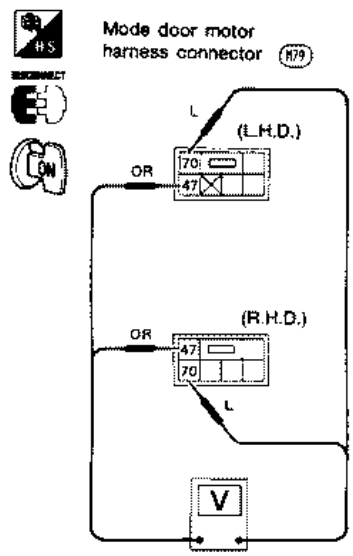
CHECK HARNESS BETWEEN AUTO AMP. AND MODE DOOR MOTOR.

| Auto amp. harness connector terminal | Mode door motor harness connector terminal | Continuity |
|---|---|---|
| ㉑ | ㊽ | No |
| | ⑦② | Yes |
| | ⑦③ | No |
| ㊽ | ㊽ | Yes |
| | ⑦② | No |
| | ⑦③ | No |
| ㊿④ | ㊽ | No |
| | ⑦② | No |
| | ⑦③ | Yes |

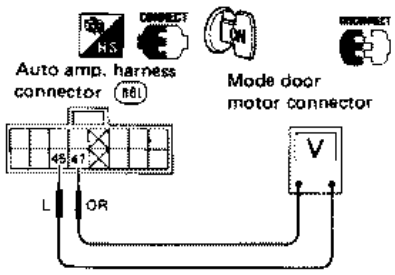
O.K. → Go to diagnostic procedure 18.

N.G. → Repair harness or connector.

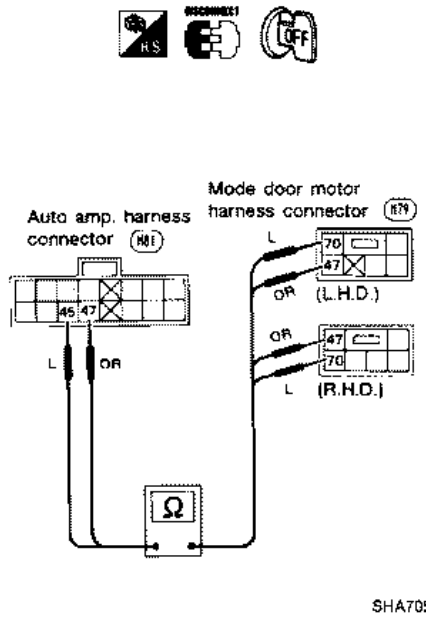
A




B




C




## Diagnostic Procedure 18

**SYMPTOM: Mode door does not move at all.**

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

A

CHECK FOR SIGNALS TO MODE DOOR MOTOR.

Set up "ACTIVE TEST" mode with CONSULT.

Set up self-diagnosis STEP 2.

Set mode door position as shown in the following chart.

Check if approximately 10V exists between mode door motor harness connector terminals ㊼ and ㊿ for approximately 1.3 seconds every 10 seconds.

| Mode door position | Code No. | Terminal No. ⊕ | Terminal No. ⊖ |
|---|---|---|---|
| DEF | 3X | ㊿ | ㊼ |
| VENT | 6X | ㊼ | ㊿ |

N.G. → B

O.K. ↓

Replace mode door motor.

B

CHECK OUTPUT OF AUTO AMP.

Set up "ACTIVE TEST" mode with CONSULT.

Set up self-diagnosis STEP 2.

Set mode door position as shown in the following chart.

Check if approximately 10V exists between mode door motor harness connector terminals ㊼ and ㊺ for approximately 1.3 seconds every 10 seconds.

| Mode door position | Code No. | Terminal No. ⊕ | Terminal No. ⊖ |
|---|---|---|---|
| DEF | 3X | ㊺ | ㊼ |
| VENT | 6X | ㊼ | ㊺ |

O.K. ↓

N.G. → Replace auto amp.

C

Check continuity between auto amp. harness connector terminal No. ㊼, ㊺ and mode door motor harness connector terminal No. ㊼, ㊿ respectively.

O.K. ↓

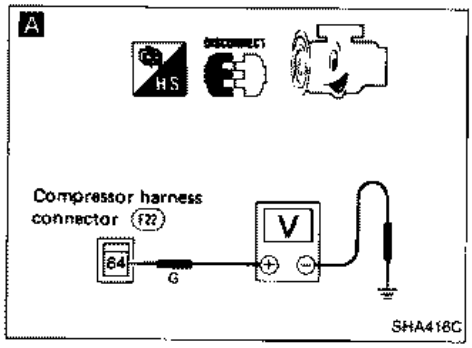
N.G. → Repair harness or connector.

