DATSUN Model S110 Series

SECTION HA

HEATER & AIR CONDITIONER

CONTENTS

HEATER

AIR CONDITIONER

Refer to Section MA (Heater and Air Conditioner) for:

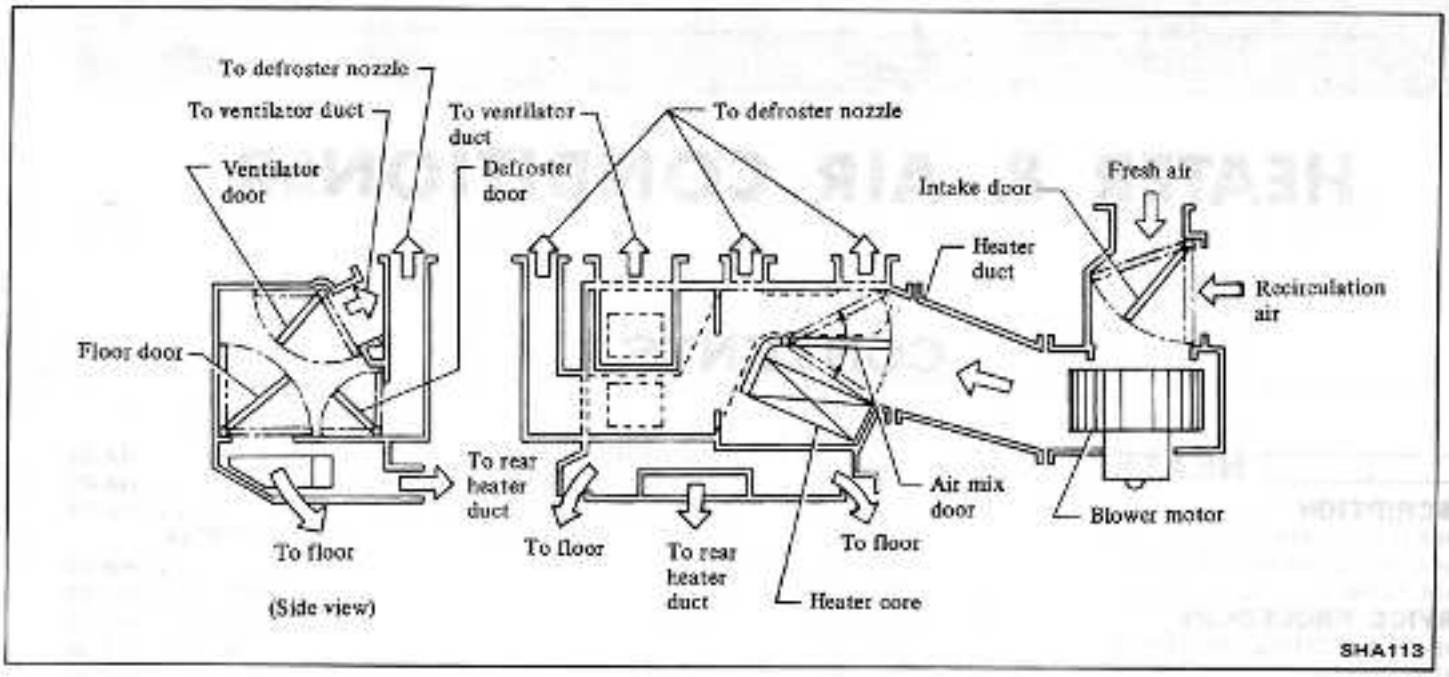
- CHECKING REFRIGERANT LEVEL
- CHECKING REFRIGERANT LEAKS

Refer to Section MA (Basic Mechanical System) for:

