HEATER & AIR CONDITIONER

SECTION HA

CONTENTS

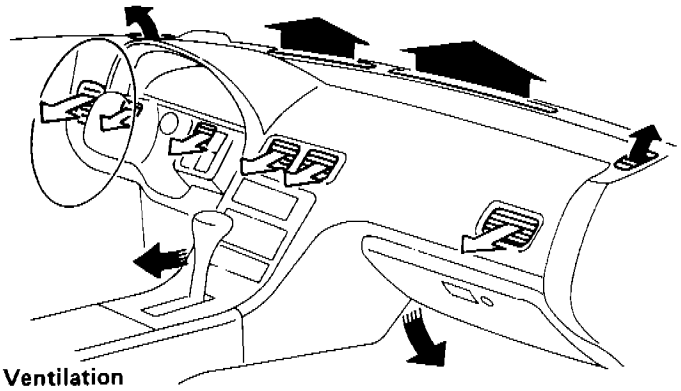
When you read wiring diagrams:

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

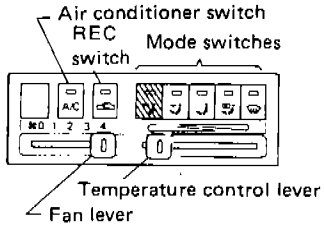
When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

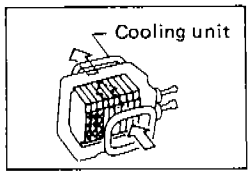
Air Flow

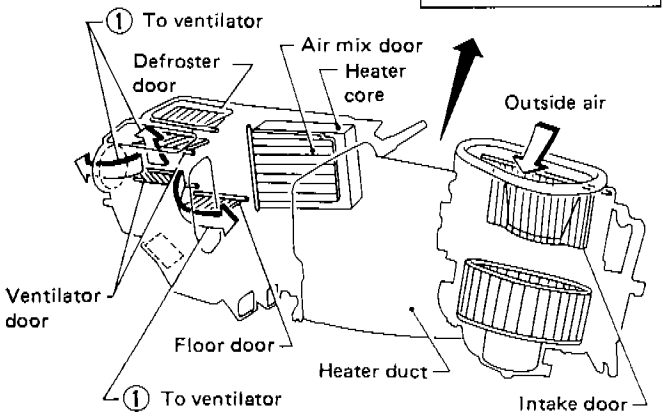
EXCEPT EUROPE MODEL



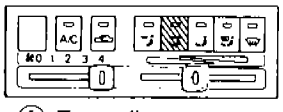
Ventilation

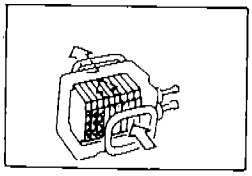


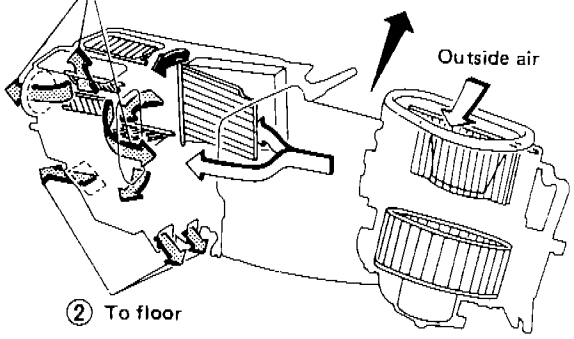




Bi-level

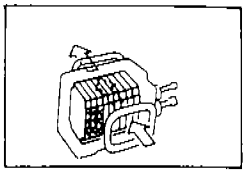


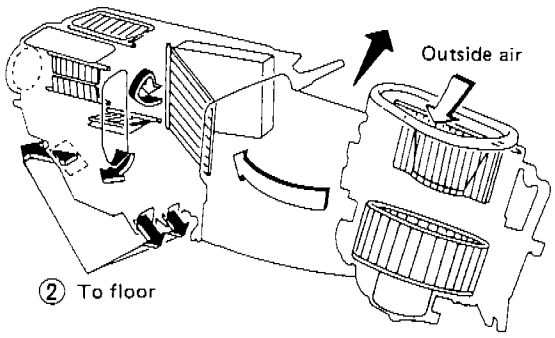




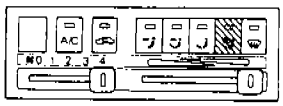
This illustration is for L.H. drive models.
For R.H. drive models, it is basically same.

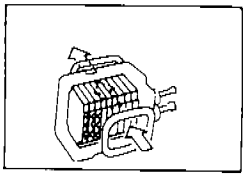
Floor

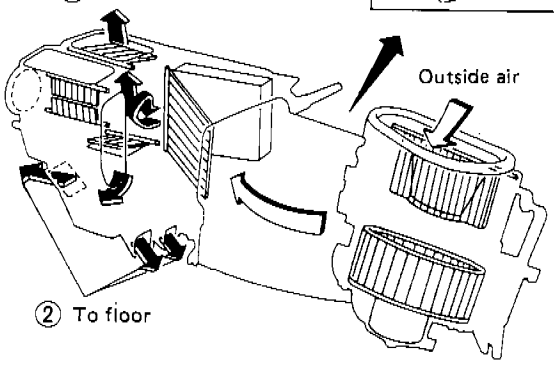




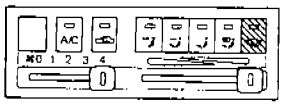
Floor and defroster

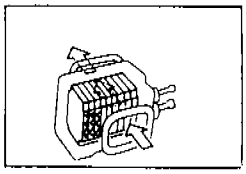


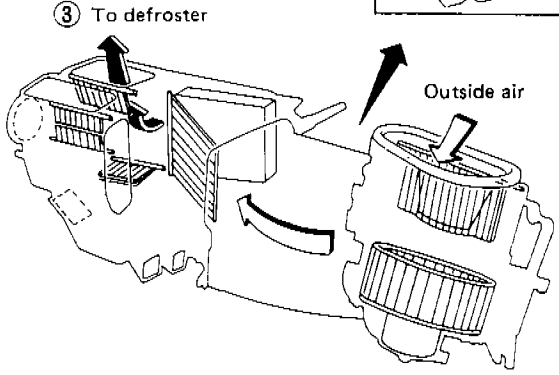




Defroster







: Air passed through heater core

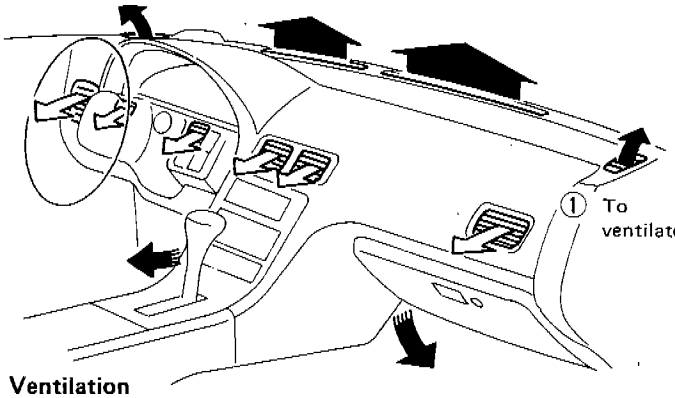
: Mixed air (+)

: Air not passed through heater core

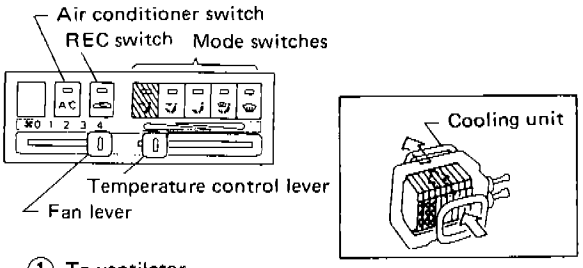
RHA625A

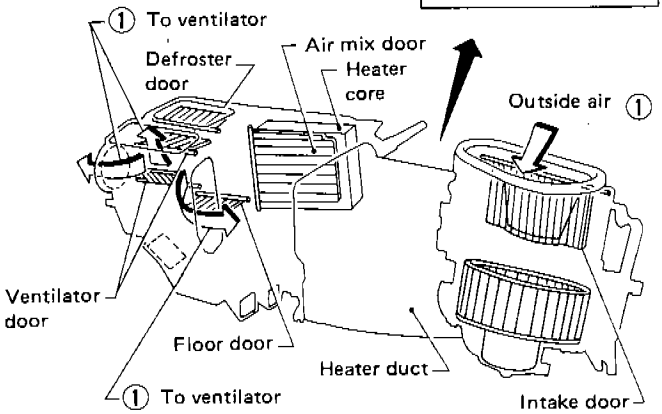
Air Flow (Cont'd)

EUROPE MODEL

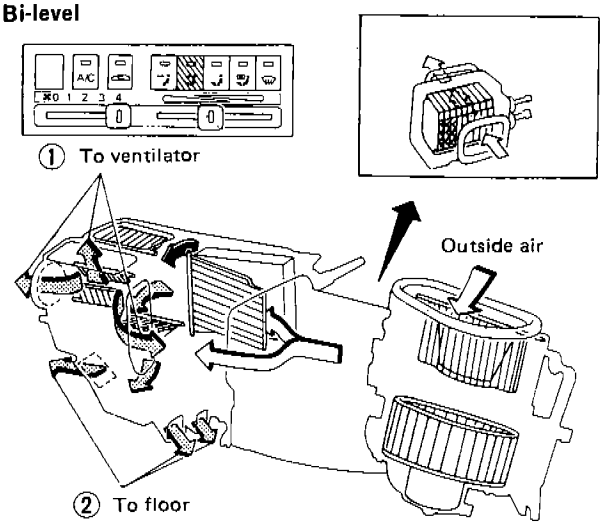


Ventilation

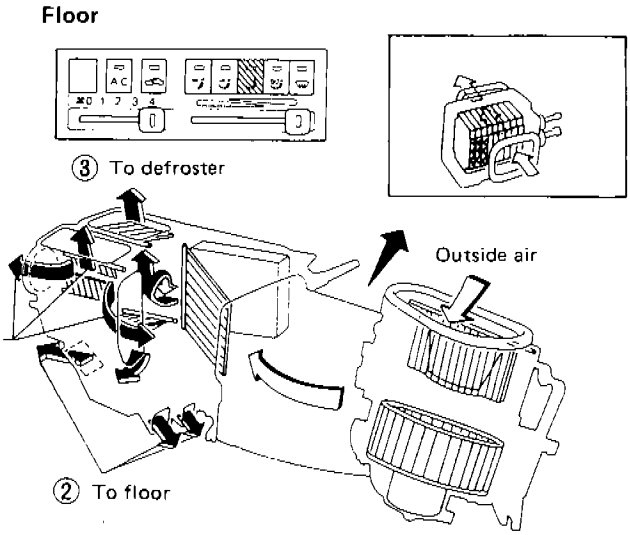




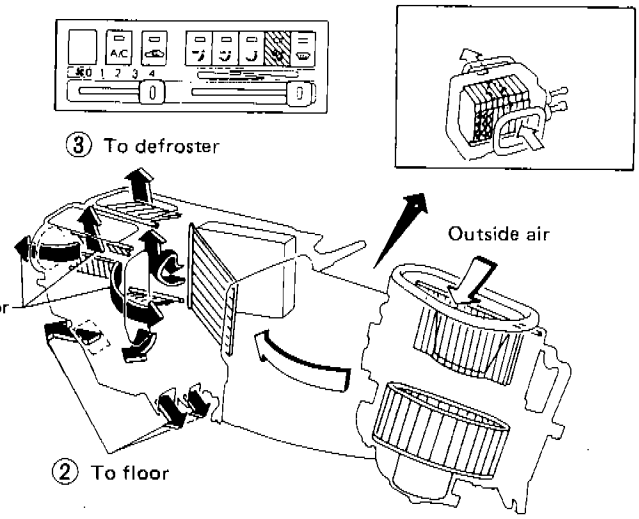
Bi-level



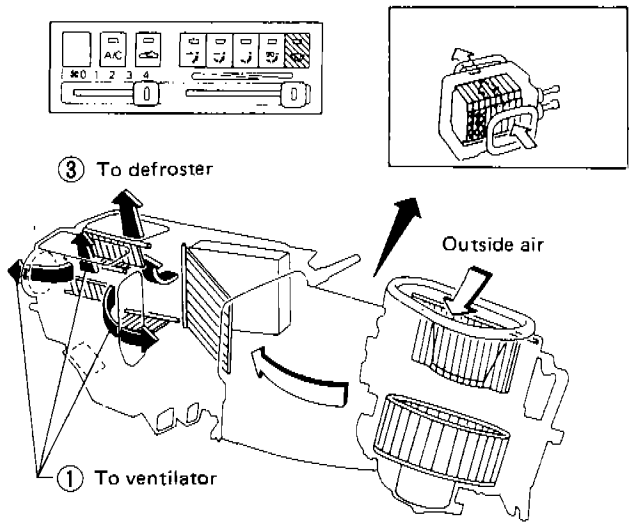
Floor



Floor and defroster



Defroster



: Air passed through heater core

: Mixed air (+)

: Air not passed through heater core

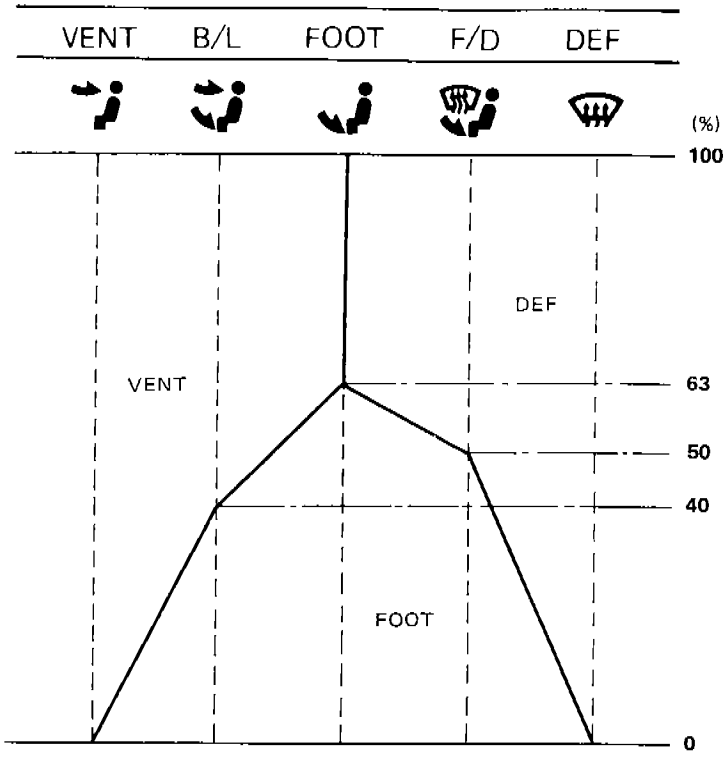
This illustration is for L.H. drive models.
For R.H. drive models, it is basically same.

RHA626A

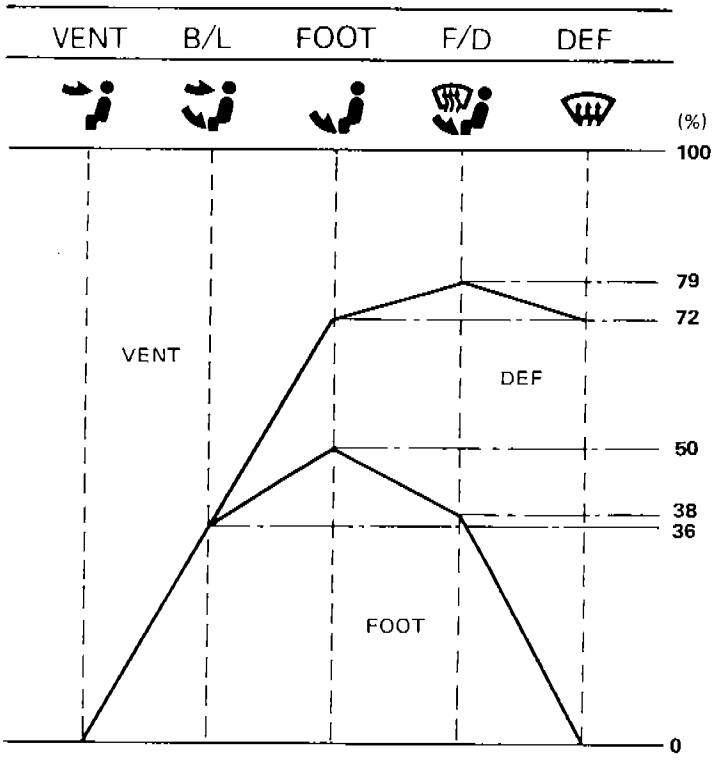
Air Flow (Cont'd)

AIR DISTRIBUTION RATIOS

Except Europe model

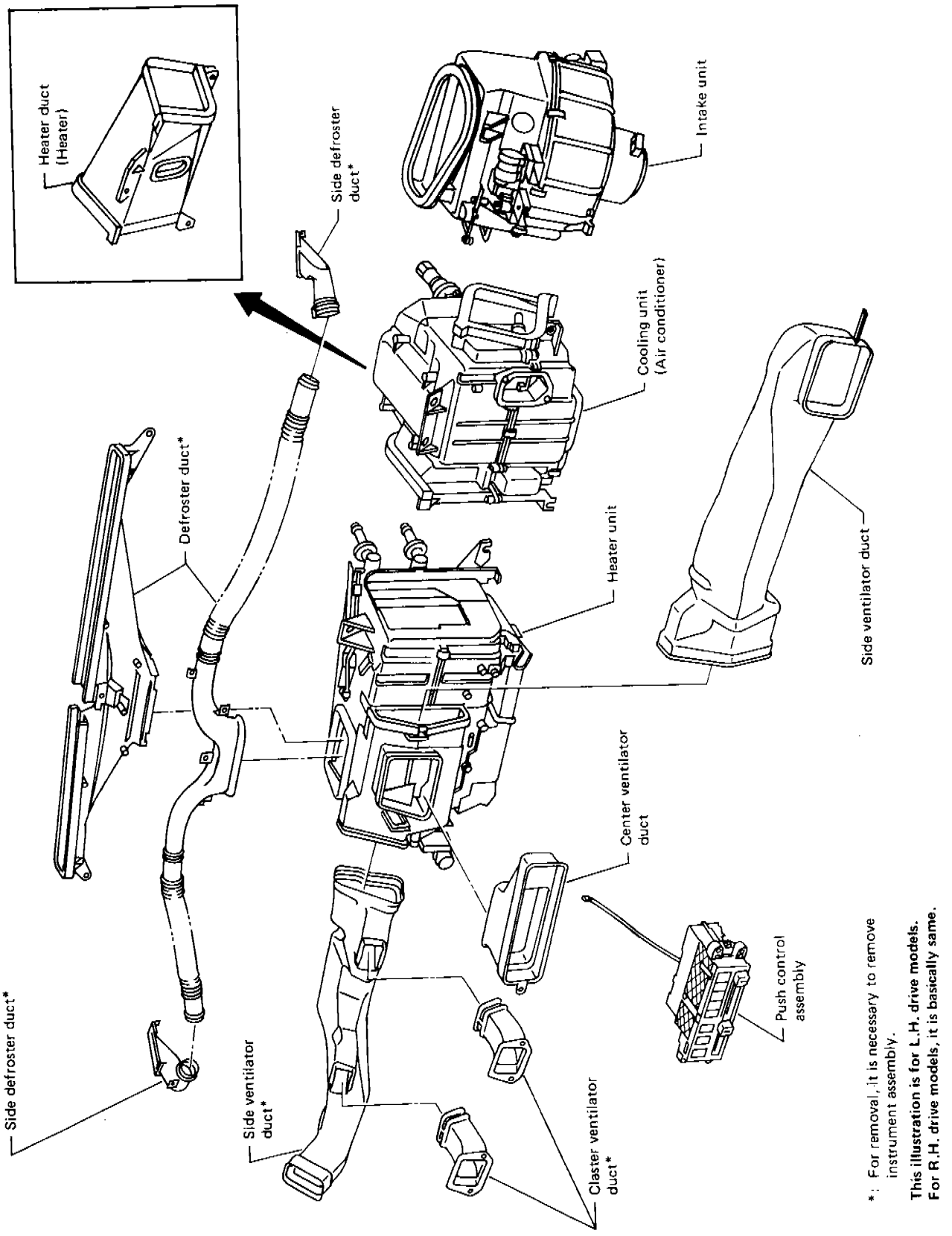


Europe model



RHA627A

Component Layout



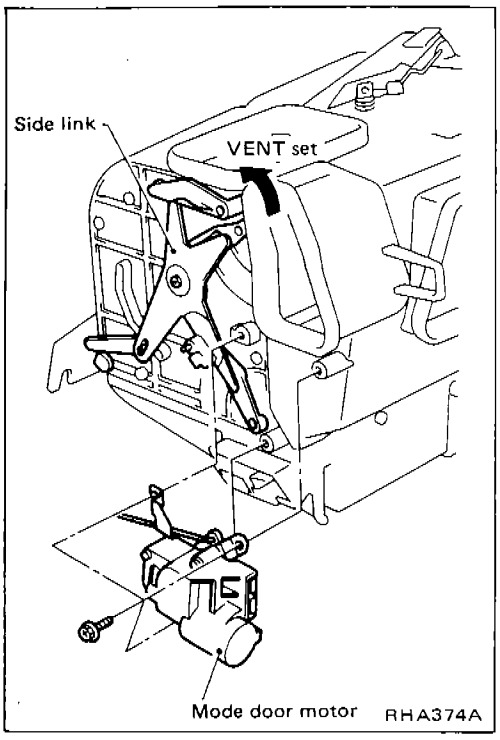
*: For removal, it is necessary to remove instrument assembly.

This illustration is for L.H. drive models. For R.H. drive models, it is basically same.

RHA373A

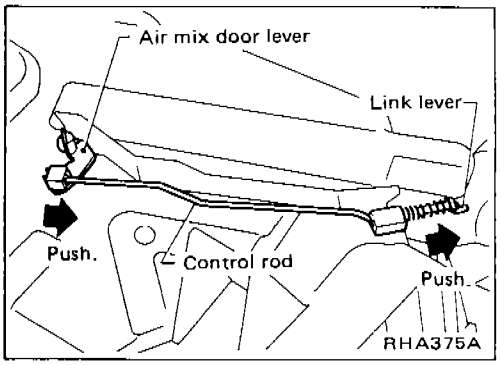
Control Cable Adjustment

- **When disconnecting the control cable, remove the E-ring and take off the cable while pushing the cable outer.**
- **The following illustrations are for L.H. drive models. For R.H. drive models, it is basically same.**



MODE DOOR

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

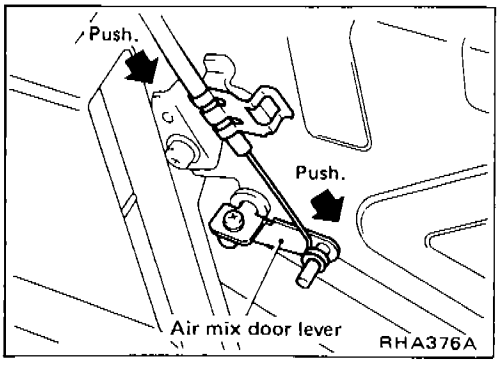


WATER COCK CONTROL ROD

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

1. Push air mix door lever in direction of arrow.
2. Pull control rod of water cock in direction of arrow so as to 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.

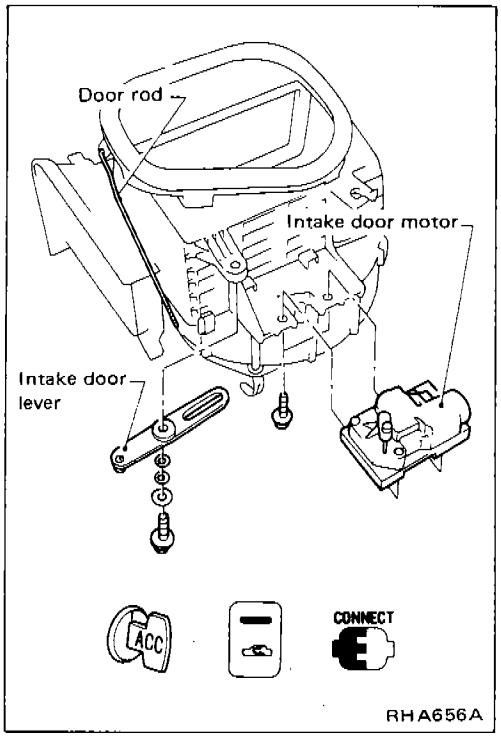


TEMPERATURE CONTROL CABLE

- Clamp the cable while pushing cable outer and air mix door lever in direction of arrow.

After positioning control cable, check it operates properly.

Control Cable Adjustment (Cont'd)

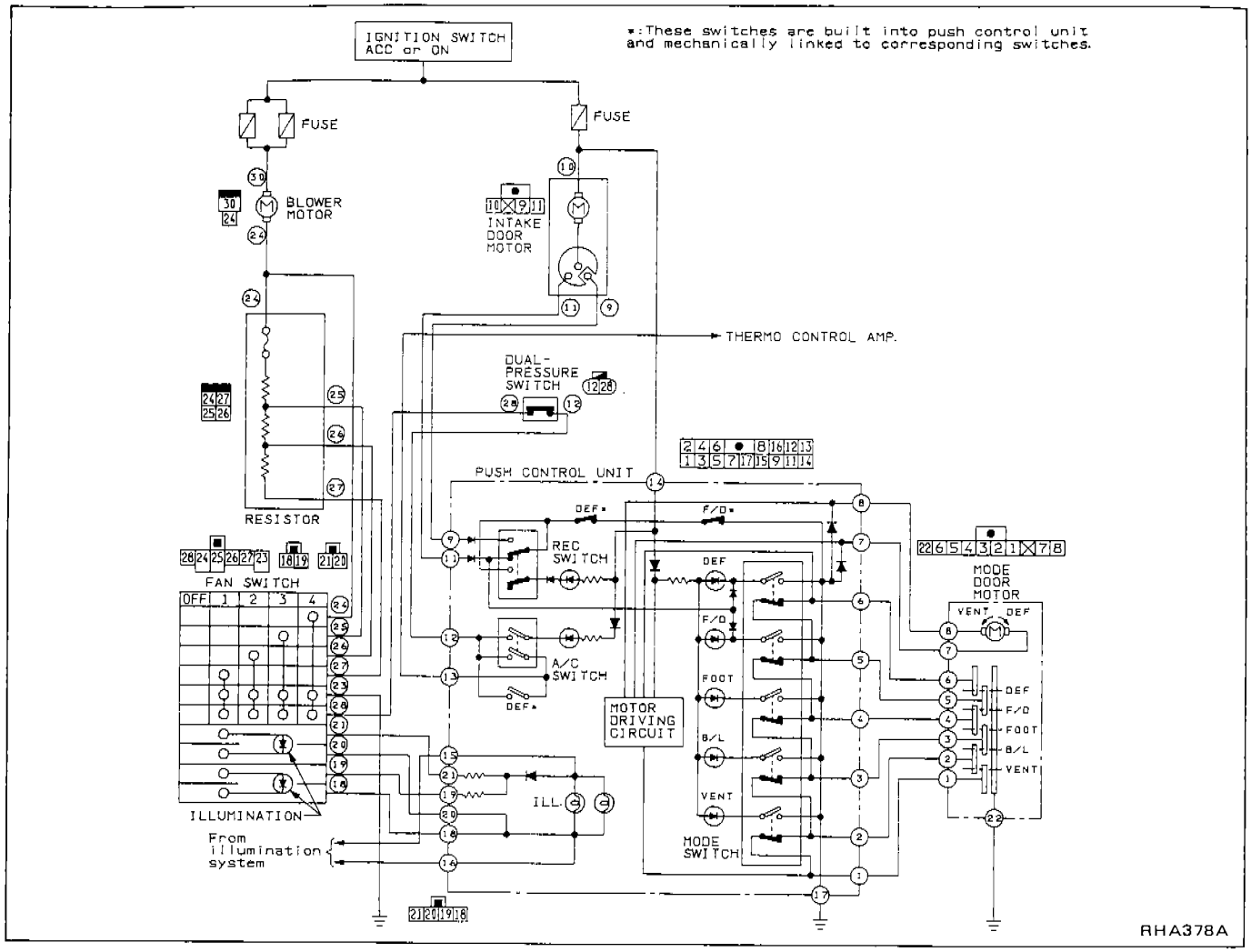


INTAKE DOOR

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

Push Control System

L.H.D. MODEL



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

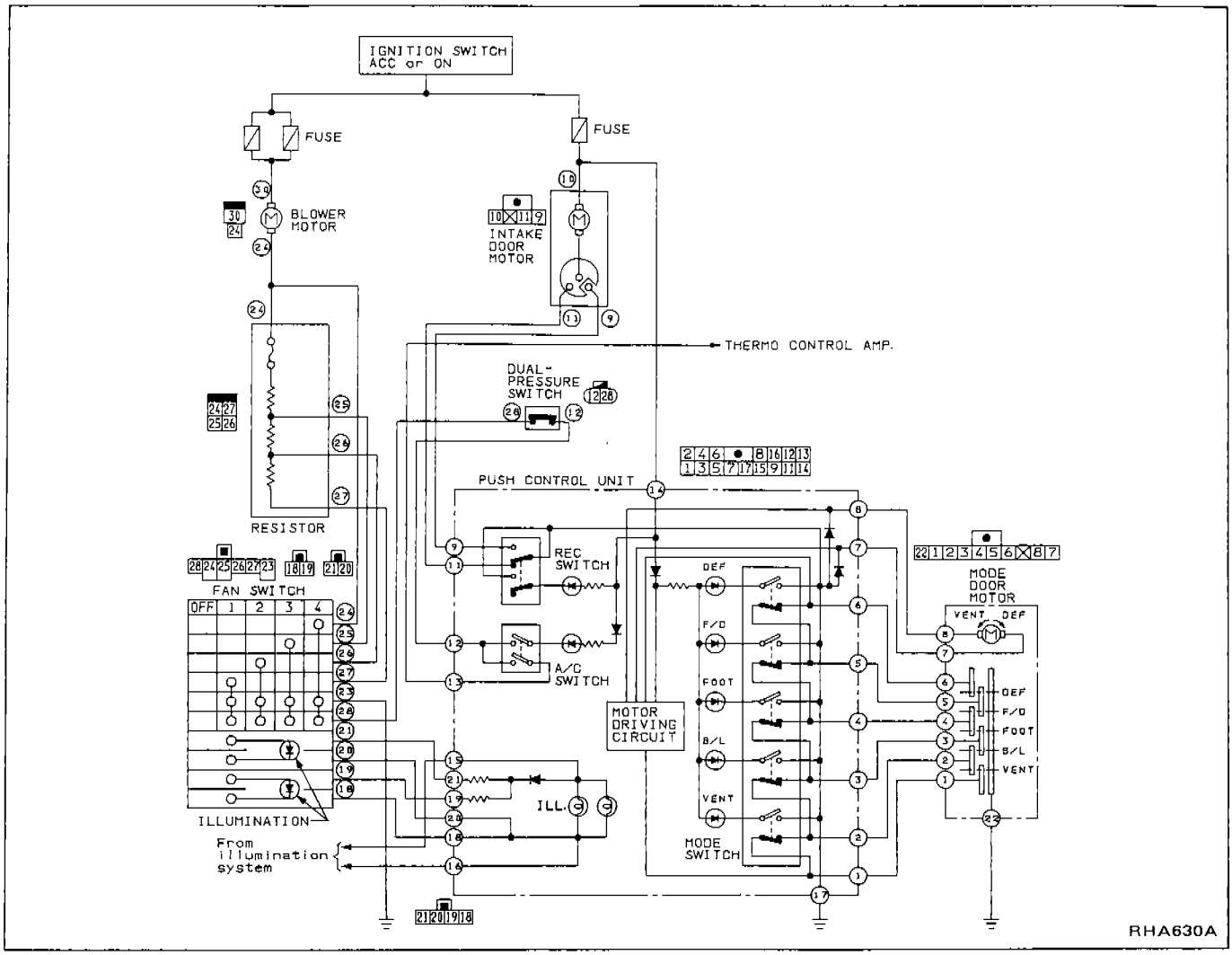
Switches and their control functions

Switch		Indicator illuminates							Air outlet	Intake air	Compressor
		A/C									
A/C		○							Refer to "AIR DISTRIBUTION RATIOS". (See page HA-4.)		ON*1
Mode			○								
				○							
					○						
						○				FRE	
							○			FRE	ON*1
								○*2		REC*2	

*1: Compressor is operated by thermo control amp.
*2: Depending on mode switch position.