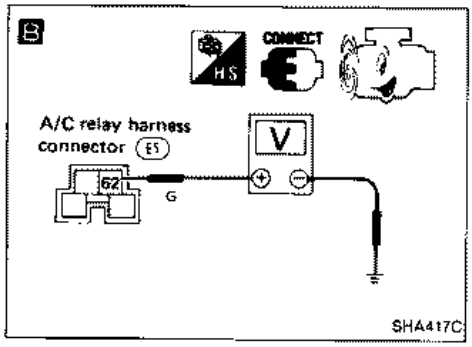
INSPECTION END

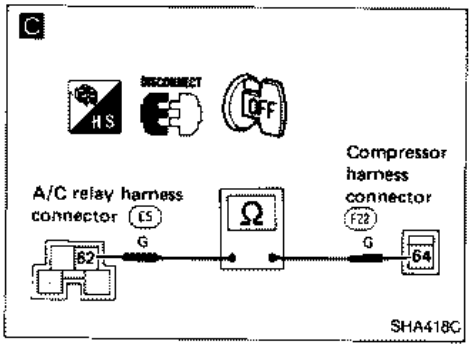
## Diagnostic Procedure 19

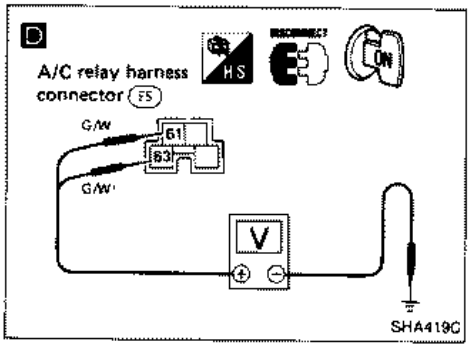
**SYMPTOM: Magnet clutch does not engage.**

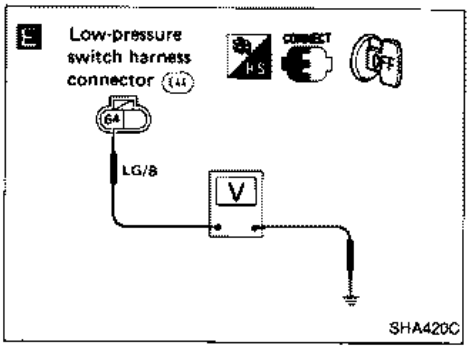
- **Perform Preliminary check 6 before referring to the following flow chart.**




A

CHECK POWER SUPPLY FOR COMPRESSOR.
Disconnect compressor harness connector.
Set up "ACTIVE TEST" mode with CONSULT.
Set up self-diagnosis STEP 2.
Set compressor as shown in the following chart.
Check if approximately 12V exists between compressor harness connector terminal and body ground.

| Compressor | Code No. | Terminal No. | |
|---|---|---|---|
| ON | 6X | 64 | Body ground |

N.G. → B

O.K. ↓

Check magnet clutch.

N.G. ↓

Replace magnet clutch.
Refer to COMPRESSOR — Model MJS170 (HITACHI make).

B

CHECK A/C RELAY OPERATION.
Do approximately 12 volts exist between A/C relay harness connector terminal No. 62 and body ground?

N.G. → D

O.K. ↓

Disconnect A/C relay harness connector.

C

Note

Check circuit continuity between A/C relay harness connector terminal No. 62 and compressor harness connector terminal No. 64.

D

CHECK POWER SUPPLY FOR A/C RELAY.
Disconnect A/C relay.
Do approximately 12 volts exist between A/C relay harness connector terminal No. 61, 63 and body ground respectively?

N.G. → CHECK POWER SUPPLY CIRCUIT.
(Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.)

O.K. ↓

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

N.G. → Replace A/C relay.

O.K. ↓

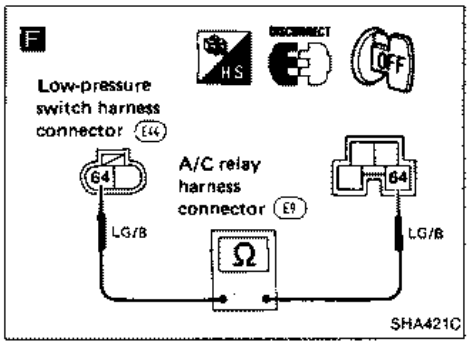
Reconnect A/C relay.

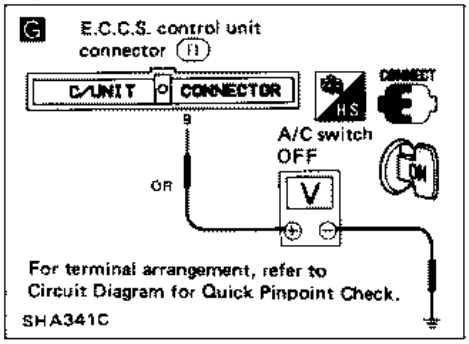
Ⓐ

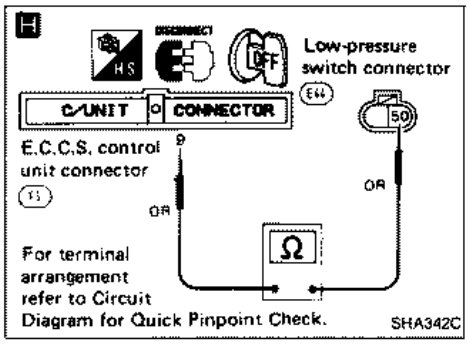
(Go to next page.)