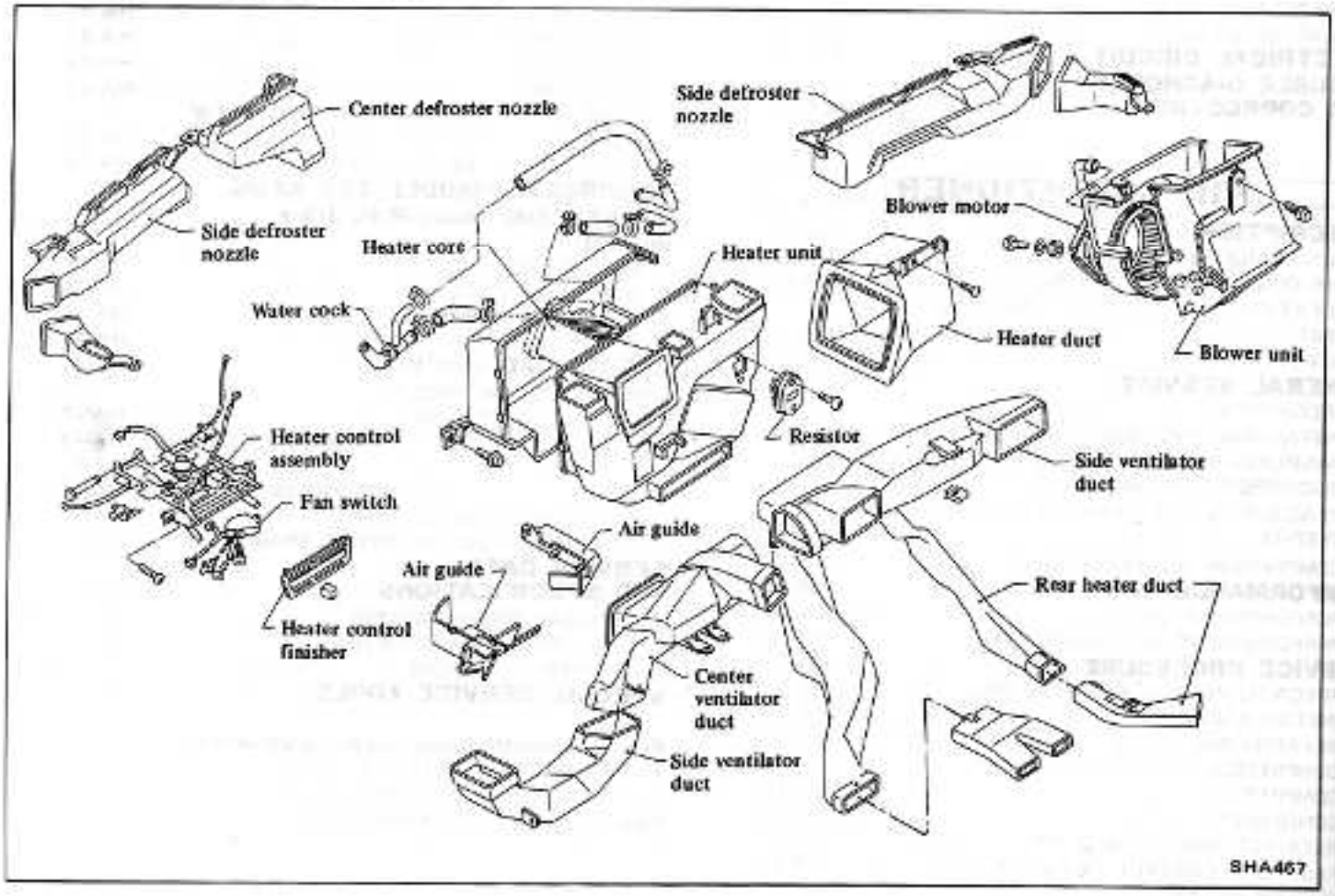
- CHECKING AND ADJUSTING DRIVE BELTS

DESCRIPTION

HEATER SYSTEM

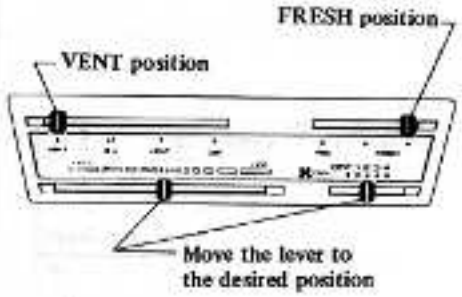


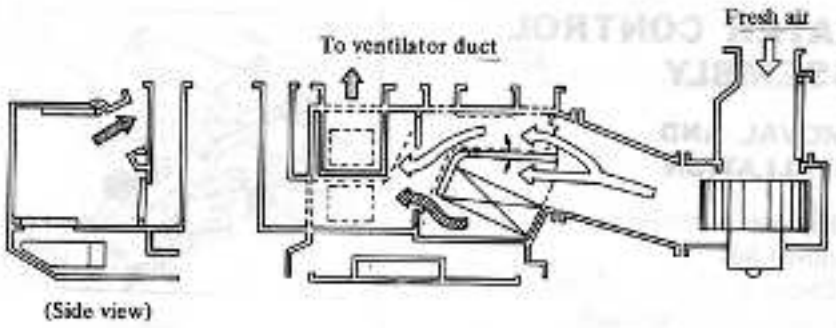
HEATER COMPONENTS



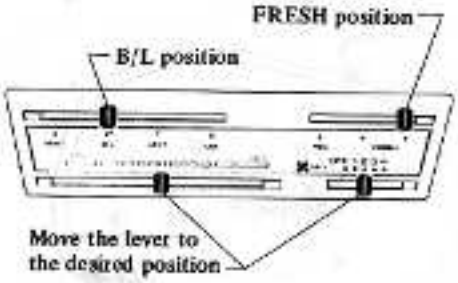
AIR FLOW

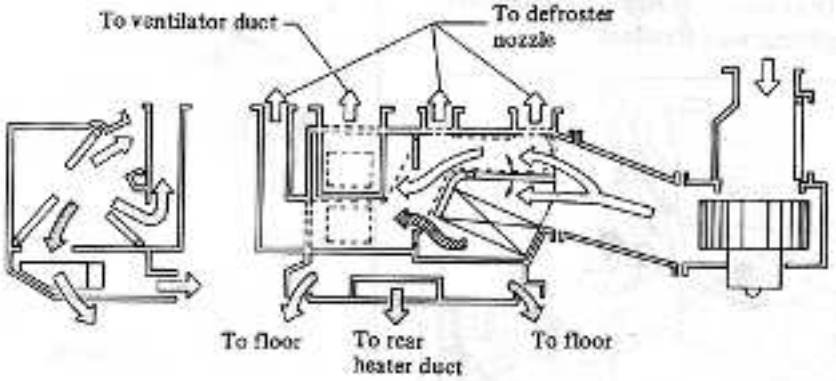
VENT position



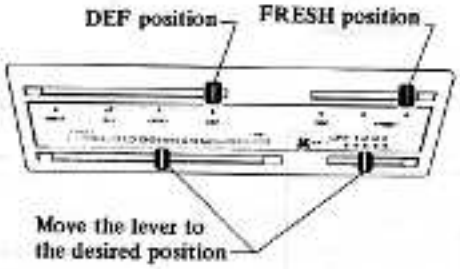


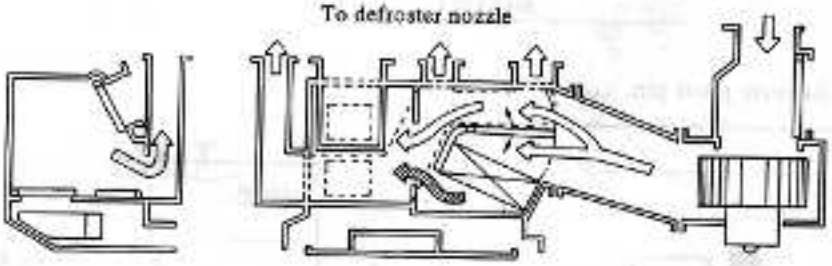
B/L (Bi-level) position



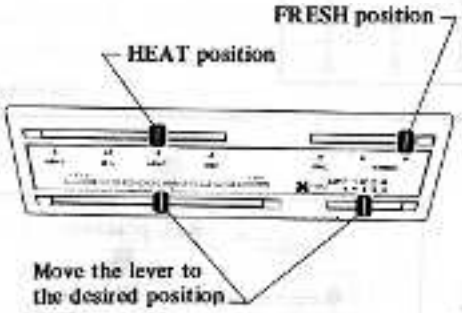


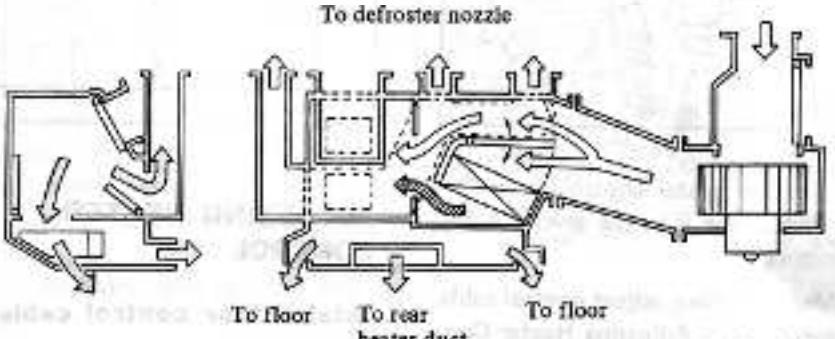
DEF position



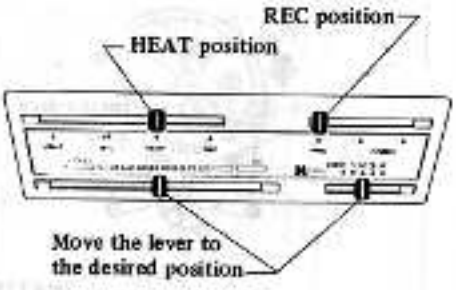


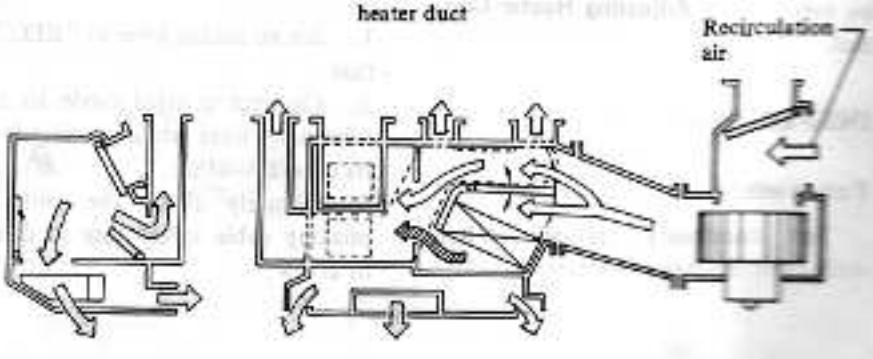
HEAT position





REC position





