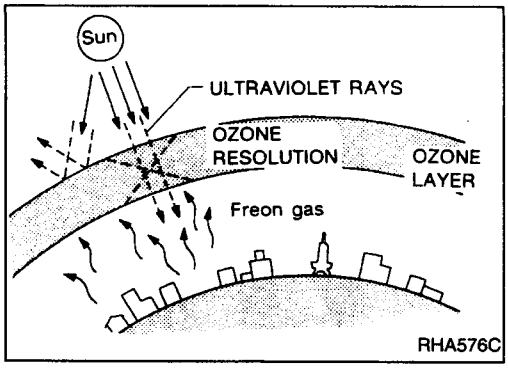
HEATER & AIR CONDITIONER

SECTION HA

CONTENTS

When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

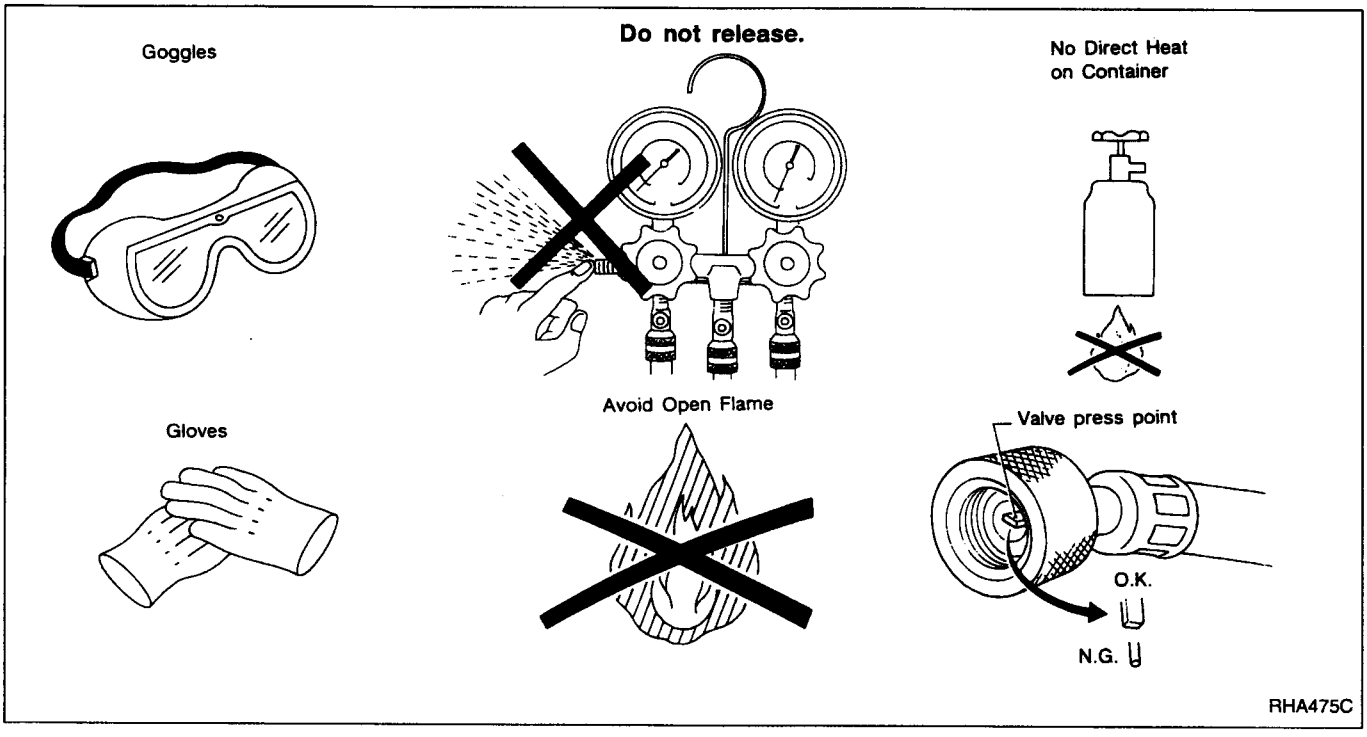
When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".



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:

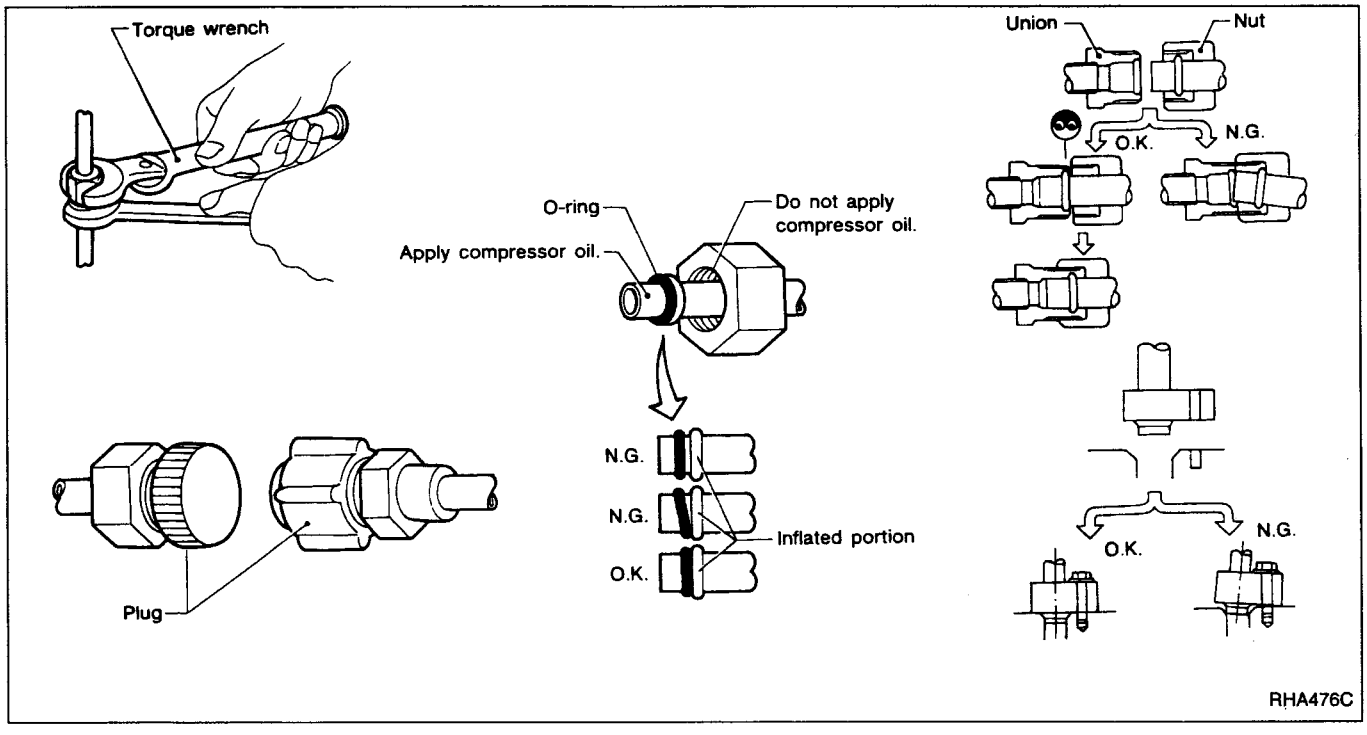
- **Do not use steam to clean surface of condenser or evaporator. Be sure to use cold water or compressed air.**
- **Do not use compressed air to clean out a contaminated A/C tube or hose. Shake the line over a clean, white paper towel. If it contains obvious moisture or contaminants, replace it. Do not blow out the line with refrigerant.**
- **Do not use manifold gauge set whose press point shape is different from that shown. Otherwise, insufficient evacuating may occur.**
- **Do not over-tighten service valve cap.**
- **Follow the manufacturer's instructions for discharging into your refrigerant recycling equipment.**

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 compressor 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.**

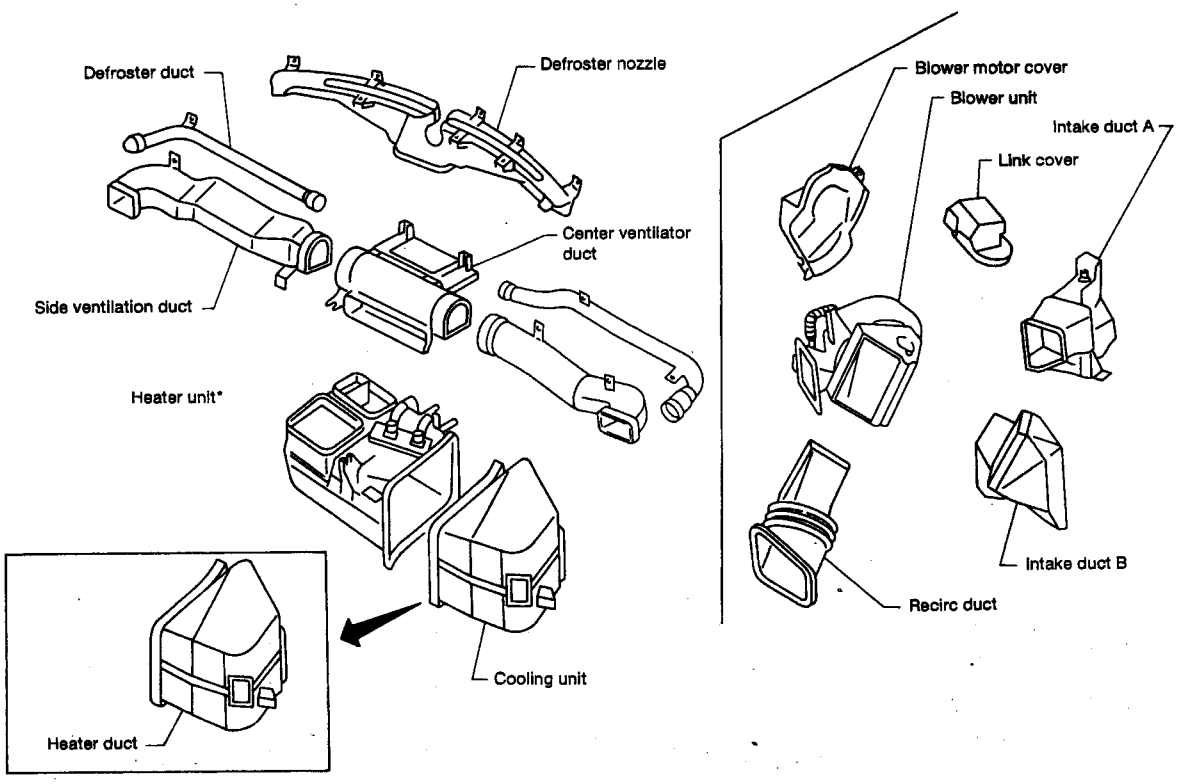


Precautions for Servicing Compressor

- 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 "COMPRESSOR OIL".
- 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.

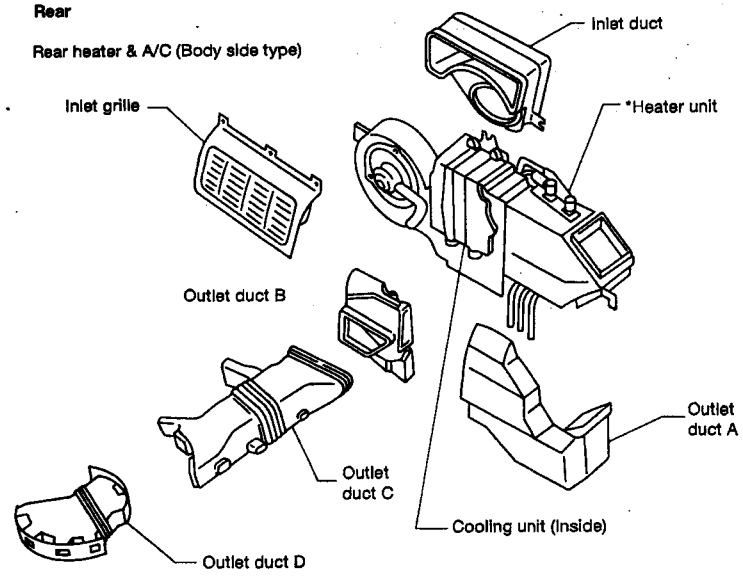
Component Layout

Front

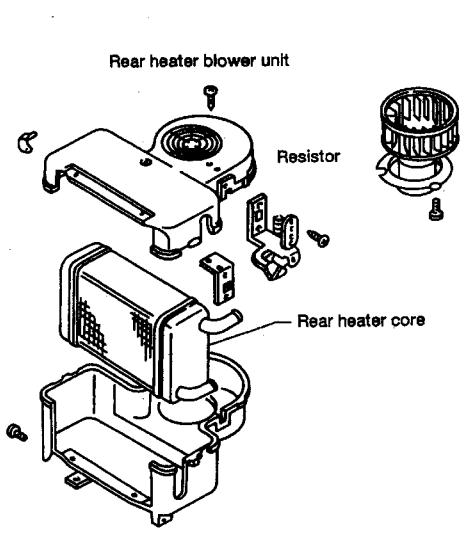


Rear

Rear heater & A/C (Body side type)



Rear heater (Floor type)

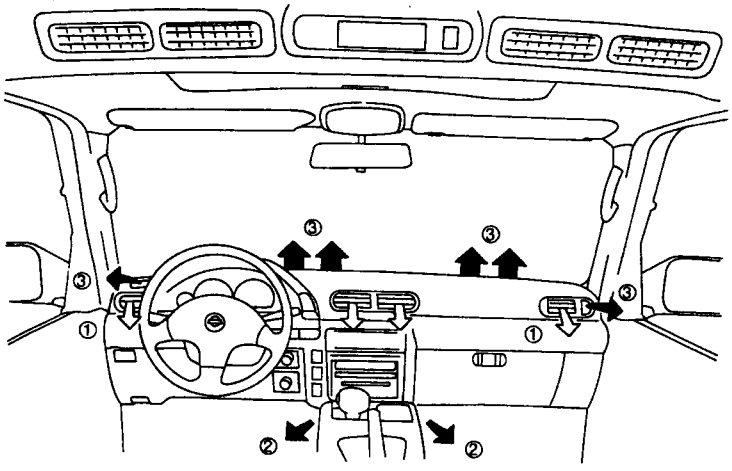


* when reinstalling these units, refer to MA section for the proper coolant filling.

This illustration is for L.H. drive models.
R.H. drive models are basically the same.

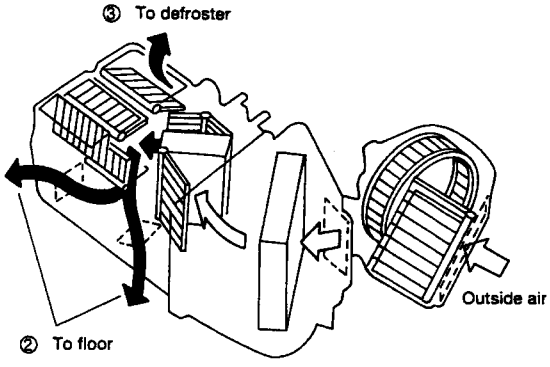
RHA408D

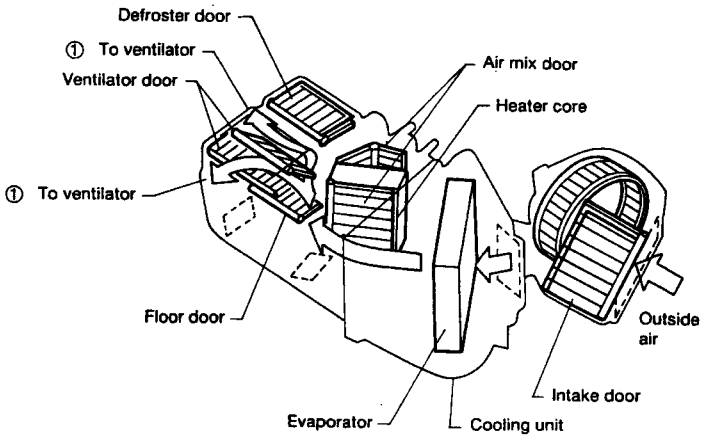
Air Flow — Air Conditioner (Front)



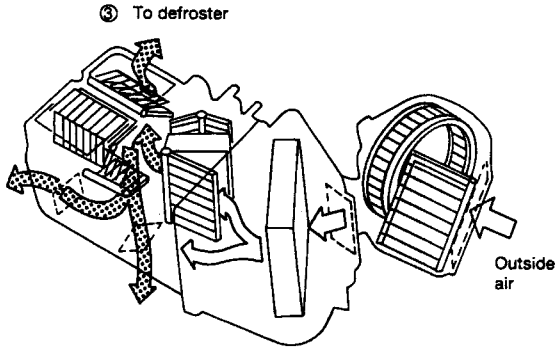
Ventilation

Floor

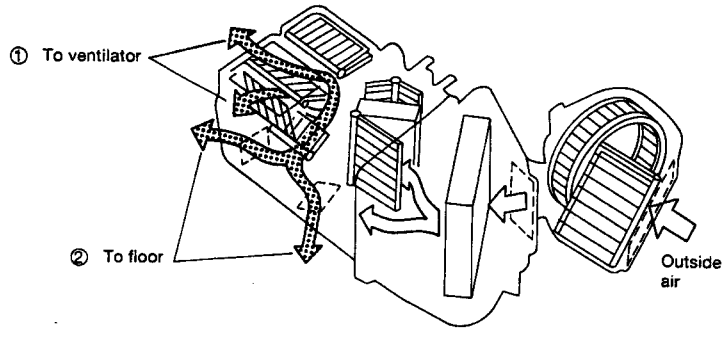




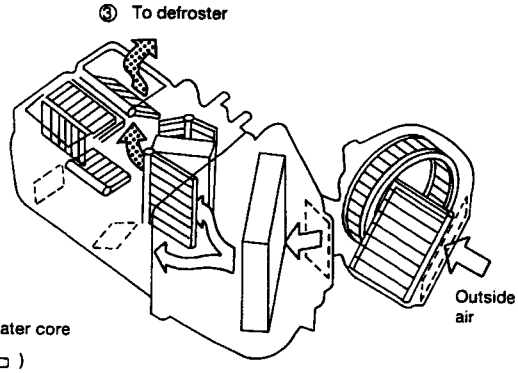
Floor and Defroster



Bi-level



Defroster

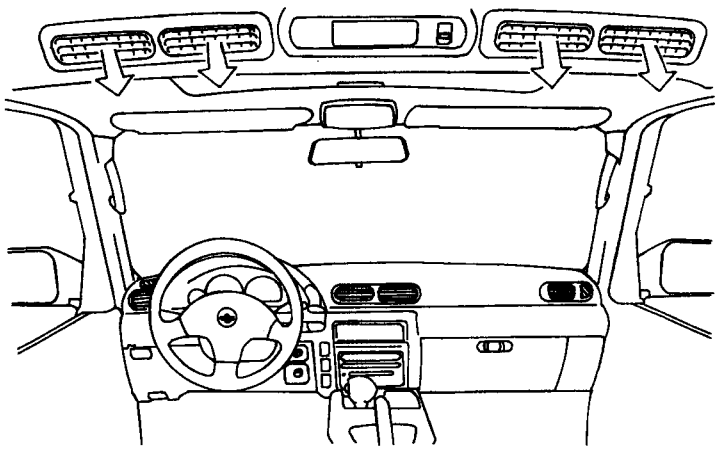


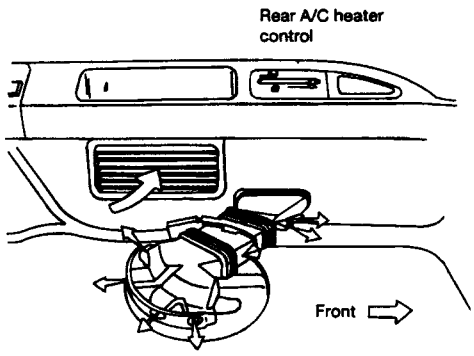
: Air passed through heater core
: Mixed air (+)
: Air not passed through heater core

This illustration is for L.H. drive models.
R.H. drive models are basically the same.

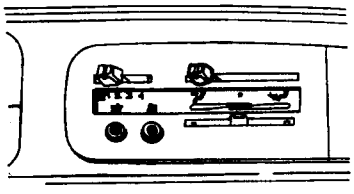
RHA454D

Air Flow — Rear Air Conditioner (Body side type)

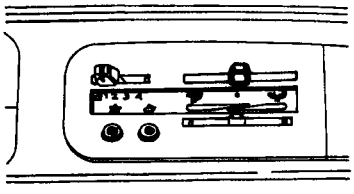




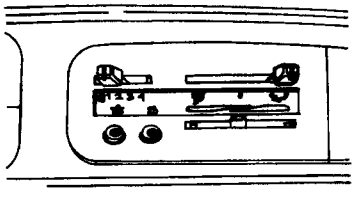
Ventilation

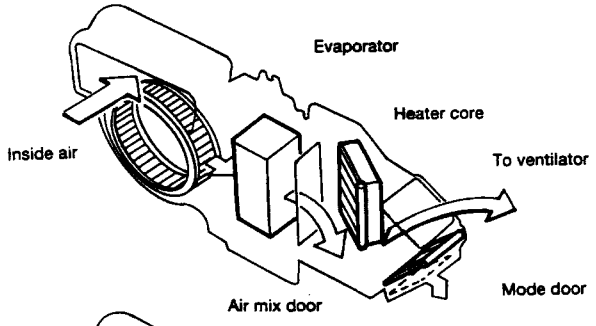


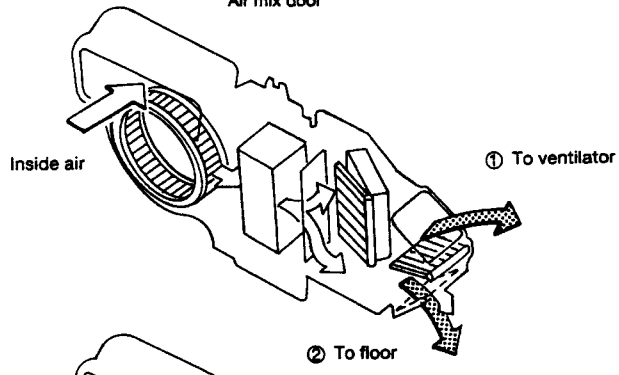
Bi-level

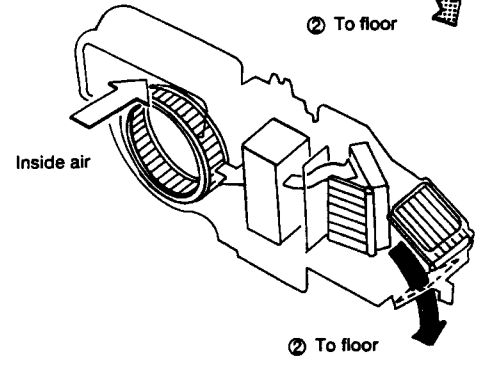


Floor







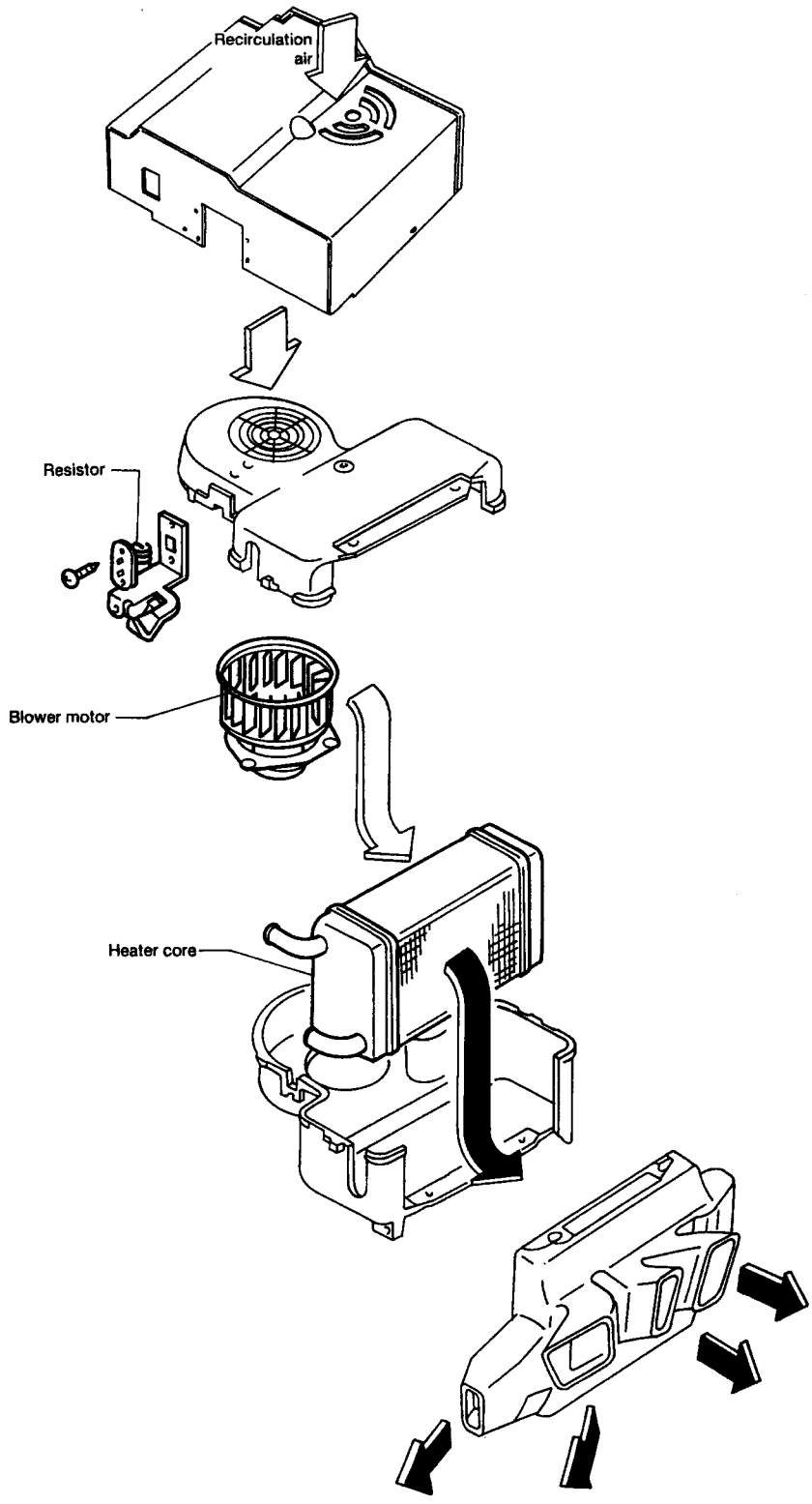


: Air passed through heater core
: Mixed air (+)
: Air not passed through heater core

This illustration is for L.H. drive models.
R.H. drive models are basically the same.

RHA409D

Air Flow — Rear Heater (Floor type)



This illustration is for L.H. drive models.
R. H. drive models are basically the same.

⬅ : Air passed through heater core

⇦ : Air not passed through heater core

RHA410D

Refrigeration Cycle

REFRIGERANT FLOW

The refrigerant flows in the standard pattern, that is, through the compressor, the condenser, the liquid tank, through the evaporator, and back to the compressor.
The refrigerant evaporation through the evaporator coil is controlled by an externally equalized expansion valve, located inside the evaporator case.
The rear refrigeration cycle is controlled by a solenoid valve. When the solenoid valve is energized (open), the refrigerant flows into the rear evaporator.

FREEZE PROTECTION

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

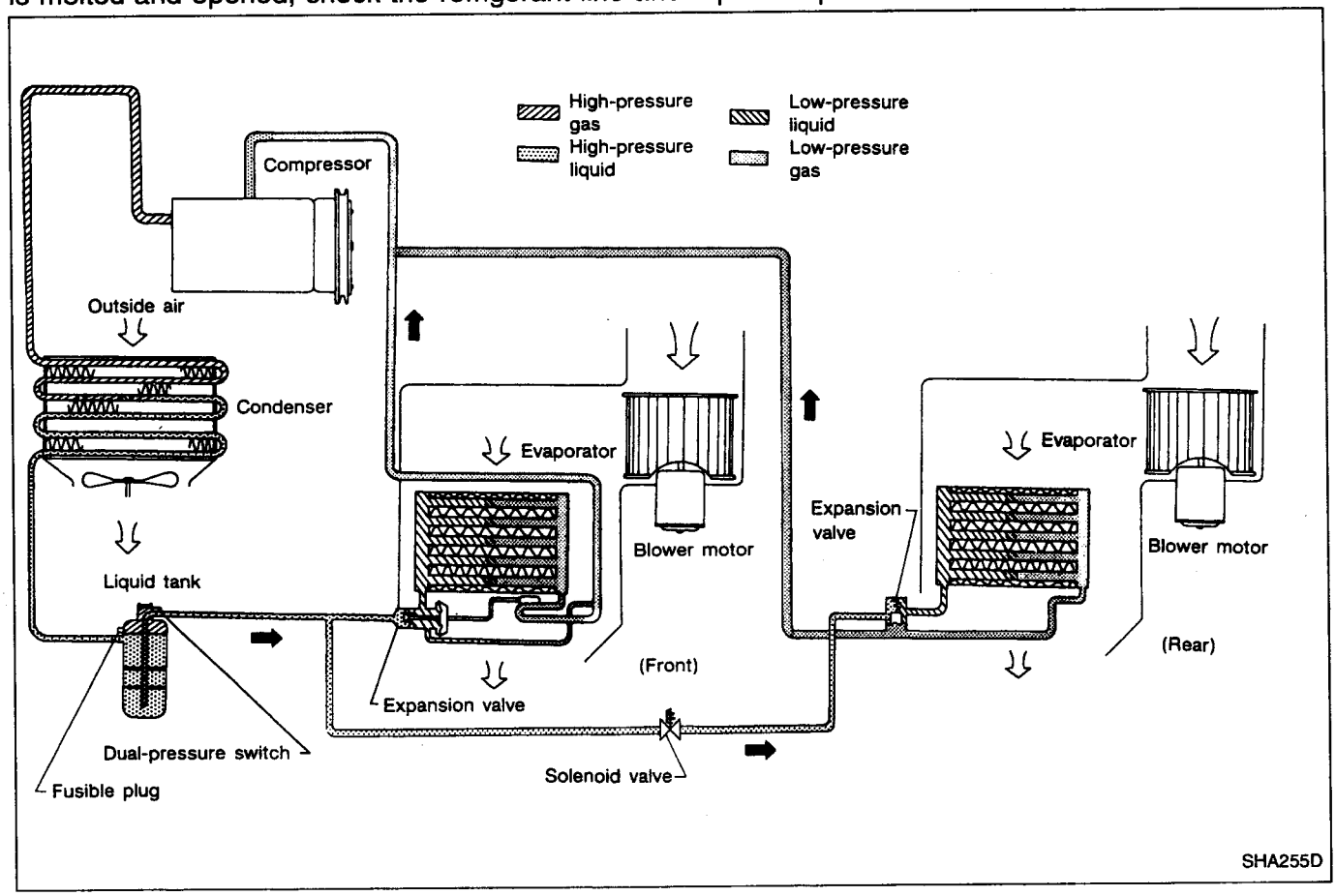
REFRIGERANT SYSTEM PROTECTION

Dual-pressure switch

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

Fusible plug

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



DCW-17 Variable Displacement Wobble Plate Type Compressor

GENERAL INFORMATION

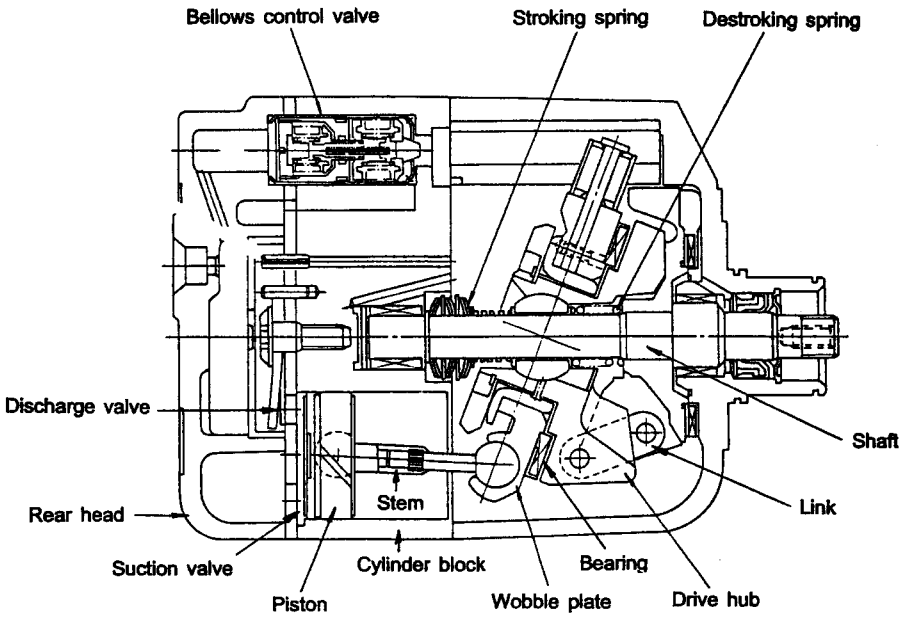
1. The DCW-17 variable compressor differs from previous units in that the vent temperatures do not drop too far below 5°C (41°F) at a evaporator intake air temperature of less than 20°C (68°F) while the engine is running at speeds less than 1,500 rpm. This is because the DCW-17 compressor provides a means of "capacity" control.
2. The DCW-17 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.
3. A "clanking" sound may occasionally be heard during refrigerant charge. The sound indicates that the tilt angle of the swash plate has changed and is not a problem.
4. In air conditioning systems which are equipped with the DCW-17 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.
5. A constant range of suction pressure is maintained when engine speed is greater than a certain value. It normally ranges from 137 to 177 kPa (1.37 to 1.77 bar, 1.4 to 1.8 kg/cm^2, 20 to 26 psi) under varying conditions. In previous compressors, however, suction pressure was reduced with increases in engine speed.
6. If the ambient temperature drops below approx. 20.5°C (69°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.

