

HEATER & AIR CONDITIONER

SECTION HA

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CONTENTS

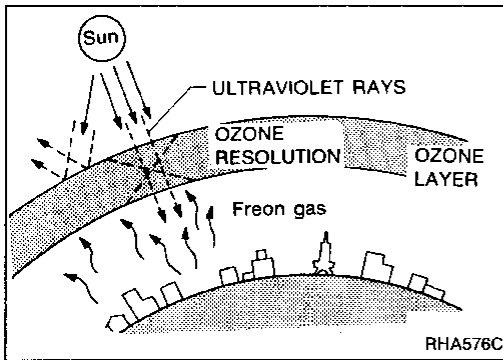
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When you read wiring diagrams:

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

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

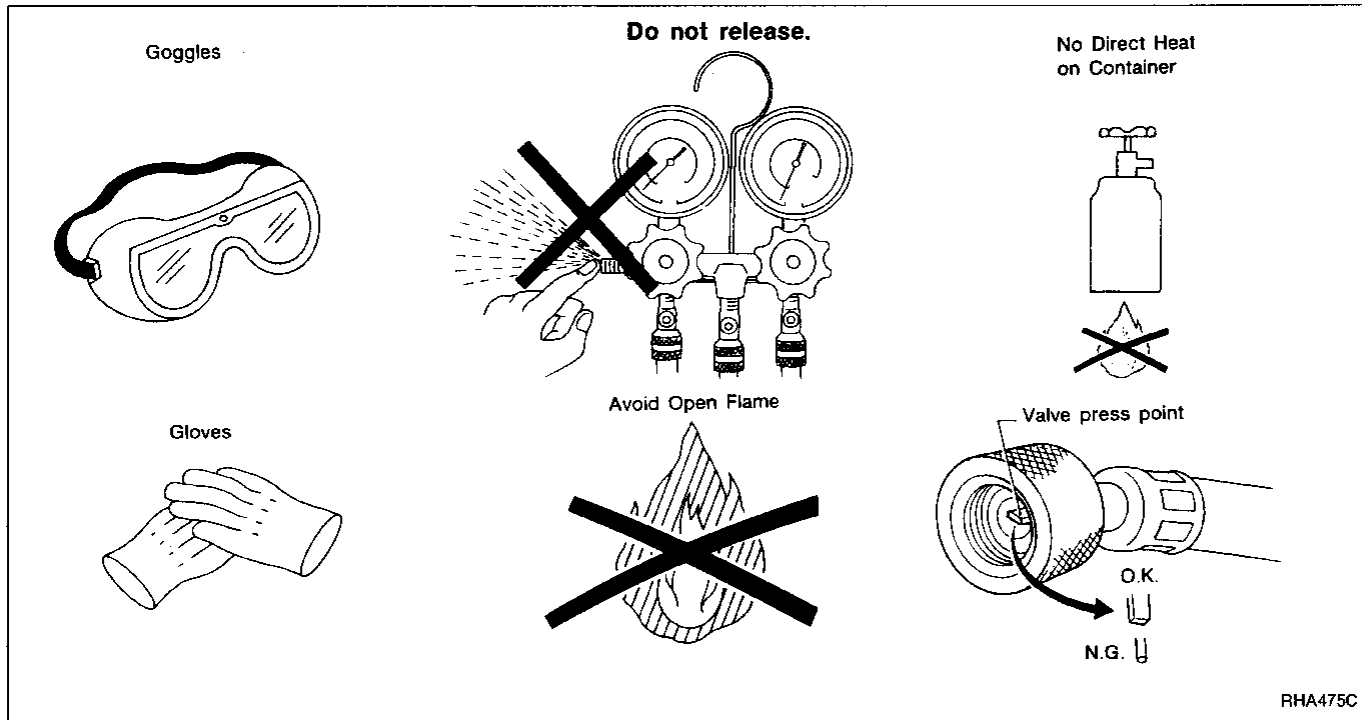
PRECAUTIONS



Precautions for the Handling of Refrigerant

- Do not release refrigerant into the air. Use your refrigerant recycling equipment to capture the refrigerant every time you need to discharge an air conditioning system.

The release of refrigerant into the air can cause damage to the Earth's ozone layer.



- 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.
- Do not use compressed air to clean out a contaminated A/C tube or hose. Shake the line over a clean, white paper towel. If it contains obvious moisture or contaminants, replace it. Do not blow out the line with refrigerant.

PRECAUTIONS

Precautions for Refrigerant Connection

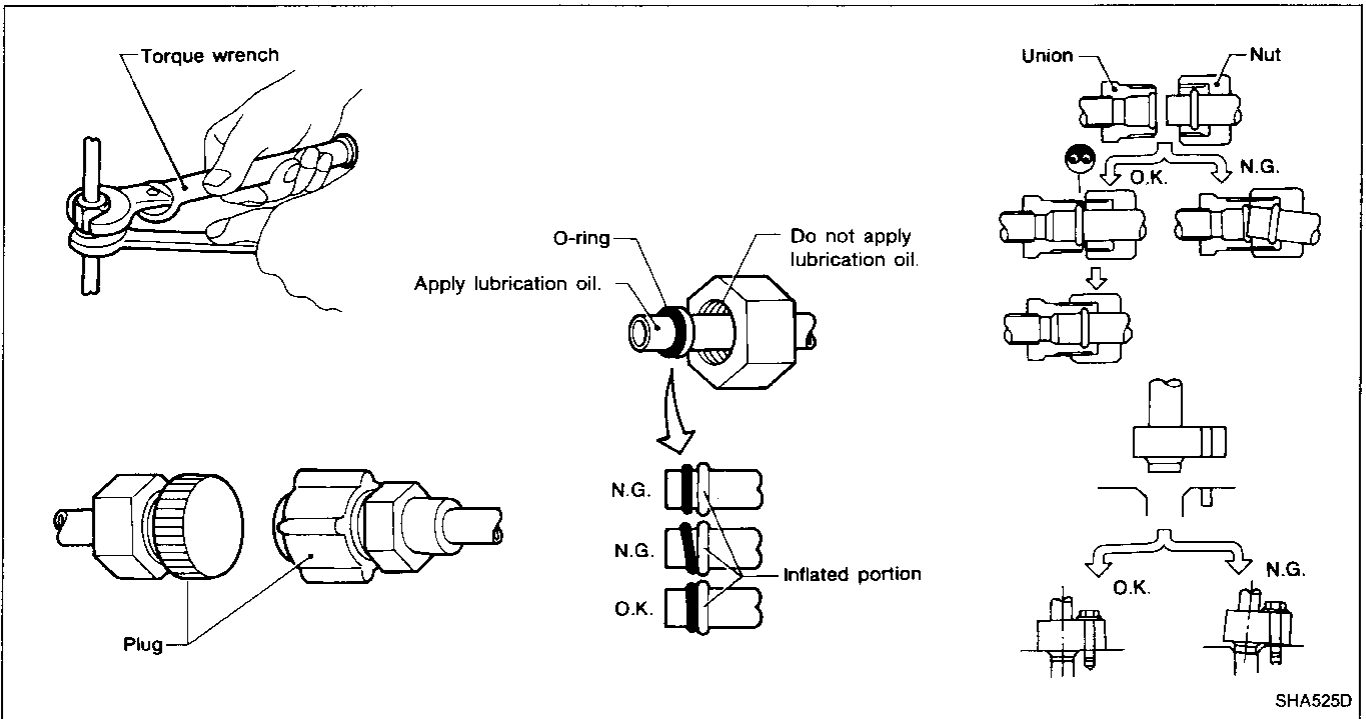
WARNING:

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

CAUTION:

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

- Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.
- When connecting tubes, always use a torque wrench and a back-up wrench.
- After disconnecting tubes, plug all openings immediately to prevent entrance of dirt and moisture.
- When installing an air conditioner in the vehicle, the pipes must be connected as the final stage of the operation. The seal caps of the pipes and other components must not be removed until their removal is required for connection.
- 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.
- Always replace used O-rings.
- When connecting tube, apply lubrication oil to portions shown in illustration. Be careful not to apply oil to threaded portion.
- O-ring must be closely attached to inflated portion of tube.
- After inserting tube into union until O-ring is no longer visible, tighten nut to specified torque.
- After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten connections of seal seat to the specified torque.

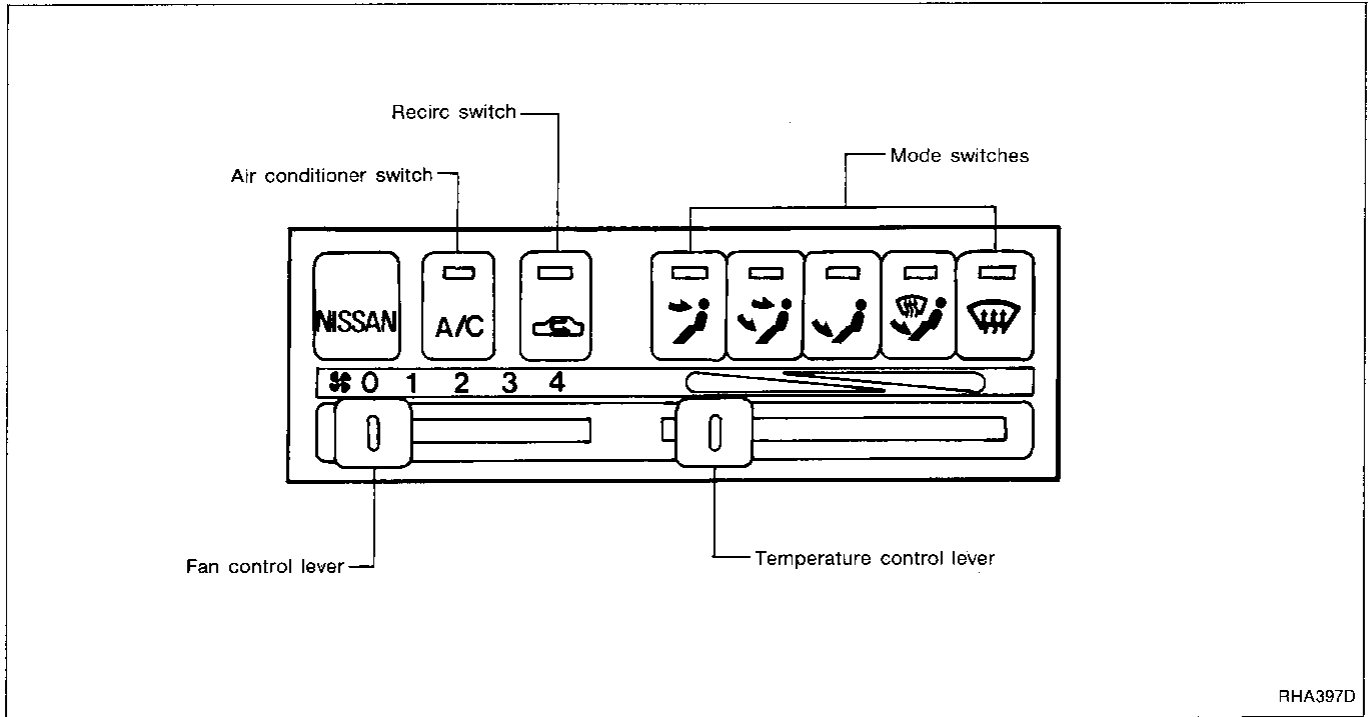


PRECAUTIONS

Precautions for Servicing Compressor

- **Attach a blind plug to the suction port (low pressure) and discharge port (high pressure) of the compressor to prevent oil from leaking out and dust from getting inside.**
- **Do not keep the compressor in the upside down position or laid on its side for more than 10 minutes.**
- **When replacing or repairing compressor, be sure to remove oil from the compressor and check the oil quantity extracted.**
- **When replacing with a new compressor, be sure to remove oil from the new compressor so that the quantity of oil remaining in the new compressor is equal to the quantity collected from the removed compressor. See the section "LUBRICATION OIL".**
- **Pay attention so as not to allow dirt and oil to attach on the friction surfaces between clutch and pulley. If the surface is contaminated, with oil, wipe it off by using a clean waste cloth moistened with thinner.**
- **After completing the compressor service operation, be sure to rotate the compressor shaft more than five turns in both directions by hand to equalize oil distribution inside the compressor, then run the compressor for about one hour by idling the engine.**
- **When the compressor magnet clutch has been replaced, be sure to check the magnet clutch for normal operation by applying voltage to the clutch.**

Control Operation



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FAN CONTROL LEVER

This lever turns the fan ON and OFF, and controls fan speed.

MODE SWITCHES

These switches allow you to select the outlet air flow.

When the MODE is set to "DEF" or "F/D", the push control unit sets the intake door to "FRE". The compressor turns on when the MODE is set to "DEF".

TEMPERATURE CONTROL LEVER

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

RECIRC SWITCH

OFF position:

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

ON position:

Interior air is recirculated inside the vehicle.

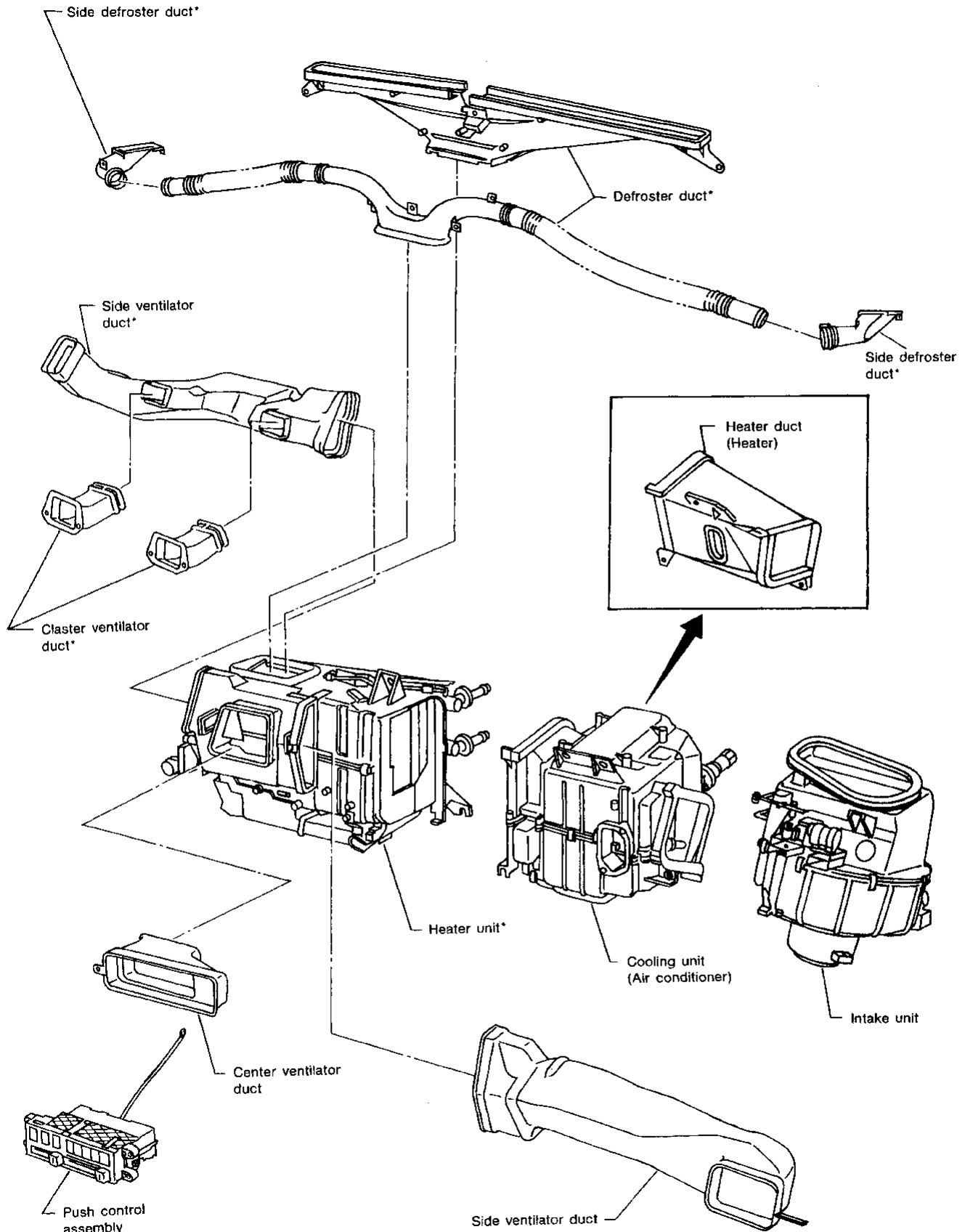
"RECIRC" is canceled when "DEF" or "F/D" are selected. "RECIRC" resumes when another mode is chosen.

AIR CONDITIONER SWITCH

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

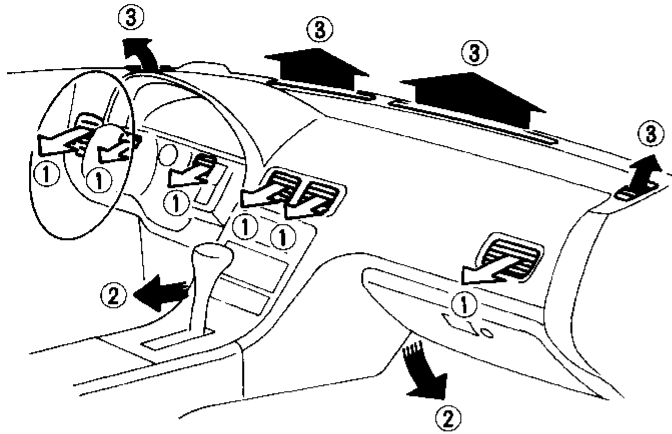
The air conditioner cooling function operates only when the engine is running.

Component Layout

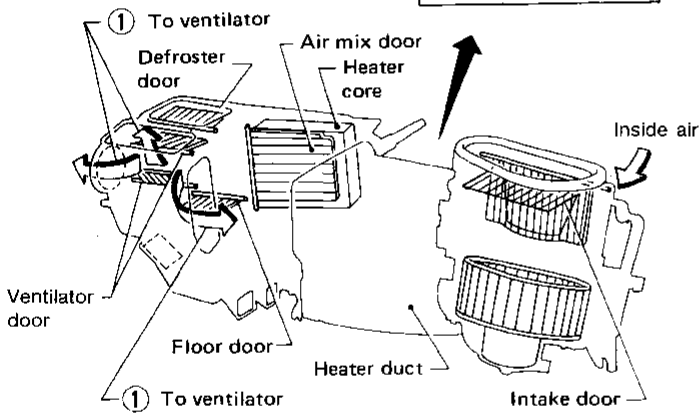
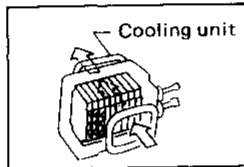
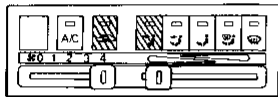


*: For removal, it is necessary to remove instrument assembly.

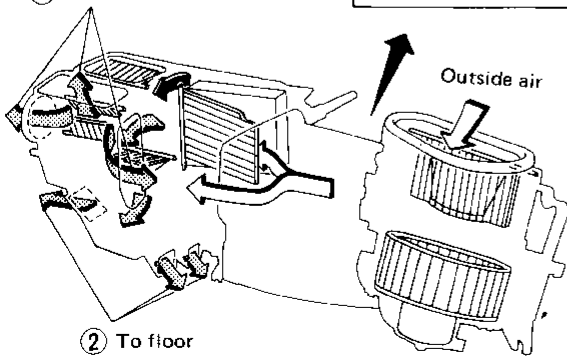
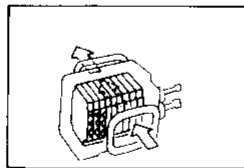
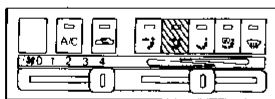
Air Flow



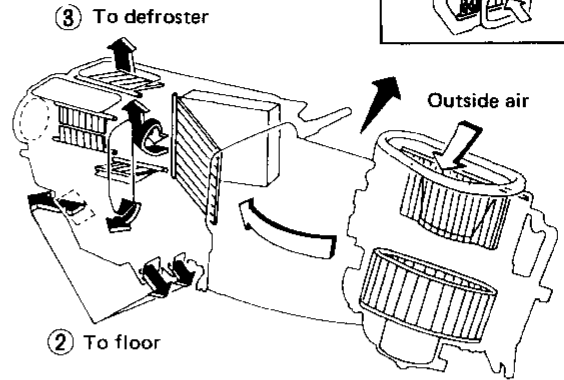
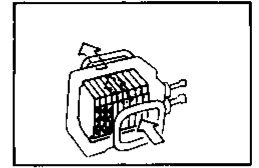
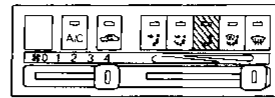
Ventilation (REC switch "ON")



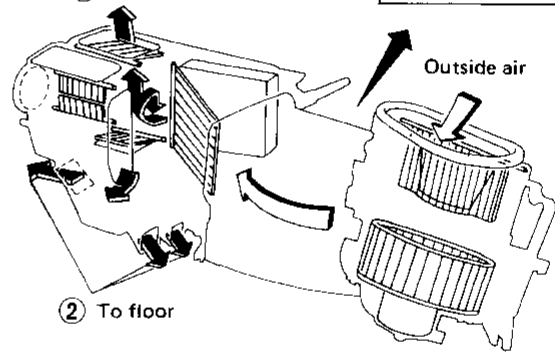
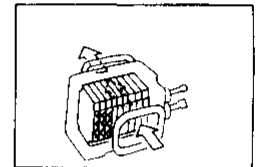
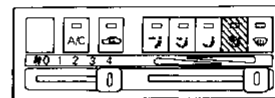
Bi-level



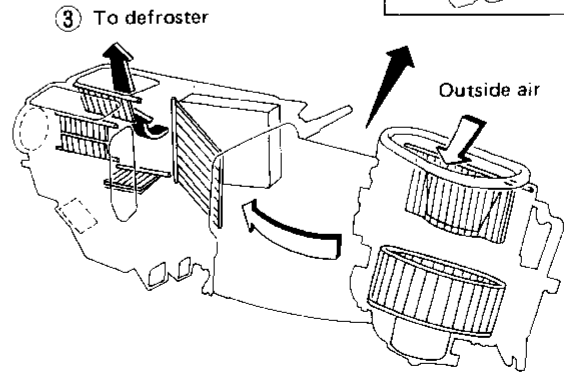
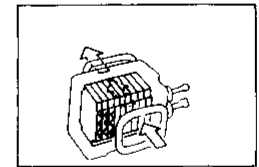
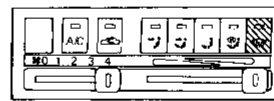
Floor



Floor and defroster



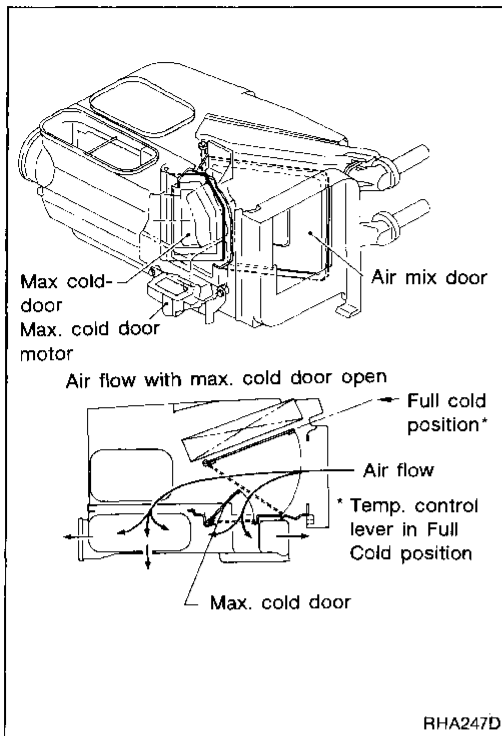
Defroster



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

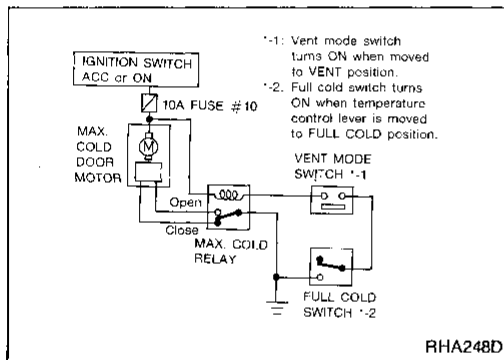
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DESCRIPTION — Overall System



Air Flow — Max. Cold Door Operation System

In the FULL COOL mode (in VENT mode and with temp. control lever in FULL COOL position), max. cold door system reduces resistance of vent air flowing through interior of heater unit. The max. cold door system reduces noise during FULL COOL mode by allowing cold air which has just passed through the cooling unit to blow out from ventilators through both the max. cold door and the heater unit vent door.



Max. cool door system is set to operate during FULL COOL mode. When the temp. control lever is moved to FULL COOL position and mode switch is turned to VENT position, both vent mode switch and full cold are turned ON. Therefore, max. cold relay coil is energized and the relay switch is turned ON for OPEN side, and the max. cold door motor starts to rotate to open the door. The door is kept closed unless this operation is performed.

| Vent mode switch operation | Max. cold switch operation | Max. cold door operation |
|----------------------------|----------------------------|--------------------------|
| ON | ON | OPEN |
| | OFF | CLOSE |
| OFF | ON | |
| | OFF | |

Refrigeration Cycle

REFRIGERANT FLOW

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser, the liquid tank, through the evaporator, and the compressor.

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

FREEZE PROTECTION

Under normal operating conditions, when the A/C is switched on, the compressor runs continuously, and the evaporator pressure, and therefore temperature, is controlled by the V-5 variable displacement compressor.

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

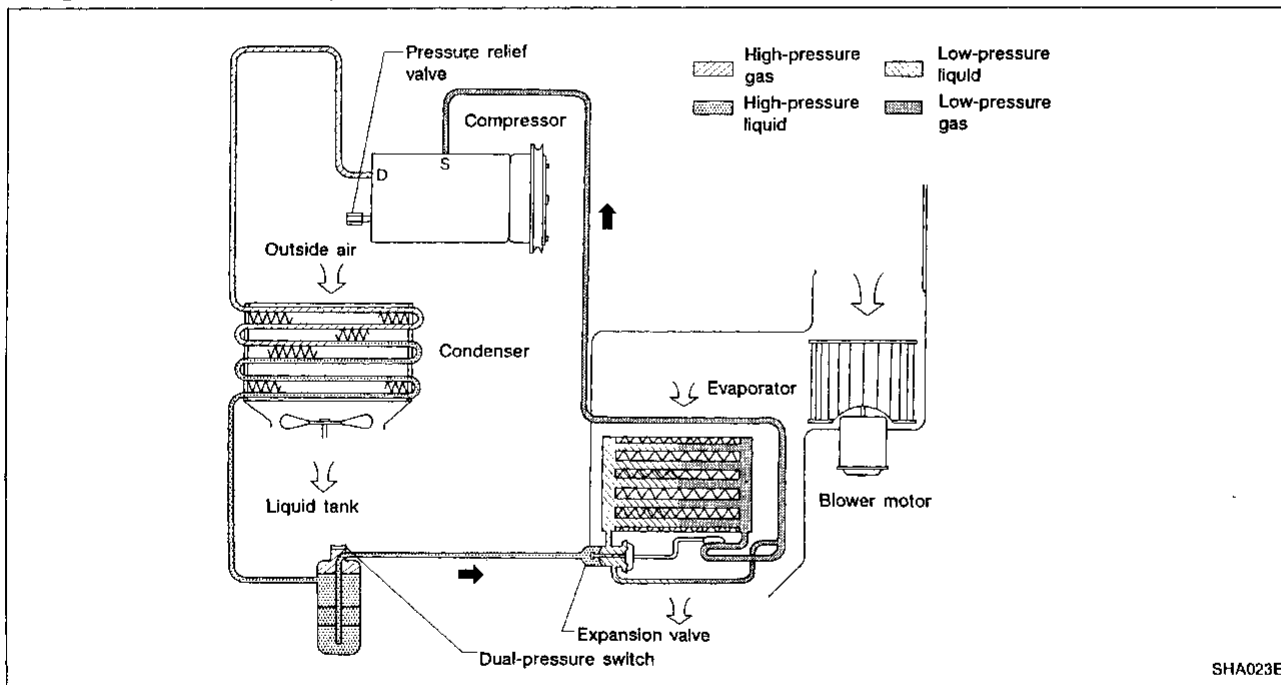
REFRIGERANT SYSTEM PROTECTION

Dual-pressure switch

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

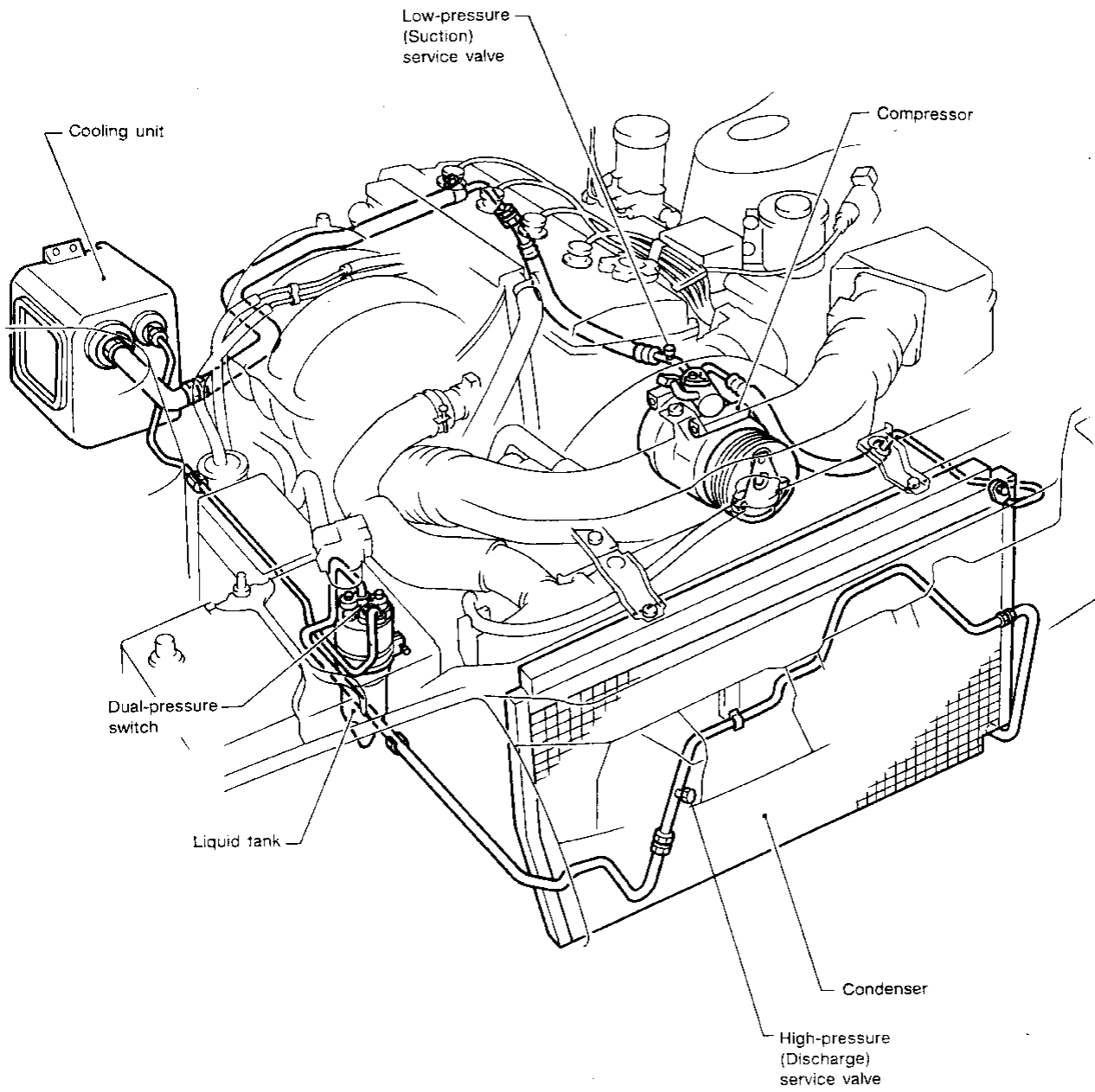
Pressure relief valve

The refrigerant system is also protected by a pressure relief valve, located on the end of compressor. When the pressure of the refrigerant in the system increases to an abnormal level [more than 3,727 kPa (38 kg/cm², 540 psi)], the release port on the pressure relief valve automatically opens and releases refrigerant into the atmosphere.