Push Control System (Cont'd)

R.H.D. MODEL

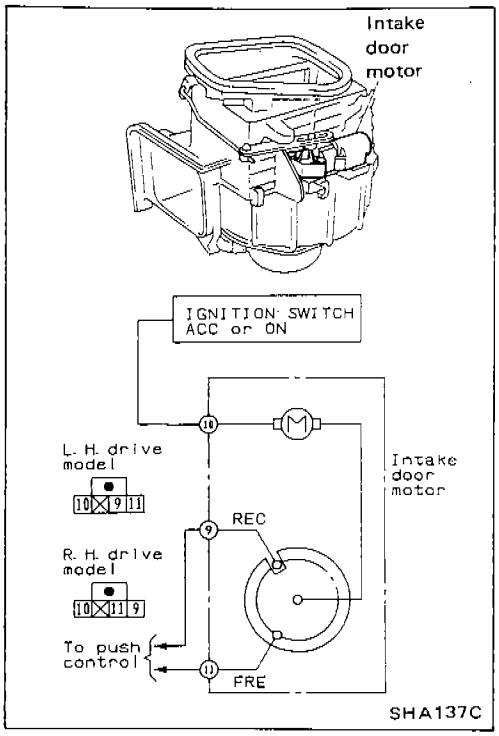


This push control system operates the intake and mode door motors to activate their corresponding doors.

Switches and their control functions

Switch		Indicator illuminates							Air outlet	Intake air	Compressor
		A/C									
A/C		○							Refer to "AIR DISTRIBUTION RATIOS". (See page HA-4.)		ON*
Mode			○								
				○							
					○						
						○					
							○				
								○		REC	

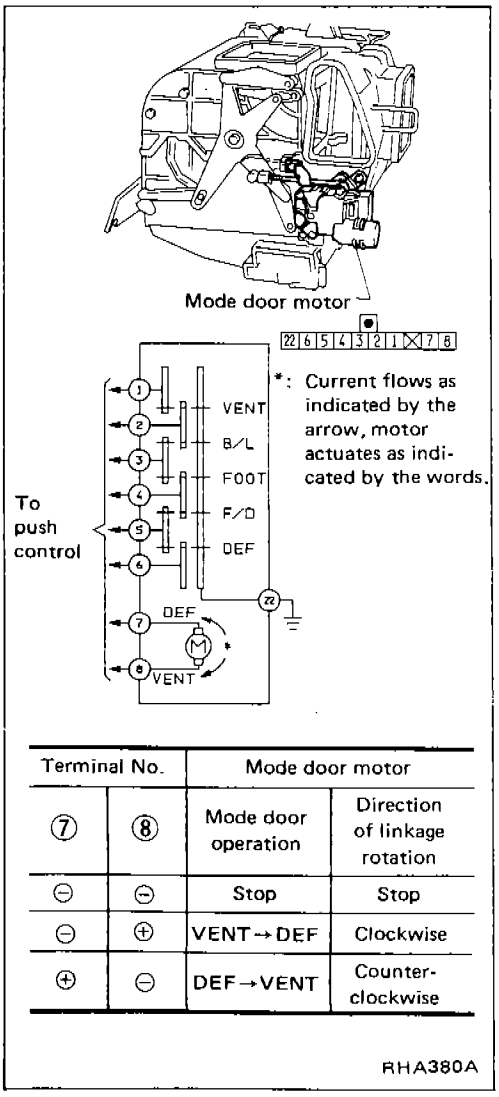
*: Compressor is operated by thermo control amp.



Intake Door Motor

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

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



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

Mode Door Motor

L.H.D. MODEL

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

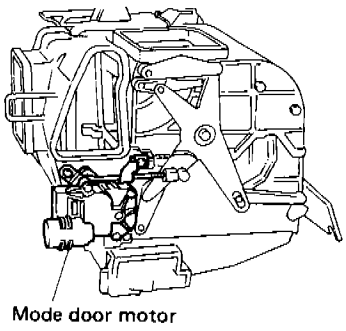
When one mode switch is pushed, the position switch built into it reads the corresponding mode to determine the direction of the motor rotation. As soon as the desired mode is set, the position switch stops the motor.

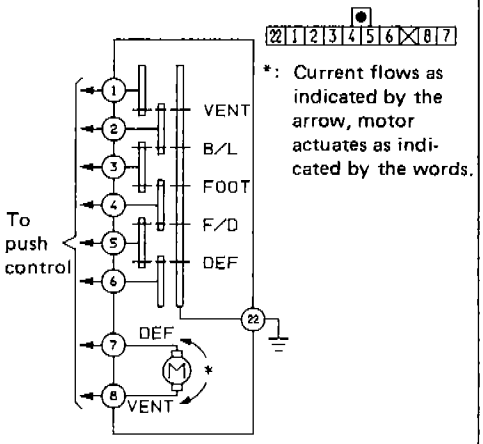
Mode Door Motor (Cont'd)

R.H.D. MODEL

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

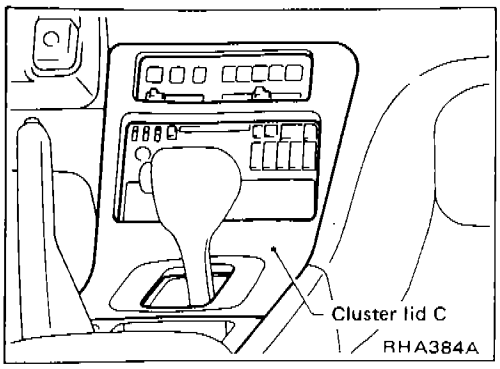
When one mode switch is pushed, the position switch built into it reads the corresponding mode to determine the direction of the motor rotation. As soon as the desired mode is set, the position switch stops the motor.





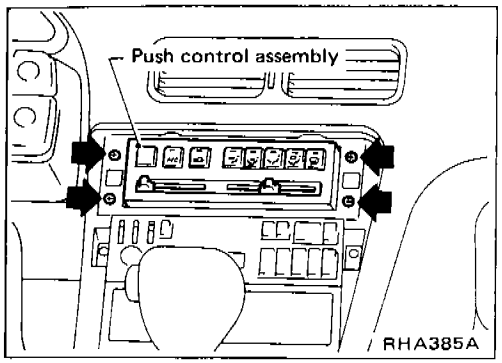
Terminal No.		Mode door motor	
⑦	⑧	Mode door operation	Direction of linkage rotation
⊖	⊖	Stop	Stop
⊖	⊕	VENT → DEF	Counter-clockwise
⊕	⊖	DEF → VENT	Clockwise

RHA631A



Removal and Installation

1. Remove cluster lid C.

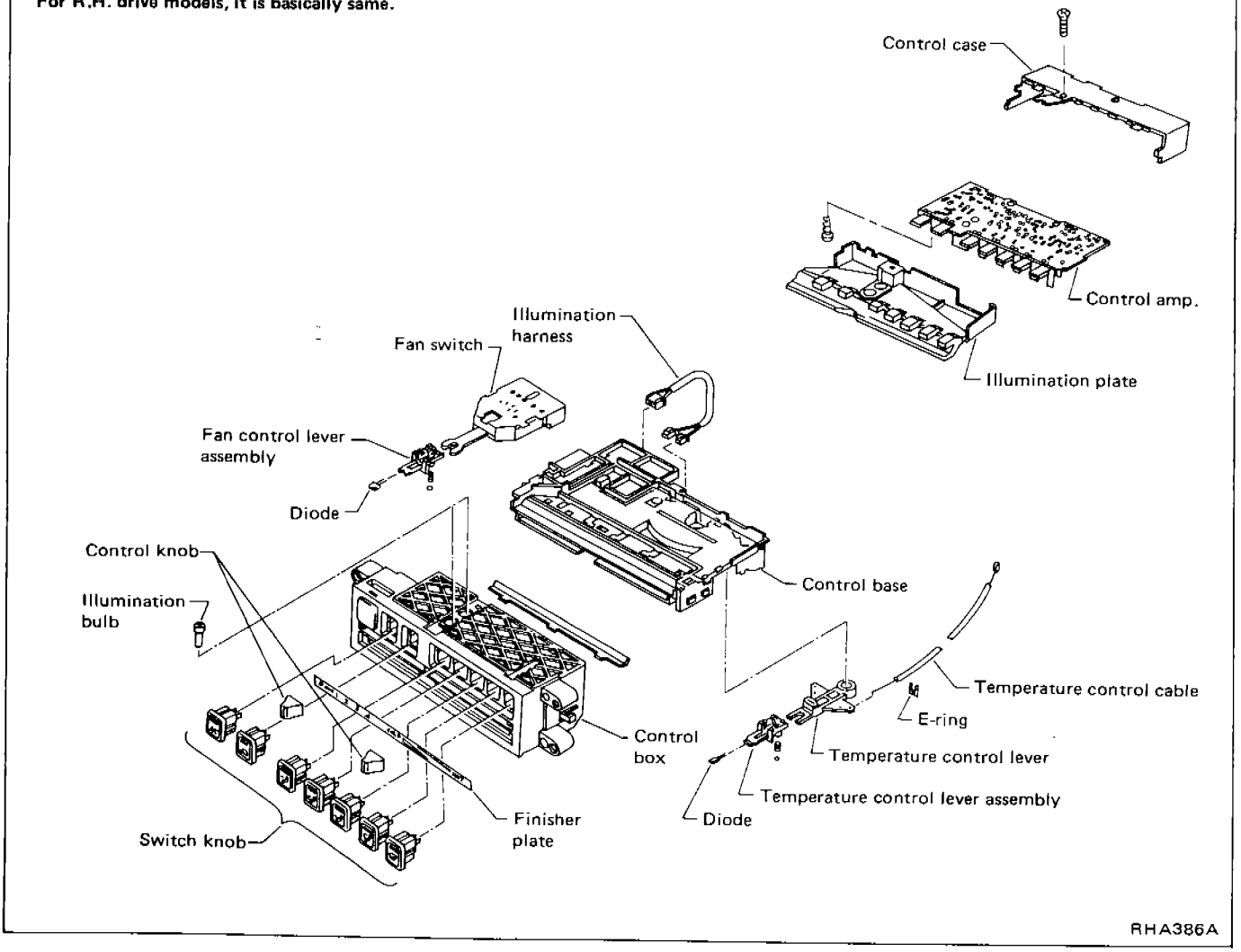


2. Remove audio (radio).
3. Remove four screws of push control unit.
4. Remove temperature control cable.
5. Disconnect push control unit harness connectors.
6. Remove push control unit.
7. Installation is in the reverse order of removal.

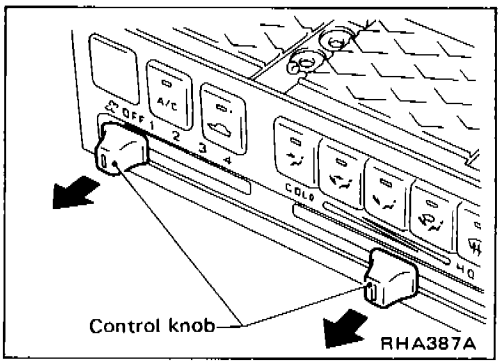
Refer to Control Cable Adjustment for temperature control cable.

Overhaul — Push control unit assembly

This illustration is for L.H. drive models.
For R.H. drive models, it is basically same.

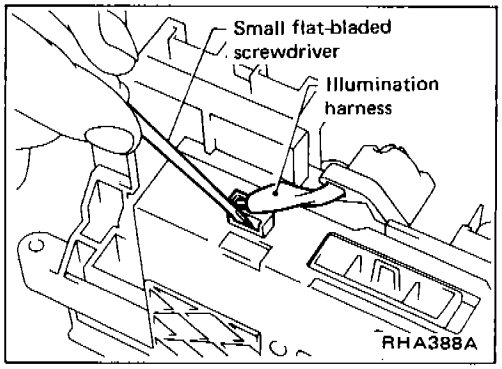


Overhaul — Push control unit assembly (Cont'd)

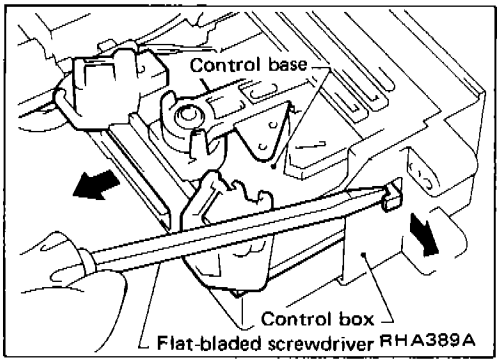


1. Remove two knobs.

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

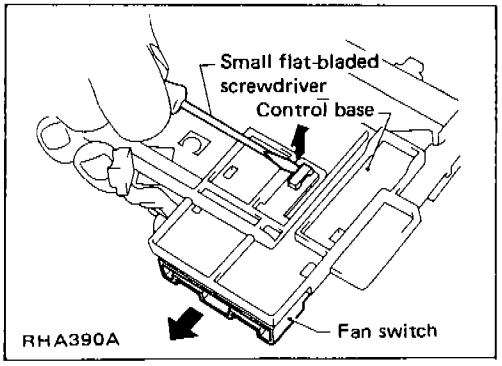


2. Disconnect illumination harness connectors.



3. Remove control base.

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

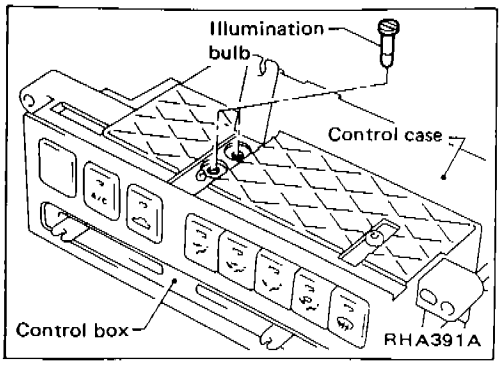


4. Remove fan switch.

5. Remove control knobs.

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

Overhaul — Push control unit assembly (Cont'd)



6. Remove illumination bulb.
7. Remove control case.

8. Remove illumination plate.

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

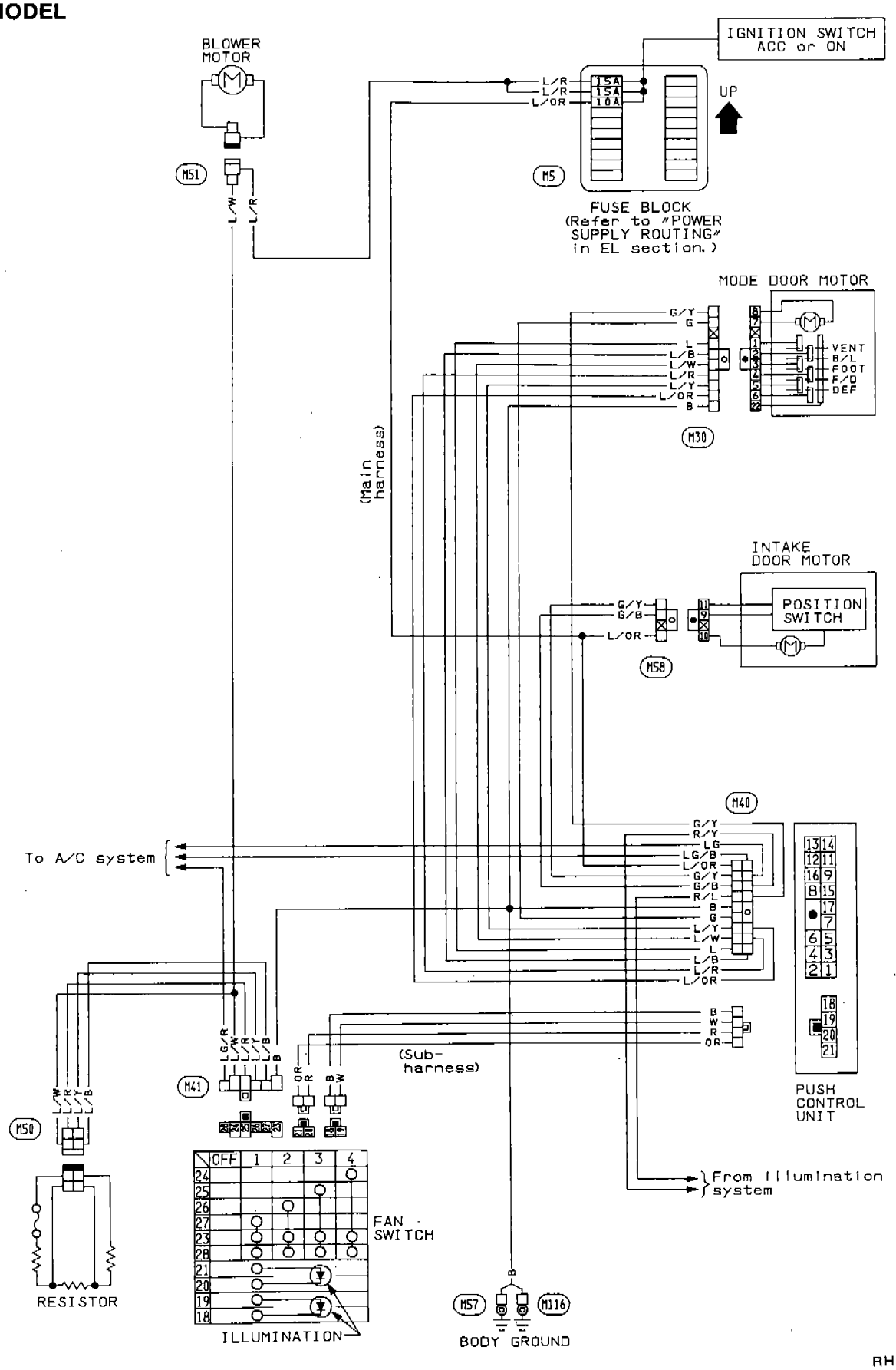
9. Remove finisher plate.
10. Remove control amp.

Be careful not to damage substrate when removing.

11. Disconnect temperature control cable.
12. Installation is in reverse order of removal.

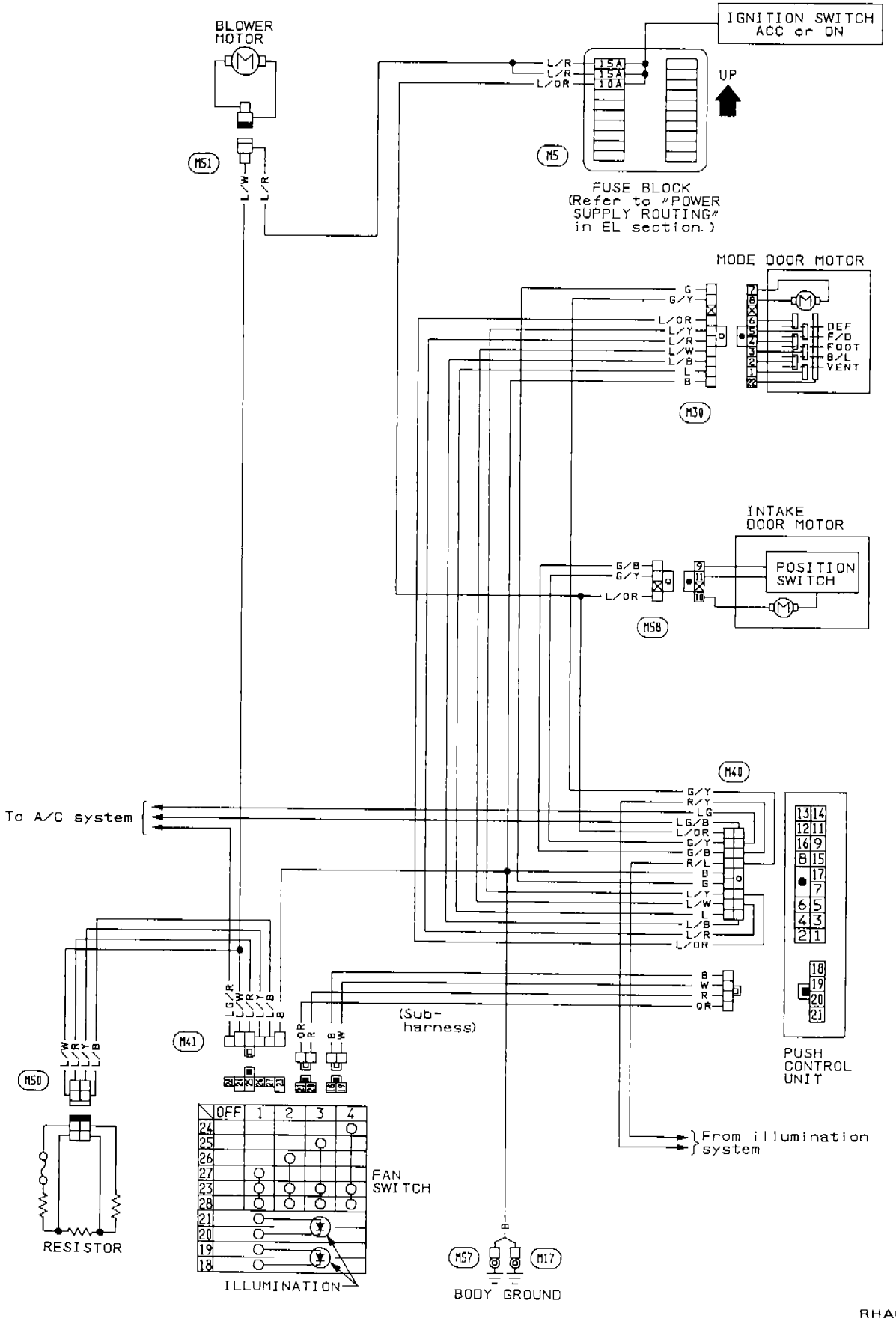
Wiring Diagram

L.H.D. MODEL



Wiring Diagram (Cont'd)

R.H.D. MODEL



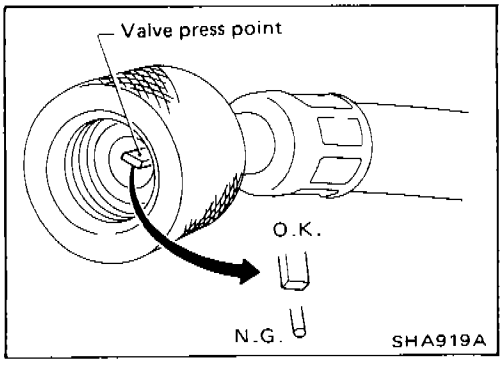
RHA632A

WARNING:

- 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 can with an open flame. There is a danger that can will explode.

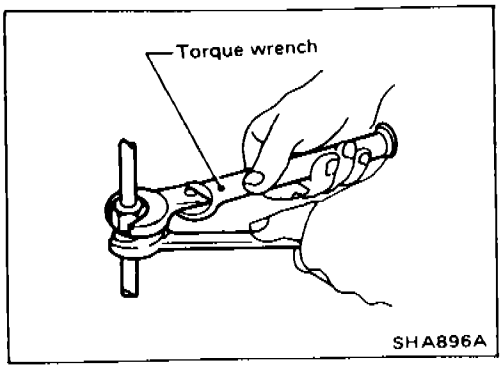
CAUTION:

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



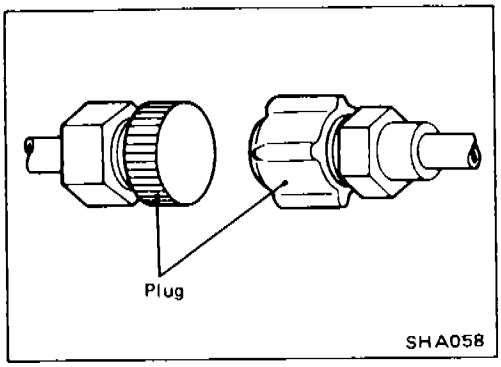
- Do not use manifold gauge whose press point shape is different from that shown. Otherwise, insufficient evacuating may occur.

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

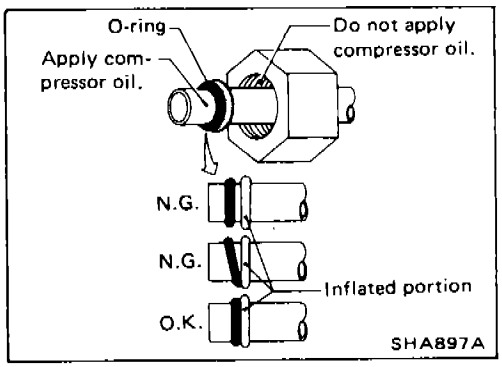


WARNING:
Gradually loosen discharge side hose fitting, and remove it after remaining pressure has been released.
CAUTION:
When replacing or cleaning refrigerant cycle components, observe the following.