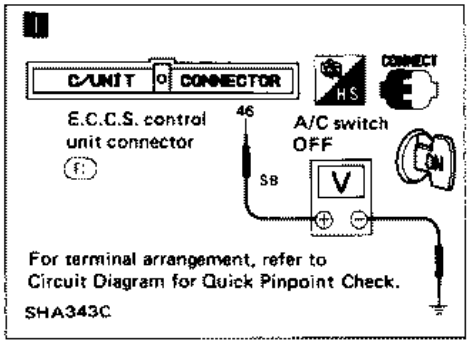
**Note:**
**If the result is N.G. after checking circuit continuity, repair harness or connector.**

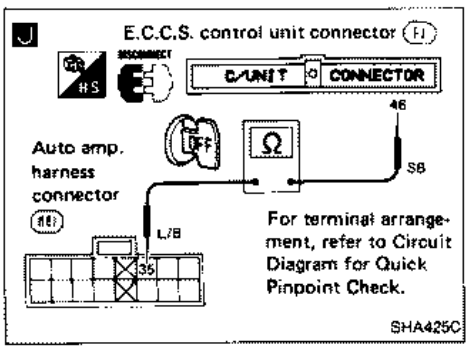
## Diagnostic Procedure 19 (Cont'd)




Ⓐ

Turn ignition switch ON and press (OFF) switch.

**E** CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approximately 12 volts exist between low-pressure switch harness connector terminal No. 64 and body ground?

N.G. → **F** Check circuit continuity between A/C relay harness connector terminal No. 64 and low-pressure harness connector terminal No. 64. Note

O.K. ↓

**G** Do approximately 12 volts exist between E.C.C.S. control unit harness connector terminal No. 9 and body ground?

N.G. → **H** Check circuit continuity between low-pressure switch harness connector terminal No. 9 and E.C.C.S. control unit harness connector terminal No. 9. Note

O.K. ↓

CHECK LOW-PRESSURE SWITCH.
(Refer to Electrical Components Inspection.)

N.G. ↓

Replace low-pressure switch.

O.K. ↓

**I** Do approximately 8 to 9 volts exist between E.C.C.S. control unit harness connector terminal No. 46 and body ground?

N.G. → CHECK E.C.C.S. CONTROL UNIT.
(Refer to EF & EC section.)

O.K. ↓

Disconnect auto amp. harness connector.

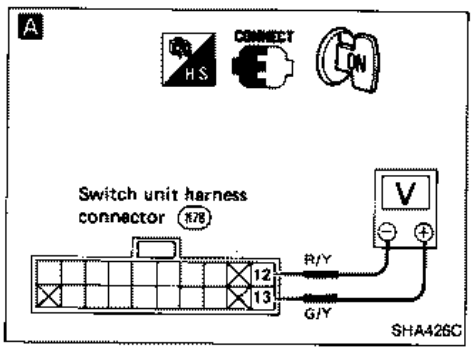
O.K. ↓

**J** Check circuit continuity between auto amp. harness connector terminal No. 35 and E.C.C.S. control unit harness connector terminal No. 46.

O.K. ↓

Replace auto amp.

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




## Diagnostic Procedure 20

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

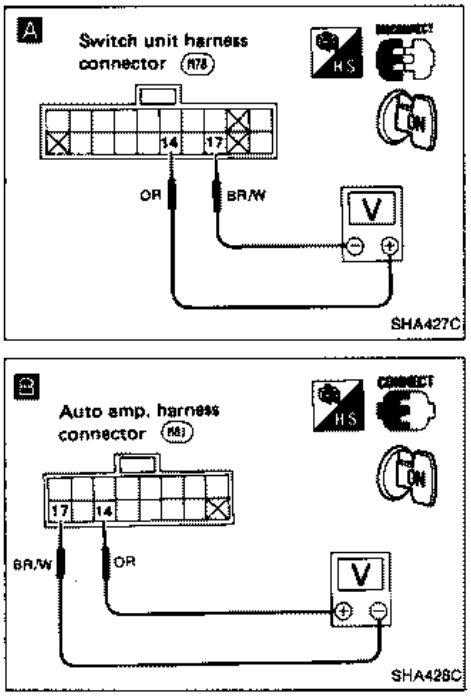
A

Turn on light switch.
Set illumination control switch at the brightest position.
Check if approximately 12V exists between switch panel harness connector terminal No. ⑫ and ⑬.

N.G. → Check illumination control system. Refer to section EL.