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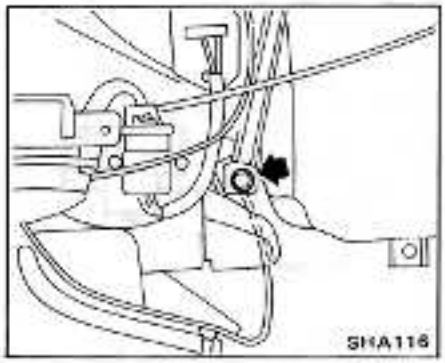
SERVICE PROCEDURE

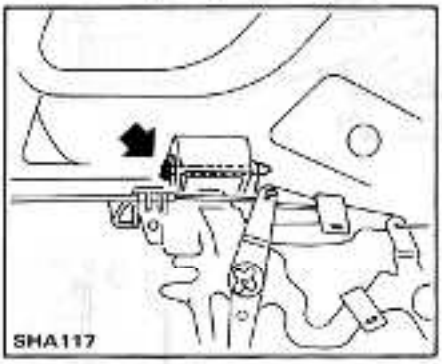
HEATER CONTROL ASSEMBLY

REMOVAL AND INSTALLATION

1. Remove instrument lower covers and cluster lids.
2. Disconnect control cables from heater unit and blower unit.
3. Disconnect harness connectors and ground wire terminal.

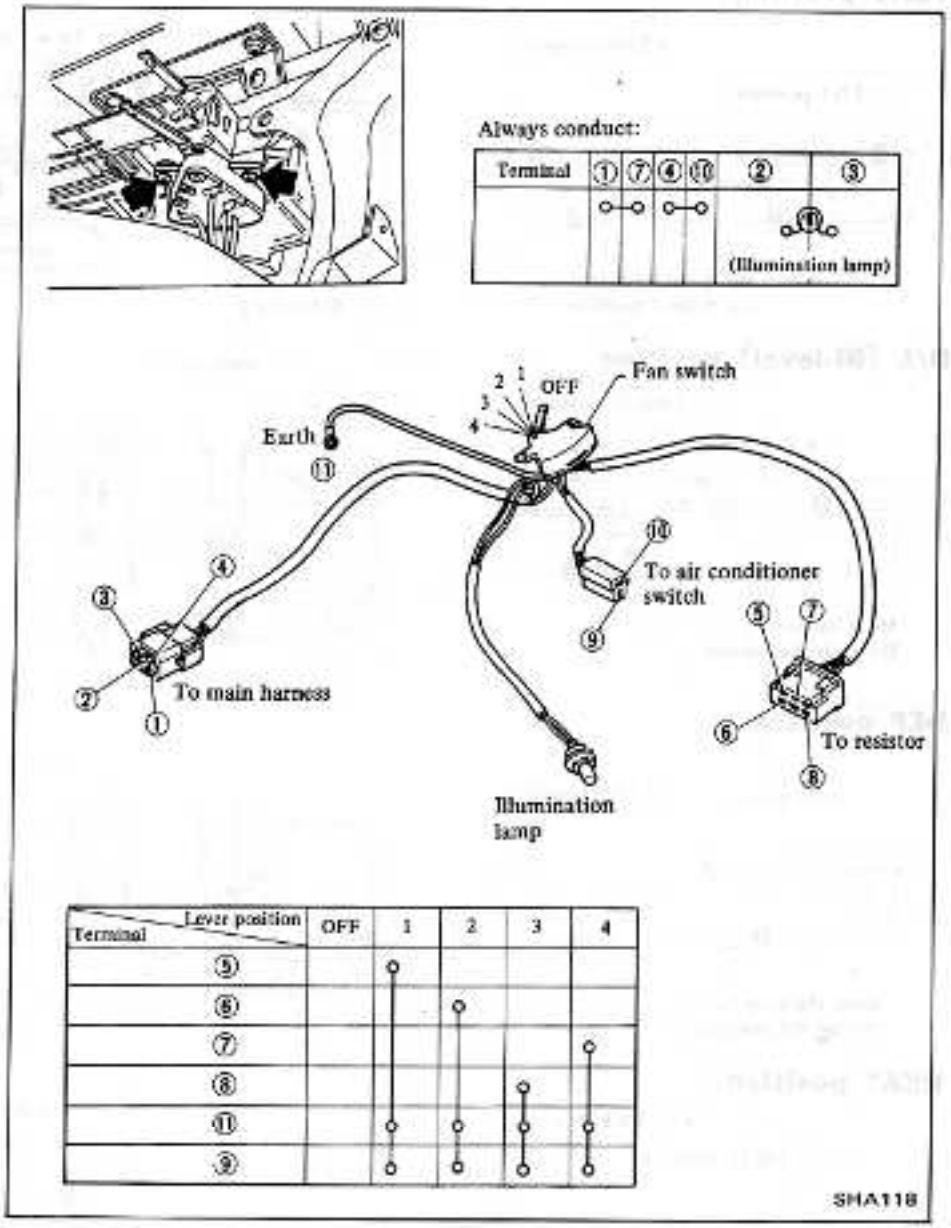


4. Remove pivot pin.



5. Remove heater control assembly.
6. Installation is in the reverse order of removal.

After installing, adjust control cable by referring to Adjusting Heater Control.



INSPECTION

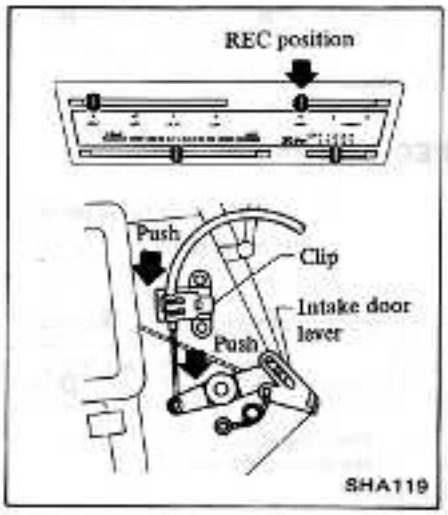
Fan switch

Test continuity through switch with a test lamp or ohmmeter.