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Refrigerant Lines



V-5 Variable Displacement Compressor

GENERAL INFORMATION

1. The V-5 variable compressor differs from previous units in that the vent temperatures do not drop too far below 5°C (41°F) at a evaporator intake air temperature of less than 20°C (68°F) while the engine is running at speeds less than 1,500 rpm. This is because the V-5 compressor provides a means of "capacity" control. GI
2. The V-5 variable compressor provides refrigerant control under varying conditions. During the winter season when ambient temperatures are low, it sometimes does not produce high refrigerant pressure discharge (compared to previous units) when used with automobile air conditioning systems. Vapor bubbles in the sight glass also may not disappear. However, these are not symptoms of a problem. When charging the refrigerant, always use an accurate refrigerant measuring device. Extreme care should be taken not to charge the refrigerant excessively. Do not charge the system by the sight glass. MA
EM
3. A "clanking" sound may occasionally be heard during refrigerant charge. The sound indicates that the tilt angle of the swash plate has changed and is not a problem. LC
4. In air conditioning systems which are equipped with the V-5 compressor, the clutch remains engaged unless the system main switch, fan switch or ignition switch is turned OFF. When the acceleration cut system is operating or when the amount of refrigerant is insufficient, the clutch is disengaged to protect the compressor. EF &
EC
5. A constant range of suction pressure is maintained when engine speed is greater than a certain value. It normally ranges from 147 to 177 kPa (1.5 to 1.8 kg/cm², 21 to 26 psi) under varying conditions. In previous compressors, however, suction pressure was reduced with increases in engine speed. FE
CL
6. If the ambient temperature drops below approx. 22°C (72°F), the ambient temperature switch turns OFF and F.I.C.D. operation stops. The reason is that the variable displacement compressor is controlling the volume of refrigerant, and when the ambient temperature is low and refrigerating load becomes small, the compressor requires less torque, which eliminates the need for the F.I.C.D., idling r.p.m. increase. MT
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DESCRIPTION — Refrigeration System

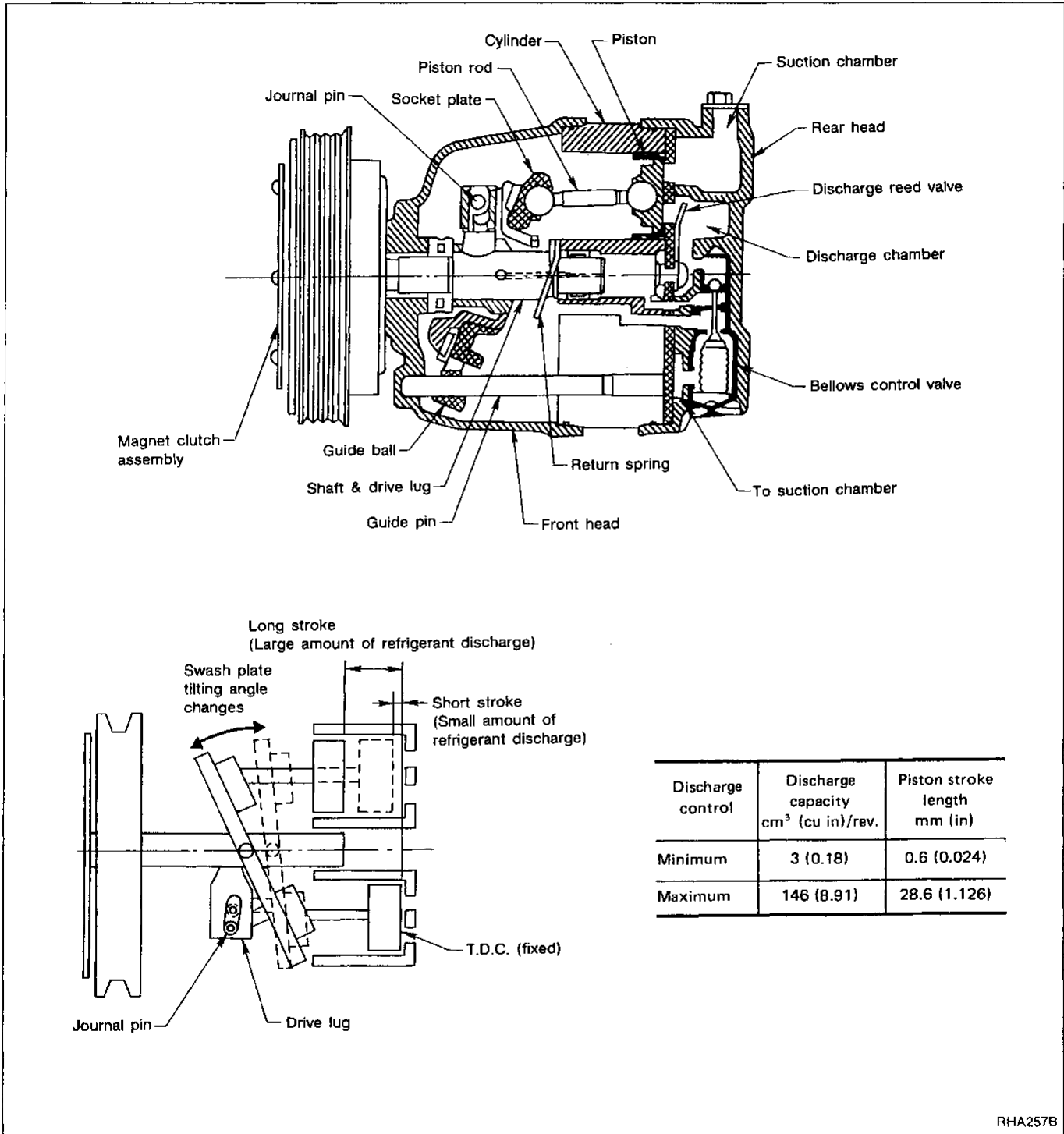
V-5 Variable Displacement Compressor (Cont'd)

DESCRIPTION

General

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

The tilt of the swash plate allows the piston's stroke to change so that refrigerant discharge can be continuously changed from 3 to 146 cm³ (0.18 to 8.91 cu in).



RHA257B

DESCRIPTION — Refrigeration System

V-5 Variable Displacement Compressor (Cont'd)

Operation

1. Operation control valve

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

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

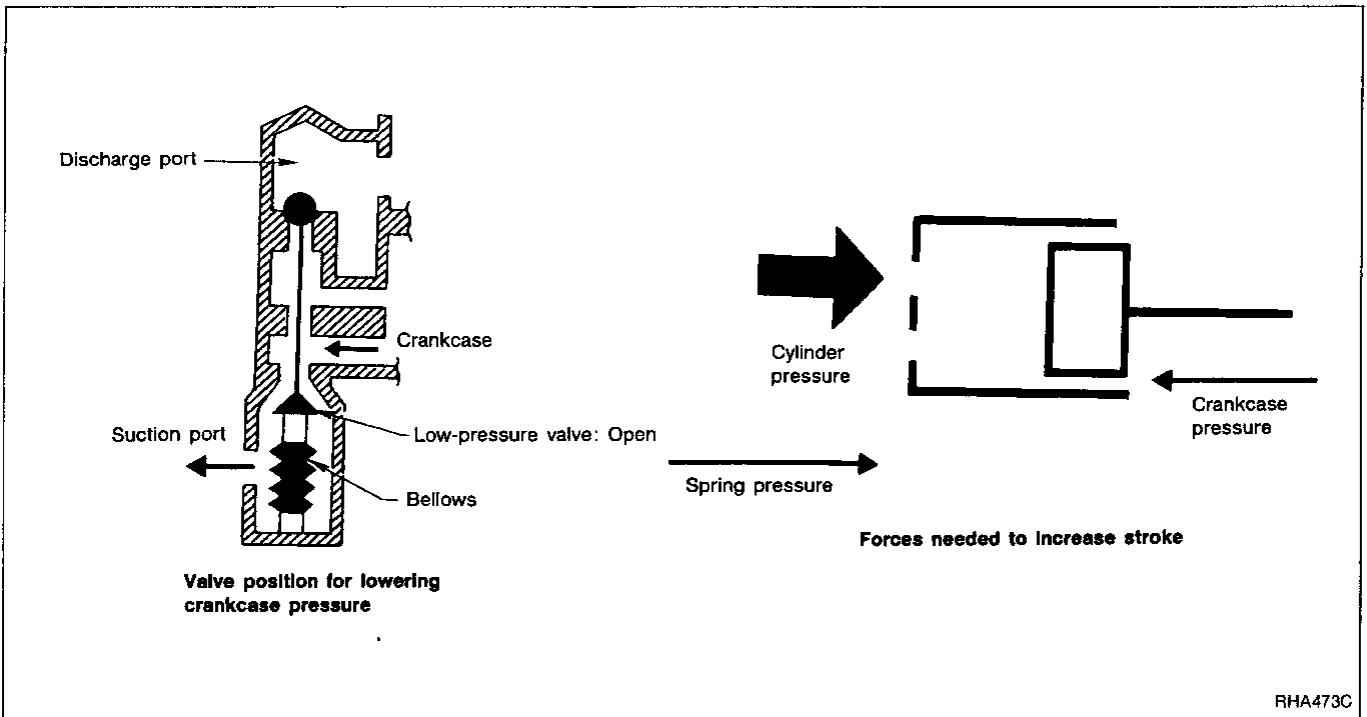
The angle of the swash plate is controlled between the crankcase's internal pressure and the piston cylinder pressure.

2. Maximum cooling

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

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

This causes the crankcase's internal pressure to equal the pressure on the low-pressure side and the cylinder's internal pressure to be greater than the crankcase's internal pressure. Under this condition, the swash plate is set to the maximum stroke position.



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DESCRIPTION — Refrigeration System

V-5 Variable Displacement Compressor (Cont'd)

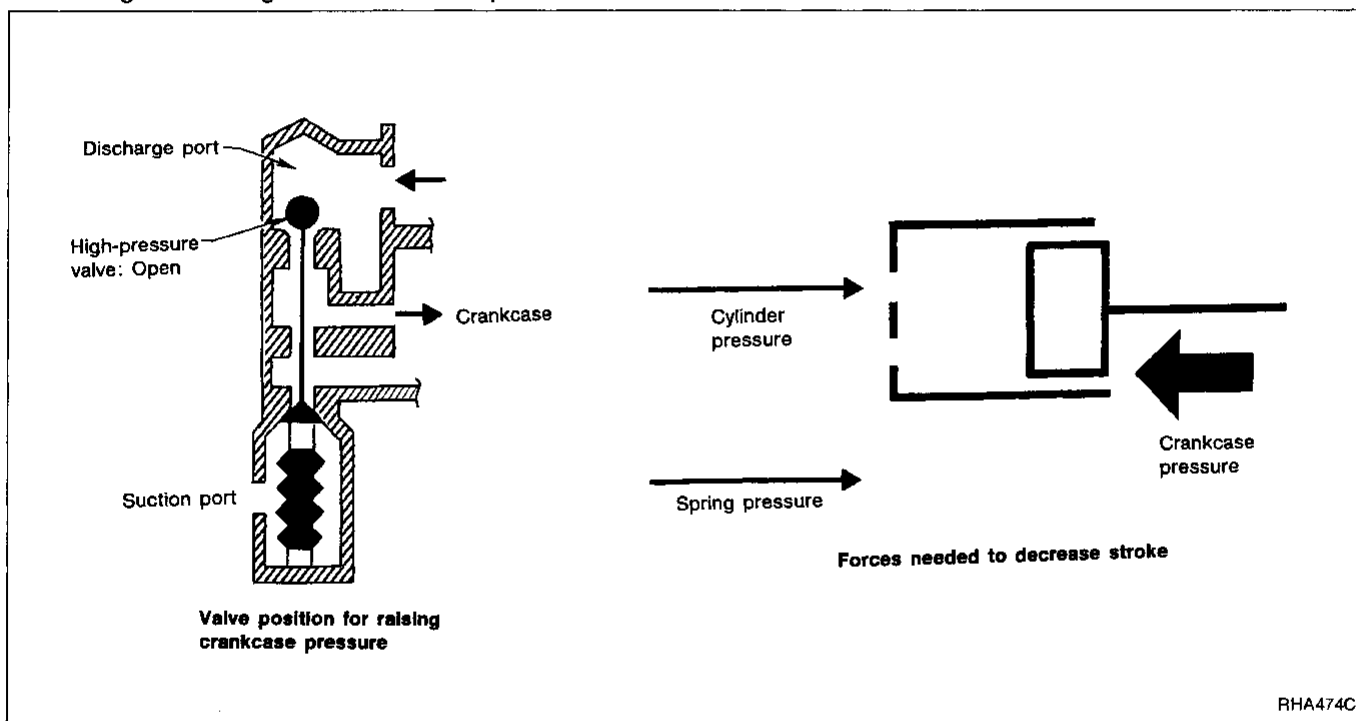
3. Capacity control

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

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

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

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



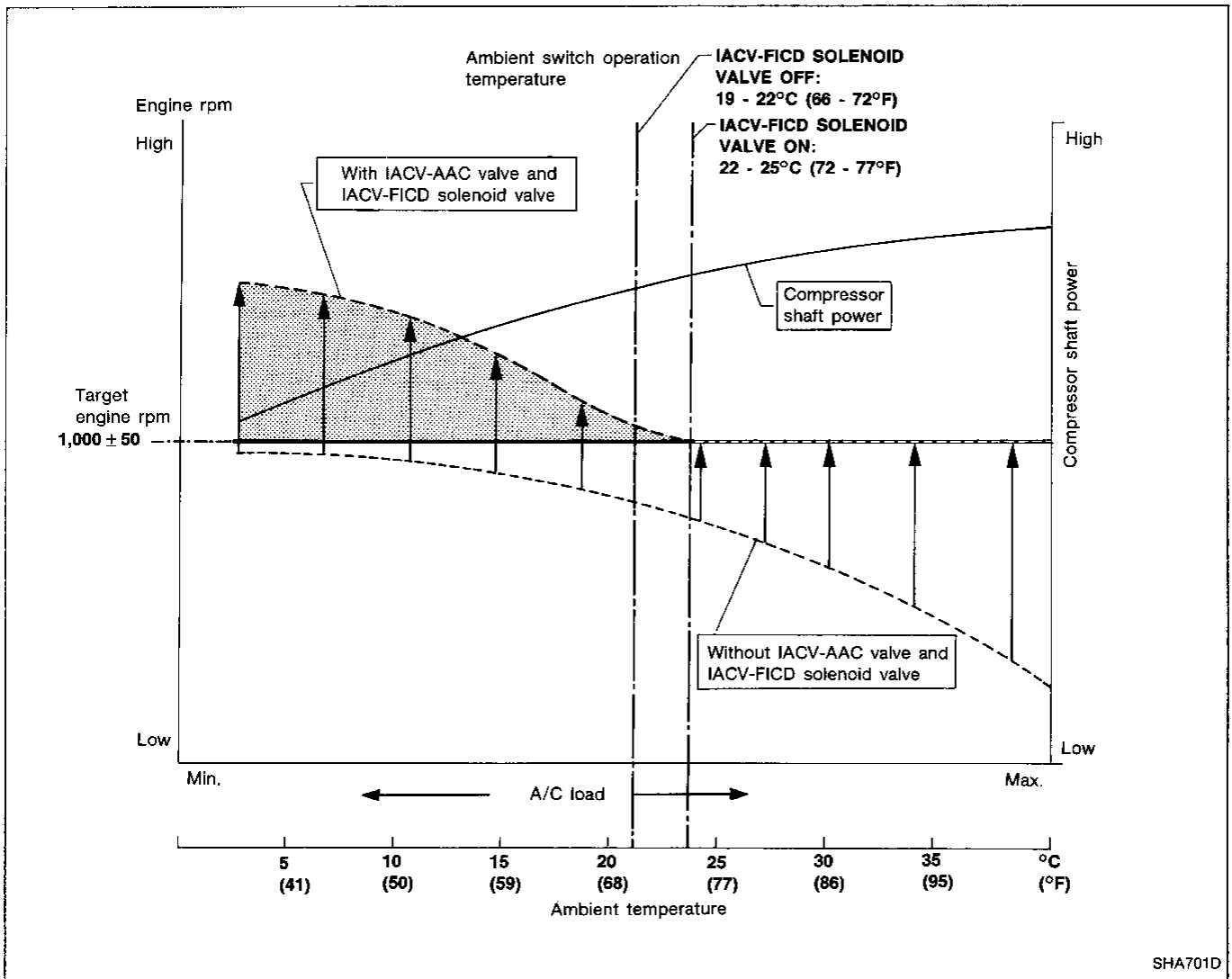
DESCRIPTION — Refrigeration System

V-5 Variable Displacement Compressor (Cont'd)

F.I.C.D. CONTROL SYSTEM

General

With the variable displacement compressor, the compressor power requirements differ from when the ambient temperature is high and maximum cooling effect is required (i.e., when refrigerating load is large and the tilt angle of the compressor swash plate is large) to when the ambient temperature is low and less cooling effect is required (i.e., when refrigerating load is small and the tilt angle of the swash plate is small). To correspond correctly to this change in compressor power requirements, it is also necessary to control the operation of the F.I.C.D. according to the refrigerating load. Thus, an ambient air temperature switch is provided on the front face of the condenser so that the F.I.C.D. can be controlled depending on the ambient temperature.



SHA701D

DESCRIPTION — Refrigeration System

V-5 Variable Displacement Compressor (Cont'd)

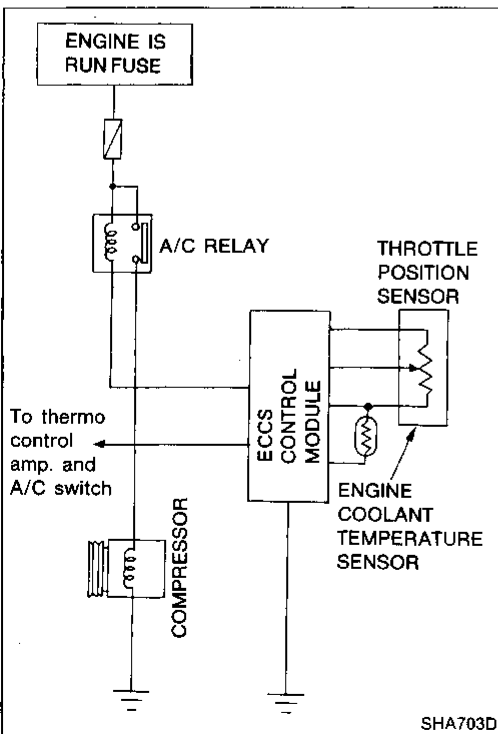
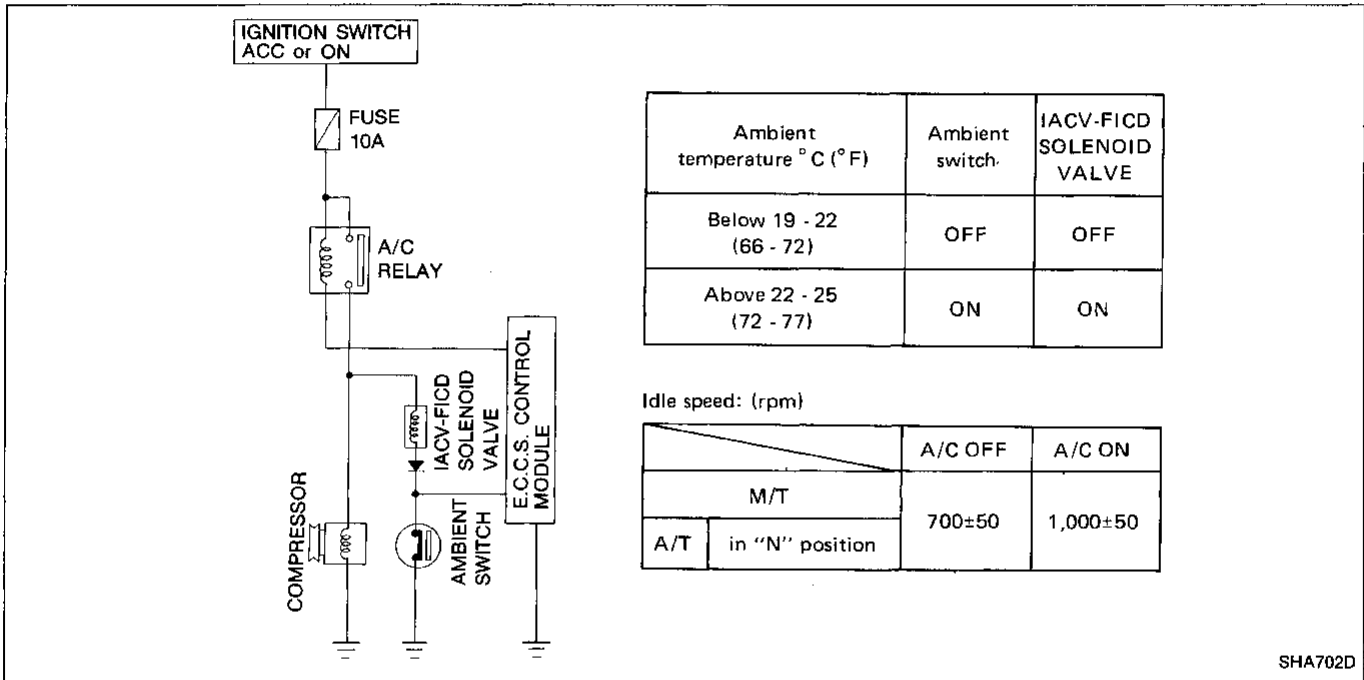
Operation

When the air conditioner is OFF, the ECM detects the load applied to the engine, and controls the IACV-AAC valve to adjust the engine idling speed to the appropriate rpm by supplying additional air from the IACV-AAC valve.

When the air conditioner is ON (A/C relay is ON), and when the ambient temperature switch is ON (this switch turns ON automatically when the ambient temperature rises to approx. 25°C (77°F) or higher), the IACV-FICD solenoid valve is energized and additional air is supplied to the engine.

If the appropriate engine speed is not reached, the IACV-AAC valve supplies the additional air required to increase the engine speed.

If the ambient temperature switch is OFF (this switch turns OFF when the ambient temperature is below 22°C (72°F) even when the air conditioner is ON (A/C relay is ON), the IACV-FICD solenoid valve is deenergized, and the idling speed is controlled so that the appropriate rpm can be achieved by operation of the IACV-AAC valve only.



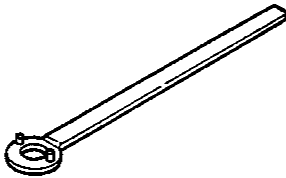
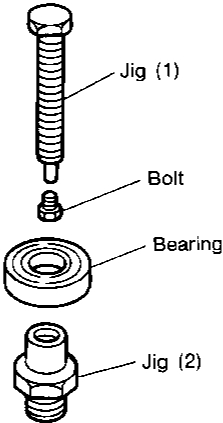

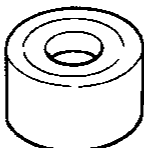
Acceleration Cut System

This system is controlled by the ECM (ECCS control module). When the engine is heavily over loaded (throttle position sensor judges that throttle valve is at full throttle position), the compressor is turned off for approx. 4 seconds to reduce overloading.

Additionally when the temperature of engine coolant rises above approx. 113°C (235°F), the compressor is turned off.

PREPARATION

Special Service Tools

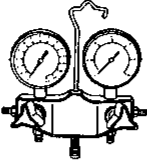
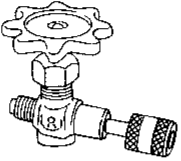
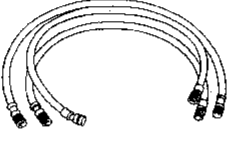
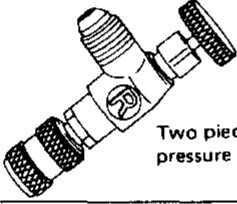
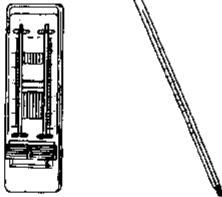
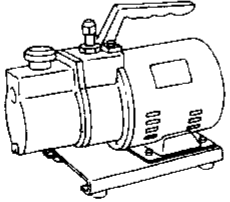
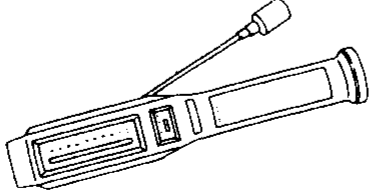
| Tool number (Kent-Moore number) Tool name | Description | |
|---|---|---------------------------------|
| (J39072) Clutch disc wrench |  | Removing center nut |
| (J39073-3) Clutch disc puller set |  | Removing/Installing clutch disc |
| (J39073-4) Clutch jig (1) (J33013-1) Clutch jig (2) (J33013-3) Bolt (J33013-1) Bearing | | |
| (J39073-2) Pulley pressing jig* |  | Installing pulley |
| (J39073-1) Coil pressing jig* |  | Installing magnet clutch coil |

* Coil pressing jig (J39073-1), Pulley pressing jig (J39073-2) and Clutch disc puller set (J39073-3) are provided as Clutch and coil Service set (J39073).

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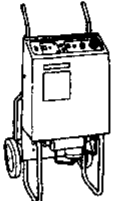
PREPARATION

Service Tools

| Tool name | Description |
|----------------------------|--|
| Manifold gauge | <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: right;"> <p>Discharging, evacuating and charging refrigerant</p> <p>SHA899C</p> </div> </div> |
| Additional valve | <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: right;"> <p>Discharging, evacuating and charging refrigerant</p> <p>SHA898C</p> </div> </div> |
| Charging hose | <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: right;"> <p>Discharging, evacuating and charging refrigerant</p> <p>SHA897C</p> </div> </div> |
| Adapter valve | <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: right;"> <p>Discharging, evacuating and charging refrigerant</p> <p>Two pieces on each high pressure and low pressure line</p> <p>RHA573B</p> </div> </div> |
| Thermometer and hygrometer | <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: right;"> <p>Checking temperature and humidity</p> <p>Etched-stem type thermometer</p> <p>SHA900C</p> </div> </div> |
| Vacuum pump | <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: right;"> <p>Evacuating</p> <p>RHA575B</p> </div> </div> |
| Gas leak detector | <div style="display: flex; justify-content: space-between; align-items: center;">  <div style="text-align: right;"> <p>Checking refrigerant leaks</p> <p>RHA577B</p> </div> </div> |

PREPARATION

Service Tools (Cont'd)

| Tool name | Description |
|---------------------------------|--|
| Charging cylinder | <div style="text-align: center;">  </div> <p style="text-align: right;">Checking amount of refrigerant and charging refrigerant</p> <p style="text-align: right;">RHA578B</p> |
| Weight scale | <div style="text-align: center;">  </div> <p style="text-align: right;">Checking amount of refrigerant</p> <p style="text-align: right;">RHA579B</p> |
| Refrigerant recycling equipment | <div style="text-align: center;">  </div> <p style="text-align: right;">Capturing and recycling refrigerant</p> <p style="text-align: right;">SHA732C</p> |

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

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PREPARATION

Service Tools (Cont'd)

HANDLING METHOD AND STRUCTURE

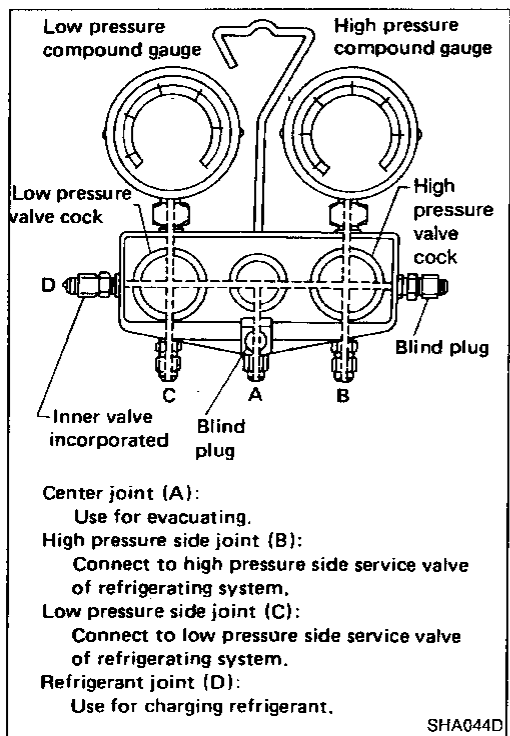
Manifold gauge

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 (-760 mmHg, -29.92 inHg) to $2,942$ kPa (30 kg/cm², 427 psi), and the low pressure gauge measures generally from -101.3 kPa (-760 mmHg, -29.92 inHg) to $1,471$ kPa (15 kg/cm², 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.)

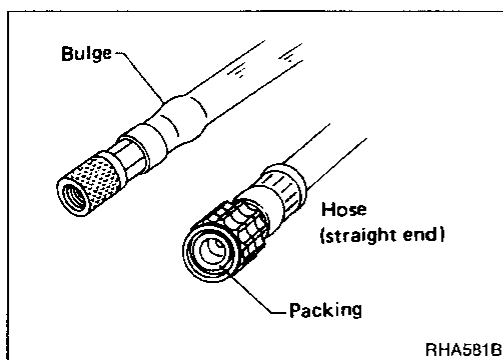


Charging hose

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 |



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.

PREPARATION

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.

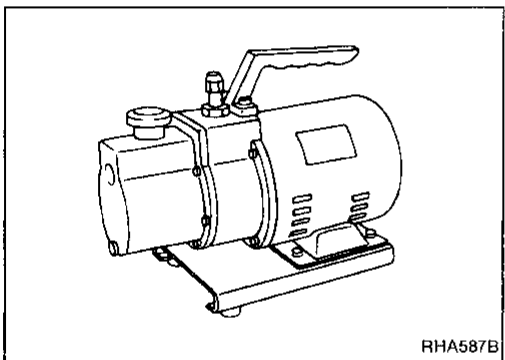
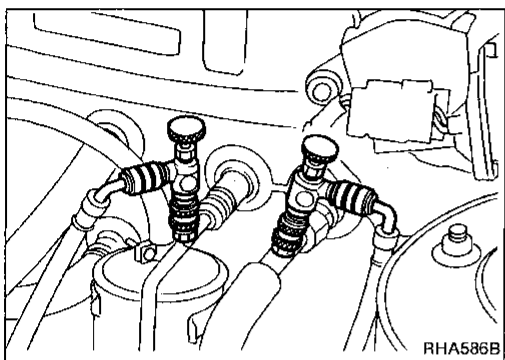
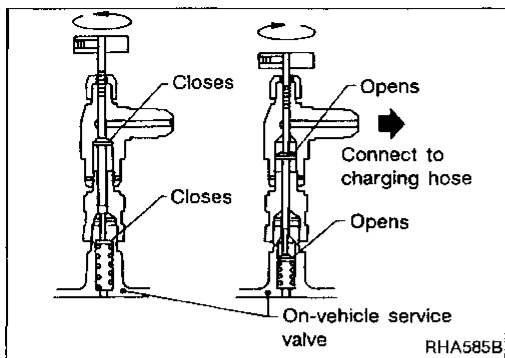
CAUTION:

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

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.



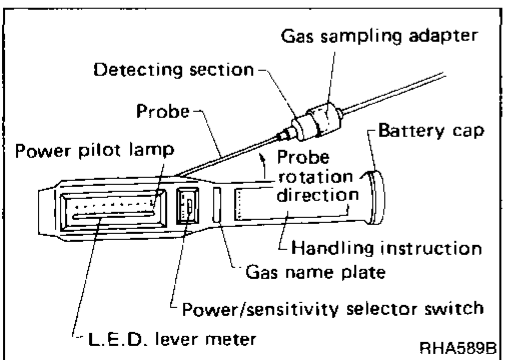
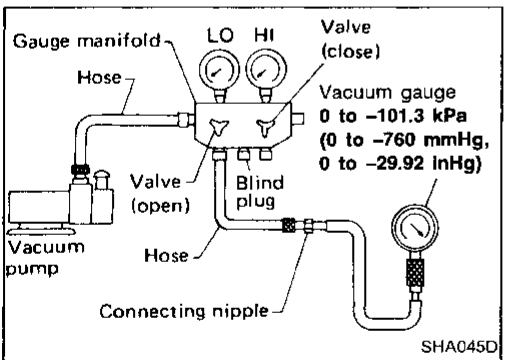
Vacuum pump

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 (-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 capacity of the vacuum pump.



Gas leak detector

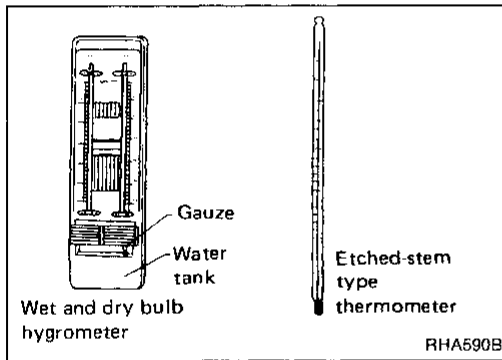
The gas leak detector is used to check whether the refrigeration system is leaking. The features of this gas leak detector are listed on the next page.

PREPARATION

Service Tools (Cont'd)

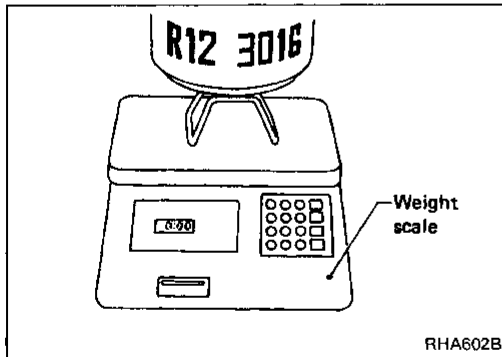
| Type | | Detection ability | Features |
|---|---|--|---|
| Electrical | Discharge type (Suction type) | 3 - 50 g (0.11 - 1.76 oz)/year | <ul style="list-style-type: none"> ● Easy handling ● Medium sensitivity ● Each point needs two or more seconds for detection. |
| | Positive ion emission type (Suction type) | 2 g (0.07 oz)/year | <ul style="list-style-type: none"> ● High sensitivity ● High price ● 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 (100 mmHg, 3.94 inHg) change in vacuum is detected in 10 minutes. | <ul style="list-style-type: none"> ● Can be used easily in refrigerant charging operation. ● 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.

PREPARATION

Service Tools (Cont'd)

Charging cylinder

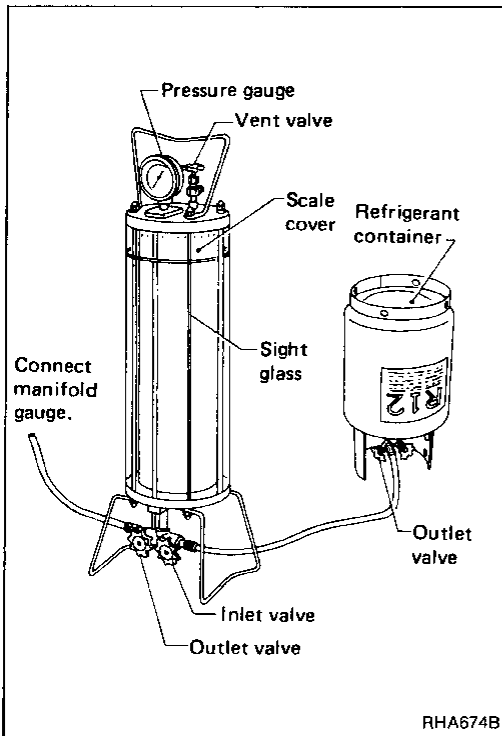
The charging cylinder is used to correctly measure the amount of refrigerant to be charged.

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.

CAUTION:

- 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.