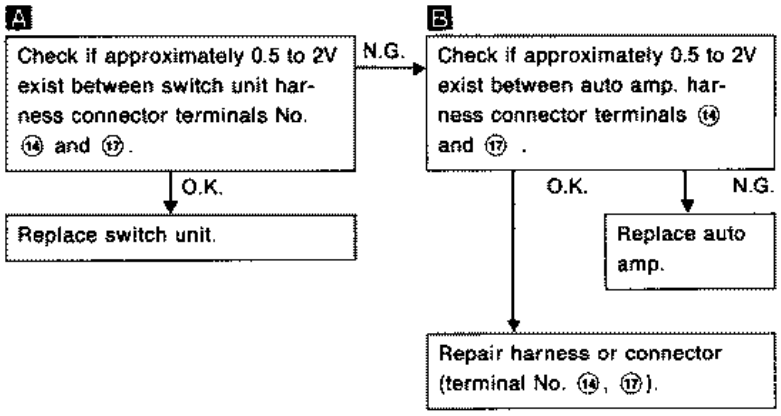
O.K. ↓

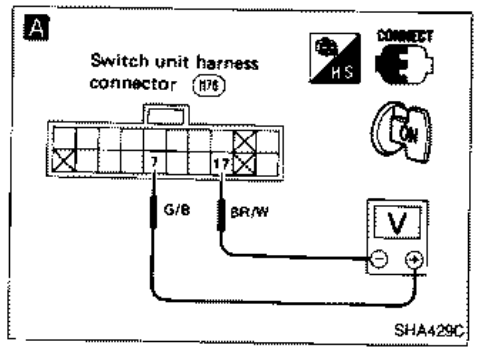
Replace bulb.

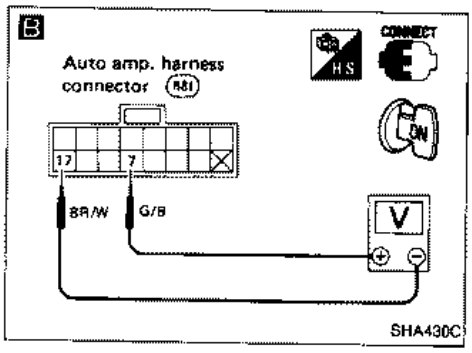



## Diagnostic Procedure 21

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






## Diagnostic Procedure 22

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

A

Do approximately 12 volts exist between air conditioner switch unit harness connector terminal No. ⑦ and ⑰?

N.G. → Replace air conditioner switch

O.K. ↓

B

Do approximately 12 volts exist between auto amp. harness connector terminal No. ⑦ and ⑰?

N.G. → Repair harness or connector (terminal No. ⑰).

O.K. ↓

Check switch panel. Refer to Electrical Components Inspection.

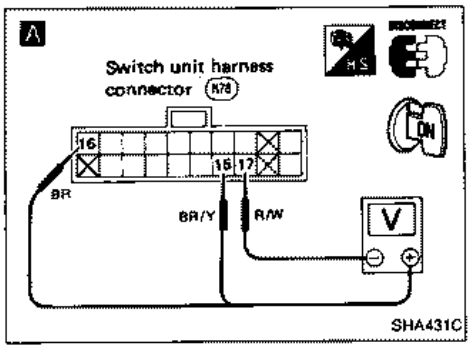
N.G. → Replace auto amp.

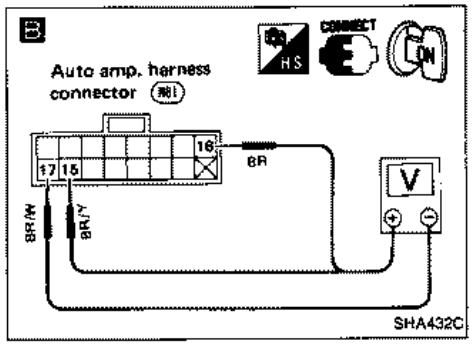
O.K. ↓

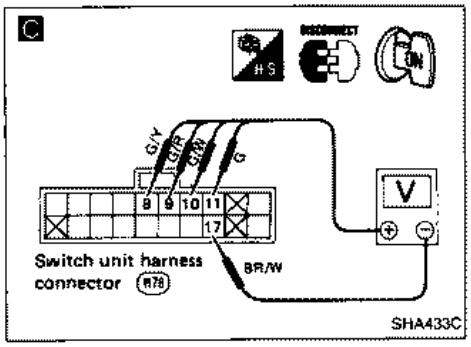
Replace switch panel.

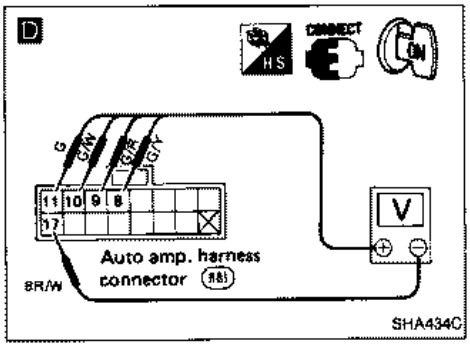
## Diagnostic Procedure 23

**SYMPTOM: Figures of set temperature and ambient temperature do not appear on the display window and indicator lamp (L.E.D.) does not come on.**




A

Do approximately 12 volts exist between switch unit harness connector terminal No. ⑮, ⑯ and ⑰?

N.G. → B

B

Do approximately 12 volts exist between auto amp. harness connector terminal No. ⑮, ⑯ and ⑰?

O.K. → Repair harness or connector (Terminal No. ⑮, ⑯ and ⑰).