ADJUSTING HEATER CONTROL

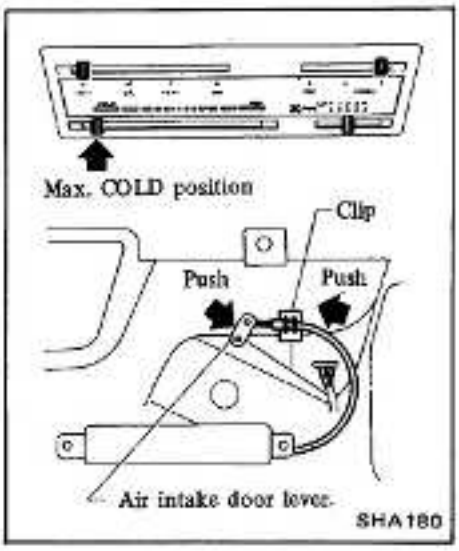
Intake door control cable

1. Set air intake lever at "REC" position.
2. Connect control cable to air intake door lever while pushing lever to its closed position.
3. Securely clamp the cable while pushing cable outer case in direction of arrow.



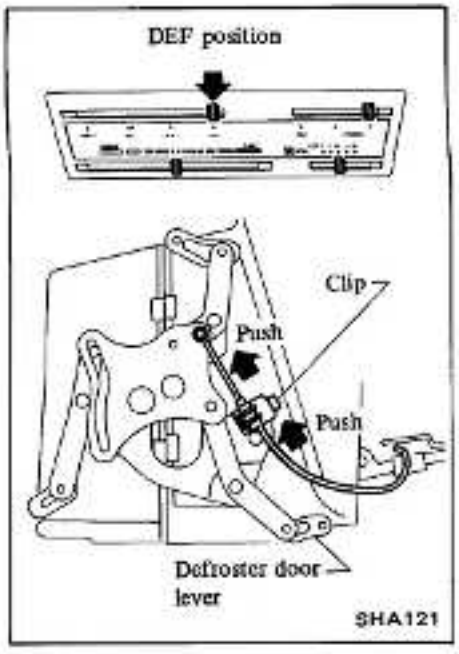
Air mix door control cable

1. Set temperature lever at max. "COLD" position.
2. Connect control cable to air mix door lever while pushing lever to its full closed position.
3. Securely clamp the cable while pushing cable outer case in direction of arrow.



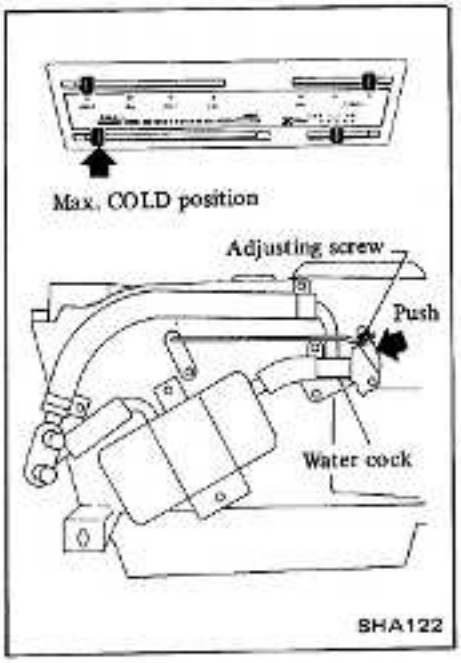
Air control cable

1. Set air control lever at "DEF" position.
2. Connect control cable to side linkage while pushing the linkage in direction of arrow.
3. Securely clamp the cable while pushing cable outer case in direction of arrow.



Water cock control linkage

1. Set air mix door lever at max. "COLD" position.
2. Securely clamp control rod while pushing water cock lever to its full closed position.

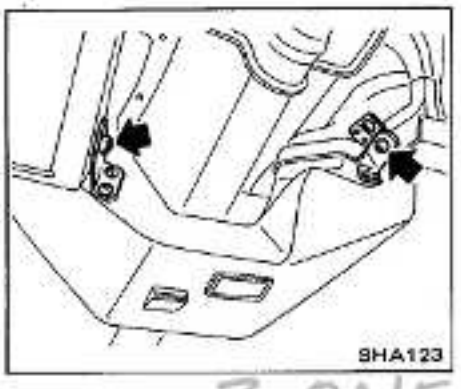


HEATER UNIT

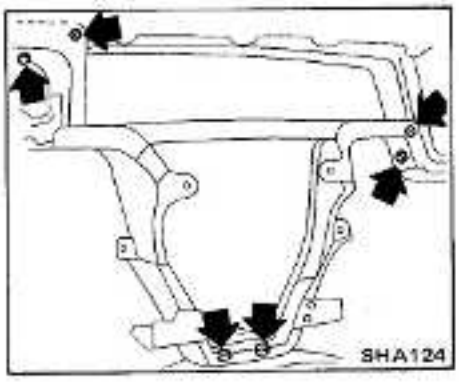
REMOVAL AND INSTALLATION

1. Set TEMP lever to max. "HOT" position and drain engine coolant.
2. Disconnect heater hoses from heater unit.
3. Remove following parts.

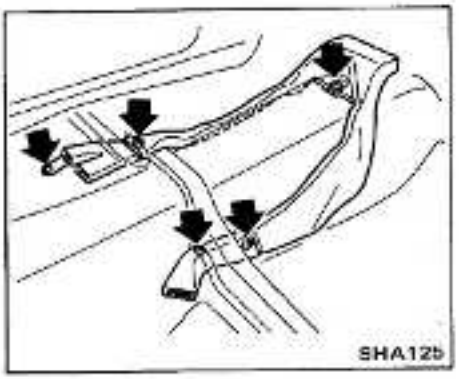
(1) Front seats
(2) Console box
(3) Floor carpet
(4) Instrument lower covers and cluster lids
(5) Side ventilator duct on the left hand side



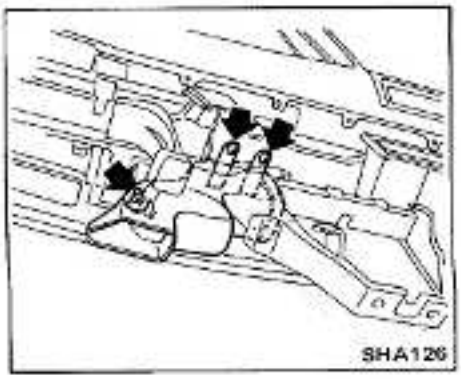
(6) Radio, sound balancer and stereo cassette deck
(7) Stay of instrument panel