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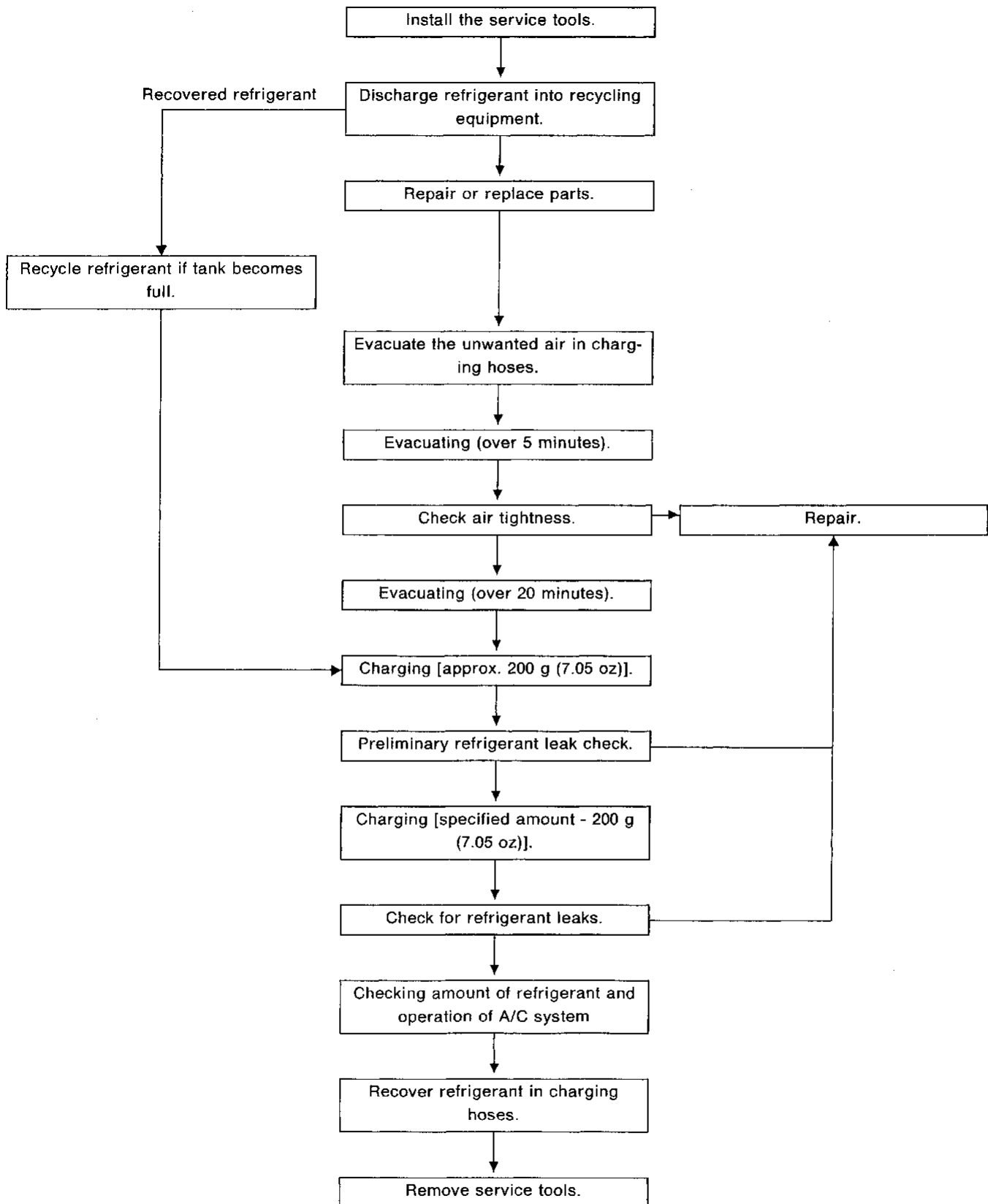
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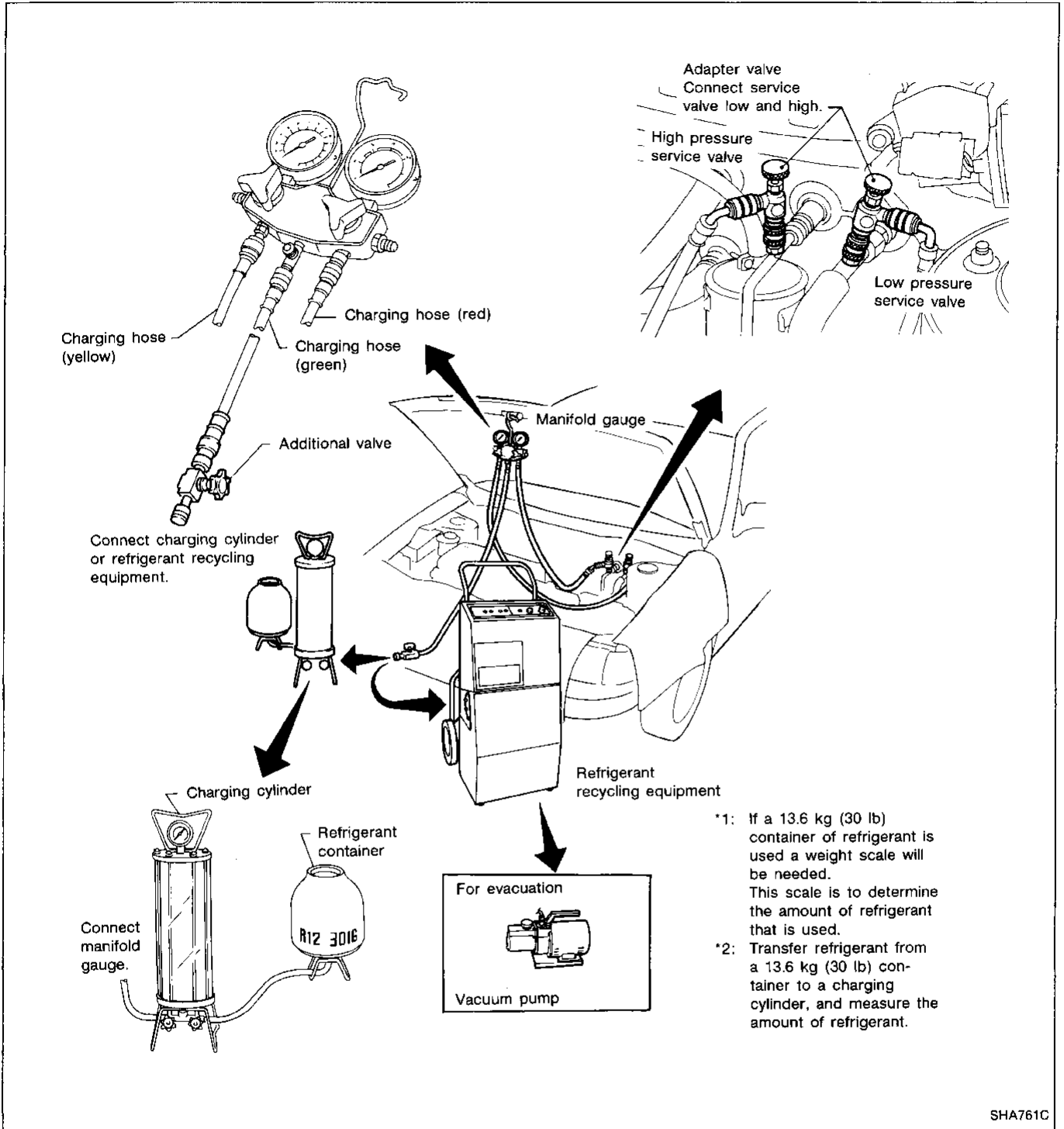
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DISCHARGING, EVACUATING, CHARGING AND CHECKING

Work Procedure



Setting of Service Tools



WARNING:
Discharge only into your recycling equipment. Do not release refrigerant into the air.

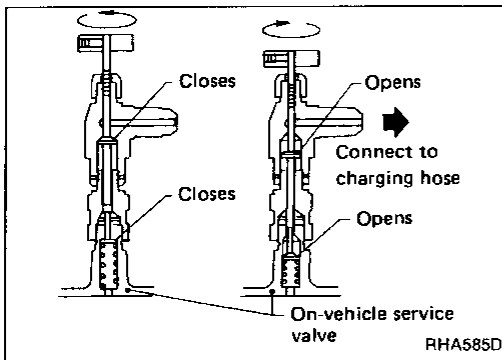
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DISCHARGING, EVACUATING, CHARGING AND CHECKING

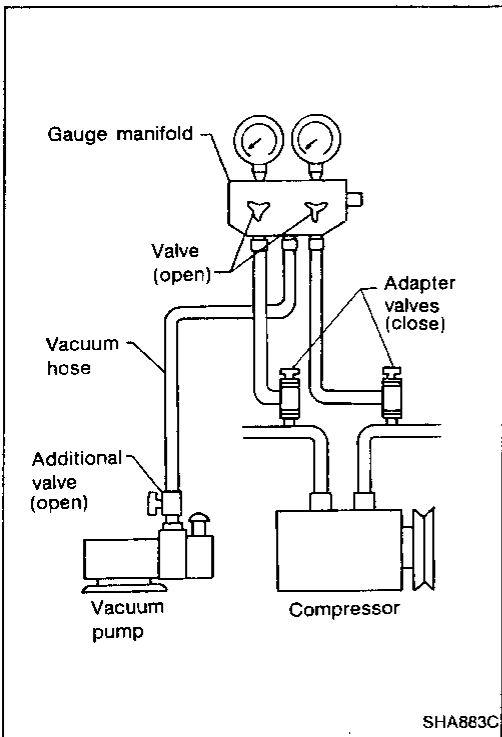
Setting of Service Tools (Cont'd)



1. Install adapter valve to each of high pressure and low pressure service valves.

Before connecting adapter valve, turn adapter valve handle fully counterclockwise to retract pin.

2. Connect charging hoses to adapter valves and connect vacuum hose to vacuum pump.
3. Run vacuum pump and open additional valve and both valves on gauge manifold set.
4. After evacuating unwanted air in gauge set, close additional valve and stop vacuum pump.
5. Disconnect vacuum hose from vacuum pump and connect it to refrigerant recycling equipment.

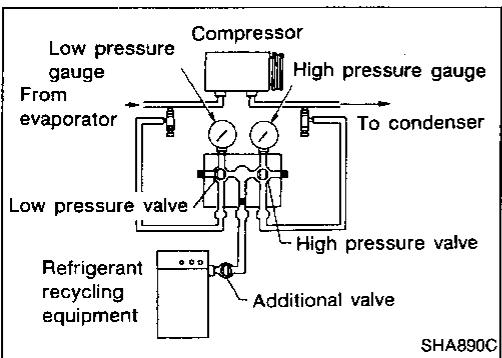


Discharging

WARNING:

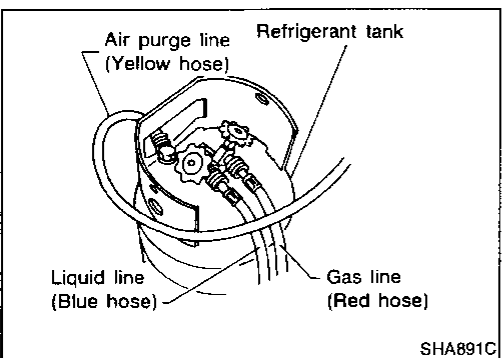
Discharge only into your recycling equipment. Do not release refrigerant into the air.

Use only authorized refillable refrigerant tanks for your recycling equipment. Use of other tanks could cause personal injury.



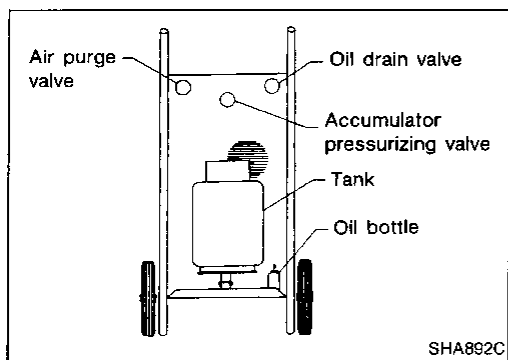
REFRIGERANT RECOVERY

1. Connect vacuum hose to refrigerant recycling equipment and open additional valve and adapter valves.
2. Open both valves of manifold gauge set. Make certain refrigerant tank "Gas" and "Liquid" valves are open.
3. Plug unit's power cord into a suitable AC outlet and turn on "Main Power" switch.
4. Turn on "Recovery" switch.
5. Depress "Start" switch. Compressor will start. Compressor will shut off automatically when recovery is complete. Watch for pressure rise to above 0 kPa (0 kg/cm², 0 psi) within two minutes. If this occurs, repeat this step.



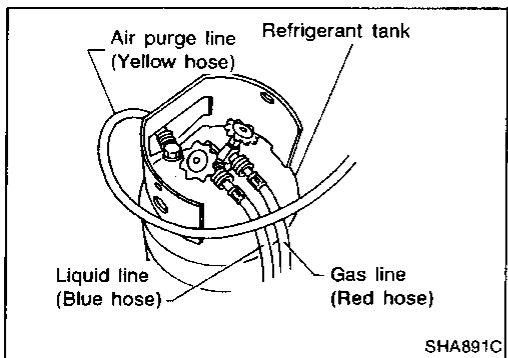
DISCHARGING, EVACUATING, CHARGING AND CHECKING

Discharging (Cont'd)



6. To drain A/C system oil accumulator, open "Accumulator Pressurizing" valve for approximately 15 seconds to allow some compressor discharge pressure back into accumulator. Close "Accumulator Pressurizing" valve and open "Oil Drain" valve slowly and drain accumulator. Do not allow accumulator to completely depressurize. When oil stops draining, close "Oil Drain" valve. Be sure to replace oil in A/C system before servicing.
7. Turn off "Recovery" switch.
8. When recovery tank is full, trip switch at the bottom of weight platform tank is full, trip switch at the bottom of weight platform will de-energize compressor and "Tank Full" light will come on. Recycle refrigerant in tank before removing.

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REFRIGERANT RECYCLING

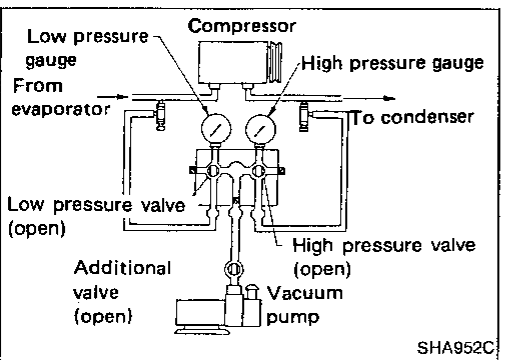
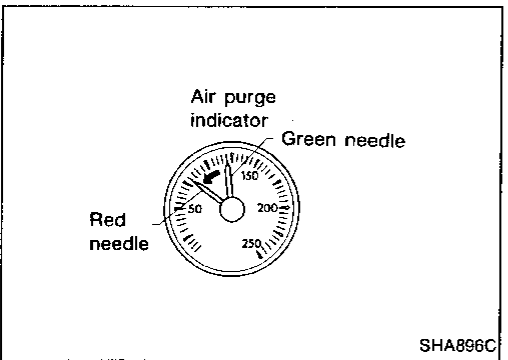
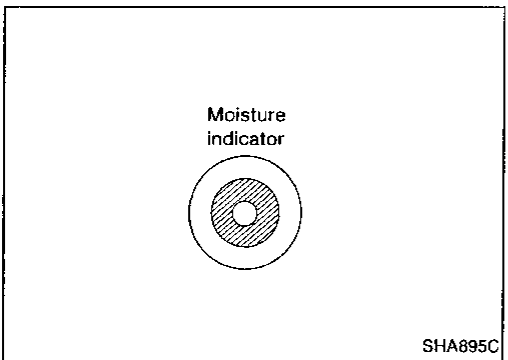
The recycling of reclaimed refrigerant is essential in order to assure that the refrigerant which meets the standards is re-used.

For maximum efficiency, full tanks of recovered refrigerant should be recycled. As required, tanks containing a minimum of 3.6 kg (8 lb) of refrigerant can be recycled.

For greatest efficiency, recycling full tanks of refrigerant is recommended.

1. Make certain both valves on recovery tank are open.
2. Turn on "Recycling" switch. Recycling solenoid will be energized.
3. Depress start switch. Compressor will start, and "Recycling On" light will come. Refrigerant will be seen going through moisture indicator at start up. The sightglass will not completely fill with refrigerant.
4. Allow the station to operate until moisture indicator turns green. If moisture indicator does not turn green after 40 minutes, remove and replace filter.
5. After recycling for approximately 5 minutes, check air purge indicator. If green pointer on air purge indicator leads red pointer by more than 10 psi (2 small divisions), bleed tank through air purge valve on the back of unit until both pointers are equal. Repeat as necessary.

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Evacuation

EVACUATION PROCEDURE

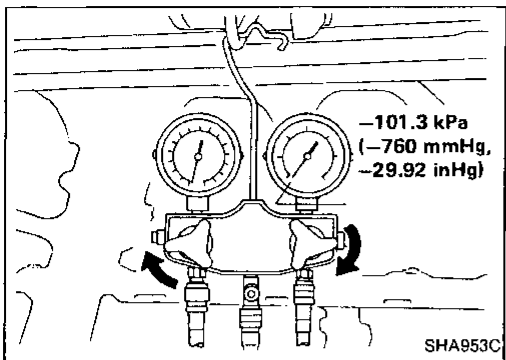
1. Connect vacuum hose to vacuum pump.
2. Open high and low pressure valves of manifold gauge set and additional valve.
3. Run vacuum pump.

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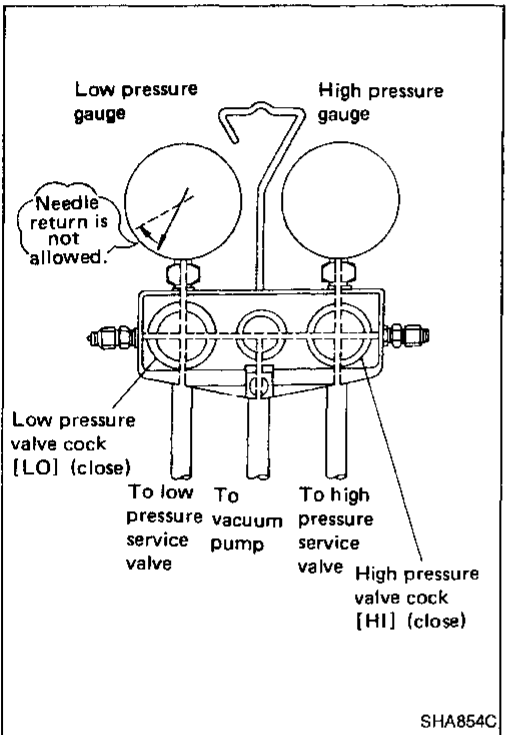
DISCHARGING, EVACUATING, CHARGING AND CHECKING

Evacuation (Cont'd)



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 (-740 to -760 mmHg , -29.13 to -29.92 inHg).
5. Shut off the high and low pressure valves and additional valve.

CHECKING AIRTIGHTNESS



1. Shut off high and low pressure valves and additional valve, and leave the system as it is for 5 to 10 minutes.
2. Make sure that the needle of 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 (100 mmHg , 3.94 inHg) in 10 minutes, the refrigerant in the system will be exhausted in about one month.

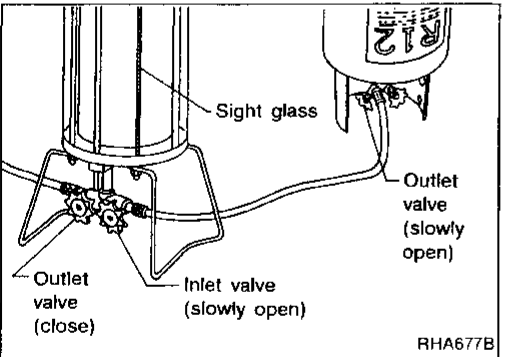
EVACUATION

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

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

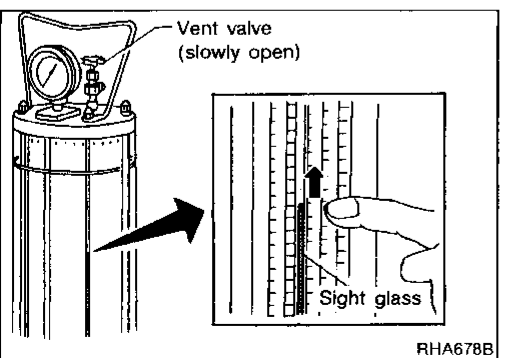
Charging Refrigerant

SETTING OF CHARGING CYLINDER



1. Make sure that inlet and outlet valves of charging cylinder are closed.
2. Slowly open liquid line valve of refrigerant tank.
3. Slowly open inlet valve of charging cylinder.

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



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

The refrigerant volume changes with temperature and pressure. It is necessary to charge refrigerant with a little more than required amount (indicated on sight glass).

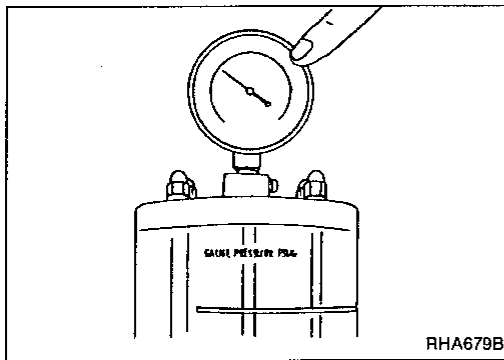
5. Close inlet valve and upper vent valve of charging cylinder.

DISCHARGING, EVACUATING, CHARGING AND CHECKING

Charging Refrigerant (Cont'd)

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

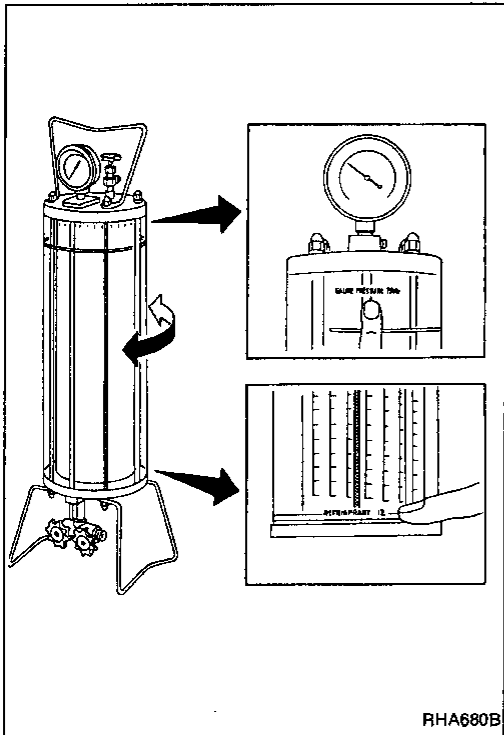
The refrigerant charging time can be reduced by heating refrigerant to increase its pressure. In this case, do not allow the pressure in cylinder to rise higher than 1,030 kPa (10.5 kg/cm², 150 psi). (If pressure rises above this level, turn off the heater.) The pressure in the charging cylinder can be measured by upper pressure gauge.



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SETTING OF FLOW METER

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



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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:

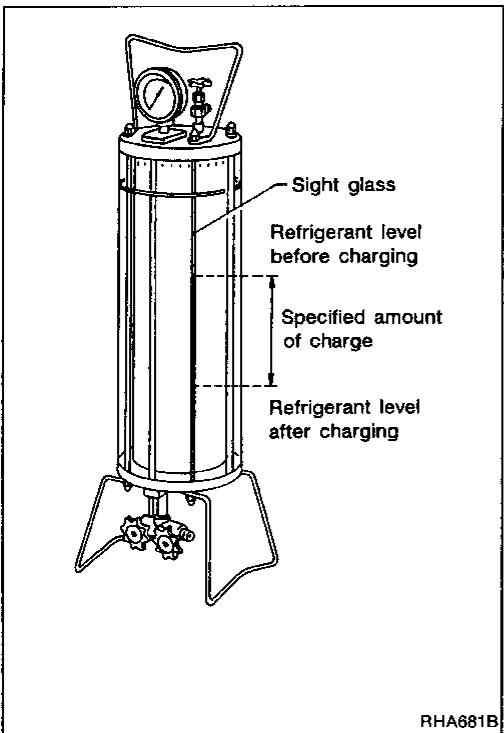
Level in sight glass: 3 lb 8 oz

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 level in sight glass (3 lb 8 oz) = 1 lb 2 oz.

This will be our ending point.



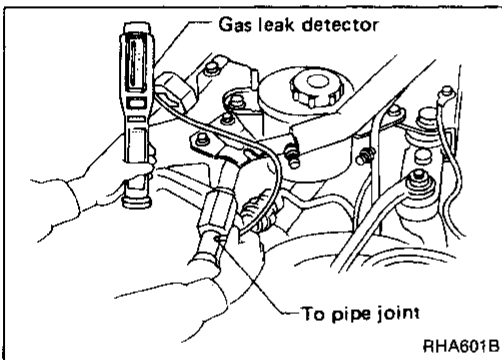
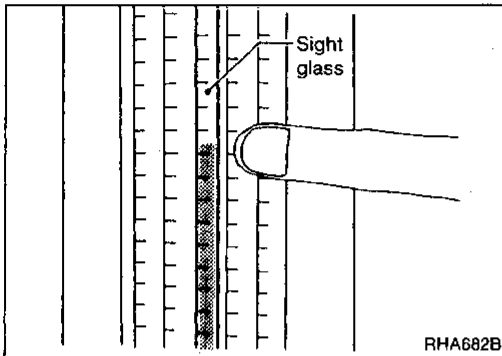
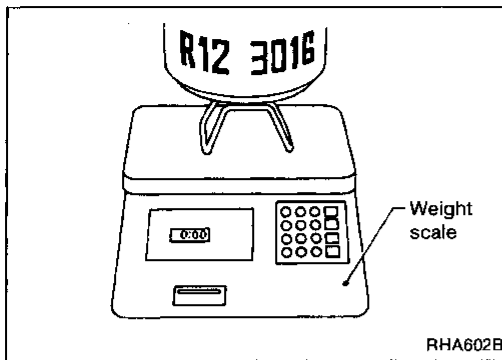
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DISCHARGING, EVACUATING, CHARGING AND CHECKING

Charging Refrigerant (Cont'd)

If a flow meter is not available, the amount of charged refrigerant also can be determined by subtracting the weight of the container measured after charging from its weight measured before charging.



PRELIMINARY CHARGING OF REFRIGERANT

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

CAUTION:

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

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

CAUTION:

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

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

Inspection for Refrigerant Leaks

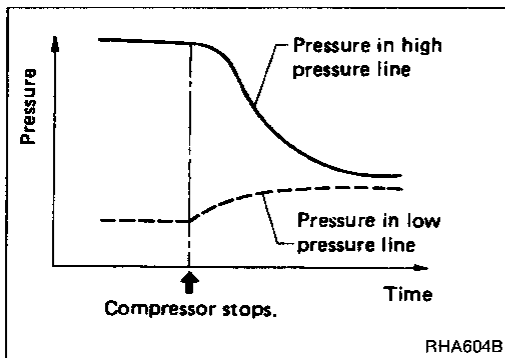
WORK PROCEDURE

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

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

DISCHARGING, EVACUATING, CHARGING AND CHECKING

Inspection for Refrigerant Leaks (Cont'd)



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

To prevent detecting errors, make sure that there is no refrigerant vapor or tobacco smoke in the vicinity of vehicle. It is also necessary to shield vehicle from wind so that leaking refrigerant is not blown away.

INSPECTION POINTS

Check carefully each of tube joints. To check, wipe the portion to be checked with waste cloth, and move tester probe all around the joint.

Compressor

Check shaft seals and bolt holes, and also around magnet clutch.

Liquid tank

Check pressure valve, safety valve and fusible plug mounts.

Service valve

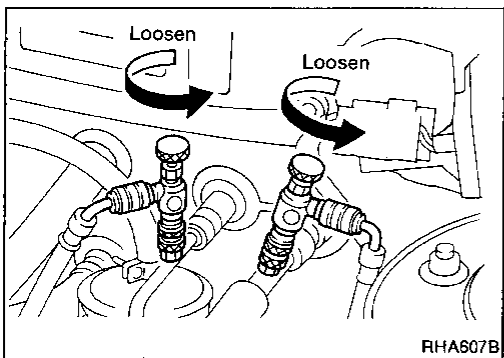
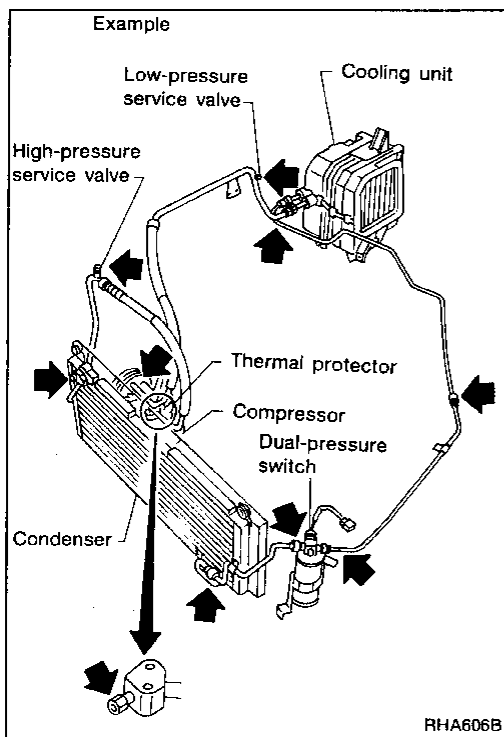
Check all around service valves.

Ensure that valve core is not loose.

Service valve caps must be attached to valves (to prevent leak). Also check that there are no foreign objects inside the cap.

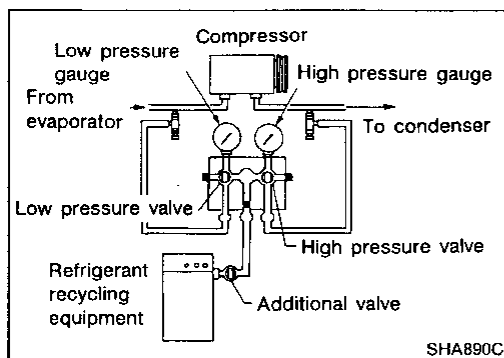
Inside of cooling unit

To check, insert leak tester probe into drain hose immediately after stopping engine. (Keep probe inserted for more than 10 seconds.)



Removal of Service Tools

1. Completely loosen adapter valve of low pressure and high pressure lines.
2. Close additional valve and remove hose from charging cylinder.
3. Connect center hose to refrigerant recycling equipment.
4. Open additional valve and both valves on gauge manifold.
5. Capture refrigerant in charging system.
6. After recovering refrigerant, remove adapter valves from on-car service valves.



Sight Glass Inspection for System

As previously stated, the inspection characteristics of the sight glass on a system equipped with the V-5 compressor are different from a system using a fixed displacement compressor. Refer to the information below:

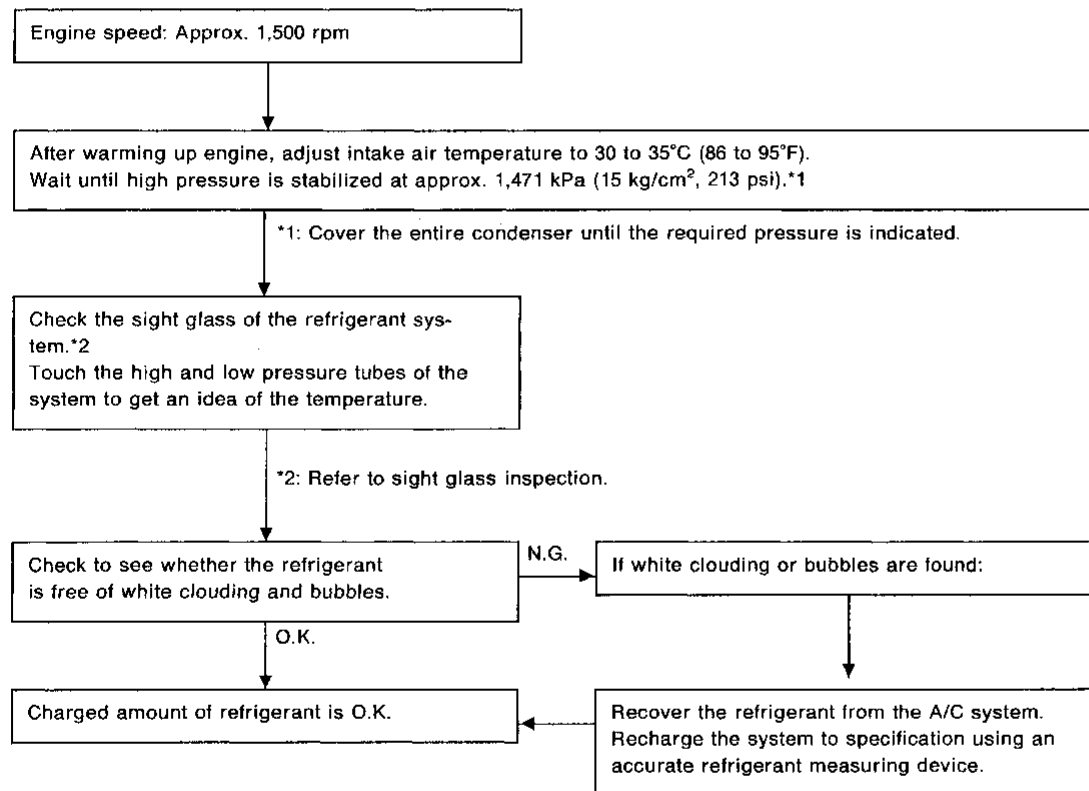
Inspection conditions

1. Operate the engine at approximately 1,500 rpm.
2. Open the door windows.
3. Set the fan switch to the "MAX" position.
4. Turn the air conditioner switch "ON".
5. Ensure that compressor discharge pressure is at least 588 kPa (6 kg/cm², 85 psi).

When discharge pressure does not reach 588 kPa (6 kg/cm², 85 psi) in areas where outside air temperature is low, proceed as follows:

- Set the TEMP. LEVER to the "full-hot" position.
- Set the intake lever/switch to the recirculation position.
- Close the door windows completely.
- Increase the compartment temperature so that discharge pressure reaches at least 588 kPa (6 kg/cm², 85 psi).

WORK PROCEDURE

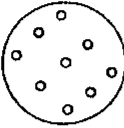
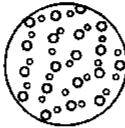
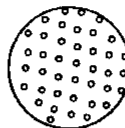
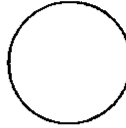


DISCHARGING, EVACUATING, CHARGING AND CHECKING

Sight Glass Inspection for System (Cont'd)

Refrigerant charge amount checking

Check the refrigerant charge amount using the following table as a guide.

| Item to check | Adequate | Insufficient | Almost no refrigerant | Too much refrigerant |
|--|---|--|---|--|
| State in sight glass | <p>CLEAR Air bubbles sometimes appear when engine speed is increased or decreased.</p>  | <p>FOAMY or BUBBLY Air bubbles always appear.</p>  | <p>FROSTY Frost appears.</p>  | <p>NO FOAM No air bubbles appear.</p>  |
| Temperature of high and low pressure lines | High-pressure side is hot while low-pressure side is cold. (A big temperature difference between high and low-pressure side.) | High-pressure side is warm and low-pressure side is slightly cold. (Not so large a temperature difference between high and low-pressure side.) | There is almost no temperature difference between high and low-pressure side. | High-pressure is hot and low-pressure side is slightly warm. (Slight temperature difference between high and low-pressure side.) |
| Pressure of system | Both pressures on high and low-pressure sides are normal. | Both pressures on high and low-pressure sides are slightly low. | High-pressure side is abnormally low. | Both pressure on high and low-pressure sides are abnormally high. |

RHA264B

Note: The condition of the bubbles in the sight glass, temperatures, and pressure are affected by ambient temperature and relative humidity.

CAUTION:

The condition of bubbles seen through the sight glass as well as the intake and discharge pressures are influenced by the ambient temperature, wind velocity, weather, and by the air temperature in front of the condenser, etc.