N.G. → Replace auto amp.

O.K. ↓

C

Check switch unit.
Refer to Electrical Components Inspection.

N.G. → D

O.K. ↓

Replace switch panel.

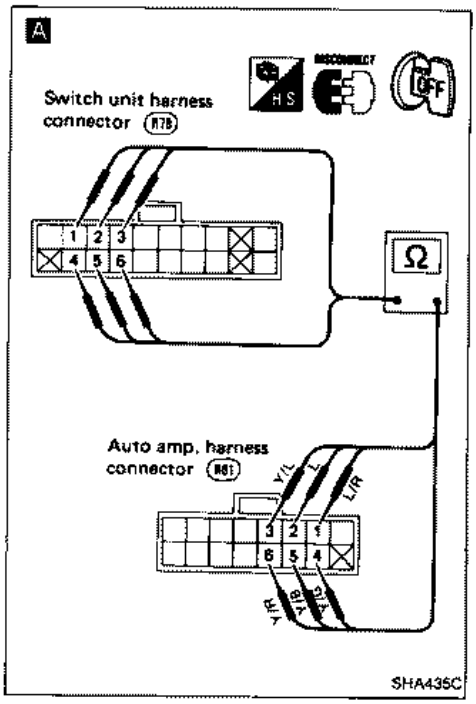
D

Measure voltage between auto amp. harness connector terminal No. ⑧, ⑨, ⑩, ⑪ and ⑰.

| Terminal No. ⊕ | Terminal No. ⊖ | Voltage (approx.) |
|---|---|---|
| ⑧ | ⑰ | 1.0V |
| ⑨ | ⑰ | 0.65V |
| ⑩ | ⑰ | 0.2V |
| ⑪ | ⑰ | 0V (Light OFF) 12V (Light ON) |

O.K. → Repair harness or connector (Terminal No. ⑧, ⑨, ⑩, ⑪ and ⑰).

N.G. → Replace auto amp.




## Diagnostic Procedure 24

**SYMPTOM: Switches do not work.**

Check switch panel.
Refer to Electrical Components Inspection.
N.G. → Replace switch panel.

O.K. ↓

A

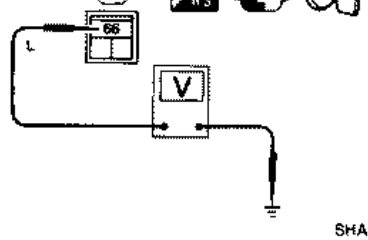
Check continuity between auto amp. harness connector terminal No. ① ~ ⑥ and switch panel harness terminal No. ① ~ ⑥ respectively.
N.G. → Repair harness or connector.

O.K. ↓

Replace auto amp.

A

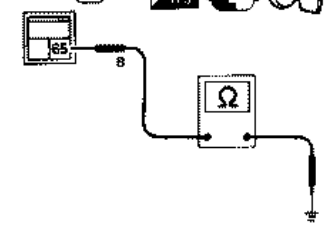
Blower control amp. harness connector (M67)




SHA449C

B

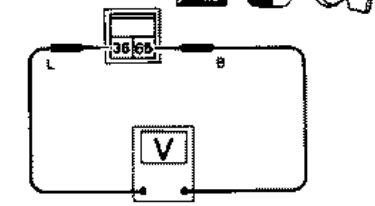
Blower control amp. harness connector (M67)




SHA450C

C

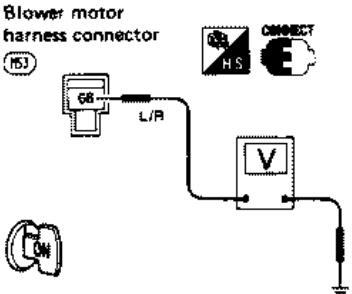
Blower control amp. harness connector (M67)




SHA451C

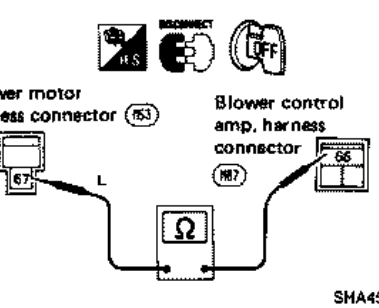
D

Blower motor harness connector (M53)




SHA452C

E




SHA453C

## Diagnostic Procedure 25

**SYMPTOM: Blower motor operation is malfunctioning.**

- **Perform Preliminary check 5 before referring to the of flowing flow chart.**

A

CHECK POWER SUPPLY FOR FAN CONTROL AMP.
Do approximately 12 volts exist between fan control amp. harness connector terminal No. (66) and body ground?

N.G. → D

O.K. ↓

B

Note

CHECK BODY GROUND CIRCUIT FOR FAN CONTROL AMP.
Does continuity exist between fan control amp. harness connector terminal No. (65) and body ground?