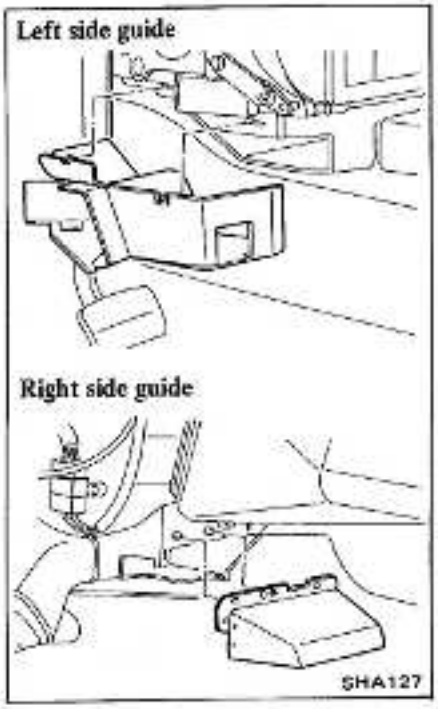
(8) Rear heater duct



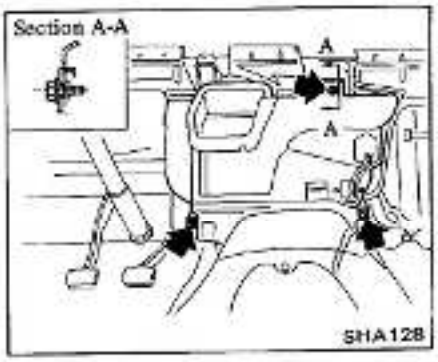
(9) Center ventilator duct



(10) Air guides at lower outlets



4. Disconnect wire harness connections.
5. Remove heater unit with heater control assembly.

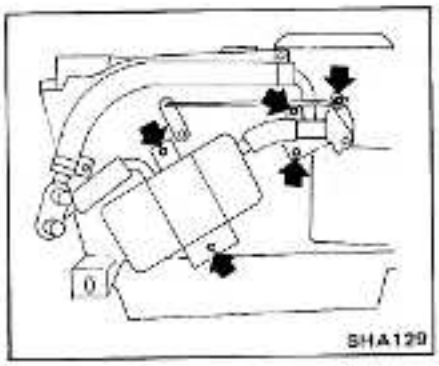


6. Remove heater control assembly. Refer to the item on Heater Control Assembly.
7. Installation is in the reverse order of removal.

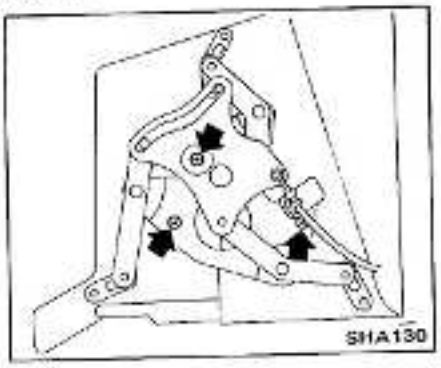
After installing heater unit, adjust control cable by referring to Adjusting Heater Control.

DISASSEMBLY AND ASSEMBLY

1. Remove heater core with water cock.

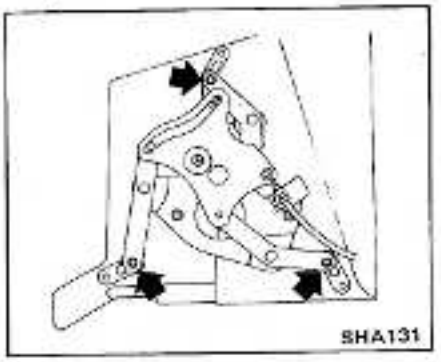


2. Remove air control linkage securing screws.



3. Separate heater unit case by removing clips.
4. Assemble heater unit in the reverse order of disassembly.

a. After installing heater core and water cock, adjust water cock control linkage by referring to Adjusting Heater Control.
b. When assembling air control linkage, set it as illustrated.



INSPECTION

Case

If it is cracked or deformed, replace.

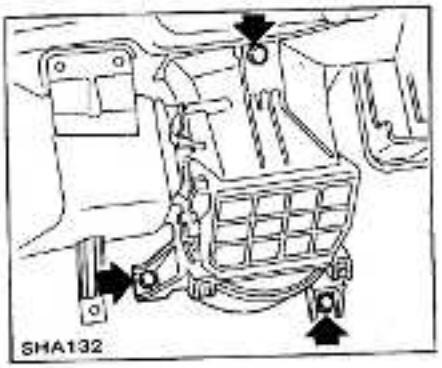
Heater core

Clean fins and check for water leakage.

BLOWER UNIT

REMOVAL AND INSTALLATION

1. Remove instrument lower cover and cluster lid on the right hand.
2. Disconnect control cable and harness connector from blower unit.
3. Remove blower unit.

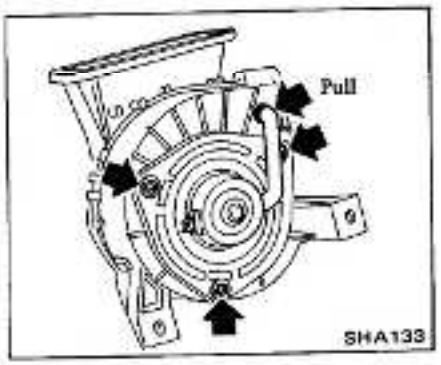


4. Installation is in the reverse order of removal.

Adjust intake door control cable by referring to Adjusting Heater Control.

DISASSEMBLY

1. Remove blower motor.

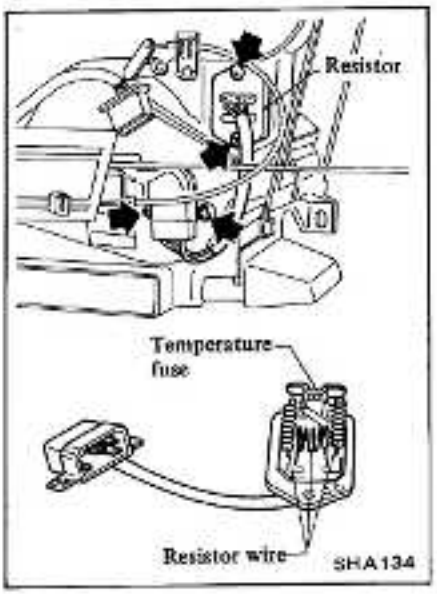


2. Separate blower unit case by removing clips.

RESISTOR

REMOVAL AND INSTALLATION

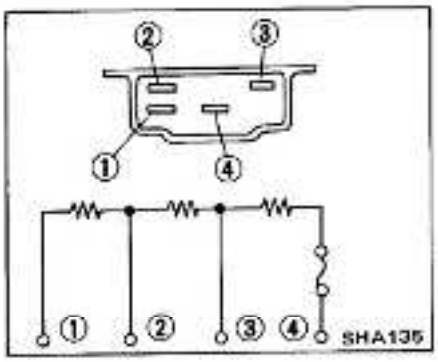
1. Remove instrument cluster lid.
2. Remove resistor from heater unit.