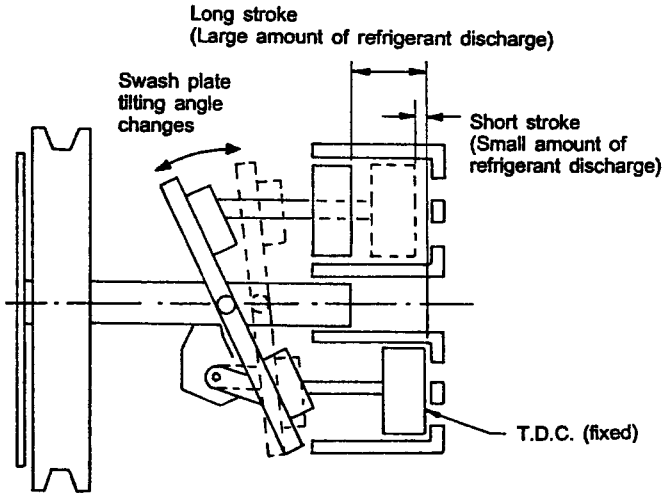
DCW-17 Variable Displacement Wobble Plate Type Compressor (Cont'd)

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 continuosly changed from 8 to 167 cm^3(0.49 to 10.19 cu in).





Discharge control	Discharge capacity cm^3 (cu in)/rev.	Piston stroke lenght mm (in)
Minimum	8 (0.49)	1.4 (0.055)
Maximum	167 (10.22)	29.2 (1.149)

RHA677D

DCW-17 Variable Displacement Wobble Plate Type Compressor (Cont'd)

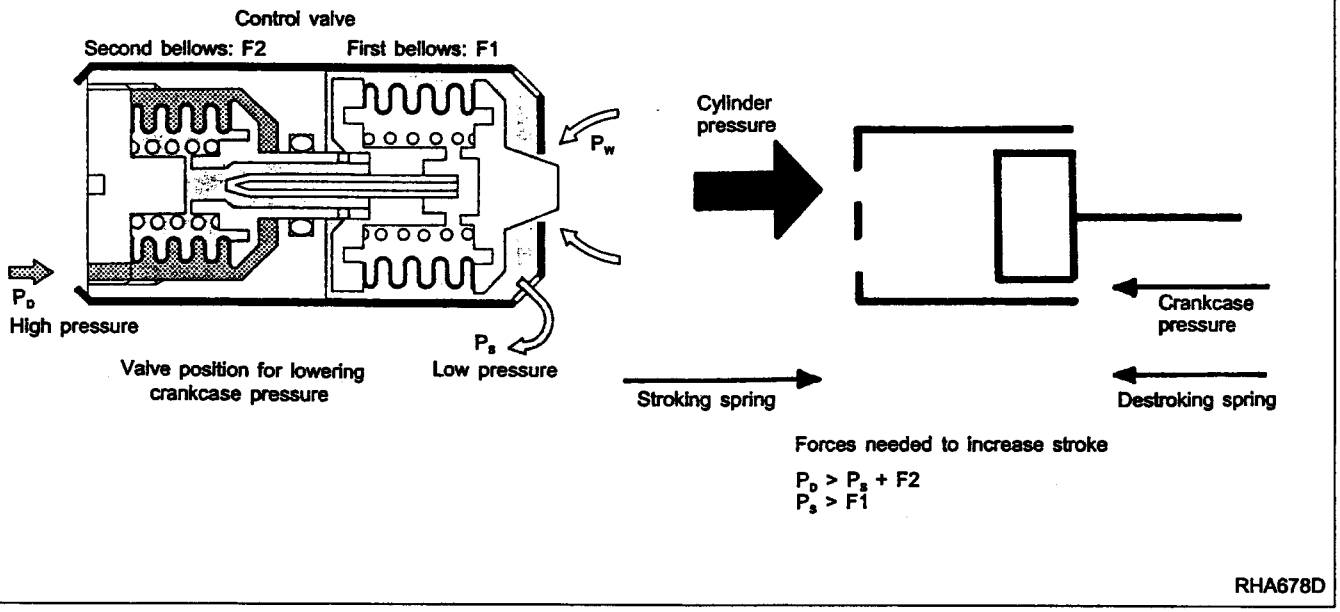
Operation

1. Operation control valve

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

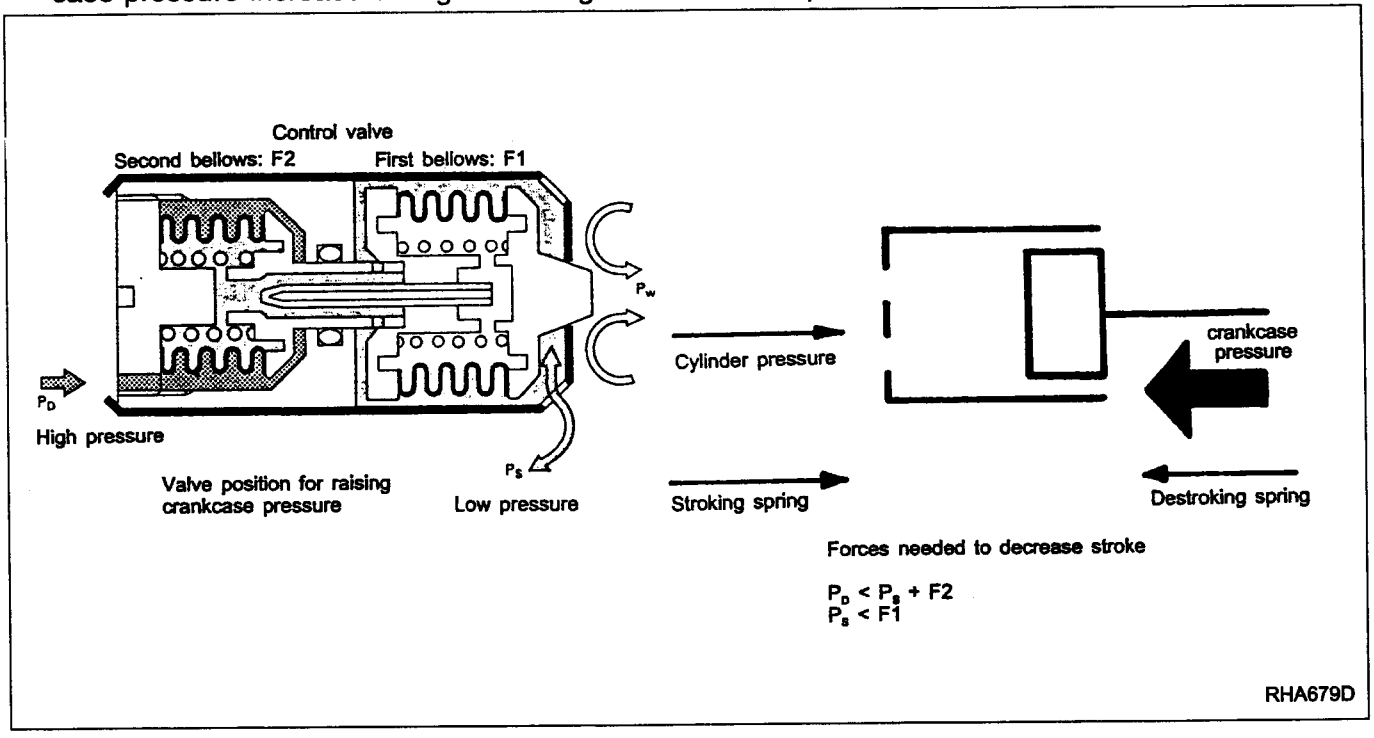
Refrigerant pressure on the High and low-pressure side increases with an increase in heat loads. When this occurs, the control valve's bellows compress to open the low-pressure side and the cylinders' internal pressure to be greater than the crankcase's internal pressure. Under this condition, the swash plate is set to the maximum stroke postion.



DCW-17 Variable Displacement Wobble Plate Type 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 (1.77 bar, 1.8 kg/cm^2, 26 psi).
  Since suction pressure is low, it makes the suction port close. Thus, crankcase pressure becomes high as high pressure enters the crankcase.
- The force acts around the link near the swash plate, and is generated by the pressure difference before and behind the piston. Piston pressure is between suction pressure Ps and discharge pressure Pd, which is near suction pressure Ps. If crankcase pressure Pw rises due to capacity control, the force around the link makes the swash plate angle decrease and also the piston stroke decreas
  In other words, the pressure difference between the piston and the crankcase according to crankcase pressure increase changes the angle of the swash plate.



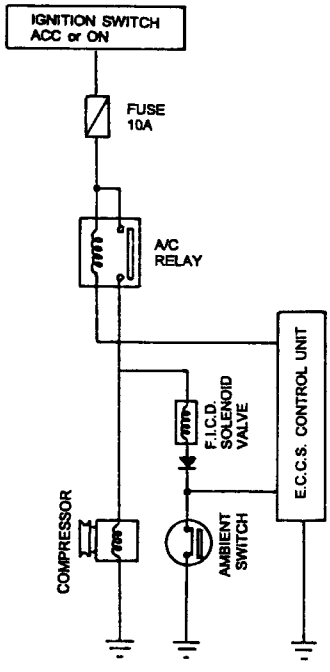
F.I.C.D. Control System — SR20 engine model

General

With the variable displacement wobble plate type 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.

Operation

When the air conditioner is OFF, the E.C.C.S. detects the load applied to the engine, and controls the A.A.C. valve to adjust the engine idling speed to the appropriate rpm by supplying additional air from the A.A.C. 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 highter), the F.I.C.D. solenoid valve is energized and additional air is supplied to the engine.
If the appropriate engine speed is not reached, the A.A.C. valve supplies the additional air required to increase the engine rpm.
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 F.I.C.D. solenoid is deenergized, and the idling speed is controlled so that the appropriate rpm can be achieved by operation of the A.A.C. valve only.



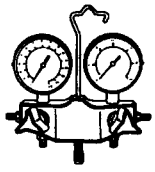
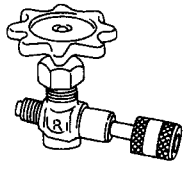
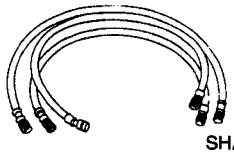
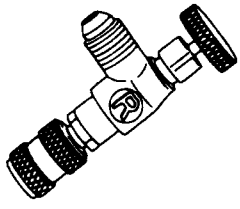
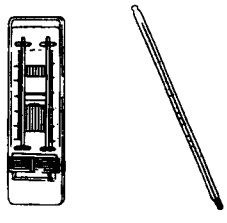
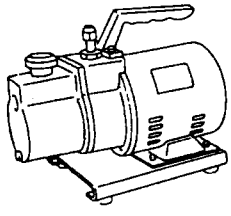
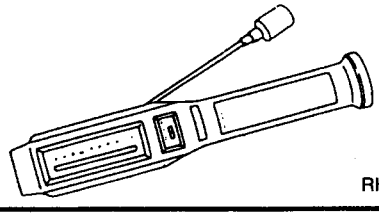
Ambient temperature °C (°F)	Ambient switch	F.I.C.D.
Below 19-22 (66-72)	OFF	OFF
Above 22-25 (72-77)	ON	ON

Idle speed: (rpm)

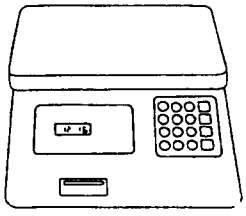
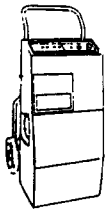
A/C OFF	A/C ON
800 ±50	

RHA542C

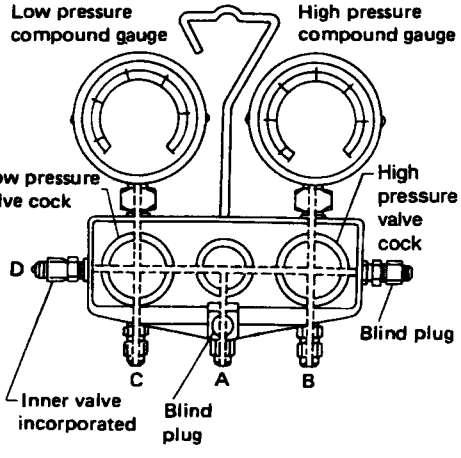
Service Tools

Tool name	Description	
Manifold gauge	 SHA899C	Discharging, evacuating and charging refrigerant
Additional valve	 SHA898C	Discharging, evacuating and charging refrigerant
Charging hose	 SHA897C	Discharging, evacuating and charging refrigerant
Adapter valve	 RHA573B	Discharging, evacuating and charging refrigerant
Thermometer and hygrometer	 Etched-stem type thermometer SHA900C	Checking temperature and humidity
Vacuum pump	 RHA575B	Evacuating
Gas leak detector	 RHA577B	Checking refrigerant leaks

Service Tools (Cont'd)

Tool name	Description
Charging cylinder	 RHA578B — Checking amount of refrigerant and charging refrigerant
Weight scale	 RHA579B — Checking amount of refrigerant
Refrigerant recycling equipment	 SHA732C — Capturing and recycling refrigerant

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



Center joint (A):
Use for evacuating.
High pressure side joint (B):
Connect to high pressure side service valve of refrigerating system.
Low pressure side joint (C):
Connect to low pressure side service valve of refrigerating system.
Refrigerant joint (D):
Use for charging refrigerant.
SHA044D

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 (−1,013 mbar, −760 mmHg, −29.92 inHg) to 2,942 kPa (29.4 bar, 30 kg/cm^2, 427 psi), and the low pressure gauge measures generally from −101.3 kPa (−1,013 mbar, −760 mmHg, −29.92 inHg) to 1,471 kPa (14.7 bar, 15 kg/cm^2, 213 psi).

CAUTION:

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

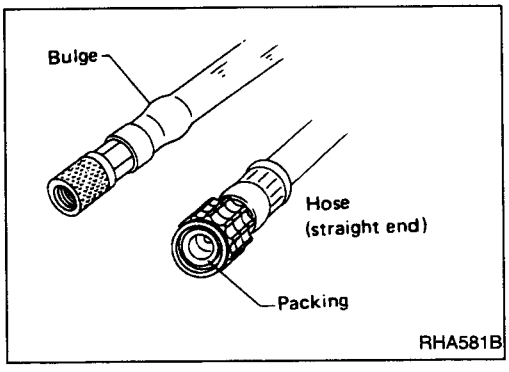
Service Tools (Cont'd)

Charging hose

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

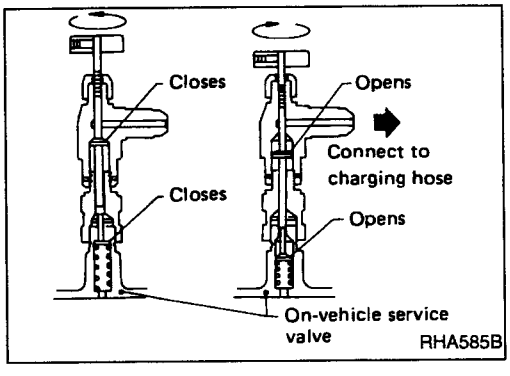
High and low pressure hoses are color coded to prevent wrong connection.

High pressure line hose	Red
Low pressure line hose	Yellow
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.**



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.

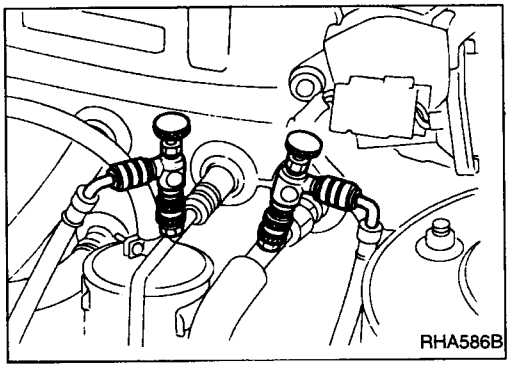
CAUTION:

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

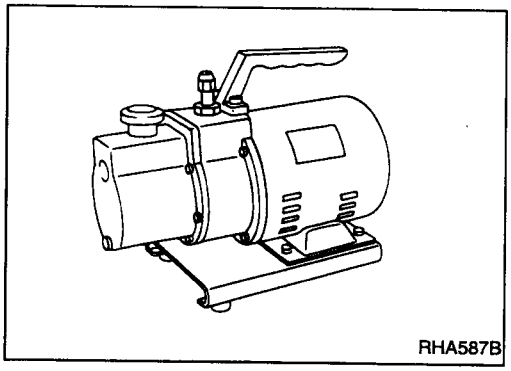
2. Connect the charging hose to the adapter valve.

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.



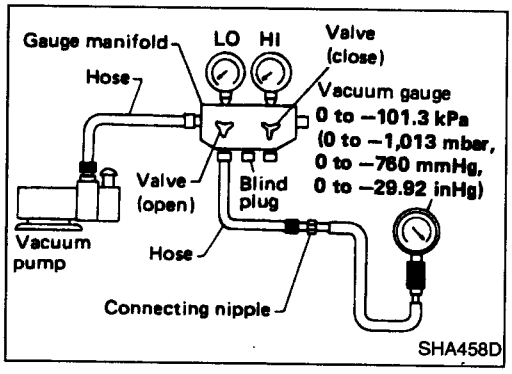
Service Tools (Cont'd)


RHA587B

Vacuum pump

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

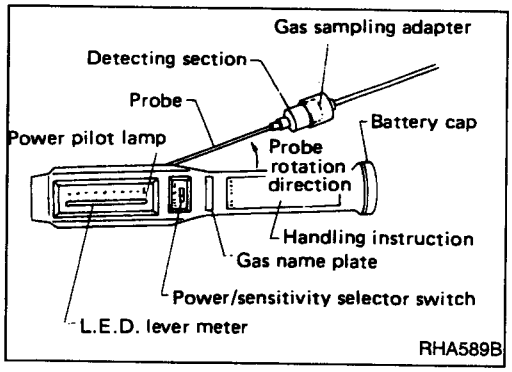
Check the vacuum pump to see that the vacuum pump capacity is greater than −100.0 kPa (−1,000 mbar, −750 mmHg, −29.53 inHg).



SHA458D

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.



RHA589B

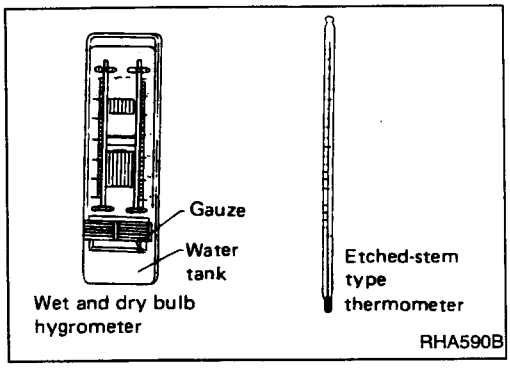
Gas leak detector

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

Type		Detection ability	Features
Electrical	Discharge type (Suction type)	3 - 50 g (0.11 - 1.76 oz)/year	• Easy handling • Medium sensitivity • Each point needs tow or more seconds for detection.
	Positive ion emission type (Suction type)	2 g (0.07 oz)/year	• 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 (133 mbar, 100 mmHg, 3.94 inHg) change in vacuum is detected in 10 minutes.	• Can be used easily in refrigerant charging operation. • Detection ability is very low with vacuum gauge in gauge manifold.

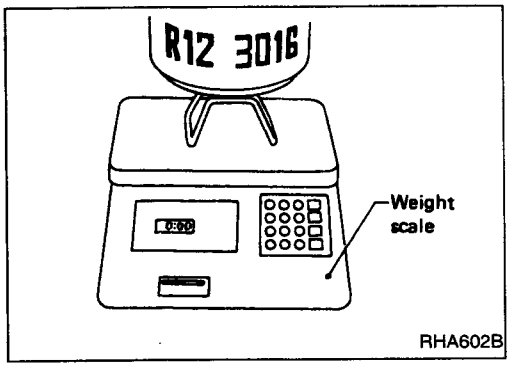
- **Leakage inspection of a refrigeration system needs a sensitivity greater than 20 g (0.71 oz)/year.**
- **The actual amount of leak is estimated at 5 to 10 times the detected amount.**
- **Insufficient cooling may be felt if leakage exceeds 150 to 200 g (5.29 to 7.05 oz).**

Service Tools (Cont'd)



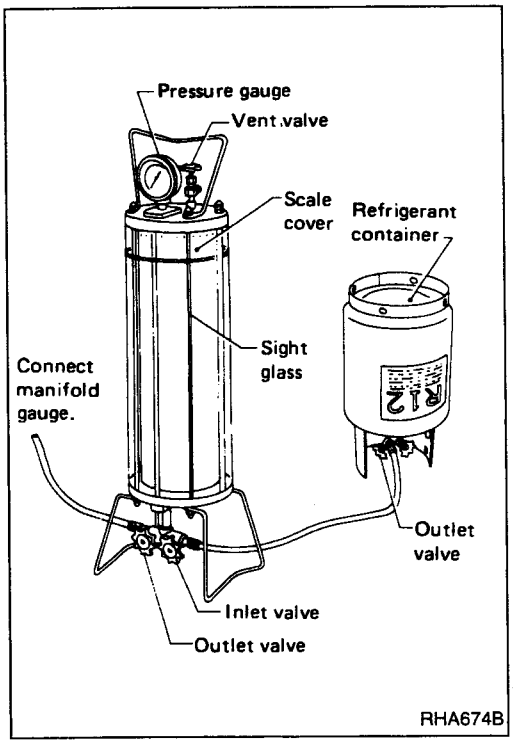
Temperature gauge

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.



Charging cylinder

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

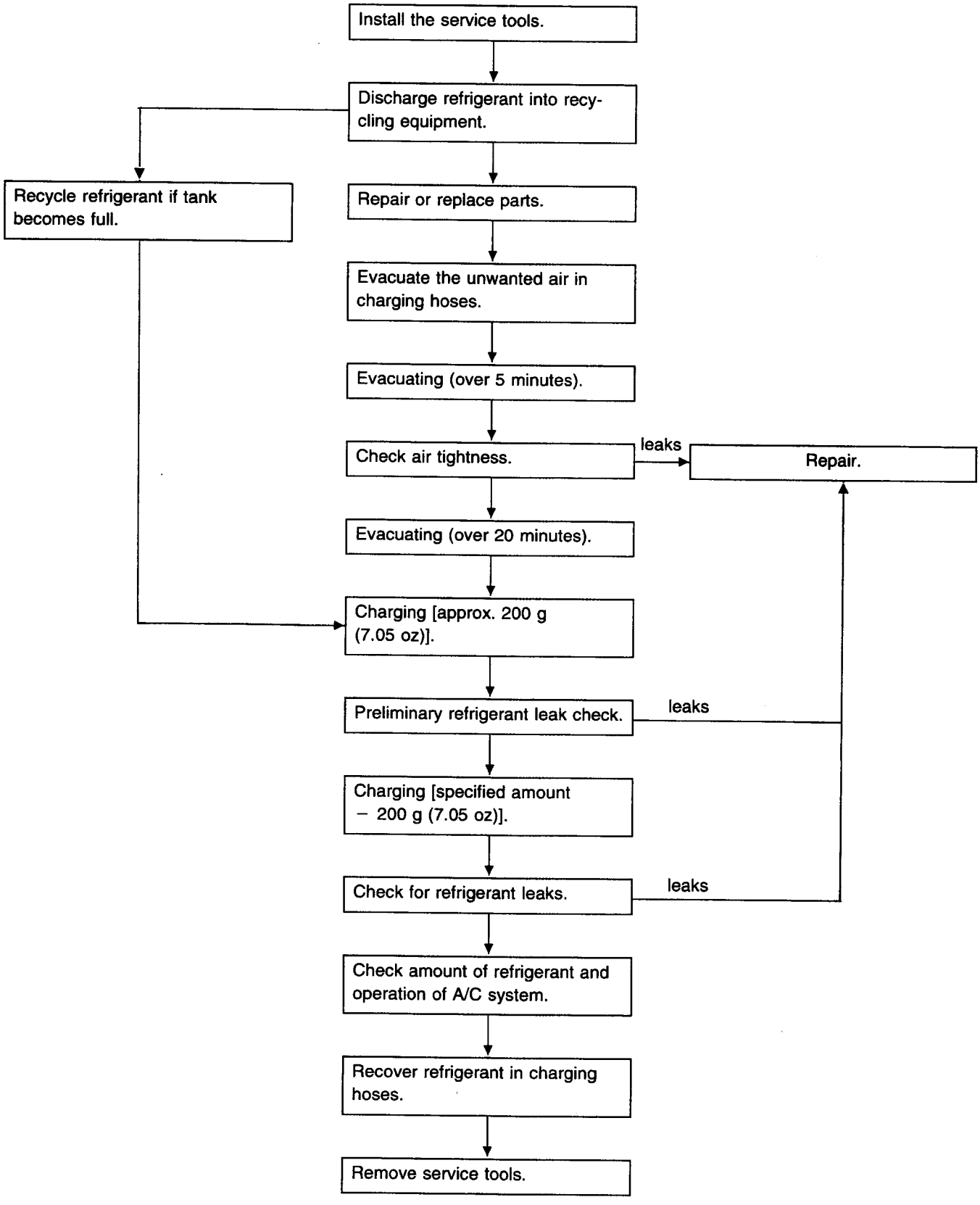
Features

- 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.

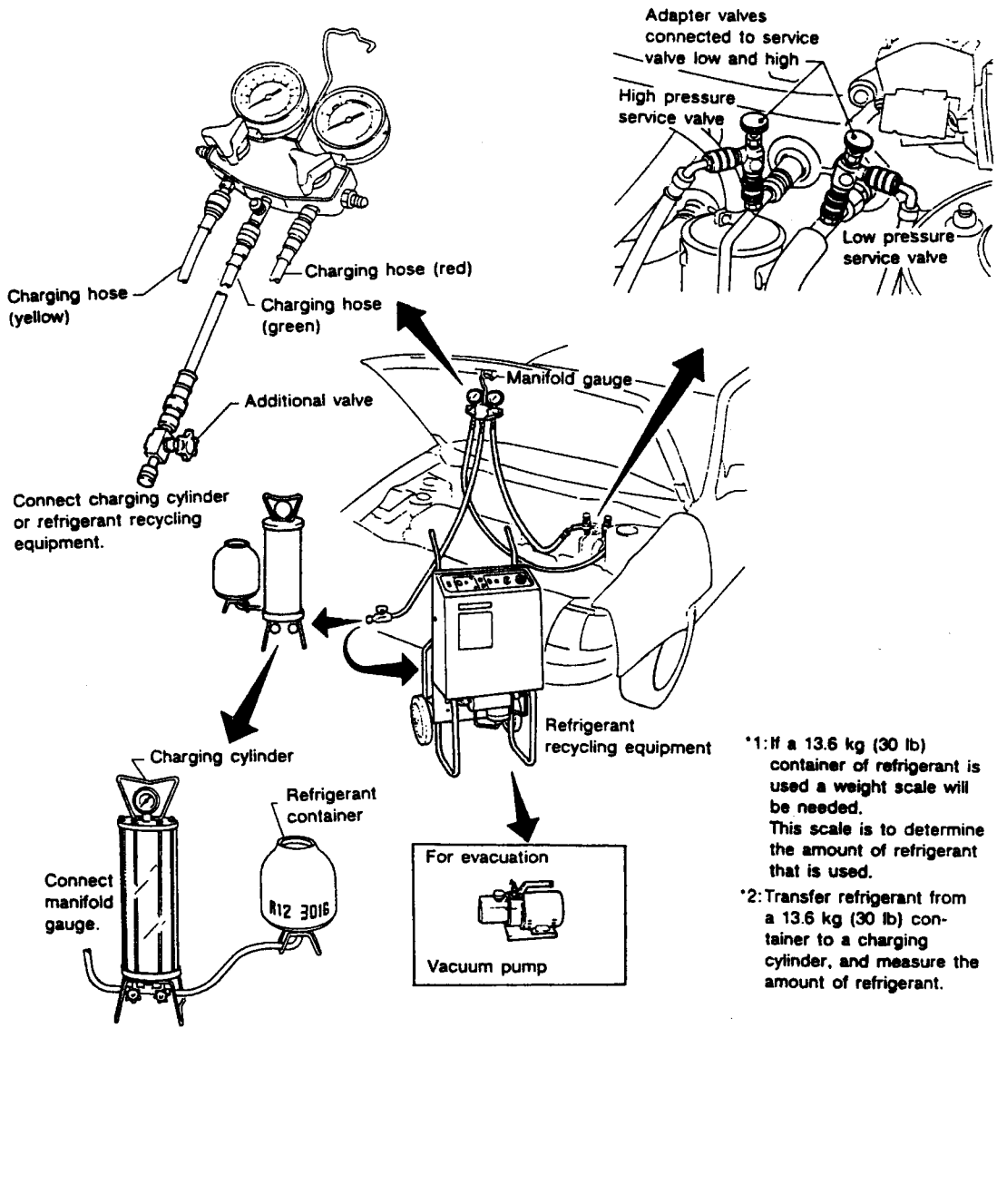
CAUTION:

- **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.**

Work Procedure

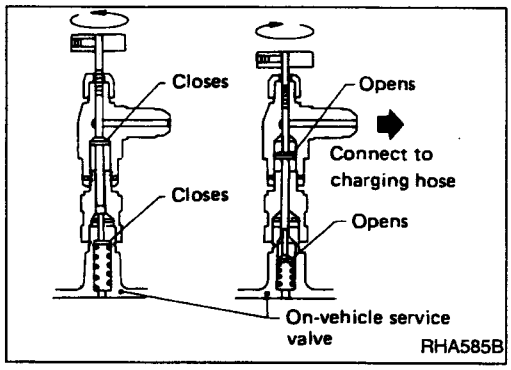


Setting of Service Tools



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

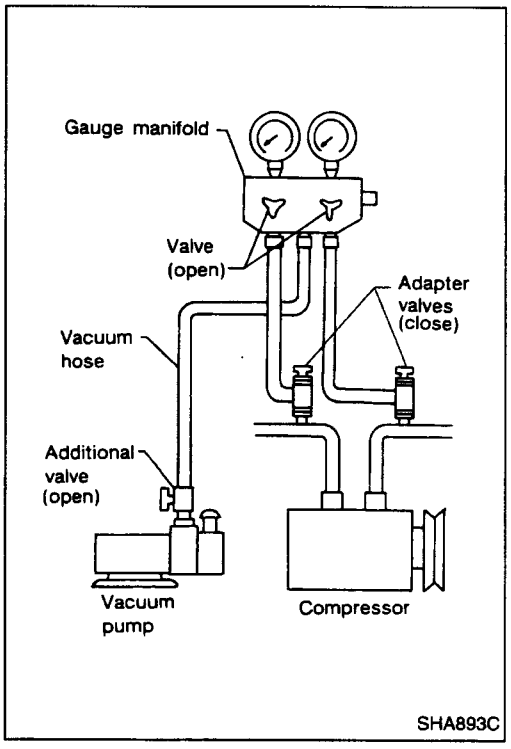
Setting of Service Tools (Cont'd)

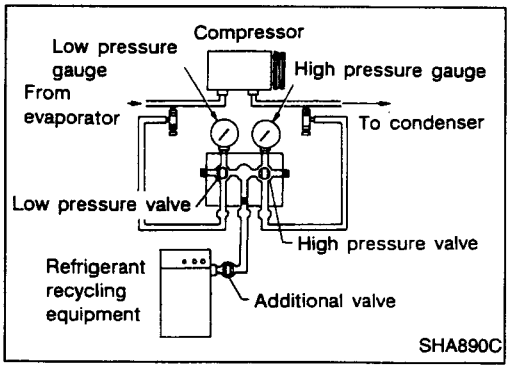


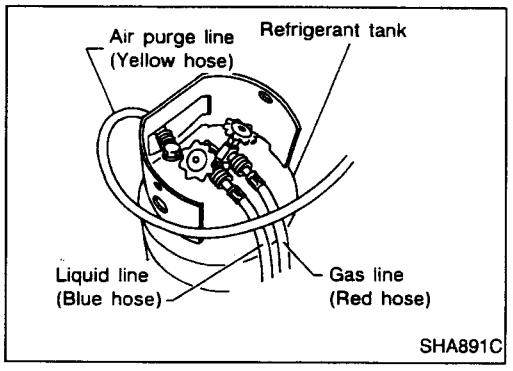
1. Install adapter valve to each of high pressure and low pressure service valves.

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.

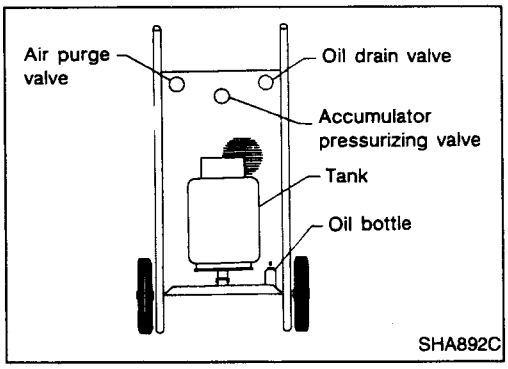
Use only authorized refillable refrigerant tanks for your recycling equipment.