O.K. ↓

C

CHECK OUTPUT OF AUTO AMP.
Set up "ACTIVE TEST" mode with CONSULT.
Set up self-diagnosis STEP 2.
Measure voltage across fan control amp. harness connector terminals No. (36) and (65).

| Blower motor voltage (V) | Code No. | Terminal No. ⊕ | Terminal No. ⊖ | Voltage (Approx.) (V) |
|---|---|---|---|---|
| 4 | x 3 | 36 | 65 | 1.2 |
| 6 | x 4 | | | 1.3 |
| 9 | x 5 | | | 1.4 |
| 12 | x 6 | | | 1.6 |

O.K. ↓

Replace fan control amp.

O.K. → (A) (Go to next page.)

D

CHECK POWER SUPPLY FOR BLOWER MOTOR.
Do approximately 12 volts exist between blower motor harness connector terminal No. (68) and body ground?

O.K. ↓

N.G. → (B) (Go to page after next.)

E

Note

Check circuit continuity between blower motor harness connector terminal No. (67) and fan control amp. harness connector terminal No. (66).

O.K. ↓

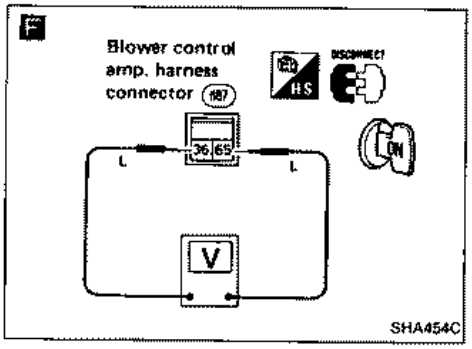
CHECK BLOWER MOTOR.
(Refer to Electrical Components inspection.)

N.G. ↓

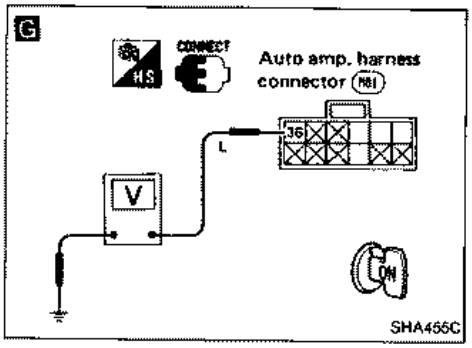
Replace blower motor.

## Diagnostic Procedure 25 (Cont'd)

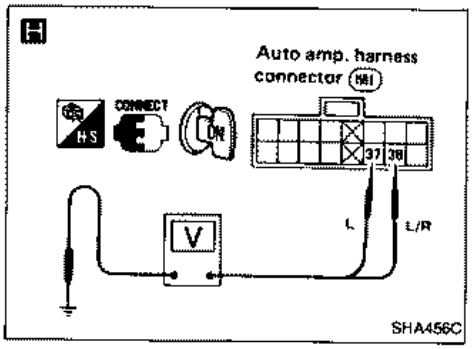
F




G




H




Ⓐ

F

Set up "ACTIVE TEST" mode with CONSULT.
Set blower motor voltage at 9 volts
Set up self-diagnosis STEP 2. Set code No. in X5.
Do approximately 12 volts exist between fan control amp. harness connector terminal No. ㊱ and ㊽?

N.G. → G

O.K. ↓

Replace fan control amp.

G

CHECK FOR OUTPUT OF AUTO AMP.
Set up "ACTIVE TEST" mode with CONSULT.
Set blower motor voltage at 9 volts
Set up self-diagnosis STEP 2. Set code No. in X5.
Do approximately 12 volts exist between auto amp. harness connector terminal No. ㊱ and body ground?

N.G. ↓

O.K. ↓

Repair harness or connector

H

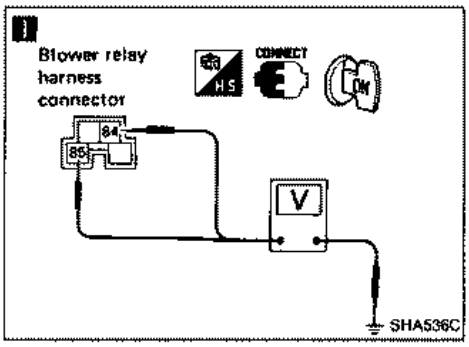
CHECK FOR FEEDBACK SIGNAL TO AUTO AMP.
Disconnect fan control amp. connector only.
Do approximately 12 volts exist between auto amp. harness connector terminal No. ㊲, ㊳ and body ground?

N.G. → Repair harness or connector

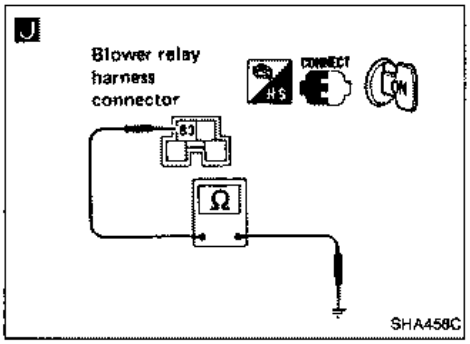
O.K. → Replace auto amp.