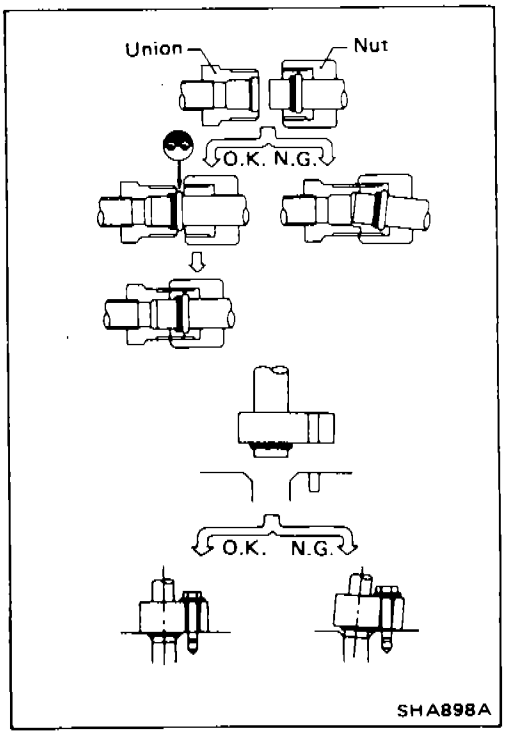
- **Do not leave compressor on its side or upside down for more than 10 minutes, as compressor oil will enter low pressure chamber.**
- **When connecting tubes, always use a torque wrench.**



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



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

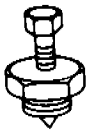
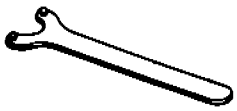


- **After inserting tube into union until O-ring is no longer visible, tighten nut to specified torque.**
- **After connecting line, conduct leak test and make sure that there is no leakage from connections. When the gas leaking point is found, disconnect that line and replace the O-ring. Then tighten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

SPECIAL SERVICE TOOLS

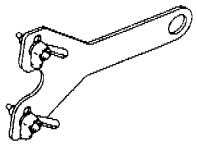
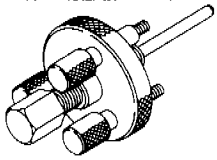
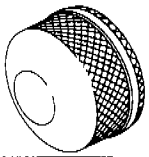
NVR 140S model

*: Special tool or commercial equivalent

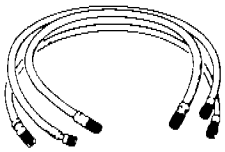
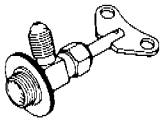
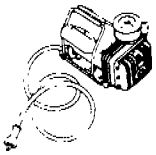
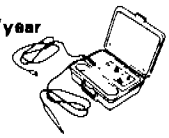
Tool name Tool number	Description	
KV998VR001 Clutch hub puller		Removing clutch disc
KV99231010* Clutch hub wrench		Removing shaft nut and clutch disc
KV99235160* Nut wrench		Removing lock nut

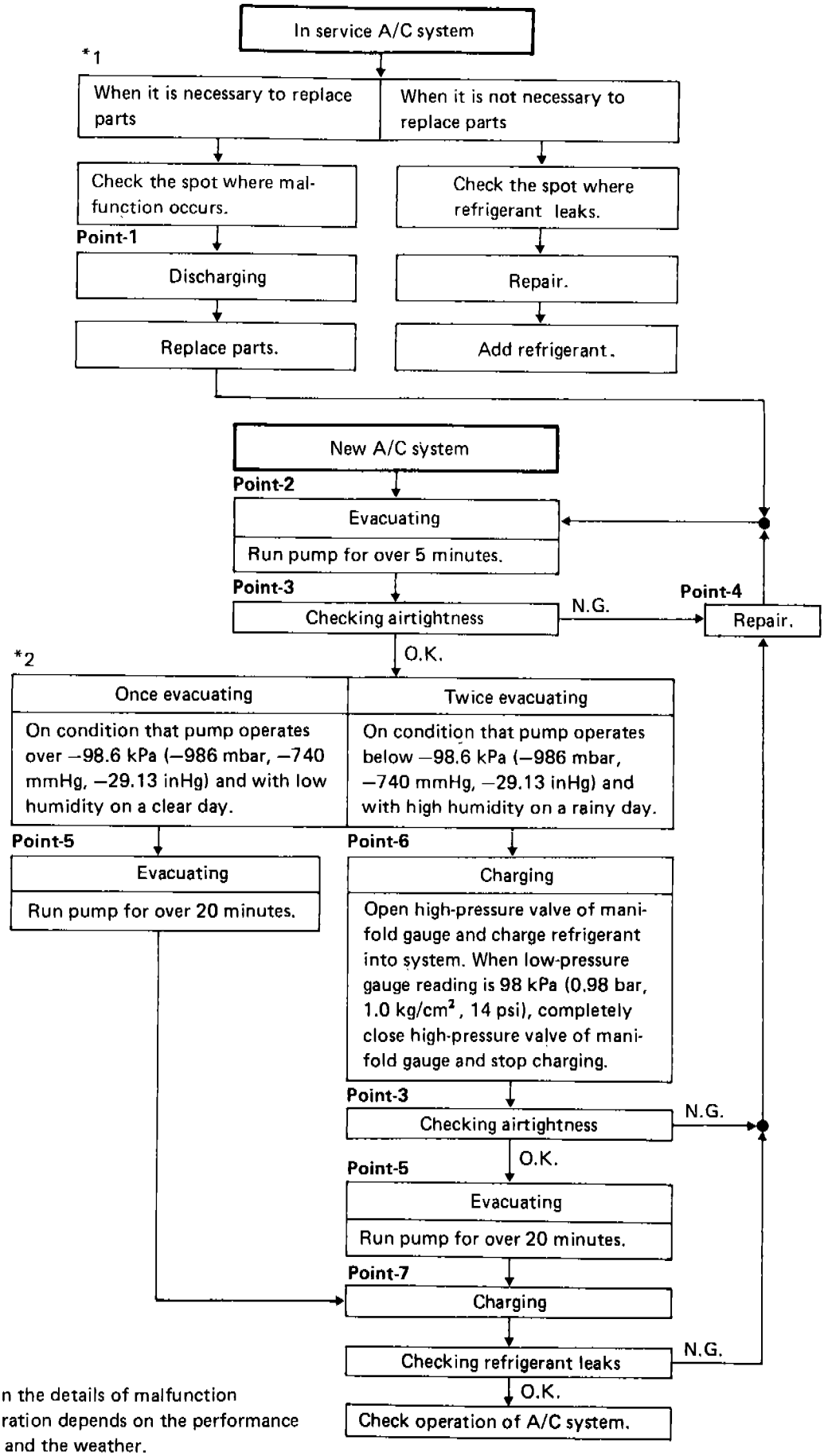
DKV-14C model

*: Special tool or commercial equivalent

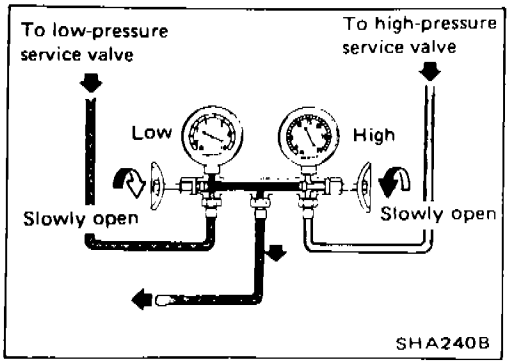
Tool number Tool name	Description	
KV99231162* Clutch disc wrench		Removing shaft nut and clutch disc
KV99232340 Clutch disc puller		Removing clutch disc
KV99234330 Pulley installer		Installing pulley

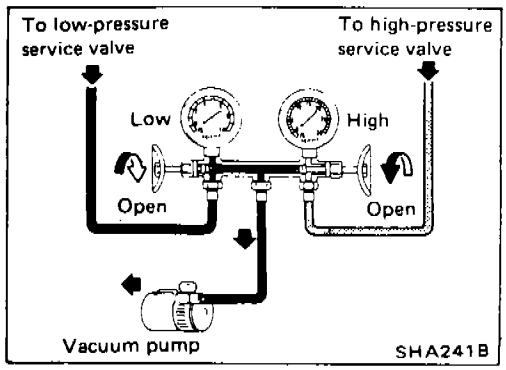
SERVICE TOOLS

Tool name	Description	
Manifold gauge		Discharging and charging refrigerant into system
Charging hose		Discharging, evacuating and charging refrigerant into system
Charge valve		Discharging and charging refrigerant into system
Thermometer		Checking temperature
Vacuum pump		Evacuating refrigerant system
Electric leak detector	**Nominal sensitivity:** **15 - 25 g (0.53 - 0.88 oz)/year** 	Checking refrigerant leaks



*1: Depending on the details of malfunction
*2: Working operation depends on the performance of the pump and the weather.





Elevation m (ft)	Vacuum of system* kPa (mbar, mmHg, inHg)
0 (0)	101.3 (1,013, 760, 29.92)
300 (1,000)	98.0 (980, 735, 28.94)
600 (2,000)	94.6 (946, 710, 27.95)
900 (3,000)	91.3 (913, 685, 26.97)

*: Values show reading of the low-pressure gauge.

Point-1

Discharging

Slowly open the valves to discharge only refrigerant. If they are opened quickly, compressor oil will also be discharged.

Point-2

Evacuating the System

1. Start pump, then open both valves and run pump for over 5 minutes.
2. When low gauge has reached approx. 98.6 to 101.3 kPa (986 to 1,013 mbar, 740 to 760 mmHg, 29.13 to 29.92 inHg), completely close both valves of gauge and stop vacuum pump.

a. The low-pressure gauge reads lower by 3.3 kPa (33 mbar, 25 mmHg, 0.98 inHg) per 300 m (1,000 ft) elevation. Perform evacuation according to the following table.

b. The rate ascension of the low-pressure gauge should be less than 3.3 kPa (33 mbar, 25 mmHg, 0.98 inHg) in 5 minutes.

Point-3

Checking Airtightness

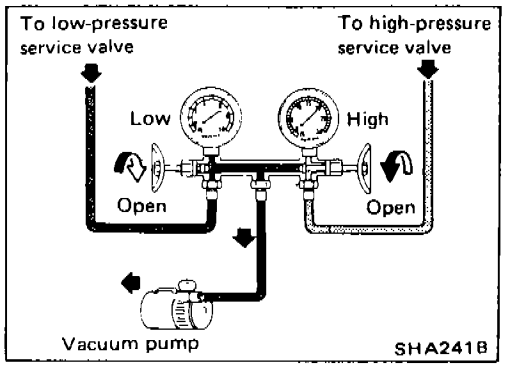
1. Close both low and high-pressure valves and leave them unattended for approx. 5 to 10 minutes.
2. Make sure the pointer of the low-pressure gauge does not deflect toward the "0" direction.
3. If the pointer deflects, gas leakage is present. Repair as outlined under Point-4.

Point-4

Repair

If a malfunction is noticed under Point-3 above, locate and repair the leaking point using the following table as a guide.

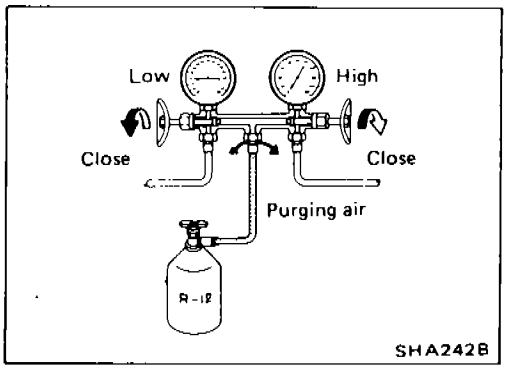
Leak at/around pipe connection	Leak at/around gauge manifold
• O-ring fouled, damaged or deformed • Oil not applied to pipe connections during installation • Pipe connections not properly tightened (too tight or too loose)	• Malfunctioning charging hose • Gauge improperly installed • Malfunctioning valve • Malfunctioning packing, etc.



Point-5

Evacuating the System

1. Close manifold gauge valve securely and disconnect charging hose from refrigerant can.
2. Connect center charging hose to vacuum pump.
3. Start pump, then open both valves and run pump for over 20 minutes.

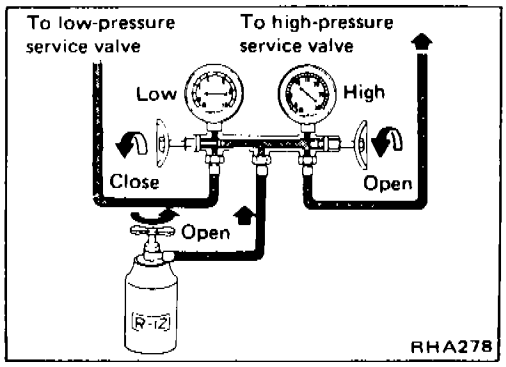


Point-6

Charging

1. Close manifold gauge valves securely and disconnect charging hose from vacuum pump.
2. Purge air from center charging hose.

1) Connect center charging hose to refrigerant can through charge valve.
2) Break seal of refrigerant can and purge air.

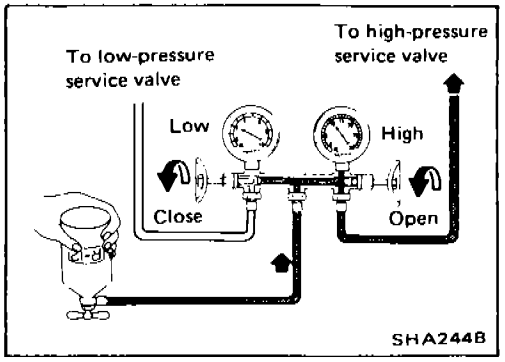


3. Charge refrigerant into system.

WARNING:

Ensure that engine is off.

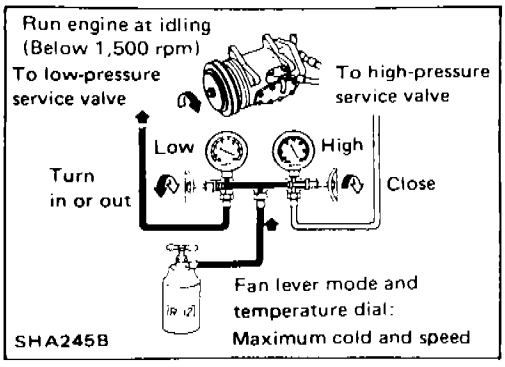
1) Open high-pressure valve of manifold gauge and charge refrigerant into system.



CAUTION:

If charging liquefied refrigerant into the system with the can turned upside down to reduce charging time, charge it only through high-pressure (discharge) service valve. After charging, the compressor should always be turned several times manually.

2) When low-pressure gauge reading is 98 kPa (0.98 bar, 1.0 kg/cm^2, 14 psi), completely close high-pressure valve of manifold gauge and stop charging.



Point-7

Charging

1. Charge refrigerant into system.

WARNING:

Ensure that engine is off.

- Open low-pressure valve of manifold gauge and charge refrigerant into system.

2. When refrigerant charging speed slows down, close high-pressure valve of manifold gauge and open low-pressure valve of manifold gauge and charge it while running the compressor for ease of charging.
3. Start engine — Air conditioning system ON, maximum temperature set, maximum blower speed. Open low-pressure valve on gauge set, with can in upright position, and monitor sight glass. Charge is complete when sight glass is clear.

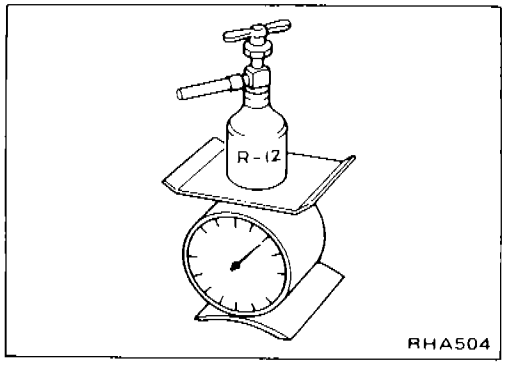
Cycling clutch systems will produce bubbles in sight glass when clutch engages. Therefore, allow 5 seconds after clutch engages to determine if bubbles continue, and, if so, add refrigerant to clear sight glass.

WARNING:

Never charge refrigerant through high-pressure side (discharge side) of system since this will force refrigerant back into refrigerant can and can may explode.

4. Charge refrigerant while controlling low-pressure gauge reading at 275 kPa (2.75 bar, 2.8 kg/cm^2, 40 psi) or less by turning in or out low-pressure valve of manifold gauge.

- **Be sure to purge air from charging hose when replacing can with a new one.**



5. Charge the specified amount of refrigerant into system by weighing charged refrigerant with scale. Overcharging will cause discharge pressure to rise.

Refrigerant amount:

L.H.D. model

0.9 - 1.0 kg (2.0 - 2.2 lb)

R.H.D. model

0.8 - 0.9 kg (1.8 - 2.0 lb)

Point-7

Charging (Cont'd)

The state of the bubbles in sight glass can only be used for checking whether the amount of charged refrigerant is small or not. The amount of charged refrigerant should be correctly judged by means of discharge pressure.

6. After charging, be sure to install valve cap on service valve.
7. Confirm that there are no leaks in system by checking with a leak detector.

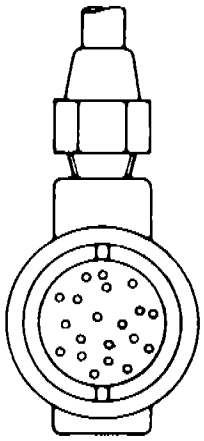
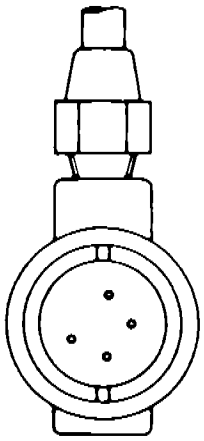
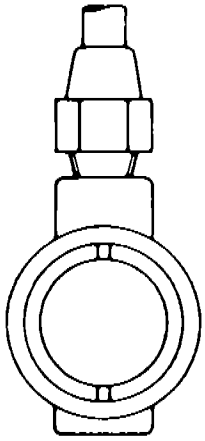
- When refrigerant charging is performed with a charging cylinder, charging station, or automatic charging equipment, engine off, charge only through high side, after specified refrigerant amount has entered the system, close high-pressure valve on gauge set. Start engine return to idle speed, operate A/C at maximum temperature setting, high blower. Observe sight glass to confirm complete charge.

Overcharging will result in increased high pressures, and reduced performance.

Checking Refrigerant Level

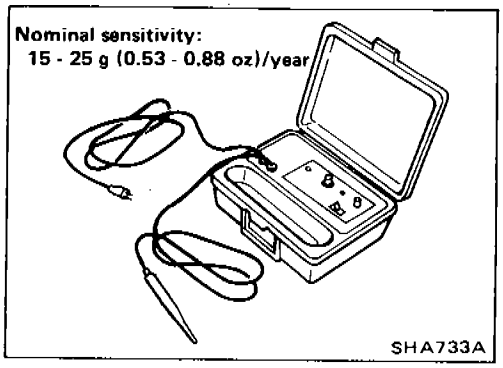
CONDITION

- Door window: Open
- A/C switch: ON
- TEMP. lever position: Max. COLD
- FAN lever position: 4
- Check sight glass after a lapse of about five minutes.

Amount of refrigerant / Check item	Almost no refrigerant	Insufficient	Suitable	Too much refrigerant
Temperature of high-pressure and low-pressure lines.	Almost no difference between high-pressure and low-pressure side temperature.	High-pressure side is warm and low-pressure side is fairly cold.	High-pressure side is hot and low-pressure side is cold.	High-pressure side is abnormally hot.
State in sight glass.	Bubbles flow continuously. Bubbles will disappear and something like mist will flow when refrigerant is nearly gone.  AC256	The bubbles are seen at intervals of 1 - 2 seconds.  AC257	Almost transparent. Bubbles may appear when engine speed is raised and lowered. No clear difference exists between these two conditions.  AC258	No bubbles can be seen.
Pressure of system.	High-pressure side is abnormally low.	Both pressures on high and low-pressure sides are slightly low.	Both pressures on high and low-pressure sides are normal.	Both pressures on high and low-pressure sides are abnormally high.
Repair.	Stop compressor immediately and conduct an overall check.	Check for gas leakage, repair as required, replenish and charge system.		Discharge refrigerant from service valve of low pressure side.

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

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

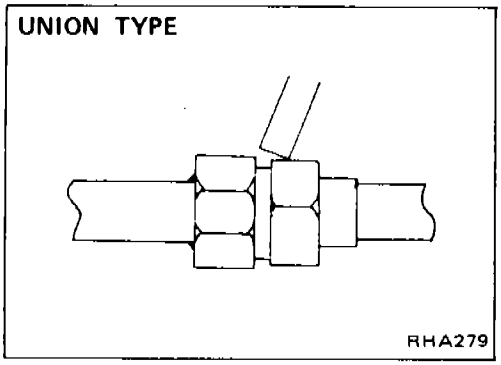


Checking Refrigerant Leaks

ELECTRIC LEAK DETECTOR

The leak detector is a delicate device that detects small amounts of halogen.

To use the device properly, read the manufacturer's manuals. Also perform the specified maintenance and inspections.

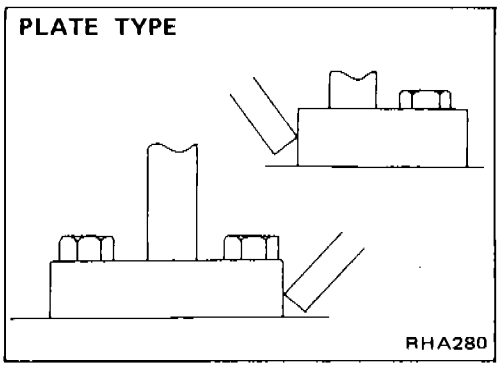


GENERAL PRECAUTIONS FOR HANDLING LEAK DETECTOR

Place the probe on connection fitting and wait for 5 seconds or more.

To check cooling unit, wait for 10 seconds or more.

Keep the probe as still as possible for one more minute.

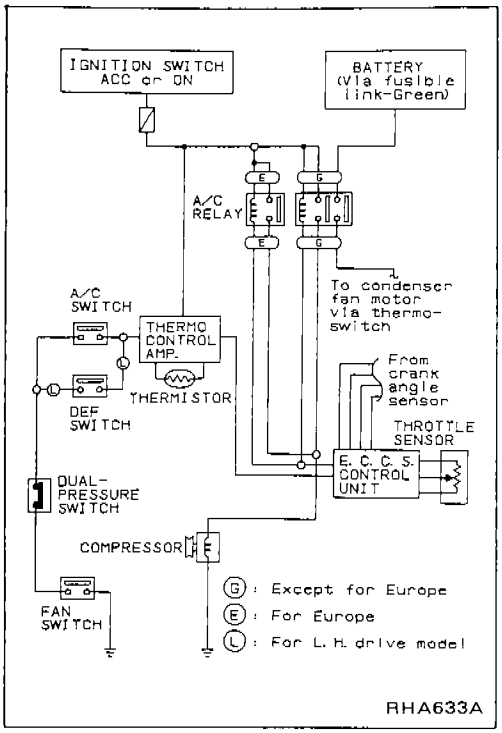


When testing single-bolt flange, place the probe on the opposite side of the fitting.

MEASUREMENT STANDARD

If any leak is noted with a detector having a nominal sensitivity of 15 to 25 g (0.53 to 0.88 oz)/year, that leak must be repaired.

- The nominal sensitivity of the detector is determined under the assumption that all the leaking gas is collected by the detector. Accordingly, the quantity of gas actually leaking can amount to five to ten times the indicated value. Generally speaking, leakage of 150 to 200 g (5.29 to 7.05 oz) of refrigerant can cause insufficient cooling.
- Oil deposited during assembling must be wiped off before inspection. Refrigerant easily dissolves in oil, and the presence of oil can cause an error in measurement.
  This precaution is important when checking a used car for refrigerant leakage.
- If oil is noted at or around connections, it indicates that refrigerant is leaking.



Acceleration Cut System

This system is controlled by the E.C.C.S. control unit.
When the engine is heavily overloaded (throttle sensor judges that throttle valve is at full throttle position or engine speed is more than 6,500 rpm), the compressor is turned off for approx. 5 seconds to reduce overloading.

Refrigeration Cycle

REFRIGERANT FLOW

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

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.

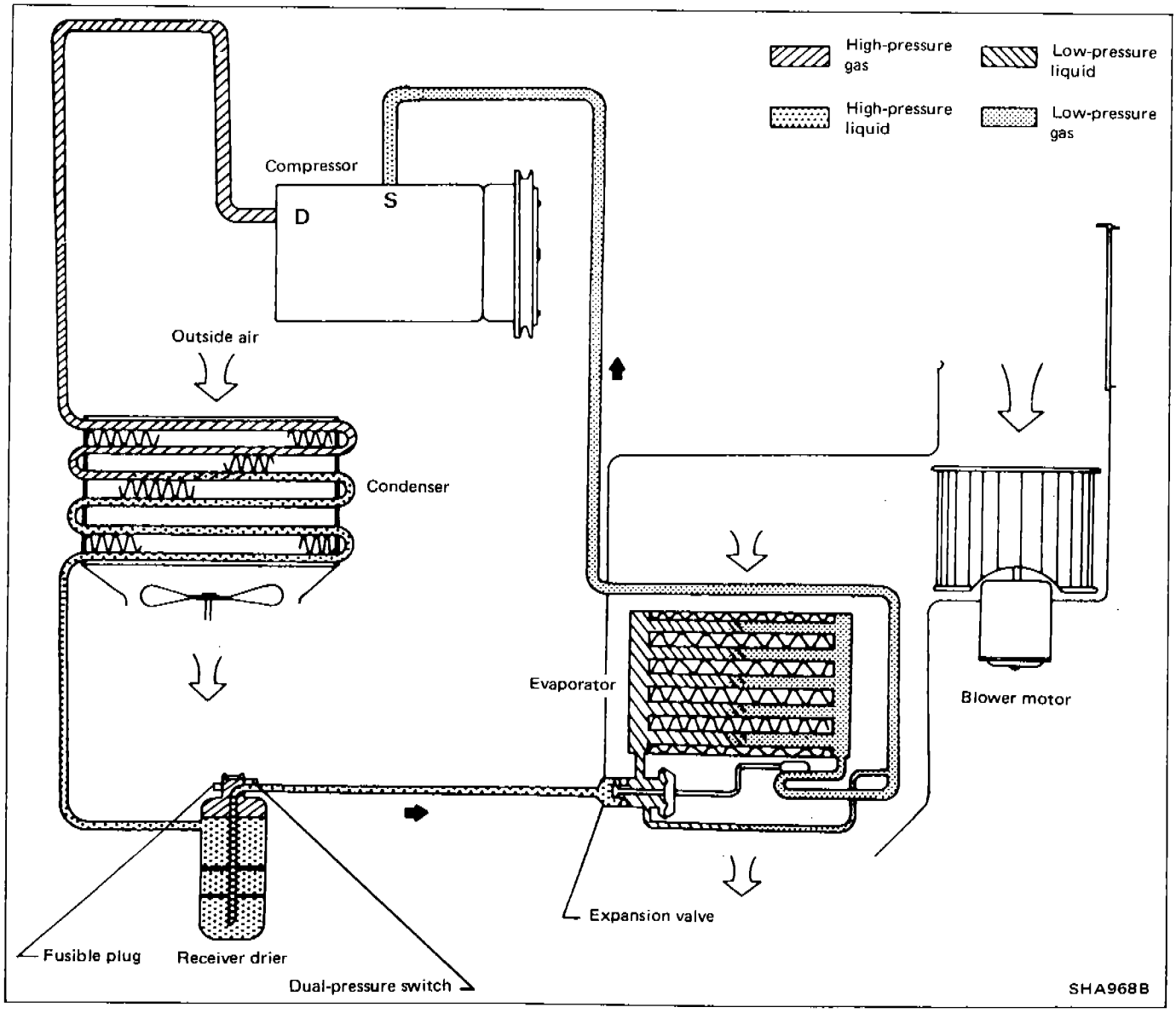
REFRIGERANT SYSTEM PROTECTION

Dual-pressure switch

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

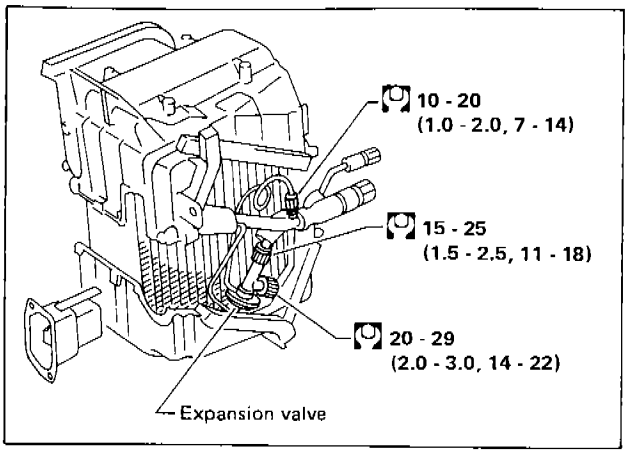
Fusible plug

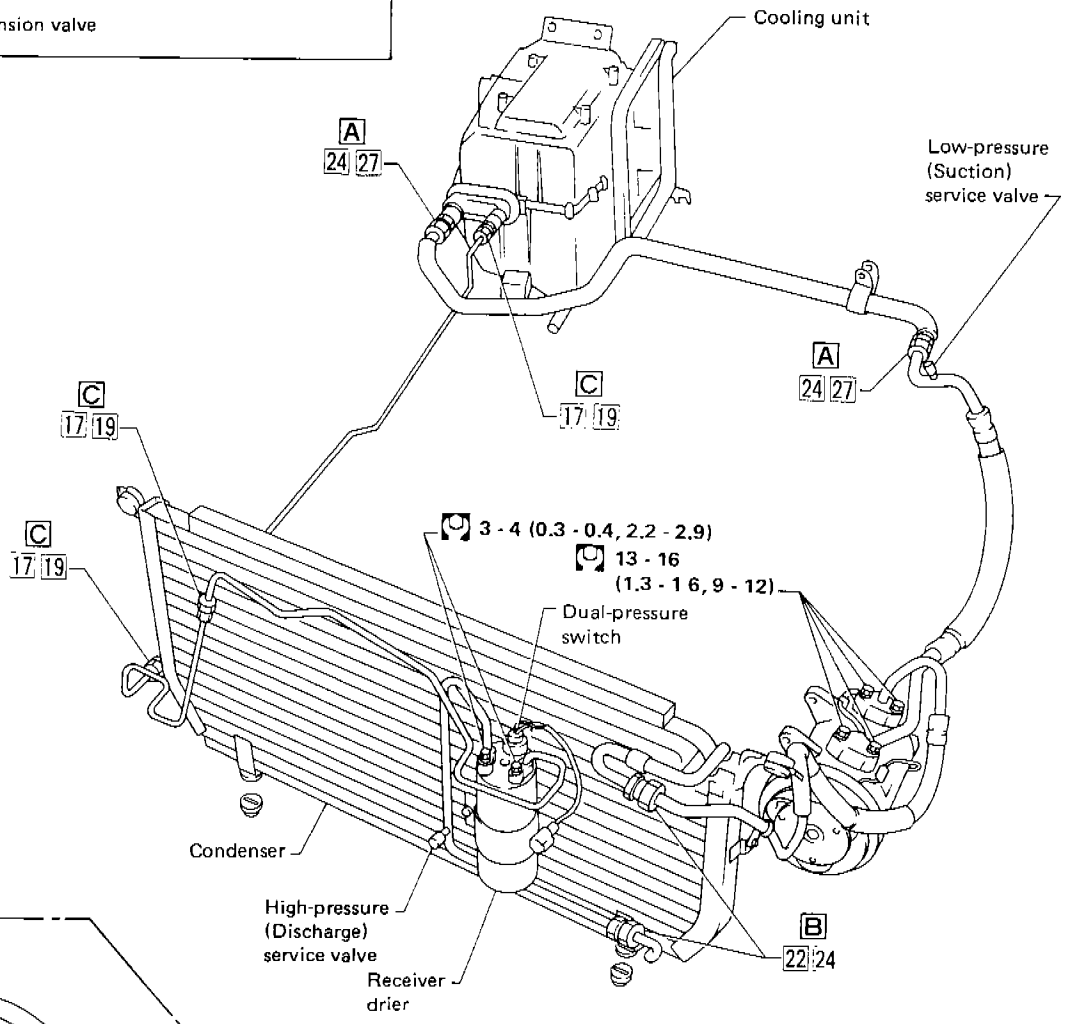
Open at temperature above 105°C (221°F), thereby discharging refrigerant to the atmosphere. If this plug is melted and opened, check the refrigerant line and replace receiver drier.