3. Install resistor so that temperature fuse locates at upper side.

INSPECTION

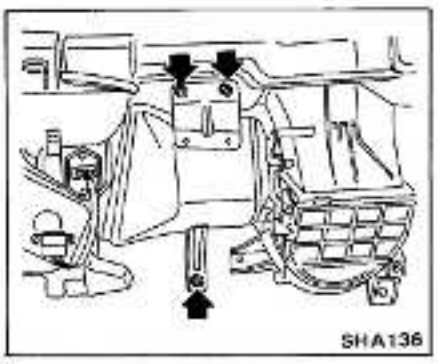
Test continuity using a test lamp or ohmmeter.



HEATER DUCT

REMOVAL AND INSTALLATION

Proceed after removing instrument lower cover and cluster lid on the right hand side.



REAR HEATER DUCT

REMOVAL AND INSTALLATION

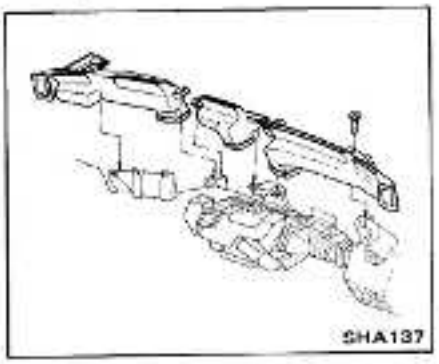
Refer to the item on Heater Unit.

DEFROSTER NOZZLE

REMOVAL AND INSTALLATION

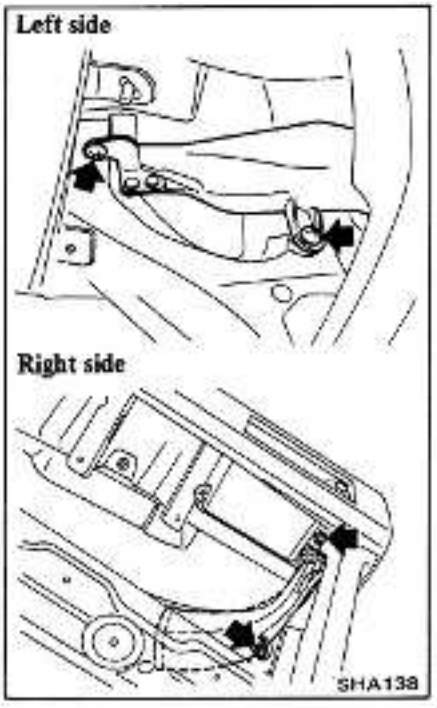
Front window defroster nozzle

Proceed after removing instrument assembly.



Side window defroster nozzle

Proceed after removing instrument lower covers and cluster lids.



VENTILATOR DUCT

REMOVAL AND INSTALLATION

Center ventilator duct

Refer to the item on Heater Unit.

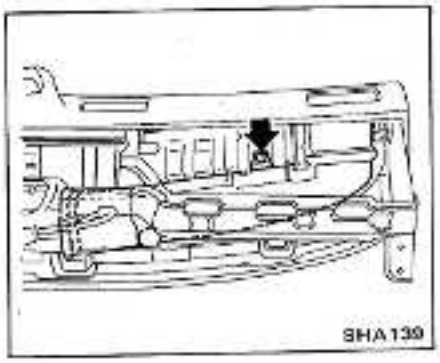
Side ventilator duct

Left side:

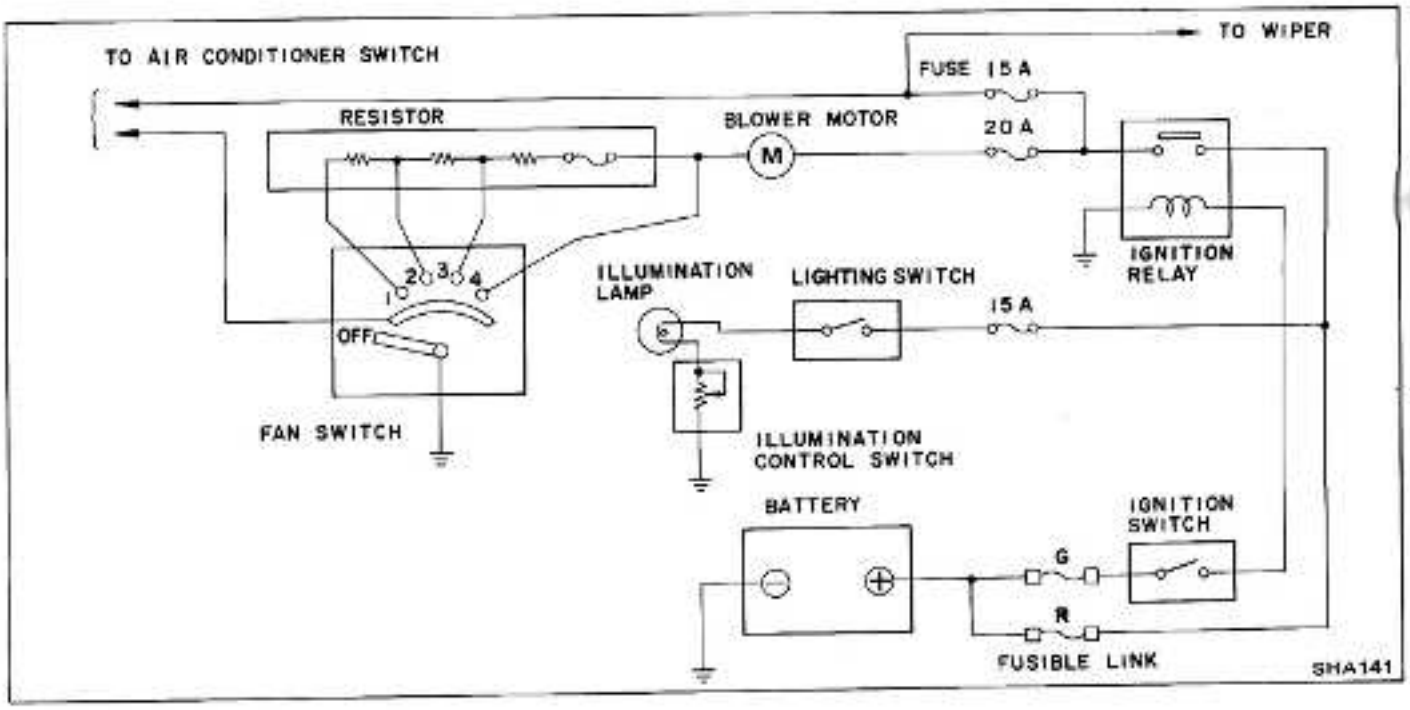
Refer to the item on Heater Unit.