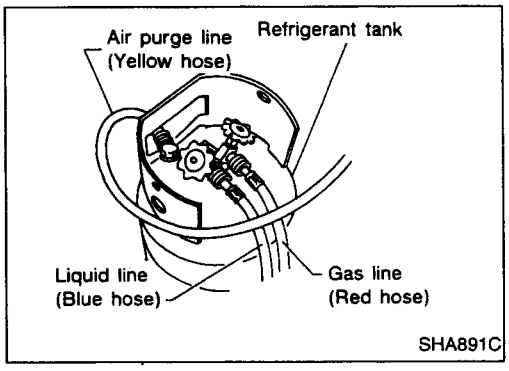
Use of other tanks could cause personal injury.

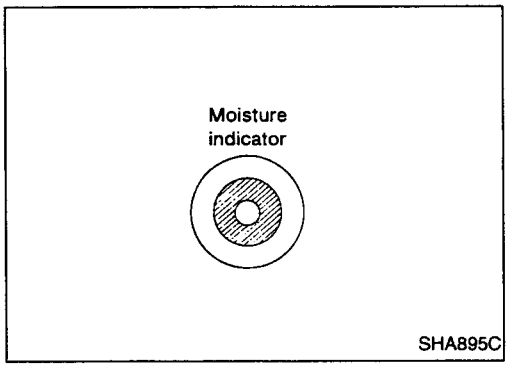
REFRIGERANT RECOVERY

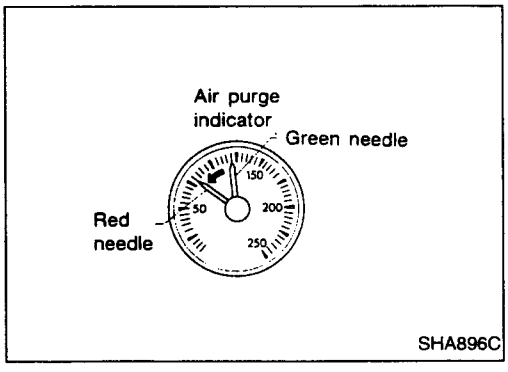
1. Connect vacuum hose to refrigerant recycling equipment and open additional valve and adapter valves.
2. Open both valves of manifold gauge set. Make certain refrigerant tank "Gas" and "Liquid" valves are open.
3. Plug unit's power cord into a suitable AC outlet and turn on "Main Power" switch.
4. 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 bar, 0 kg/cm^2, 0 psi) within two minutes. If this occurs, repeat this step.

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 will de-energize compressor and "Tank Full" light will come on. Recycle refrigerant in tank before removing.

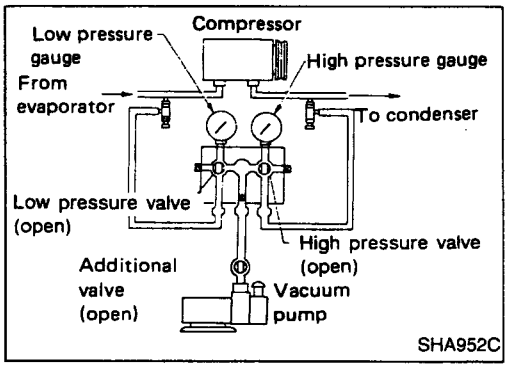
REFRIGERANT RECYCLING

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.

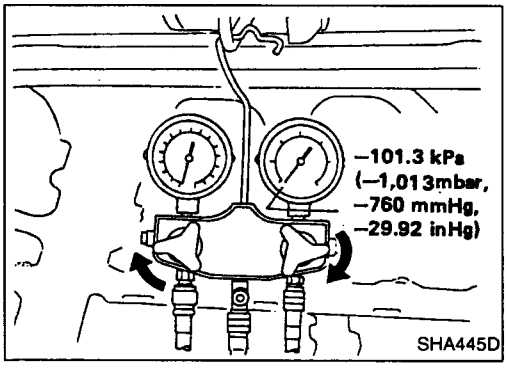
1. Make certain both valves on recovery tank are open.
2. Turn on "Recycling" switch. Recycling solenoid will be energized.
3. Depress start switch. Compressor will start, and "Recycling On" light will come. Refrigerant will be seen going through moisture indicator at start up. The sight glass will not 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.



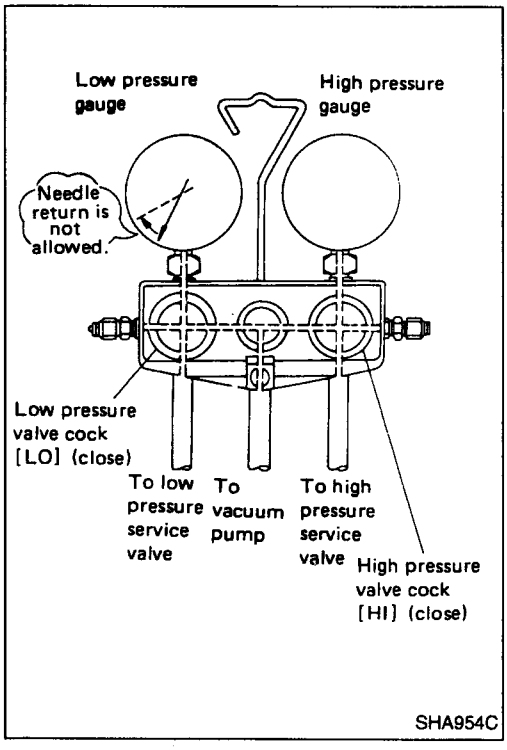
Evacuation

EVACUATION PROCEDURE

1. Completely tighten low pressure and high pressure adapter valves.
2. Open high and low pressure valves of manifold gauge set and additional valve.
3. Run vacuum pump.



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



CHECKING AIRTIGHTNESS

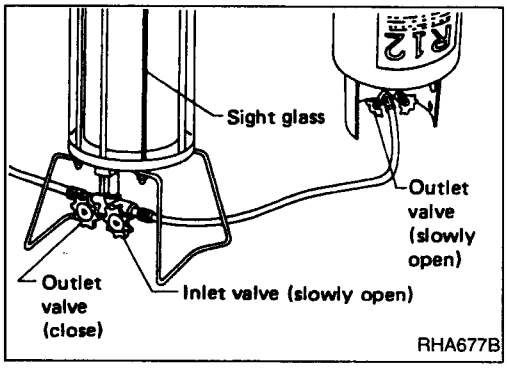
1. Shut off high and low pressure valves and additional valve, and leave the system as it is for 5 to 10 minutes.
2. Make sure that the needle of low pressure gauge will not move back toward atmospheric pressure side (gauge pressure 0).

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

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.



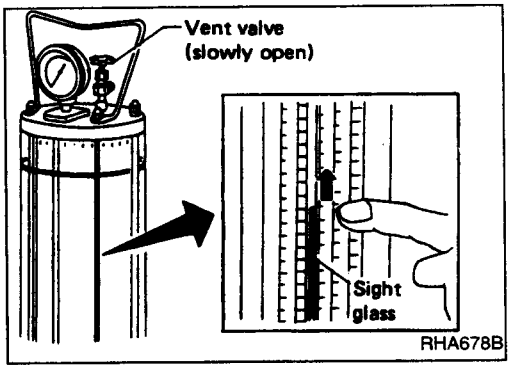
Charging Refrigerant

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.

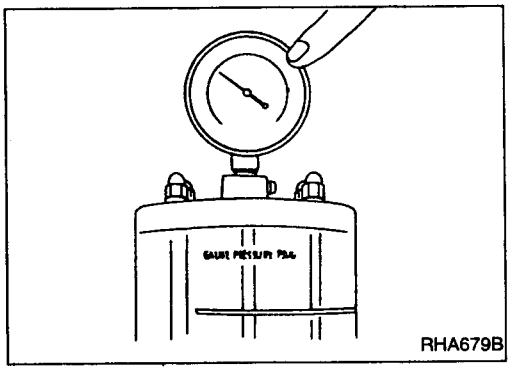
Charging Refrigerant (Cont'd)



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

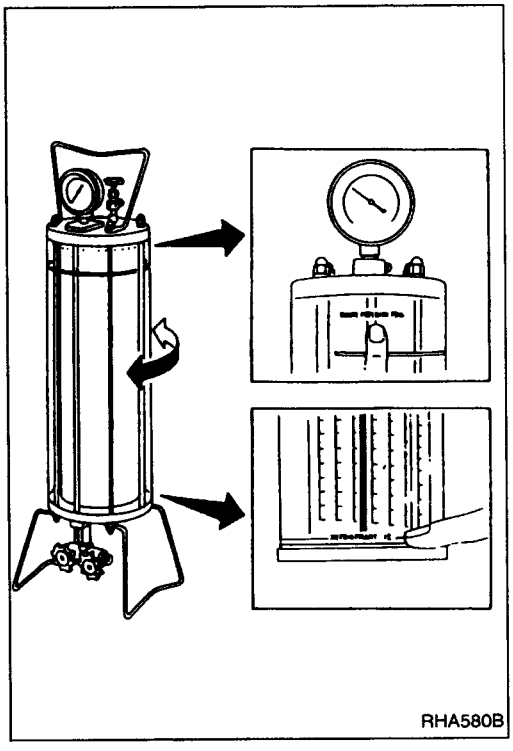
The refrigerant volume changes with temperature and pressure. It is necessary to charge refrigerant with a little more than required amount (indicated on sight glass).

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



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

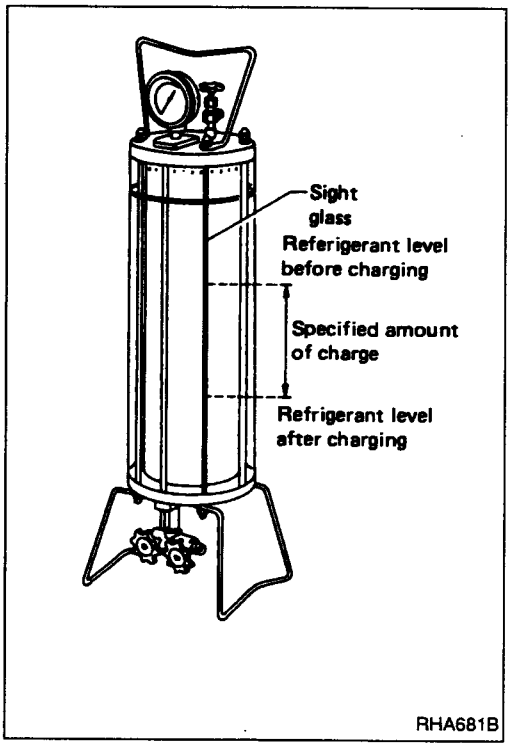
The refrigerant charging time can be reduced by heating refrigerant to increase its pressure. In this case, do not allow the pressure in cylinder to rise higher than 1,030 kPa (10.30 bar, 10.5 kg/cm^2, 150 psi). (If pressure rises above this level, turn off the heater.) The pressure in the charging cylinder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



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.

Charging Refrigerant (Cont'd)

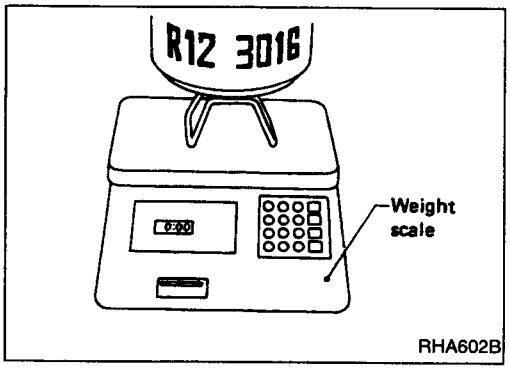


CALCULATING CHARGING AMOUNT OF REFRIGERANT

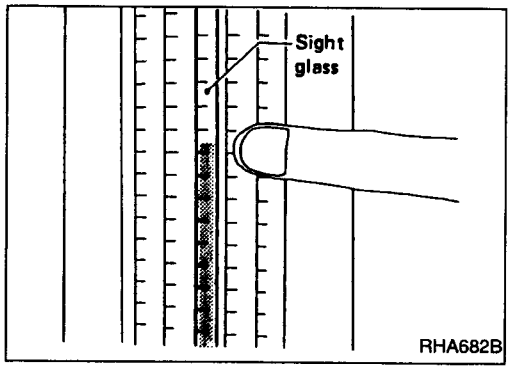
1. Record the amount of refrigerant in the sight glass before charging.
2. Subtract the required amount of refrigerant (charge quantity specified for the vehicle) from the amount of refrigerant recorded in step 1. Charge refrigerant into the system until the remaining value equals to the value indicated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

Example:

Level in sight glass: 3 lb 8 oz
Charge specification (from service manual) 2.0 - 2.4 lb.
Calculate charge quantity into lb and oz as follows: 1 lb = 16 oz, and 0.1 lb = 1.6 oz, so that 2.0 lb = 32 oz, 2.4 lb = 32 + (4 × 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.



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



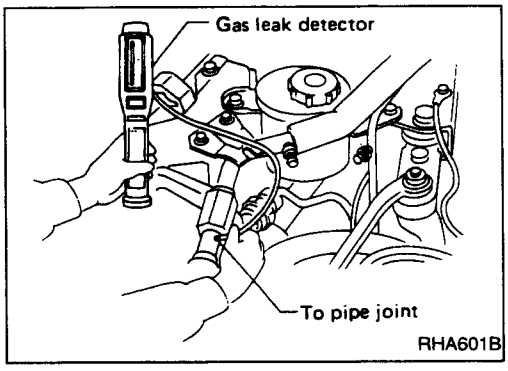
PRELIMINARY CHARGING OF REFRIGERANT

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.

Charging Refrigerant (Cont'd)



PRELIMINARY CHECK FOR REFRIGERANT LEAKS

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

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

CHARGING REFRIGERANT

1. Slowly open high pressure valve of manifold gauge, and charge calculate 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.

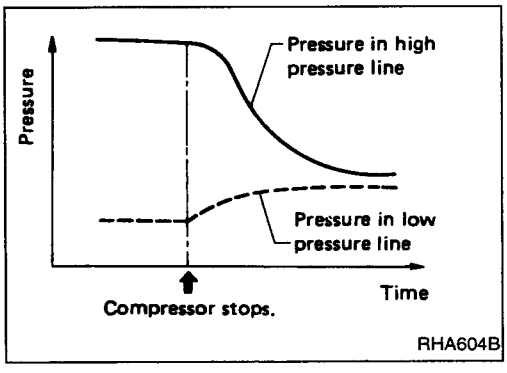
2. Close high pressure valve of manifold gauge.
3. Make sure that the calculated amount of refrigerant remains in sight glass.
4. Close charging cylinder outlet valve.
5. Turn off heater if it is on (when using heater equipped).

Inspection for Refrigerant Leaks

WORK PROCEDURE

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

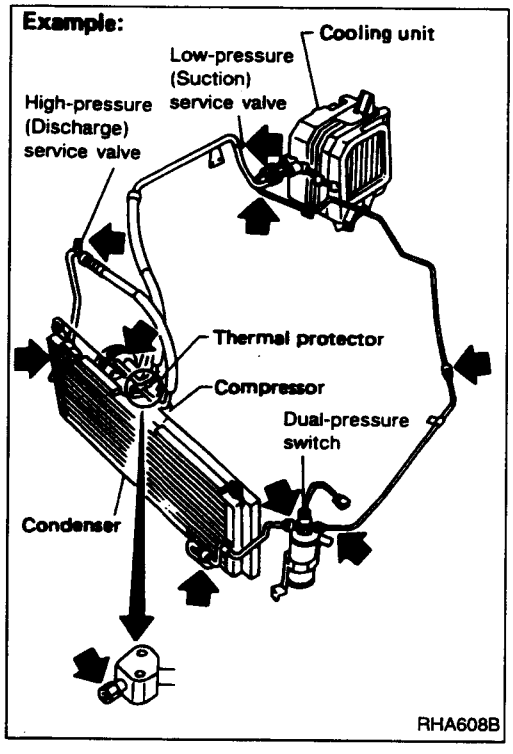
- Start engine.
- Run air conditioner.
- Set blower fan control to MAX.
- Set temperature control to FULL COLD.
- Run the refrigerant system for more than 5 minutes after setting the above-mentioned conditions (to circulate refrigerant through the system).

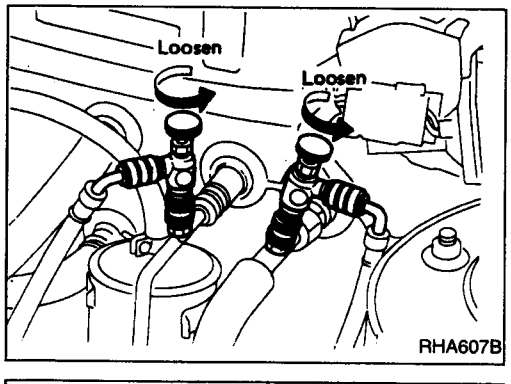


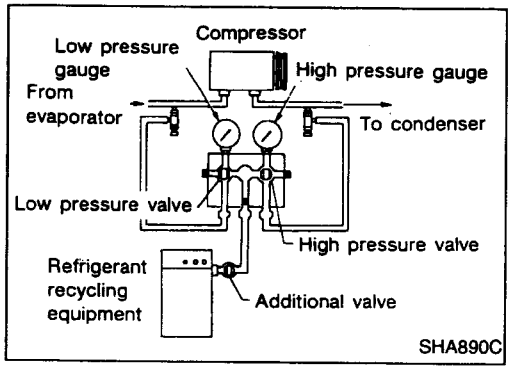
Refrigerant leaks should be checked immediately after stopping engine, beginning with high pressure line, using a gas leak detector. This is because the pressure in high pressure line drops gradually after refrigerant circulation stops while the pressure in low pressure line rises gradually as shown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

Inspection for Refrigerant Leaks (Cont'd)

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







INSPECTION POINTS

Check carefully each tube joint. 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 caps.

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 valves of low pressure and high pressure lines.
2. Close additional valve and remove center 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.

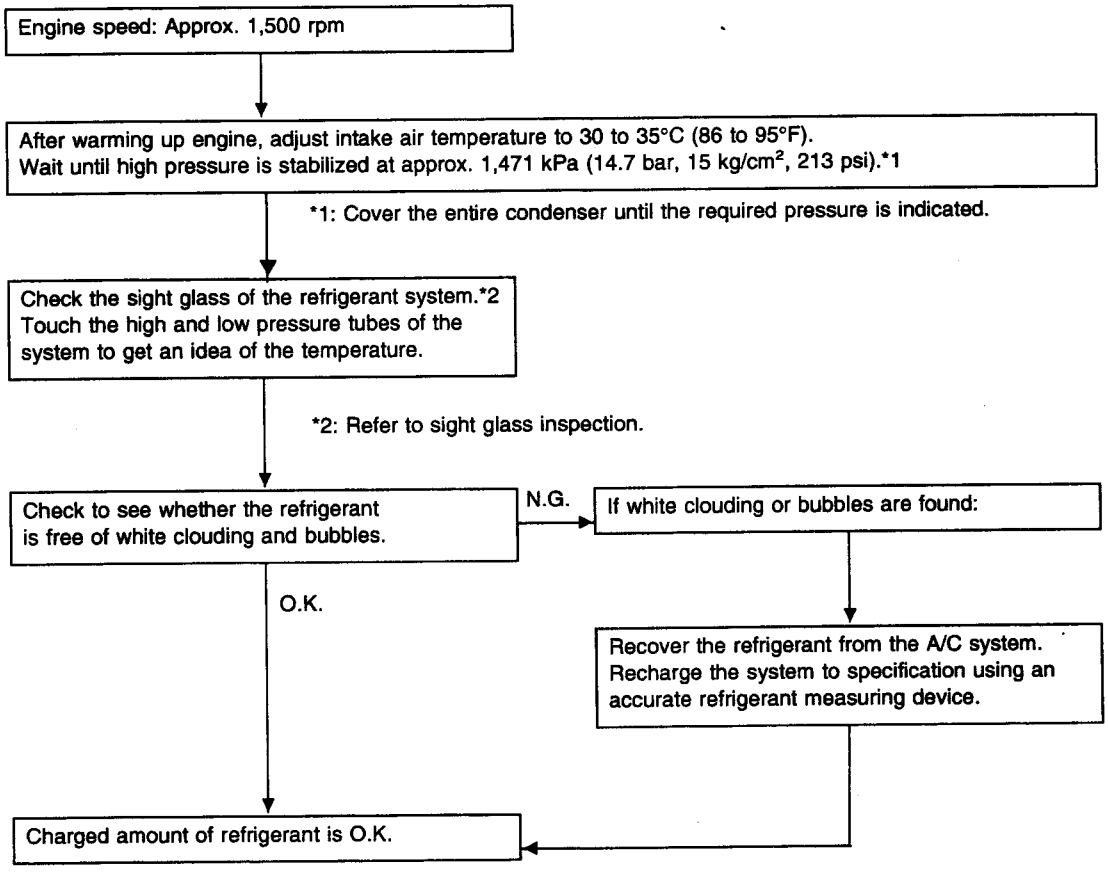
Confirmation of Amount of Charged Refrigerant

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

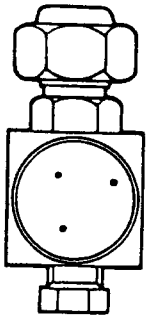
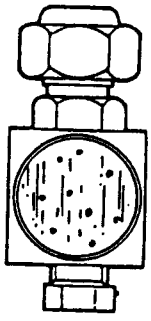
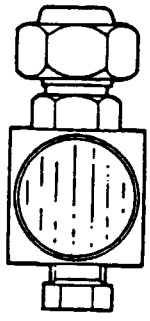
CONDITIONS

- Doors:
  Close completely.
- Window glasses:
  Close completely.
- Intake lever position:
  RECIRC
- Mode lever position:
  VENT
- Blower fan:
  HI
- TEMP control:
  Optional (Set so that intake air temperature is 30 to 35°C (86 to 95°F).
- A/C switch:
  ON
- Engine speed:
  Approx. 1,500 rpm

WORK PROCEDURE



Confirmation of Amount of Charged Refrigerant (Cont'd)

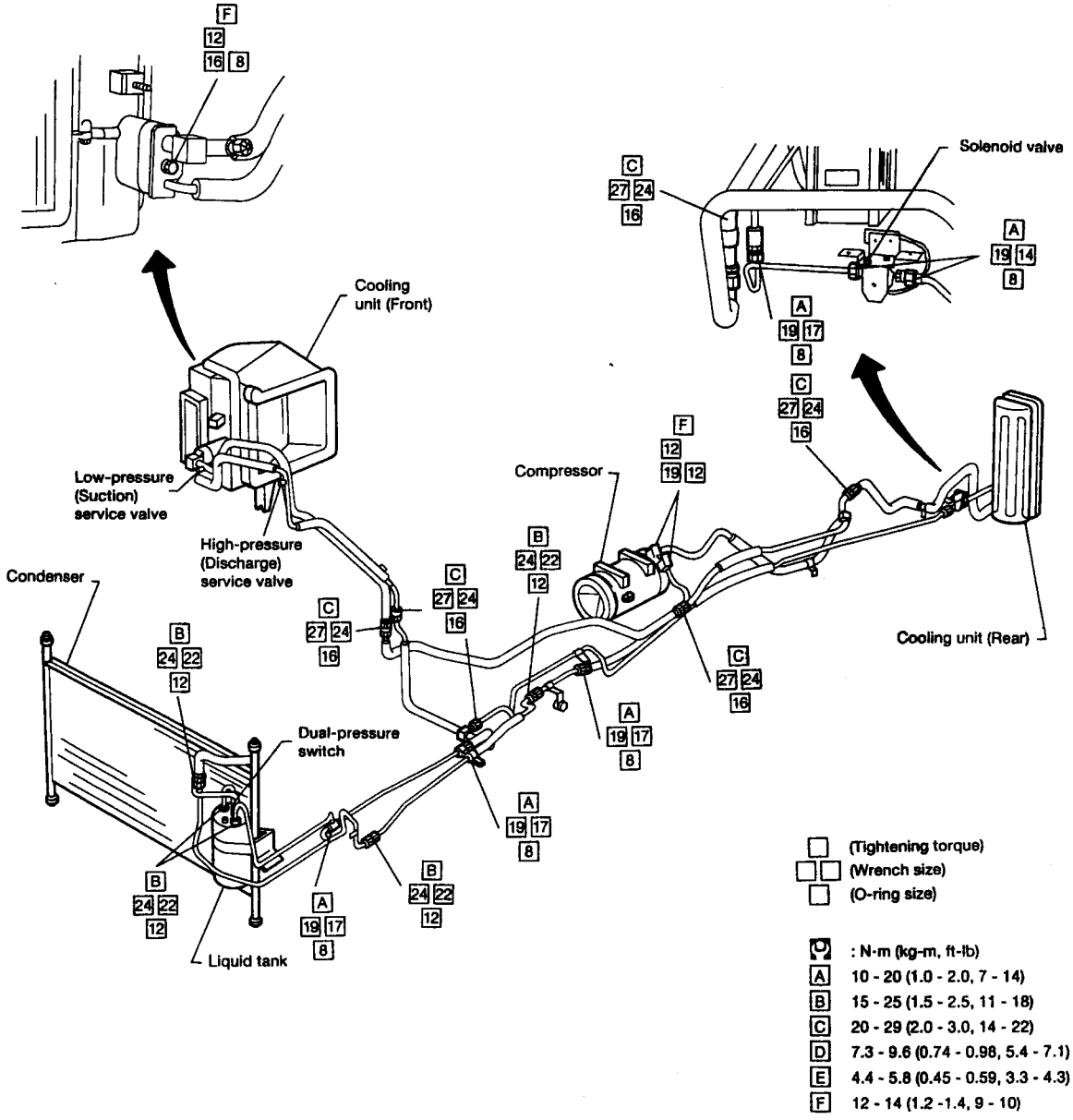
Amount of charge / Check item	Appropriate	Refrigerant is insufficient	Almost no refrigerant	Overcharged, or air in system
Temperature of high and low pressure pipes	High pressure side is hot while low pressure side is cold.	High pressure side is warm and low pressure side is somewhat cold.	No difference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

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.