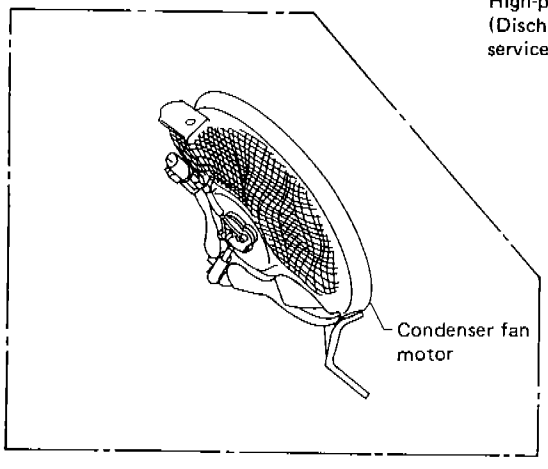
Refrigerant Lines

L.H.D. MODEL





For hot areas



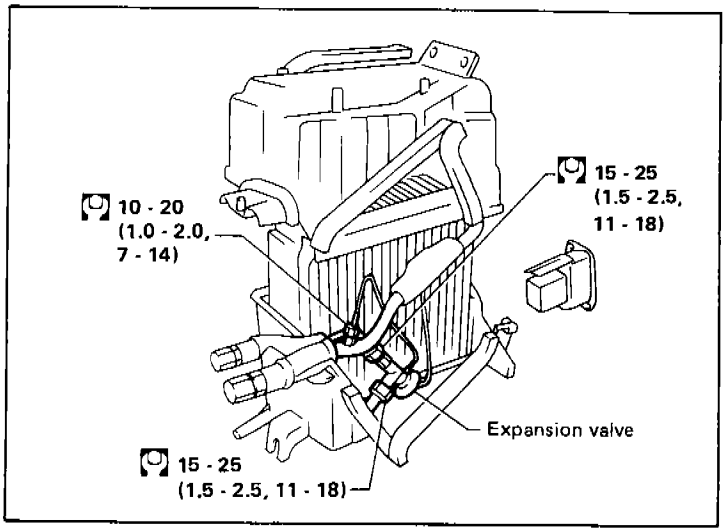
□ (Tightening torque)
□□ (Wrench size)
A 20 - 29 (2.0 - 3.0, 14 - 22)
B 15 - 25 (1.5 - 2.5, 11 - 18)
C 10 - 20 (1.0 - 2.0, 7 - 14)

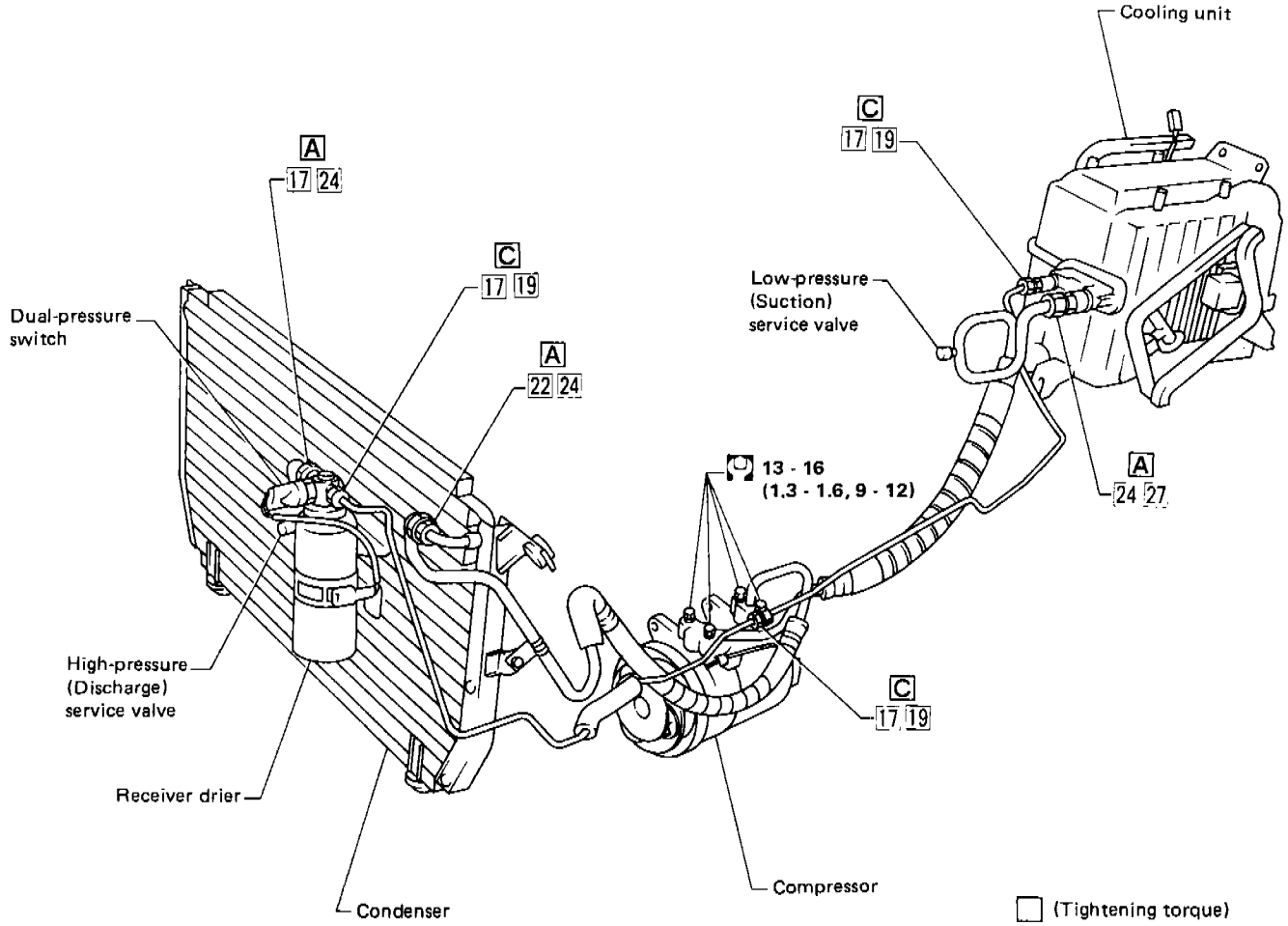
: N·m (kg-m, ft-lb)

RHA634A

Refrigerant Lines (Cont'd)

R.H.D. MODEL

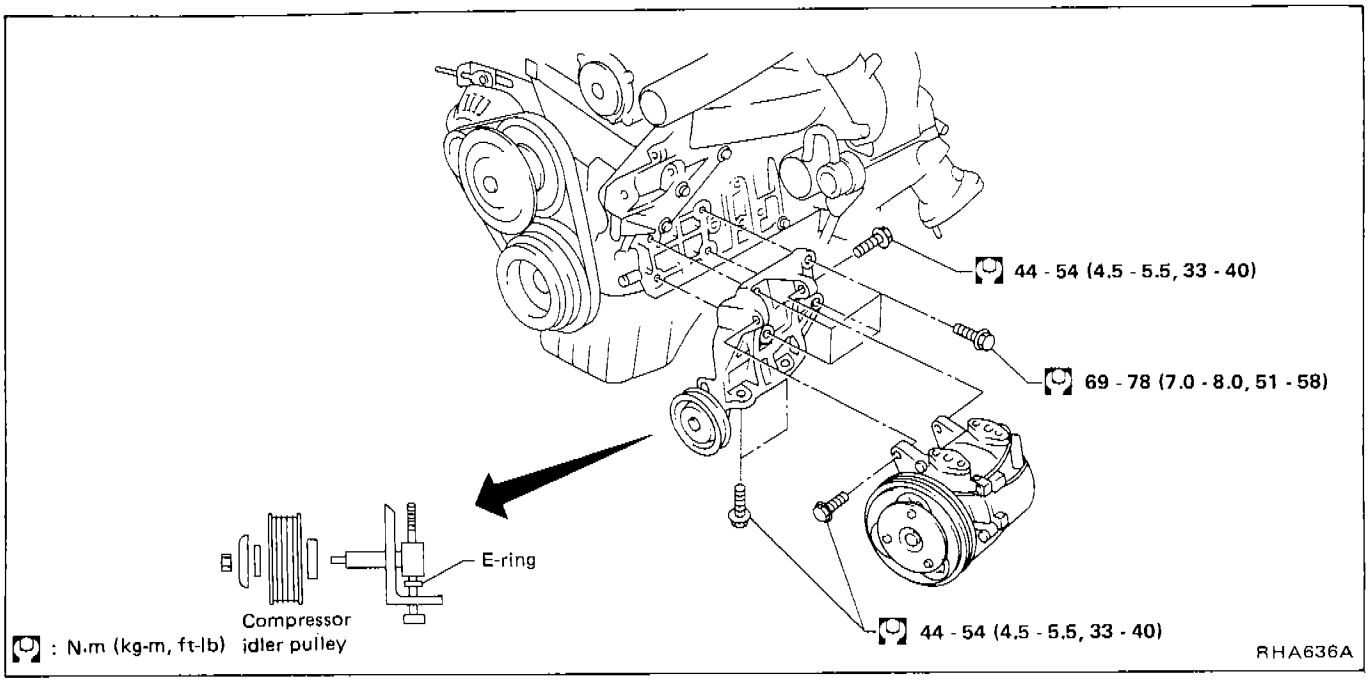




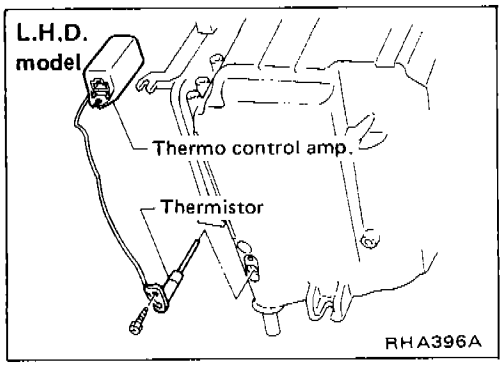
□ (Tightening torque)
□□ (Wrench size)
A 20 - 29 (2.0 - 3.0, 14 - 22)
B 15 - 25 (1.5 - 2.5, 11 - 18)
C 10 - 20 (1.0 - 2.0, 7 - 14)
: N·m (kg-m, ft-lb)

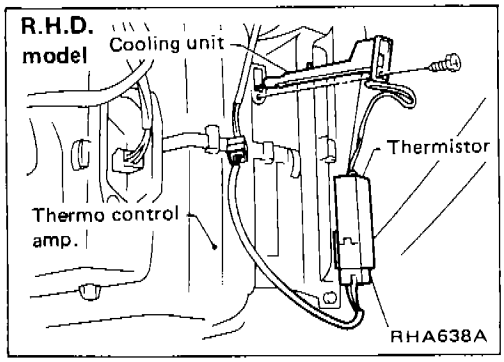
RHA635A

Compressor Mounting



: N·m (kg-m, ft-lb)





Thermo Control Amp.

REPLACEMENT

Remove screws, which secure thermistor locating stay, from front of cooling unit. Replace thermo control amp. assembly with a new one. (Cooling unit need not be removed during the replacement.)

Belt Tension

- **Refer to MA section.**

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

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

Performance Chart

TEST CONDITION

Testing must be performed as follows:

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

For hot areas, make sure that condenser fan motor does not operate during the following tests.

TEST READING

L.H.D. model

Recirculating-to-discharge air temperature table

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	20 (68)	1.6 - 2.7 (35 - 37)
	25 (77)	4.4 - 6.0 (40 - 43)
	30 (86)	9.2 - 11.3 (49 - 52)
	35 (95)	14.8 - 17.0 (59 - 63)
	40 (104)	18.1 - 20.3 (65 - 69)
60 - 70	20 (68)	2.7 - 4.3 (37 - 40)
	25 (77)	6.0 - 8.2 (43 - 47)
	30 (86)	11.3 - 13.8 (52 - 57)
	35 (95)	17.0 - 19.5 (63 - 67)
	40 (104)	20.3 - 22.8 (69 - 73)

Ambient air temperature-to-compressor pressure table

Ambient air		High-pressure (Discharge side) kPa (bar, kg/cm^2, psi)	Low-pressure (Suction side) kPa (bar, kg/cm^2, psi)
Relative humidity %	Air temperature °C (°F)		
50 - 70	20 (68)	1,030 - 1,255 (10.30 - 12.55, 10.5 - 12.8, 149 - 182)	98.1 - 142.2 (0.981 - 1.422, 1.0 - 1.45, 14.2 - 20.6)
	25 (77)	1,196 - 1,471 (11.96 - 14.71, 12.2 - 15.0, 173 - 213)	122.6 - 171.6 (1.226 - 1.716, 1.25 - 1.75, 17.8 - 24.9)
	30 (86)	1,402 - 1,706 (14.02 - 17.06, 14.3 - 17.4, 203 - 247)	161.8 - 210.9 (1.618 - 2.109, 1.65 - 2.15, 23.5 - 30.6)
	35 (95)	1,608 - 1,971 (16.08 - 19.71, 16.4 - 20.1, 233 - 286)	205.9 - 259.9 (2.059 - 2.599, 2.1 - 2.65, 29.9 - 37.7)
	40 (104)	1,844 - 2,256 (18.44 - 22.56, 18.8 - 23.0, 267 - 327)	259.9 - 318.7 (2.599 - 3.187, 2.65 - 3.25, 37.7 - 46.2)

Performance Chart (Cont'd)

R.H.D. model

Recirculating-to-discharge air temperature table

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C (°F)
Relative humidity %	Air temperature °C (°F)	
50 - 60	20 (68)	1.5 - 2.5 (35 - 37)
	25 (77)	4.0 - 6.0 (39 - 43)
	30 (86)	9.0 - 12.0 (48 - 54)
	35 (95)	14.5 - 18.0 (58 - 64)
	40 (104)	20.5 - 23.0 (69 - 73)
60 - 70	20 (68)	2.5 - 4.5 (37 - 40)
	25 (77)	6.0 - 9.0 (43 - 48)
	30 (86)	12.0 - 14.5 (54 - 58)
	35 (95)	18.0 - 21.0 (64 - 70)
	40 (104)	23.0 - 26.0 (73 - 79)

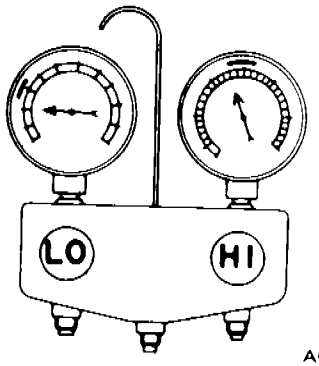
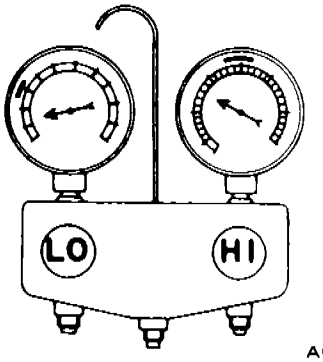
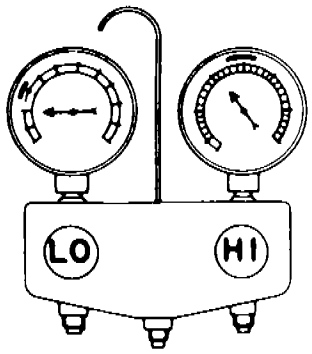
Ambient air temperature-to-compressor pressure table

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)	922 - 1,304 (9.22 - 13.04, 9.4 - 13.3, 134 - 189)	107.9 - 171.6 (1.079 - 1.716, 1.1 - 1.75, 15.6 - 24.9)
	25 (77)	1,098 - 1,520 (10.98 - 15.20, 11.2 - 15.5, 159 - 220)	127.5 - 201.0 (1.275 - 2.010, 1.3 - 2.05, 18.5 - 29.2)
	30 (86)	1,314 - 1,775 (13.14 - 17.75, 13.4 - 18.1, 191 - 257)	156.9 - 235.4 (1.569 - 2.354, 1.6 - 2.4, 22.8 - 34.1)
	35 (95)	1,550 - 2,059 (15.50 - 20.59, 15.8 - 21.0, 225 - 299)	196 - 284 (1.96 - 2.84, 2.0 - 2.9, 28 - 41)
	40 (104)	1,804 - 2,373 (18.04 - 23.73, 18.4 - 24.2, 262 - 344)	245 - 343 (2.45 - 3.43, 2.5 - 3.5, 36 - 50)

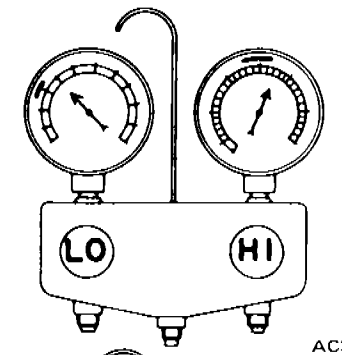
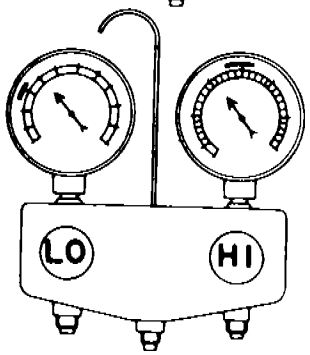
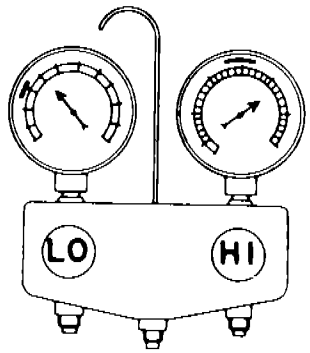
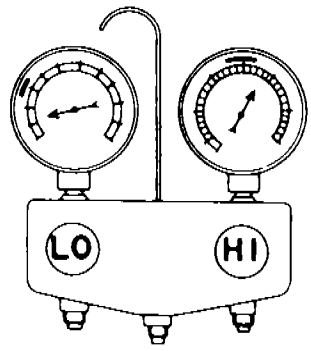
Performance Test Diagnoses

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

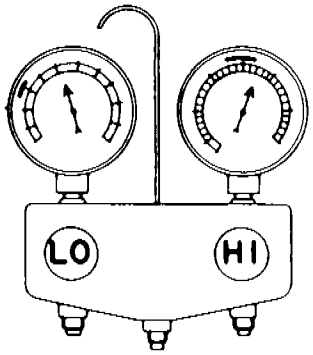
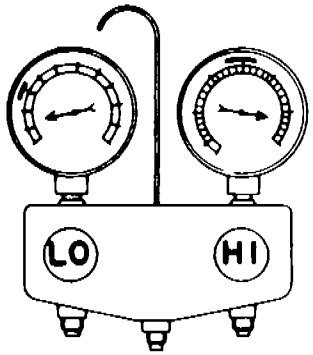
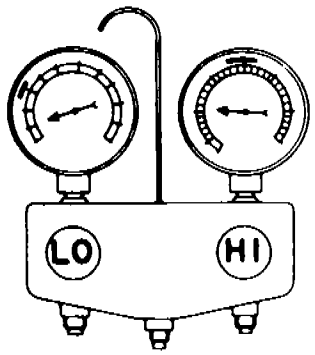
In the following table, the portion smeared with ink on each gauge scale indicates the range showing that the air conditioning system is in good order. This range is described in Performance Chart.

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

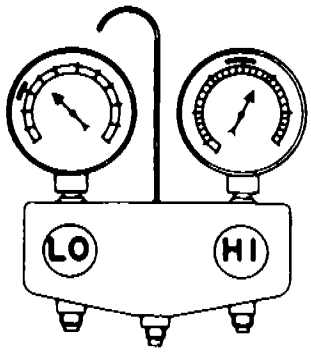
Performance Test Diagnoses (Cont'd)

Condition		Probable cause	Corrective action
 AC355A	Insufficient cooling. Sweat on suction line.	Expansion valve allows too much refrigerant through evaporator.	Check valve for operation. If suction side does not show a pressure decrease, replace valve.
 AC356A	No cooling. Sweat or frosting on suction line.	Malfunctioning expansion valve.	1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.
AIR IN SYSTEM			
 AC359A	Insufficient cooling. Sight glass shows occasional bubbles.	Air mixed with refrigerant in system.	1. Discharge system. 2. Replace receiver drier. 3. Evacuate and charge system.
MOISTURE IN SYSTEM			
 AC360A	After short operation, suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As a warning of this, reading vibrates around 39 kPa (0.39 bar, 0.4 kg/cm^2, 6 psi).	Drier is saturated with moisture. Moisture has frozen in expansion valve. Refrigerant flow is restricted.	1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely. (Repeat 30-minutes evacuating three times.) 4. Recharge system.

Performance Test Diagnoses (Cont'd)

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

Performance Test Diagnoses (Cont'd)

Condition		Probable cause	Corrective action
TOO MUCH OIL IN SYSTEM (Excessive)  AC364A	Insufficient cooling.	Too much oil circulates with refrigerant, causing the cooling capacity of the system to be reduced.	Refer to COMPRESSOR OIL for correcting oil level.

Checking and Adjusting

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

OIL CAPACITY

Unit: mℓ (Imp fl oz)

Applied model	All models
Capacity	
Total in system	200 (7.0)
Amount of oil which can be drained	Approx. 100 (3.5)*
Compressor (Service parts) charging amount	200 (7.0)

*: All oil cannot be drained from system.

OIL RETURN OPERATION

Before checking and adjusting oil level, operate compressor at engine idling speed, with controls set for maximum cooling and high blower speed, for 20 to 30 minutes in order to return oil to compressor.

CHECKING AND ADJUSTING FOR USED COMPRESSOR

1. After oil return operation, stop the engine and discharge refrigerant and then remove compressor from the vehicle.
2. Drain compressor oil from compressor discharge port and measure the amount.

Oil is sometimes hard to extract when compressor is cooled. Remove oil while compressor is warm [maintained to 40 to 50°C (104 to 122°F)].

3. If the amount is less than 90 mℓ (3.2 Imp fl oz), some refrigerant may have leaked out. Conduct leak tests on connections of each system, and if necessary, repair or replace faulty parts.
4. Check the purity of the oil and then adjust oil level following the procedure below.
   (a) When oil is clean;

Unit: mℓ (Imp fl oz)

Amount of oil drained	Adjusting procedure
Above 90 (3.2)*	Oil level is right. Pour in same amount of oil as was drained out.
Below 90 (3.2)	Oil level may be low. Pour in 90 mℓ (3.2 Imp fl oz) of oil.

*: If amount of oil drained is much greater than under normal circumstances, flush air conditioner system with refrigerant. Then pour 200 mℓ (7.0 Imp fl oz) of oil into air conditioner system.

   (b) When oil contains chips or foreign material; After air conditioner system has been flushed with refrigerant, replace receiver drier. Then pour 200 mℓ (7.0 Imp fl oz) of oil into air conditioner system.

CHECKING AND ADJUSTING FOR COMPRESSOR REPLACEMENT

200 mℓ (7.0 Imp fl oz) of oil is charged in compressor (service parts). So it is necessary to drain the proper amount of oil from new compressor. Follow the procedure below.

1. After oil return operation, drain compressor oil from used compressor and measure the amount.
   (It is the same procedure as CHECKING AND ADJUSTING FOR USED COMPRESSOR.)

Checking and Adjusting (Cont'd)

2. Check the purity of the oil and then adjust oil level following the procedure below.
   (a) When oil is clean;

Unit: mℓ (Imp fl oz)

Amount of oil drained from used compressor	Draining amount of oil from new compressor
Above 90 (3.2)*	200 (7.0) — [Amount of oil drained + 20 (0.7)]
Below 90 (3.2)	90 (3.2)

*: If amount of oil drained is greater than under normal circumstances, flush air conditioner system with refrigerant. Then install new compressor. [200 mℓ (7.0 Imp fl oz) of oil is changed in compressor service parts.]

Example:

Unit: mℓ (Imp fl oz)

Amount of oil drained from used compressor	Draining amount of oil from new compressor
110 (3.9)	70 (2.5)
70 (2.5)	90 (3.2)

(b) When oil contains chips or foreign material; After air conditioner system has been flushed with refrigerant, replace receiver drier. Then install new compressor. [200 mℓ (7.0 Imp fl oz) of oil is changed in compressor service parts.]

Checking and Adjusting

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

OIL CAPACITY

Unit: mℓ (Imp fl oz)

Applied model	All models
Capacity	
Total in system	200 (7.0)
Amount of oil which can be drained	70 - 120 (2.5 - 4.2)*
Compressor (Service parts) charging amount	200 (7.0)

*: All oil cannot be drained from system.

OIL RETURN OPERATION

Before checking and adjusting oil level, operate compressor at engine idling speed, with controls set for maximum cooling and high blower speed, for 20 to 30 minutes in order to return oil to compressor.

CHECKING AND ADJUSTING FOR USED COMPRESSOR

1. After oil return operation, stop the engine and discharge refrigerant and then remove compressor from the vehicle.
2. Drain compressor oil from compressor discharge port and measure the amount.

Oil is sometimes hard to extract when compressor is cooled. Remove oil while compressor is warm [maintained to 40 to 50°C (104 to 122°F)].

3. If the amount is less than 70 mℓ (2.5 Imp fl oz), some refrigerant may have leaked out. Conduct leak tests on connections of each system, and if necessary, repair or replace faulty parts.
4. Check the purity of the oil and then adjust oil level following the procedure below.

   (a) When oil is clean;

Unit: mℓ (Imp fl oz)

Amount of oil drained	Adjusting procedure
Above 70 (2.5)*	Oil level is right. Pour in same amount of oil as was drained out.
Below 70 (2.5)	Oil level may be low. Pour in 70 mℓ (2.5 Imp fl oz) of oil.

*: If amount of oil drained is much greater than under normal circumstances, flush air conditioner system with refrigerant. Then pour 200 mℓ (7.0 Imp fl oz) of oil into air conditioner system.

   (b) When oil contains chips or other foreign material;
   After air conditioner system has been flushed with refrigerant, replace receiver drier. Then pour 200 mℓ (7.0 Imp fl oz) of oil into air conditioner system.

CHECKING AND ADJUSTING FOR COMPRESSOR REPLACEMENT

200 mℓ (7.0 Imp fl oz) of oil is charged in compressor (service parts). So it is necessary to drain the proper amount of oil from new compressor. Follow the procedure below.

1. After oil return operation, drain compressor oil from used compressor and measure the amount.
   (It is the same procedure as CHECKING AND ADJUSTING FOR USED COMPRESSOR.)

Checking and Adjusting (Cont'd)

2. Check the purity of the oil and then adjust oil level following the procedure below.

   (a) When oil is clean;

Unit: mℓ (Imp fl oz)

Amount of oil drained from used compressor	Draining amount of oil from new compressor
Above 70 (2.5)*	200 (7.0) − [Amount of oil drained + 20 (0.7)]
Below 70 (2.5)	110 (3.9)

*: If amount of oil drained is greater than under normal circumstances, flush air conditioner system with refrigerant. Then install new compressor. [200 mℓ (7.0 Imp fl oz) of oil is charged in compressor service parts.]

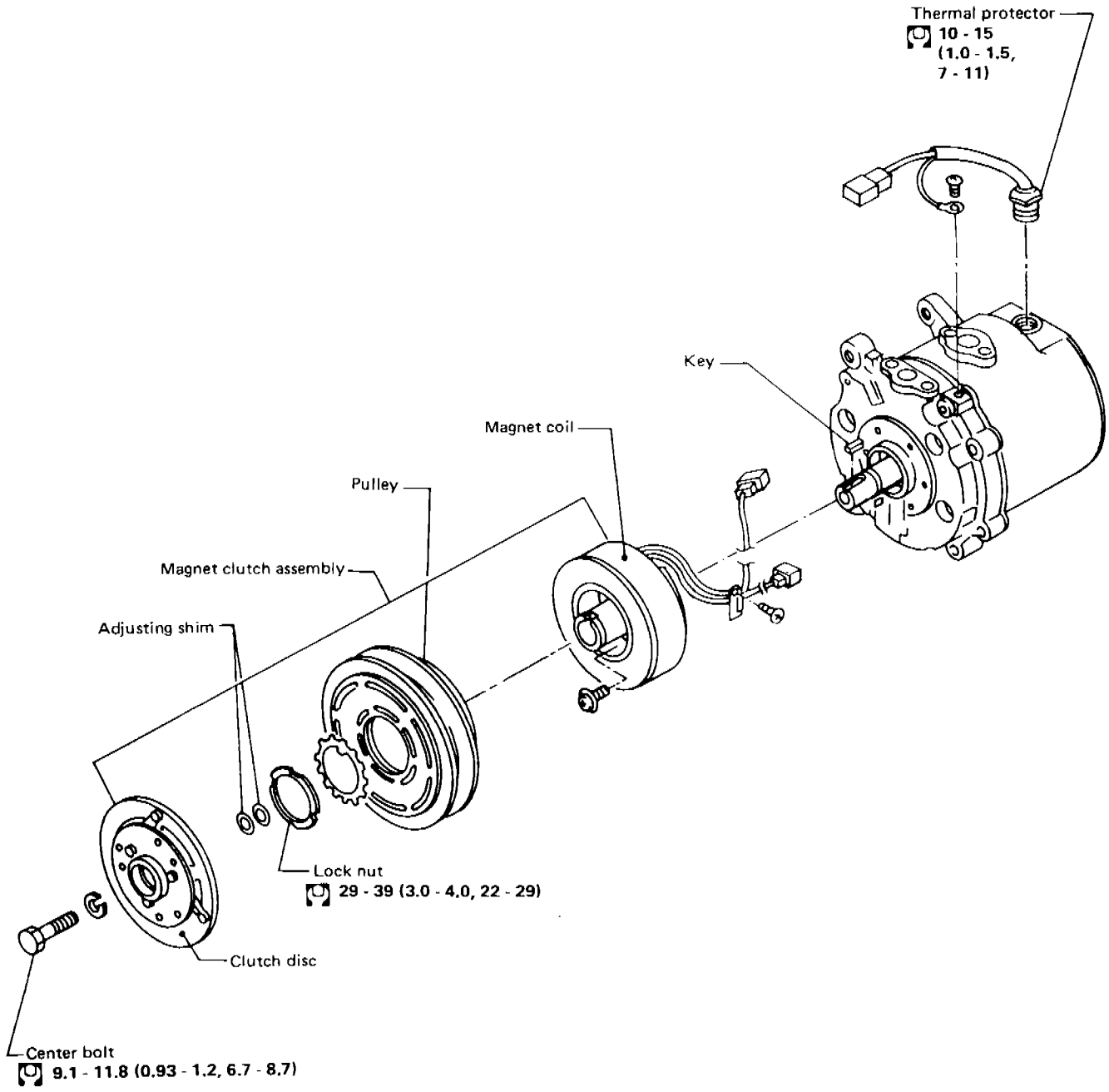
Example:

Unit: mℓ (Imp fl oz)

Amount of oil drained from used compressor	Draining amount of oil from new compressor
90 (3.2)	90 (3.2)
50 (1.8)	110 (3.9)

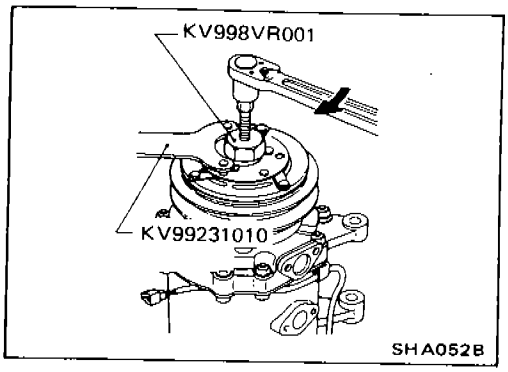
   (b) When oil contains chips or foreign material; After air conditioner system has been flushed with refrigerant, replace receiver drier. Then install new compressor. [200 mℓ (7.0 Imp fl oz) of oil is charged in compressor service parts.]