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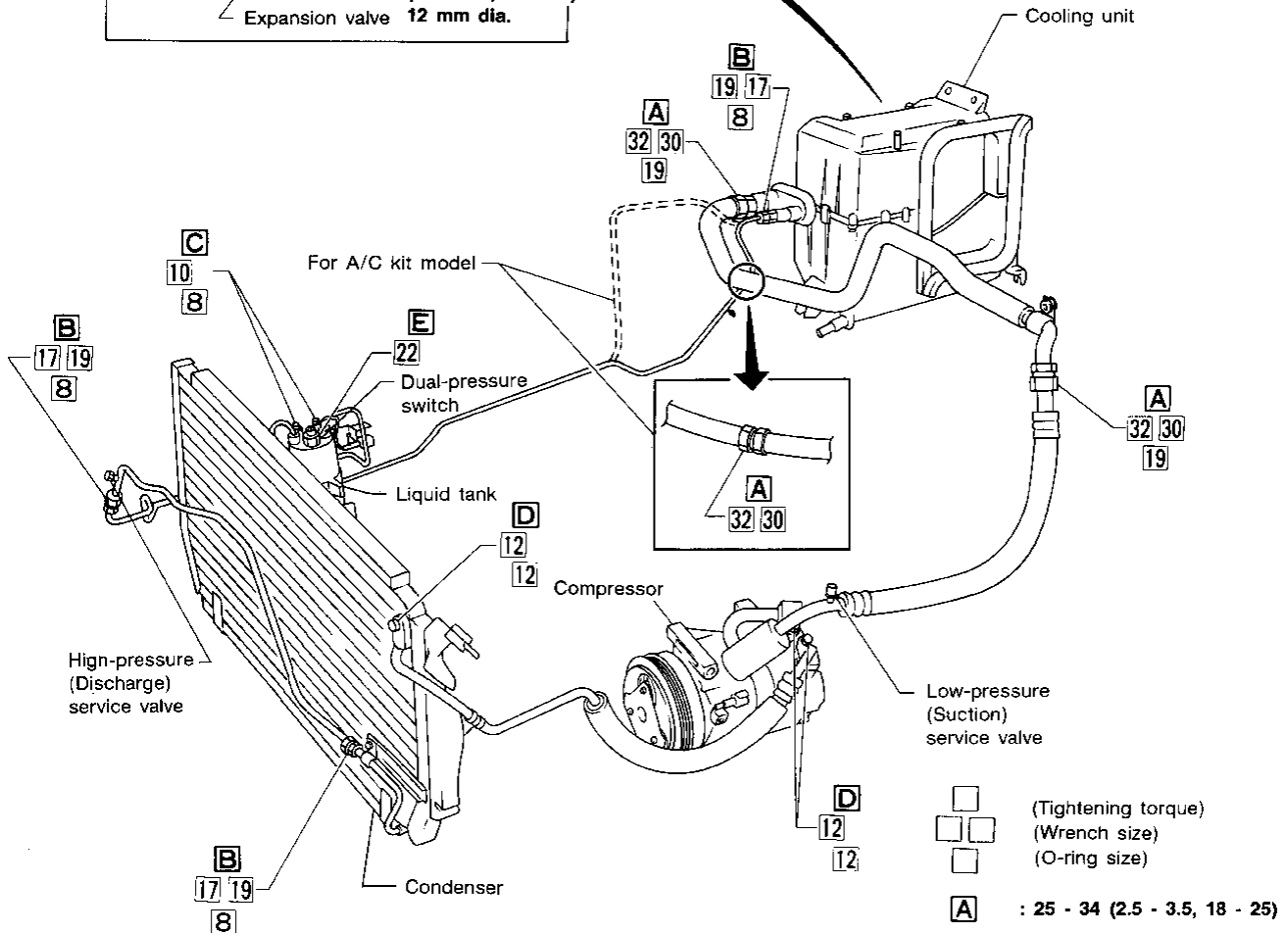
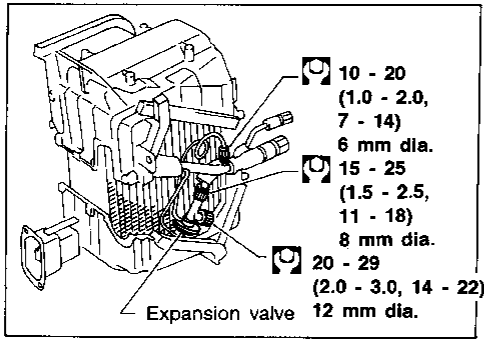
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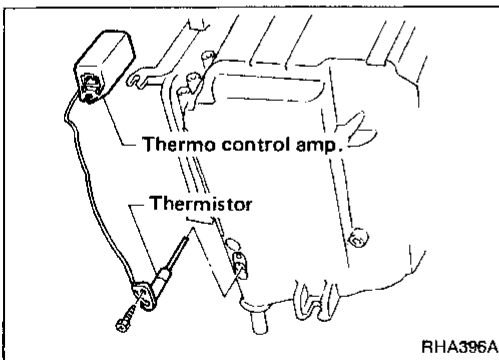
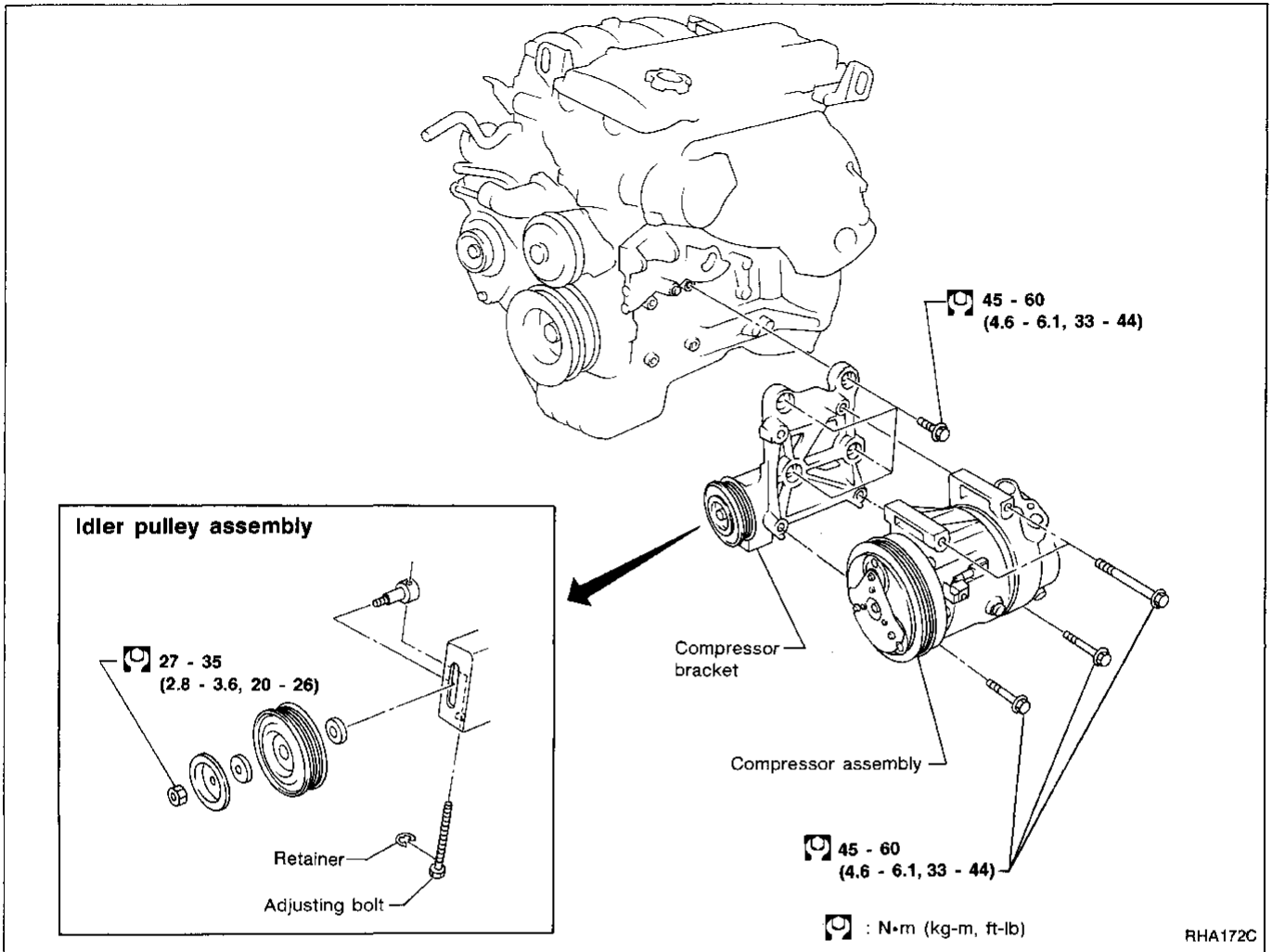
SERVICE PROCEDURES

Refrigerant Lines



- (Tightening torque)
 (Wrench size)
 (O-ring size)
- A** : 25 - 34 (2.5 - 3.5, 18 - 25)
- B** : 10 - 20 (1.0 - 2.0, 7 - 14)
- C** : 3 - 4 (0.3 - 0.4, 2.2 - 2.9)
- D** : 8 - 11 (0.8 - 1.1, 5.8 - 8.0)
- E** : 10 - 12 (1.0 - 1.2, 7 - 9)
- : N·m (kg·m, ft·lb)

Compressor Mounting



Thermo Control Amp.

REPLACEMENT

Remove screws, which secure thermistor locating stay, from front of cooling unit. Replace thermo control amp. assembly with a new one. (Without removing cooling unit, thermo control amp. can be replace.)

Belt Tension

- Refer to MA section.

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

- Refer to EF & EC section.

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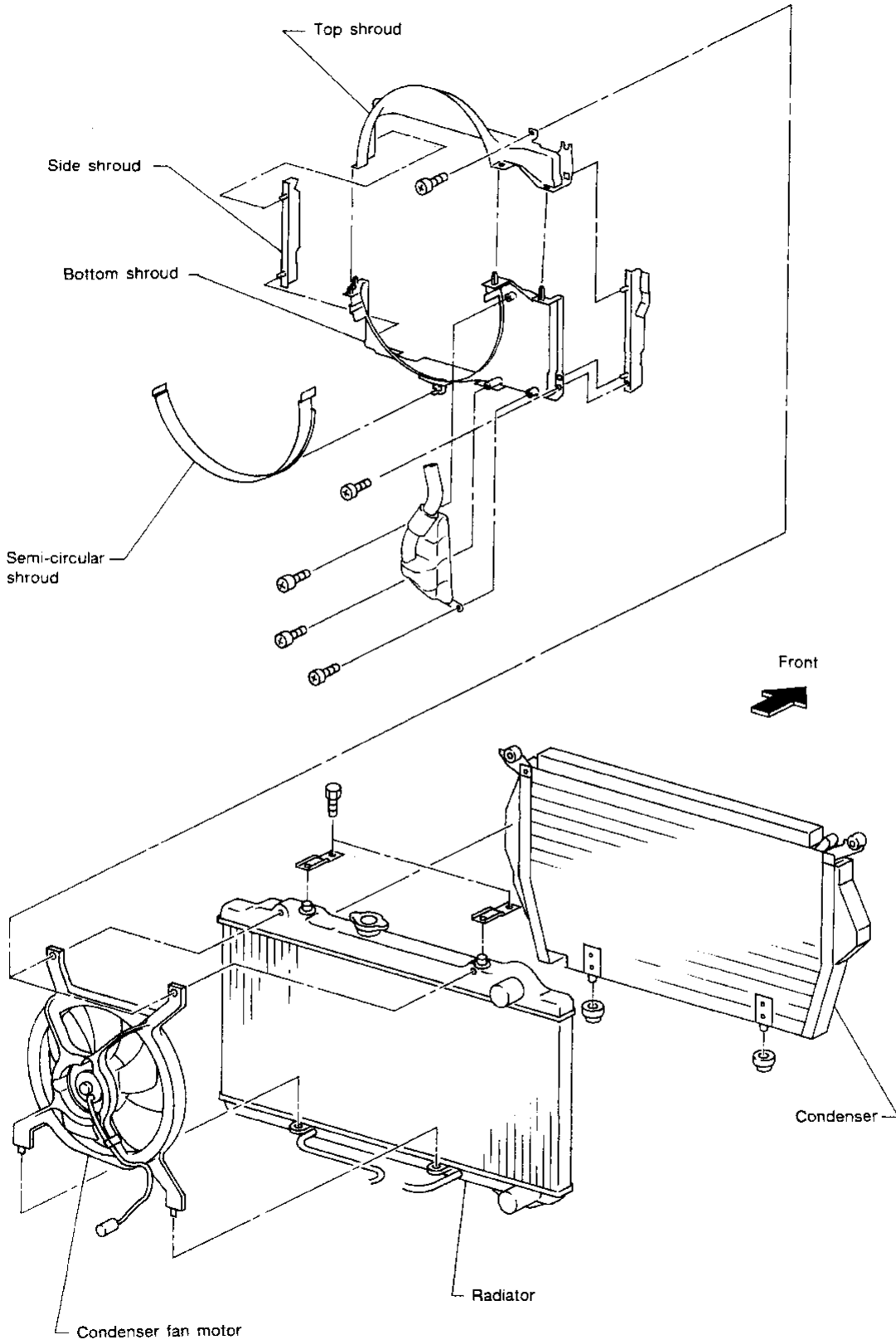
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SERVICE PROCEDURES

Condenser and Condenser Fan Motor



SERVICE PROCEDURES

Condenser and Condenser Fan Motor (Cont'd)

REMOVAL

1. Remove engine air inlet duct.
2. Remove air filter assembly.
3. Remove radiator top mounting bracket.
4. Remove harness clips from top shroud.
5. Move vacuum hoses and harness behind the back edge of shroud.
6. Remove radiator reservoir hose.
7. Remove undercover.

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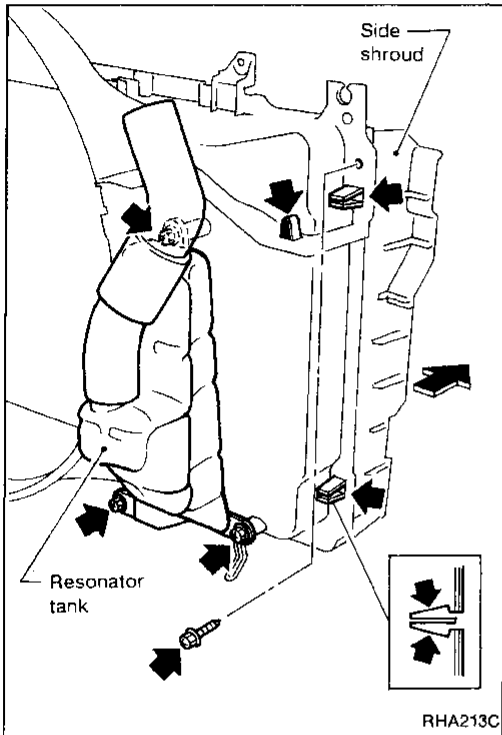
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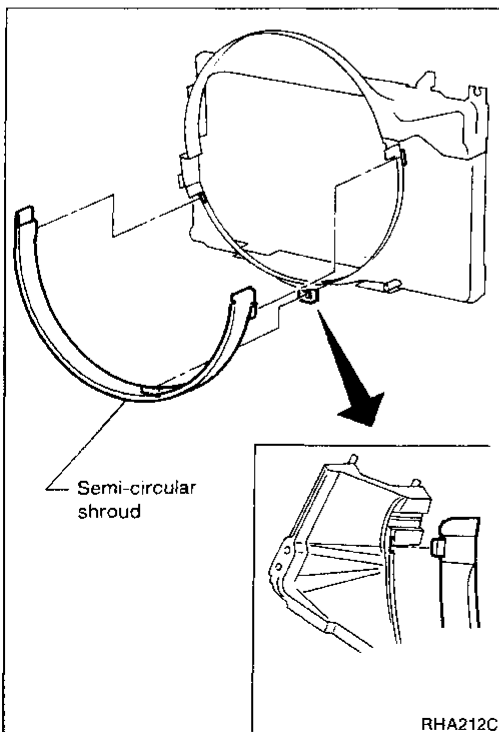
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8. Remove the two bottom shroud mounting screws.
9. Remove the two top shroud mounting screws.
10. Disassemble top shroud from bottom shroud (two clips each side), and from side shroud pieces (one clip each side), then remove top shroud.
11. Remove resonator tank from bottom shroud.
12. Disassemble side shroud pieces from bottom shroud (one clip each side) and remove the two side shroud pieces.
13. Disconnect condenser fan motor harness connector.
14. Remove condenser fan motor from bottom of radiator.



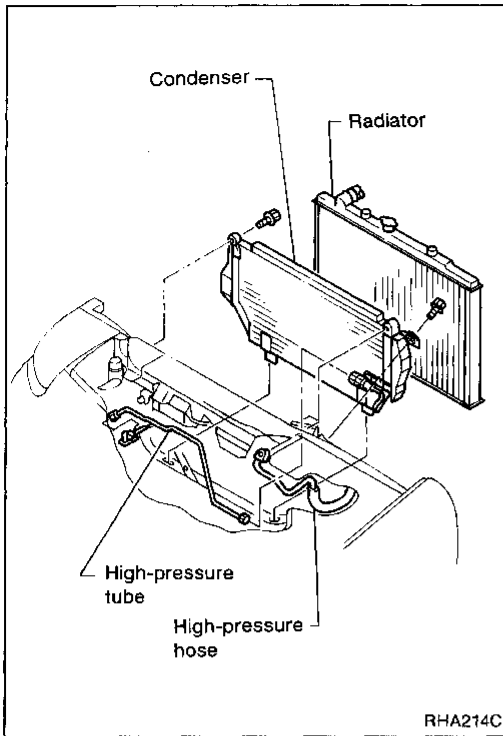
15. Unhook (by pressing on the tabs) and remove narrow semi-circle lower part of shroud.
16. Remove bottom shroud.

CAUTION:

Be careful not to damage radiator.

SERVICE PROCEDURES

Condenser and Condenser Fan Motor (Cont'd)



17. Disconnect high pressure tube from condenser outlet tube.
18. Disconnect high pressure hose from condenser.
19. Remove condenser mounting bolts.
20. Push top of radiator back toward engine.
21. Remove condenser assembly.

CAUTION:

Be careful not to damage condenser.

Lubrication oil

SUNISO 5GS or equivalent

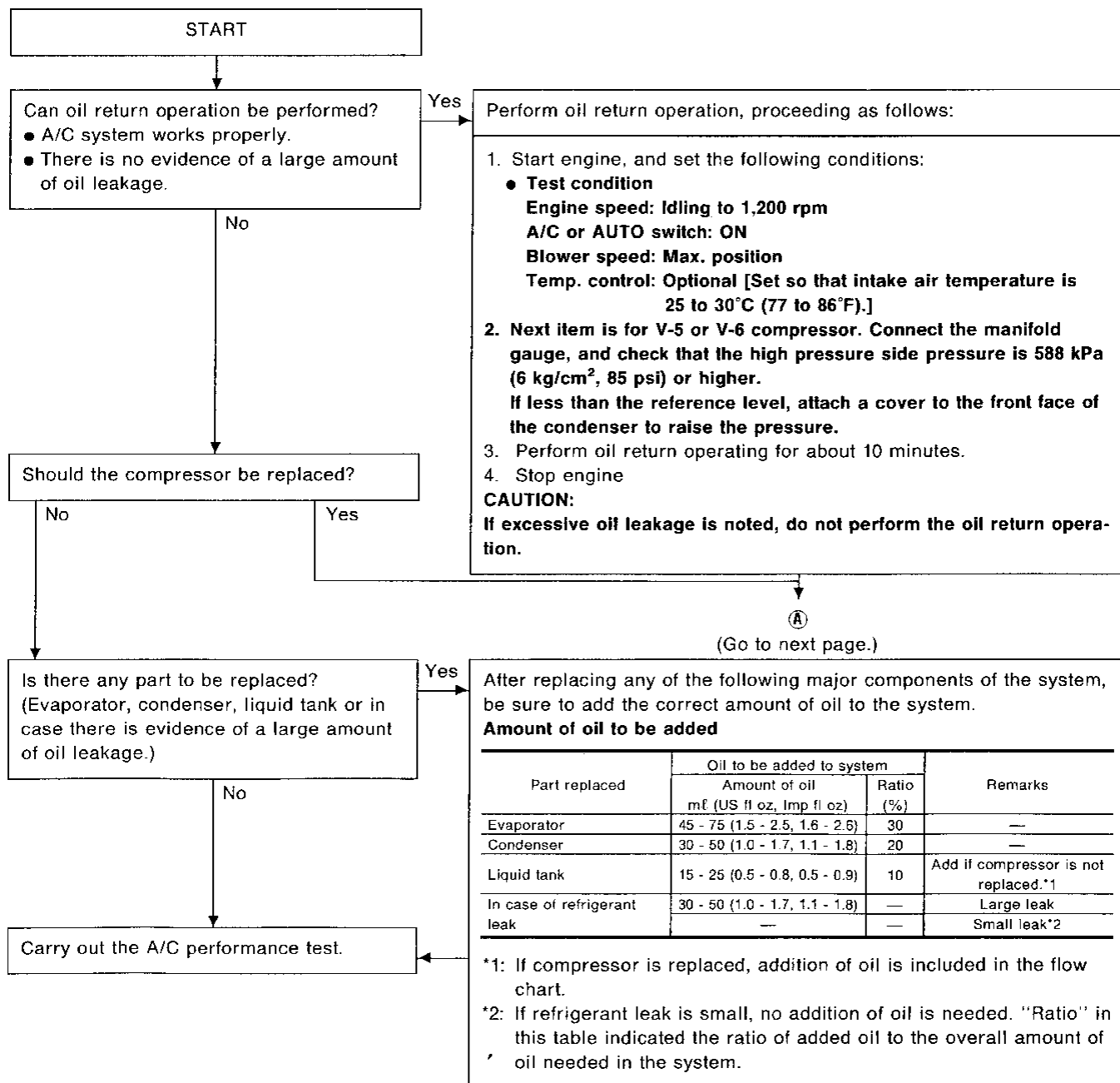
Maintenance of Oil Quantity in Compressor

The oil used to lubricate the compressor circulates through the system with the refrigerant. Whenever any component of the system is replaced or a large amount of gas leakage occurs, add oil to the compressor to maintain the specified amount. If oil quantity is not maintained properly, the following malfunctions may result:

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

Checking and Adjusting

Adjust the oil quantity according to the flowchart shown below.



LUBRICATION OIL — Checking and Adjusting

Checking and Adjusting (Cont'd)

A



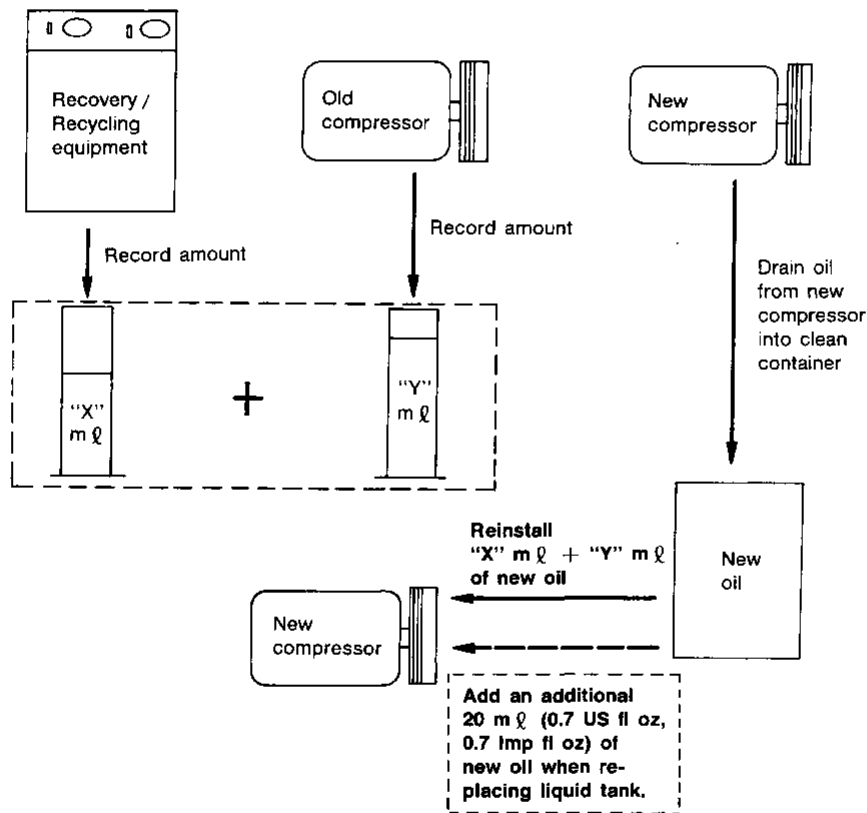
1. Discharge refrigerant into the refrigerant recovery/recycling equipment. Measure oil discharged into the recovery/recycling equipment.
2. Remove the drain plug (for V-5, V-6 or DKS-16H compressor) and drain the oil from the "old" (removed) compressor into a graduated container, and record the amount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

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

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

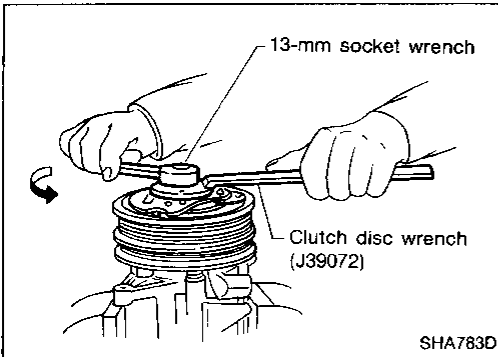
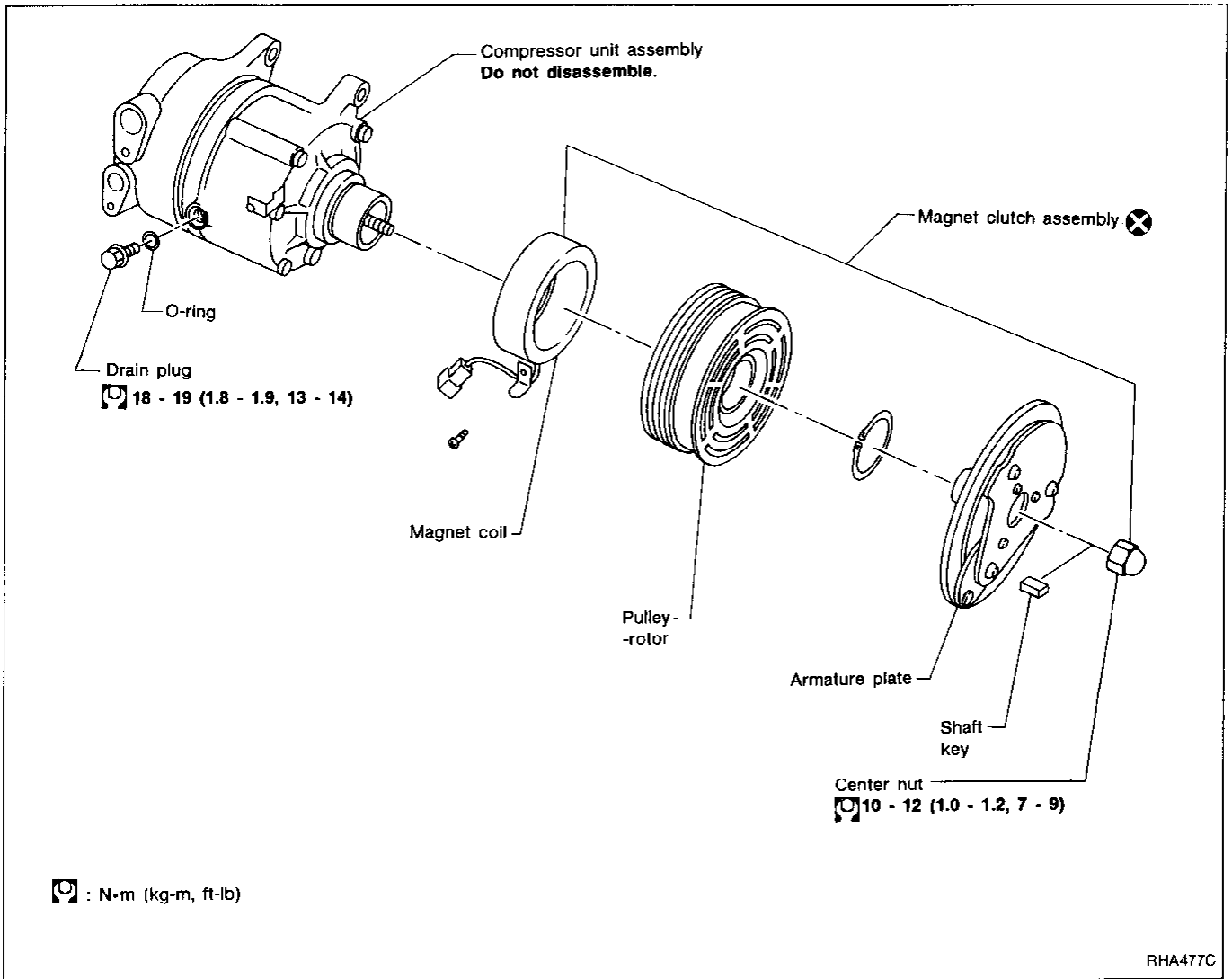
7. If the liquid tank also needs to be replaced, add an additional 20 mℓ (0.7 US fl oz, 0.7 Imp fl oz) of oil at this time.

Do not add this 20 mℓ (0.7 US fl oz, 0.7 Imp fl oz) of oil if only replacing the compressor.



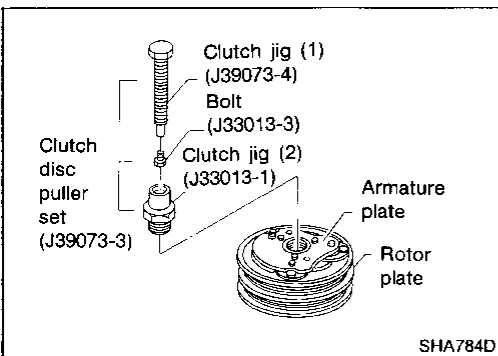
SHA856D

COMPRESSOR — Model V-5 (CALSONIC make)



Removing Magnet Clutch Assembly

- Remove center nut while holding armature plate with clutch disc wrench.



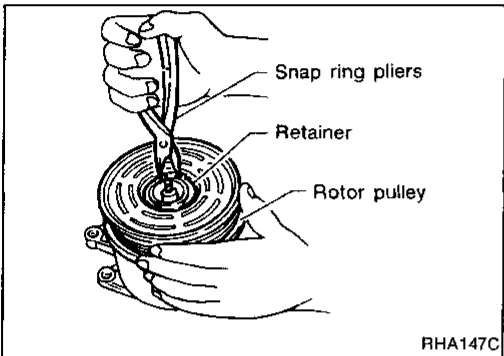
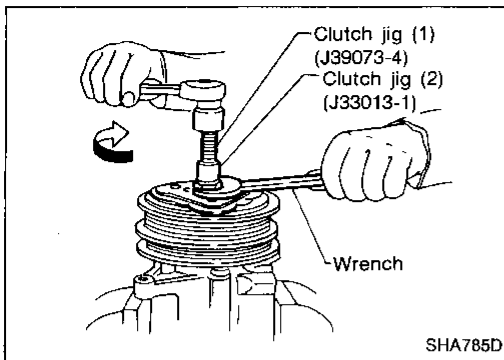
- Install jigs in the sequence shown, and tighten clutch jig (1) while holding clutch jig (2) with wrench. This will cause armature plate to be removed.

Fit a bolt to the tip of the clutch jig, and attach the jig to the clutch.

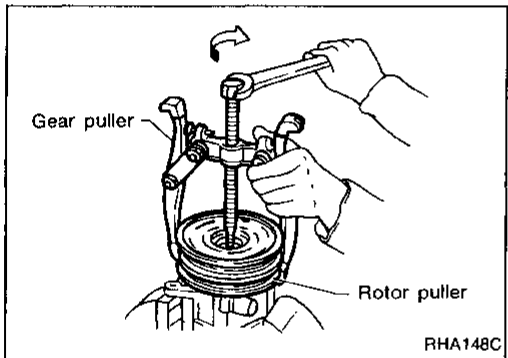
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COMPRESSOR — Model V-5 (CALSONIC make)

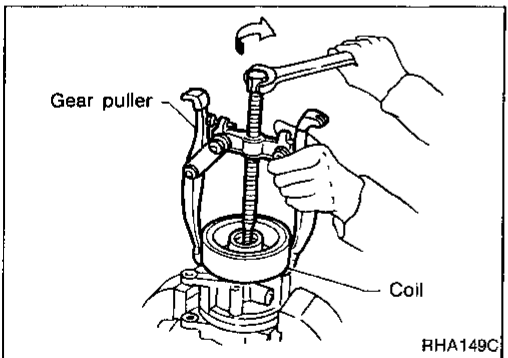
Removing Magnet Clutch Assembly (Cont'd)



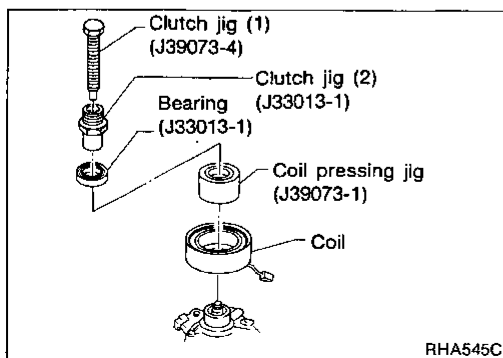
- Remove retainer using snap ring pliers.



- Remove pulley using gear puller.



- Remove lead wire fixing screw, and remove coil.
When removing the coil, pay attention so as not to damage the lead and grounding wire with gear puller jaws.

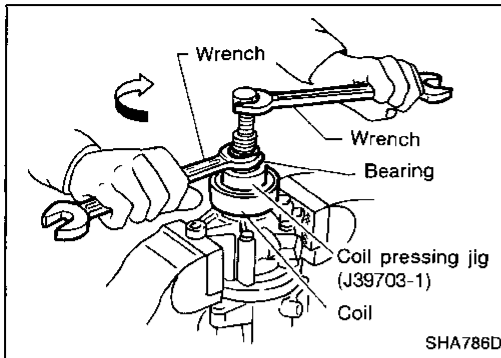


Installation of Magnet Clutch Assembly

- Remove bolt from the tip of the clutch jig (1), and attach jigs in the sequence shown.
Tighten clutch jig (1) to shaft securely.

COMPRESSOR — Model V-5 (CALSONIC make)

Installation of Magnet Clutch Assembly (Cont'd)



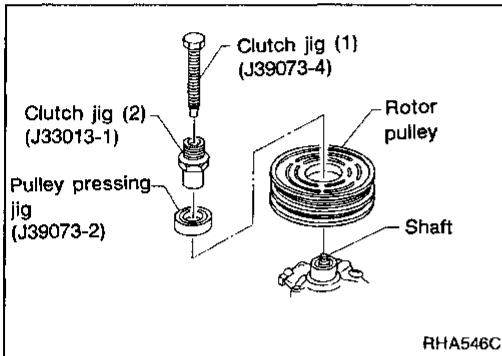
- Press fit the coil into compressor main body by tightening clutch jig (2) while holding clutch jig (1) with wrench.
- Arrange coil lead and lead (connector) of compressor on the same side before press fitting the coil.**

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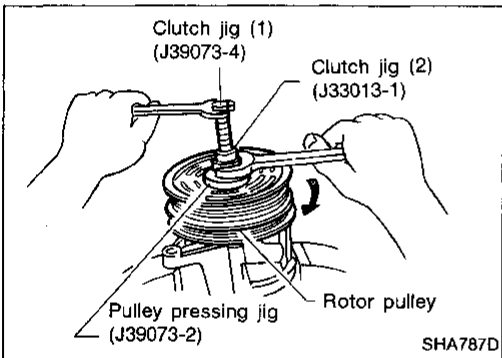
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- Install jigs in the sequence shown.
- Tighten clutch jig (1) to shaft.**

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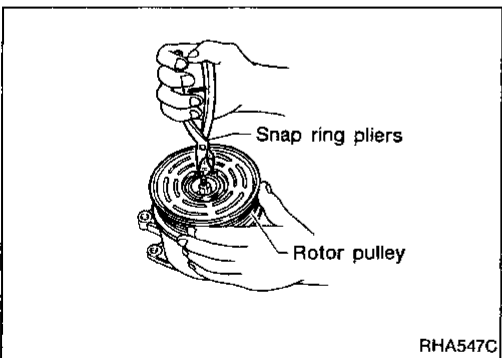
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- Press fit the rotor pulley by tightening clutch jig (2) while holding clutch jig (1) with wrench.