Refrigerant Lines

SR20DE ENGINE — L.H.D. MODELS

- **Refer to "Precautions for Refrigerant Connection" on page HA-3.**

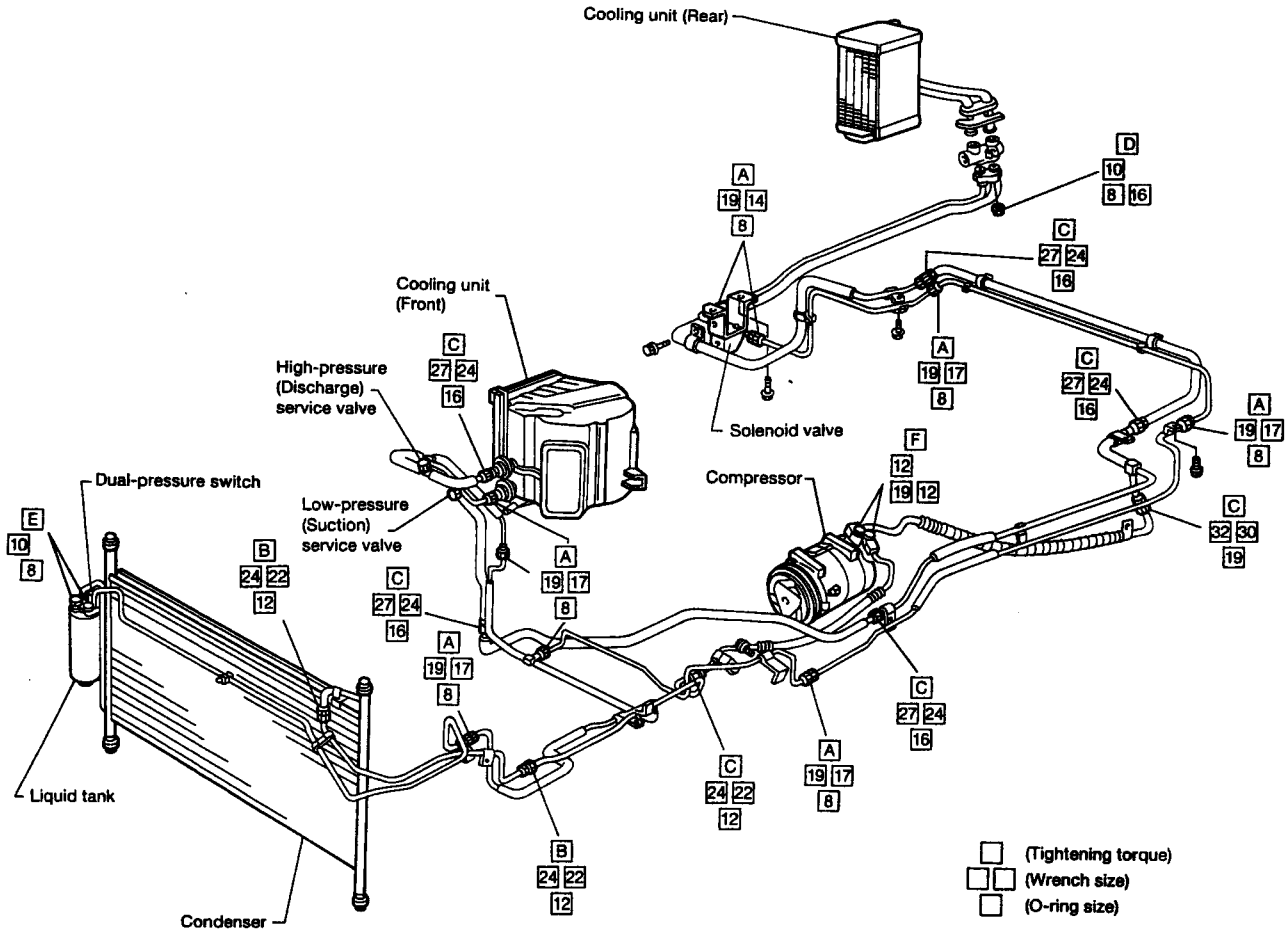


RHA411D

Refrigerant Lines

SR20DE ENGINE — R.H.D. MODELS

- **Refer to "Precautions for Refrigerant Connection" on page HA-3.**

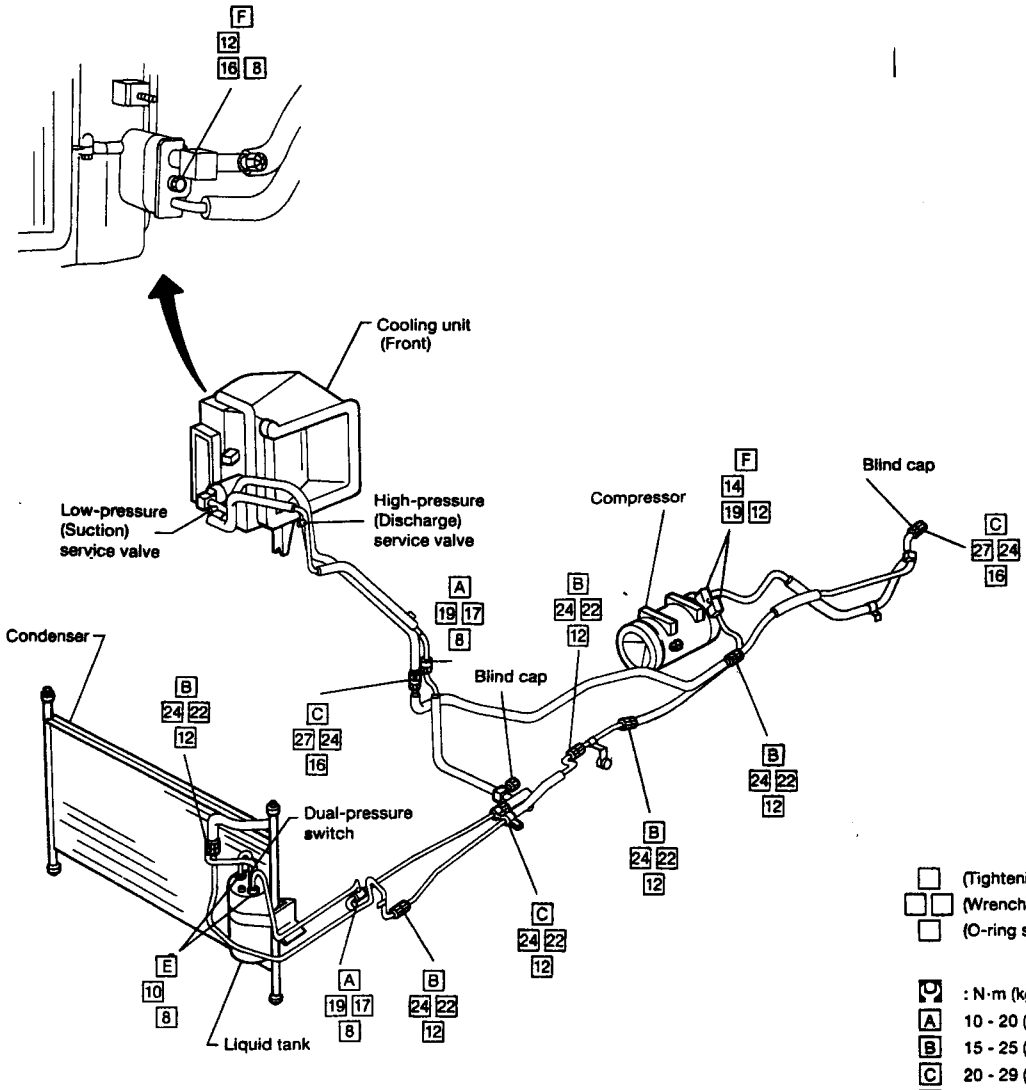


RHA412D

Refrigerant Lines

GA16DE ENGINE — L.H.D. MODELS

- **Refer to "Precautions for Refrigerant Connection" on page HA-3.**

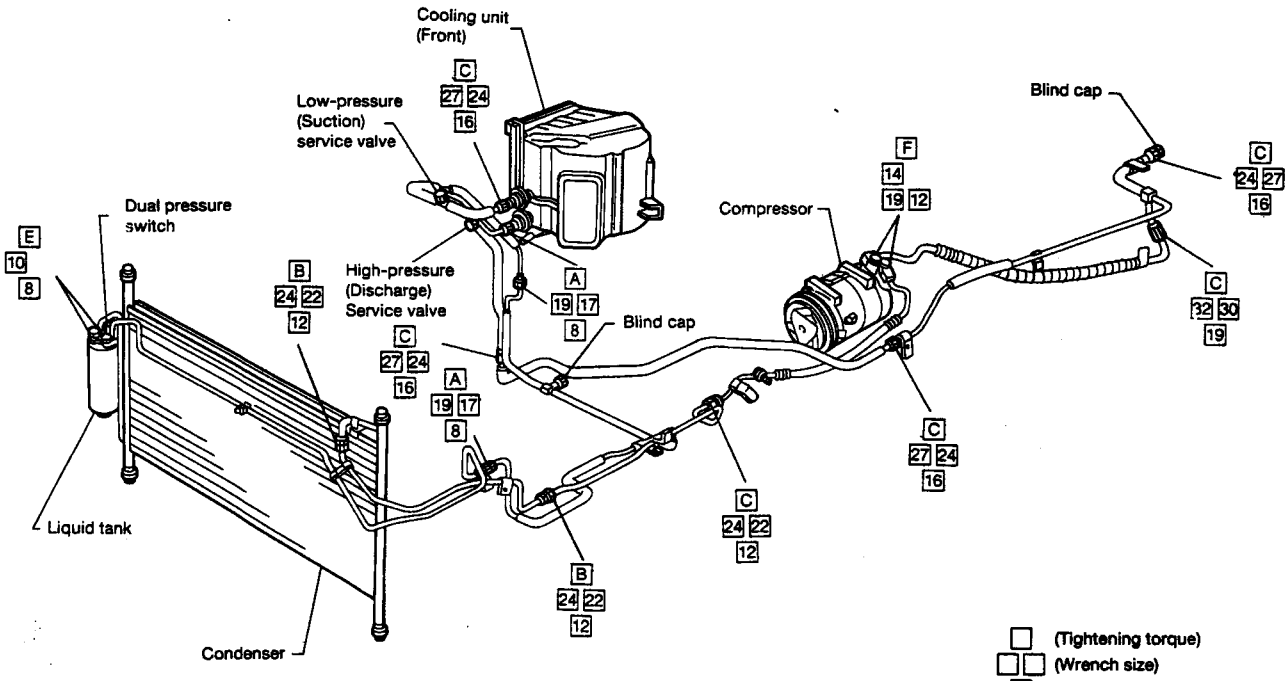


RHA413D

Refrigerant Lines

GA16DE ENGINE — R.H.D. MODELS

- **Refer to "Precautions for Refrigerant Connection" on page HA-3.**

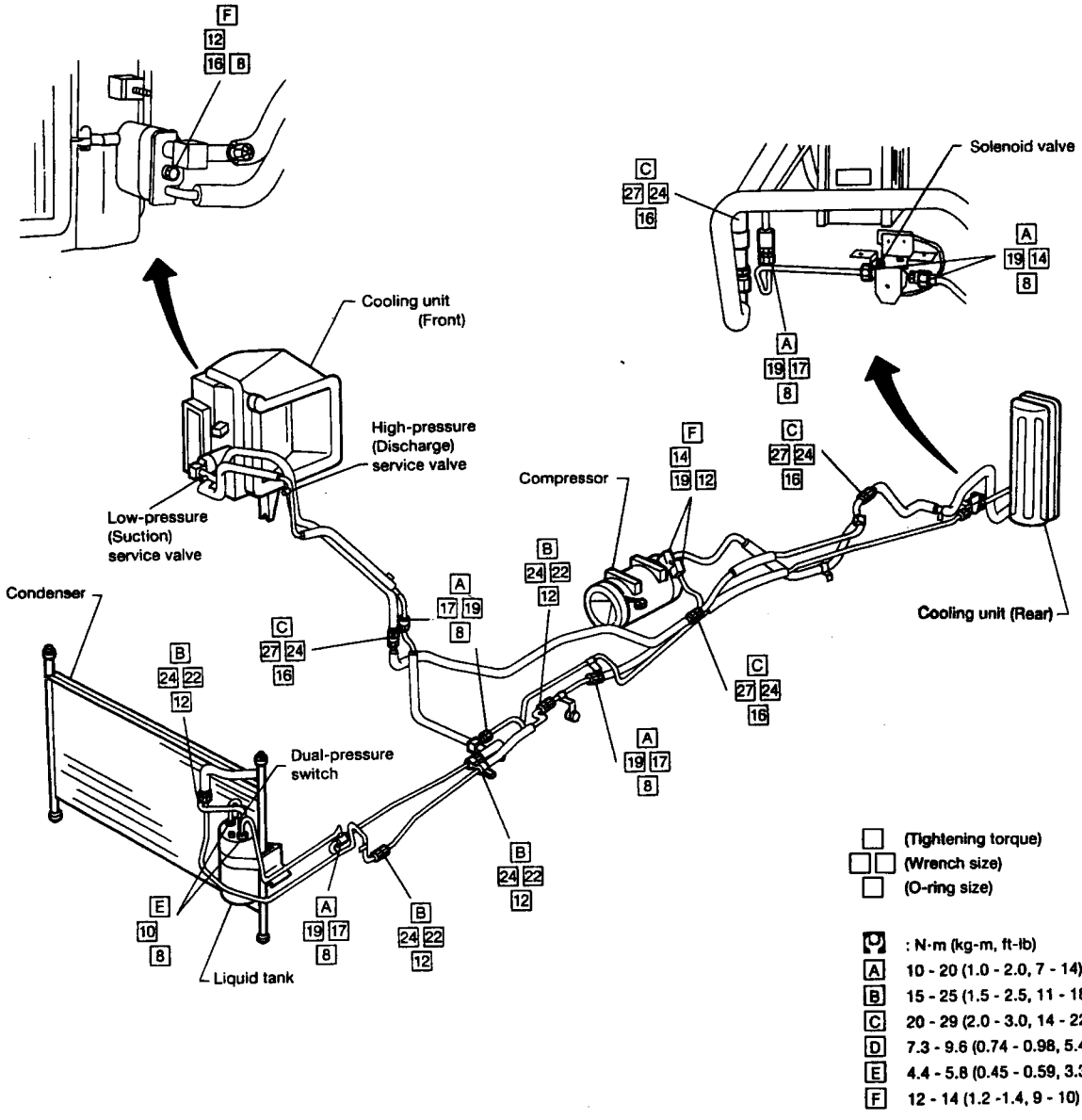


RHA414D

Refrigerant Lines

LD20II ENGINE — L.H.D. MODELS

- **Refer to "Precautions for Refrigerant Connection" on page HA-3.**

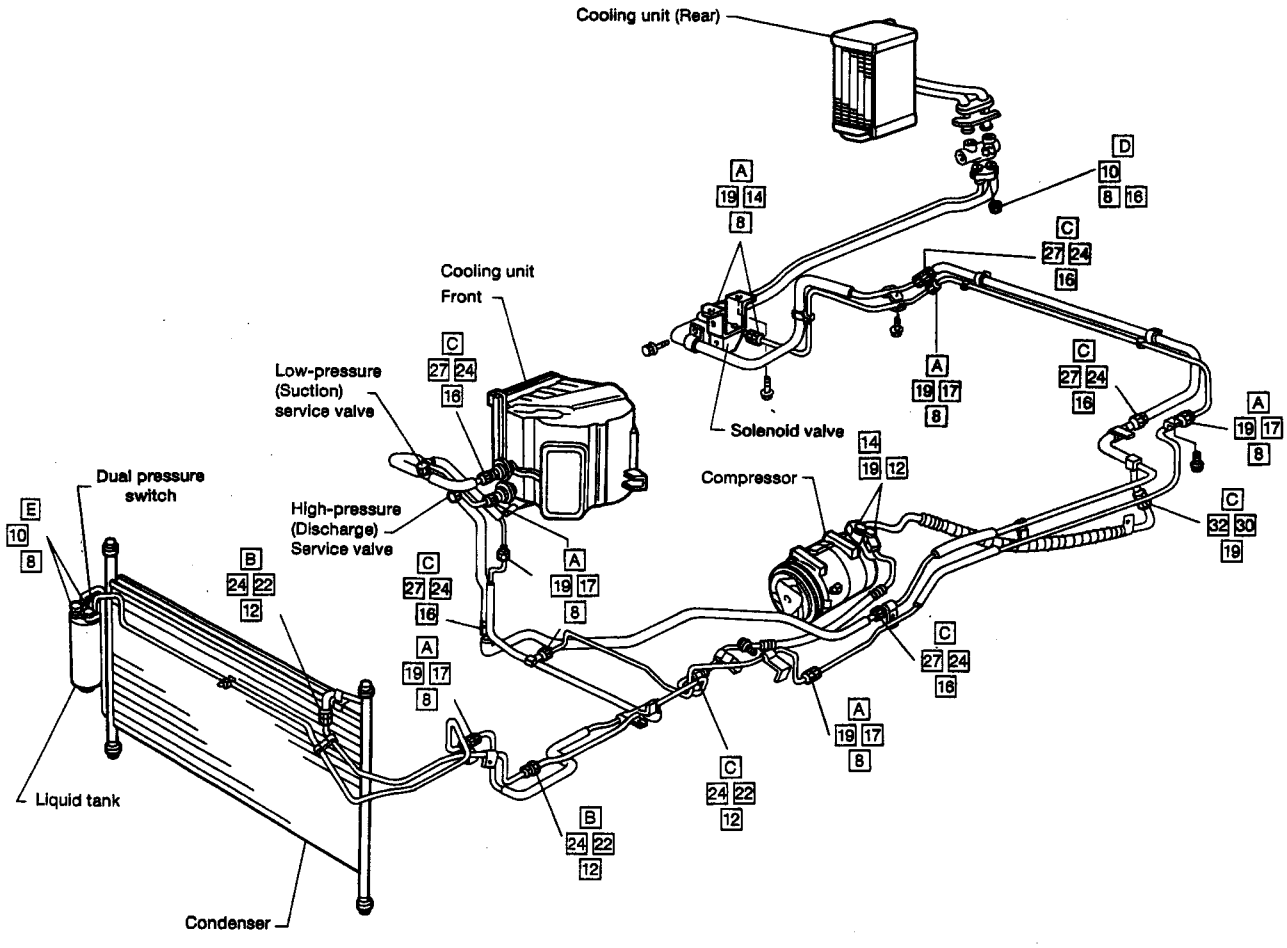


RHA415D

Refrigerant Lines

LD20II ENGINE — R.H.D. MODELS

- **Refer to "Precautions for Refrigerant Connection" on page HA-3.**

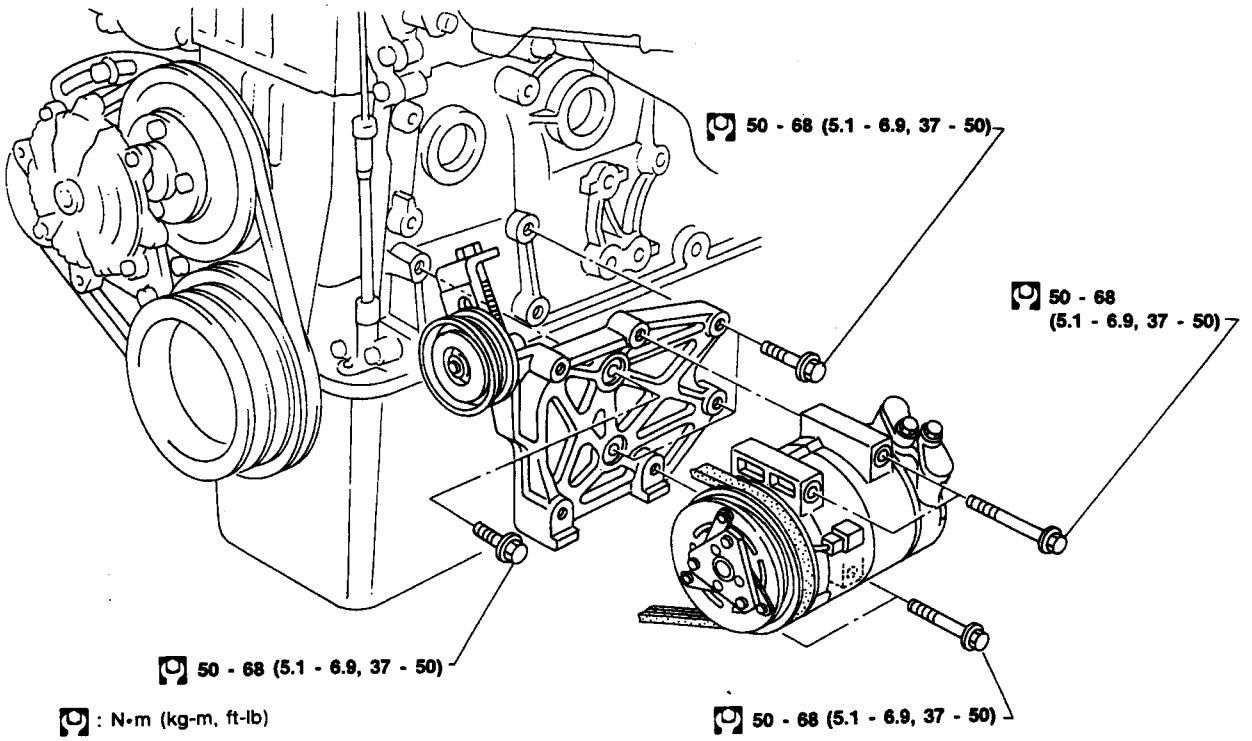


□ (Tightening torque)
□□ (Wrench size)
□ (O-ring size)

□ : N·m (kg-m, ft-lb)
A 10 - 20 (1.0 - 2.0, 7 - 14)
B 15 - 25 (1.5 - 2.5, 11 - 18)
C 20 - 29 (2.0 - 3.0, 14 - 22)
D 7.3 - 9.6 (0.74 - 0.98, 5.4 - 7.1)
E 4.4 - 5.8 (0.45 - 0.59, 3.3 - 4.3)
F 12 - 14 (1.2 -1.4, 9 - 10)

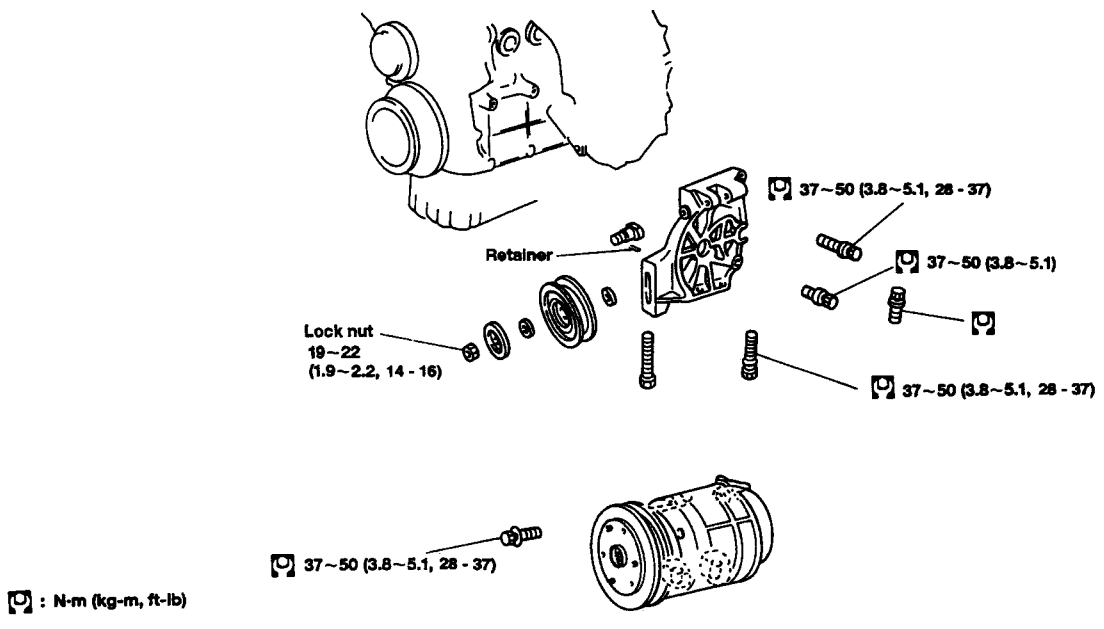
RHA416D

Compressor Mounting

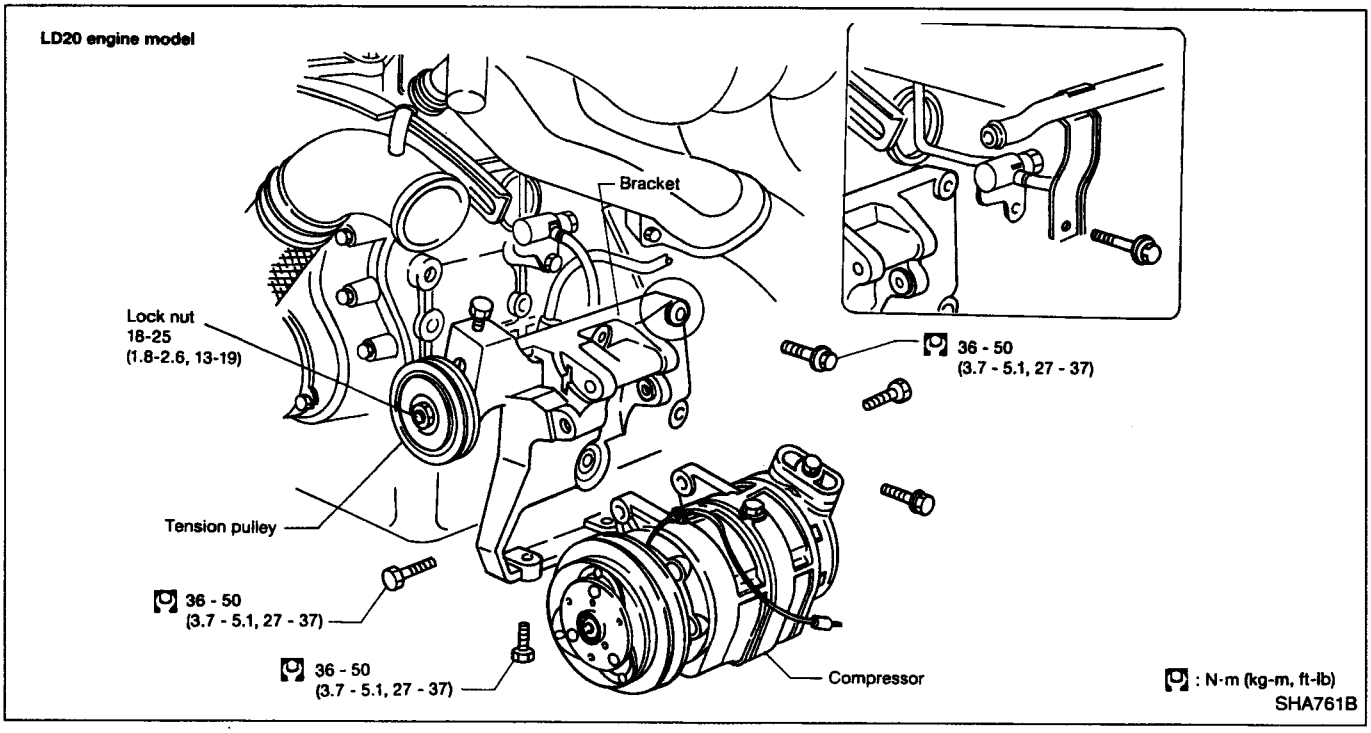


SHA258D

QA 16 DE ENGINE



RHA417D

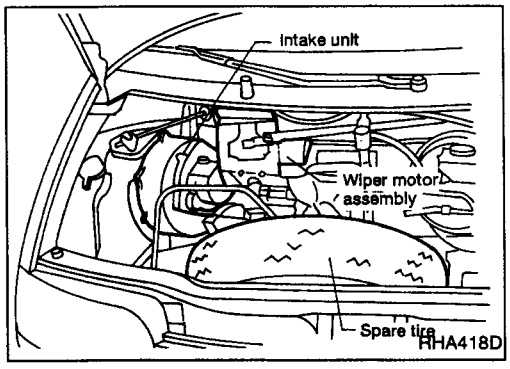


Belt Tension

- **Refer to MA section.**

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

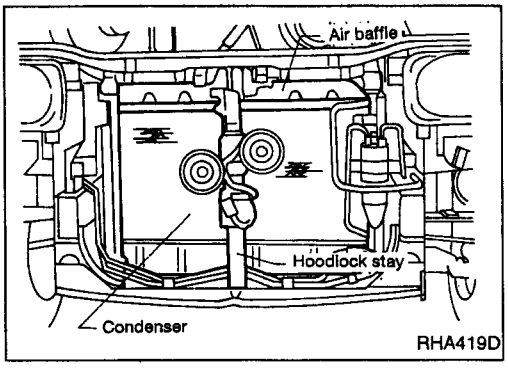
- **Refer to EF & EC section.**



Intake Unit

REPLACEMENT

Before starting the removal operation, remove the spare tire and wiper motor assembly.



Condenser

REPLACEMENT

When replacing the condenser, the following procedures are suggested to take.

1. Remove the bumper completely by removing six (6) screws and four (4) nuts.
2. Remove the radiator grille and air baffle.
3. Finally remove the hoodlock stay.

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.

START

Can oil return operation be performed?
- A/C system works properly.
- There is no evidence of a large amount of oil leakage.

Yes → Perform oil return operation, proceeding as follows:

1. Start engine, and set the following conditions:
   - **Test condition**
     Engine speed: Idling to 1,200 rpm
     A/C or AUTO switch: ON
     Blower speed: Max. position
     Temp. control: Optional [Set so that intake air temperature is 25 to 33°C (77 to 86°F).]
2. Next item is for Variable Displacement Wobble Plate Type compressor. Connect the manifold gauge, and check, that the high pressure side pressure is 588 kPa (6 kg/cm^2, 85 psi) or higher. If less than the reference level, attach a cover tothe front face of the condenser to raise the pressure.
3. Perform oil return operating for about 10 minutes.
4. Stop engine.

CAUTION:
If excessive oil leakage is noted, do not perform the oil return operation.

No

Should the compressor be replaced?

No

Yes

Ⓐ
(Go to next page.)

Is there any part to be replaced?
(Evaporator, condenser, liquid tak or in case there is evidence of a large amount of oil leakage.)

Yes → After replacing any of the following major components of the system, be sure to add the correct amount of oil to the system.
Amount of oil to be added

Part replaced	Oil to be added to system		Remarks
	Amount of oil mℓ (US fl oz, Imp fl oz)	Ratio (%)	
Evaporator	45 - 75 (1.5 - 2.5, 1.6 - 2.6)	30	—
Condenser	30 - 50 (1.0 - 1.7, 1.1 - 1.8)	20	—
Liquid tank	15 - 25 (0.5 - 0.8, 0.5 - 0.8)	10	Add if compressor is not replaced*1
In case of refrigerant leak	30 - 50 (1.0 - 1.7, 1.1 - 1.8)	—	Large leak
		—	Small leak*2

*1) If compressor is replaced, addition of oil is included in the flow chart.
*2) If refrigerant leak is small, no addition of oil is needed. "Ratio" in this table indicated the ratio of added oil to the overall amouint of oil needed in the system.

No

Carry out the A/C performance test.

Checking and Adjusting (Cont'd)

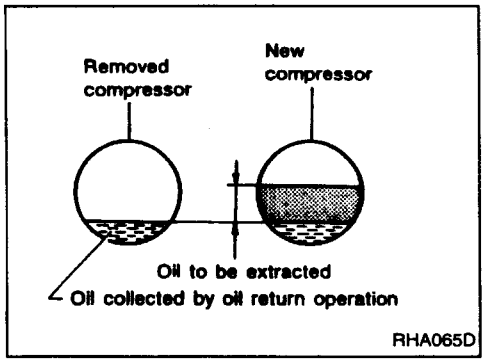
Ⓐ

Remove compressor oil from the new compressor according to the following table so that the remaining amount of oil in the new compressor is equal to the amount of recollected oil in the removed compressor.

Unit: mℓ (Imp fl oz)

	Oil quantity contained in new compressor		Amount of collected oil	Amount of oil extracted from new compressor
Rotary type	DKV14C	200 (7.0)	70 (2.5) or over	200 (7.0) — [Amount collected + 20 (0.7)]
			Below 70 (2.5)	110 (3.9)
	NVR140 NVR140S	200 (7.0)	90 (3.2) or over	200 (7.0 — [Amount collected + 20 (0.7)]
			Below 90 (3.2)	90 (3.2)
Swash plate type	DKS16H DKS16N	200 (7.0)	130 (4.6) or over	200 (7.0) — [Amount collected + 20 (0.7)]
			Below 130 (4.6)	70 (2.5)
	MJS170 MJS130	150 (5.3)	—	80 (2.8)
Wobble plate type	DCW17	200 (7.0)	120 (4.2)	200 (7.0) — [Amount collected + 20 (0.7)]
			Below 120 (4.2)	70 (2.5)

Precharged amount of oil for some models differ from figures listed above. Refer to S.D.S. of each model when servicing compressor oil



Is it necessary to replace any parts other than compressor?

Yes → Add oil according to the oil management table for major equipment. Refer to oil management standard.

No

Perform performance test. Refer to performance test. (HA-49)

If the result of performance test is N.G., carry out oil return operation again, and check the oil quantily.

Oil Management Standard for Major Equipment

When any major unit of the air conditioner has been replaced, add the following amount of oil.

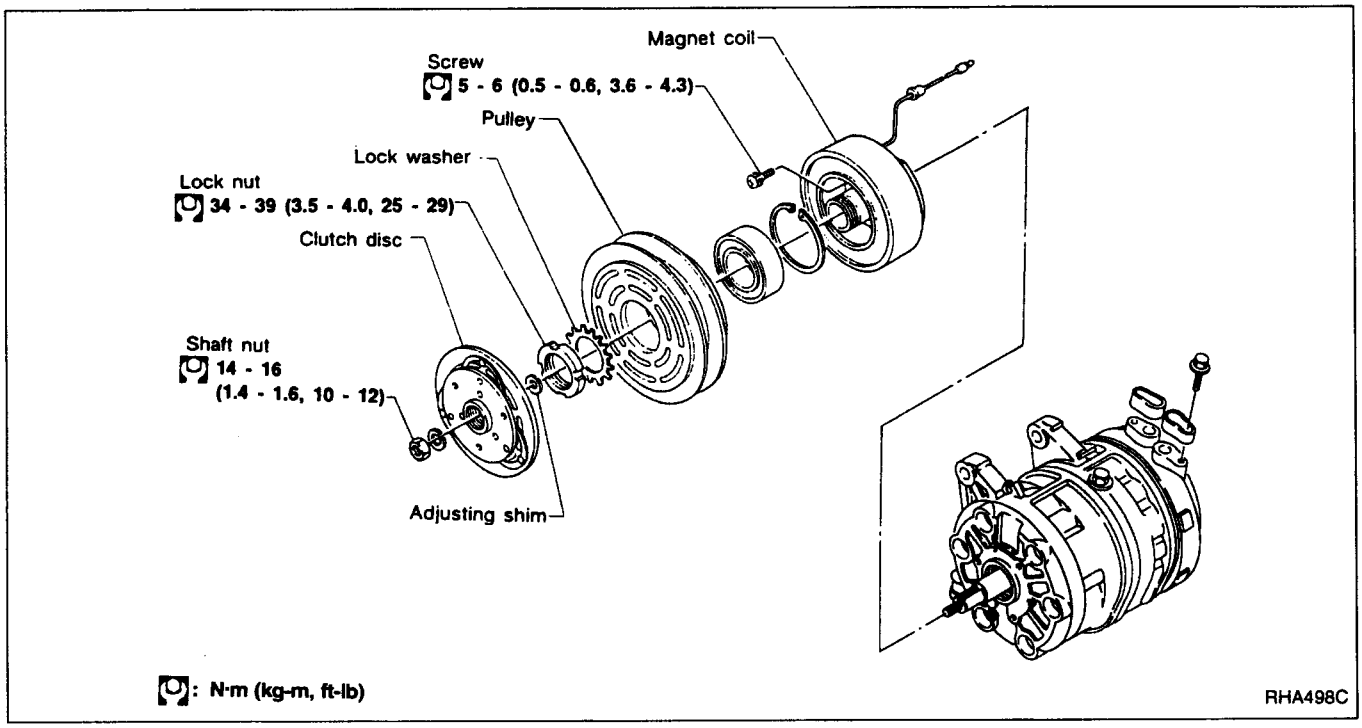
Major unit	Amount of oil to be added		Remarks
	mℓ(Imp fl oz)	Percent (%)*1	
Cooling unit, evaporator	45 - 75 (1.6 - 2.6)	30	Add compressor oil little by little from the low pressure side of the system cycle.
Condenser	30 - 50 (1.1 - 1.8)	20	
Liquid tank	15 - 25 (0.5 - 0.9)	10	
In case of refrigerant leak	30 - 50 (1.1 - 1.8)	—	Add if large of oil leak is indicated.*2
	—	—	Addition of oil is not required if no oil leak is indicated.

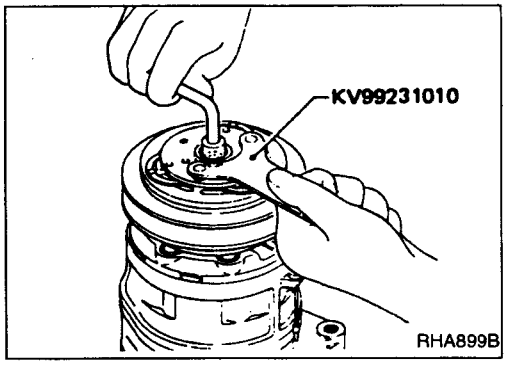
*1: The percentage of the total amount of system oil
*2: Sudden leakage of refrigerant due to fusion of a fusible plug, opening of a relief valve, or damage of a component may accompany oil leak.

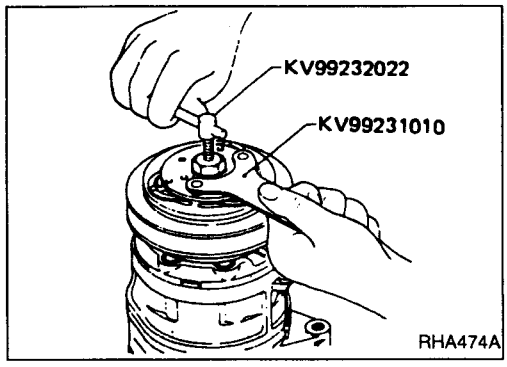
Compressor Oil

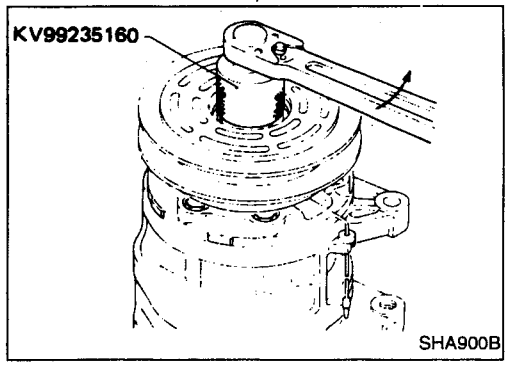
The recommended brand of compressor oil for a car air conditioner system is shown below. For the oil quantity, refer to the section **"Checking and Adjusting"**.

SUNISO 5GS or equivalent







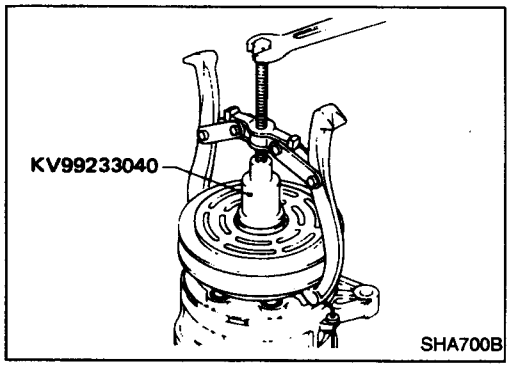


Compressor Clutch

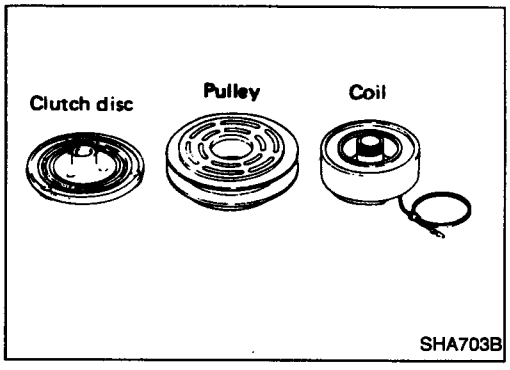
REMOVAL

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

Compressor Clutch (Cont'd)

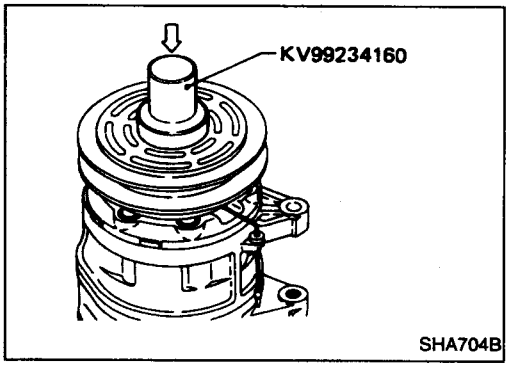


- Remove the pulley by hand. If difficult, use puller pilot.