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



: N·m (kg-m, ft-lb)

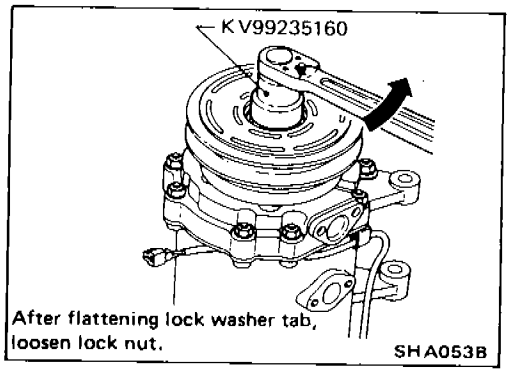
RHA283



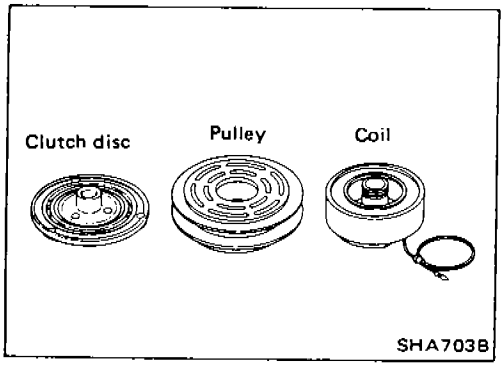
Compressor Clutch

REPLACEMENT

- When removing center bolt, hold clutch disc with clutch disc wrench.
- Using clutch disc puller, clutch disc can be removed.



- Bend down pawl of lock washer.
- When removing pulley, remove lock nut with nut wrench.



INSPECTION

Clutch disc

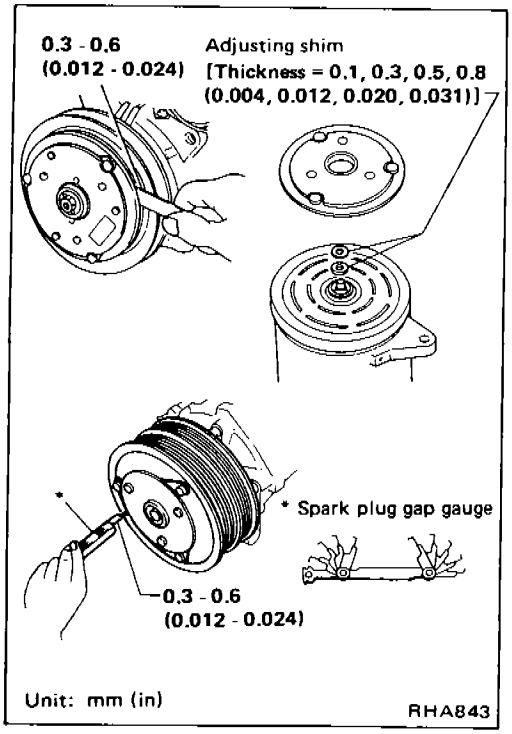
If the contact surface shows signs of damage due to excessive heat, the drive plate and pulley should be replaced.

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.

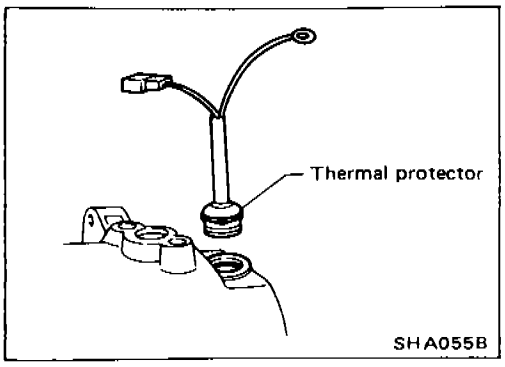


ADJUSTMENT

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

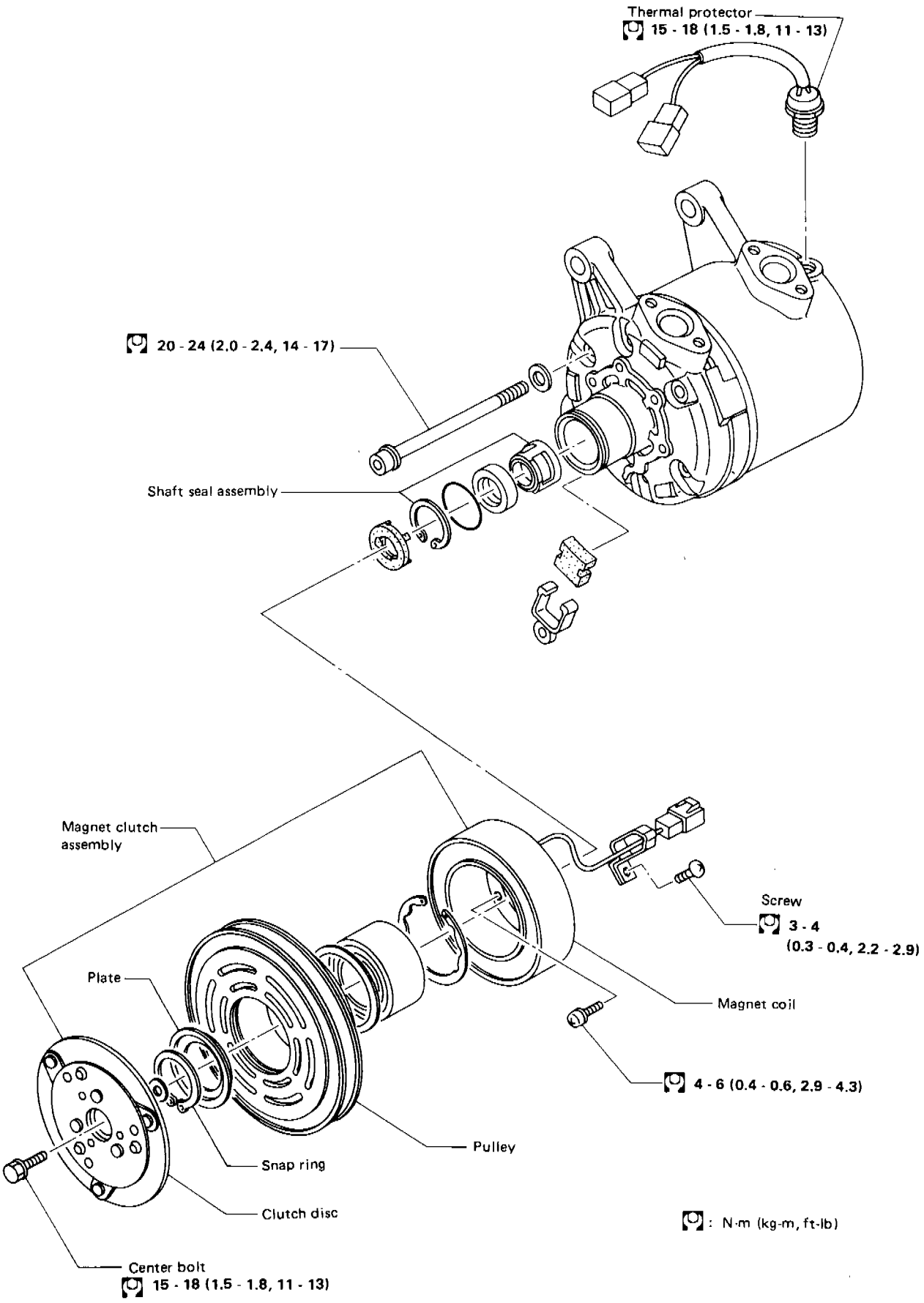
BREAK-IN OPERATION

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

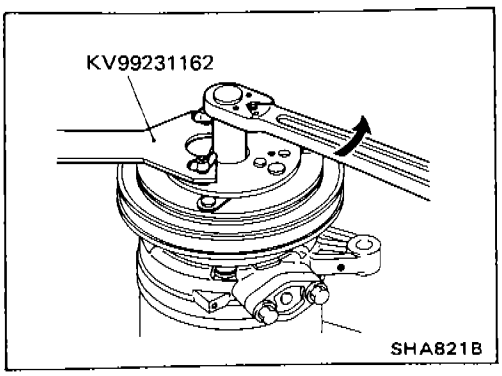


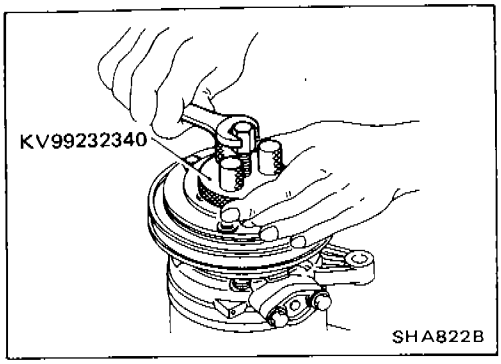
Thermal Protector

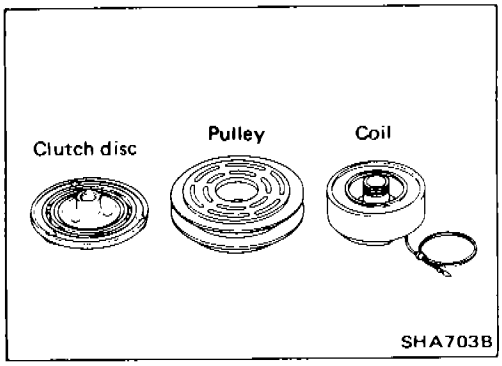
- When servicing, do not allow foreign material to get into compressor.
- Check continuity between two terminals.


Thermal protector
15 - 18 (1.5 - 1.8, 11 - 13)
20 - 24 (2.0 - 2.4, 14 - 17)
Shaft seal assembly
Magnet clutch assembly
Screw
3 - 4 (0.3 - 0.4, 2.2 - 2.9)
Plate
Magnet coil
4 - 6 (0.4 - 0.6, 2.9 - 4.3)
Pulley
Snap ring
Clutch disc
Center bolt
15 - 18 (1.5 - 1.8, 11 - 13)
: N·m (kg-m, ft-lb)

RHA402







Compressor Clutch

REMOVAL

- When removing center bolt, hold clutch disc with clutch disc wrench.

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

INSPECTION

Clutch disc

If the contact surface shows signs of damage due to excessive heat, the clutch disc 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 clutch disc should be replaced. The contact surfaces of the pulley assembly should be cleaned with a suitable solvent before reinstallation.

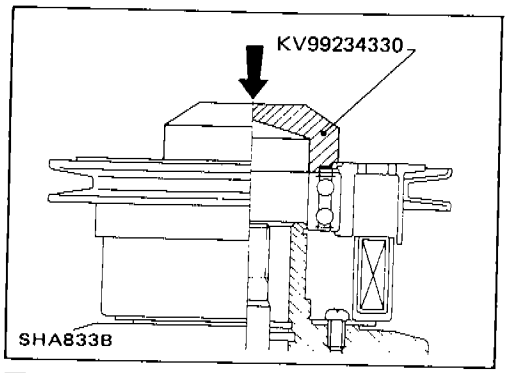
Coil

Check coil for loose connection or cracked insulation.

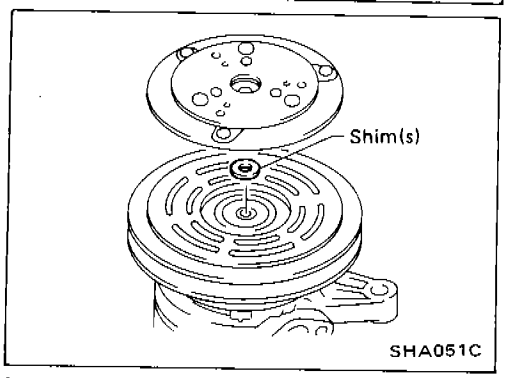
INSTALLATION

- Position coil assembly on compressor body. Be sure that the electrical terminals are reassembled in the original position. Install and tighten coil mounting screws evenly.

Compressor Clutch (Cont'd)

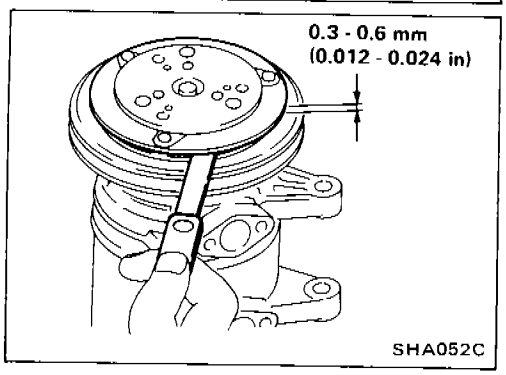


- Press pulley assembly onto the neck of coil assembly using pulley installer.
- Wipe oil thoroughly off the clutch surface.



ADJUSTMENT

- Select adjusting shim(s) which give(s) the correct clearance between pulley and clutch disc.
- Using a plastic mallet, tape clutch disc in place on drive shaft.
- Do not use excessive force with a plastic mallet or in a press, or internal damages may result.
- Place spring washer and center bolt onto drive shaft. Tighten center bolt to drive clutch wheel onto drive shaft.



- Check clearance around the entire periphery of clutch disc.

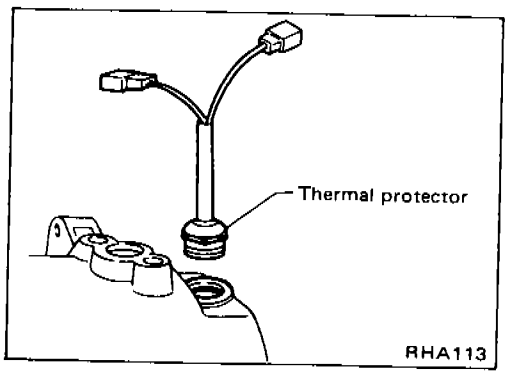
  Disc-to-pulley clearance:

  0.3 - 0.6 mm (0.012 - 0.024 in)

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

BREAK-IN OPERATION

When replacing compressor clutch assembly, 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.

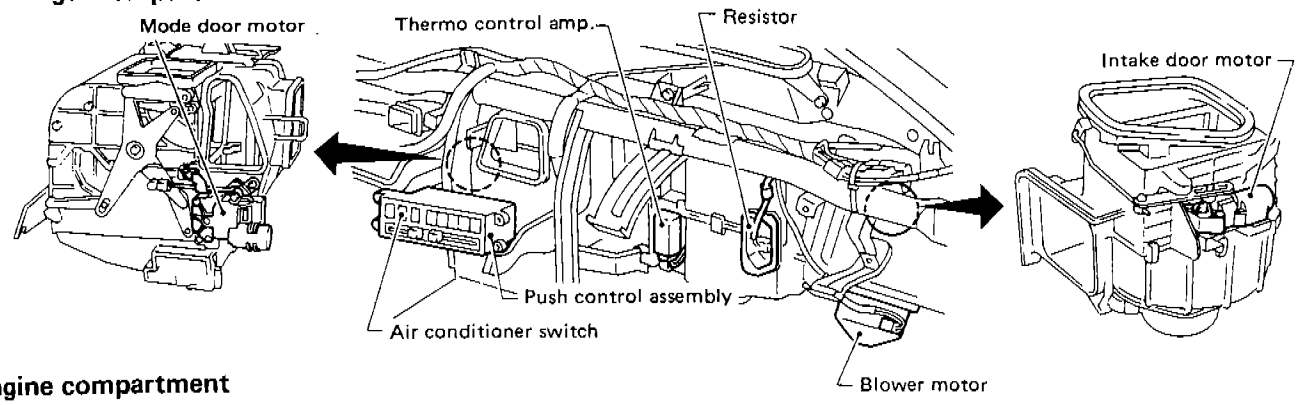


Thermal Protector

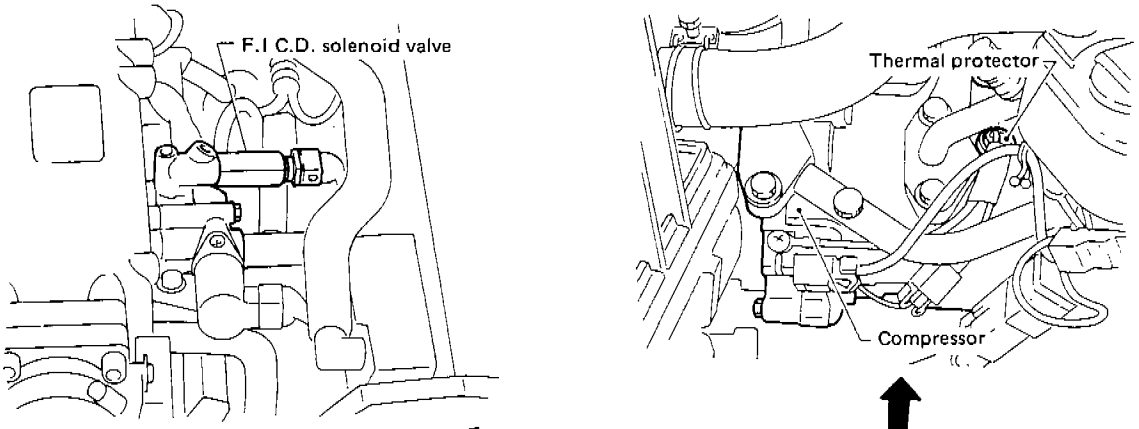
INSPECTION

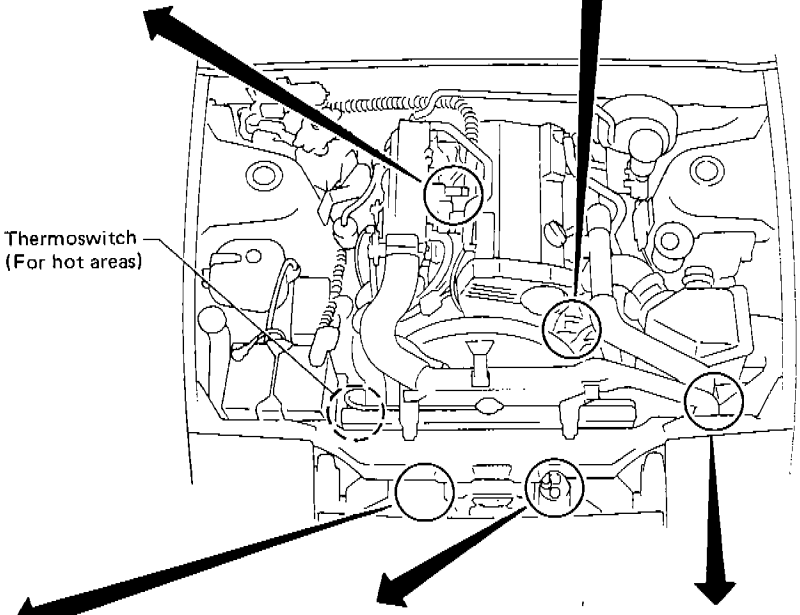
- When servicing, do not allow foreign material to get into compressor.
- Check continuity between two terminals.

Passenger compartment

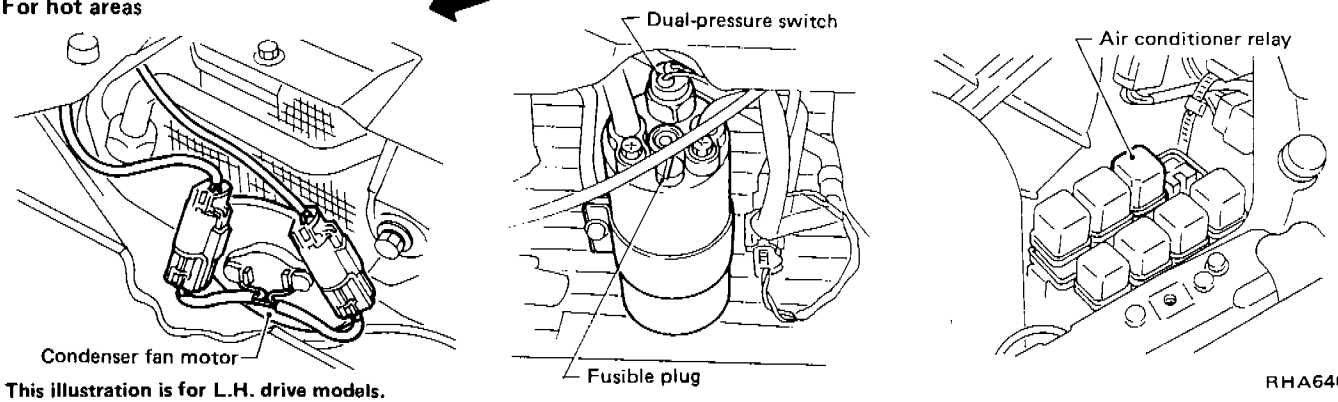


Engine compartment





For hot areas



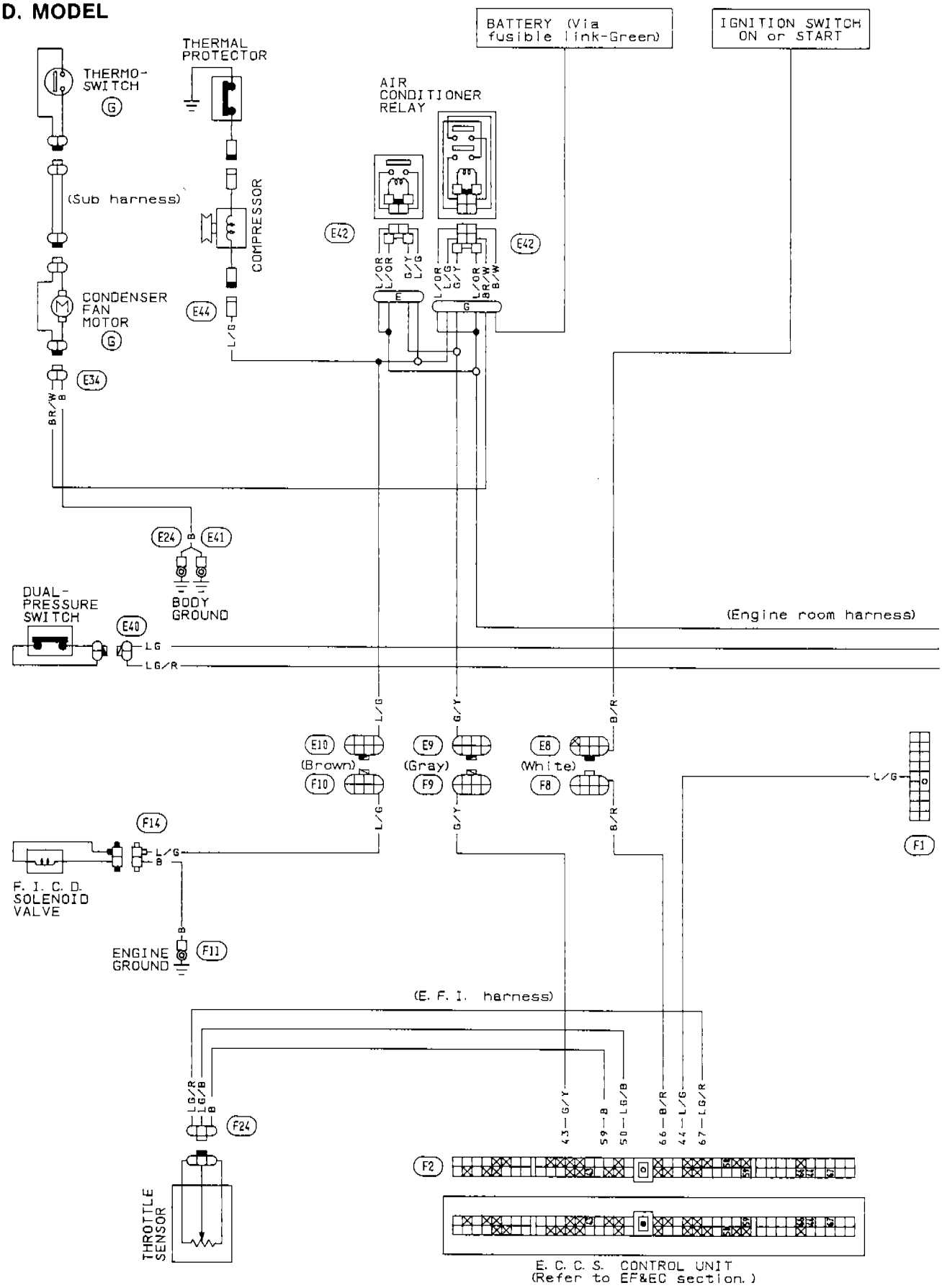
RHA640A

This illustration is for L.H. drive models.
For R.H. drive models, it is basically same.

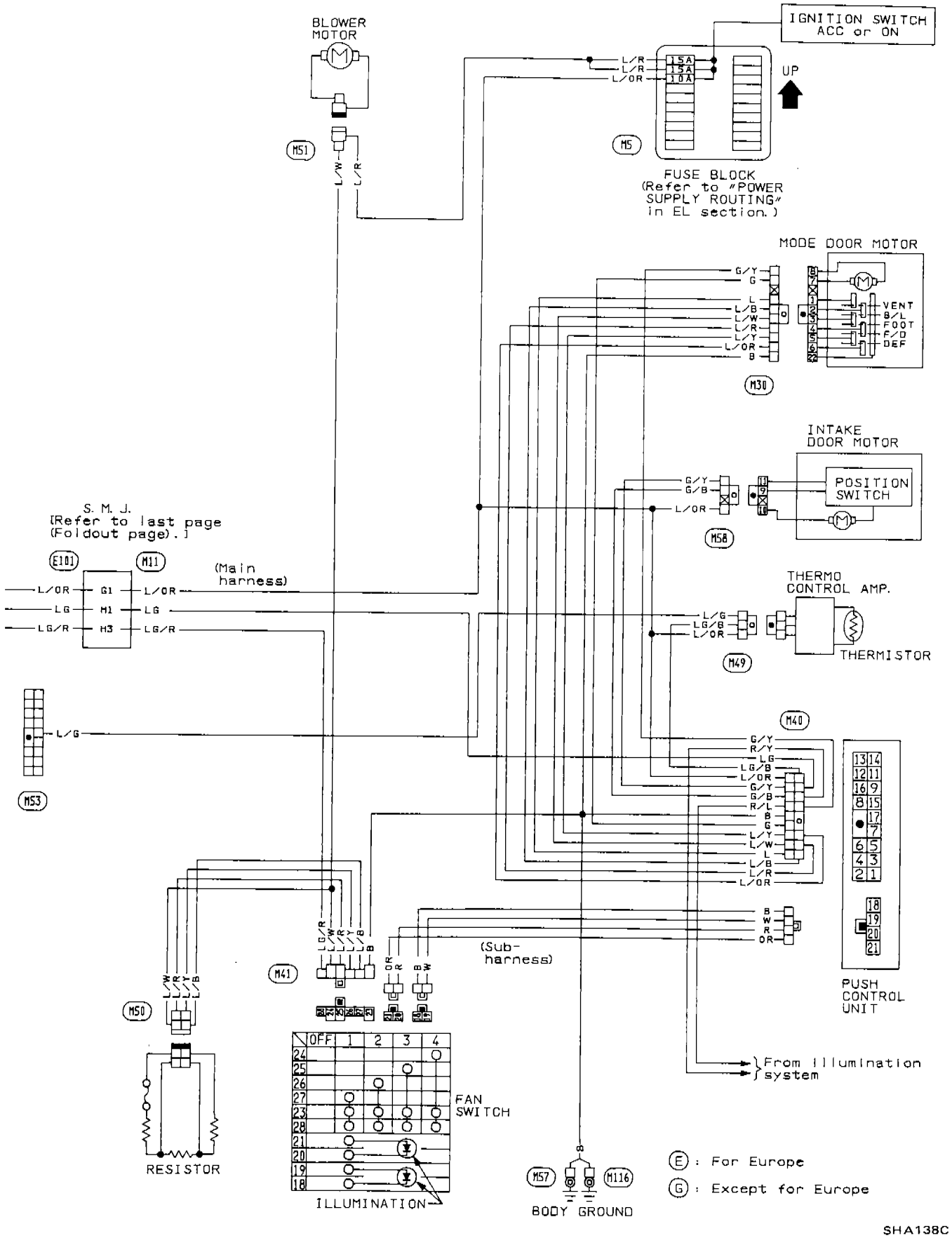
NOTE

Wiring Diagram

L.H.D. MODEL

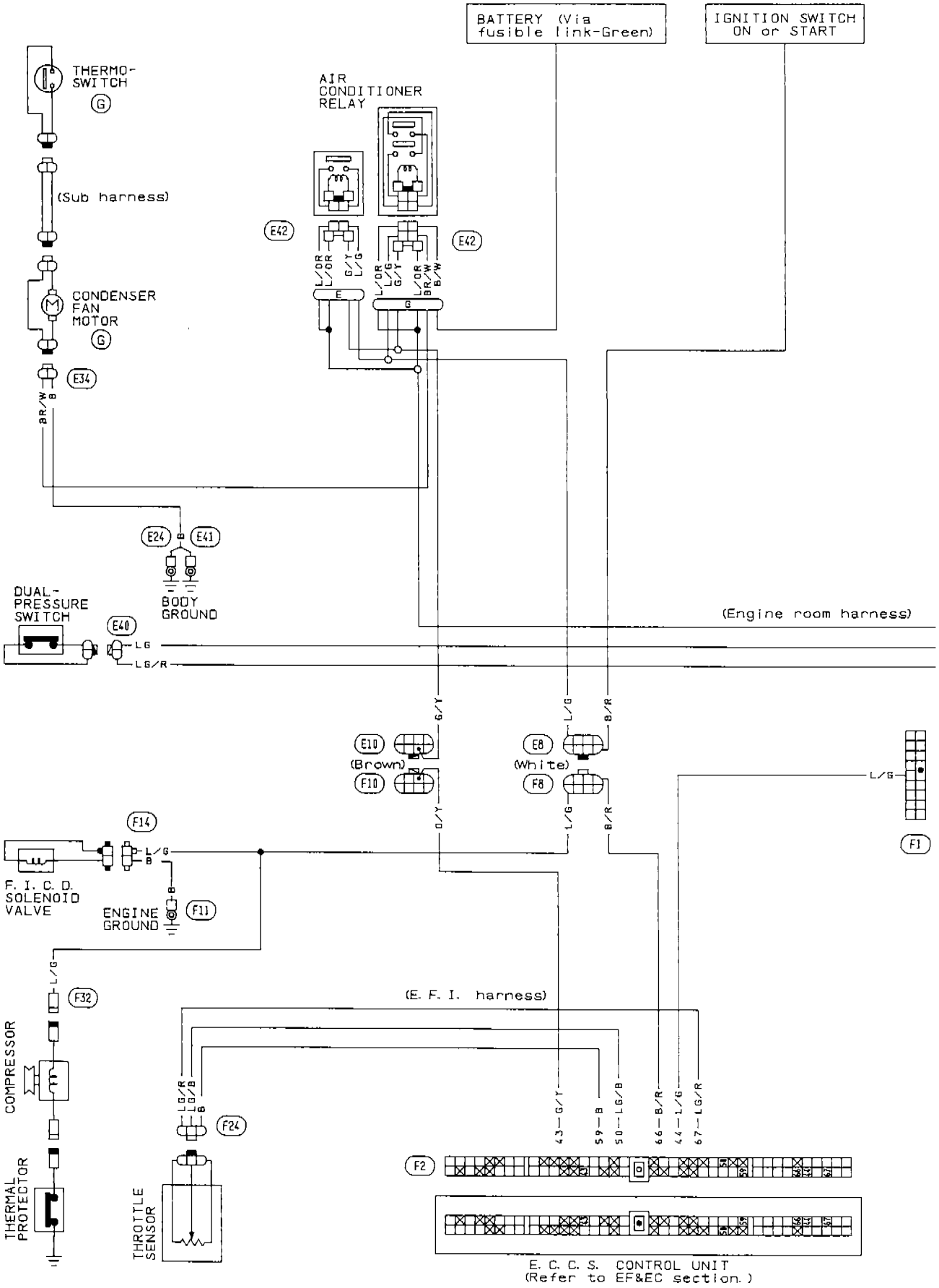


Wiring Diagram (Cont'd)