## Diagnostic Procedure 25 (Cont'd)

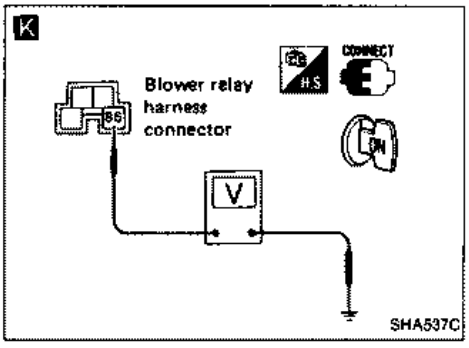
I



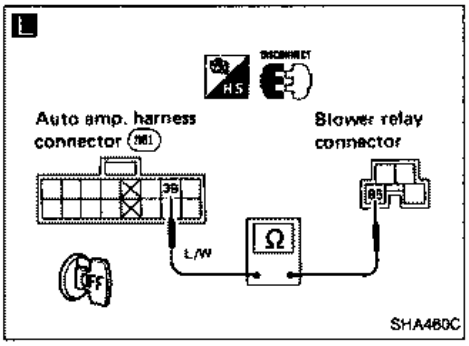

J




K




L




(B)

I CHECK POWER SUPPLY FOR BLOWER RELAY.
Do approximately 12 volts exist between blower relay harness connector terminal No. (84), (85) and body ground?

N.G. → Check power supply circuit. (Refer to "POWER SUPPLY ROUTING" in EL section.)

O.K. ↓

J Do approximately 12 volts exist between blower relay harness connector terminal No. (83) and body ground?

N.G. → K Check voltage between blower relay harness connector terminal No. (86) and body ground is less than 1.5 volt.

O.K. ↓ Check 12A fuse at fuse block. Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.)

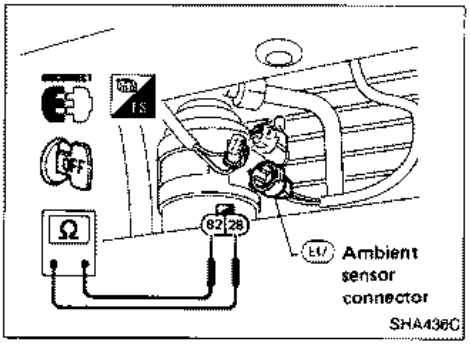
K O.K. → Replace blower relay.

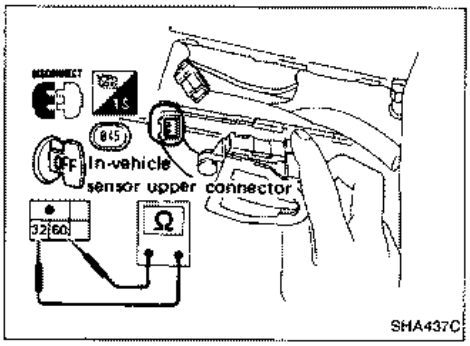
K N.G. → Note

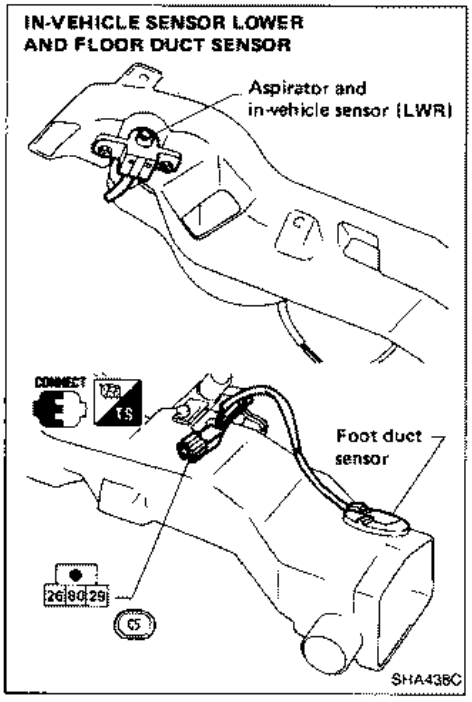
L Does continuity exist between blower relay harness connector terminal No. (85) and auto amp. harness connector terminal No. (39).

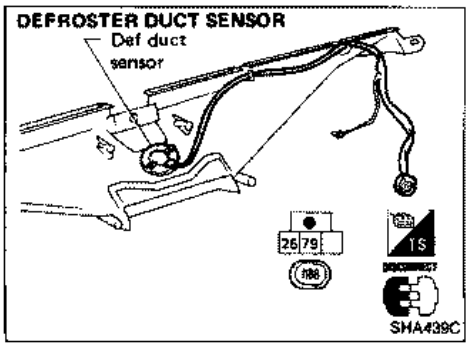
↓ Replace auto amp.