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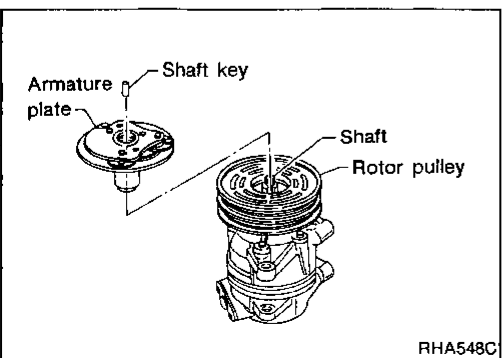


- Fit retainer using snap ring pliers.
- **Do not reuse retainer. Be sure to use a new one.**
- **Pay attention so as not to damage the bearing seal when fitting the retainer.**
- **Fit the retainer with its taper facing up.**

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- Insert shaft key by aligning shaft key groove with groove of armature plate.
- Do not reuse a shaft key. Be sure to use a new one.**

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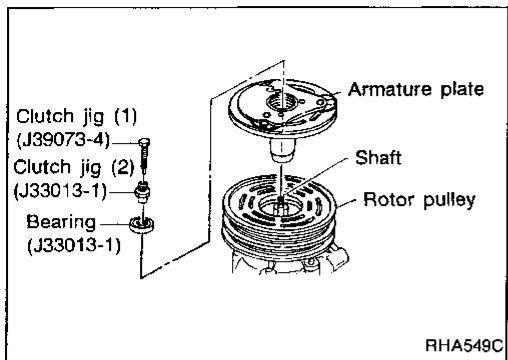
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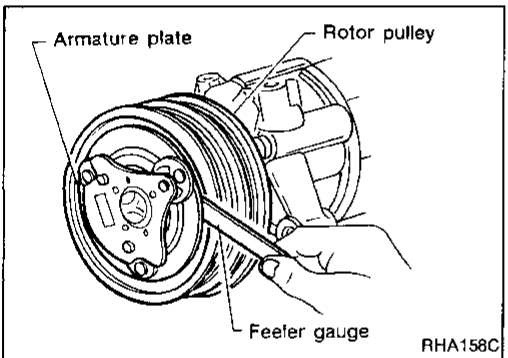
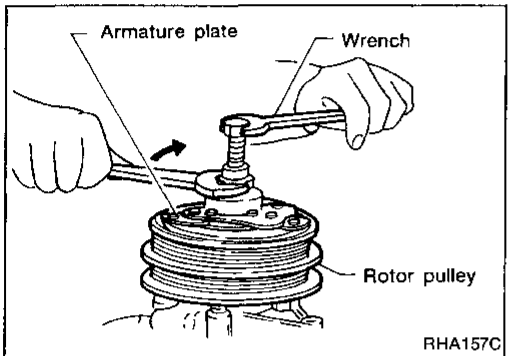
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COMPRESSOR — Model V-5 (CALSONIC make)

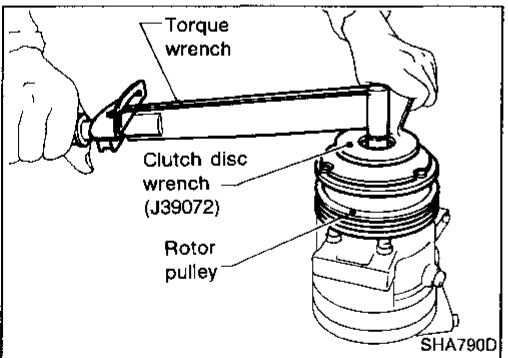
Installation of Magnet Clutch Assembly (Cont'd)



- Install jigs in the sequence shown. Press fit armature plate while observing the gap from rotor pulley. To press fit, tighten clutch jig (2) while holding clutch jig (1) with wrench.

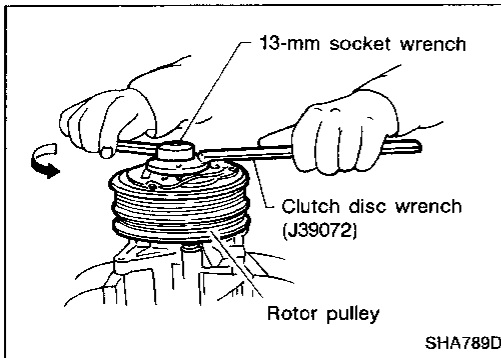


Standard gap: 0.3 - 0.6 mm (0.012 - 0.024 in)



- Install center nut using clutch disc wrench.
Do not reuse the nut. Be sure to use a new one.
Nut tightening torque:
☐: 0.10 - 0.12 N·m
(1.0 - 1.2 kg-cm, 0.87 - 1.04 in-lb)
After assembling, rotate rotor pulley by hand, and check for smooth rotation without interference noise.

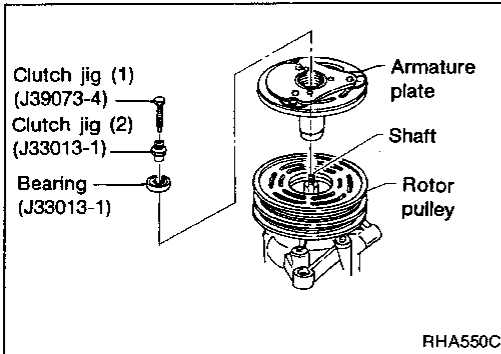
- Operation check procedure:
Apply battery voltage to magnet clutch coil, and check several times for normal clutch ON/OFF operation.
- Rotate compressor shaft more than five turns in both directions by hand to equalize oil distribution inside compressor, then run compressor for about one hour by idling engine.



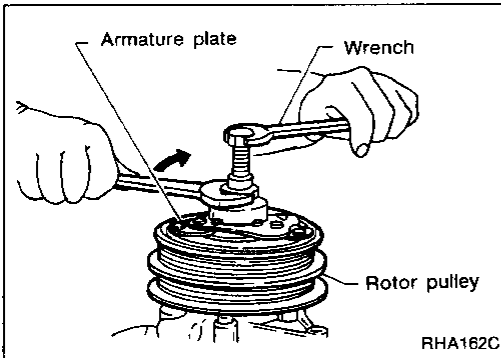
Gap Adjusting Procedure

WHEN GAP IS LARGE

- Remove center nut while holding armature plate.



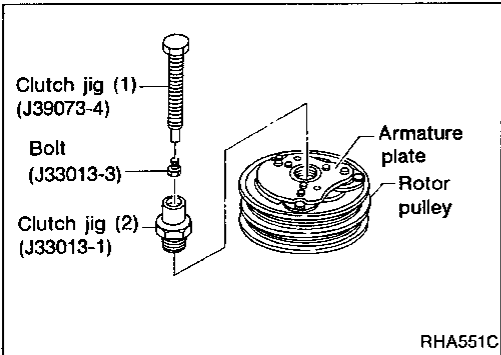
- Install clutch jigs in the sequence shown.



- Press fit the armature plate by tightening clutch jig (2) while holding clutch jig (1) with wrench.

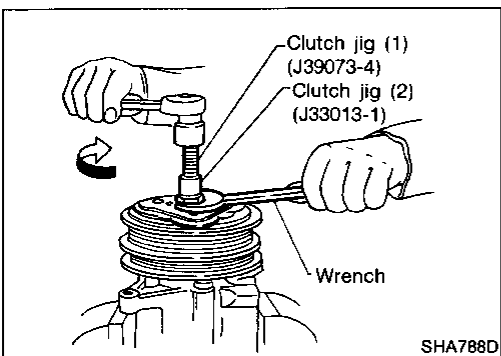
Tighten clutch jig (1) into shaft.

- Measure the gap again.
After achieving the specified gap, install center nut using clutch disc wrench.



WHEN GAP IS SMALL

- Install jigs as shown.



- Expand the gap by lifting up armature plate. To lift up armature plate, tighten clutch jig (1) while holding clutch jig (2) with wrench.

Center nut need not be removed when expanding the gap.

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Operational Check

The purpose of the operational check is to confirm that the system operates as it should. The systems which are checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase.

CONDITIONS:

Engine running at normal operating temperature.

PROCEDURE:

1. Check blower

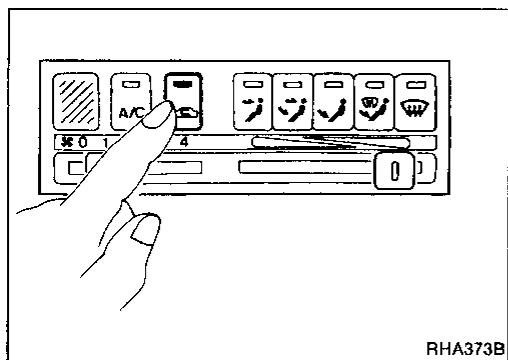
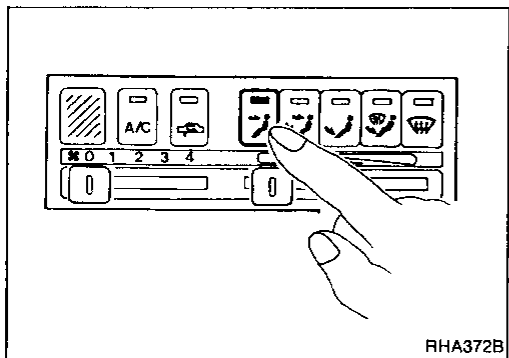
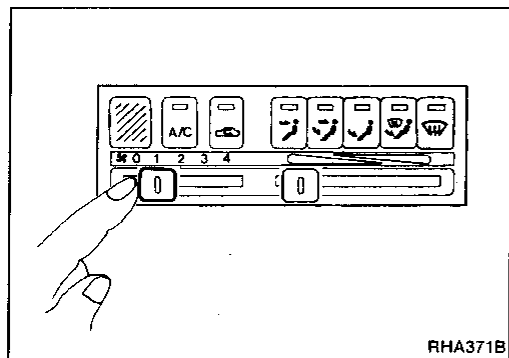
- 1) Slide Fan lever to 1-speed.
Blower should operate on 1-speed.
- 2) Then slide Fan Lever to 2-speed.
- 3) Continue checking blower speed until all four speeds are checked.
- 4) Leave blower on 4-speed.

2. Check discharge air

- 1) Press the VENT button.
VENT indicator should light.
- 2) Confirm that all discharge air comes out of face vents.
- 3) Press the B/L button.
B/L indicator should light.
- 4) Confirm that discharge air comes out of face vents and foot vents.
- 5) Press the FOOT button.
FOOT indicator should light.
- 6) Confirm that discharge air comes out of foot vents, with some air from defroster vents.
- 7) Press the F/D button.
F/D indicator should light.
- 8) Confirm that discharge air comes out of foot vents, with some air from defroster vents, and that intake door position is at FRE.
- 9) Press the DEF button.
DEF indicator should light.
- 10) The discharge air should be coming only from defroster vents. At the same time compressor should turn ON and intake door position be at FRE.

3. Check recirc

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



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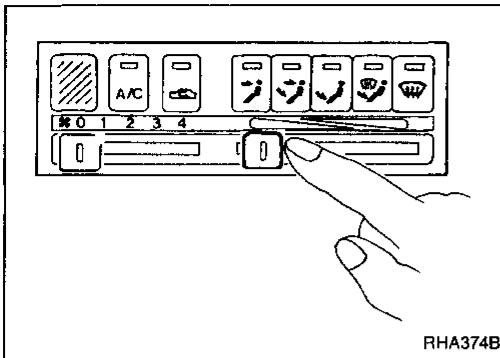
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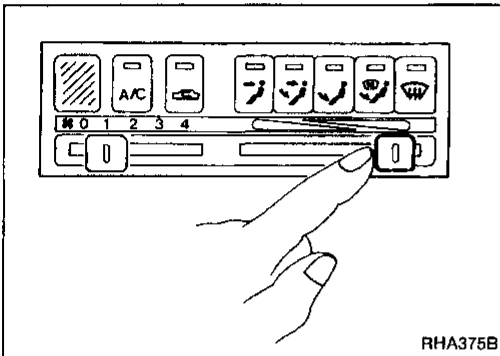
DIAGNOSES — Overall System

Operational Check (Cont'd)



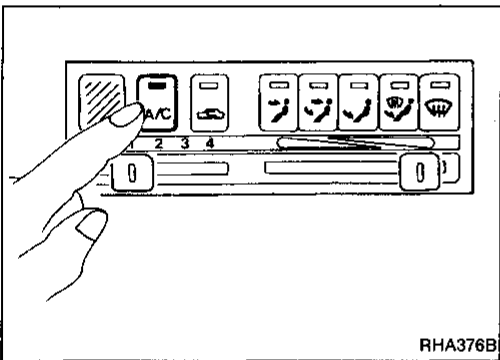
4. Check temperature decrease

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



5. Check temperature increase

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



6. Check air conditioner switch

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

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

DIAGNOSES — Overall System

Performance Chart

TEST CONDITION

Testing must be performed as follows:

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


Doors: Closed

Door window: Open (Front driver side only)

Hood: Open

Temperature control lever: Max. COLD set

Mode switch:  (Ventilation) set

REC switch:  (Recirculation) set

Fan switch: Max. speed set

Engine speed: 1,500 rpm

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

TEST READING

Recirculating-to-discharge air temperature table

| Inside air (Recirculating air) at blower assembly inlet | | Discharge air temperature at center ventilator °C (°F) |
|--|----------------------------|--|
| Relative humidity % | Air temperature °C (°F) | |
| 50 - 60 | 25 (77) | 6.5 - 8.7 (44 - 48) |
| | 30 (86) | 10.0 - 12.4 (50 - 54) |
| | 35 (95) | 13.4 - 16.1 (56 - 61) |
| | 40 (104) | 17.7 - 20.7 (64 - 69) |
| 60 - 70 | 25 (77) | 8.7 - 11.0 (48 - 52) |
| | 30 (86) | 12.4 - 14.8 (54 - 59) |
| | 35 (95) | 16.1 - 18.7 (61 - 66) |
| | 40 (104) | 20.7 - 23.4 (69 - 74) |

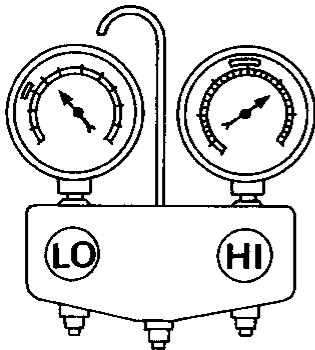
Ambient air temperature-to-compressor pressure table

| Ambient air | | High-pressure (Discharge side) kPa (kg/cm ² , psi) | Low-pressure (Suction side) kPa (kg/cm ² , psi) |
|------------------------|----------------------------|---|---|
| Relative humidity % | Air temperature °C (°F) | | |
| 50 - 70 | 25 (77) | 745 - 912 (7.6 - 9.3, 108 - 132) | 177 - 216 (1.8 - 2.2, 26 - 31) |
| | 30 (86) | 883 - 1,089 (9.0 - 11.1, 128 - 158) | 157 - 196 (1.6 - 2.0, 23 - 28) |
| | 35 (95) | 1,040 - 1,275 (10.6 - 13.0, 151 - 185) | 167 - 216 (1.7 - 2.2, 24 - 31) |
| | 40 (104) | 1,196 - 1,451 (12.2 - 14.8, 173 - 210) | 177 - 255 (1.8 - 2.6, 26 - 37) |

Performance Test Diagnoses

TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

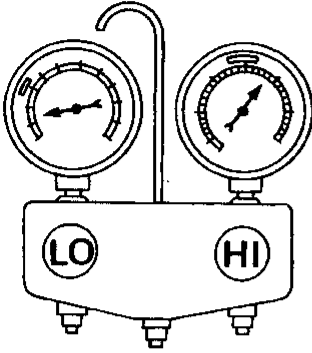
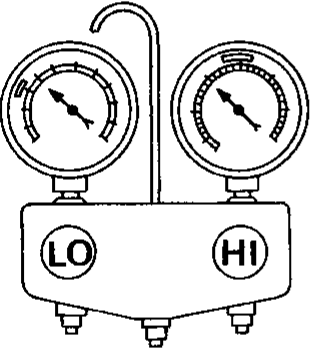
Whenever abnormal pressure of high and/or low sides of the system is noted, diagnosis must be conducted by using a manifold gauge. The large-line zone on the gauge scale (see illustrations.) shown in the following table refers to the standard (normal) pressure range for the corresponding pressure side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

| Gauge indication | Refrigerant cycle | Probable cause | Corrective action |
|--|--|---|--|
| <p>Both high and low-pressure sides are too high.</p> <p>A</p>  <p style="text-align: right; margin-right: 50px;">AC359A</p> | <ul style="list-style-type: none"> ● Pressure is reduced soon after water is splashed on condenser. ● No bubbles appear in sight glass when pressure is reduced. | <p>Excessive refrigerant charge in refrigeration cycle</p> | <p>Reduce refrigerant until specified pressure is obtained.</p> |
| | <p>Air suction by radiator or condenser fan is insufficient.</p> | <p>Insufficient condenser cooling performance</p> <p style="text-align: center;">↓</p> <p>① Condenser fins are clogged.</p> <p>② Improper rotation of radiator fan or condenser fan</p> | <ul style="list-style-type: none"> ● Clean condenser. ● Check and repair radiator or condenser fan as necessary. |
| | <ul style="list-style-type: none"> ● Low-pressure pipe is not cold. ● When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2 kg/cm², 28 psi). It then decreases gradually thereafter. | <p>Poor heat exchange in condenser (After compressor operation stops, high pressure decreases too slowly.)</p> <p style="text-align: center;">↓</p> <p>Air in refrigeration cycle</p> | <p>Evacuate repeatedly and recharge system.</p> |
| | <p>Engine tends to overheat.</p> | <p>Engine cooling systems malfunction.</p> | <p>Check and repair each engine cooling system.</p> |
| | <ul style="list-style-type: none"> ● Areas near low-pressure pipe connection and service valves are considerably cold compared with areas near expansion valve outlet or evaporator. ● Plates are sometimes covered with frost. | <ul style="list-style-type: none"> ● Excessive liquid refrigerant on low-pressure side ● Excessive refrigerant discharge flow ● Expansion valve is open a little compared with the specification. <p style="text-align: center;">↓</p> <p>① Improper thermal valve installation</p> <p>② Improper expansion valve adjustment</p> | <p>Replace expansion valve.</p> |

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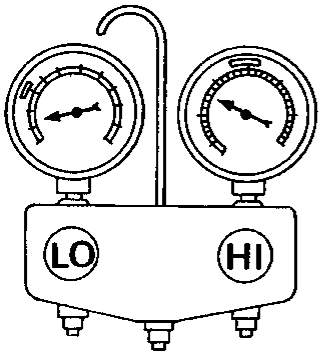
DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

| Gauge indication | Refrigerant cycle | Probable cause | Corrective action |
|---|--|--|--|
| <p>High-pressure side is too high and low-pressure side is too low.</p> <p>B</p>  <p style="text-align: right; font-size: small;">AC360A</p> | <p>Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.</p> | <p>High-pressure tube or parts located between compressor and condenser are clogged or crushed.</p> | <ul style="list-style-type: none"> ● Check and repair or replace malfunctioning parts. ● Check compressor oil for contamination. |
| <p>High-pressure side is too low and low-pressure side is too high.</p> <p>C</p>  <p style="text-align: right; font-size: small;">AC356A</p> | <p>High and low-pressure sides become equal soon after compressor operation stops.</p> | <p>Compressor pressure operation is improper.</p> <p style="text-align: center;">↓</p> <p>Damaged inside compressor packings</p> | <p>Replace compressor.</p> |
| | <p>No temperature difference between high and low-pressure sides</p> | <p>Compressor discharge capacity does not change. (Compressor stroke is set at maximum.)</p> | <p>Replace compressor.</p> |

DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

| Gauge indication | Refrigerant cycle | Probable cause | Corrective action |
|--|--|--|--|
| <p>Both high-and low-pressure sides are too low.</p> <p>D</p>  <p style="text-align: center;">AC353A</p> | <ul style="list-style-type: none"> ● There is a big temperature difference between liquid tank outlet and inlet. Outlet temperature is extremely low. ● Liquid tank inlet and expansion valve are frosted. | Liquid tank inside is clogged a little. | <ul style="list-style-type: none"> ● Replace liquid tank. ● Check compressor oil for contamination. |
| | <ul style="list-style-type: none"> ● Temperature of expansion valve inlet is extremely low as compared with areas near liquid tank. ● Expansion valve inlet may be frosted. ● Temperature difference occurs somewhere in high-pressure side | High-pressure pipe located between liquid tank and expansion valve is clogged. | <ul style="list-style-type: none"> ● Check and repair malfunctioning parts. ● Check compressor oil for contamination. |
| | There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted. | <p>Expansion valve closes a little compared with the specification.</p> <p style="text-align: center;">↓</p> <ol style="list-style-type: none"> ① Improper expansion valve adjustment ② Malfunctioning thermal valve ③ Outlet and inlet may be clogged. | <ul style="list-style-type: none"> ● Remove foreign particles by using compressed air. ● Check compressor oil for contamination. |
| | Areas near low-pressure pipe connection and service valve are extremely cold as compared with areas near expansion valve outlet and evaporator. | Low-pressure pipe is clogged or crushed. | <ul style="list-style-type: none"> ● Check and repair malfunctioning parts. ● Check compressor oil for contamination. |
| | Air flow volume is not enough or is too low. | <p>Evaporator is frozen.</p> <p style="text-align: center;">↓</p> <p>Compressor discharge capacity does not change. (Compressor stroke is set at maximum length.)</p> | Replace compressor. |

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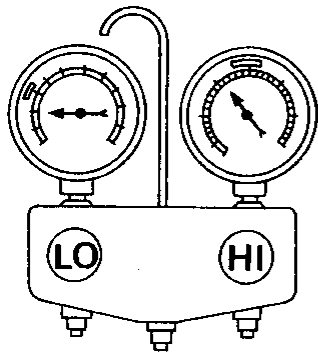
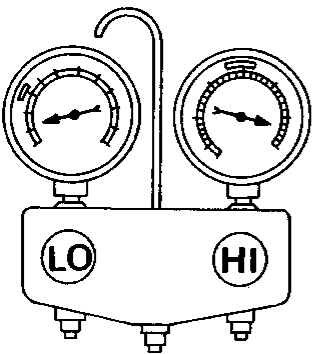
BF

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EL

DIAGNOSES — Overall System

Performance Test Diagnoses (Cont'd)

| Gauge indication | Refrigerant cycle | Probable cause | Corrective action |
|---|--|--|--|
| <p>Low-pressure side sometimes becomes negative.</p> <p>E</p>  <p style="text-align: right; font-size: small;">AC354A</p> | <ul style="list-style-type: none"> ● Air conditioning system does not function and does not cyclically cool the compartment air. ● The system constantly functions for a certain period of time after compressor is stopped and restarted. | <p>Refrigerant does not discharge cyclically.</p> <p style="text-align: center;">↓</p> <p>Moisture is frozen at expansion valve outlet and inlet.</p> <p style="text-align: center;">↓</p> <p>Water is mixed with refrigerant.</p> | <ul style="list-style-type: none"> ● Drain water from refrigerant or replace refrigerant. ● Replace liquid tank. |
| <p>Low-pressure side becomes negative.</p> <p>F</p>  <p style="text-align: right; font-size: small;">AC362A</p> | <p>Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.</p> | <p>High-pressure side is closed and refrigerant does not flow.</p> <p style="text-align: center;">↓</p> <p>Expansion valve or liquid tank is frosted.</p> | <p>After the system is left at rest, start it again in order to confirm whether or not problem is caused by water or foreign particles.</p> <ul style="list-style-type: none"> ● If the problem is due to water, drain water from refrigerant or replace refrigerant. ● If it is due to foreign particles, remove expansion valve and remove them with dry and compressed air. ● If either of the above methods cannot correct the problem, replace expansion valve. ● Replace liquid tank. ● Check compressor oil for contamination. |

TROUBLE DIAGNOSES

Contents

| | | |
|--|-------|------------|
| Symptom Chart | HA-56 | |
| Preliminary Check | HA-58 | |
| PRELIMINARY CHECK 1 (Intake door is not set at "FRESH" in DEF or FOOT mode.) | HA-58 | GI |
| PRELIMINARY CHECK 2 (A/C does not blow cold air.) | HA-59 | MA |
| PRELIMINARY CHECK 3 (Magnet clutch does not engage in DEF mode.) | HA-60 | EM |
| PRELIMINARY CHECK 4 (Air outlet does not change.) | HA-60 | EM |
| PRELIMINARY CHECK 5 (Noise) | HA-61 | LC |
| Harness Layout for A/C System | HA-62 | |
| Circuit Diagram for Quick Pinpoint Check | HA-64 | EF & EC |
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| Main Power Supply and Ground Circuit Check | HA-68 | |
| Diagnostic Procedure 1 (SYMPTOM: Blower motor does not rotate.) | HA-69 | FE |
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| Diagnostic Procedure 4 (SYMPTOM: Magnet clutch does not engage when A/C switch and fan switch are ON.) | HA-75 | AT |
| Diagnostic Procedure 5 (SYMPTOM: Illumination or indicators of push control unit do not come on.) | HA-80 | AT |
| Electrical Components Inspection | HA-83 | PD |
| Control Linkage Adjustment | HA-86 | FA |
| | | RA |
| | | BR |
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| | | BF |
| | | HA |
| | | EL |

TROUBLE DIAGNOSES

Symptom Chart

DIAGNOSTIC TABLE

| PROCEDURE | Preliminary Check | | | | | Diagnostic Procedure | | | | | Main Power Supply and Ground Circuit Check | | | |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|------------------------|------------------------|------------------------|------------------------|------------------------|--|----------|-------------------|---------------------|
| | Preliminary check 1 | Preliminary check 2 | Preliminary check 3 | Preliminary check 4 | Preliminary check 5 | Diagnostic procedure 1 | Diagnostic procedure 2 | Diagnostic procedure 3 | Diagnostic procedure 4 | Diagnostic procedure 5 | 15A Fuses | 10A Fuse | Push control unit | Thermo control amp. |
| SYMPTOM | | | | | | | | | | | | | | |
| A/C does not blow cold air. | | ① | | | | ○ | | | ○ | | ○ | ○ | | ○ |
| Blower motor does not rotate. | | ① | | | | ② | | | | | ○ | | | |
| Air outlet does not change. | | | | ① | | | ② | | | | | ○ | ○ | |
| Intake door does not change in VENT, B/L or FOOT mode. | | | | | | | | ① | | | | ○ | ○ | |
| Intake door is not set at "FRESH" in DEF or FOOT mode. | ① | | | | | | | ○ | | | | ○ | ○ | |
| Magnet clutch does not engage when A/C switch and fan switch are ON. | | ① | | | | | | | ② | | | ○ | | ○ |
| Magnet clutch does not engage in DEF mode. | | ① | ② | | | | | | ○ | | | ○ | | ○ |
| Illumination or indicators of push control unit do not come on. | | | | | | | | | ① | | | ○ | | |
| Noise | | | | | ① | | | | | | | | | |

①, ②: The number means checking order.

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

TROUBLE DIAGNOSES

Symptom Chart (Cont'd)

Electrical Components Inspection

| | Blower relay | Blower motor | Resistor | Push control unit | | | | | | | | Motor door motor | Intake door motor | A/C relay | Thermo control amp. | Dual-pressure switch | Compressor (Magnet clutch) | Compressor | ECM (ECCS control module) | Illumination system | Knob illumination | Harness |
|---|--------------|--------------|----------|-------------------|------------|-------------|------------|-------------|------------|------------|------------|------------------|-------------------|-----------|---------------------|----------------------|----------------------------|------------|---------------------------|---------------------|-------------------|---------|
| | | | | A/C switch | REC switch | VENT switch | B/L switch | FOOT switch | F/D switch | DEF switch | Fan switch | | | | | | | | | | | |
| ○ | ○ | ○ | ○ | ○ | | | | | | | | | | | | | | | | | | |
| ○ | ○ | ○ | ○ | | | | | | | | | | | | | | | | | | | ○ |
| | | | | | | ○ | ○ | ○ | ○ | ○ | ○ | | | | | | | | | | | ○ |
| | | | | | ○ | | | | | | | ○ | | | | | | | | | | ○ |
| | | | | | ○ | | | | | | | | | | | | | | | | | ○ |
| ○ | | | | ○ | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | ○ | | | ○ |
| ○ | | | | | | | | | | | | | | ○ | ○ | ○ | ○ | ○ | | | | ○ |
| ○ | | | | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | | | | | | | | ○ | ○ | ○ |

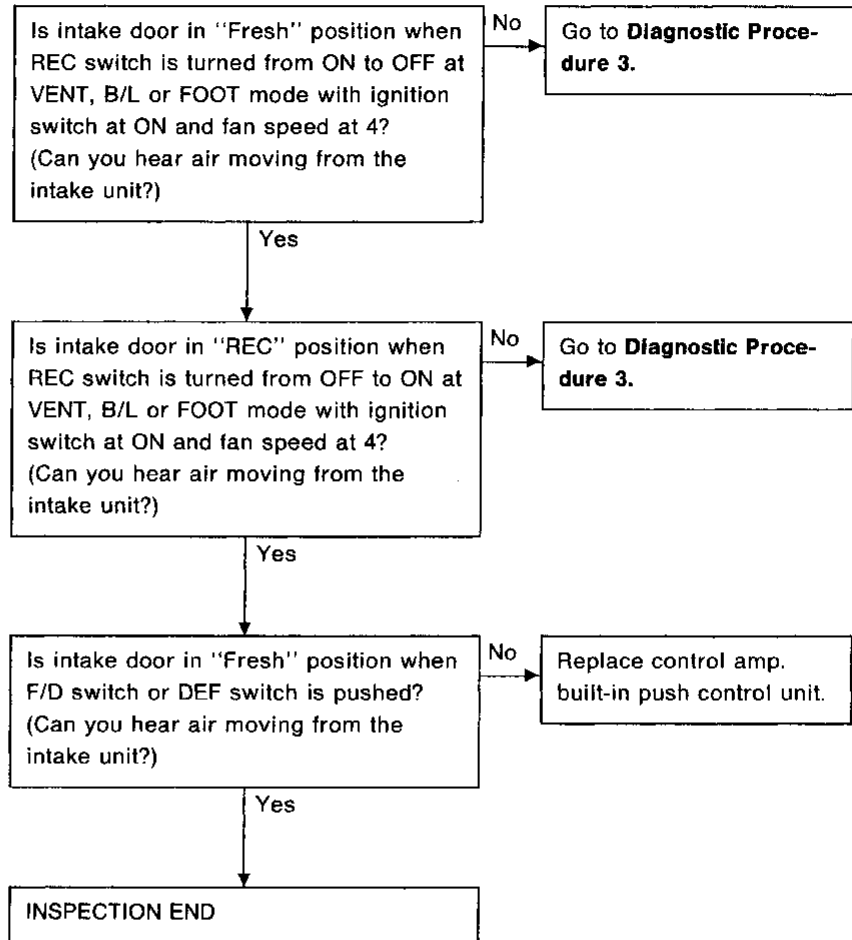
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TROUBLE DIAGNOSES

Preliminary Check

PRELIMINARY CHECK 1

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

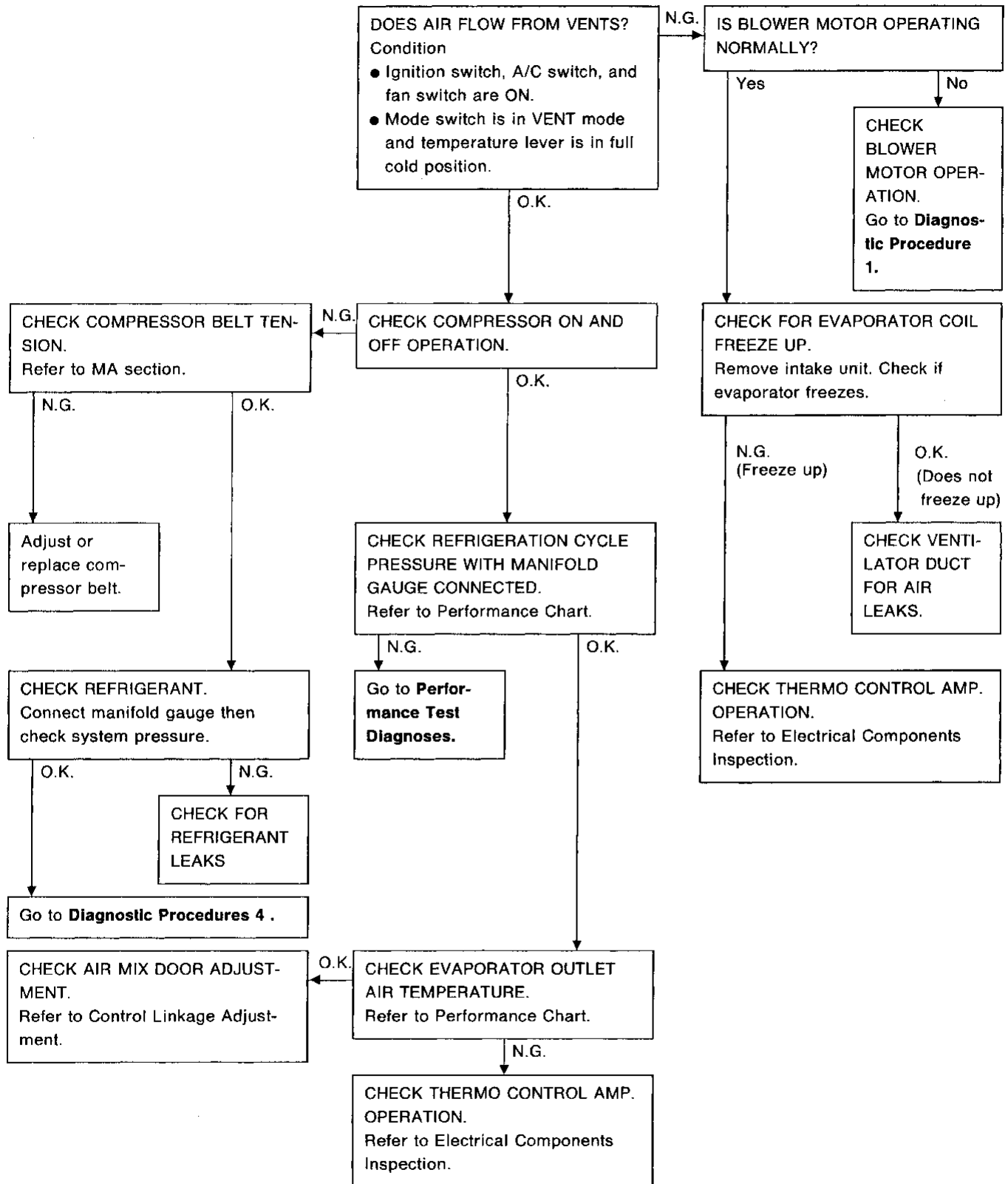


TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

PRELIMINARY CHECK 2

A/C does not blow cold air.



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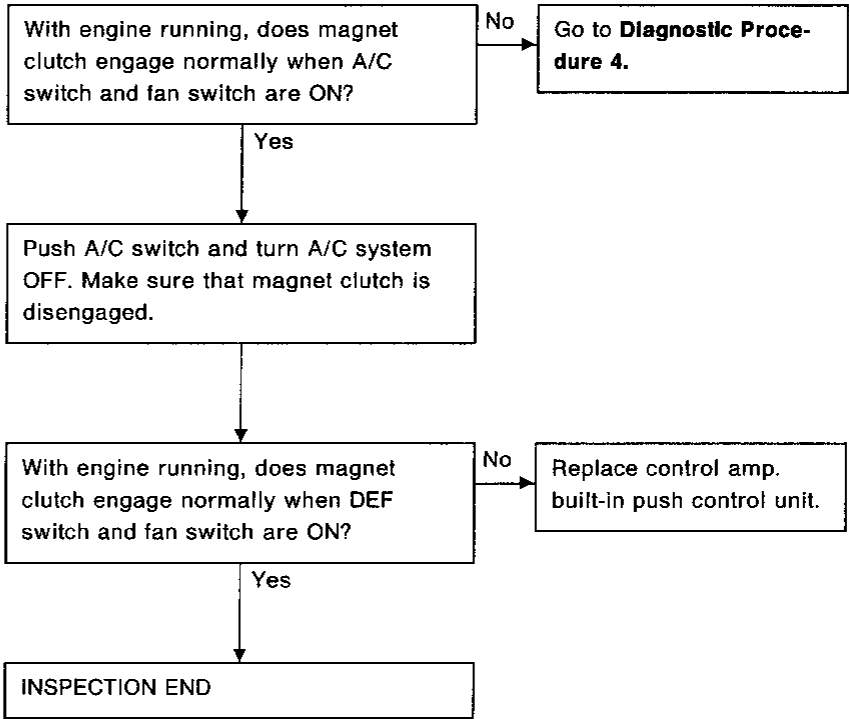
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

PRELIMINARY CHECK 3

Magnet clutch does not engage in DEF mode.