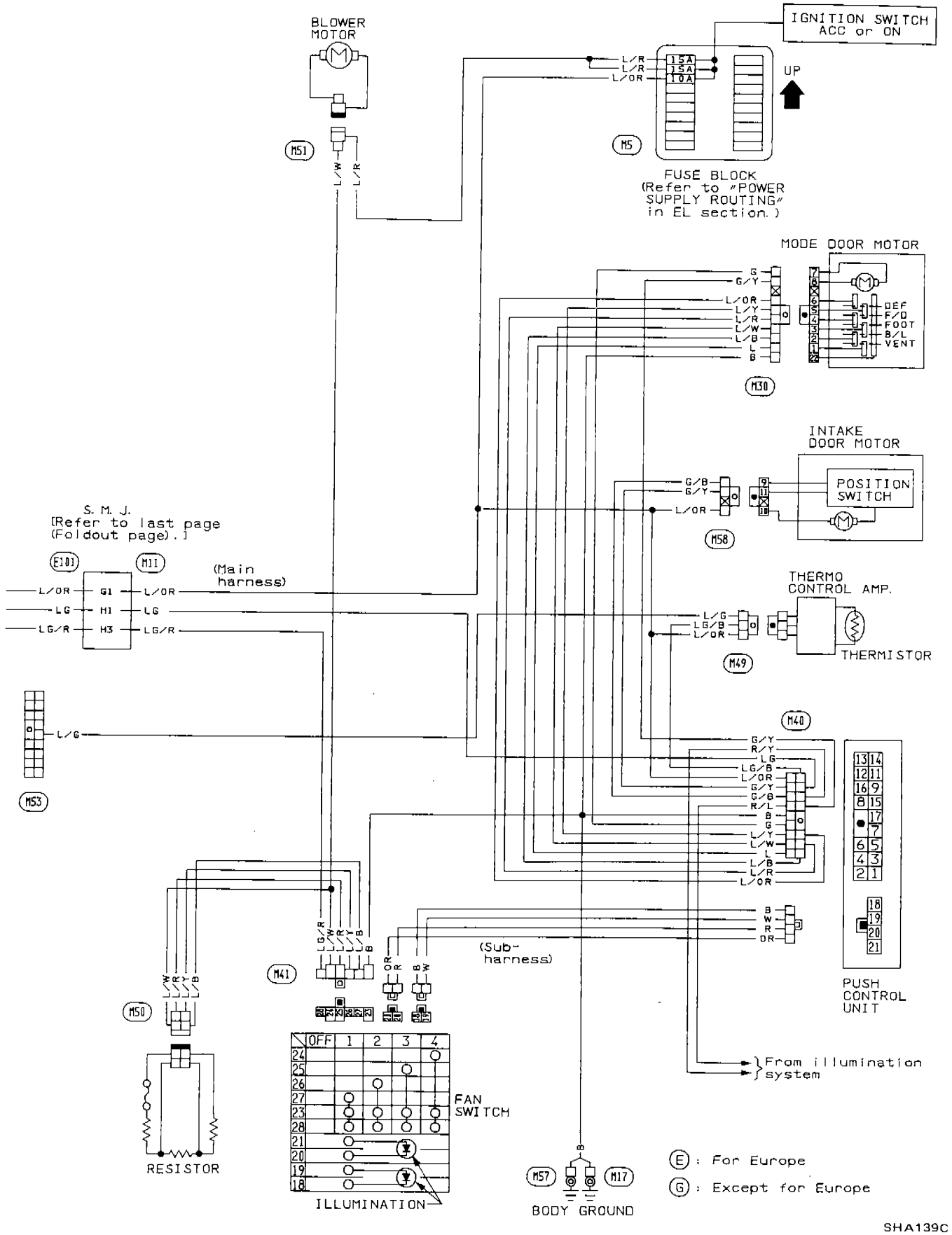


Wiring Diagram (Cont'd)

R.H.D. MODEL



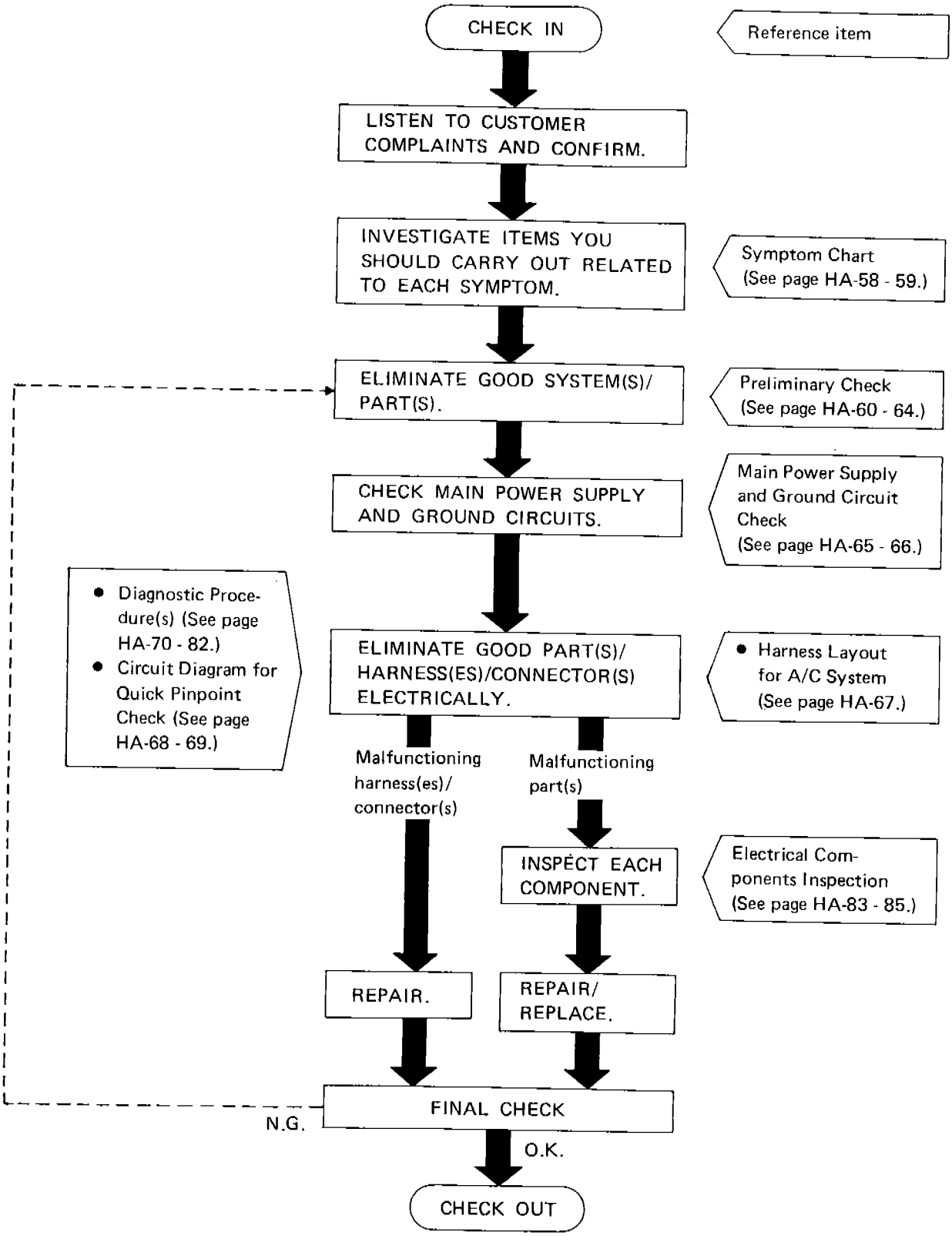
Wiring Diagram (Cont'd)



Contents

How to Perform Trouble Diagnoses for Quick and Accurate Repair

WORK FLOW



Symptom Chart

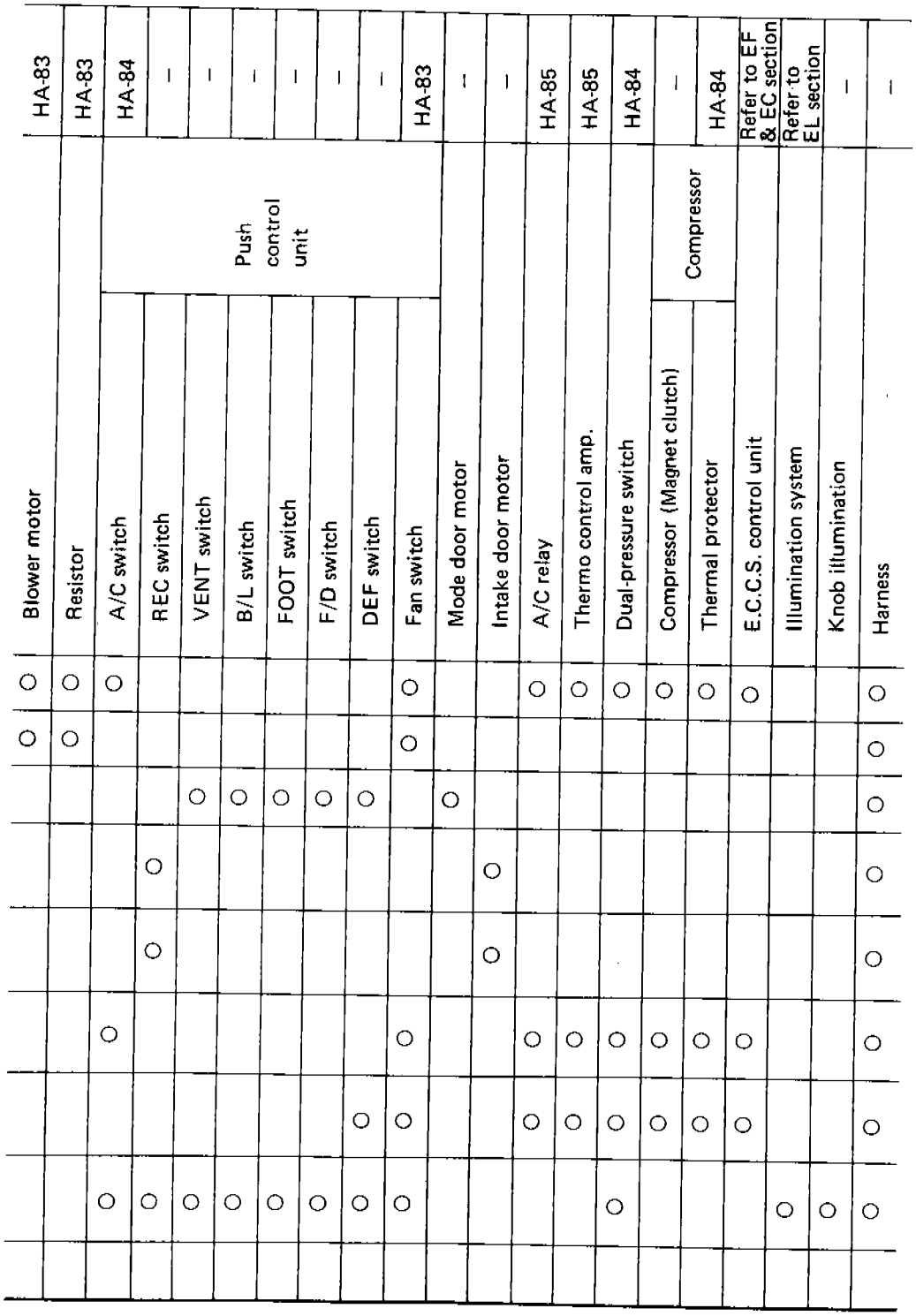
DIAGNOSTIC TABLE

PROCEDURE	Preliminary Check					Diagnostic Procedure					Main Power Supply and Ground Circuit Check			
REFERENCE PAGE	HA-60	HA-61	HA-62	HA-63	HA-64	HA-70 - 71	HA-72 - 73	HA-74	HA-75 - 78	HA-79	HA-65	HA-65	HA-66	HA-65
SYMPTOM	Preliminary check 1: For L.H.D. model only	Preliminary check 2	Preliminary check 3: For L.H.D. model only	Preliminary check 4	Preliminary check 5	Diagnostic procedure 1	Diagnostic procedure 2	Diagnostic procedure 3	Diagnostic procedure 4	Diagnostic procedure 5	15A Fuses	10A Fuse	Push control unit	Thermo control amp.
A/C does not blow cold air.		❶				○			○		○	○		○
Blower motor does not rotate.		❶				❷					○			
Air outlet does not change.				❶			❷					○	○	
Intake door does not change.								❶				○	○	
Intake door is not set at "FRESH" in DEF or F/D mode. (L.H.D. model only)	❶							○				○	○	
Magnet clutch does not operate with A/C switch and fan switch are ON.		❶							❷			○		○
Magnet clutch does not operate in DEF mode. (L.H.D. model only)		❶	❷						○			○		○
Illumination or indicators of push control unit do not come on.										❶		○		
Noise					❶									

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

Symptom Chart (Cont'd)

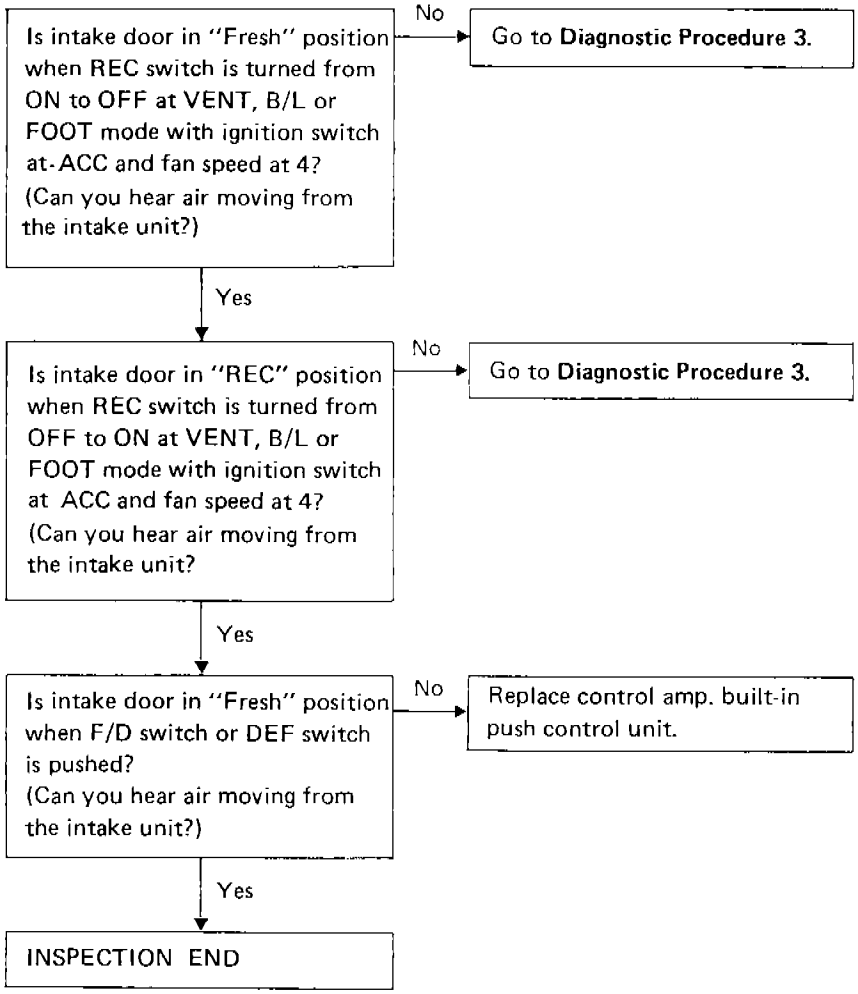
Electrical Components Inspection



Preliminary Check

PRELIMINARY CHECK 1: FOR L.H.D. MODEL ONLY

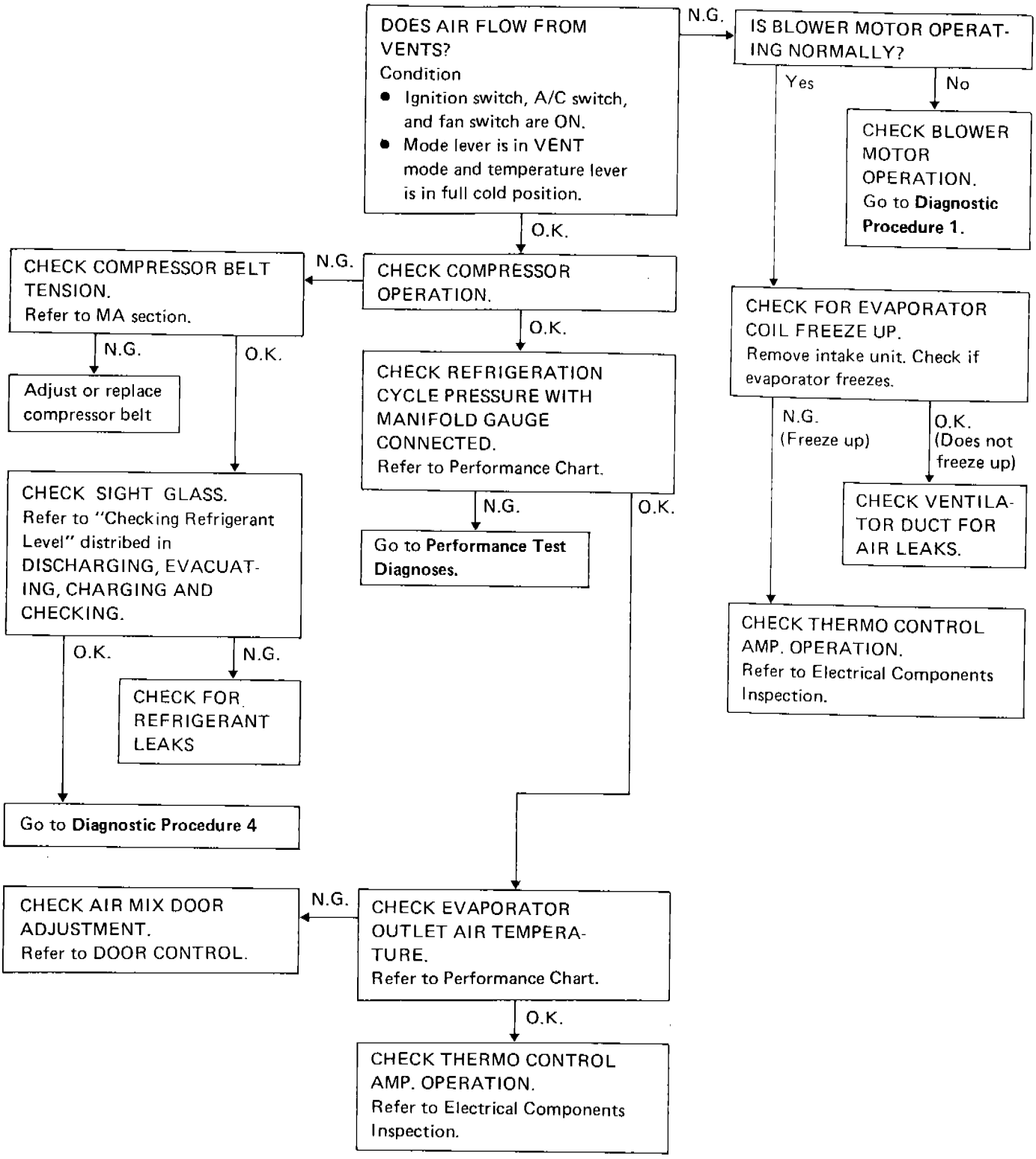
Intake door is set at "FRESH" in DEF or F/D mode.



Preliminary Check (Cont'd)

PRELIMINARY CHECK 2

A/C does not blow cold air.

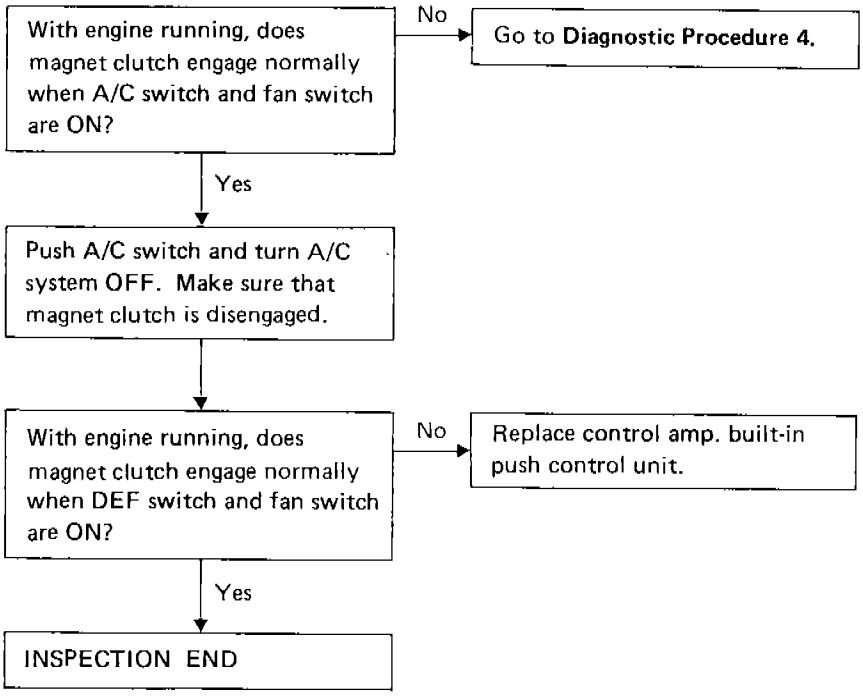


Preliminary Check (Cont'd)

PRELIMINARY CHECK 3: FOR L.H.D. MODEL ONLY

Magnet clutch does not operate in DEF mode.

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



PRELIMINARY CHECK 4

Air outlet does not change.

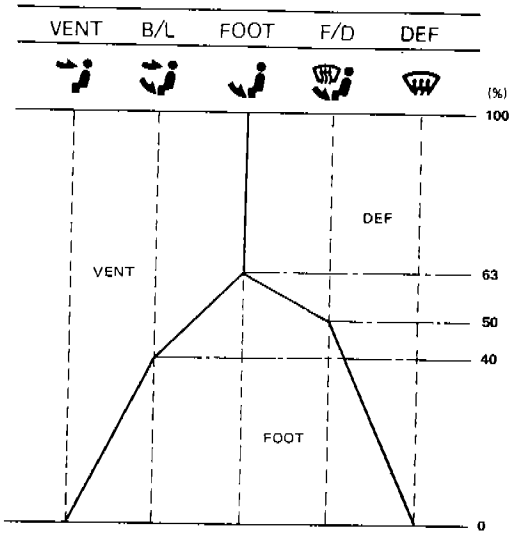
DOES AIR COME OUT FROM EACH DUCT NORMALLY WHEN EACH MODE SWITCH IS PUSHED WITH IGNITION SWITCH AT ACC?

No → Go to **Diagnostic Procedure 2.**

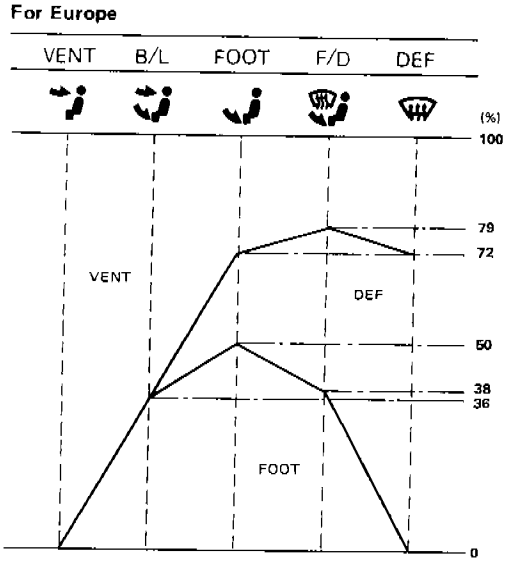
Switch (Mode)	Indicator illuminates	Air outlet	
		Except for Europe	For Europe
○		VENT	VENT
	○	FOOT & VENT	FOOT & VENT
	○	FOOT	FOOT, DEF & VENT
	○	FOOT & DEF	FOOT, DEF & VENT
	○	DEF	DEF & VENT

Air distribution ratios

Except for Europe



For Europe



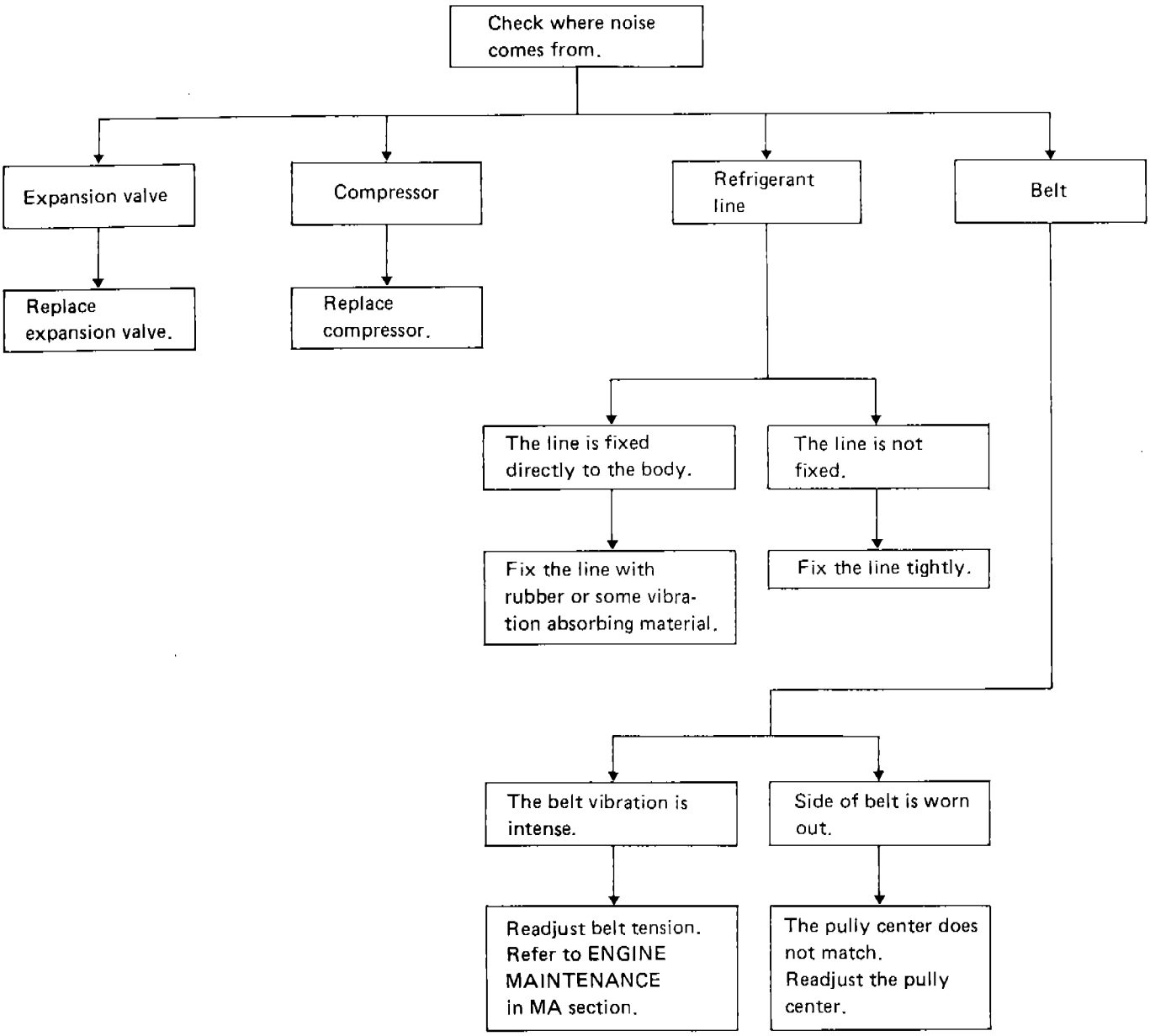
Yes

INSPECTION END

Preliminary Check (Cont'd)

PRELIMINARY CHECK 5

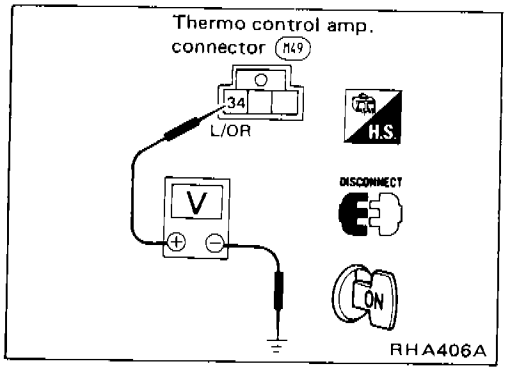
Noise



Main Power Supply and Ground Circuit Check

POWER SUPPLY CIRCUIT CHECK FOR A/C SYSTEM

Check power supply circuit for air conditioning system.
Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.