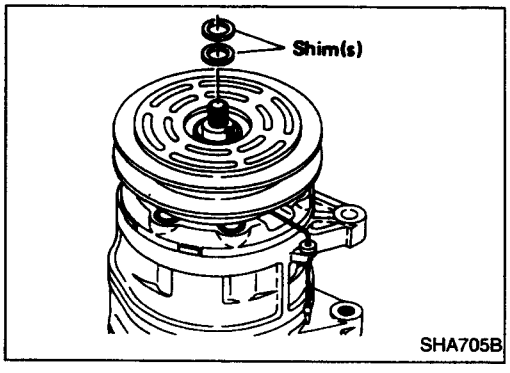
INSPECTION

Clutch disc: If the contact surface shows signs of damage due to excessive heat, the drive plate and pulley should be replaced.
Pulley: Check the appearance of the pulley assembly. If the contact surface of the pulley shows signs of excessive grooving due to slippage, both the pulley and drive plate should be replaced. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.
Coil: Check coil for loose connection or cracked insulation.

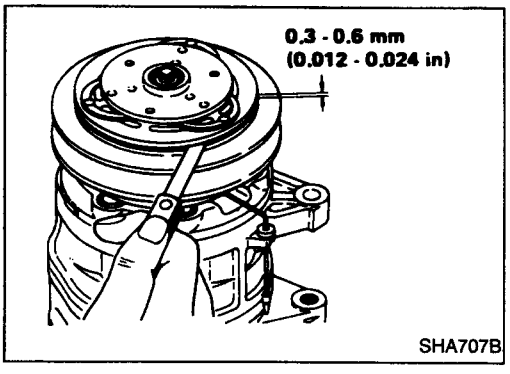


INSTALLATION

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



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



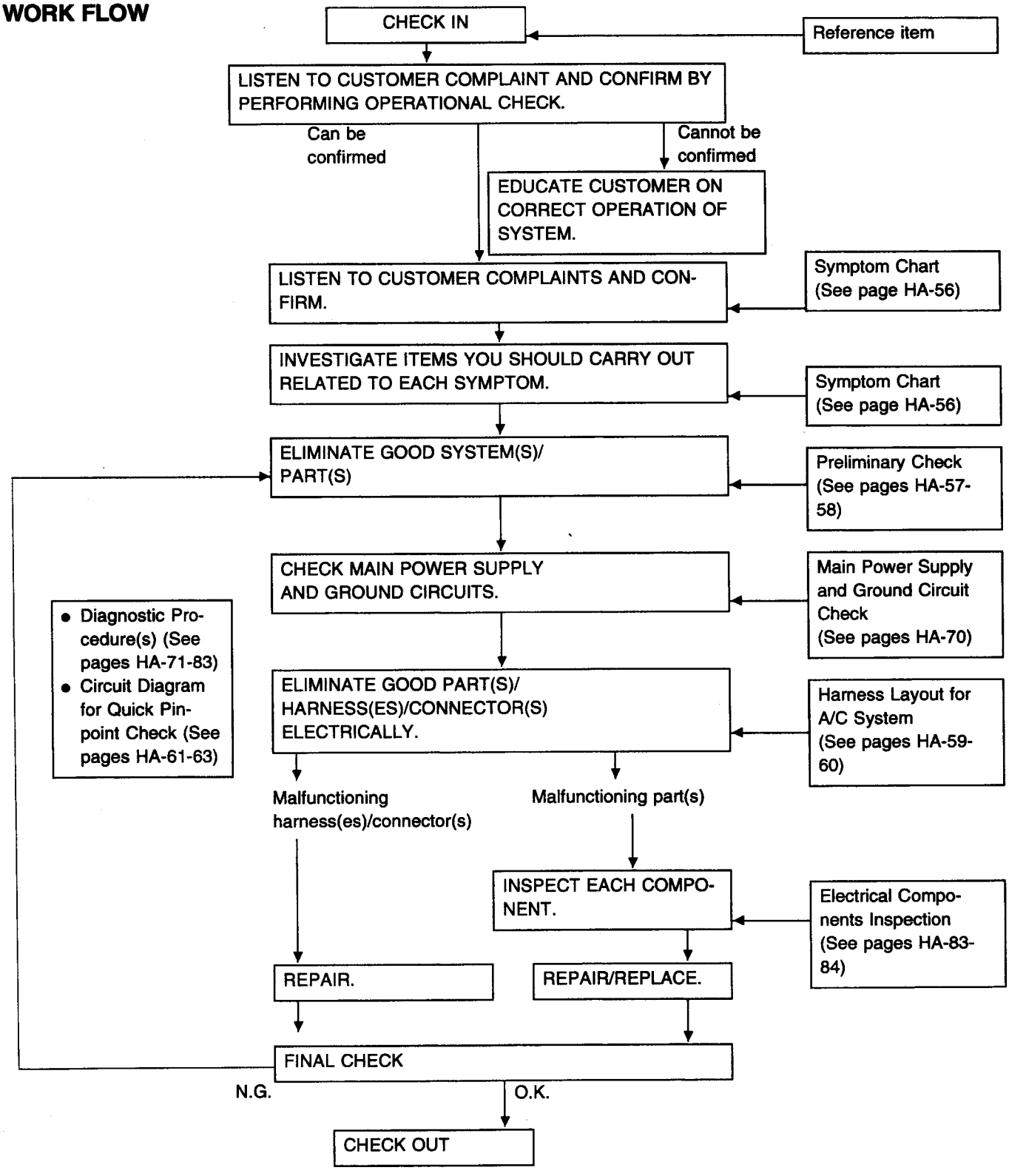
- Check to ensure that the clutch clearance is between 0.3 to 0.6 mm (0.012 to 0.024 in). Adjust the clearance using shim(s) as necessary.

BREAK-IN OPERATION

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

How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW

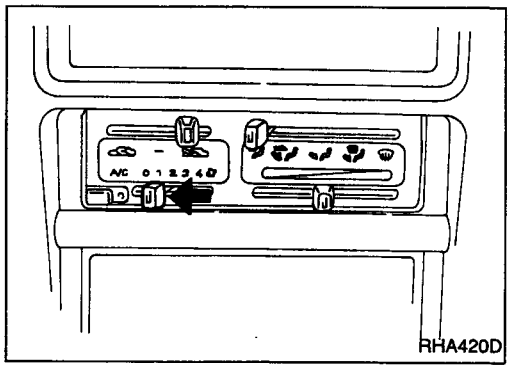


Operational Check

The purpose of the operational check is to confirm that the system is as it should be. The systems which will be checked are the blower, mode (discharge air), intake air, temperature decrease, temperature increase and A/C switch.

CONDITIONS:

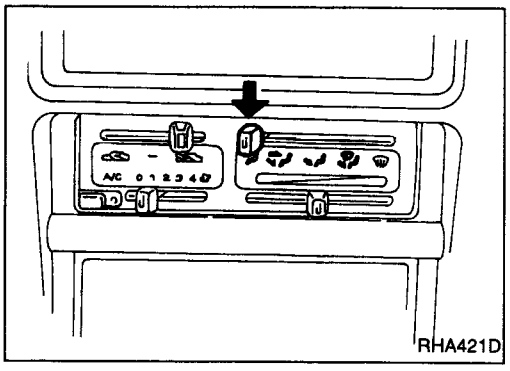
- **Engine running and at normal operating temperature.**



PROCEDURE: FRONT

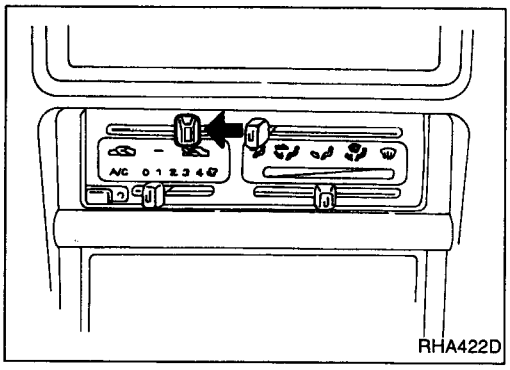
1. Check blower

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



2. Check discharge air.

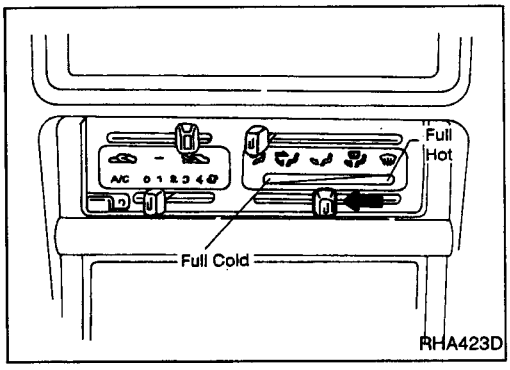
1) Slide mode lever to position.
2) Confirm that all discharge air comes out of face vents.
3) Slide mode lever to position.
4) Confirm that discharge air comes out of face vents and foot vents.
5) Slide mode lever to position.
6) Confirm that discharge air comes out of foot vents, with some air from defroster vents.
7) Slide mode lever to position.
8) Confirm that discharge air comes out of foot vents with some air from defroster vents.
9) Slide mode lever to position.
10) Confirm that all discharge air comes out of defroster vents.



3. Check air recirculation

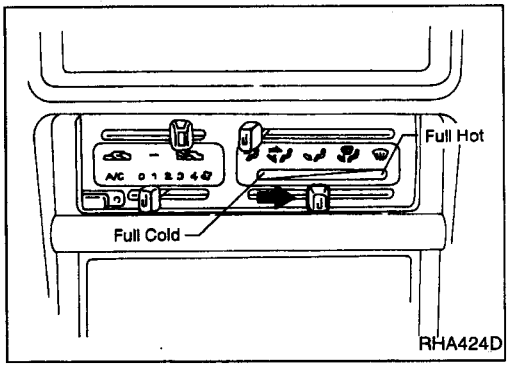
1) Slide intake lever to position.
2) Listen for intake door position change (you should hear sound change slightly).

Operational Check (Cont'd)



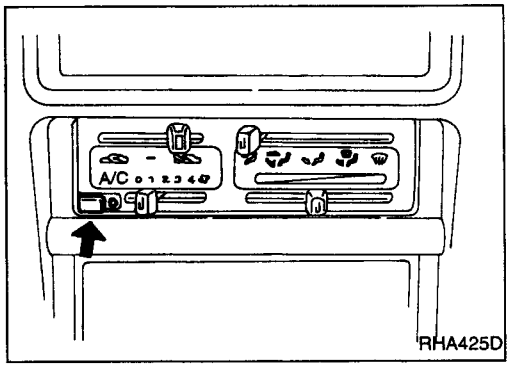
4. Check temperature decrease

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



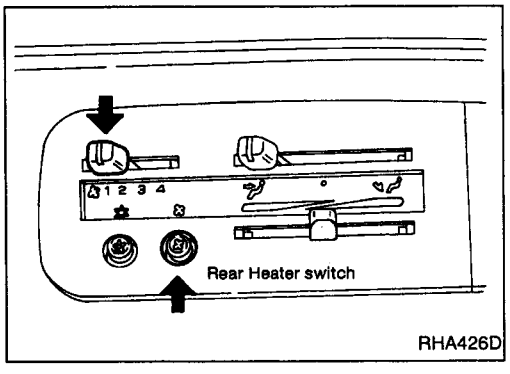
5. Check temperature increase

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



6. Check A/C switch

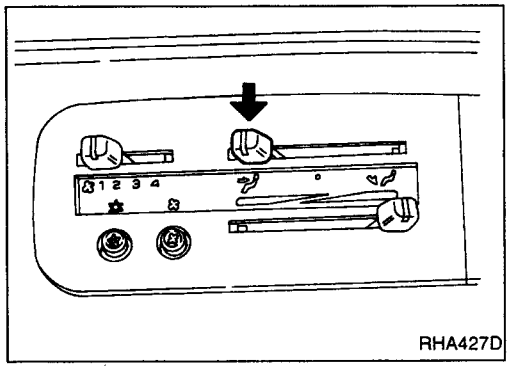
Move fan control lever to the desired position (1 to 4) and press air conditioner button to turn ON air conditioner. Indicator light will come on when air conditioner is ON.



PROCEDURE: REAR

1. Check blower

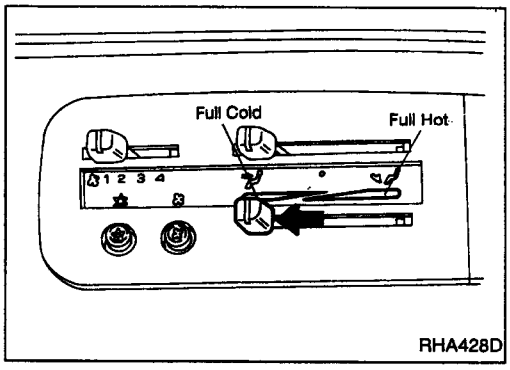
1) Press Rear Heater switch and then slide Rear FAN lever to 1.
2) Then slide lever to speed 1 or 2.
3) Continue checking blower speed until all speeds are checked.
4) Leave blower on speed 3 or 4.



2. Check discharge air

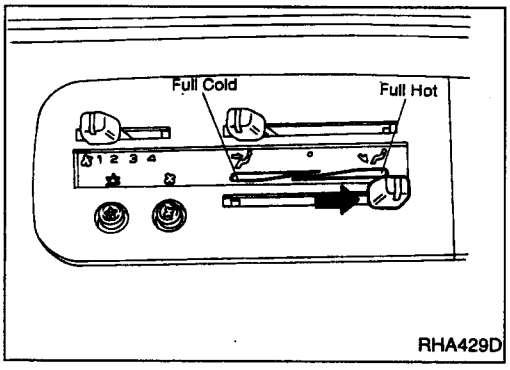
1) Slide mode lever to position.
2) Confirm that all discharge air comes out of rear vent ducts, located in the middle of ceiling.
3) Slide mode lever to the middle position between and Confirm that all discharge air comes out of rear vent ducts and rear foot ducts.
4) Slide mode lever to position. Confirm that all discharge air comes out of rear vent ducts.

Operational Check (Cont'd)



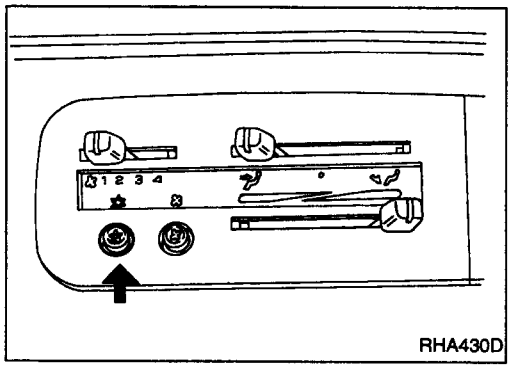
3. Check temperature decrease

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



4. Check temperature increase

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



5. Check A/C switch

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

Performance Chart

TEST CONDITION

For Auto Air Conditioner, before conducting performance test, disconnect ambient sensor harness connector and make short circuit using jumper cable.

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
Front & rear TEMP.: Max. cold
Front & rear discharge air: Ventilation
REC switch: (Recirculation) set
Front & rear fan position: Max. position
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

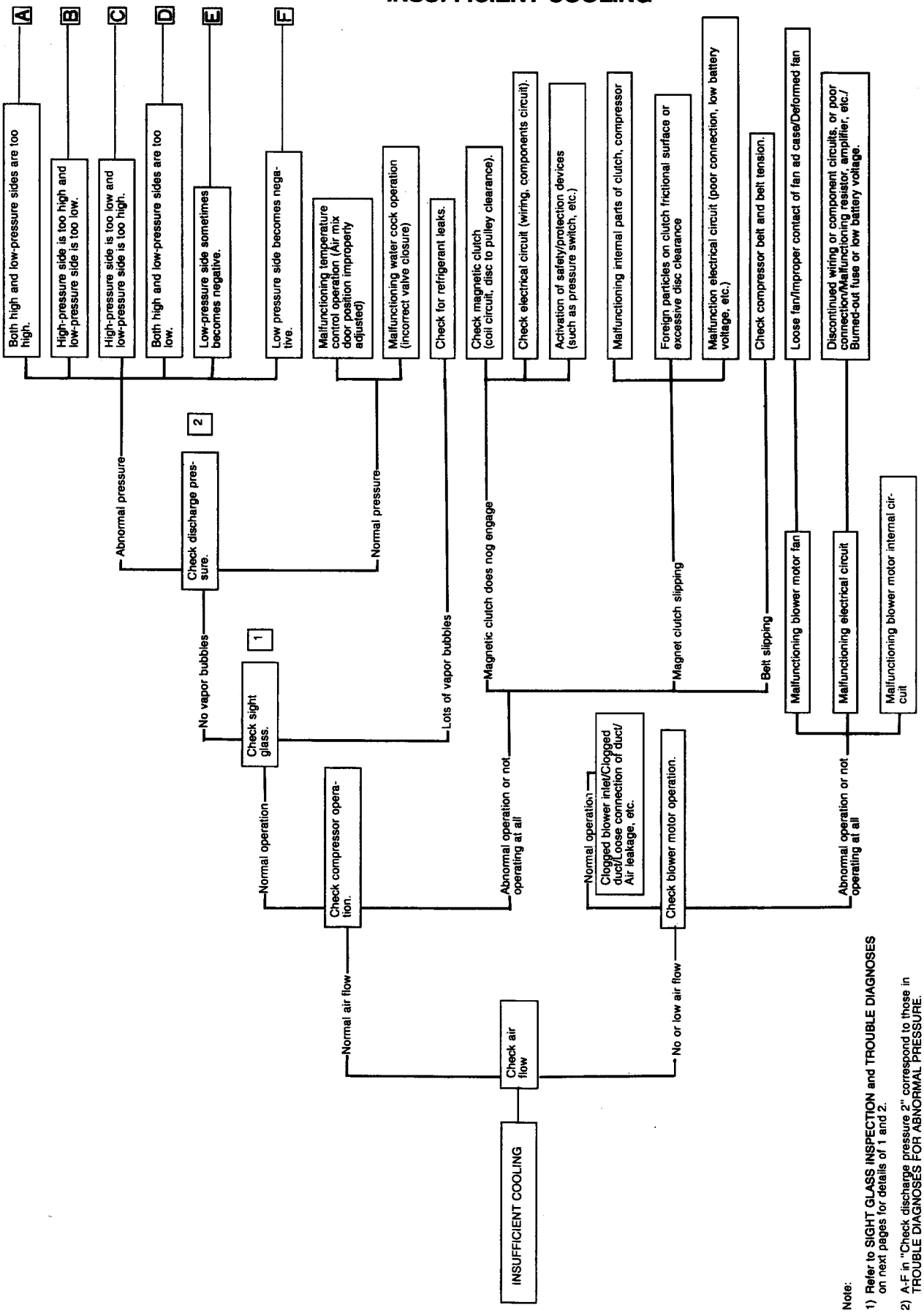
Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)	
Relative humidity %	Air temperature °C (°F)	Front	Rear
50 - 60	20 (68)	8.2 - 9.8 (47 - 50)	8.2 - 10.3 (47 - 51)
	25 (77)	12.8 - 14.4 (55 - 58)	12.6 - 14.7 (55 - 58)
	30 (86)	17.4 - 19.1 (63 - 66)	17.0 - 19.1 (63 - 66)
	35 (95)	22.0 - 23.7 (72 - 75)	21.4 - 23.5 (71 - 74)
	40 (104)	26.6 - 28.4 (80 - 83)	25.8 - 27.9 (78 - 82)
60 - 70	20 (68)	9.8 - 11.6 (50 - 53)	10.3 - 12.5 (51 - 55)
	25 (77)	14.4 - 16.2 (58 - 61)	14.7 - 16.9 (58 - 62)
	30 (86)	19.1 - 20.8 (66 - 69)	19.1 - 21.4 (66 - 71)
	35 (95)	23.7 - 25.4 (75 - 78)	23.5 - 25.8 (74 - 78)
	40 (104)	28.4 - 30.0 (83 - 86)	27.9 - 30.3 (82 - 87)

Ambient air temperature-to-compressor pressure table

Ambient air		High-pressure (Discharge side) kPa (bar, kg/cm^2, psi)	Low-pressure (Suction side) kPa (bar, kg/cm^2, psi)
Relative humidity %	Air temperature °C (°F)		
50 - 70	20 (68)	932 - 1,138 (9.32 - 11.38, 9.5 - 11.6, 135 - 165)	186.3 - 240.3 (1.863 - 2.403, 1.9 - 2.45, 27.0 - 34.8)
	25 (77)	1,147 - 1,353 (11.47 - 13.53, 11.7 - 13.8, 166 - 196)	235.4 - 289.3 (2.354 - 2.893, 2.4 - 2.95, 34.1 - 41.9)
	30 (86)	1,363 - 1,569 (13.63 - 15.69, 13.9 - 16.0, 198 - 228)	279.5 - 333.4 (2.795 - 3.334, 2.85 - 3.4, 40.5 - 48.3)
	35 (95)	1,569 - 1,785 (15.69 - 17.85, 16.0 - 18.2, 228 - 259)	328.5 - 382.5 (3.285 - 3.825, 3.35 - 3.9, 47.6 - 55.5)
	40 (104)	1,785 - 2,001 (17.85 - 20.01, 18.2 - 20.4, 259 - 290)	372.7 - 426.6 (3.727 - 4.266, 3.8 - 4.35, 54.0 - 61.9)

Performance Test Diagnoses

INSUFFICIENT COOLING



Note:

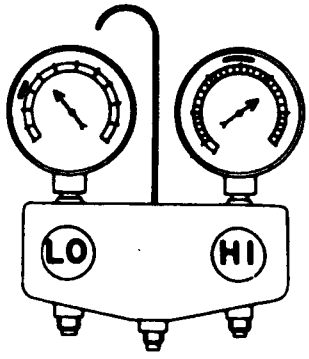
1) Refer to SIGHT GLASS INSPECTION and TROUBLE DIAGNOSES on next pages for details of 1 and 2.
2) A-F in "Check discharge pressure 2" correspond to those in TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE.

Performance Test Diagnoses (Cont'd)

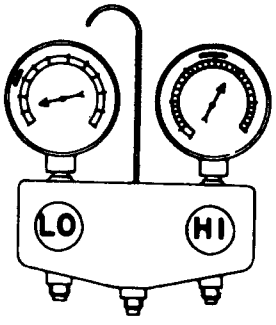
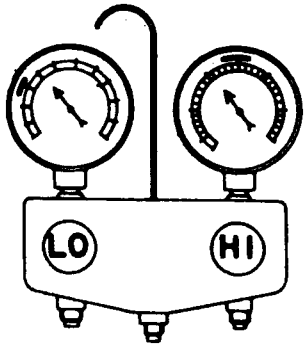
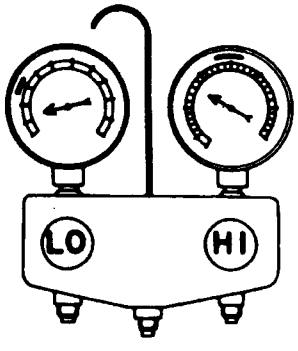
TROUBLE DIAGNOSES FOR ABNORMAL PRESSURE

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.

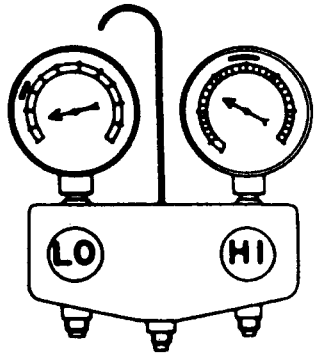
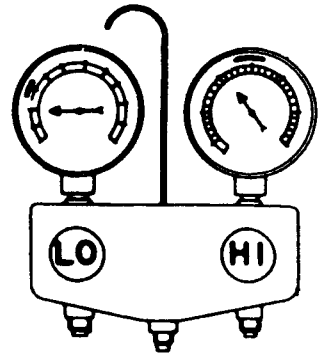
Pressure measurements are effective only when ambient temperature is in the range indicated under the heading "INSPECTION DATA (2) Measurement of compressor's high and low pressures".

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high- and low-pressure sides are too high. A  AC359A	• Pressure is reduced soon after water is splashed on condenser. • No air bubbles appear in sight glass when pressure is reduced.	Excessive refrigerant charge in refrigeration cycle	Reduce refrigerant until specified pressure is obtained.
	Air suction by radiator or condenser fan is insufficient.	Insufficient condenser cooling performance ↓ ① Condenser fins are clogged. ② Improper rotation of radiator fan or condenser fan	• Clean condenser. • Check and repair radiator or condenser fan as necessary.
	• Low-pressure pipe is not cold. • When compressor is stopped high-pressure value quickly drops by approximately 196 kPa (2.0 bar, 2 kg/cm^2, 28 psi). It then decreases gradually thereafter.	Poor heat exchange in condenser (After compressor operation stops, high pressure decreases too slowly.) ↓ Air in refrigeration cycle	Evacuate repeatedly and recharge system.
	Engine tends to overheat.	Engine cooling systems malfunction.	Check and repair each engine cooling system.
	• 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.	• Excessive liquid refrigerant on low-pressure side • Excessive refrigerant discharge flow • Expansion valve is open a little compared with the specification. ↓ ① Improper thermal valve installation ② Improper expansion valve adjustment	Replace expansion valve.

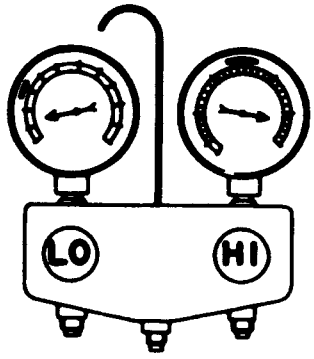
Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
High-pressure side is too high and low-pressure side is too low. B **MOISTURE IN SYSTEM**  AC360A	Upper side of condenser and high-pressure side are hot, however, liquid tank is not so hot.	High-pressure tube or parts located between compressor and condenser are clogged or crushed.	• Check and repair or replace malfunctioning parts. • Check compressor oil for contamination.
High-pressure side is too low and low-pressure side is too high. C  AC356A	High and low-pressure sides become equal soon after compressor operation stops.	Compressor pressure operation is improper. ↓ Damaged inside compressor packings	Replace compressor.
	No temperature difference between high and low-pressure sides	Compressor discharge capacity does not change. (Compressor stroke is set at maximum.)	Replace compressor.
Both high- and low-pressure sides are too low. D  AC353A	• 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.	• Replace liquid tank • Check compressor oil for contamination.
	• 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.	• Check and repair malfunctioning parts. • Check compressor oil for contamination.

Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Both high- and low-pressure sides are too low. D  AC353A	There is a big temperature difference between expansion valve inlet and outlet while the valve itself is frosted.	Expansion valve closes a little compared with the specification. ↓ ① Improper expansion valve adjustment ② Malfunctioning thermal valve ③ Outlet and inlet may be clogged.	• 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.	• Check and repair malfunctioning parts. • Check compressor oil for contamination.
	Air flow volume is not enough or is too low.	Evaporator is frozen. ↓ Compressor discharge capacity does not change. (Compressor stroke is set at maximum length.)	Replace compressor.
Low-pressure side sometimes becomes negative. E  AC354A	• 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.	Refrigerant does not discharge cyclically. ↓ Moisture is frozen at expansion valve outlet and inlet. ↓ Water is mixed with refrigerant.	• Drain water from refrigerant or replace refrigerant. • Replace liquid tank.

Performance Test Diagnoses (Cont'd)

Gauge indication	Refrigerant cycle	Probable cause	Corrective action
Low-pressure side becomes negative F  AC362A	Liquid tank or front/rear side of expansion valve's pipe is frosted or dewed.	High-pressure side is closed and refrigerant does not flow. ↓ Expansion valve or liquid tank is frosted.	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. • 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.

Contents

Symptom Chart

DIAGNOSTIC TABLE

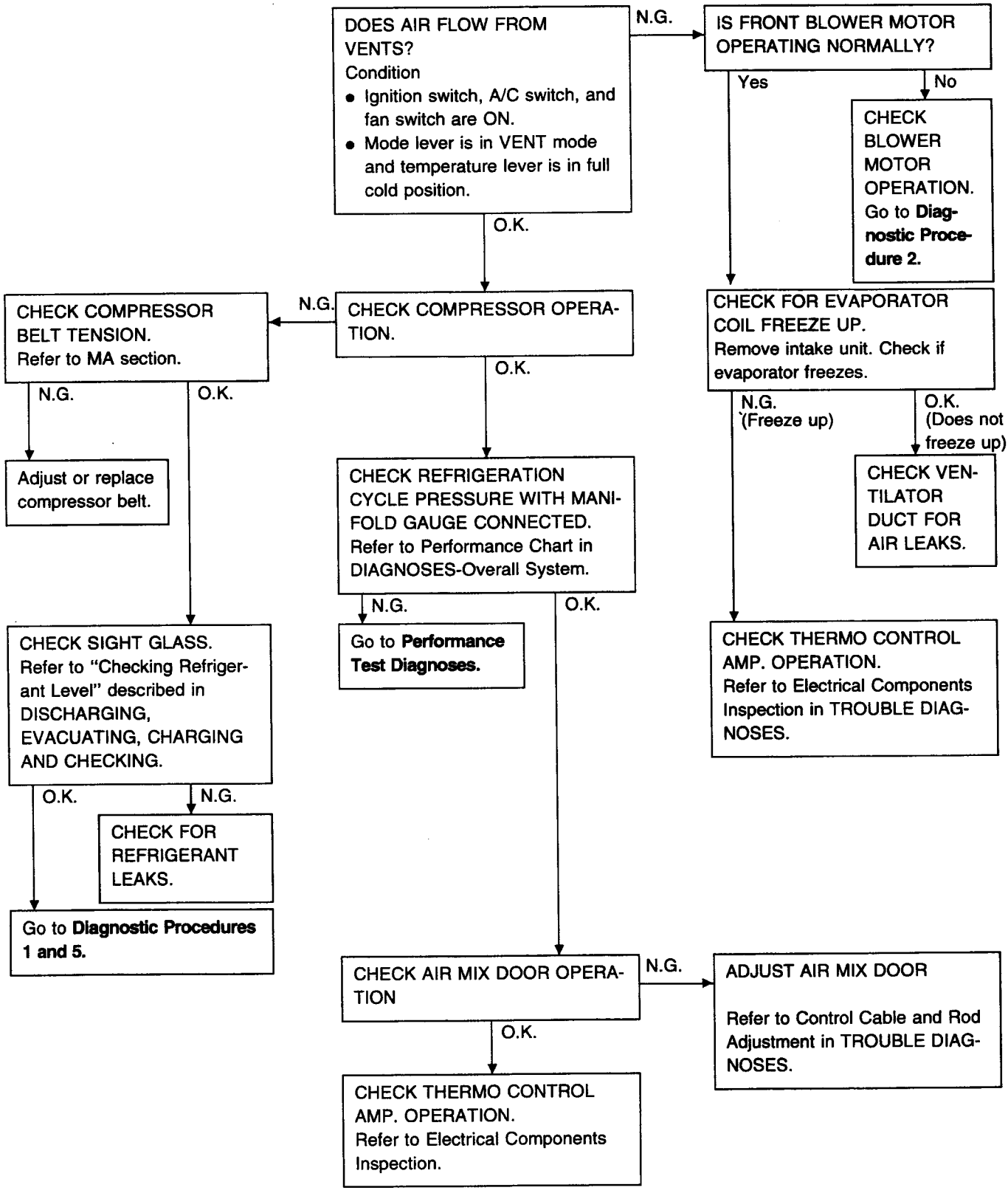
PROCEDURE	Preliminary check		Diagnostic procedure				Main Power Supply and Ground Circuit Check				Electrical Components Inspection						
	Preliminary check 1	Preliminary check 2	Diagnostic procedure 1	Diagnostic procedure 2	Diagnostic procedure 3	Diagnostic procedure 4	20A Fuse	15A Fuse	10A Fuse	Thermo control amp.	Front blower motor	Rear blower motor	Dual-pressure switch	Relay	Magnet clutch	Rear A/C solenoid valve	Front & Rear blower resistor
Front A/C does not blow cold air.	①		②	○				○	○		○		○	○	○		○
Rear A/C does not blow cold air.		①			②		○					○					○
Front blower motor does not rotate.	①			②				○			○						○
Rear blower motor does not rotate.																	
Magnet clutch does not operate.			①						○	○			○		○		
Rear A/C solenoid valve does not operate.						①		○	○					○		○	

①, ②: The number means checking order.
○: As for checking order, refer to each flow chart. (It depends on malfunctioning portion.)

Preliminary Check

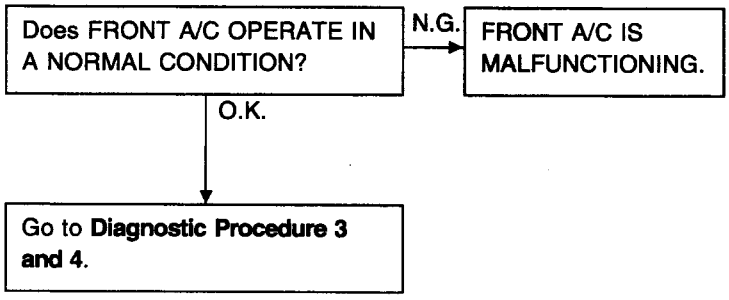
PRELIMINARY CHECK 1

Front A/C does not blow cold air.