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



PRELIMINARY CHECK 4

Air outlet does not change.

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

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

Yes

INSPECTION END

No

Go to **Diagnostic Procedure 2.**

Air distribution ratios

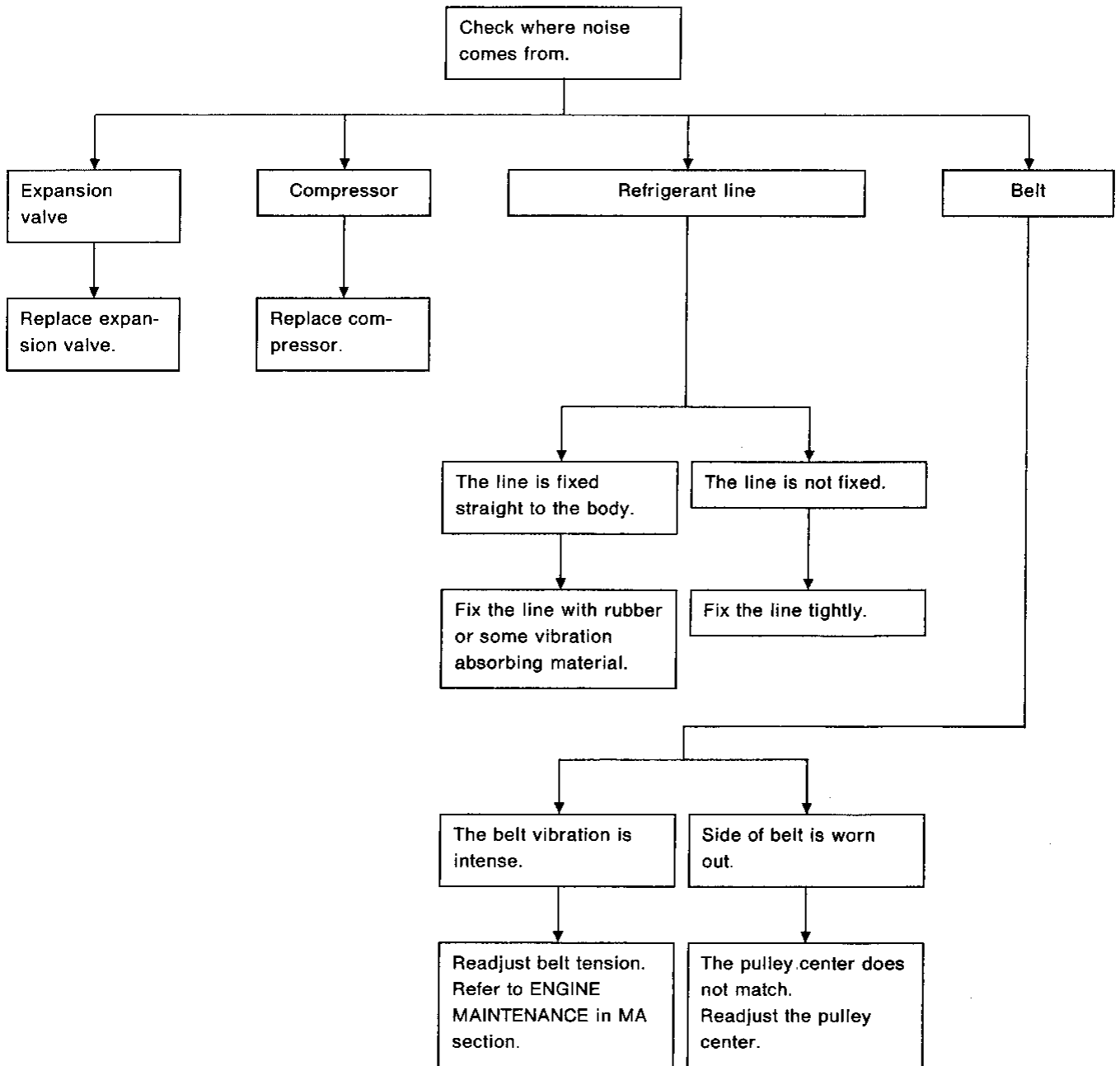
| VENT | B/L | FOOT | F/D | DEF | (%) |
|------|-----|------|-----|-----|-----|
| | | | | | 100 |
| | | | | | 70 |
| | | | | | 63 |
| | | | | | 50 |
| | | | | | 40 |
| | | | | | 0 |

TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

PRELIMINARY CHECK 5

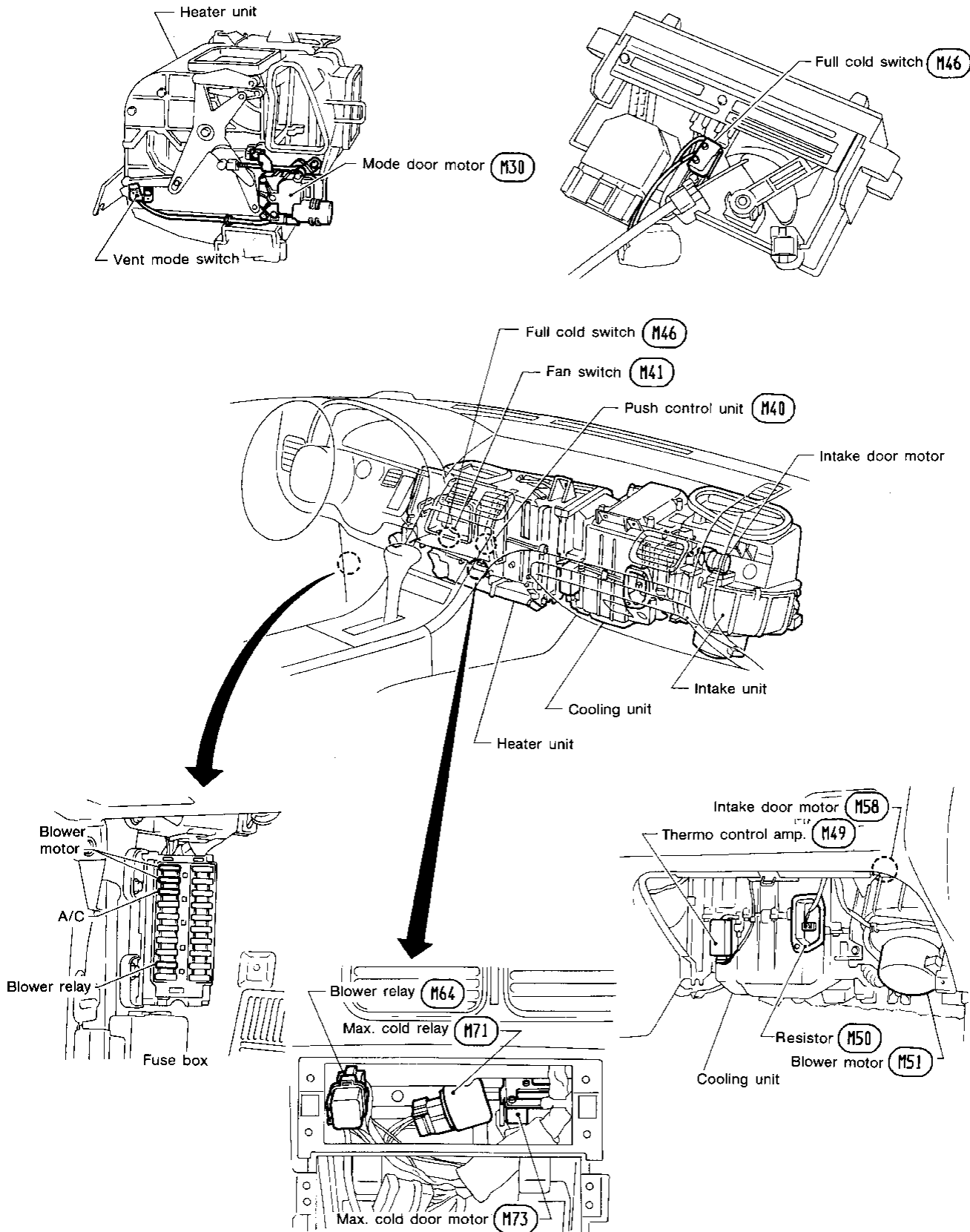
Noise



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Harness Layout for A/C System

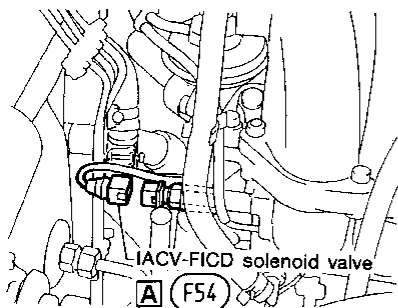
Engine compartment



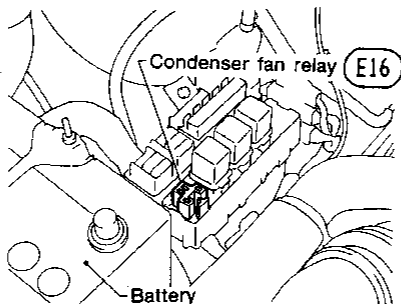
TROUBLE DIAGNOSES

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

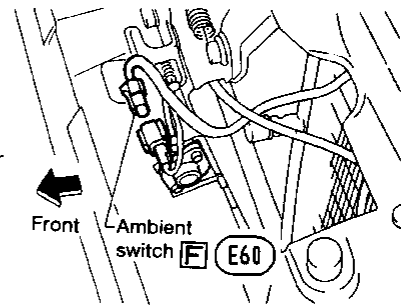
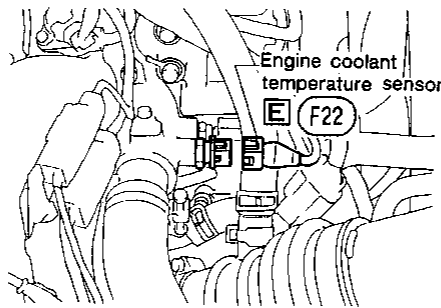
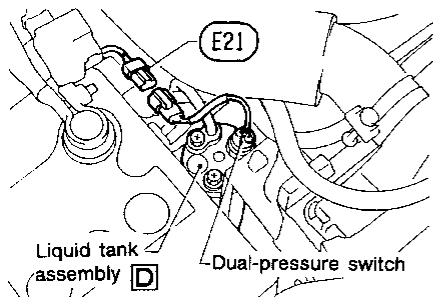
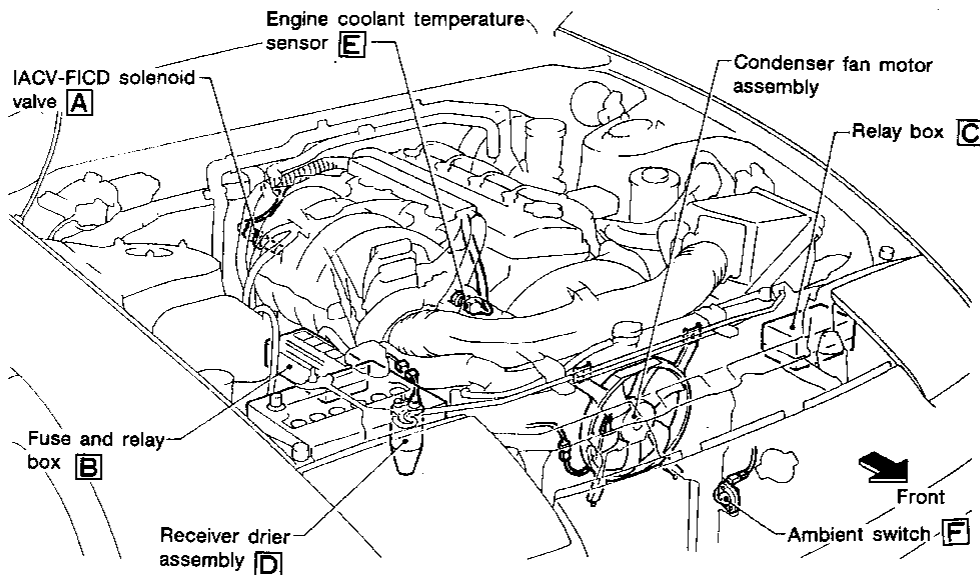
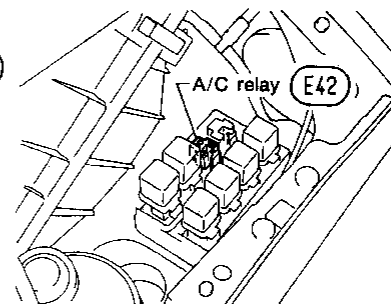
Engine compartment



Fuse and relay box (B)

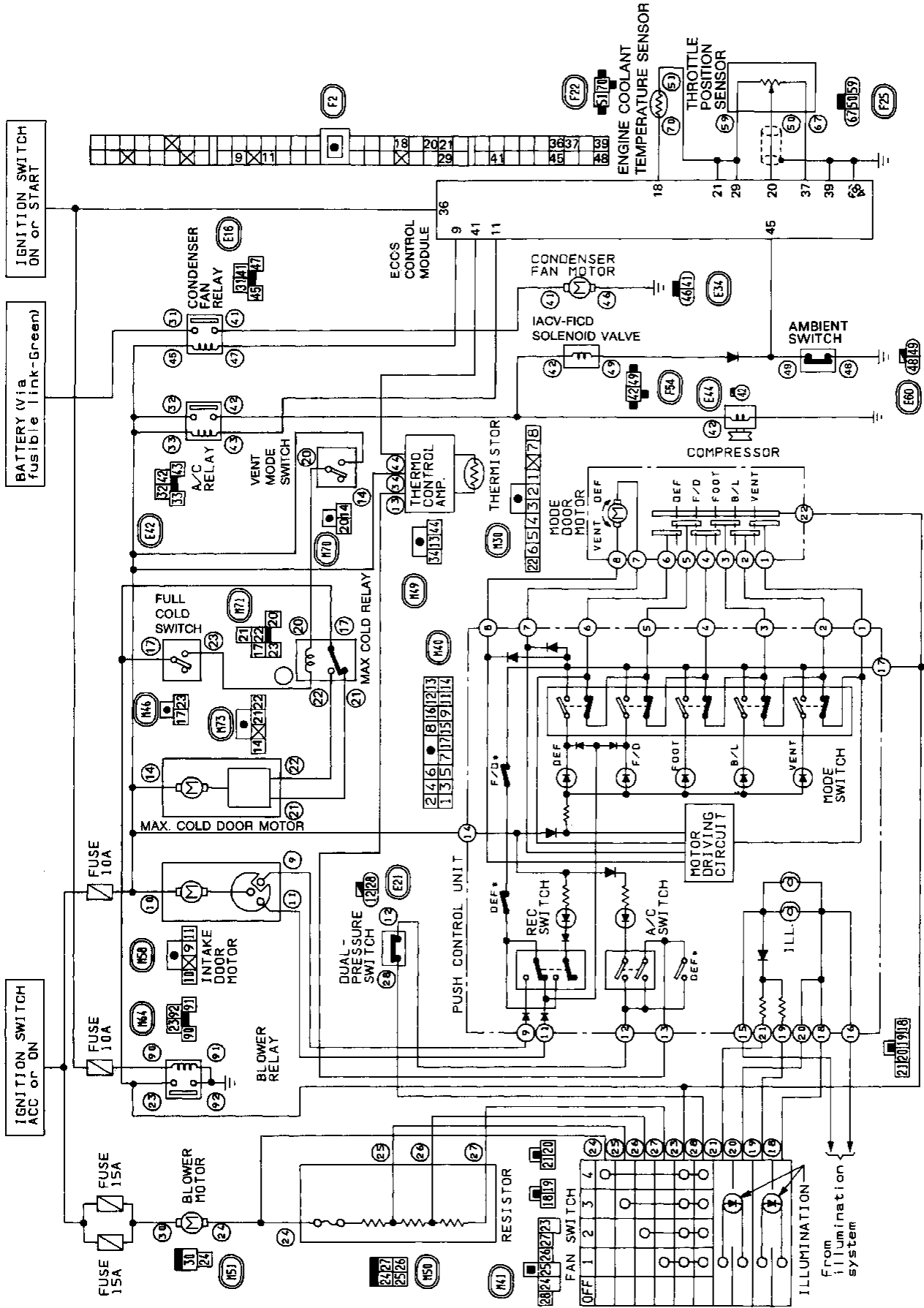


Relay box (C)



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Circuit Diagram for Quick Pinpoint Check

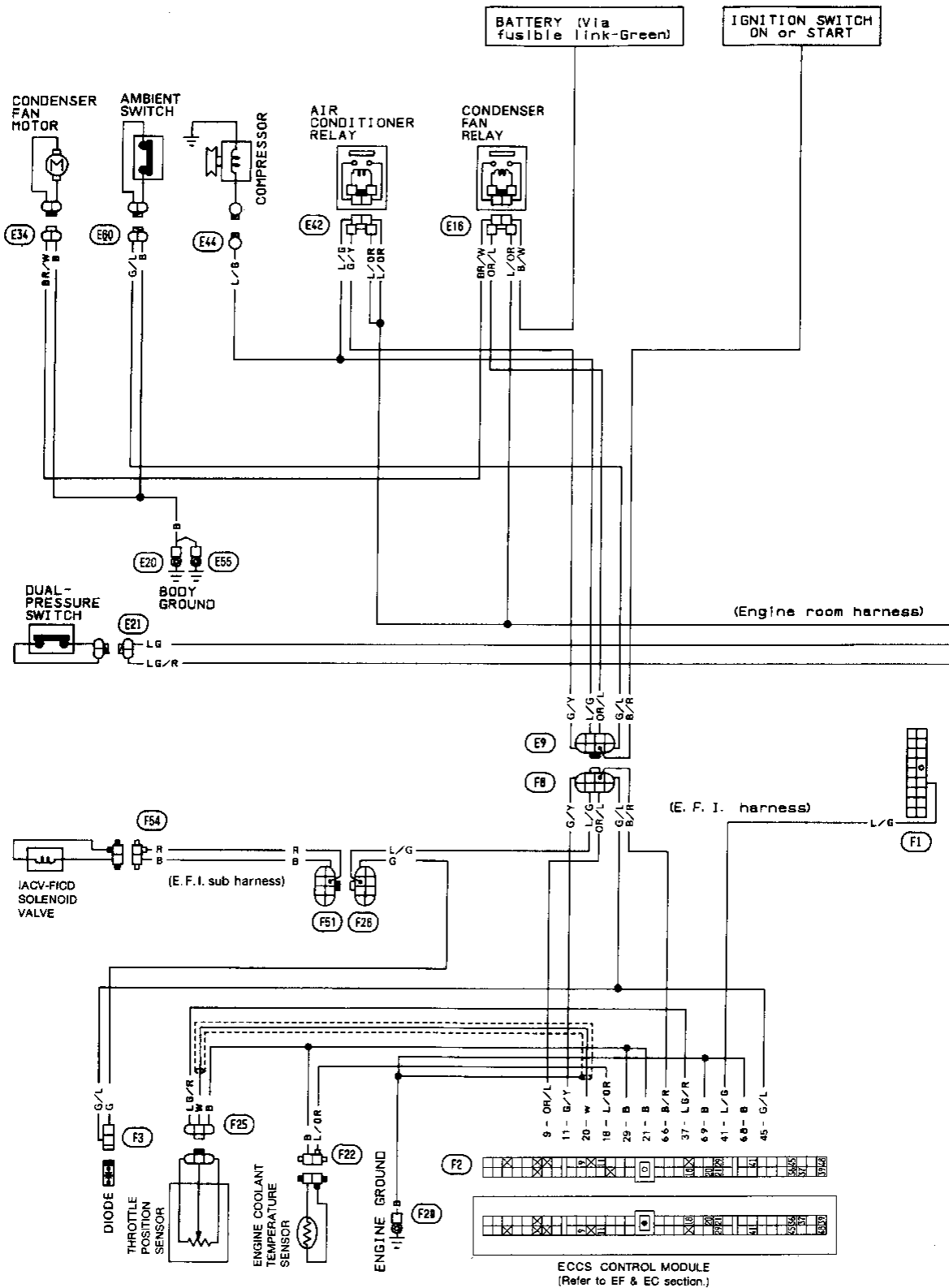


- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle "⊖" are connected to the harness side connectors shown in the "Harness Layout for A/C System". (See pages HA-62, HA-63.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle "○".
- *: These switches are built into push control unit and mechanically linked to corresponding switches.

TROUBLE DIAGNOSES

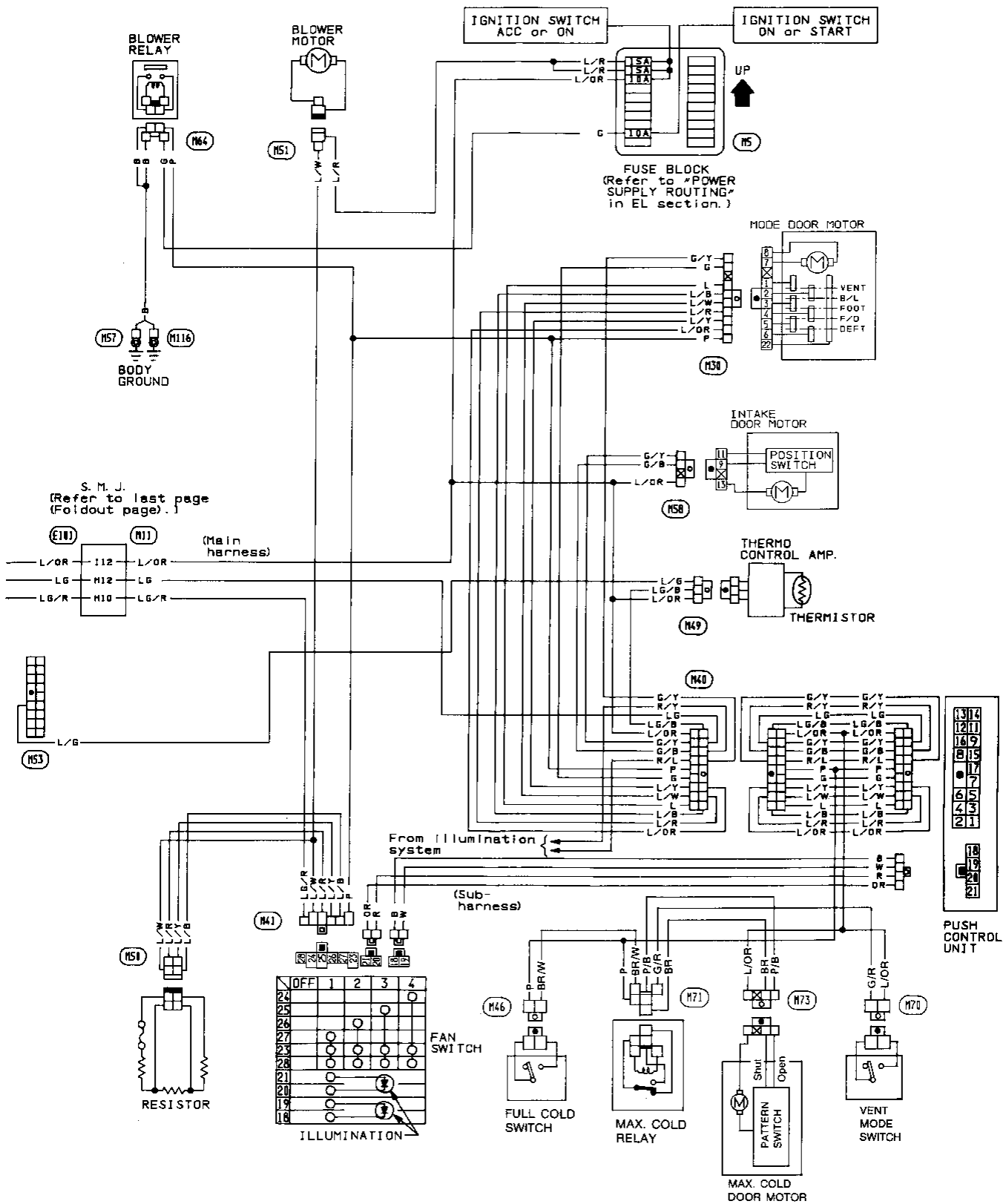
Wiring Diagram (Cont'd)

A/C ELECTRICAL CIRCUIT



TROUBLE DIAGNOSES

Wiring Diagram (Cont'd)



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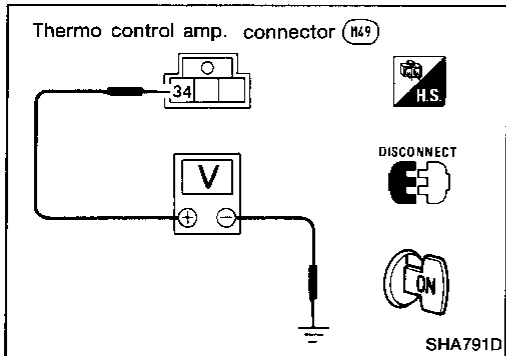
TROUBLE DIAGNOSES

Main Power Supply and Ground Circuit Check

POWER SUPPLY CIRCUIT CHECK FOR A/C SYSTEM

Check power supply circuit for air conditioning system.

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

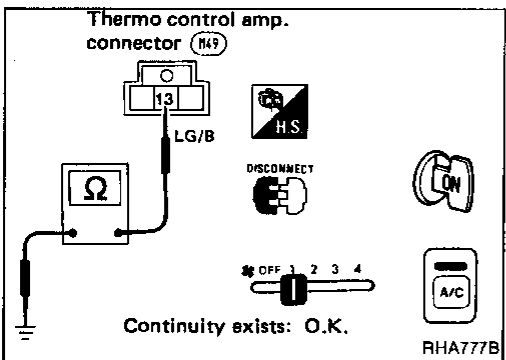


THERMO CONTROL AMP. CHECK

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

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

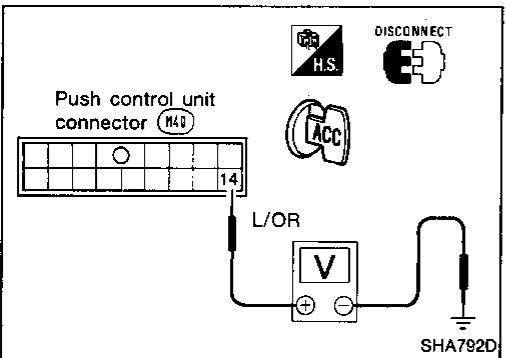
| Voltmeter terminal | | Voltage |
|--------------------|-------------|-------------|
| ⊕ | ⊖ | |
| ③④ | Body ground | Approx. 12V |



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

1. Disconnect thermo control amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ⑬ and body ground.

| Ohmmeter terminal | | Continuity |
|-------------------|-------------|------------|
| ⊕ | ⊖ | |
| ⑬ | Body ground | Yes |

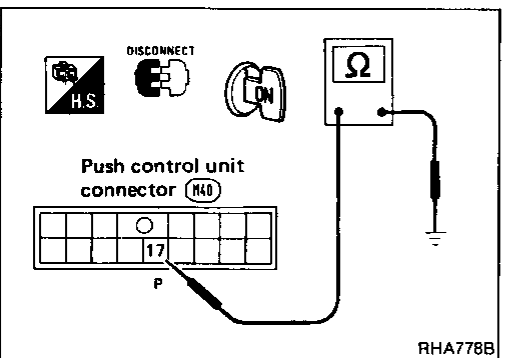


PUSH CONTROL UNIT CHECK

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

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

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



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

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

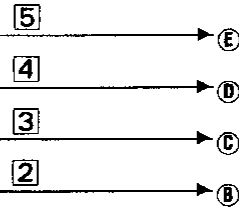
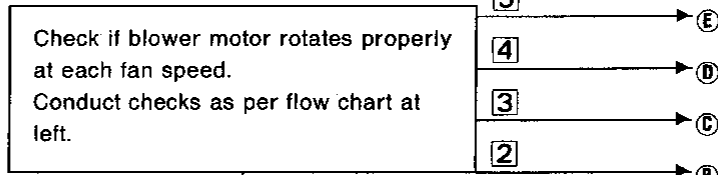
TROUBLE DIAGNOSES

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

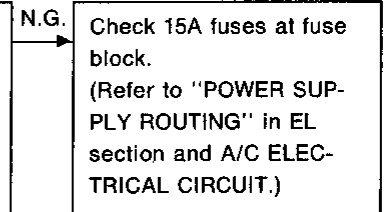
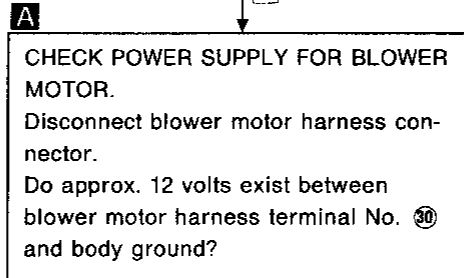
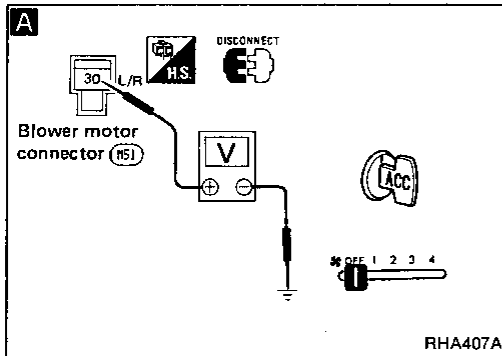
Diagnostic Procedure 1

SYMPTOM: Blower motor does not rotate.

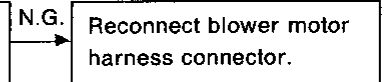
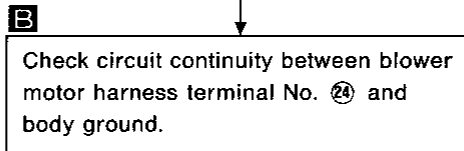
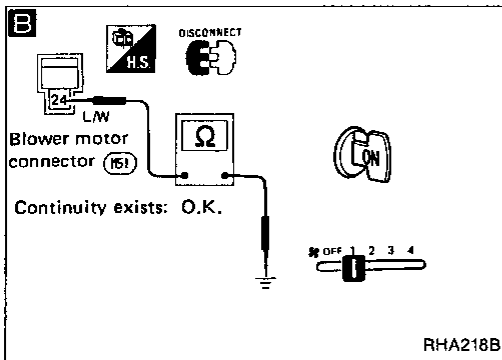
- Perform **PRELIMINARY CHECK 2** before referring to the following flow chart.



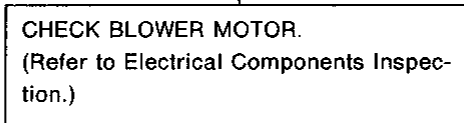
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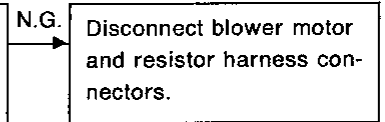
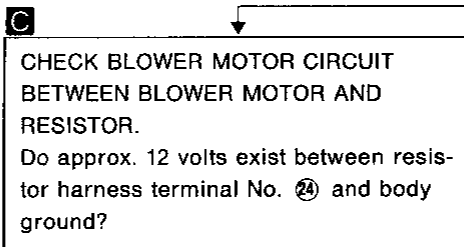
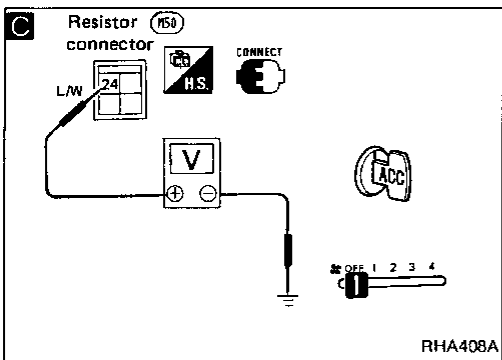
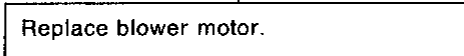
O.K.



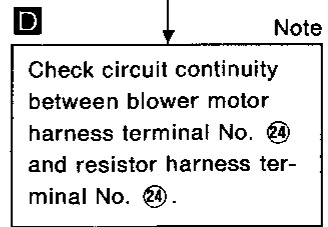
O.K.



N.G.

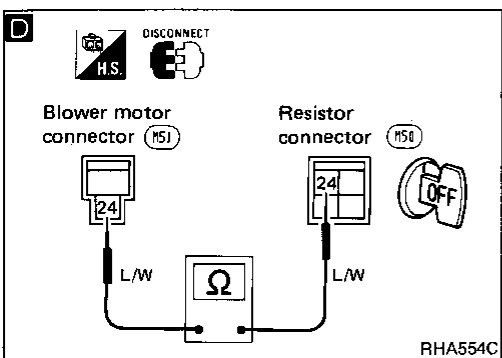


O.K.



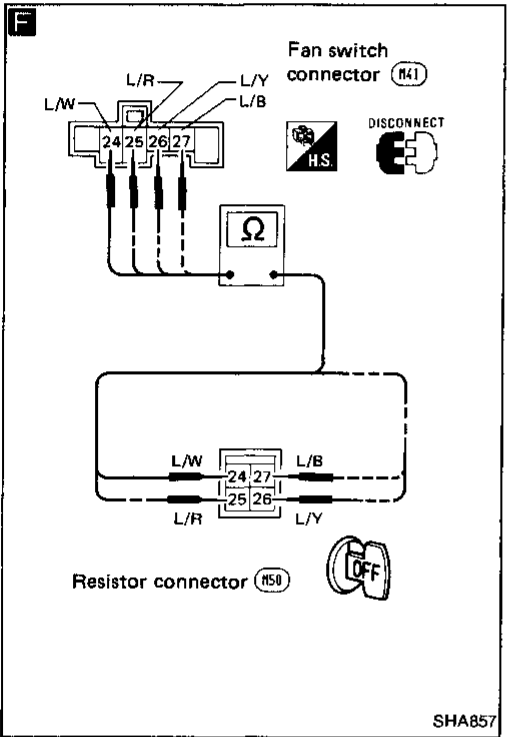
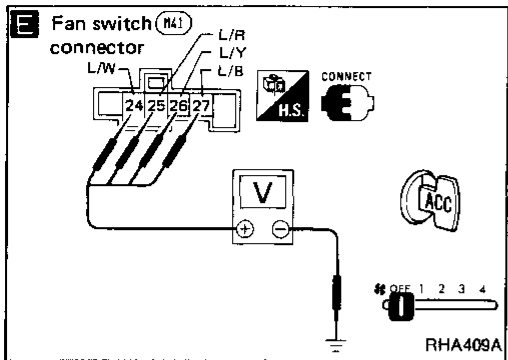
(Go to next page.)

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



TROUBLE DIAGNOSES

Diagnostic Procedure 1 (Cont'd)



A 1 B 2 C 3 D 4

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

O.K. → []
N.G. → **Replace resistor.**

Reconnect resistor harness connector.