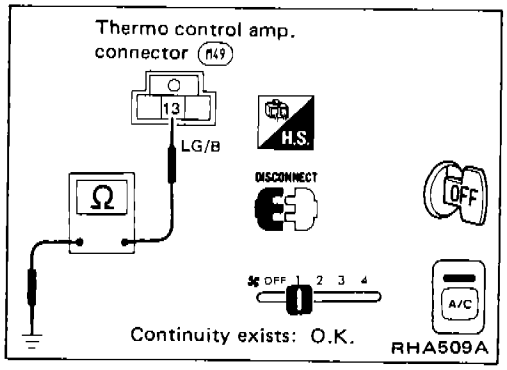


THERMO CONTROL AMP. CHECK

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

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

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

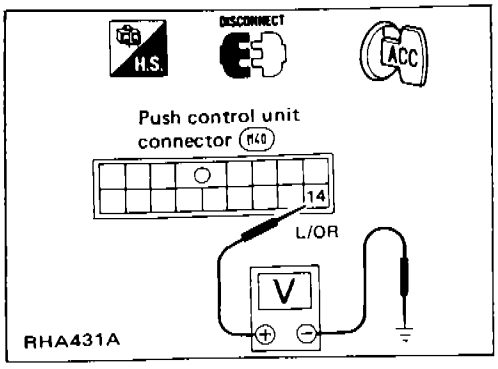


Check body ground circuit for thermo control amp. with ignition switch OFF, A/C switch ON and fan switch ON.

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

Ohmmeter terminal		Continuity
⊕	⊖	
⑬	Body ground	Yes

Main Power Supply and Ground Circuit Check (Cont'd)

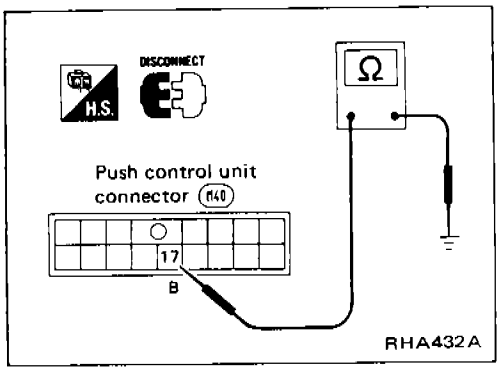


PUSH CONTROL UNIT CHECK

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

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

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

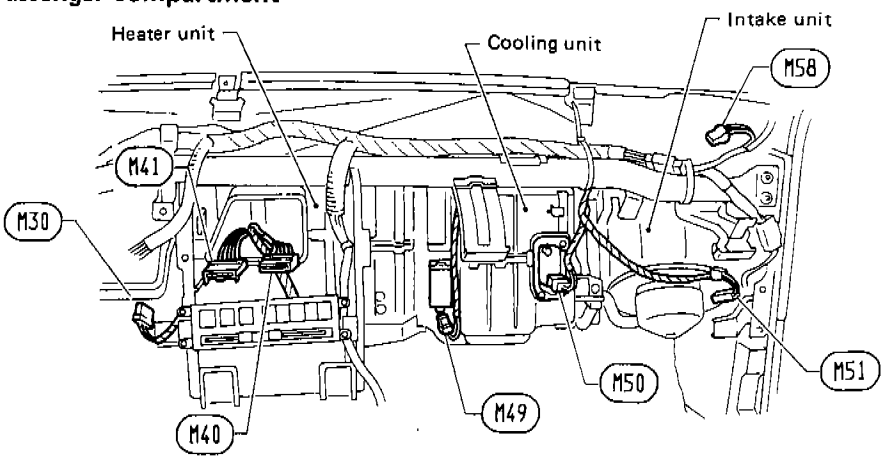


Check body ground circuit for push control unit with ignition switch OFF.

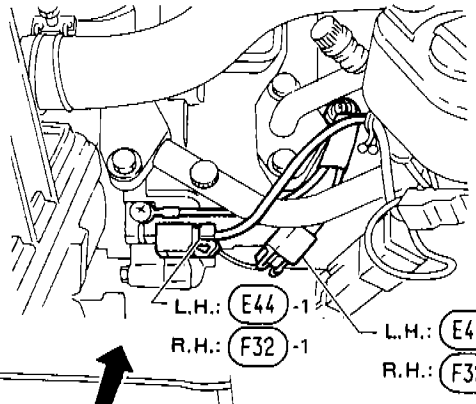
1. Disconnect push control unit harness connector.
2. Connect ohmmeter from harness side.
3. Check for continuity between terminal No. ⑰ and body ground.

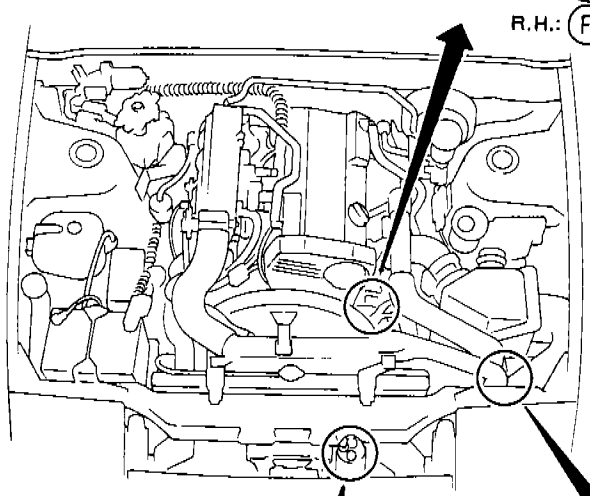
Harness Layout for A/C System

Passenger compartment



Engine compartment





Engine room harness

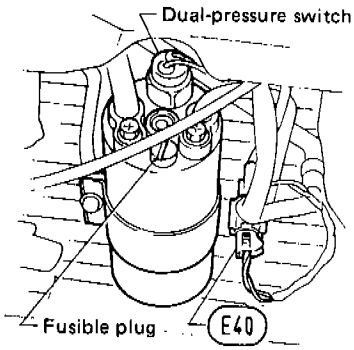
E40 : Dual-pressure switch
E42 : A/C relay
L.H. : E44-1 : Compressor (Magnet clutch)
L.H. : E44-2 : Compressor (Thermal protector)

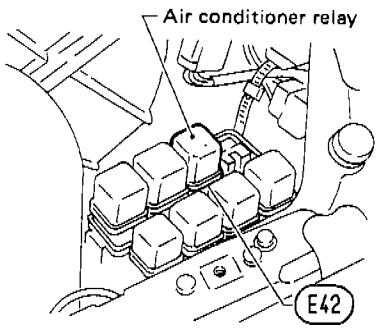
E.F.I. harness

R.H. : F32-1 : Compressor (Magnet clutch)
R.H. : F32-2 : Compressor (Thermal protector)

Main harness

M30 : Mode door motor
M40 : Push control unit
M41 : Fan switch
M49 : Thermo control amp.
M50 : Resistor
M51 : Blower motor
M58 : Intake door motor



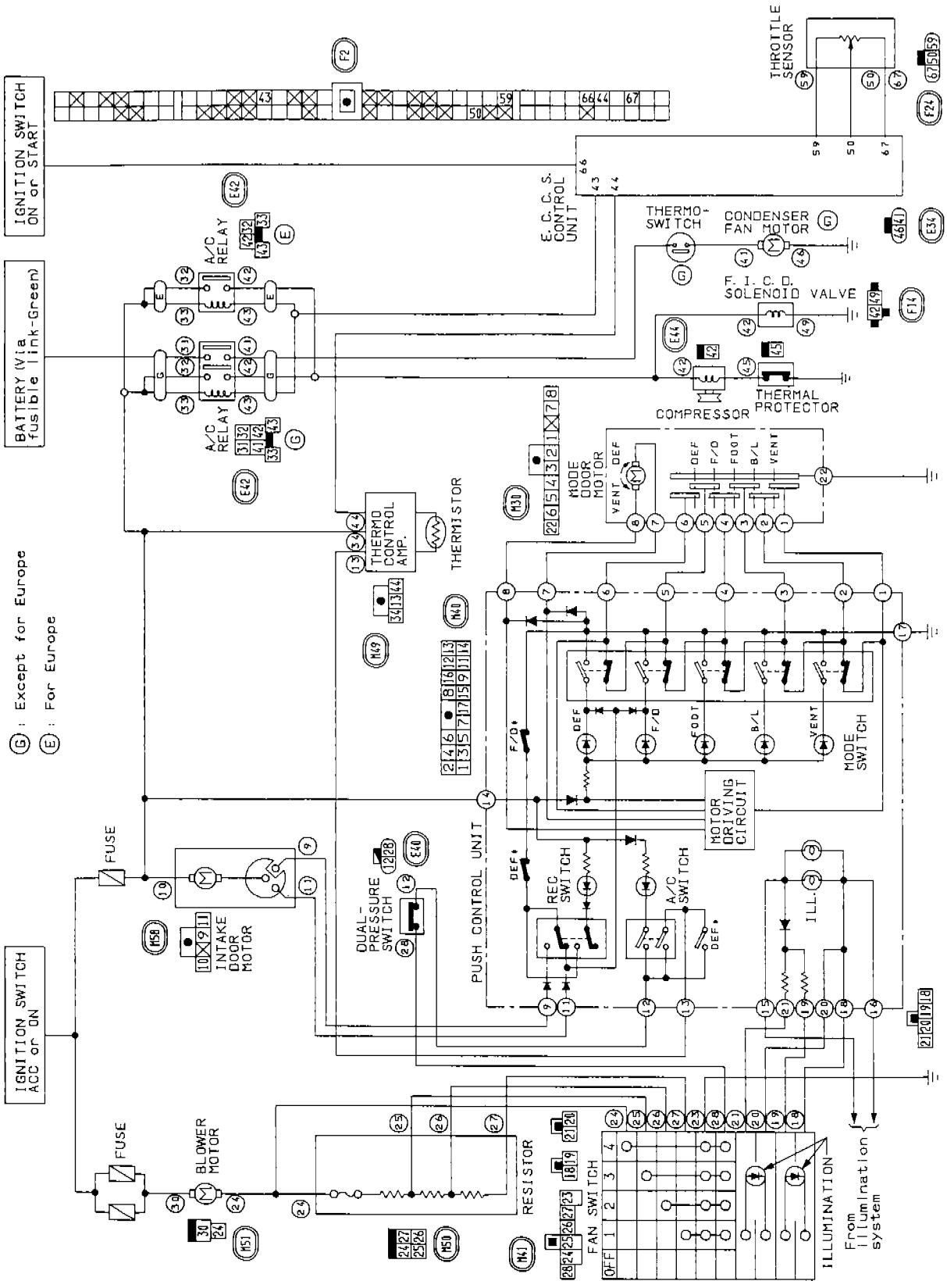


This illustration is for L.H. drive models. For R.H. drive models, it is basically same.

RHA642A

Circuit Diagram for Quick Pinpoint Check

L.H.D. MODEL

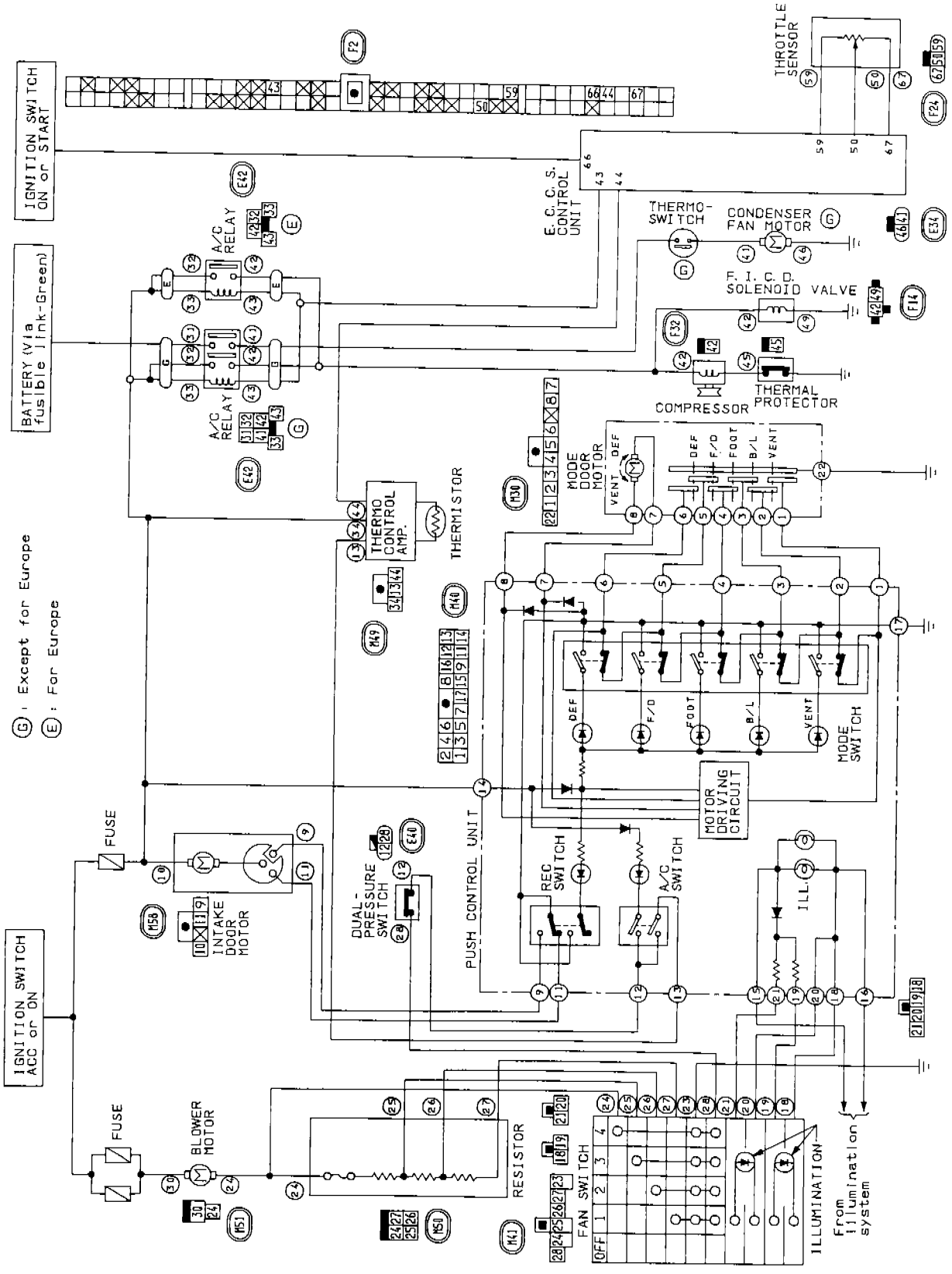


- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle " ◎ " are connected to the harness side connectors shown in the "Harness Layout for A/C System". (See page HA-67.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle " ○ ".
- *: These switches are built in push control unit and mechanically linked to corresponding switches.

SHA140C

Circuit Diagram for Quick Pinpoint Check (Cont'd)

R.H.D. MODEL



- All connectors shown in this illustration are unit side connectors.
- The unit side connectors with a double circle " ◎ " are connected to the harness side connectors shown in the "Harness Layout for A/C System". (See page HA-67.)
- The terminal numbers in the connector coincide with the circuit numbers surrounded by a single circle " ○ ".
- *: These switches are built in push control unit and mechanically linked to corresponding switches.

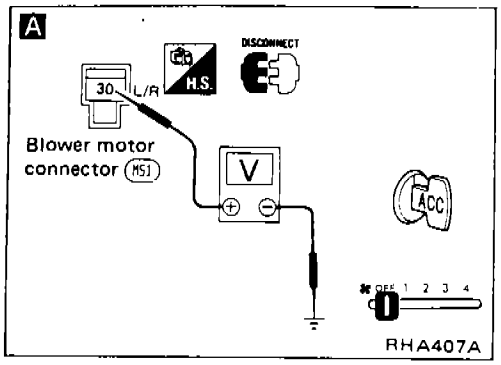
SHA141C

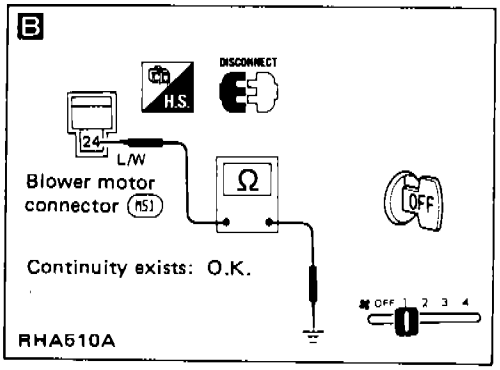
	INCIDENT	Flow chart No.
1	Fan fails to rotate.	1
2	Fan does not rotate at 1-speed.	2
3	Fan does not rotate at 2-speed.	3
4	Fan does not rotate at 3-speed.	4
5	Fan does not rotate at 4-speed.	5

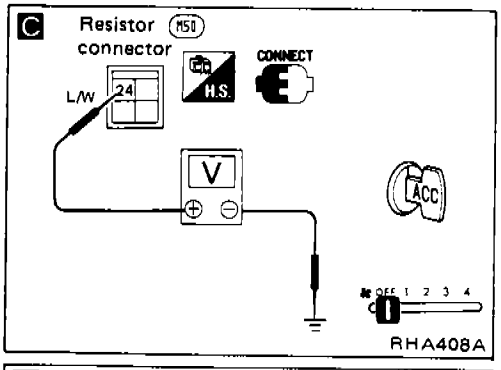
Diagnostic Procedure 1

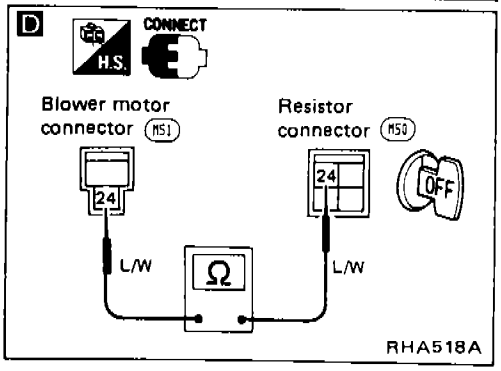
SYMPTOM: Blower motor does not rotate.

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









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

1 → **A**

A CHECK POWER SUPPLY FOR 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 15A fuses at fuse block. (Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.)
- O.K. →

B Check circuit continuity between blower motor harness terminal No. 24 and body ground.

- N.G. → Reconnect blower motor harness connector.
- O.K. →

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

- N.G. → Replace blower motor.

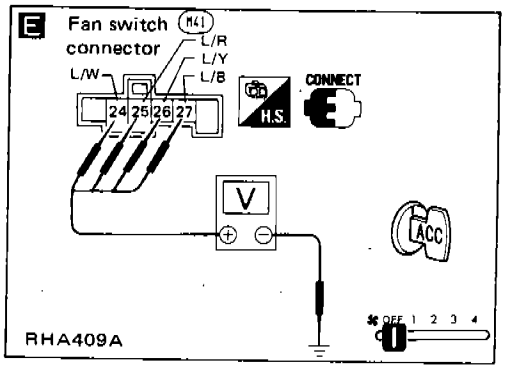
C CHECK BLOWER MOTOR CIRCUIT BETWEEN BLOWER MOTOR AND RESISTOR.
Do approx. 12 volts exist between resistor harness terminal No. 24 and body ground?

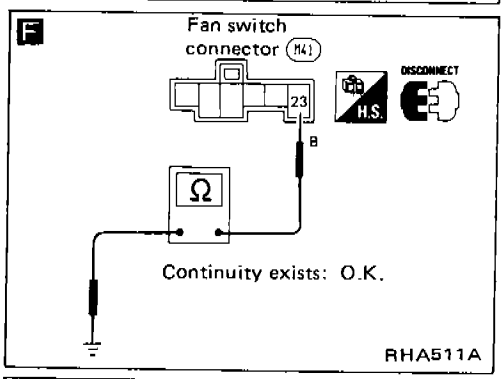
- N.G. → Disconnect blower motor and resistor harness connectors.
  - **D** Check circuit continuity between blower motor harness terminal No. 24 and resistor harness terminal No. 24. (Note)
- O.K. → Ⓐ (Go to next page.)

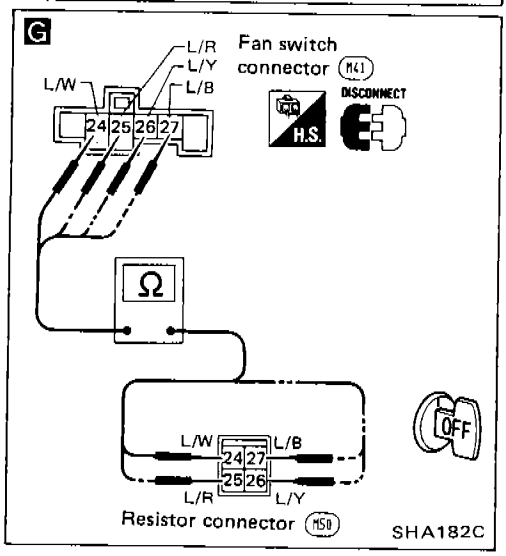
2 → Ⓑ, 3 → Ⓒ, 4 → Ⓓ, 5 → Ⓔ (Go to next page.)

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

Diagnostic Procedure 1 (Cont'd)







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

(B) → 2 (C) → 3 (D) → 4 (E) → 5

O.K. / N.G.

N.G. → Replace resistor.

Reconnect resistor harness connector.

1 2 3 4 5

E

CHECK 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	27	Body ground	Approx. 12V
3	26		
4	25		
5	24		

O.K.

2 3 4 5

G N.G. → Note: Check circuit continuity between fan switch and resistor.

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

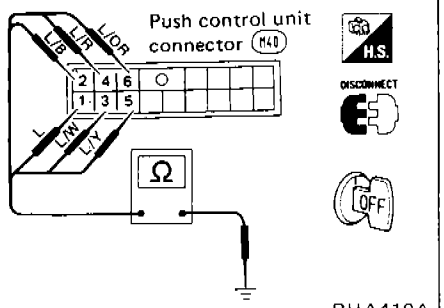
N.G. → Replace fan switch.

F O.K. → Note: Check circuit continuity between fan switch harness terminal No. (23) and body ground.

O.K. → Replace blower motor.

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

A



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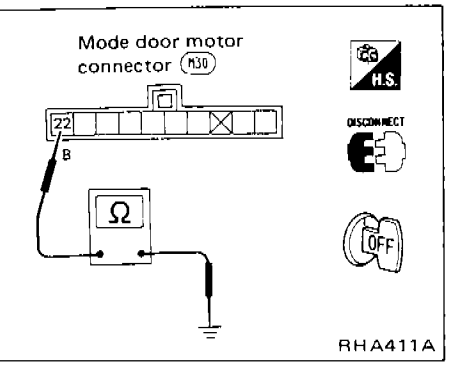
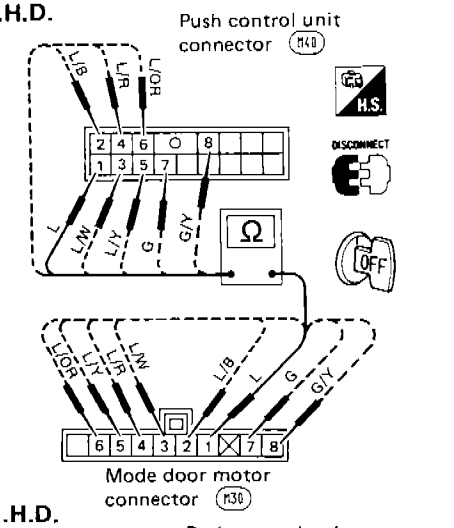
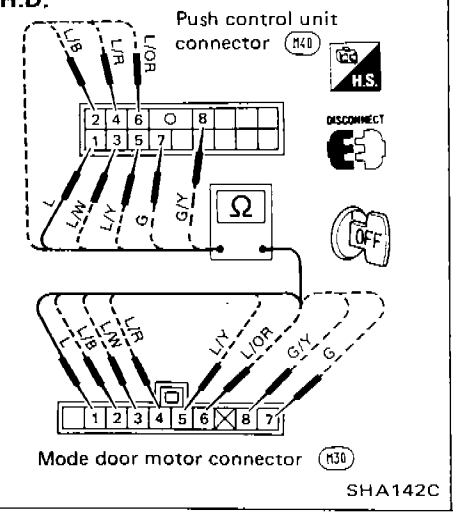


C

L.H.D.



R.H.D.



SHA142C

Diagnostic Procedure 2

SYMPTOM: Air outlet does not change.

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

A

CHECK MODE DOOR MOTOR POSITION SWITCH.

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

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

O.K.

CHECK SIDE LINK.
Refer to DOOR CONTROL.

N.G.

Disconnect mode door motor harness connector.

B

Note

CHECK BODY GROUND CIRCUIT FOR MODE DOOR MOTOR.
Does continuity exist between mode door motor harness terminal No. ㉒ and body ground?

O.K.

C

Note

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

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

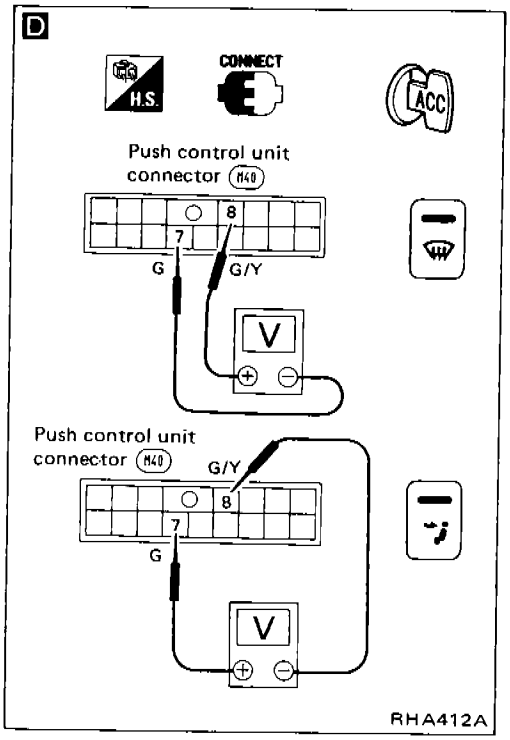
O.K.

Ⓐ

(Go to next page.)

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

Diagnostic Procedure 2 (Cont'd)



Ⓐ

Reconnect push control unit and mode door motor harness connectors.

Ⓓ

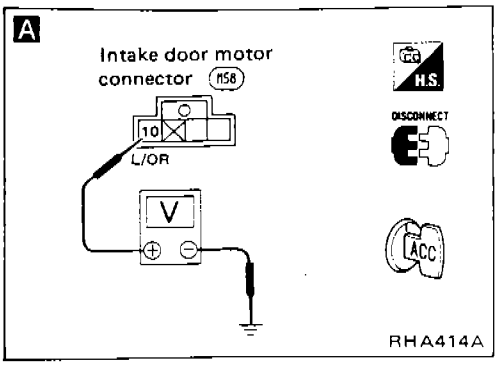
CHECK FOR OUTPUT OF PUSH CONTROL UNIT.
Do approx. 12 volts exist between push control unit harness terminal No. ⑦ and ⑧ when mode is switched from "VENT" to "DEF" or when mode is switched from "DEF" to "VENT"?

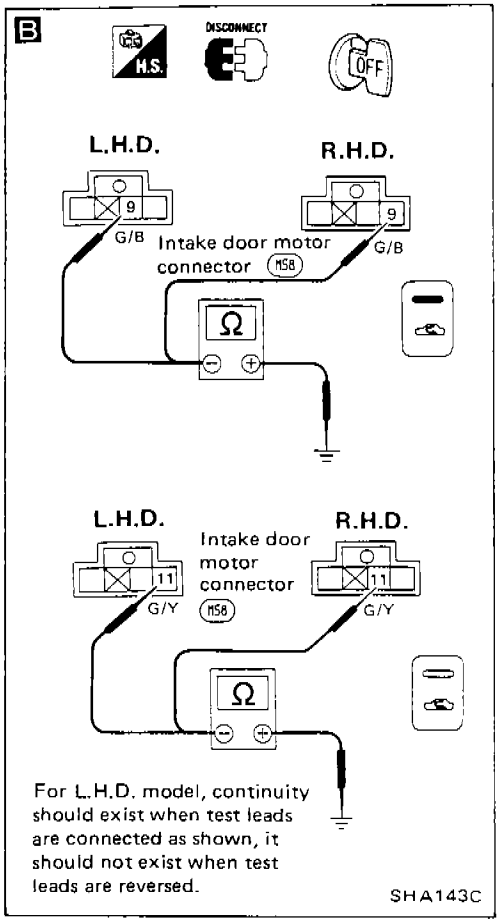
N.G. → Replace control amp. built-in push control unit.