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



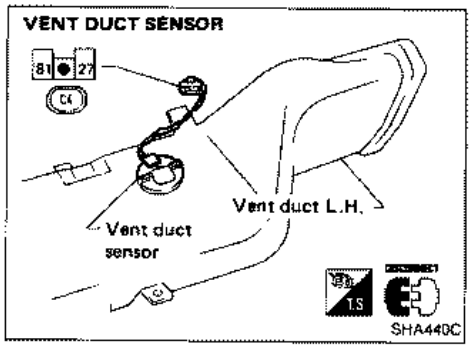

## Electrical Components Inspection

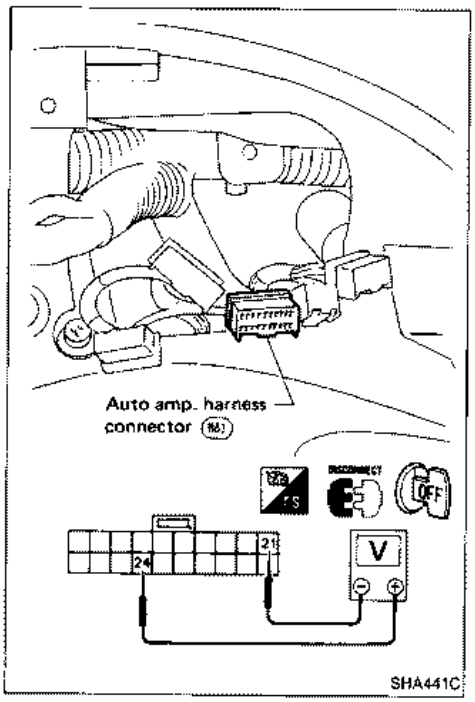
### TEMPERATURE SENSORS

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

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

## Electrical Components Inspection (Cont'd)




### SUNLOAD SENSOR

Measure voltage between terminals ㉑ and ㉔ at vehicle harness side using the table below.

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

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

### MODE DOOR MOTOR

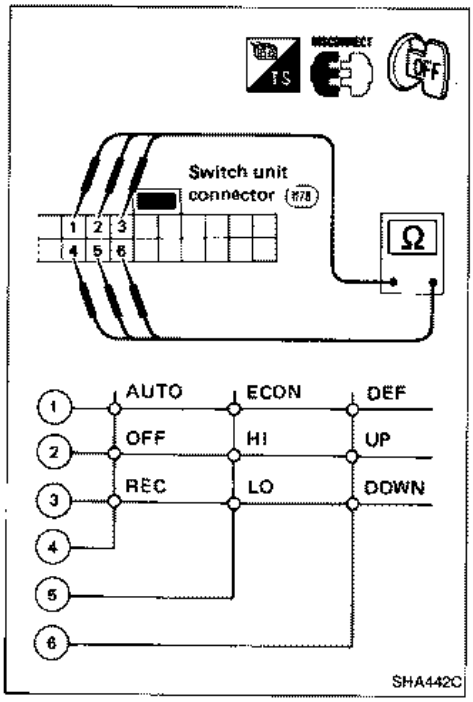
Check to see if motor rotates when 12V is applied across mode door motor connector terminals No. ㊼ and No. ㊿.

| Terminal No. | | Mode door operation |
|---|---|---|
| ㊼ | ㊿ | |
| ⊖ | ⊕ | VENT → DEF |
| ⊖ | ⊖ | STOP |
| ⊕ | ⊖ | DEF → VENT |

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

| Mode door position | Resistance between terminal No. ㊽ and ㊼ |
|---|---|
| DEF | 3 kΩ |
| FOOT/DEF | 1.6 kΩ |
| B/L | 0.7 kΩ |
| VENT | 0Ω |

## Electrical Components Inspection (Cont'd)




### AIR CONDITIONER SWITCH UNIT

Check the resistance between switch unit connector terminals as follows:

| Switch condition | Resistance |
|---|---|
| Press | Less than 500Ω |
| Free | ∞ |

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

### BLOWER MOTOR

- Refer to page HA-92.

### RELAY

- Refer to page HA-93.

### LOW-PRESSURE SWITCH

- Refer to page HA-93.

## General Specifications

### COMPRESSOR

| | |
|---|---|
| Model | HITACHI make MJS170 |
| Type | Swash plate |
| Displacement $cm^3$ (cu in)/Rev. | 170 (10.37) |
| Cylinder bore x stroke mm (in) | 40.0 x 22.6 (1.575 x 0.890) |
| Direction of rotation | Clockwise (Viewed from drive end) |
| Drive belt | Poly V |

### LUBRICATION OIL

| | |
|---|---|
| Model | HITACHI make MJS170 |
| Type | SUNISO 5GS |
| Capacity mℓ (Imp fl oz) | |
| Total in system | 150 (5.3) |
| Amount of oil which can be drained | Approx. 120 (4.2) |
| Compressor (Service parts) charging amount | 150 (5.3) |

### REFRIGERANT

| | |
|---|---|
| Type | R-12 |
| Capacity kg (lb) | |
| VG30DE engine model | 0.85 - 0.95 (1.87 - 2.09) |
| VG30DETT engine model | 0.75 - 0.85 (1.65 - 1.87) |

## Inspection and Adjustment

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

- **Refer to EF & EC section.**

### BELT TENSION

- **Refer to Checking Drive Belts (MA section).**

### COMPRESSOR

| | |
|---|---|
| Model | MJS170 |
| Clutch disc-pulley clearance mm (in) | 0.5 - 0.8 (0.020 - 0.031) |