1 2 3 4 5

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

| Flow chart No. | Terminal No. | | Voltage |
|----------------|--------------|-------------|-------------|
| | ⊕ | ⊖ | |
| 2 | 27 | Body ground | Approx. 12V |
| 3 | 26 | | |
| 4 | 26 | | |
| 5 | 24 | | |

O.K. → []
N.G. → []

Note
Check circuit continuity between fan switch and resistor.

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

O.K. → []
N.G. → **Replace fan switch.**

F
(Go to next page.)

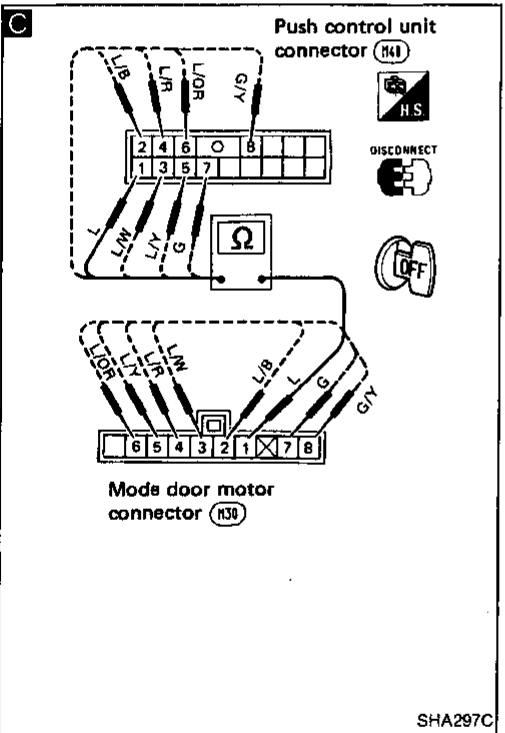
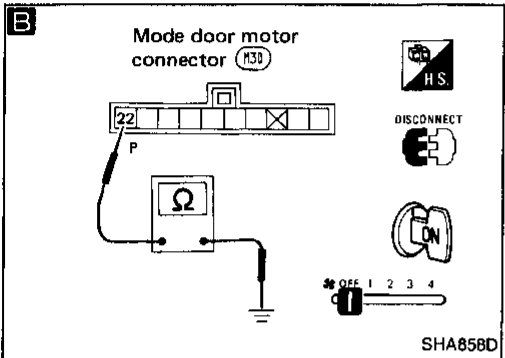
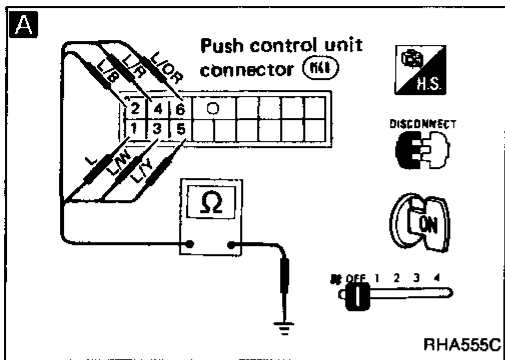
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

TROUBLE DIAGNOSES

Diagnostic Procedure 2

SYMPTOM: Air outlet does not change.

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



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

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

N.G. Disconnect mode door motor harness connector.

B Note

CHECK BODY GROUND CIRCUIT FOR MODE DOOR MOTOR. Does continuity exist between mode door motor harness terminal No. ② and body ground?

O.K.

C Note

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

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

O.K.

CHECK SIDE LINK.
Refer to Control Linkage Adjustment.

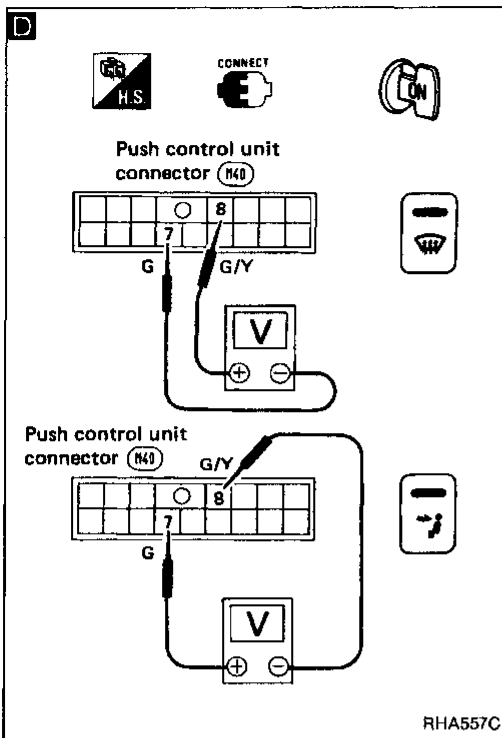
(Go to next page.)

Note:

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

TROUBLE DIAGNOSES

Diagnostic Procedure 2 (Cont'd)



A

Reconnect push control unit and mode door motor harness connectors.

D

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

N.G. → Replace control amp. built-in push control unit.

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

O.K.

Replace mode door motor.

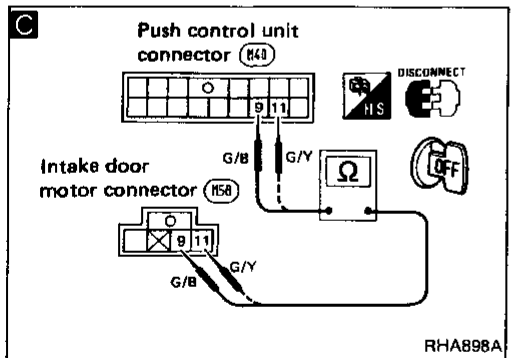
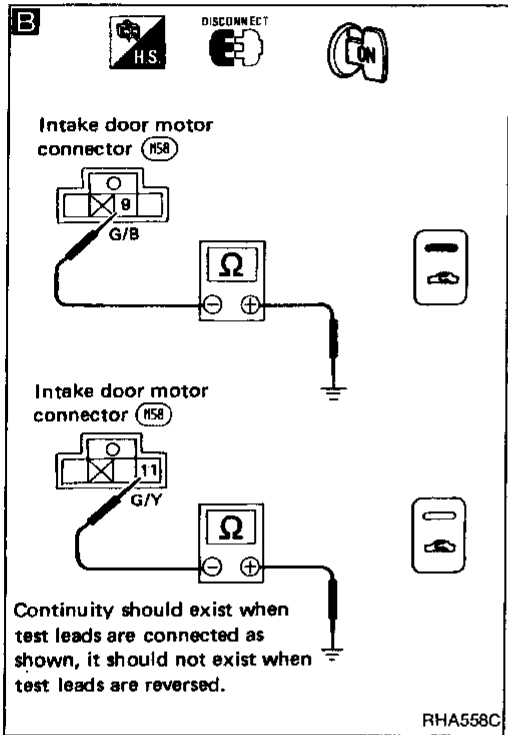
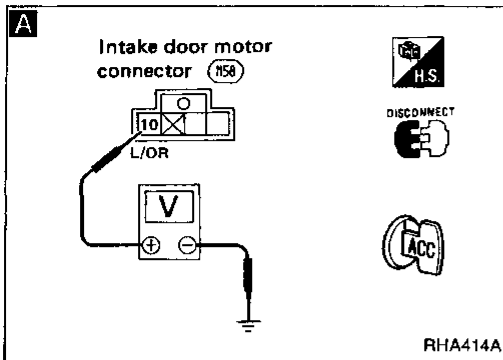
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TROUBLE DIAGNOSES

Diagnostic Procedure 3

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

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



A

CHECK POWER SUPPLY FOR INTAKE DOOR MOTOR.
Disconnect intake door motor harness connector.
Do approx. 12 volts exist between intake door motor harness terminal No. ⑩ and body ground?

N.G. → Check 10A fuses at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.)

B

CHECK BODY GROUND CIRCUIT FOR INTAKE DOOR MOTOR.
Does continuity exist between intake door motor harness terminal No. ⑨ and body ground when REC switch is ON?
Does continuity exist between intake door motor harness terminal No. ⑪ and body ground when REC switch is OFF?

N.G. → Disconnect push control unit harness connector.

C Note

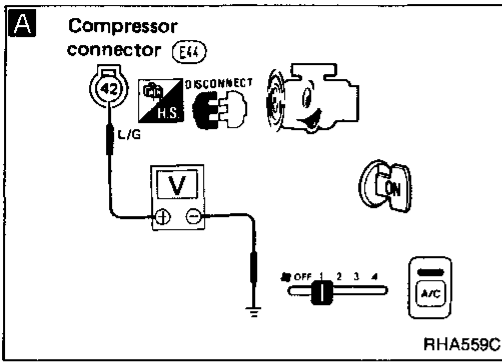
Check circuit continuity between push control unit harness terminal No. ⑨ (⑪) and intake door motor harness terminal No. ⑨ (⑪).

O.K. → Replace intake door motor.

O.K. → Replace control amp. built-in push control unit.

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

TROUBLE DIAGNOSES



Diagnostic Procedure 4

SYMPTOM: Magnet clutch does not engage when 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 approx. 12 volts exist between compressor harness terminal No. ④② and body ground?

N.G. → (A) (Go to next page.)

O.K.

Check magnet clutch coil.

O.K.

Replace magnet clutch.
Refer to COMPRESSOR — Model V-5 (CALSONIC make).

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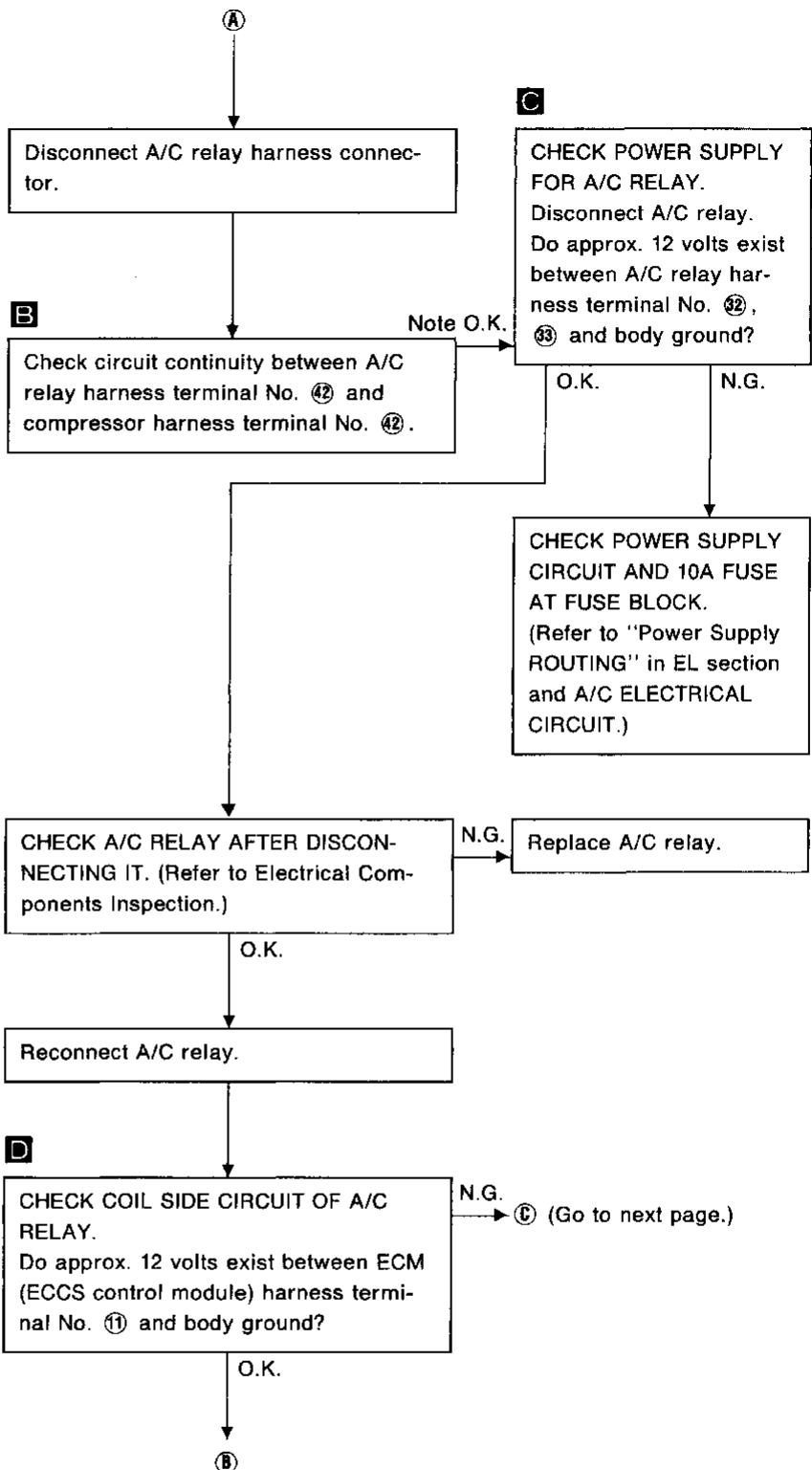
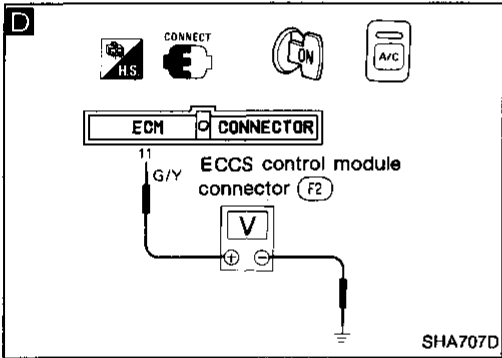
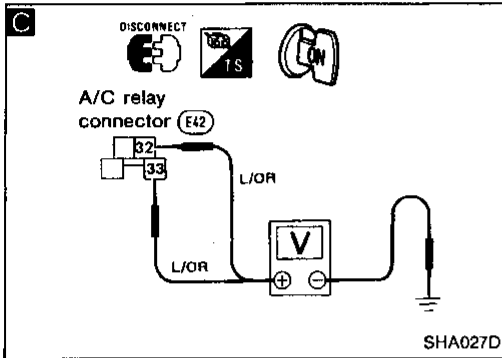
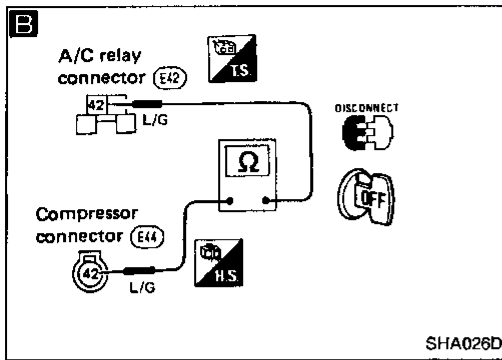
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TROUBLE DIAGNOSES

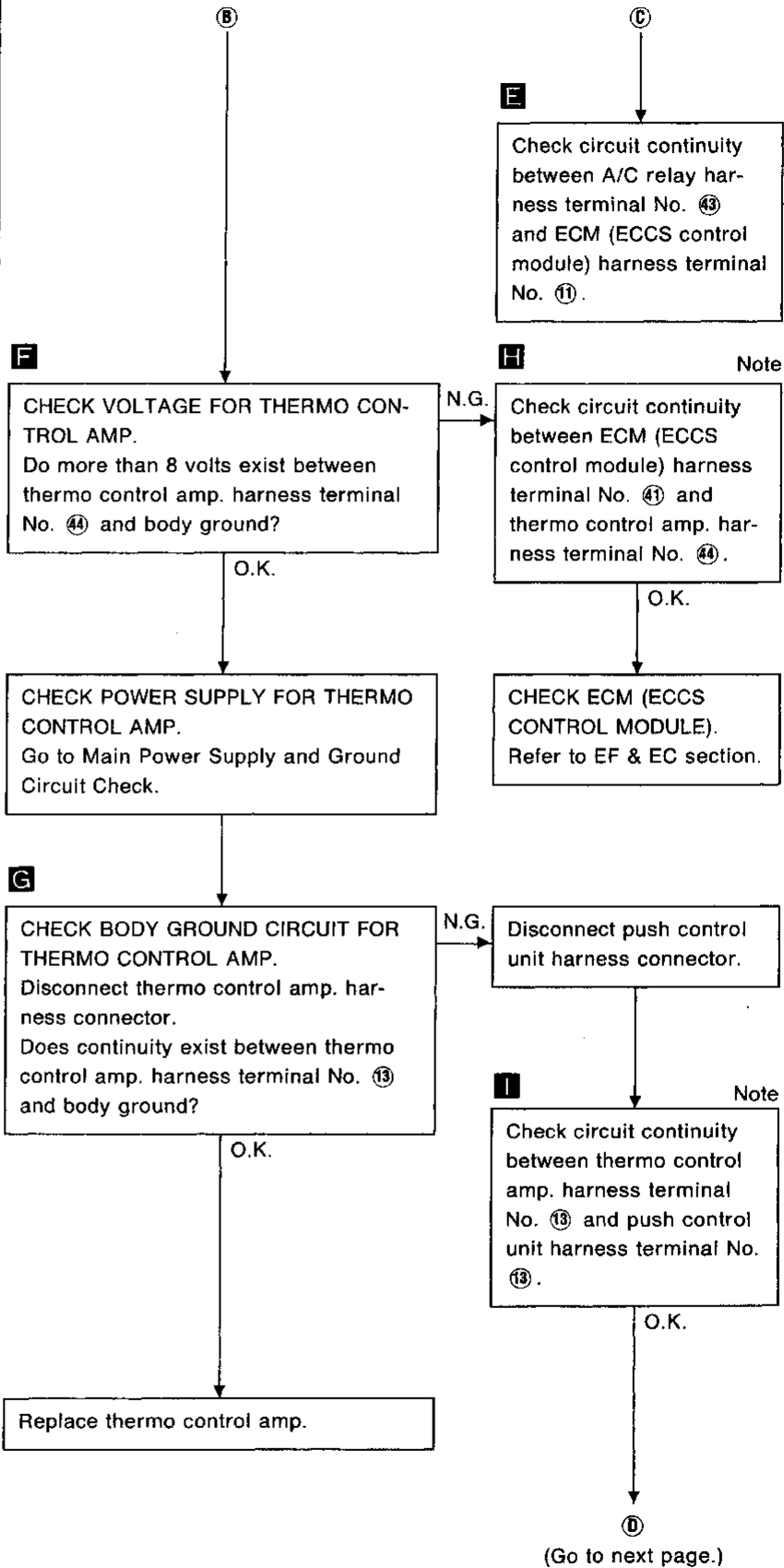
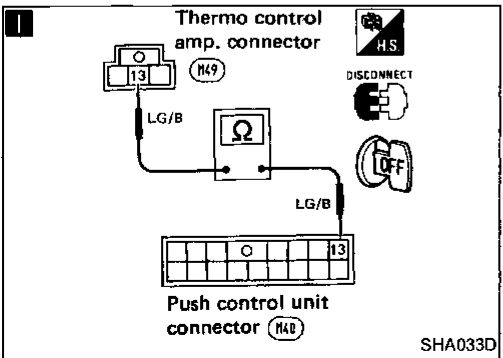
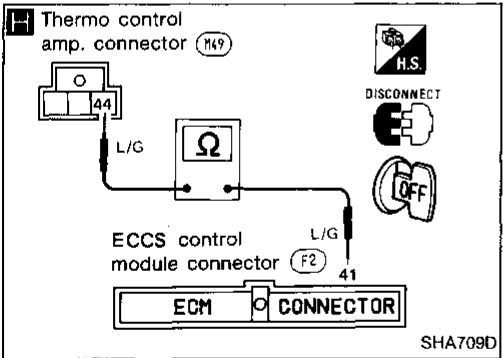
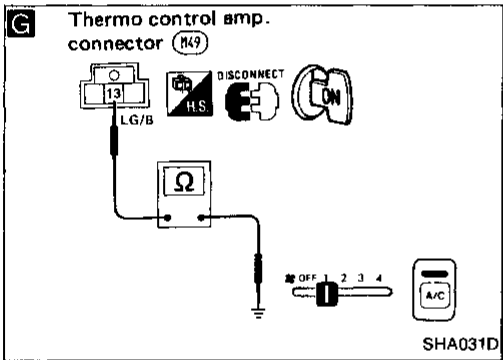
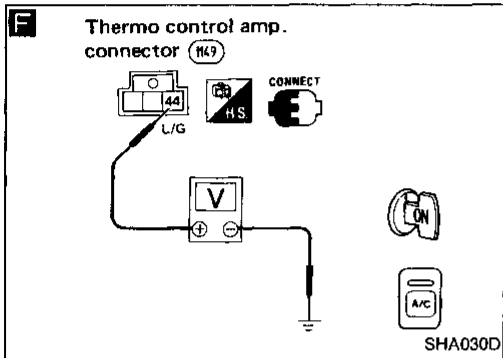
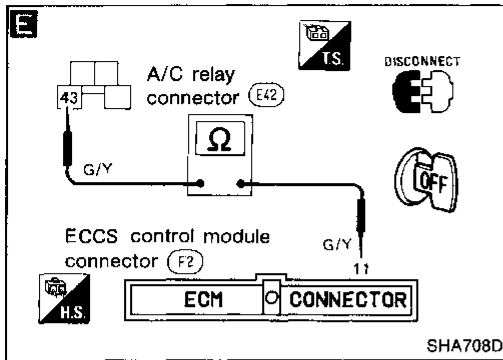
Diagnostic Procedure 4 (Cont'd)



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

TROUBLE DIAGNOSES

Diagnostic Procedure 4 (Cont'd)

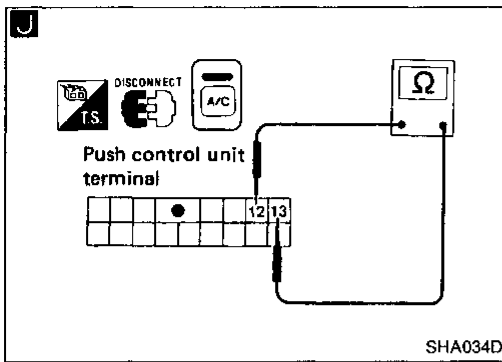


Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

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TROUBLE DIAGNOSES

Diagnostic Procedure 4 (Cont'd)



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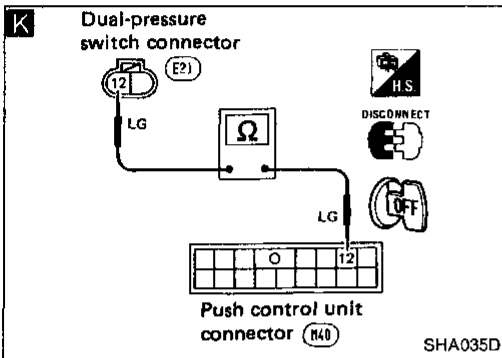
①

CHECK PUSH CONTROL UNIT.
Does continuity exist between push control unit terminals No. ⑫ and ⑬?

N.G. → Replace control amp. built-in push control unit.

O.K. →

Disconnect dual-pressure switch.



K

Note

Check circuit continuity between dual-pressure switch harness terminal No. ⑫ and push control unit harness terminal No. ⑫.

O.K. →

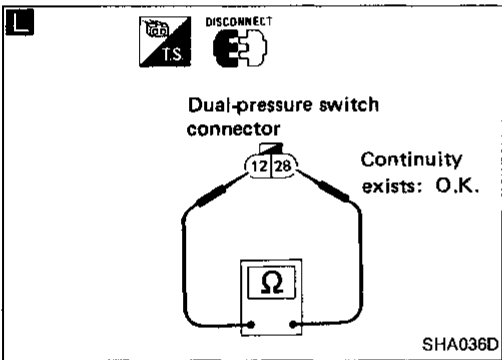
L

CHECK DUAL-PRESSURE SWITCH.
Does continuity exist between dual-pressure switch terminals?

N.G. → Replace dual-pressure switch.

O.K. →

Disconnect fan switch harness connector.

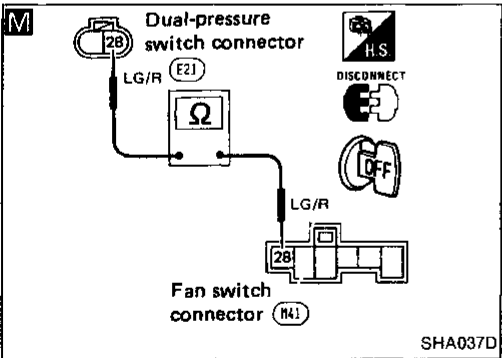


M

Note

Check circuit continuity between dual-pressure switch harness terminal No. ⑳ and fan switch harness terminal No. ⑳.

O.K. →



N

Note

CHECK BODY GROUND CIRCUIT FOR FAN SWITCH.
Does continuity exist between fan switch harness terminal No. ㉓ and body ground?

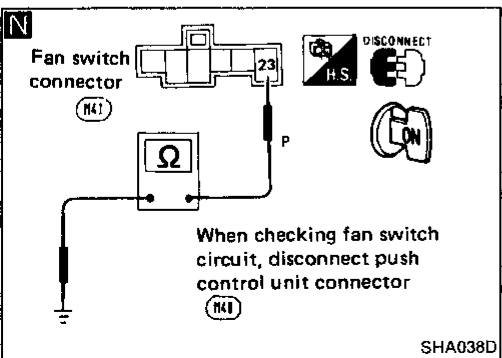
N.G. → ㉔ (Go to next page.)

O.K. →

CHECK FAN SWITCH.
(Refer to Electrical Components Inspection.)

O.K. →

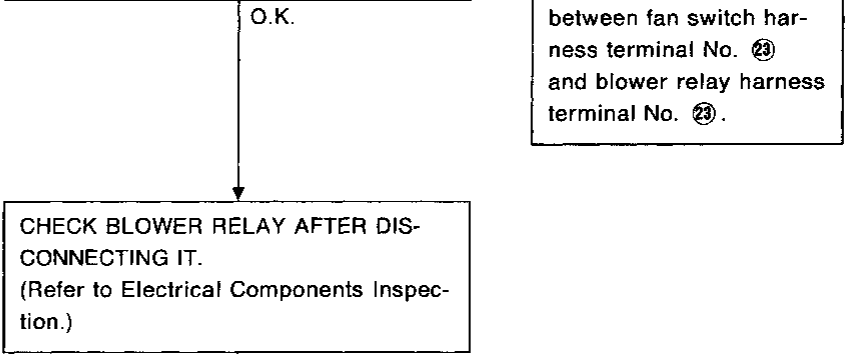
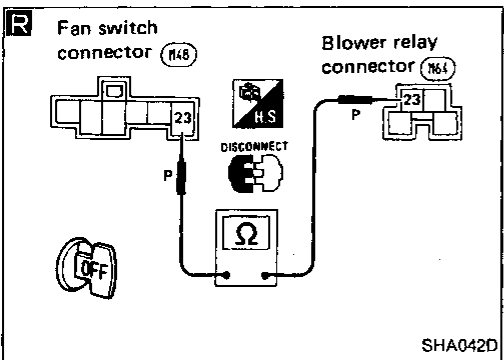
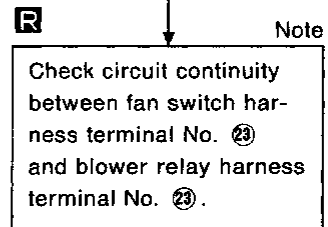
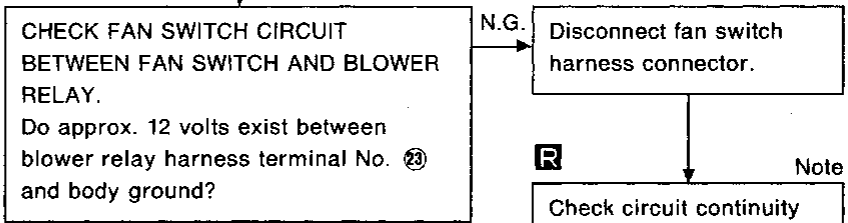
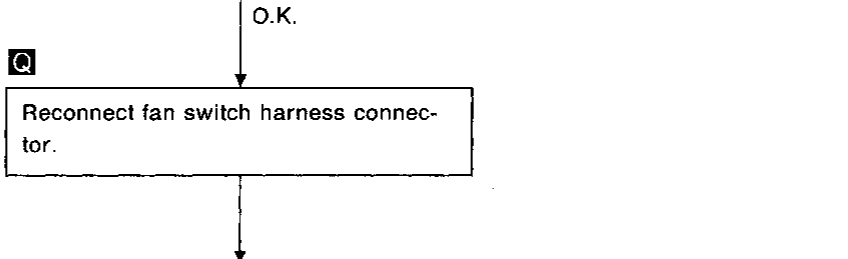
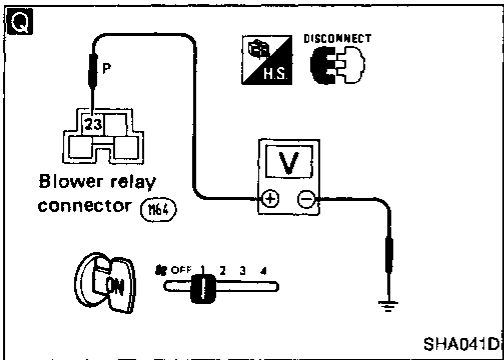
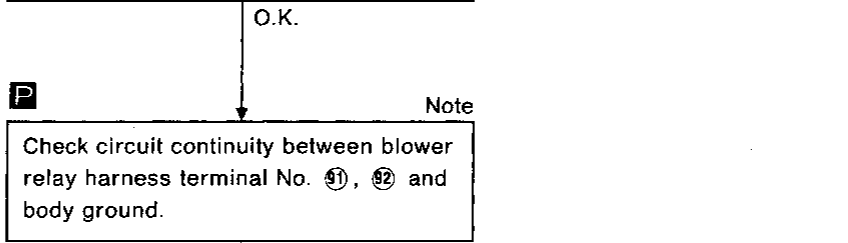
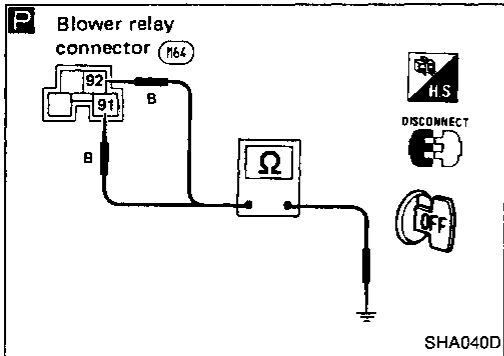
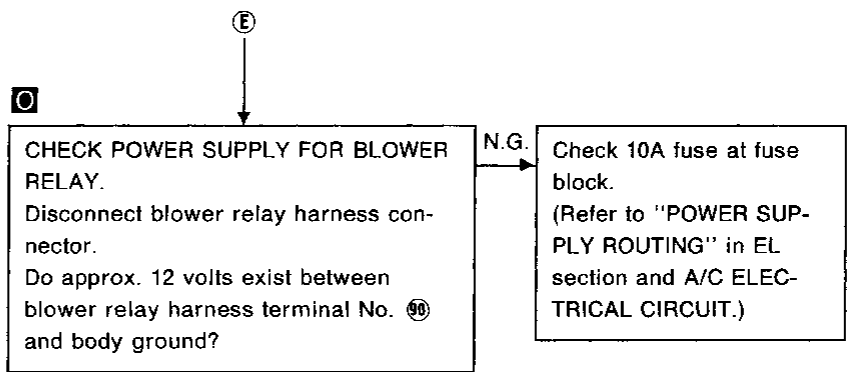
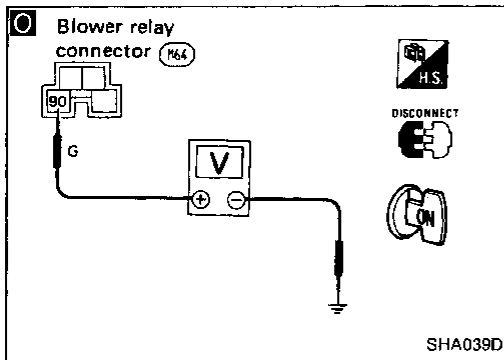
Replace fan switch.



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

TROUBLE DIAGNOSES

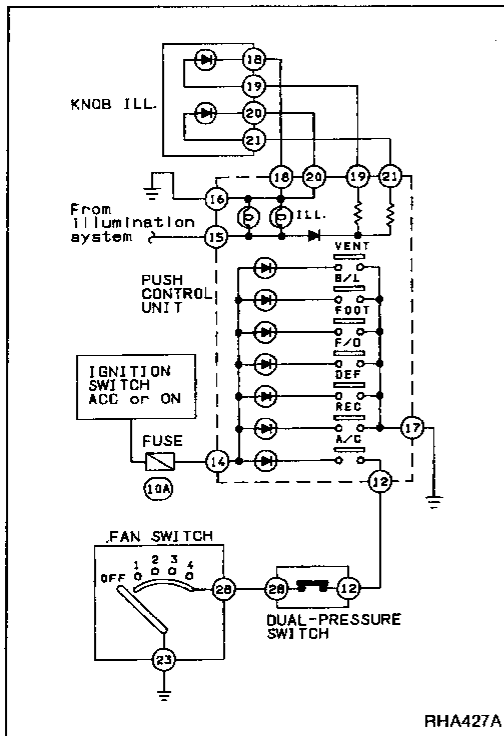
Diagnostic Procedure 4 (Cont'd)



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

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TROUBLE DIAGNOSES



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Diagnostic Procedure 5

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

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

Turn ignition switch and lighting switch ON.

CHECK ILLUMINATION AND INDICATORS.

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

| INCIDENTS | | | | | | | | "How to repair" |
|-----------|------|-----|------|-----|-----|-----|-----|--|
| ILL. | VENT | B/L | FOOT | F/D | DEF | REC | A/C | |
| X | ○ | ○ | ○ | ○ | ○ | ○ | — | Go to DIAGNOSTIC PROCEDURE 5-1. |
| — | ○ | ○ | ○ | ○ | ○ | ○ | X | Go to DIAGNOSTIC PROCEDURE 5-2. |
| ○ | X | X | X | X | X | X | — | Go to DIAGNOSTIC PROCEDURE 5-3. |
| — | △ | | | | | | — | Replace control amp. built-in push control unit. |
| ○ | X | X | X | X | X | X | ○ | Replace control amp. built-in push control unit. |
| — | X | X | X | X | X | X | ○ | Go to DIAGNOSTIC PROCEDURE 5-4. |

○ : Illumination or indicator comes on.

X : Illumination or indicator does not come on.

△ : Some indicators for VENT, B/L, FOOT, F/D, DEF or REC come on.

DIAGNOSTIC PROCEDURE 5-1

CHECK THE OTHER ILLUMINATION SYSTEMS EXCEPT FOR A/C SYSTEM. Do the other illumination 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.

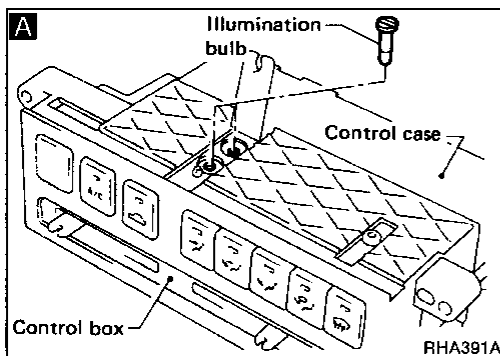
CHECK ILLUMINATION BULB. Remove push control unit and disconnect harness connectors. Remove illumination bulb(s) and check them.

N.G.

Replace illumination bulb(s).