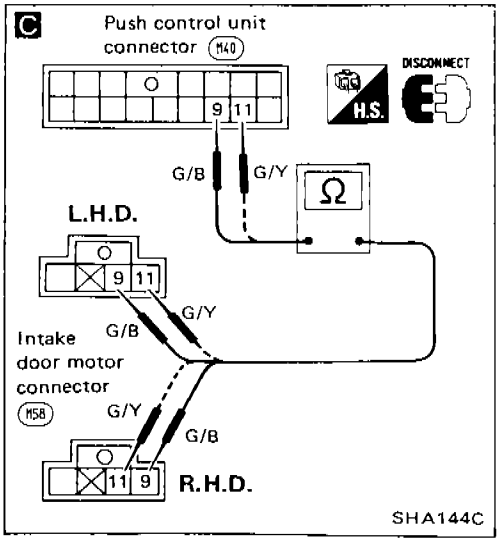
Terminal No.		Mode door motor	
⑦	⑧	Mode door operation	Direction of linkage rotation
⊖	⊖	Stop	Stop
⊖	⊕	VENT → DEF	L.H.D. model: Clockwise R.H.D. model: Counterclockwise
⊕	⊖	DEF → VENT	L.H.D. model: Counterclockwise R.H.D. model: Clockwise

O.K.

Replace mode door motor.







Diagnostic Procedure 3

SYMPTOM: Intake door does not change.

- **Perform PRELIMINARY CHECK 1 (FOR L.H.D. MODEL ONLY) and Main Power Supply and Ground Circuit Check before referring to the following flow chart.**

A

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

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

O.K. ↓

B

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

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

C

Note

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

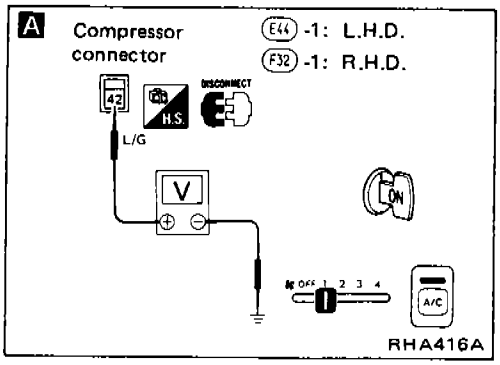
O.K. ↓

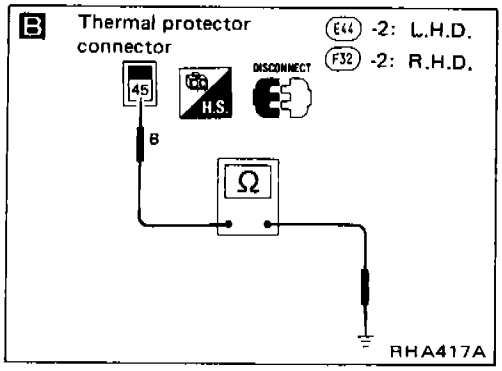
Replace control amp. built-in push control unit.

O.K. ↓

Replace intake door motor.

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





Diagnostic Procedure 4

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

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

A

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

N.G. → Ⓐ (Go to next page.)

O.K. ↓

B

CHECK THERMAL PROTECTOR.
Disconnect thermal protector harness connector.
Does continuity exist between thermal protector harness terminal No. ⑮ and body ground?

N.G. → Replace thermal protector.

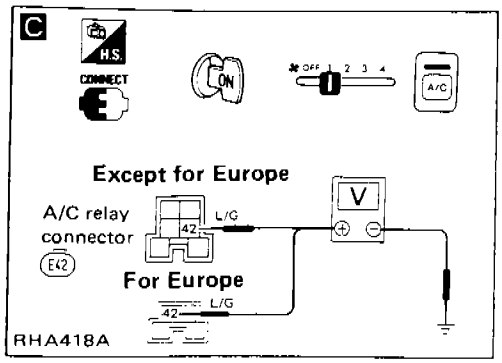
O.K. ↓

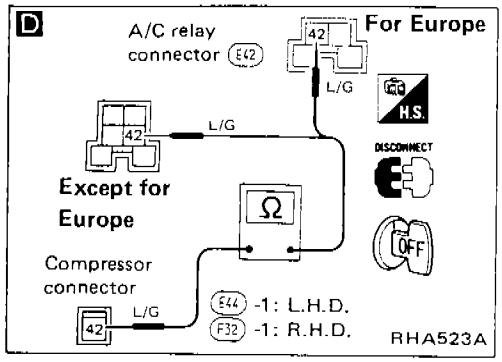
Check magnet clutch coil.

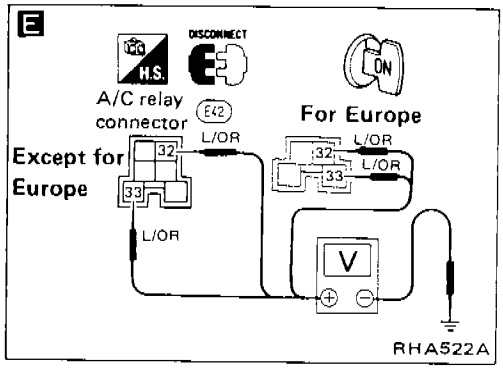
N.G. ↓

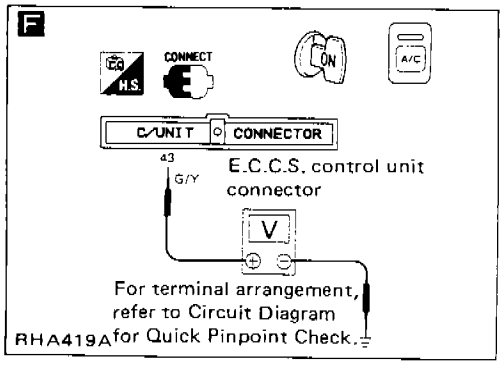
Replace magnet clutch.

Diagnostic Procedure 4 (Cont'd)









Ⓐ

C

CHECK A/C RELAY OPERATION.
Do approx. 12 volts exist between A/C relay harness terminal No. ㊷ and body ground?

N.G. → **E**

CHECK POWER SUPPLY FOR A/C RELAY.
Disconnect A/C relay.
Do approx. 12 volts exist between A/C relay harness terminal No. ㉜, ㉝ and body ground?

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

N.G. → CHECK POWER SUPPLY CIRCUIT AND 10A FUSE AT FUSE BLOCK. (Refer to "POWER SUPPLY ROUTING" in EL section and A/C ELECTRICAL CIRCUIT.)

D

Note

Check circuit continuity between A/C relay harness terminal No. ㊷ and compressor harness terminal No. ㊷.

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

N.G. → Replace A/C relay.

O.K. → Reconnect A/C relay.

F

CHECK COIL SIDE CIRCUIT OF A/C RELAY.
Do approx. 12 volts exist between E.C.C.S. control unit harness terminal No. ㊸ and body ground?

N.G. → Ⓒ

O.K. → Ⓑ

(Go to next page.)

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

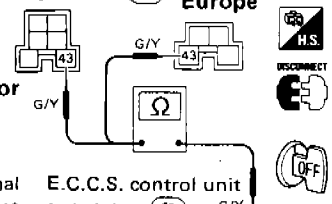
Diagnostic Procedure 4 (Cont'd)

G

A/C relay connector (E42)

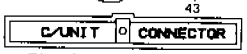
For Europe

Except for Europe



For terminal arrangement, refer to Circuit Diagram for Quick Pinpoint Check.

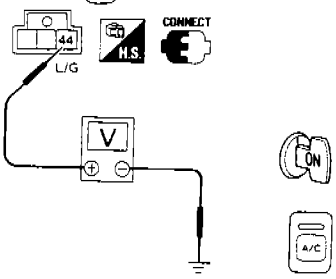
E.C.C.S. control unit connector (F2)



RHA524A

H

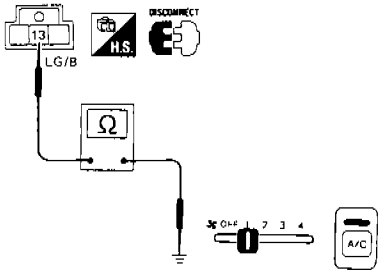
Thermo control amp. connector (M49)



RHA420A

I

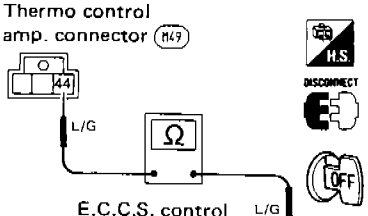
Thermo control amp. connector (M49)



RHA421A

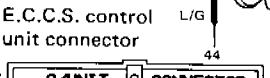
J

Thermo control amp. connector (M49)



For terminal arrangement, refer to Circuit Diagram for Quick Pinpoint Check.

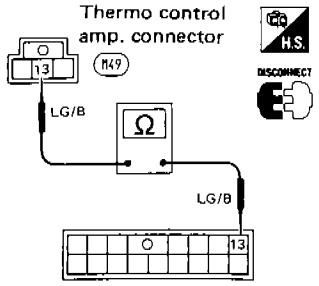
E.C.C.S. control unit connector



RHA525A

K

Thermo control amp. connector (M49)



Push control unit connector (M40)

RHA526A

Ⓑ

H CHECK VOLTAGE FOR THERMO CONTROL AMP.
Do approx. 12 volts exist between thermo control amp. harness terminal No. (44) and body ground?

N.G. → **J** Check circuit continuity between E.C.C.S. control unit harness terminal No. (44) and thermo control amp. harness terminal No. (44). Note

O.K. ↓

CHECK POWER SUPPLY FOR THERMO CONTROL AMP.
Go to Main Power Supply and Ground Circuit Check.

O.K. ↓

CHECK E.C.C.S. CONTROL UNIT.
Refer to EF & EC section.

I CHECK BODY GROUND CIRCUIT FOR THERMO CONTROL AMP.
Disconnect thermo control amp. harness connector.
Does continuity exist between thermo control amp. harness terminal No. (13) and body ground?

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

K Check circuit continuity between thermo control amp. harness terminal No. (13) and push control unit harness terminal No. (13). Note

O.K. ↓

Replace thermo control amp.

O.K. ↓

Ⓓ

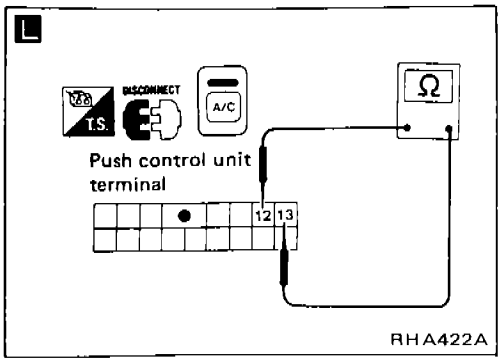
(Go to next page.)

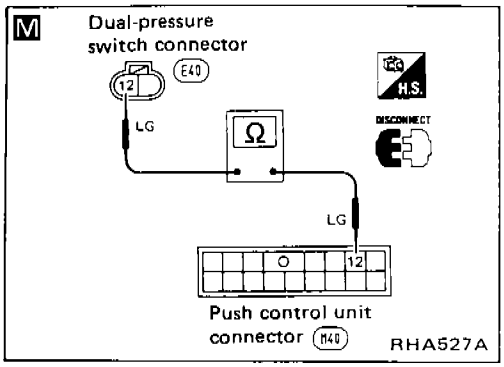
Ⓒ

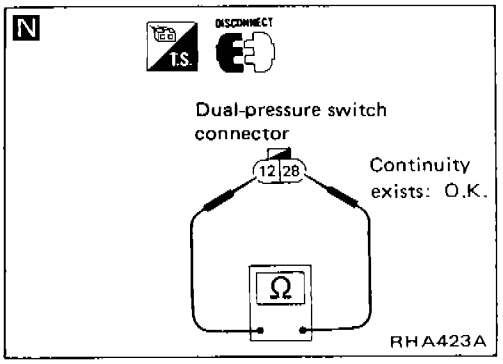
G Check circuit continuity between A/C relay harness terminal No. (43) and E.C.C.S. control unit harness terminal No. (43).

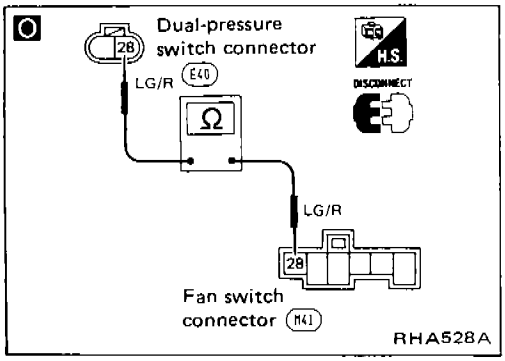
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.

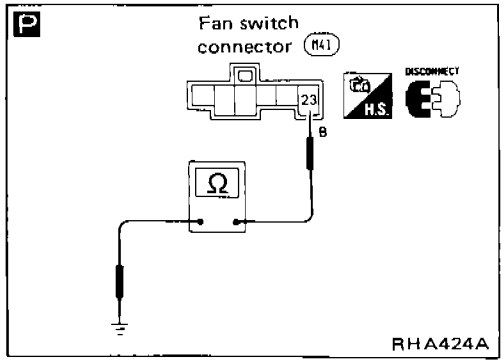
Diagnostic Procedure 4 (Cont'd)











Ⓓ

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

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

↓ O.K.

Disconnect dual-pressure switch.

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

↓ O.K.

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

→ N.G. → CHECK REFRIGERANT.
Connect manifold gauge, then check system pressure.
(Refer to A/C PERFORMANCE TEST.)

- O.K. → Replace dual-pressure switch.
- N.G. → Check refrigerant leaks.

↓ O.K.

Disconnect fan switch harness connector.

O Note
Check circuit continuity between dual-pressure switch harness terminal No. ㉘ and fan switch harness terminal No. ㉘.

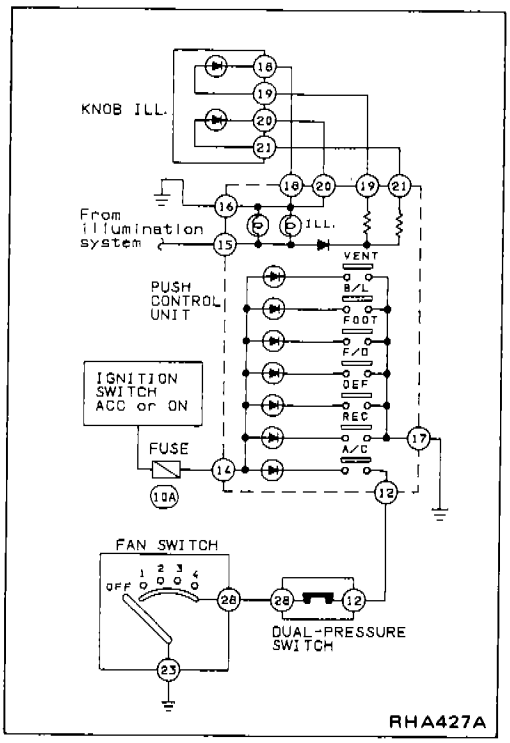
↓ O.K.

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

→ O.K. → CHECK FAN SWITCH
(Refer to Electrical Components Inspection.)

- N.G. → Replace fan switch.

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



Diagnostic Procedure 5

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

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

Turn ignition switch and lighting switch ON.

CHECK ILLUMINATION AND INDICATORS.

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

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

○: Illumination or indicator comes on.
X: Illumination or indicator does not come on.
Δ: Some indicators for VENT, B/L, FOOT, F/D, DEF or REC come on.

DIAGNOSTIC PROCEDURE 5-1

CHECK OTHER ILLUMINATION SYSTEMS EXCEPT FOR A/C SYSTEM.
Does other illumination come on with ignition switch and lighting switch ON?

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

O.K. ↓

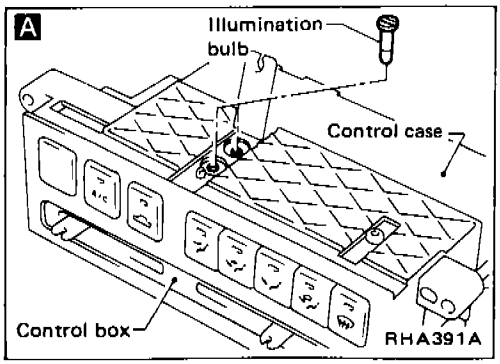
Turn ignition switch and lighting switch OFF.

Ⓐ

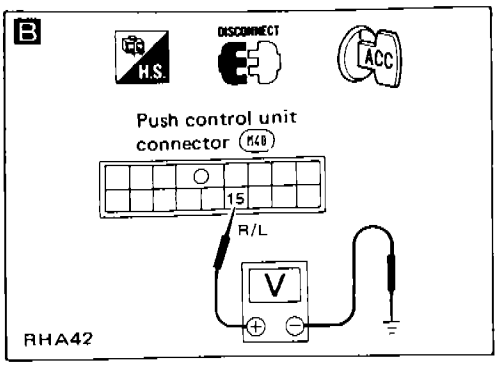
CHECK ILLUMINATION BULB.
Remove push control unit and disconnect harness connectors.
Remove illumination bulb(s) and check them.

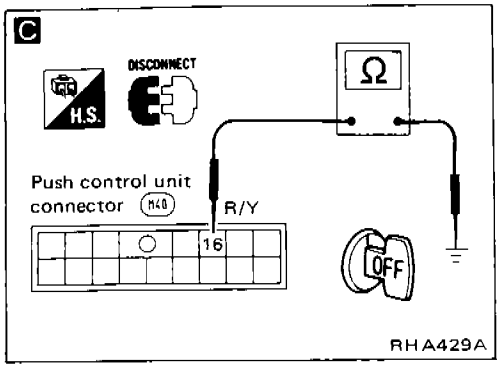
N.G. → Replace illumination bulb(s).

O.K. → Ⓐ (Go to next page.)



Diagnostic Procedure 5 (Cont'd)





Ⓐ

B

CHECK POWER SUPPLY FOR ILLUMINATION WITH LIGHTING SWITCH ON.
Do approx. 12 volts exist between push control unit harness terminal No. ⑮ and body ground?

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

O.K. ↓

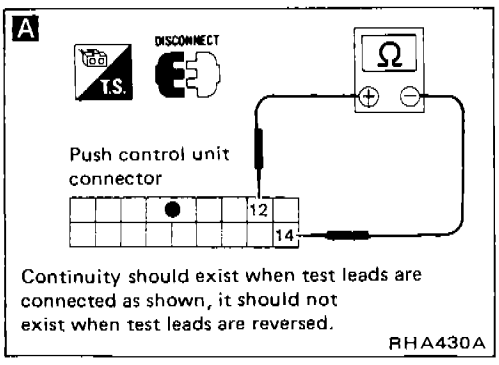
C

CHECK BODY GROUND CIRCUIT FOR ILLUMINATION.
Does contunity exist between push control unit harness terminal No. ⑯ and body ground?

Note

O.K. ↓

Replace control amp. built-in push control unit.



DIAGNOSTIC PROCEDURE 5-2

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

N.G. → Go to Diagnostic Procedure 4.

O.K. ↓

A

Check circuit continuity of L.E.D.

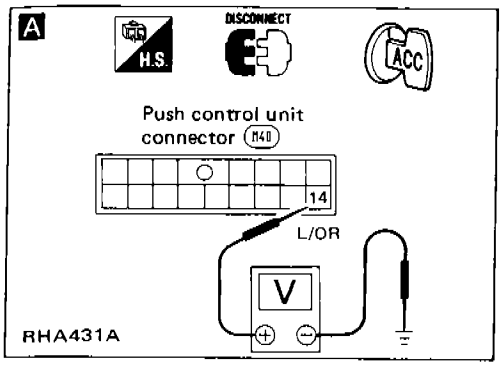
N.G. ↓

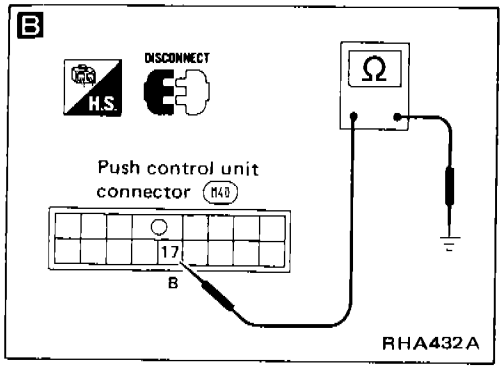
Replace control amp. built-in push control unit.

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

Diagnostic Procedure 5 (Cont'd)

DIAGNOSTIC PROCEDURE 5-3





Turn ignition switch and lighting switch OFF.

↓

Disconnect push control unit harness connector.

↓

A

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

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

O.K. ↓

B

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

Note

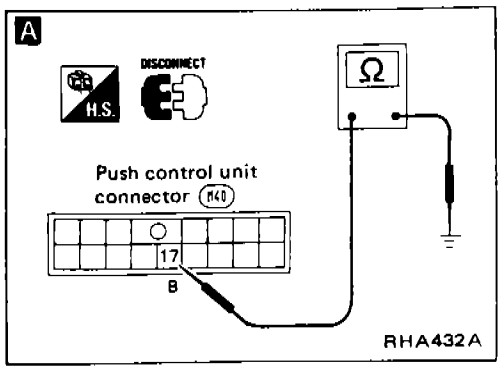
O.K. ↓

Replace control amp. built-in push control unit.

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

Diagnostic Procedure 5 (Cont'd)

DIAGNOSTIC PROCEDURE 5-4



Turn ignition switch and lighting switch OFF.

↓

Disconnect push control unit harness connector.

↓

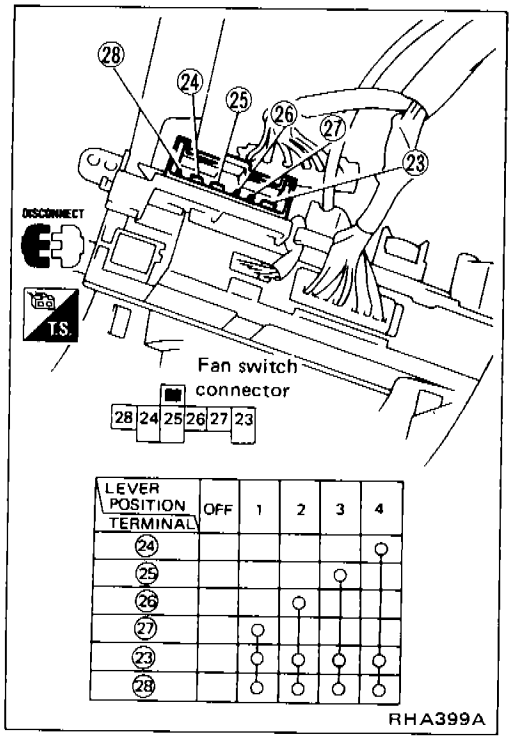
A Note

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

↓ O.K.

Replace control amp. built-in push control unit.

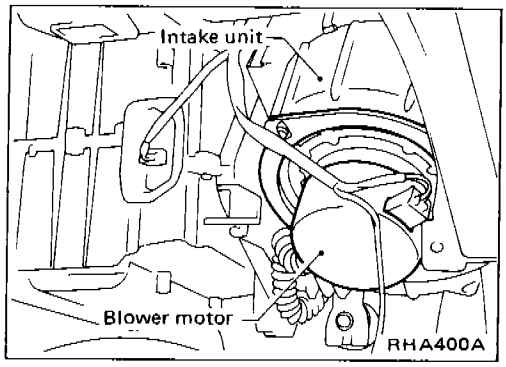
Note:
If the result is N.G. after checking circuit continuity, repair harness or connector.



Electrical Components Inspection

FAN SWITCH

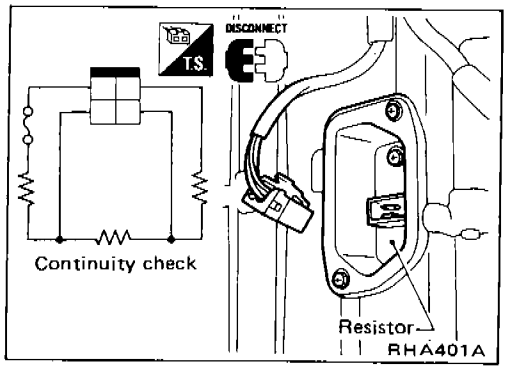
Check continuity between terminals at each switch position.



BLOWER MOTOR

Confirm smooth rotation of the blower motor.

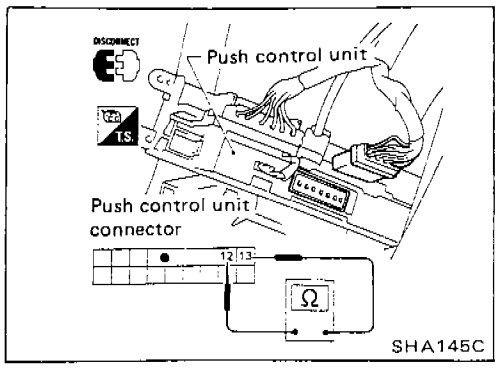
- Ensure that there are no foreign particles inside the intake unit.



BLOWER RESISTOR

Check continuity between terminals.

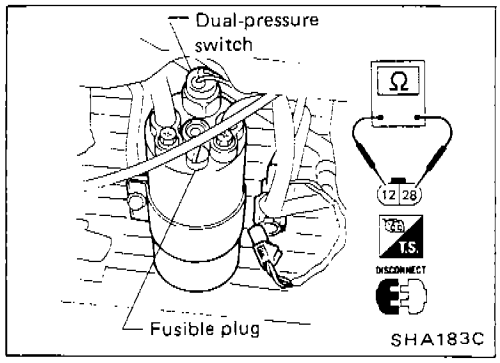
Electrical Components Inspection (Cont'd)



A/C SWITCH

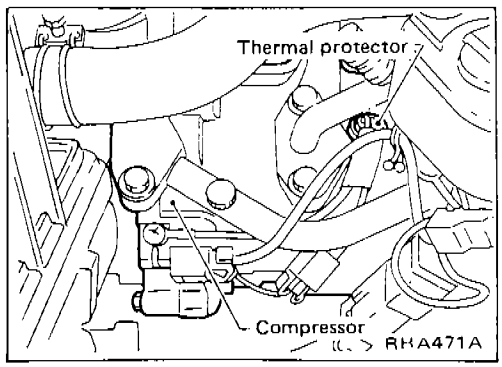
Check continuity between terminals at each switch position.

Switch condition			Terminal No.		Continuity
L.H.D.		R.H.D.	⊕	⊖	
A/C	DEF	A/C			
ON	ON	ON	⑬	⑫	Exists
ON	OFF				
OFF	ON				



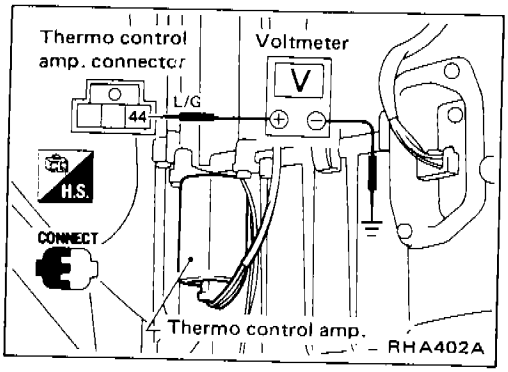
DUAL-PRESSURE SWITCH

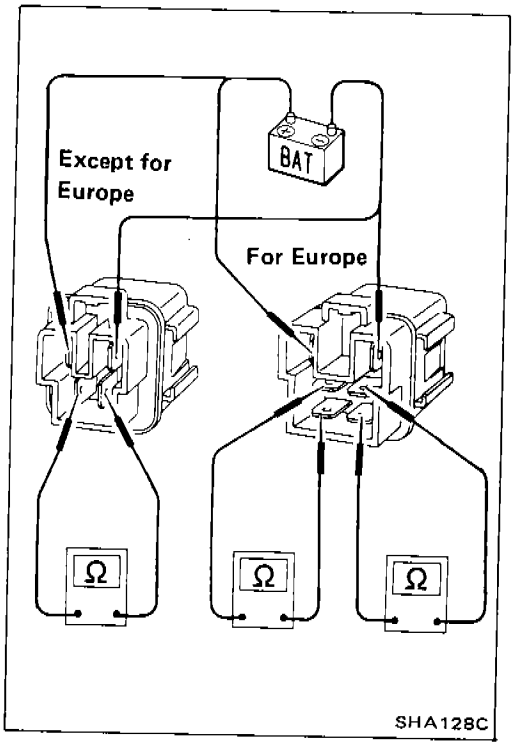
High-pressure side line pressure kPa (bar, kg/cm^2, psi)	Operation	Continuity
Decreasing to 177 - 216 (1.77 - 2.16, 1.8 - 2.2, 26 - 31) Increasing to 2,452 - 2,844 (24.5 - 28.4, 25 - 29, 356 - 412)	Turn OFF	Does not exist
Increasing to 177 - 235 (1.77 - 2.35, 1.8 - 2.4, 26 - 34) Decreasing to 1,863 - 2,256 (18.6 - 22.6, 19 - 23, 270 - 327)	Turn ON	Exists



THERMAL PROTECTOR

Temperature of compressor °C (°F)	Operation
Increasing to approx. 135 - 145 (275 - 293)	Turn OFF
Decreasing to approx. 120 - 130 (248 - 266)	Turn ON





Electrical Components Inspection (Cont'd)

THERMO CONTROL AMP.

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

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

A/C RELAY

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

THERMOSWITCH (For hot areas)

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

General Specifications

COMPRESSOR

	L.H.D.	R.H.D.
Model	ATSUGI make NVR 140S	DIESEL-KIKI make DKV-14C
Type	Vane rotary	
Displacement cm^3 (cu in)/rev.	140 (8.54)	
Direction of rotation	Clockwise (Viewed from drive end)	
Drive belt	Poly V	

LUBRICATION OIL

Type	SUNISO 5GS
Capacity mℓ (Imp fl oz)	
Total in system	200 (7.0)
Amount of oil which can be drained	Approx. 100 (3.5)
Compressor (Service parts) charging amount	200 (7.0)

REFRIGERANT

Type	R-12
Capacity kg (lb)	
For Europe	0.85 - 0.95 (1.87 - 2.09)
Except Europe	
L.H.D. model	0.9 - 1.0 (2.0 - 2.2)
R.H.D. model	0.8 - 0.9 (1.8 - 2.0)

Inspection and Adjustment

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

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

BELT TENSION

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

COMPRESSOR

Model	NVR 140S	DKV-14C
Clutch disc-pulley clearance mm (in)	0.3 - 0.6 (0.012 - 0.024)	