Right side:

Proceed after removing instrument assembly.



ELECTRICAL CIRCUIT

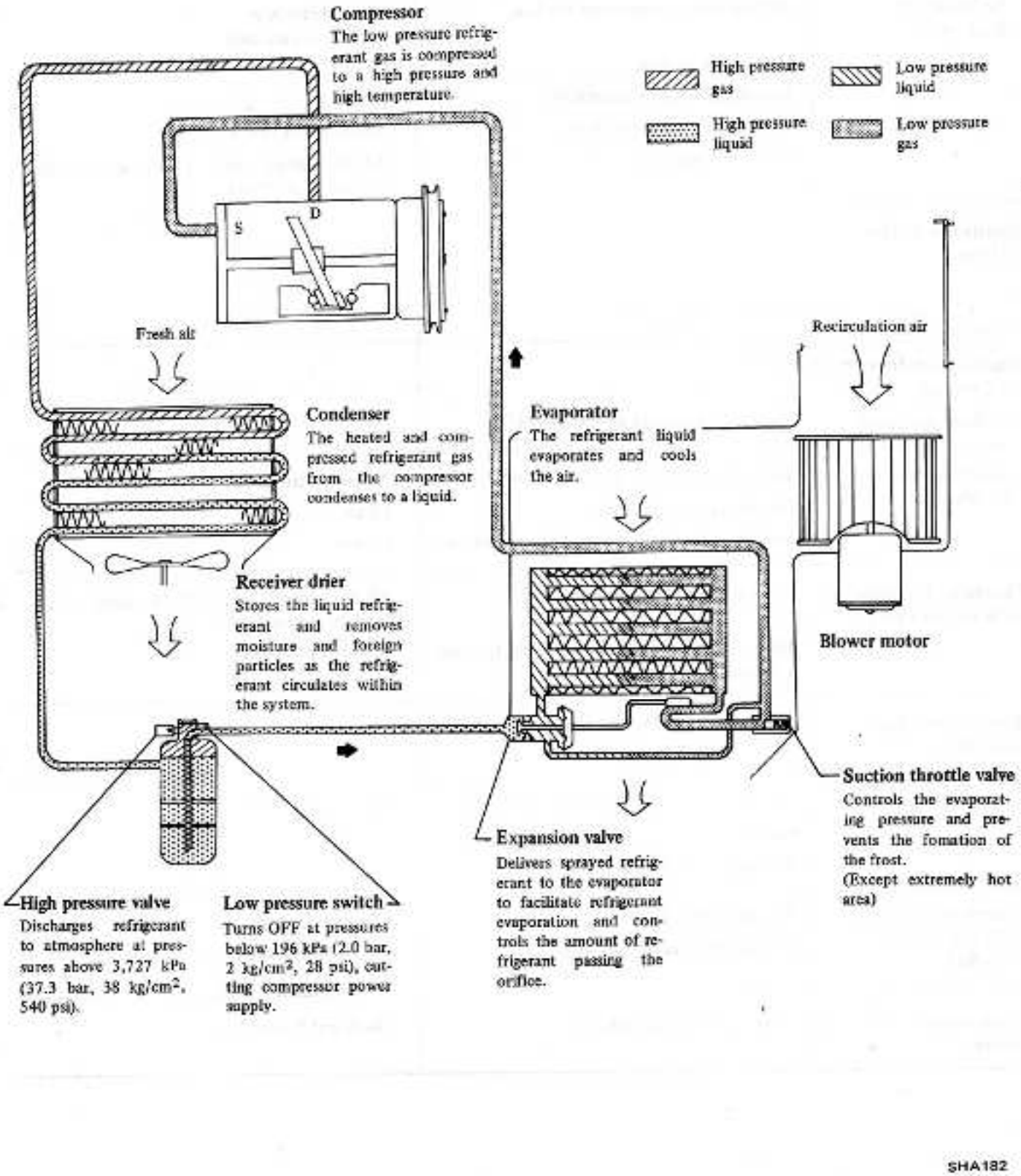


TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Insufficient heating performance.		
No heated air discharged.	Cooling water temperature too low.	Check thermostat. Replace as necessary.
	Heater core plugged.	Clean.
	Insufficient cooling water level.	Refill.
	Malfunctioning air mix door.	Adjust control cable.
	Malfunctioning water cock.	Adjust control cable. Check water cock. Replace as necessary.
Insufficient air flow to floor.	Blower motor speed too low.	Check motor terminal voltage. Repair poor connection and discontinuity. Replace motor if necessary.
	Malfunctioning floor door.	Adjust control cable.
Insufficient defrosting performance.		
Cold air discharged.	Refer to "No heated air discharged".	
Insufficient air flow to defroster.	Malfunctioning floor door (or faulty seal).	Adjust control cable.
	Defroster nozzle plugged.	Clean.
	Leak at defroster duct-to-nozzle connection.	Correct.
Heated air discharged with lever in VENT.	Water cock not operating properly.	Adjust control cable. Check water cock. Replace as necessary.
	Mode door not operating properly (or seal damaged).	Adjust control cable.
Blower motor does not operate.	Refer to Trouble Diagnoses and Corrections (Air conditioner).	
Control lever drags.	Inner wire rubbing against outer case end.	Adjust control cable.
	Control cable bent excessively.	Correct.
	Malfunctioning doors, door levers, etc.	Check and correct.
Outside air comes in with AIR control lever REC.	Air intake door not operating properly.	Repair or replace.
	Control cable out of adjustment.	Adjust control cable.
Noise from blower motor.	Loose bolt in blower motor.	Check and tighten loose bolts.