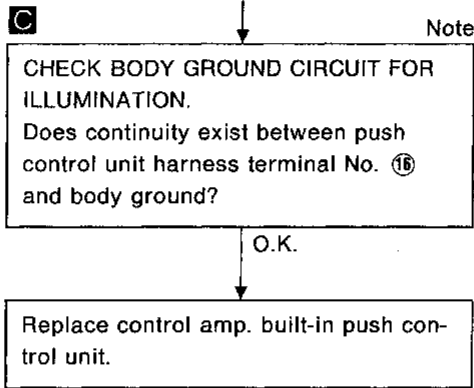
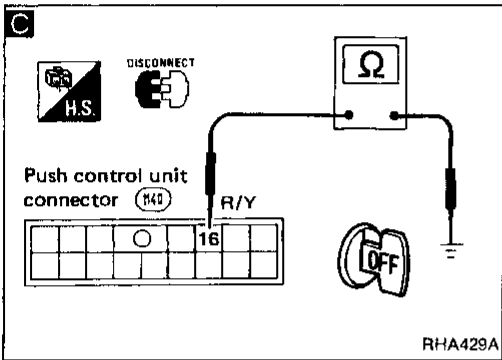
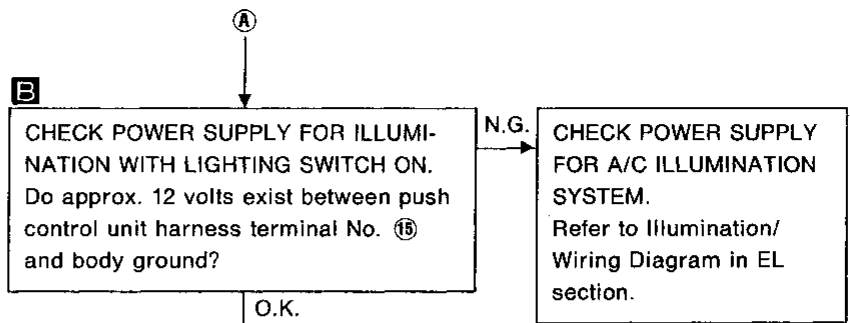
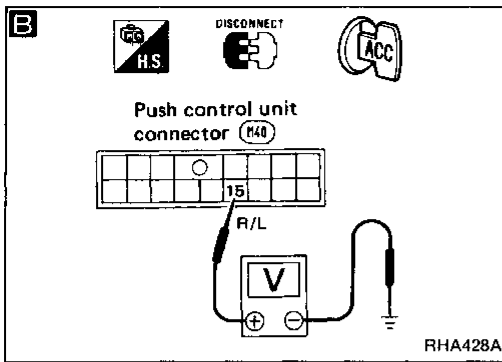
O.K.

Ⓐ (Go to next page.)

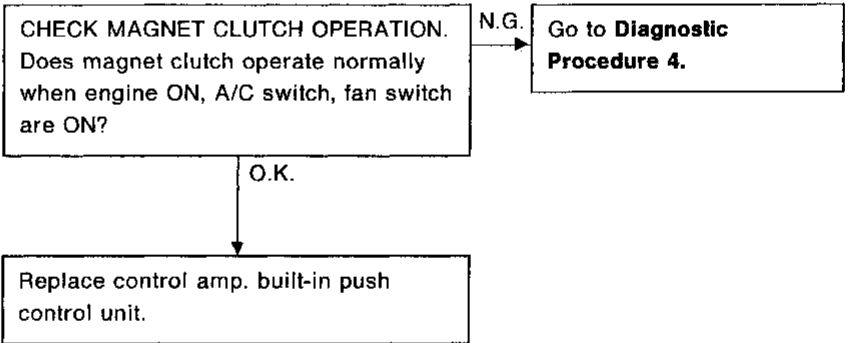


TROUBLE DIAGNOSES

Diagnostic Procedure 5 (Cont'd)



DIAGNOSTIC PROCEDURE 5-2



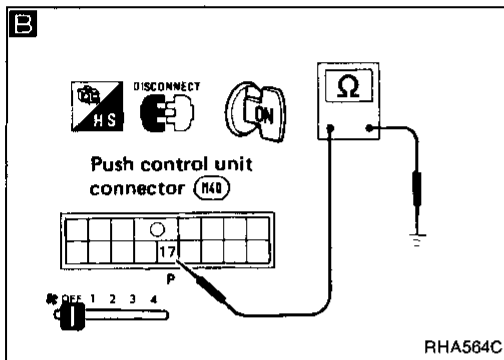
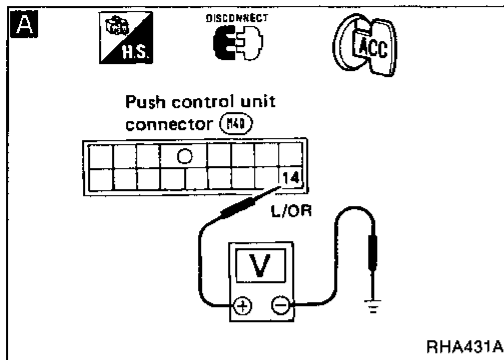
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

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TROUBLE DIAGNOSES

Diagnostic Procedure 5 (Cont'd)

DIAGNOSTIC PROCEDURE 5-3



Turn ignition switch and lighting switch OFF.

Disconnect push control unit harness connector.

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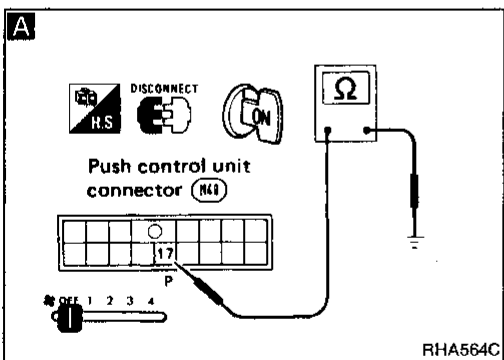
CHECK POWER SUPPLY FOR PUSH CONTROL UNIT.
Do approx. 12 volts exist between push control unit harness terminal No. ⑭ and body ground?

N.G. Check 10A fuse at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.)

B

CHECK BODY GROUND CIRCUIT FOR PUSH CONTROL UNIT.
Does continuity exist between push control unit harness terminal No. ⑰ and body ground?

Replace control amp. built-in push control unit.



DIAGNOSTIC PROCEDURE 5-4

Turn ignition switch and lighting switch OFF.

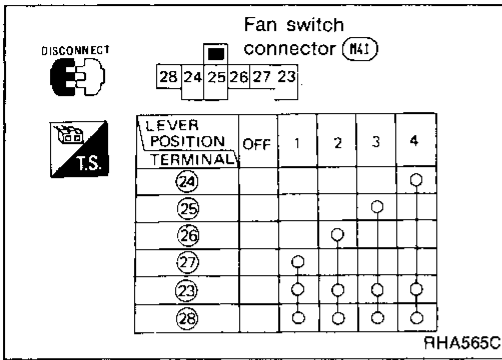
Disconnect push control unit harness connector.

A

CHECK BODY GROUND CIRCUIT FOR PUSH CONTROL UNIT.
Does continuity exist between push control unit harness terminal No. ⑰ and body ground?

Replace control amp. built-in push control unit.

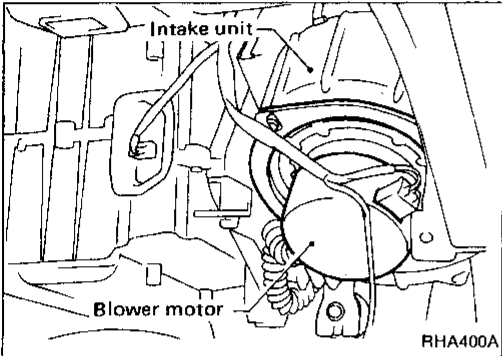
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.



Electrical Components Inspection

FAN SWITCH

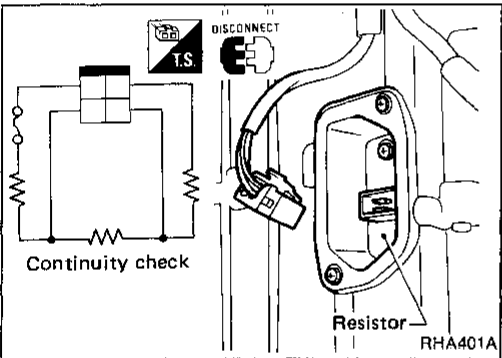
Check continuity between terminals at each switch position.



BLOWER MOTOR

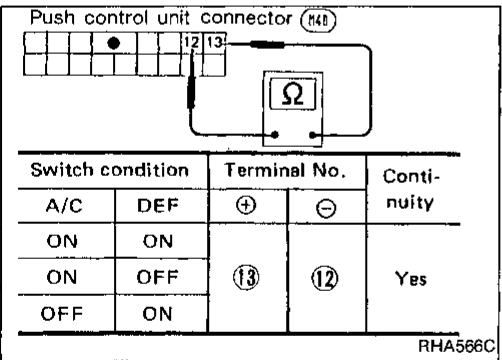
Confirm smooth rotation of the blower motor.

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



BLOWER RESISTOR

Check continuity between terminals.



A/C SWITCH

Check continuity between terminals at each switch position.

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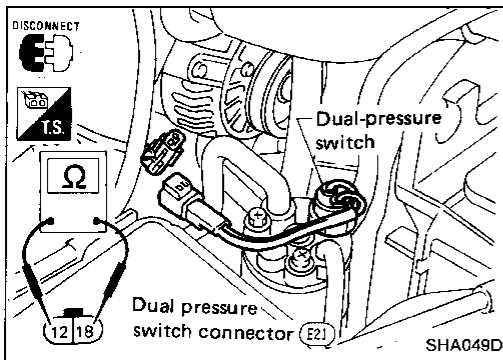
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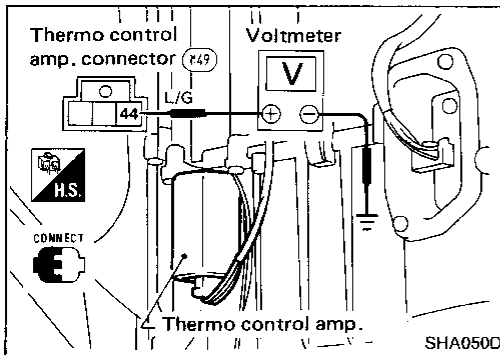
TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

DUAL-PRESSURE SWITCH



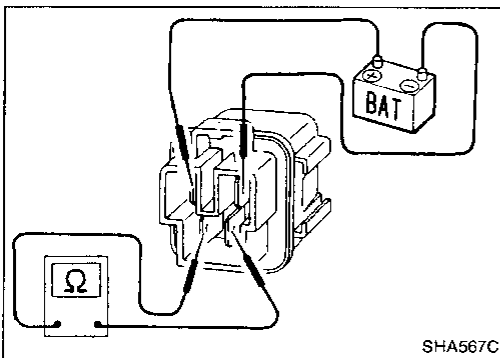
| High-pressure side line pressure kPa (kg/cm ² , psi) | Operation | Continuity |
|--|-----------|----------------|
| Decreasing to 177 - 216 (1.8 - 2.2, 26 - 31) Increasing to 2,452 - 2,844 (25 - 29, 356 - 412) | Turn OFF | Does not exist |
| Increasing to 177 - 235 (1.8 - 2.4, 26 - 34) Decreasing to 1,863 - 2,256 (19 - 23, 270 - 327) | Turn ON | Exists |



THERMO CONTROL AMP.

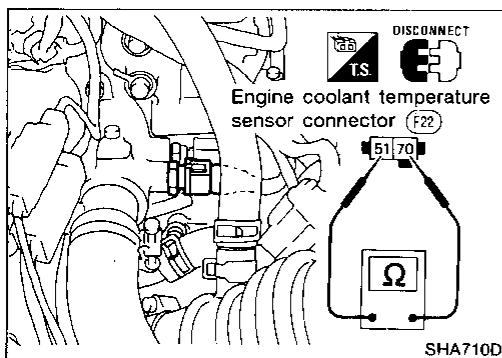
1. Run engine, and operate A/C system.
2. Connect the voltmeter from harness side.
3. Check thermo control amp. operation shown in the table.

| Evaporator outlet air temperature °C (°F) | Thermo amp. operation | Tester |
|--|--------------------------|-------------|
| Decreasing to 1.5 - 2.5 (35 - 37) | Turn OFF | Approx. 12V |
| Increasing to 3.0 - 4.0 (37 - 39) | Turn ON | Approx. 0V |



A/C RELAY AND BLOWER RELAY

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



ENGINE COOLANT TEMPERATURE SENSOR

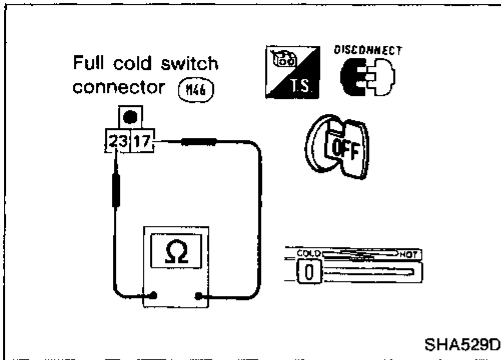
| Water temperature °C (°F) | Operation | Continuity |
|--------------------------------------|-----------|----------------|
| Decreasing to 85 - 91 (185 - 196) | Turn OFF | Does not exist |
| Increasing to 92 - 98 (198 - 208) | Turn ON | Exists |

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

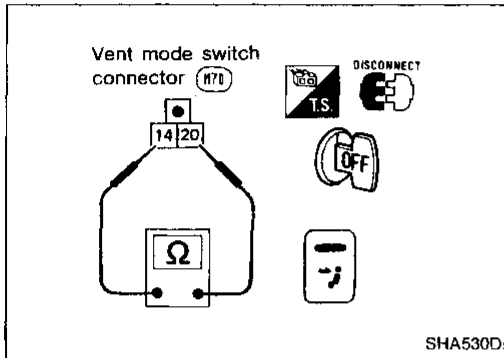
FULL COLD SWITCH

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



VENT MODE SWITCH

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



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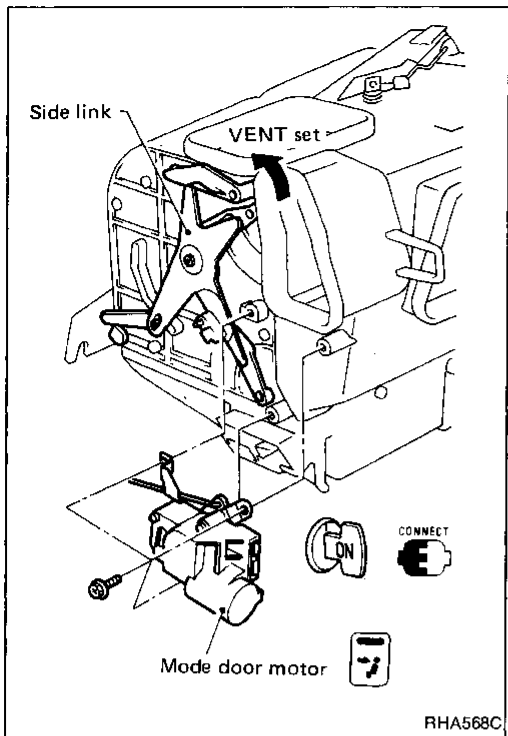
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Control Linkage Adjustment

MODE DOOR

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

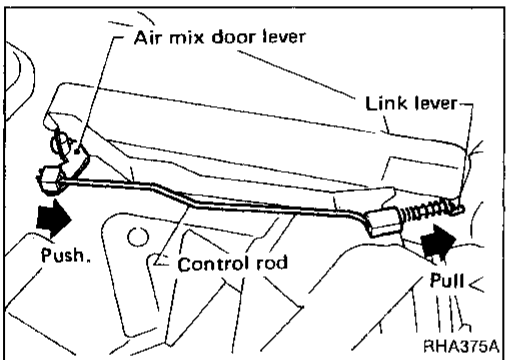


WATER COCK CONTROL ROD

- When adjusting water cock control rod, first disconnect temperature control cable from air mix door lever. Reconnect and readjust temperature control cable.

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

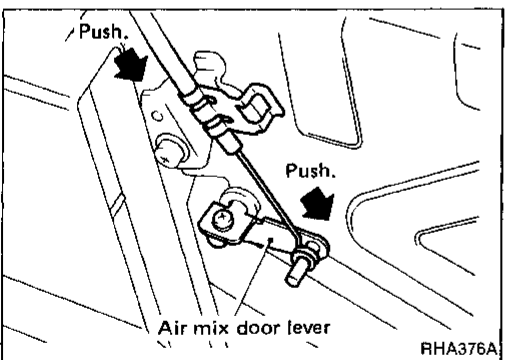
After connecting control rod, check it operates properly.



TEMPERATURE CONTROL CABLE

- When disconnecting control cable, remove E-ring and take off cable while pushing cable outer.
- Move temperature control lever to full cold position. Push air mix door lever in direction of arrow. Push on outer cable in direction of arrow and then clamp it.

After positioning control cable, check it operates properly.

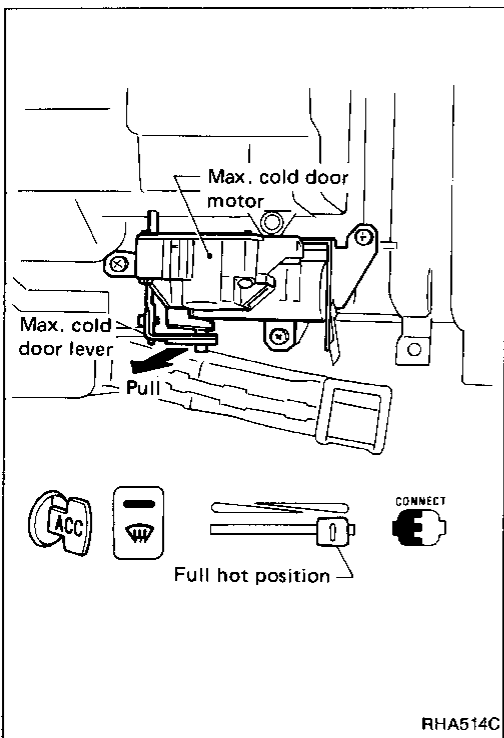
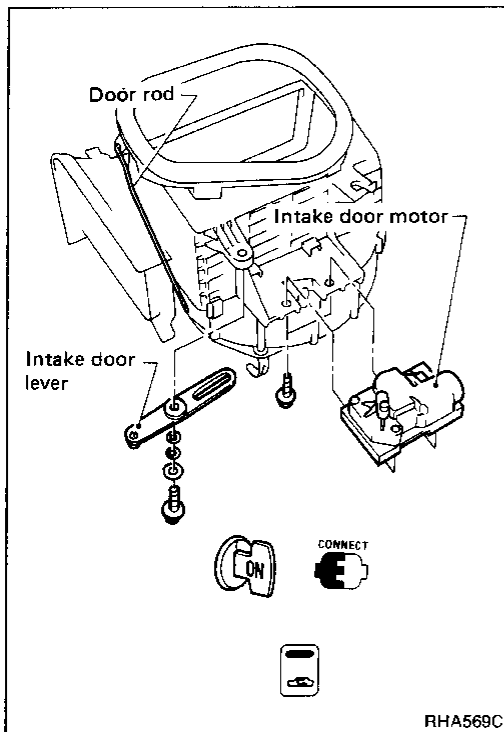


TROUBLE DIAGNOSES

Control Linkage Adjustment (Cont'd)

INTAKE DOOR

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



MAX. COLD DOOR

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

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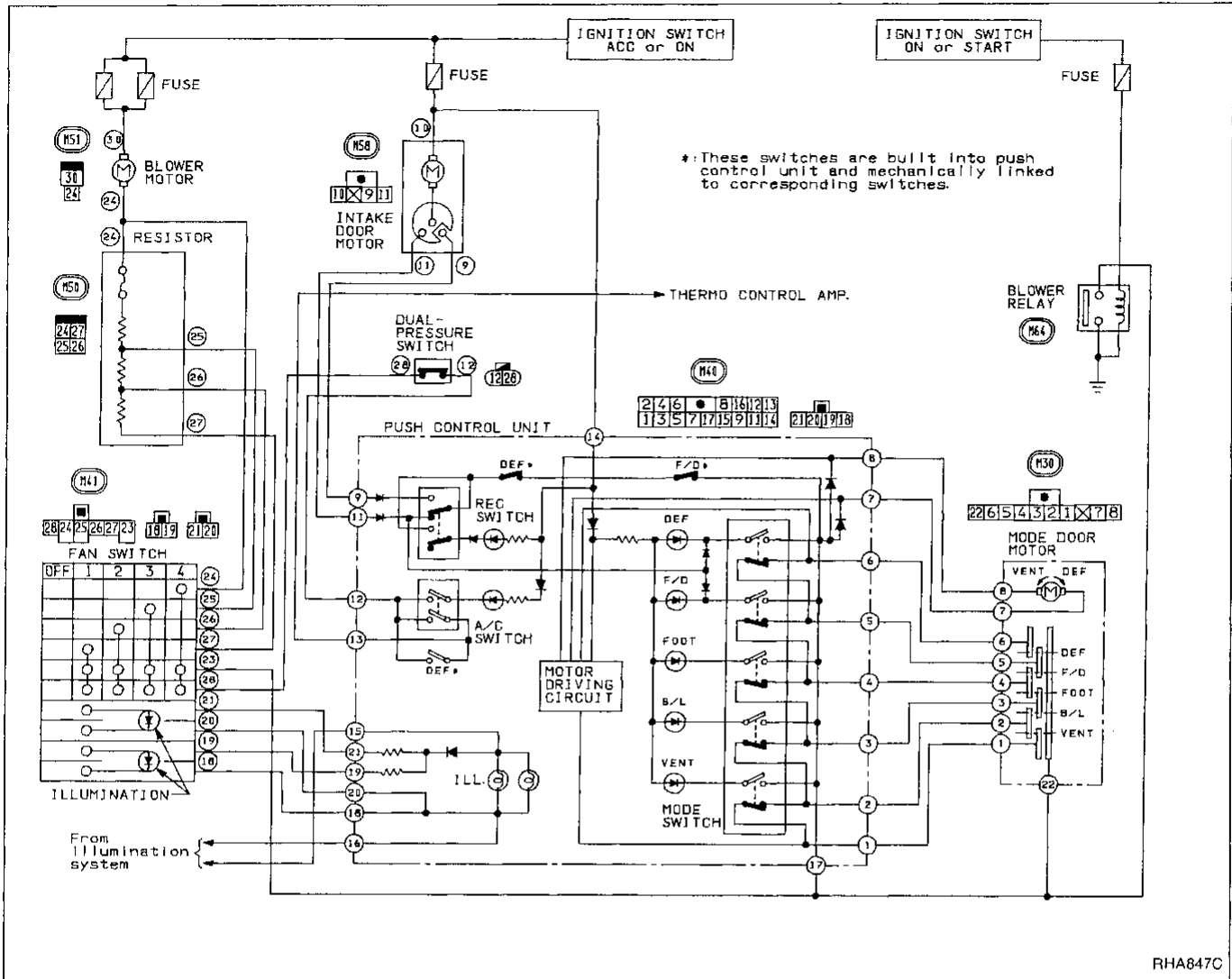
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SYSTEM DESCRIPTION — Push Control

Push Control System



RHA647C

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

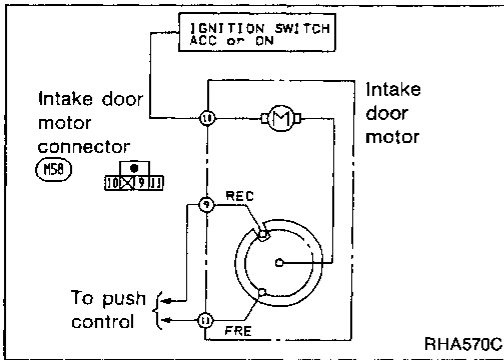
SWITCHES AND THEIR CONTROL FUNCTIONS

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

*1: Compressor is operated by thermo control amp.

*2: It depends on mode switch position.

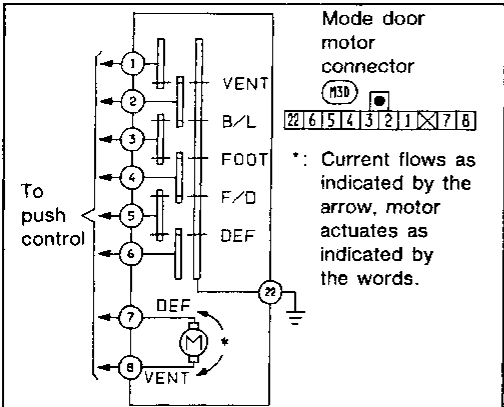
SYSTEM DESCRIPTION — Push Control



Intake Door Motor

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

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



Mode Door Motor

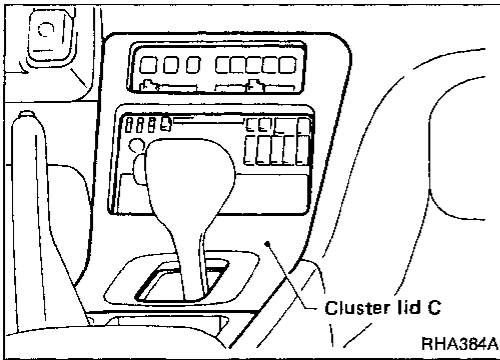
The mode door motor is located on the left side of the heater unit. Through the side link it opens and closes the vent, foot and defroster door.

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

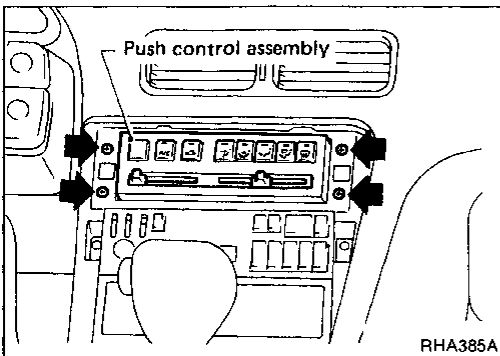
| Terminal No. | | Mode door motor | |
|--------------|---|---------------------|-------------------------------|
| ⑦ | ⑧ | Mode door operation | Direction of linkage rotation |
| ⊖ | ⊖ | Stop | Stop |
| ⊖ | ⊕ | VENT → DEF | Clockwise |
| ⊕ | ⊖ | DEF → VENT | Counter-clockwise |

Removal and Installation

1. Remove cluster lid C.

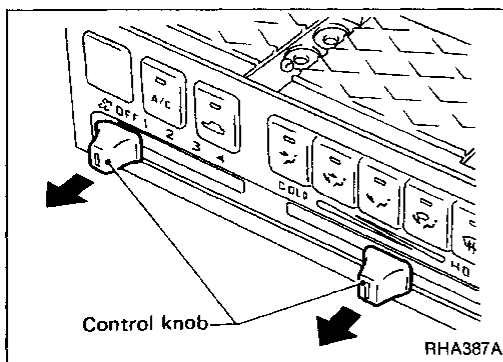
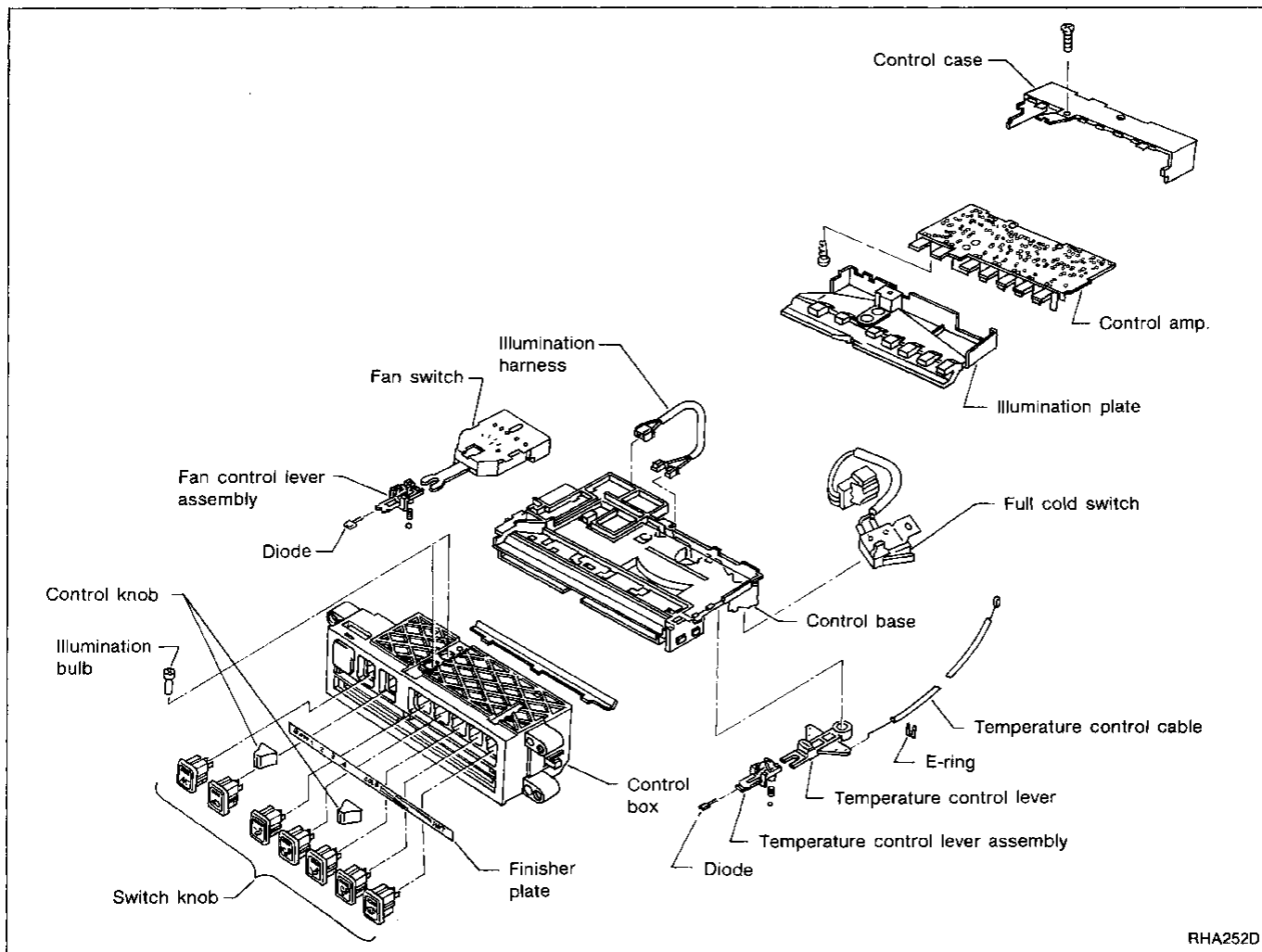


2. Remove audio (radio).
3. Remove four screws of push control unit.
4. Remove temperature control cable.
5. Disconnect push control unit harness connectors.
6. Remove push control unit.
7. Installation is in the reverse order of removal.

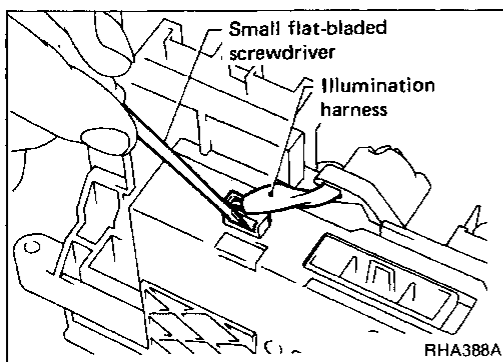


Refer to Control Linkage Adjustment for temperature control cable.

Overhaul — Push control unit assembly



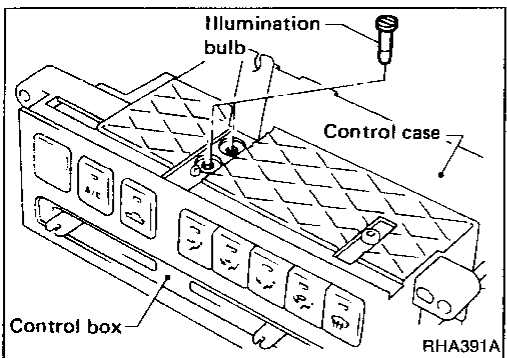
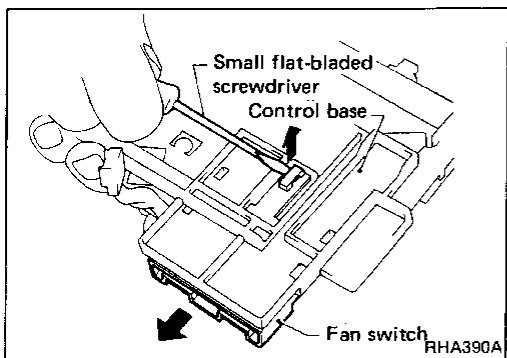
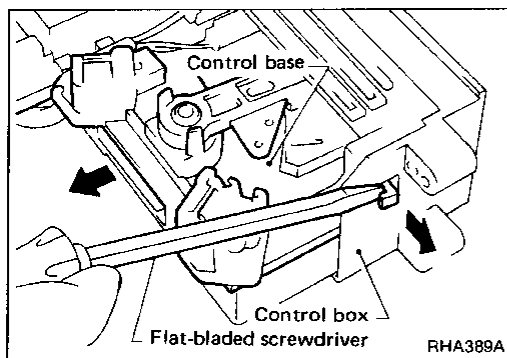
1. Remove control knobs.
Wrap knobs with a cloth and pull in direction indicated by arrow as shown in figure at left. Be careful not to scratch knobs during removal.



2. Disconnect illumination harness connectors.

SYSTEM DESCRIPTION — Push Control

Overhaul — Push control unit assembly (Cont'd)



3. Remove control base.

Undo hook at each end of control box and remove control base from control box by moving it in direction indicated by arrow.

4. Remove fan switch.

5. Remove illumination bulb.

6. Remove control knobs.

Wrap finisher with a cloth and remove knobs using pliers or similar tool. Be careful not to scratch finisher's surface.

7. Remove control case.

8. Remove illumination plate.

Be careful not to scratch control amp. when removing illumination plate.

9. Remove finisher plate.

10. Remove control amp.

Be careful not to damage substrate when removing.

11. Disconnect temperature control cable.

12. Installation is in reverse order of removal.

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SERVICE DATA AND SPECIFICATIONS (S.D.S.)

General Specifications

COMPRESSOR

| | | |
|------------------------|--------------------------------------|--|
| Model | CALSONIC make V-5 | |
| Type | V-5 variable displacement | |
| Displacement | cm ³ (cu in)/rev. | |
| Max. | | 146 (8.91) |
| Min. | | 3 (0.18) |
| Cylinder bore x stroke | mm (in) | 36.1 (1.421) x [0.6 - 28.6 (0.024 - 1.126)] |
| Direction of rotation | Clockwise (viewed from drive end) | |
| Drive belt | Poly V | |

LUBRICATION OIL

| | | |
|--|--------------------------|----------------|
| Model | CALSONIC make V-5 | |
| Type | SUNISO 5GS or equivalent | |
| Capacity | mℓ (US fl oz, Imp fl oz) | |
| Total in system | | 236 (8.0, 8.3) |
| Compressor (Service part) charging amount | | 236 (8.0, 8.3) |

REFRIGERANT

| | | |
|----------|---------|-----------------------|
| Type | R-12 | |
| Capacity | kg (lb) | 0.8 - 0.9 (1.8 - 2.0) |

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 | CALSONIC make V-5 | |
| Clutch disc-pulley clearance | mm (in) | 0.3 - 0.6 (0.012 - 0.024) |