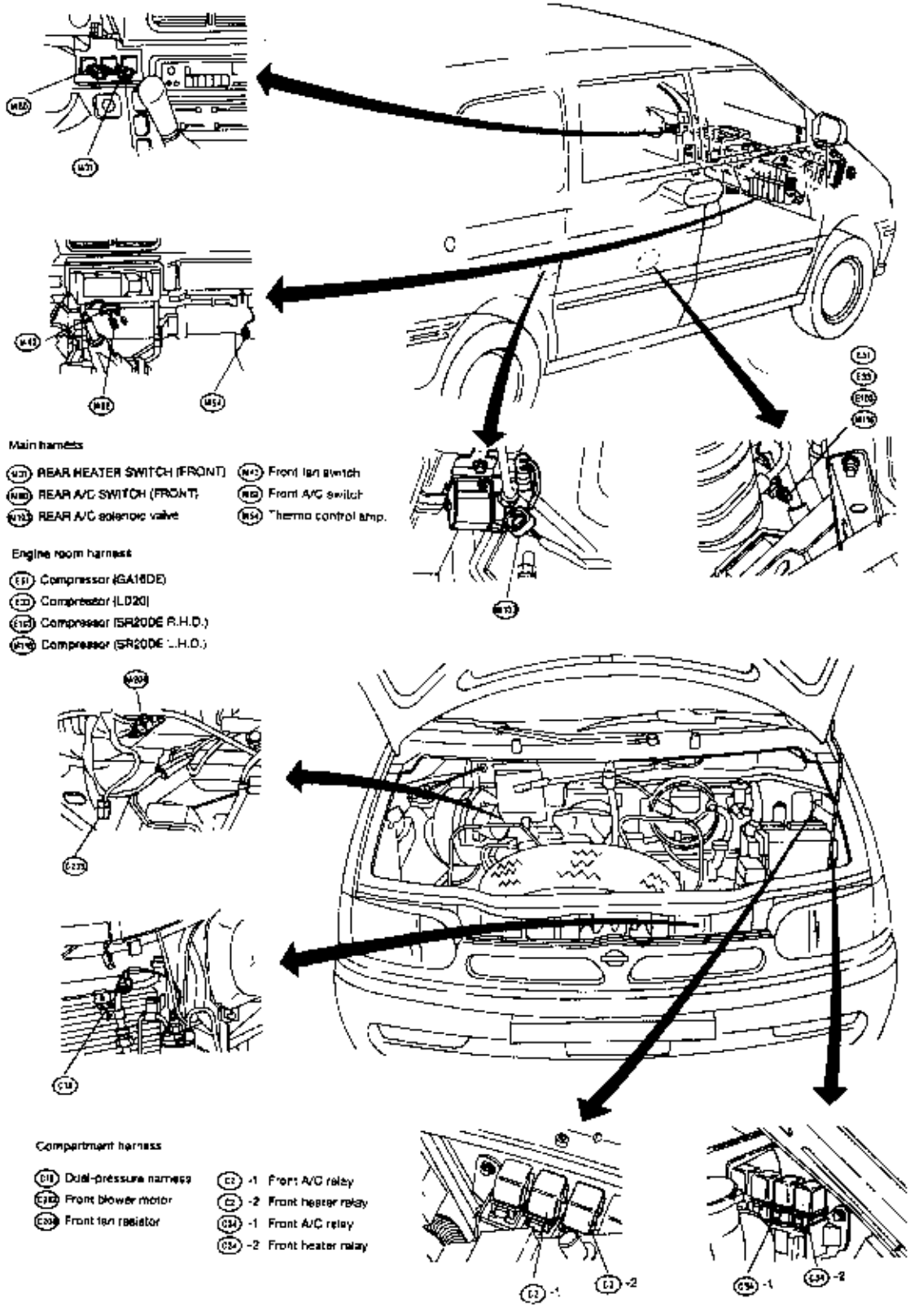


PRELIMINARY CHECK 2

REAR A/C does not blow cold air.

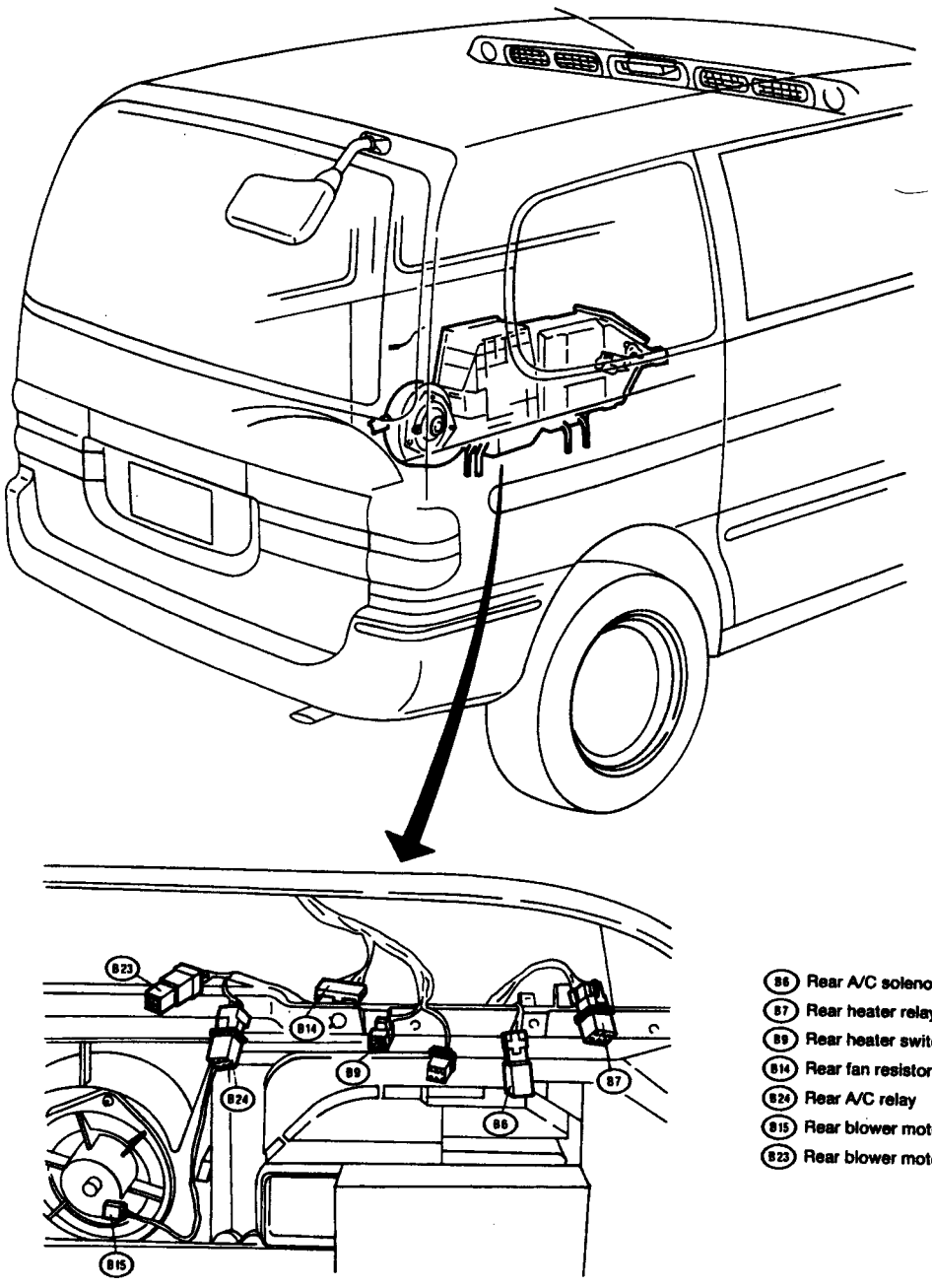


Harness Layout for A/C System



RHA431D

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

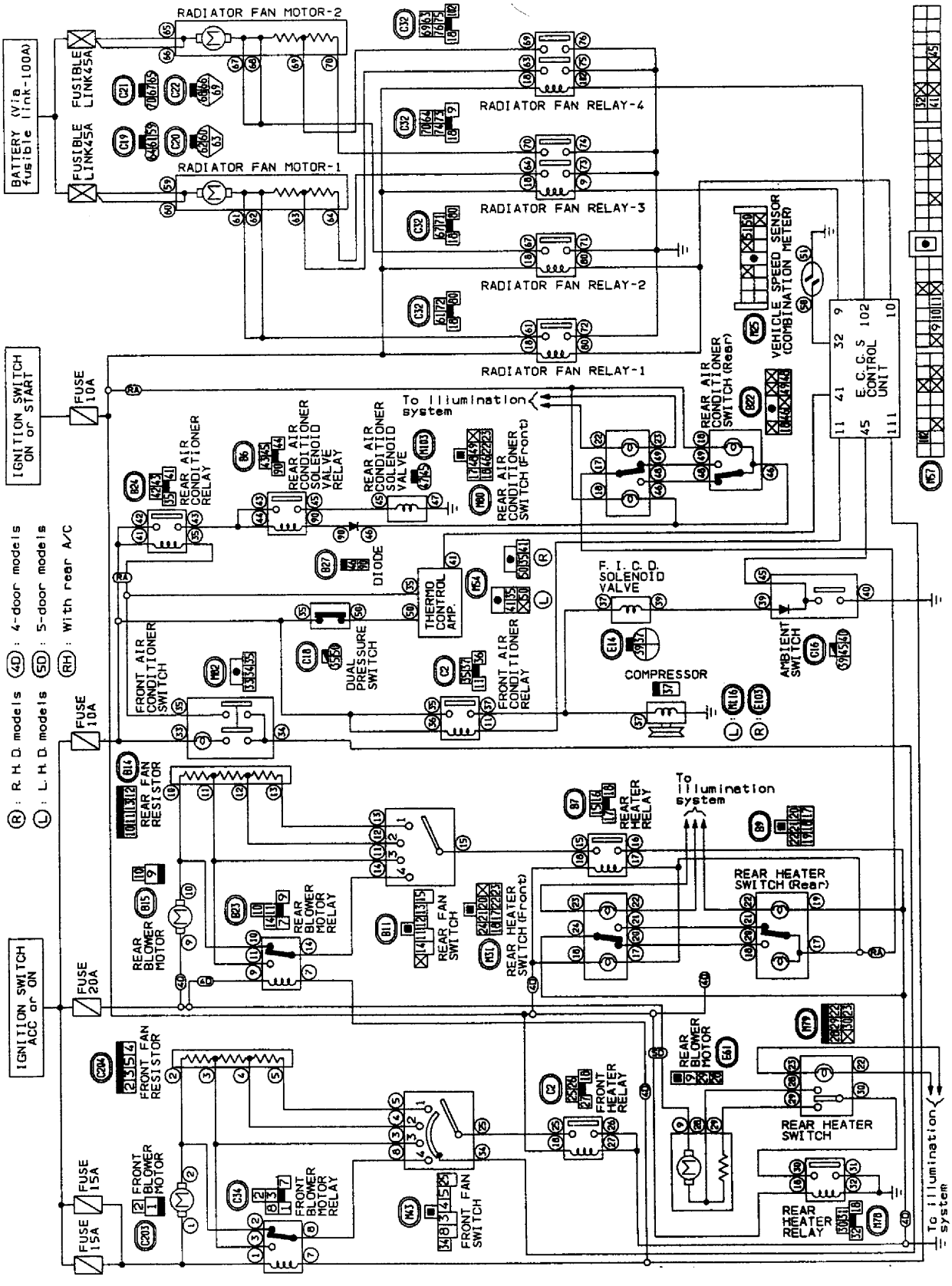


- B6 Rear A/C solenoid valve relay
- B7 Rear heater relay
- B9 Rear heater switch (Rear)
- B14 Rear fan resistor
- B24 Rear A/C relay
- B15 Rear blower motor
- B23 Rear blower motor relay (SR20DE only)

RHA432D

Circuit Diagram for Quick Pinpoint Check

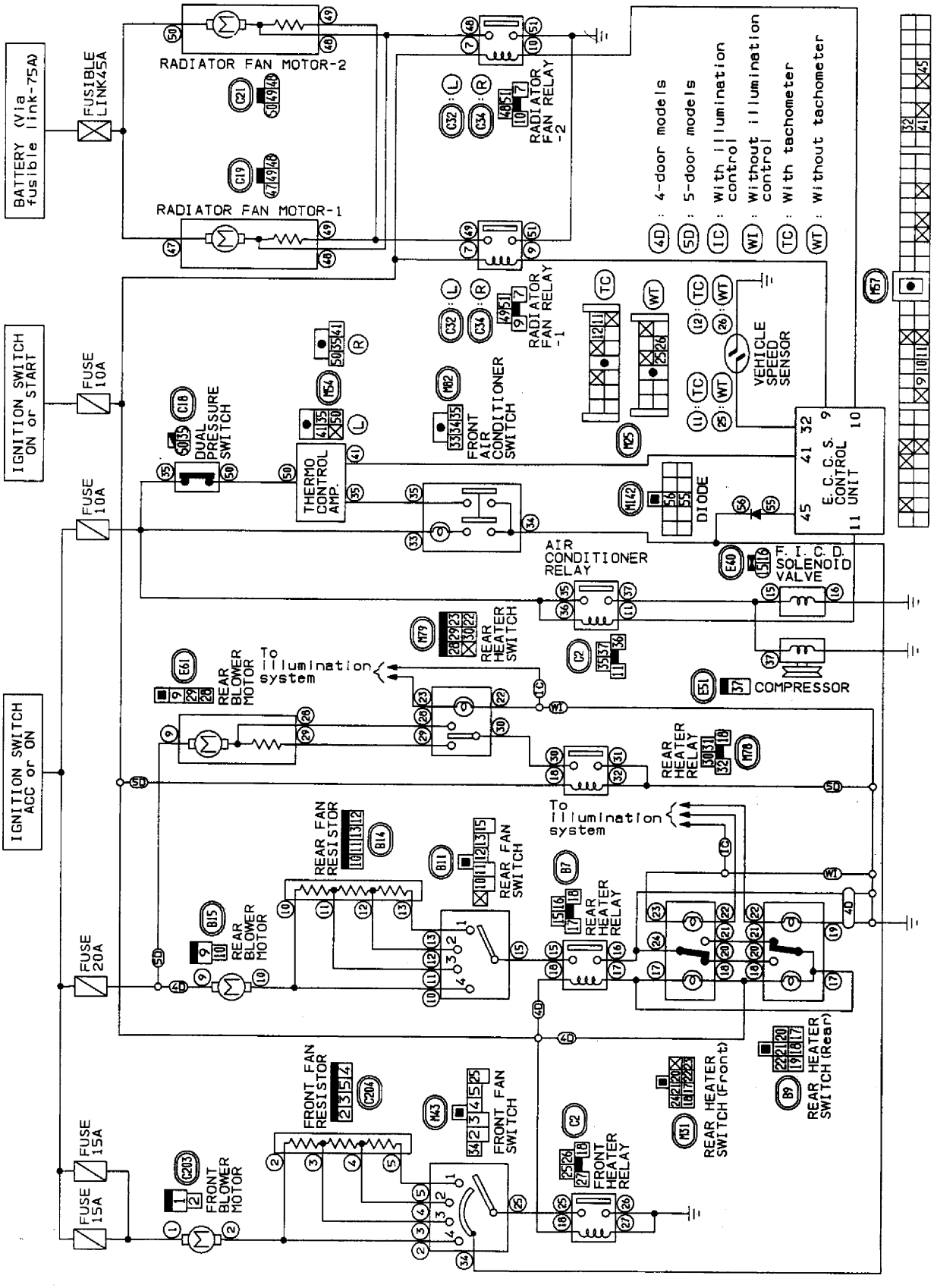
SR20DE



MHA140A

Circuit Diagram for Quick Pinpoint Check (Cont'd)

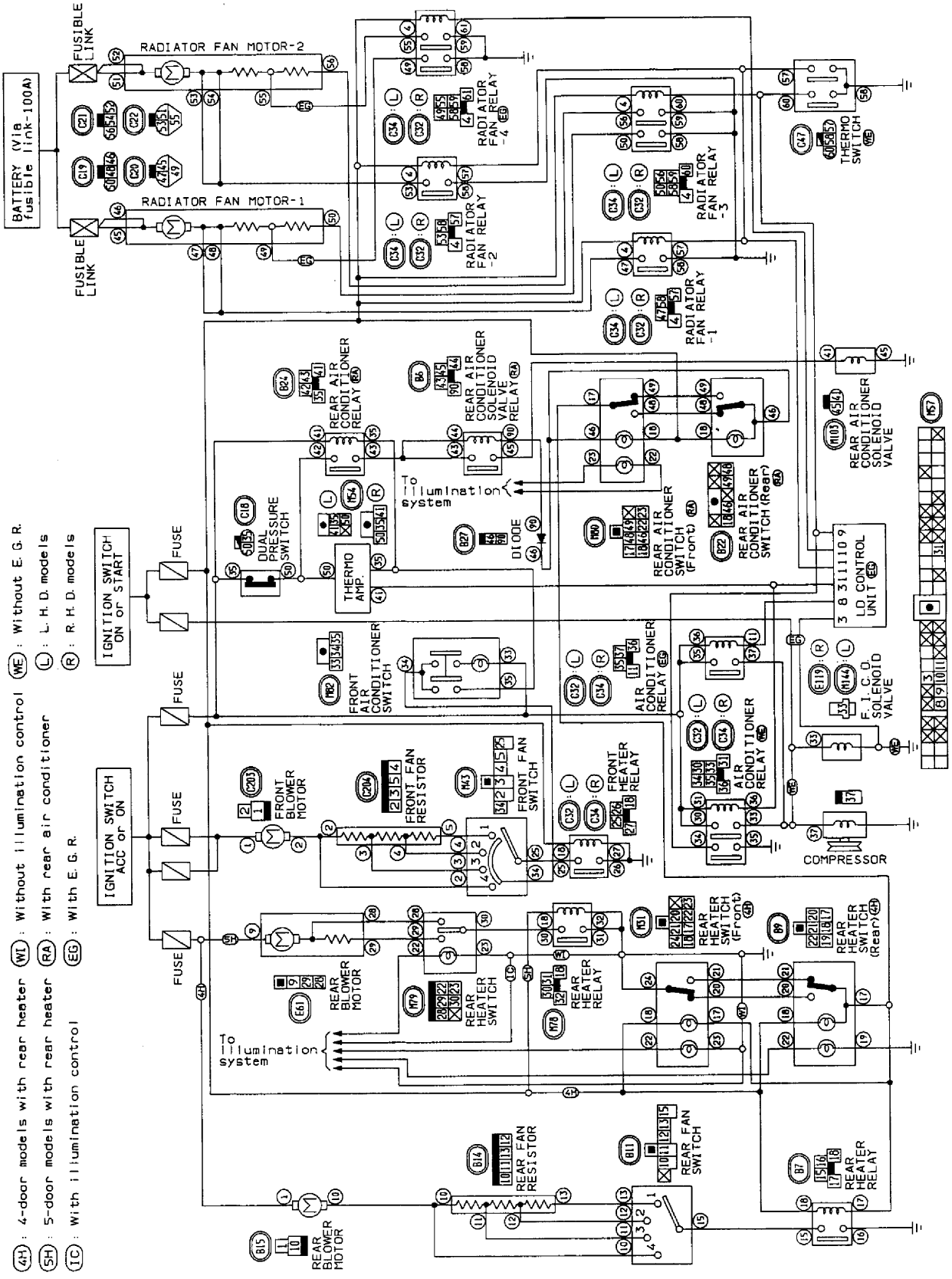
GA16DE



MHA138A

Circuit Diagram for Quick Pinpoint Check (Cont'd)

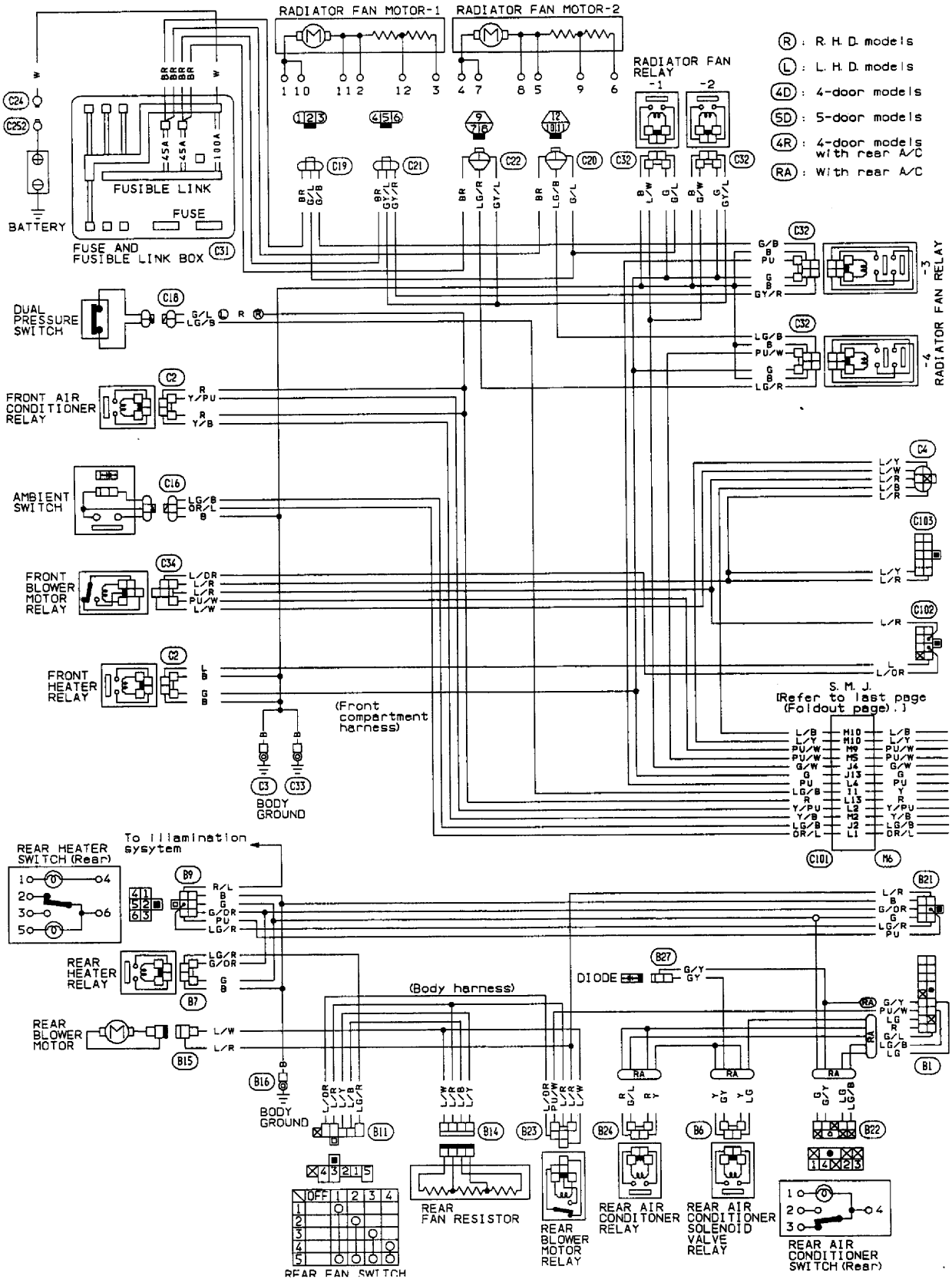
LD20-II



MHA136A

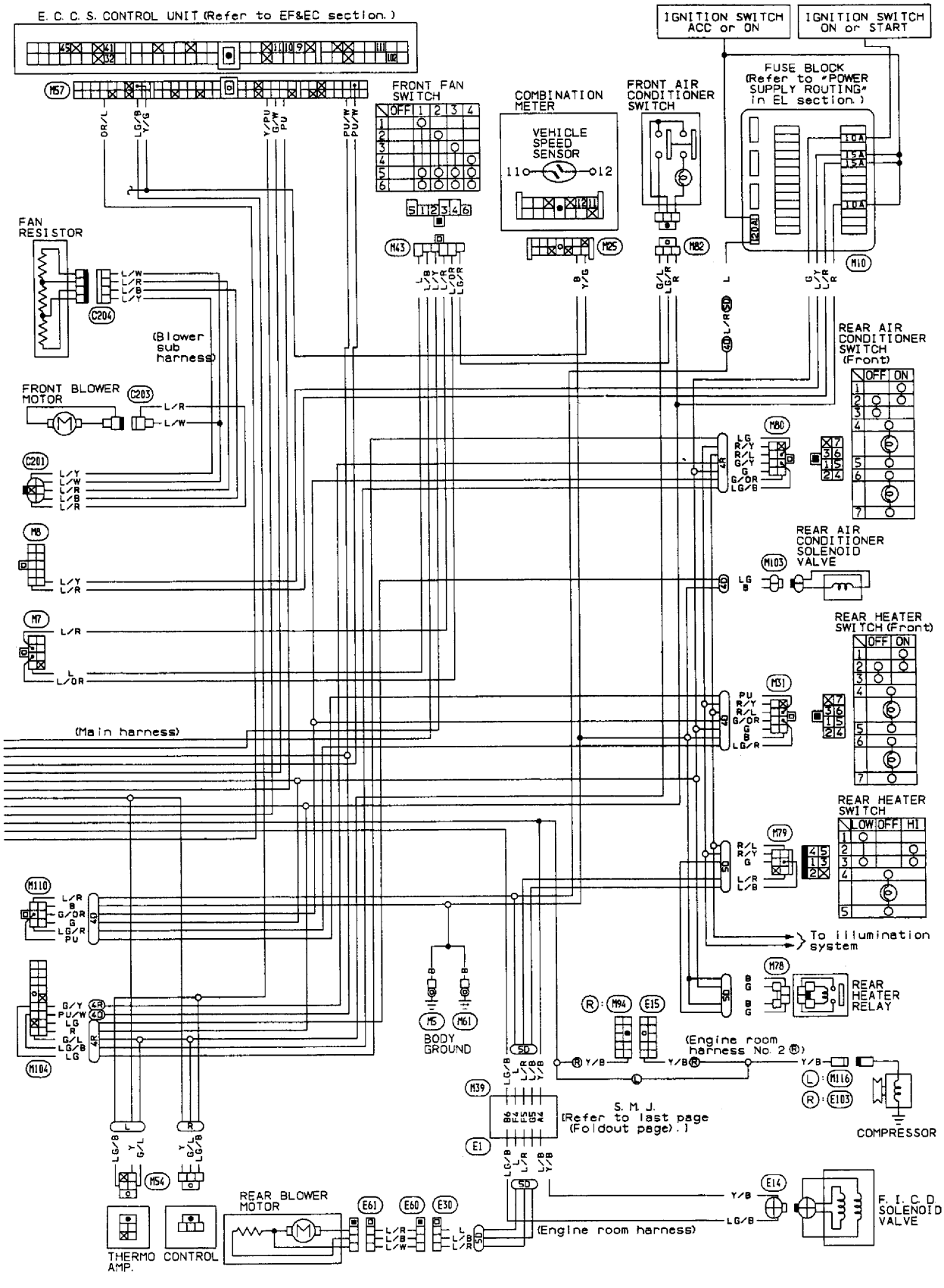
Wiring Diagram

SR20DE



MHA139AL

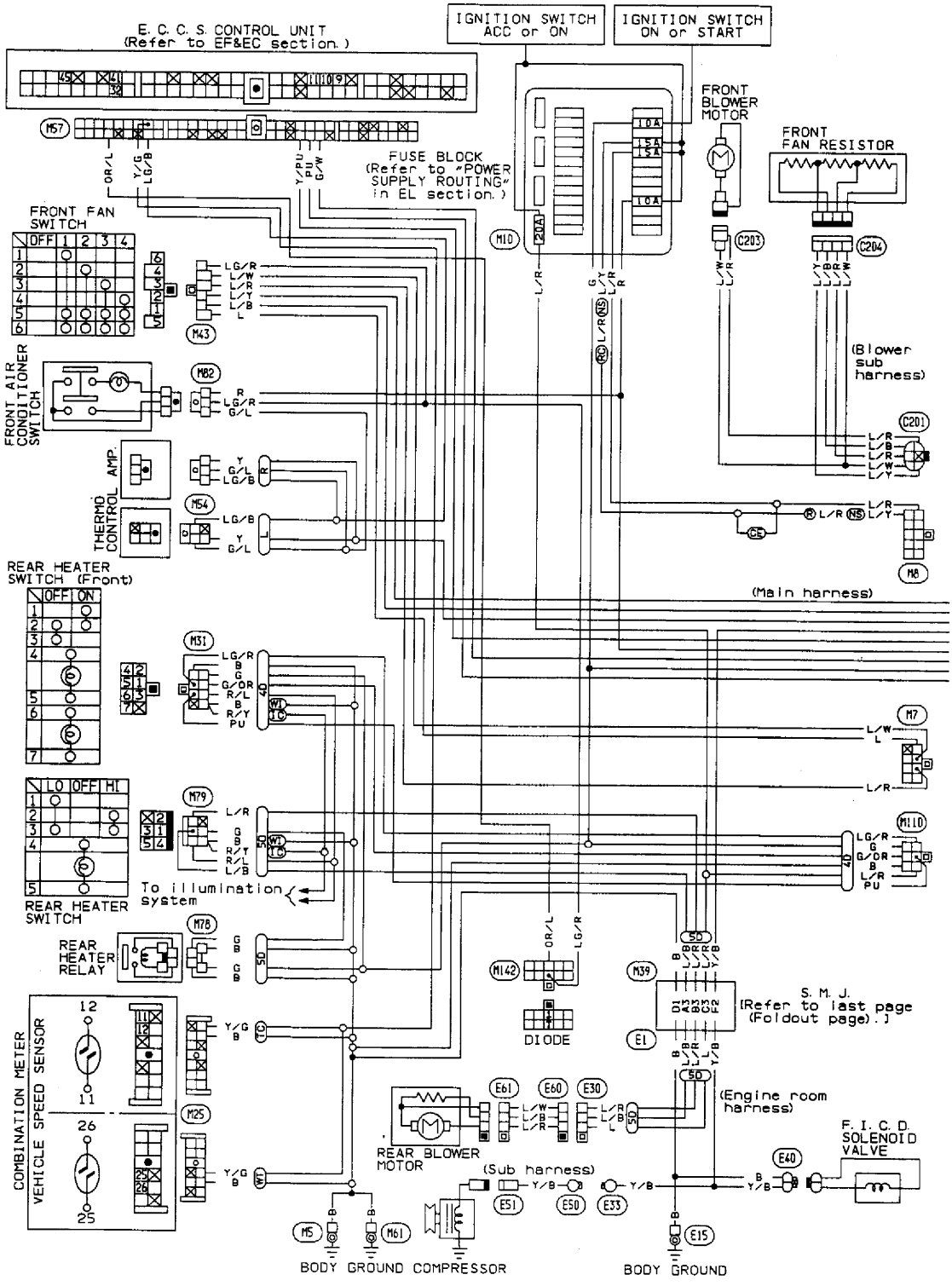
Wiring Diagram (Cont'd)



MHA139A

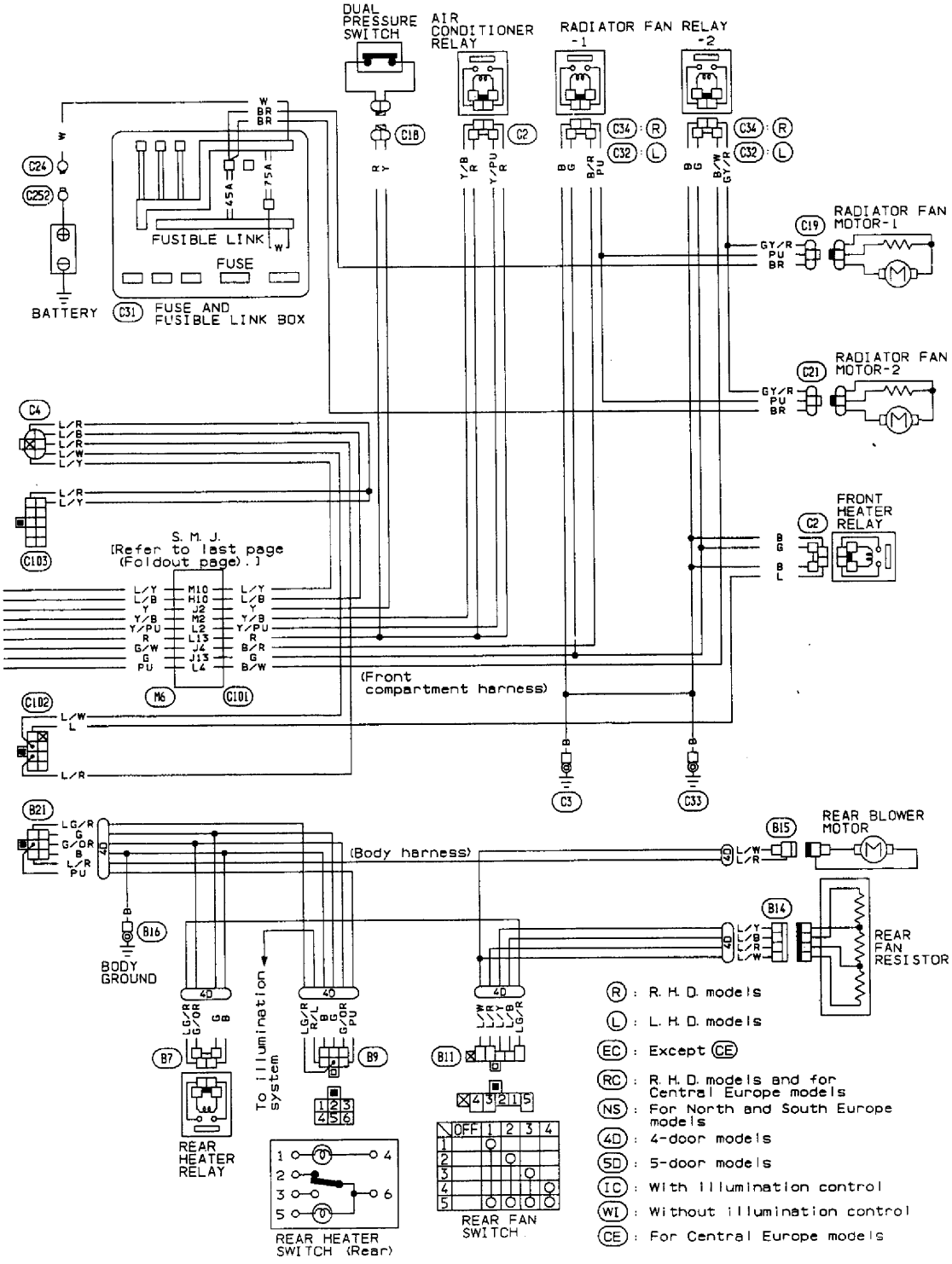
Wiring Diagram (Cont'd)

GA16DE



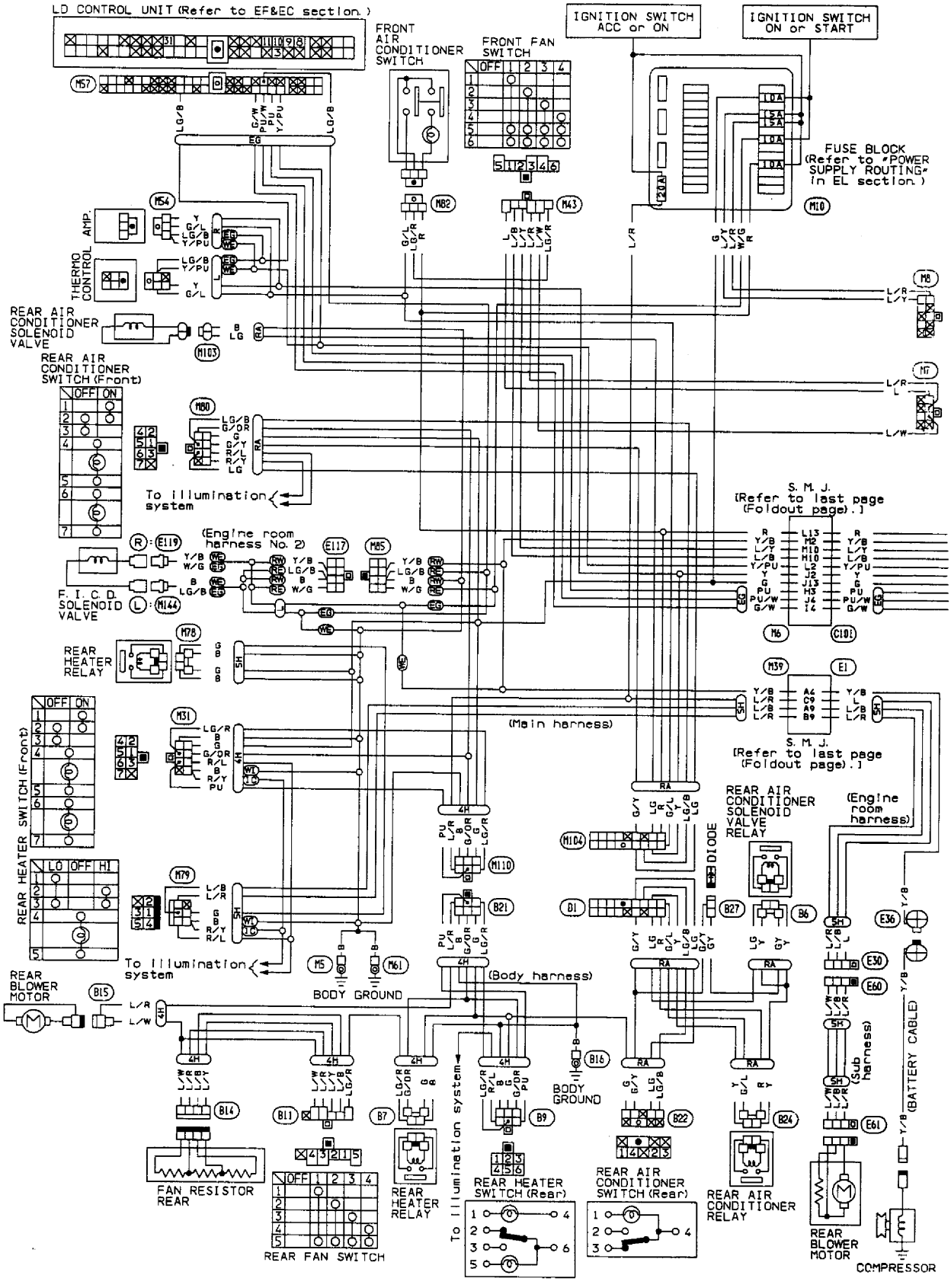
RHA437D

Wiring Diagram (Cont'd)



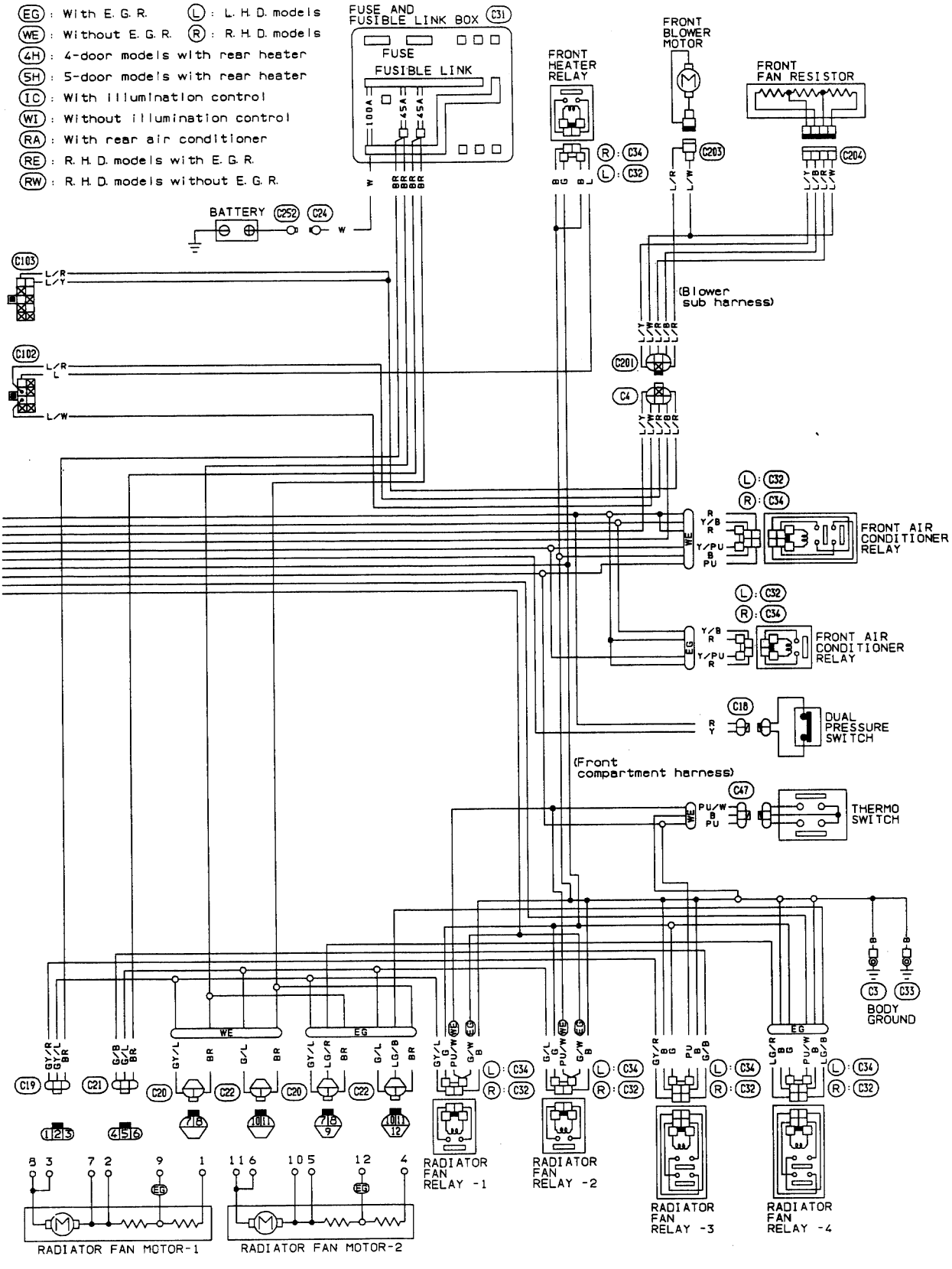
Wiring Diagram (Cont'd)

LD20-II



MHA135A1

Wiring Diagram (Cont'd)



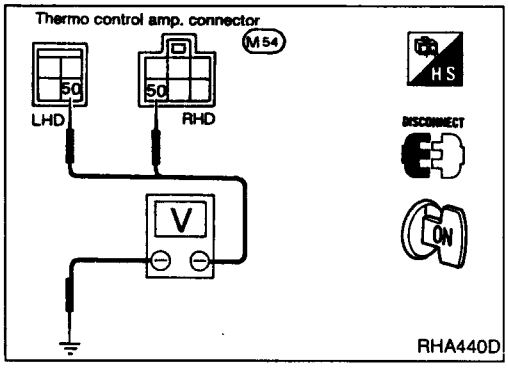
MHA135A

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.

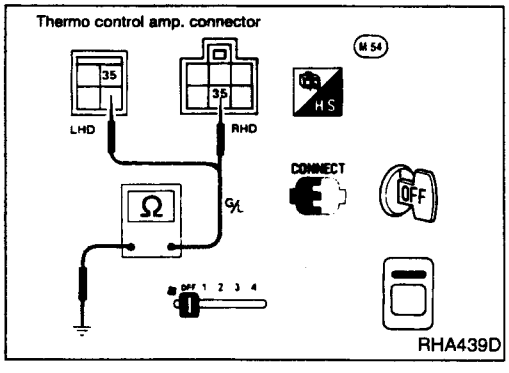


THERMO CONTROL AMP. CHECK

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. ⑤⓪ and body ground.

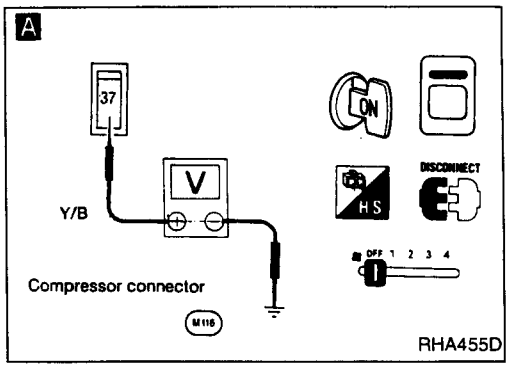
Voltmeter terminal		Voltage
⊕	⊖	
⑤⓪	Body ground	Approx. 12V

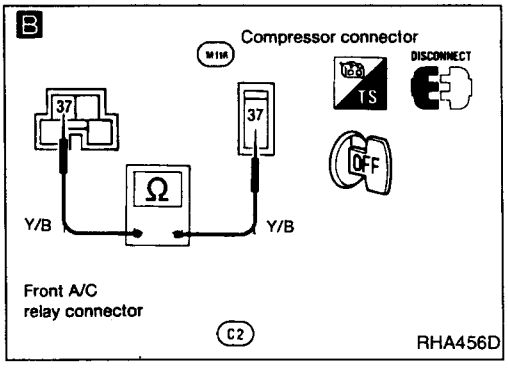


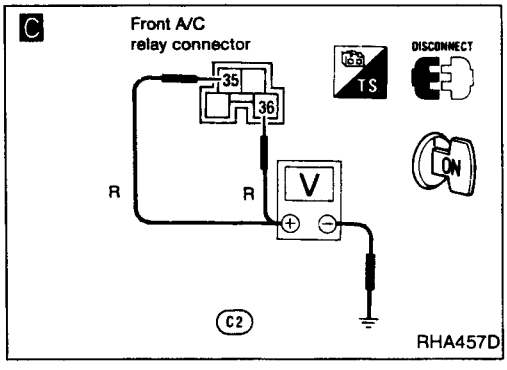
Check body ground circuit for thermo control amp. with ignition switch OFF, A/C switch ON and fan switch ON.

1. Disconnect thermo control amp. harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ③⑤ and body ground.

Ohmmeter terminal		Continuity
⊕	⊖	
③⑤	Body ground	Yes







Diagnostic Procedure 1

SYMPTOM: Magnet clutch does not operate.

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

A

CHECK POWER SUPPLY FOR COMPRESSOR
Disconnect compressor harness connector.
Do approx. 12 volts exist between compressor harness terminal No. ㊲ and body ground?

N.G.

O.K.

Check magnet clutch coil.

O.K.

Replace magnet clutch.
Refer to COMPRESSOR.

Disconnect Front A/C relay harness connector.

B

Check circuit continuity between Front A/C relay harness terminal No. ㊲ and Compressor harness terminal No. ㊲.

Note

C

CHECK POWER SUPPLY FOR FRONT A/C RELAY.
Do approx. 12 volts exist between Front A/C relay harness terminal No. ㉟, ㊱ and body ground?

O.K.

N.G.

CHECK FRONT A/C RELAY.
(Refer to Electrical Components Inspection.)

O.K.

N.G.

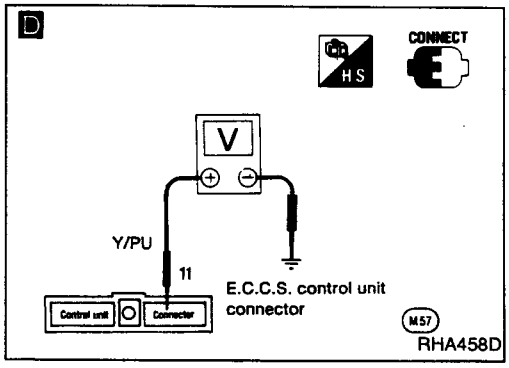
CHECK POWER SUPPLY CIRCUIT AND 10 A FUSE AT FUSE BLOCK.
(Refer to "POWER SUPPLY ROUTING" in EL section and "Wiring Diagram".)

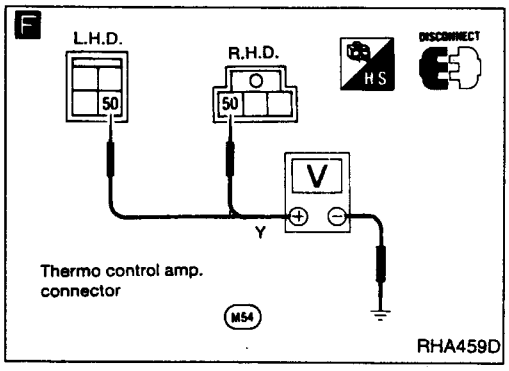
Replace Front A/C relay

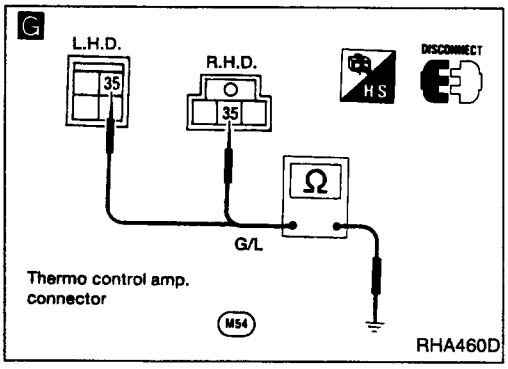
Reconnect Front A/C relay.

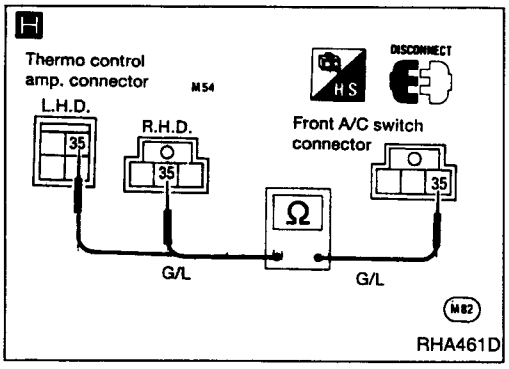
Ⓐ

Diagnostic Procedure 1 (Cont'd)









Ⓐ

D CHECK COIL SIDE CIRCUIT OF FRONT A/C RELAY.
Do approx. 12 volts exist between E.C.C.S. control unit harness terminal No. ⑪ and body ground?

N.G. → **E** Note: Check circuit continuity between Front A/C relay harness terminal No. ⑪ and E.C.C.S. control unit harness terminal No. ⑪.

O.K.

F CHECK VOLTAGE FOR THERMO CONTROL AMP.
Do approx. 12 volts exist between thermo control amp. harness terminal No. ㊿ and body ground?

N.G. → CHECK DUAL-PRESSURE SWITCH. (Refer to Electrical Components Inspection in TROUBLE DIAGNOSES.)

N.G. → Replace dual-pressure switch.

O.K.

CHECK POWER SUPPLY FOR THERMO CONTROL AMP.

O.K.

G CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP.
Disconnect thermo control amp. harness connector.
Does continuity exist between thermo control amp. harness therminal No. ㉟ and body ground?

N.G. → Disconnect Front A/C switch harness connector.

O.K.

Replace thermo control amp.

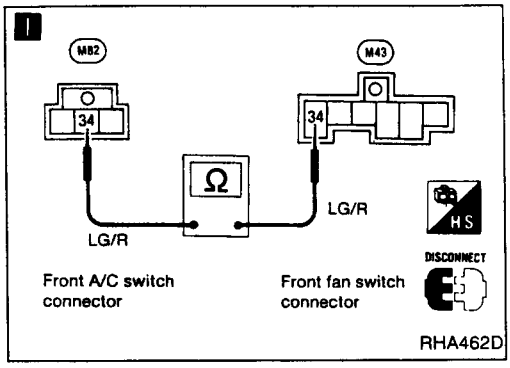
H Note: Check circuit continuity between thermo control amp. harness terminal No. ㉟ and Front A/C switch harness terminal No. ㉟.

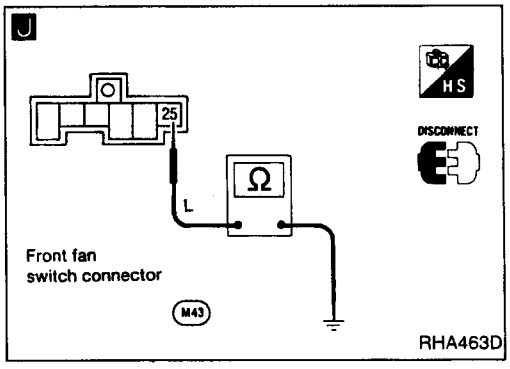
O.K.

Ⓑ

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

Diagnostic Procedure 1 (Cont'd)





Ⓑ

CHECK FRONT A/C SWITCH.
(Refer to Electrical Components Inspection in TROUBLE DIAGNOSES.)

N.G. → Replace Front A/C switch.

O.K.

Disconnect Front fan switch harness connector.

I Note

Check circuit continuity between Front A/C switch harness terminal No. ㉞ and Front fan switch harness terminal No. ㉞.

O.K.

J

CHECK BODY GROUND CIRCUIT FOR FRONT FAN SWITCH.
Does continuity exist between Front fan switch harness terminal No. ㉕ and body ground?

N.G. → CHECK FRONT HEATER RELAY OPERATION.
(Refer to Electrical Components Inspection in TROUBLE DIAGNOSES.)

N.G. → Replace Front heater relay.

O.K.

CHECK FRONT FAN SWITCH
(Refer to Electrical Components Inspection in TROUBLE DIAGNOSES.)

N.G.

Replace Front fan switch

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

	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 2

SYMPTOM: Front blower motor does not rotate.

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

Check if Front blower motor rotates properly at each fan speed.
Conduct check as per flow chart at left.
→ 2 → B, 3 → C, 4 → D, 5 → E

1

A

CHECK POWER SUPPLY FOR FRONT BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal No. ① and body ground?

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

O.K.

B

Check circuit continuity between blower motor harness terminal No. ② and body ground.

N.G. → Reconnect blower motor harness connector.

O.K.

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

Replace blower motor.

C

CHECK FRONT BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND RESISTOR.
Do approx. 12 volts exist between resistor harness terminal No. ② and body ground?

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

D

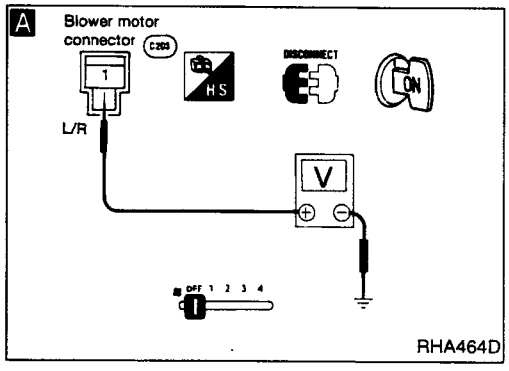
Note: Check circuit continuity between Front blower motor harness terminal No. ② and resistor harness terminal No. ②.

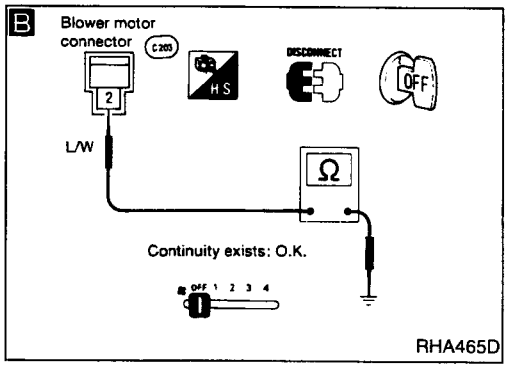
O.K.

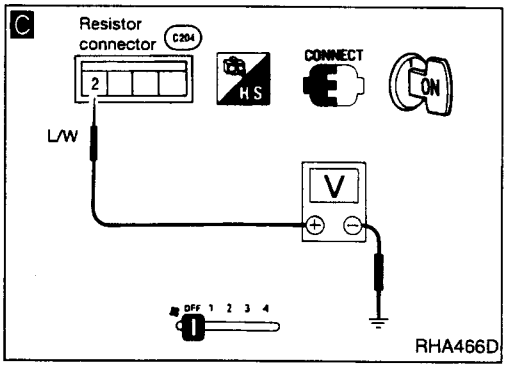
Ⓐ

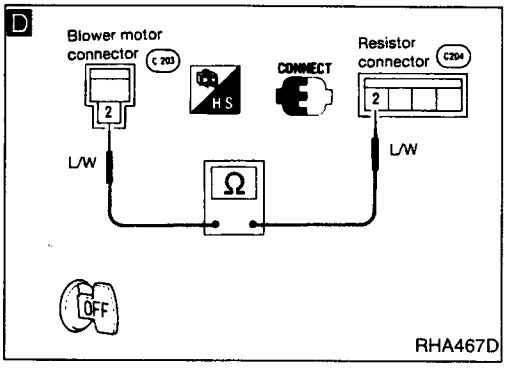
(Go to next page.)

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

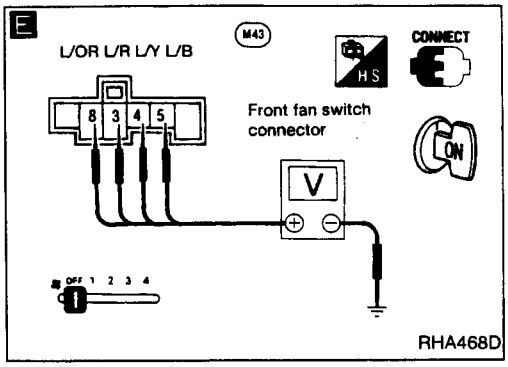


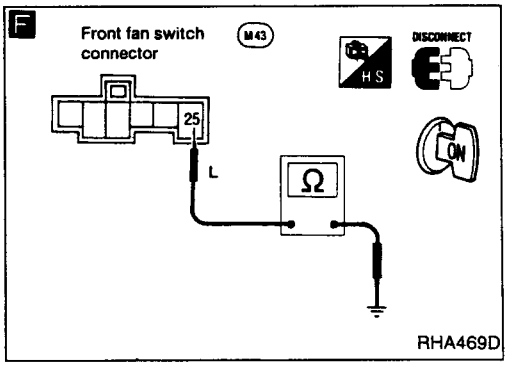


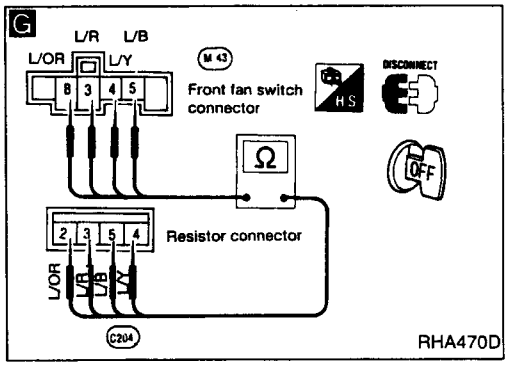




Diagnostic Procedure 2 (Cont'd)







Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

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

O.K. / N.G.

N.G. → Replace resistor.

Reconnect resistor harness connector.

E

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

Flow chart No.	Terminal No. ⊕	Terminal No. ⊖	Voltage
2	⑤	Body ground	Approx. 12 V
3	④		
4	③		
5	⑧		

O.K.

N.G.

G

Note

Check circuit continuity between Front fan switch and resistor.

CHECK FAN SWITCH AFTER DISCONNECTING IT.

N.G. → Replace Front fan switch.

O.K.

F

Note

Check circuit continuity between Front fan switch harness terminal No. ㉓ and body ground.

N.G. → CHECK FRONT HEATER RELAY OPERATION.
(Refer to Electrical Components Inspecton in TROUBLE DIAGNOSES.)

O.K. → Replace Front blower motor.

N.G. → Replace Front heater relay.

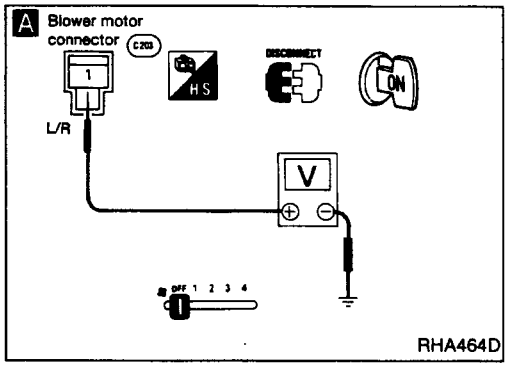
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

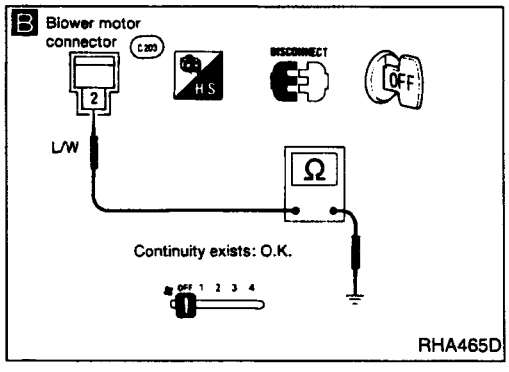
	INCIDENT	Flow chart No.
1	Fan fails to rotate.	1
2	Fan does not rotate at 1-speed.	2
3	Fan does not rotate at 2-speed.	3
4	Fan does not rotate at 3-speed.	4
5	Fan does not rotate at 4-speed.	5

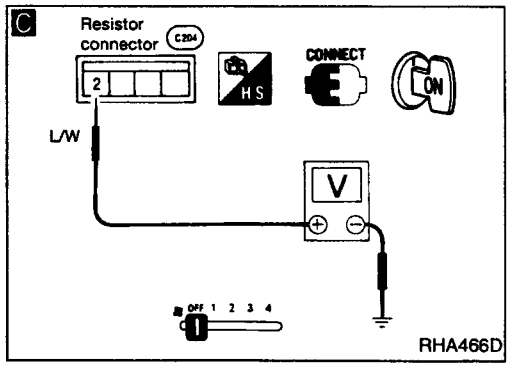
Diagnostic Procedure 3

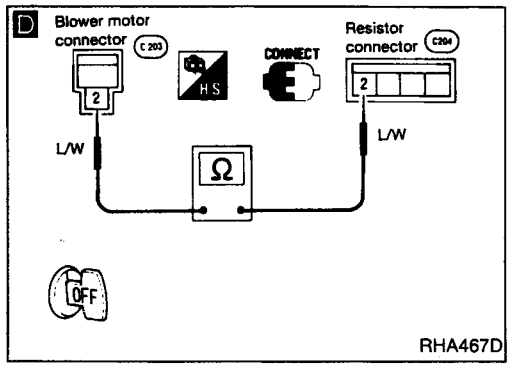
SYMPTOM: Rear blower motor does not rotate.

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









Check if rear blower motor rotates properly at each fan speed.
Conduct check as per flow chart at left.
→ 2 → B, 3 → C, 4 → D, 5 → E

1

A

CHECK POWER SUPPLY FOR REAR BLOWER MOTOR.
Disconnect blower motor harness connector.
Do approx. 12 volts exist between blower motor harness terminal No. ㉚ and body ground?

N.G. → Check 20A fuses at fuse block.
(Refer to "POWER SUPPLY ROUTING" in EL section and "Wiring Diagram".)

O.K.

B

Check circuit continuity between rear blower motor harness terminal No. ⑩ and body ground.

N.G. → Reconnect blower motor harness connector.

O.K.

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

Replace rear blower motor.

C

CHECK BLOWER MOTOR CIRCUIT BETWEEN REAR BLOWER MOTOR AND RESISTOR.
Do approx. 12 volts exist between resistor harness terminal No. ⑩ and body ground?

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

D

Note: Check circuit continuity between Front blower motor harness terminal No. ⑩ and resistor harness terminal No. ⑩.

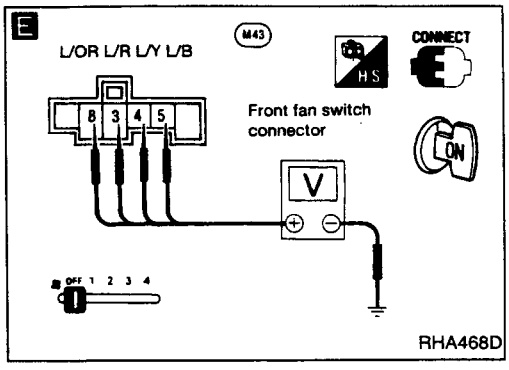
O.K.

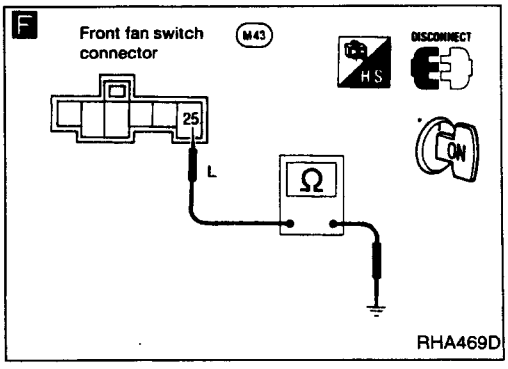
Ⓐ

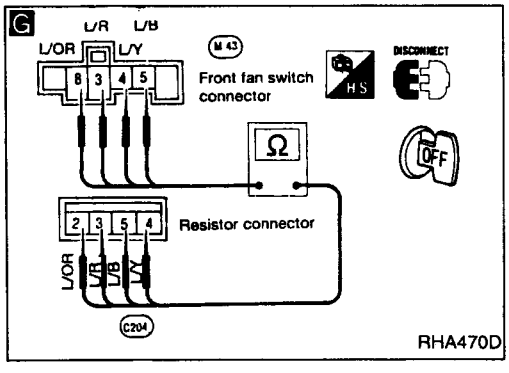
(Go to next page.)

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

Diagnostic Procedure 3 (Cont'd)







Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

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

O.K. / N.G.

N.G. → Replace resistor.

Reconnect resistor harness connector.

E

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

Flow chart No.	Terminal No. ⊕	Terminal No. ⊖	Voltage
2	⑬	Body ground	Approx. 12 V
3	⑫		
4	⑪		
5	⑭		

O.K.

CHECK FAN SWITCH AFTER DISCONNECTING IT.

O.K.

F

CHECK BODY GROUND CIRCUIT FOR REAR BLOWER RELAY.
Do approx. 12 volts exist between rear heater relay harness terminal No. ⑯ and body ground?

O.K.

G

CHECK POWER SUPPLY FOR COIL SIDE OF REAR HEATER RELAY.
Do approx. 12 volts exist between rear heater relay harness terminal No. ⑱ and body ground?

O.K. → Ⓕ

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

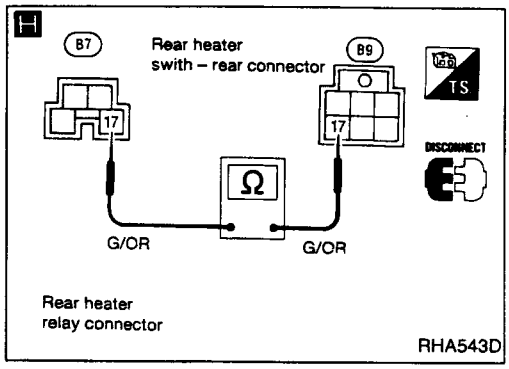
N.G. (CHECK FRONT FAN SWITCH CIRCUIT.) → Note: Check circuit continuity between Front fan switch and resistor.

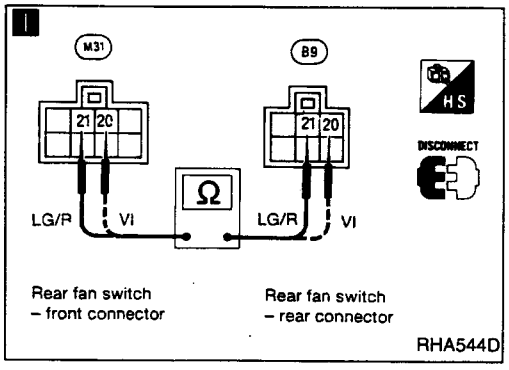
N.G. (CHECK FAN SWITCH AFTER DISCONNECTING IT.) → Replace fan switch.

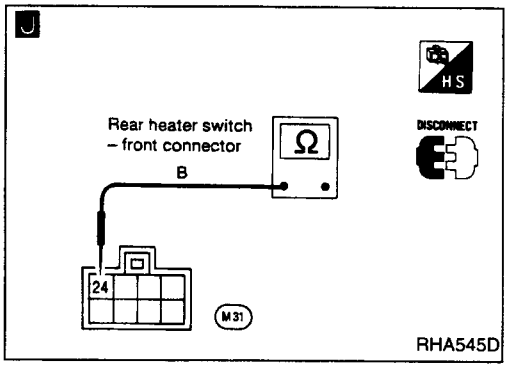
N.G. (CHECK BODY GROUND CIRCUIT FOR REAR BLOWER RELAY.) → Note: Check circuit continuity between rear heater relay harness terminal No. ⑯ and body ground

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

Diagnostic Procedure 3 (Cont'd)







Ⓕ

H

Note

Chedck circuit continuity between rear heater relay harness terminal No. ⑰ and rear heater switch - rear harness terminal No. ⑰

N.G. → Replaqce rear heater relay.

O.K.

CHECK REAR HEATER SWITCH — REAR

N.G. → Replace rear fan switch — rear

O.K.

Disconnect rear fan switch — front

I

Note

Check circuit continuity between rear fan switch — rear harness terminal No. ⑳ (㉑) and rear fan switch — front harness terminal No. ⑳ (㉑).

O.K.

CHECK REAR FAN SWITCH — FRONT

N.G. → Replace rear fan switch — front

O.K.

J

Note

Check circuit continuity between rear fan switch — front harness terminal No. ㉔ and body grround.

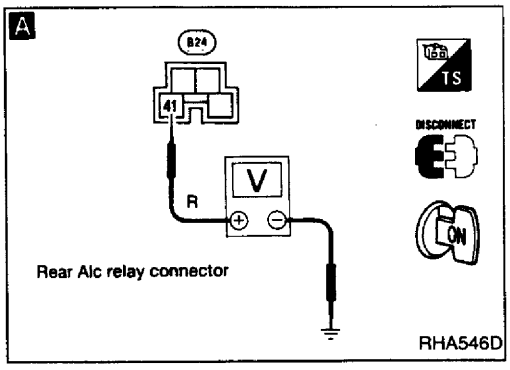
O.K.

Replace rear blower motor.

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

Diagnostic Procedure 4

SYMPTOM: Rear A/C solenoid valve does not operate.
Perform PRELIMINARY CHECK 2 before referring to the following flow chart.

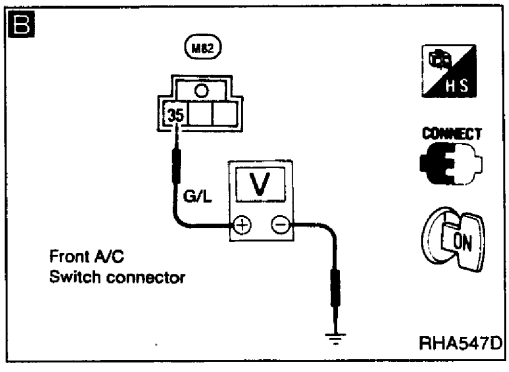


A

CHECK POWER SUPPLY FOR COIL SIDE OF REAR A/C RELAY.
Do approx. 12 volts exist between rear A/C relay harness terminal No. (41) and body ground?

N.G. → Check 10A fuse for rear A/C relay and power supply circuit. Note

O.K. ↓

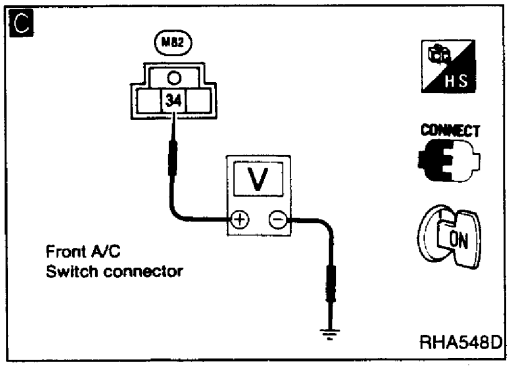


B

CHECK VOLTAGE FOR FRONT A/C SWITCH.
Do approx. 12 volts exist between front A/C switch harness terminal No. (35) and body ground?

N.G. → Check rear A/C relay operation and dcircuit continuity between front A/C switch harness terminal No. (35) and rear A/C relay harness terminal No. (35). Note

O.K. ↓

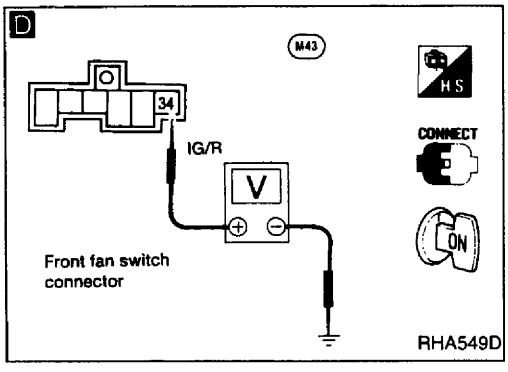


C

CHECK VOLTAGE FOR FRONT A/C SWITCH.
Do approx. 12 volts exist between front A/C switch harness terminal No. (34) and body ground when front A/C swtich and front fan switch are ON?

N.G. → CHECK FRONT A/C SWITCH
N.G. → Replace front A/C switch

O.K. ↓

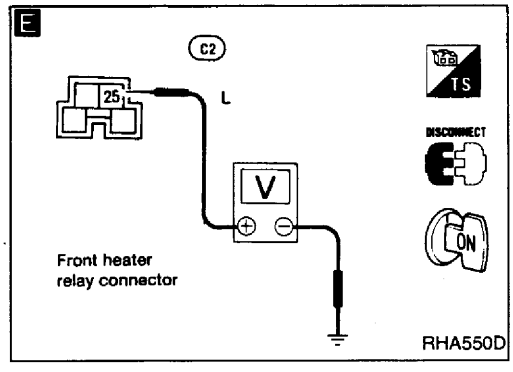


D

CHECK VOLTAGE FOR FRONT FAN SWITCH.
Do approx. 12 volts exsist between front fan switch harness terminal No. (34) and body ground?

N.G. → Check circuit continuity between front A/C switch harness terminal No. (34) and front fan switch harness terminal No. (34). Note

O.K. ↓



E

CHECK VOLTAGE FOR FRONT HEATER RELAY.
Do approx. 21 volts exist between front heater relay harness terminal No. (25) and body ground?

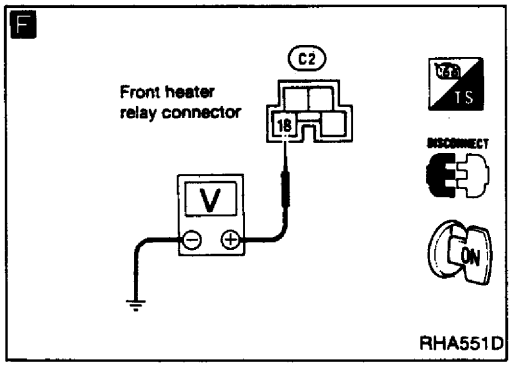
N.G. → Check front fan switch operation and circuit continuity between front fan switch harness terminal No. (25) and front heater relay harness temrinal No. (26) Note

Ⓐ

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

Diagnostic Procedure 4 (Cont'd)

F



Ⓐ

O.K.

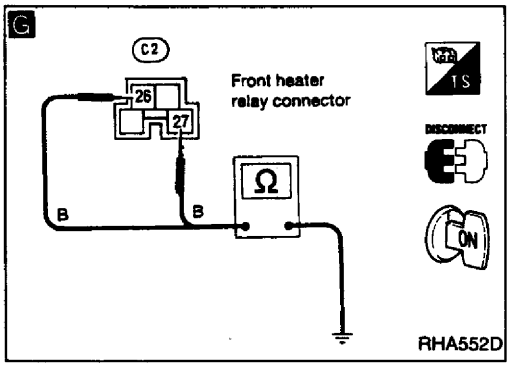
F

CHECK POWER SUPPLY FOR COIL SIDE OF FRONT HEATER RELAY.
Do approx. 12 volts exiswt between front heater relay harness terminal No. ⑱ and body ground?

N.G. → Check 10A fuse and power supply circuit.

O.K.

G



Check circuit continuity between front heater relay harness terminal No. ㉗, ㉖ and body ground.

N.G. → Repair harness of body ground circuit for front heater relay.

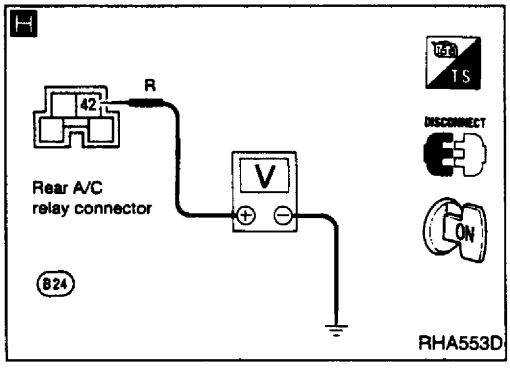
O.K.

Check front heater relay operation.

N.G. → Replace front heater relay.

O.K.

H

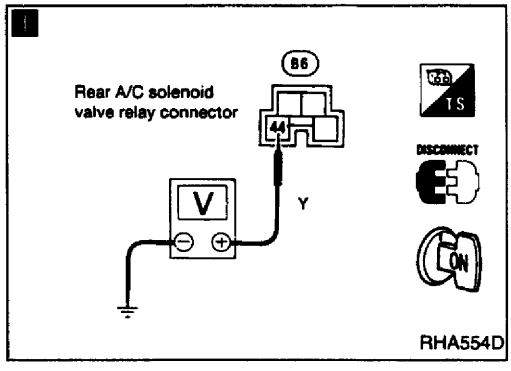


CHECK POWER SUPPLY FOR CLUTCH SIDE OF REAR A/C RELAY.
Do approx. 12 volts exist between rear A/C relay harness terminal No. ㊷ and body ground?

N.G. → Check 10A fuse and power supply circuit. Note

O.K.

I

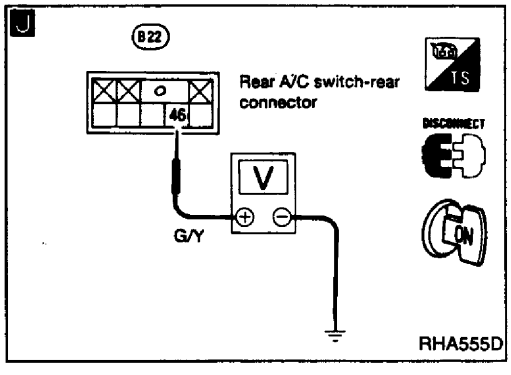


CHECK VOLTAGE FOR REAR A/C SOLENOID VALVE RELAY.
Do approx. 12 volts exist between rear A/C solenoid valve harness terminal No. ㊹ and body ground?

N.G. → Replace rear A/C relay.

O.K.

J



CHECK VOLTAGE FOR REAR A/C SWITCH — REAR
Do approx. 12 volts exist between rear A/C switch — rear harness terminal No. ㊻ and body ground?

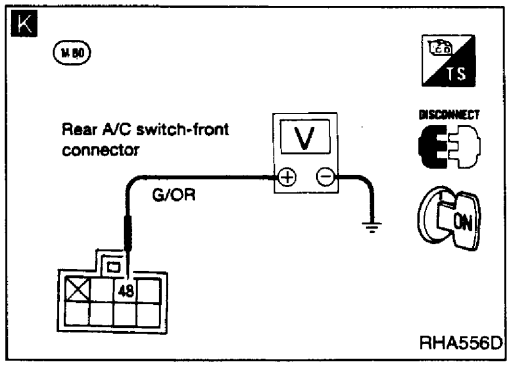
N.G. → Check rear A/C solenoid valve relay and circuit continuity between rear A/C solenoid valve relay harness terminal No. ㊻ and rear A/C switch — rear harness terminal No. ㊻. Note

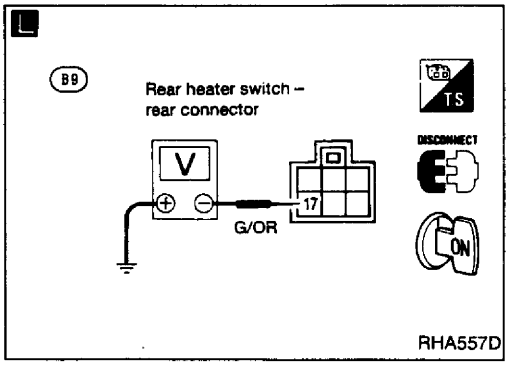
O.K.

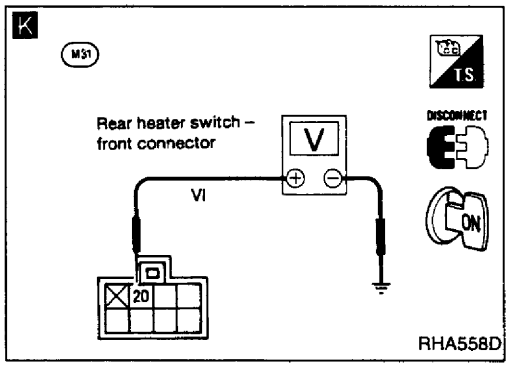
Ⓑ

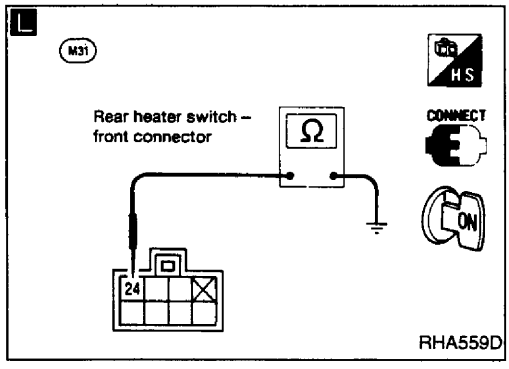
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

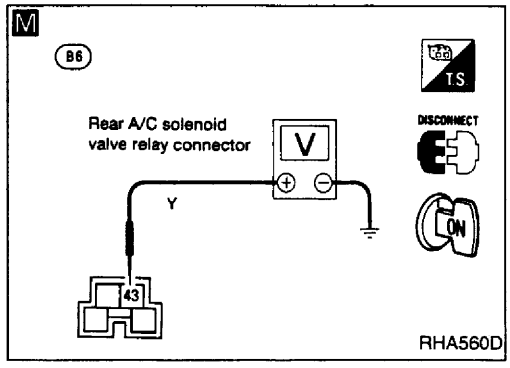
Diagnostic Procedure 4 (Cont'd)











Ⓑ

K

CHECK VOLTAGE FOR REAR A/C SWITCH — FRONT.
Do approx. 12 volts exist between rear A/C switch — front harness terminal No. ㊽ and body ground?

N.G. → Note: Check rear A/C switch — rear and circuit continuity between rear A/C switch — rear harness terminal No. ㊽ and rear A/C swtich — front harness terminal No. ㊽.

O.K.

L

CHECK VOLTAGE FOR REAR HEATER SWITCH — REAR.
Do approx. 12 volts exist between rear heater switch — rear harness terminal No. ⑰ and body ground?

N.G. → Note: Check rear A/C switch — front operation and circuit continuity between rear A/C front harness terminal No. ⑰ and rear heater switch — rear harness terminal No. ⑰.

O.K.

K

CHECK VOLTAGE FOR REAR HEATER SWITCH — FRONT.
Do approx. 12 volts exist between rear heater switch harness terminal No. ⑳ and body ground?

N.G. → Note: Check rear heater switch — rear operation and circuit continuity between rear heater switch — rear harness terminal No. ⑳ and rear heater switch harness terminal No. ⑳.

O.K.

L

CHECK BODY GROUND CIRCUIT FOR REAR HEATER — FRONT.
Check continuity between rear heater switch — front harness terminal No. ㉔ and body ground.

N.G. → Repair harness of body ground circuit for rear heater — front.

O.K.

M

CHECK POWER SUPPLY FOR REAR A/C SOLENOID VALVE RELAY.
Do approx. 12 volts exist between rear A/C solenoid valve relay harness terminal No. ㊸ and body ground?

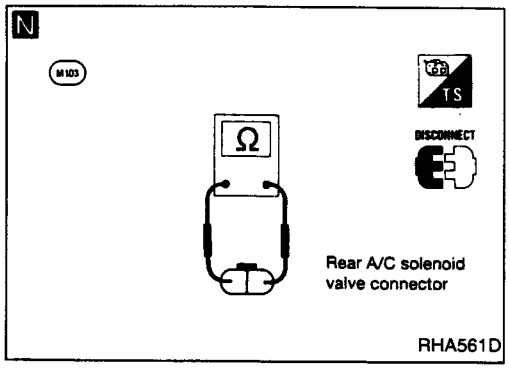
N.G. → Note: Check circuit continuity between rear A/C relay harness terminal No. ㊸ and rear A/C solenoid valve relay harness terminal No. ㊸.

O.K.

Ⓒ

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

Diagnostic Procedure 4 (Cont'd)



Ⓒ

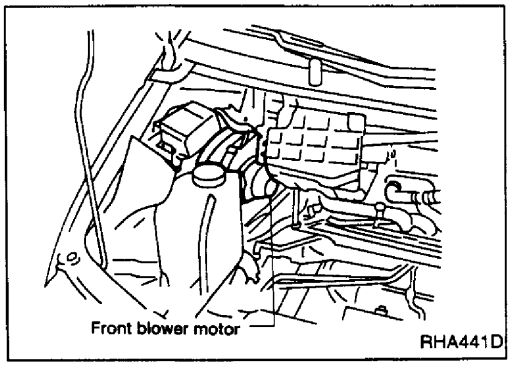
N

CHECK REAR A/C SOLENOID VALVE.
Is there 14Ω resistance between terminals of rear A/C solenoid valve?

N.G. → Replacde rear A/C solenoid valve.

O.K. ↓

Repair harness between rear A/C solenoid valve relay harness terminal No. ㊺ and rear A/C solenoid valve harness terminal No. ㊺ or harness between rear A/C solenoid valve harness terminal No. ㊼ and body ground.



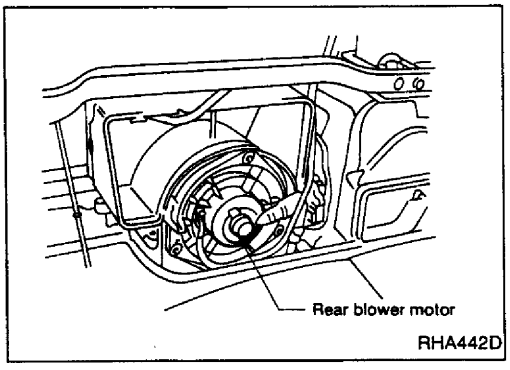
Electrical Components Inspection

BLOWER MOTOR

Front

Confirm smooth rotation of the blower motor.

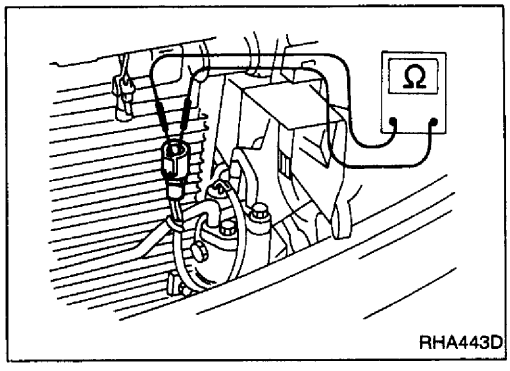
- Ensure that there are no foreign particles inside the blower unit.



Rear

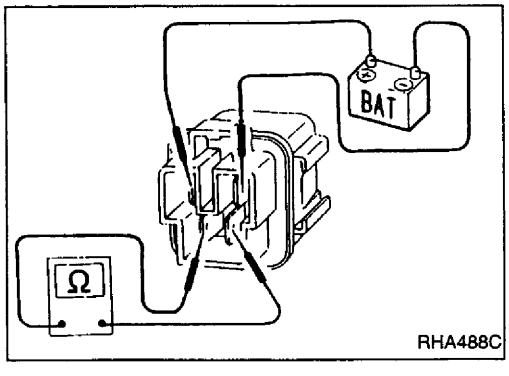
Confirm smooth rotation of the blower motor.

- Ensure that there are no foreign particles inside the A/C unit.



DUAL-PRESSURE SWITCH

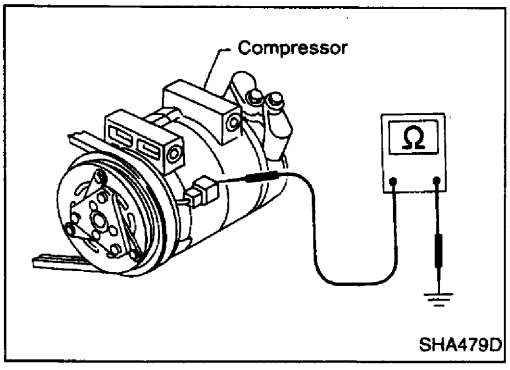
High-pressure side line pressure kPa (bar, kg/cm², psi)	Operation	Continuity
Decreasing to 177 - 216 (1.77 - 2.16, 1.8 - 2.2, 26 - 31) Increasing to 2,452 - 2,844 (24.5 - 28.4, 25 - 29, 356 - 412)	Turn OFF	Does not exist
Increasing to 177 - 235 (1.77 - 2.35, 1.8 - 2.4, 26 - 34) Decreasing to 1,373 - 1,667 (13.7 - 16.7, 14 - 17, 199 - 242)	Turn ON	Exists



RELAY

Check circuit continuity between terminals by supplying 12 volts to coil side terminal of each relay in heater and A/C systems.

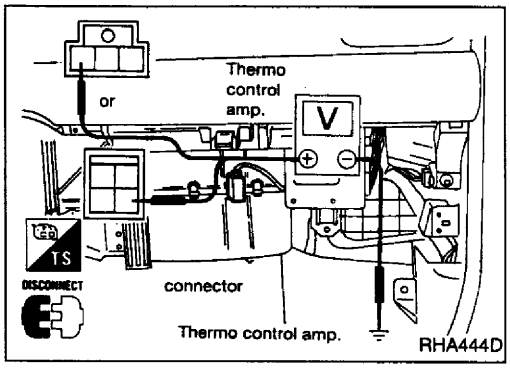
Electrical Components Inspection (Cont'd)



MAGNETIC CLUTCH

Resistance of magnetic clutch field coil:
Approx. 3.5 Ω

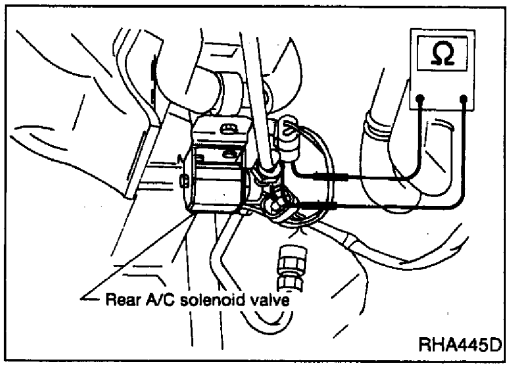
*Resistance varies slightly with changes in temperature.



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.

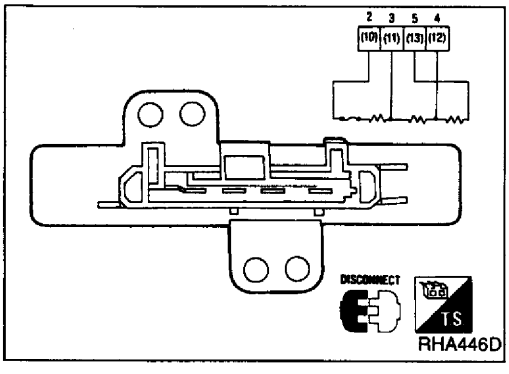
Evaporator outlet air temperature °C (°F)			Thermo amp. operation	Tester
Decreasing to	SR engine	0 (32)	Turn OFF	Approx. 12V
	Except SR engine	3.5 (38)		
Increasing to:	SR engine	2.5 (37)	Turn ON	Approx. 0V
	Except SR engine	6.0 (43)		



REAR A/C SOLENOID VALVE

Resistance value:
Approx. 14 Ω

*Resistance varies slightly with changes in temperature.



FRONT & REAR BLOWER RESISTOR

Check continuity between terminals.

Control Cable and Rod Adjustment

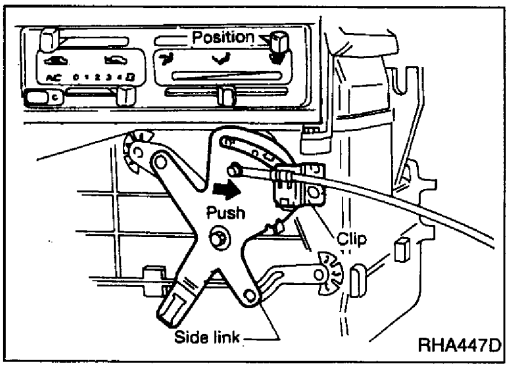
FRONT HEATER

AIR CONTROL CABLE

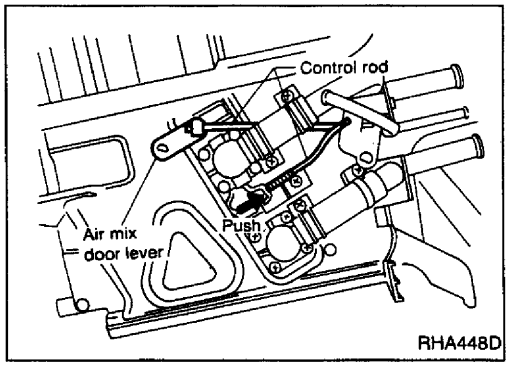
- Clamp the cable while pushing cable outer and side link in DEF mode.

After positioning control cable, check it operates properly.

- For R.H.D. models, set side link in VENT mode.



Control Cable and Rod Adjustment (Cont'd)

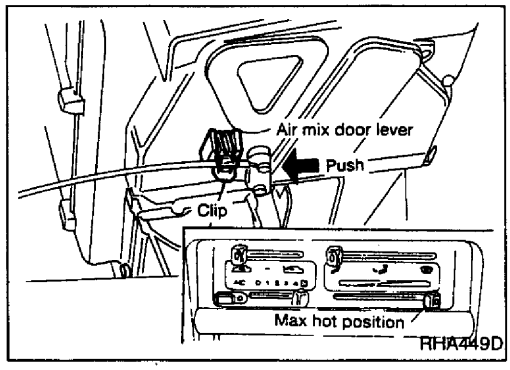


WATER COCK CONTROL ROD

- **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 make clearance of about 2 mm (0.08 in) between ends of rod and link lever and connect the rod to door lever.

After connecting control rod, check it operates properly.

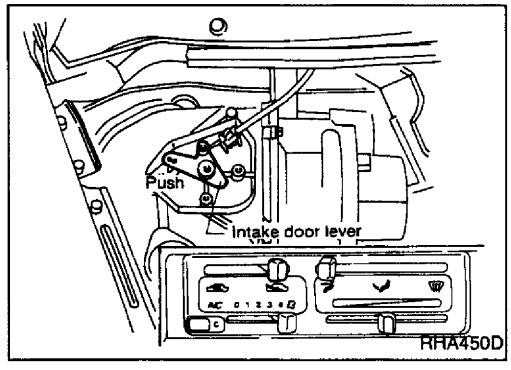


TEMPERATURE CONTROL CABLE

- Clamp the cable while pushing cable outer and air mix door lever in full hot position.

After positioning control cable, check it operates properly.

- For R.H.D. models, set air mix door lever in full cold position.



INTAKE DOOR CONTROL CABLE

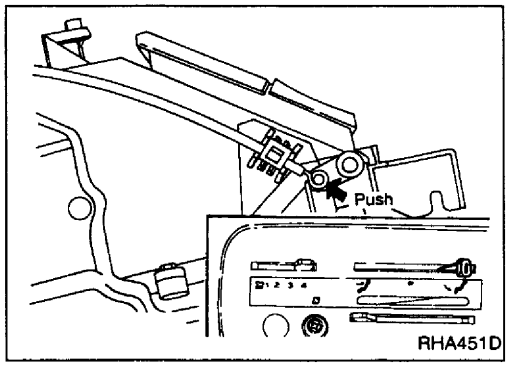
- Clamp the cable while pushing cable outer and intake door lever at FRE position.

After positioning control cable, check it operates properly.

- For R.H.D. models, set intake door lever at REC position.

REAR HEATER

Body side type

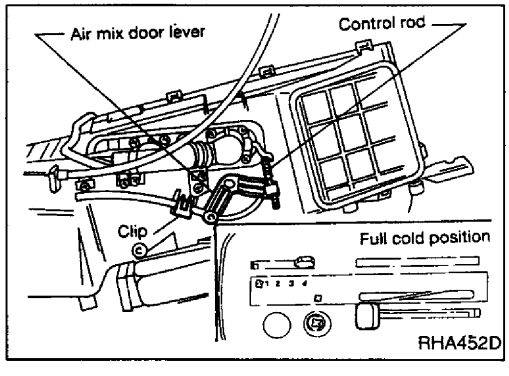


AIR CONTROL CABLE

- Clamp the cable while pushing cable outer and side link in FOOT mode.

After positioning control cable, check it operates properly.

- For R.H.D. models, set side link in VENT mode.

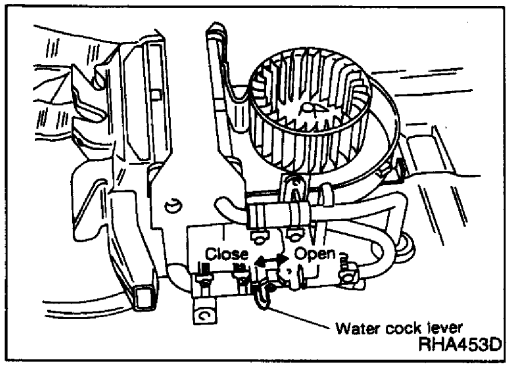


WATER COCK CONTROL ROD

- **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 make clearance of about 2 mm (0.08 in) between ends of rod and link lever and connect the rod to door lever.

After connecting control rod, check it operates properly.



Floor type

WATER COCK LEVER

- When the lever is switched to OPEN, the water flows out and when it is switched to CLOSE, the water does not flow out.

General Specifications

COMPRESSOR

Model	ZEXEL make DCW-17	ZEXEL make DKS-16H
Type	Variable Displacement Wobble Plate	Swash plate
Engine	SR20	LD20II and GA16
Displacement cm^3 (cu in)/Rev.	167 (10.19)	
Cylinder bore x stroke mm (in)	38.2 x 29.2 (1.504 x 1.150) (Max)	37.0 x 25.8 (1.457 x 1.016)
Direction of rotation	Clockwise (viewed from drive end)	
Drive belt	Poly V	

LUBRICATION OIL

Model	ZEXEL make DCW-17	ZEXEL make DKS-16H
Type	SUNISO 5GS or equivalent	
Capacity mℓ (Imp fl oz)		
Total in system	200 (7.0)	250 (8.8)
Compressor (Service parts) charging amount	200 (7.0)	250 (8.8)

REFRIGERANT

Engine			SR20DE	GA16DE	LD20II
Capacity g (lb)	Single A/C	LHD	550 ± 50 (1.2 ± 0.1)		
		RHD	500 ± 50 (1.1 ± 0.1)		
	Twin A/C	LHD	650 ± 50 (1.4 ± 0.1)	–	650 ± 50 (1.4 ± 0.1)
		RHD	750 ± 50 (1.6 ± 0.1)	–	750 ± 50 (1.6 ± 0.1)

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	DCW-17/DKS-16H
Clutch disc-pulley clearance mm (in)	0.3 - 0.6 (0.012 - 0.024)

General Specifications

COMPRESSOR

Model	ZEXEL make DCW-17	ZEXEL make DKS-16H
Type	Variable Displacement Wobble Plate	Swash plate
Engine	SR20	LD20II and GA16
Displacement cm^3 (cu in)/Rev.	167 (10.19)	
Cylinder bore x stroke mm (in)	38.2 x 29.2 (1.504 x 1.150) (Max)	37.0 x 25.8 (1.457 x 1.016)
Direction of rotation	Clockwise (viewed from drive end)	
Drive belt	Poly V	

LUBRICATION OIL

Model	ZEXEL make DCW-17	ZEXEL make DKS-16H
Type	SUNISO 5GS or equivalent	
Capacity mℓ (Imp fl oz)		
Total in system	200 (7.0)	250 (8.8)
Compressor (Service parts) charging amount	200 (7.0)	250 (8.8)

REFRIGERANT

Engine			SR20DE	GA16DE	LD20II
Capacity kg (lb)	Single A/C	LHD	550 ± 50 (1.2 ± 0.1)		
		RHD	500 ± 50 (1.1 ± 0.1)		
	Twin A/C	LHD	650 ± 50 (1.4 ± 0.1)	–	650 ± 50 (1.4 ± 0.1)
		RHD	750 ± 50 (1.6 ± 0.1)	–	750 ± 50 (1.6 ± 0.1)

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	DCW-17/DKS-16H
Clutch disc-pulley clearance mm (in)	0.3 - 0.6 (0.012 - 0.024)