DESCRIPTION

REFRIGERATION CYCLE



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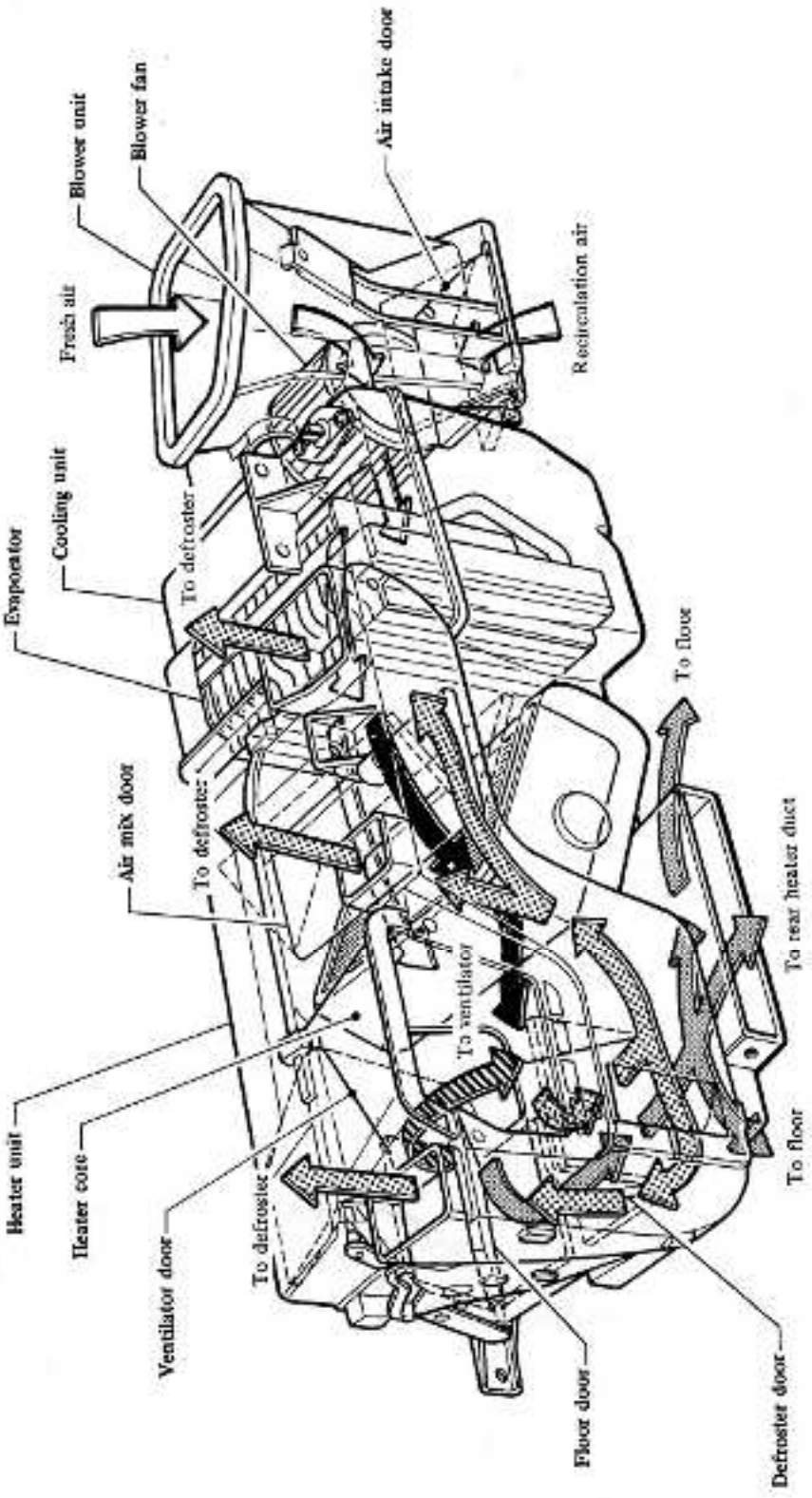
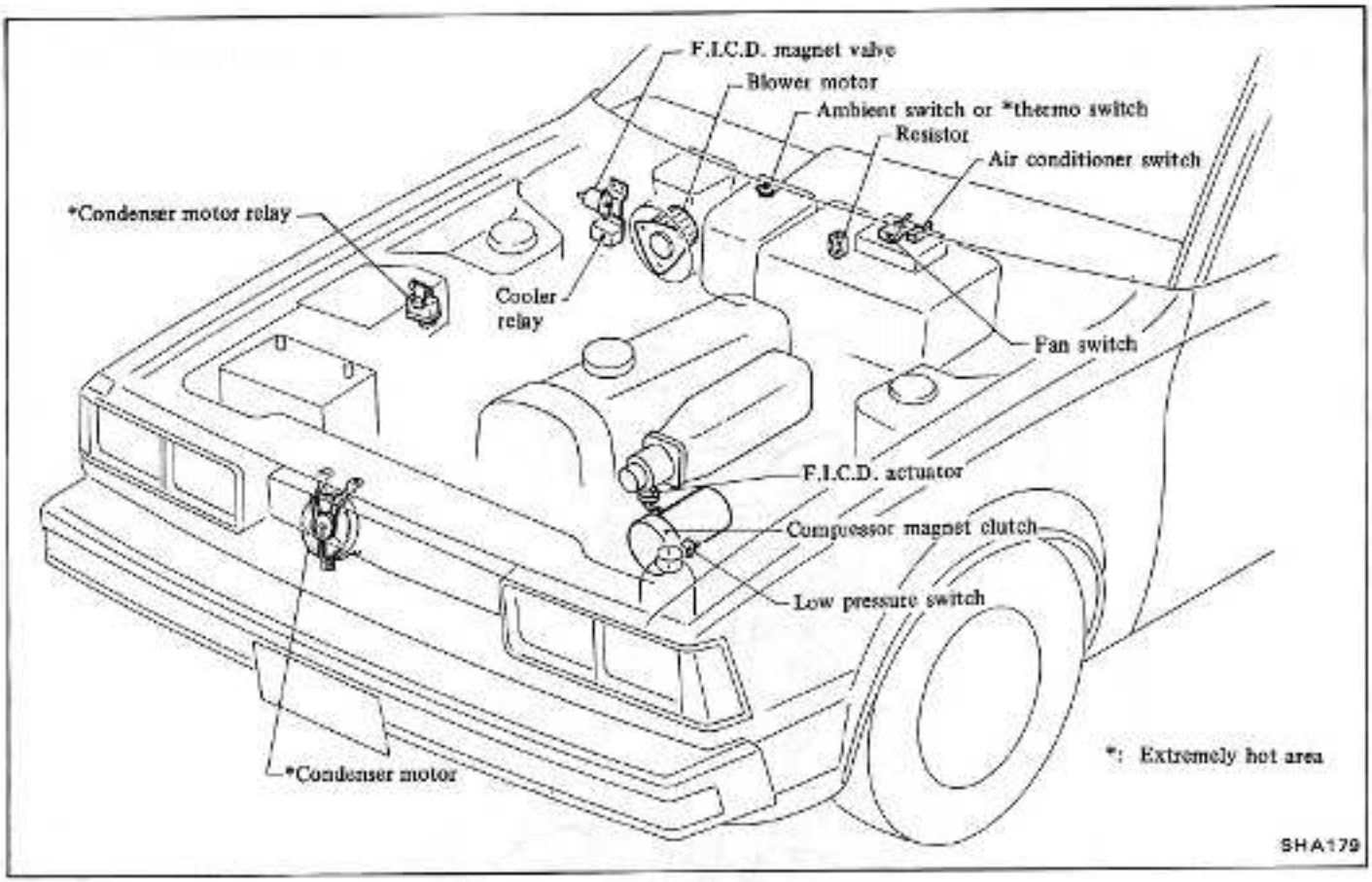
AIR CONDITIONING COMPONENTS

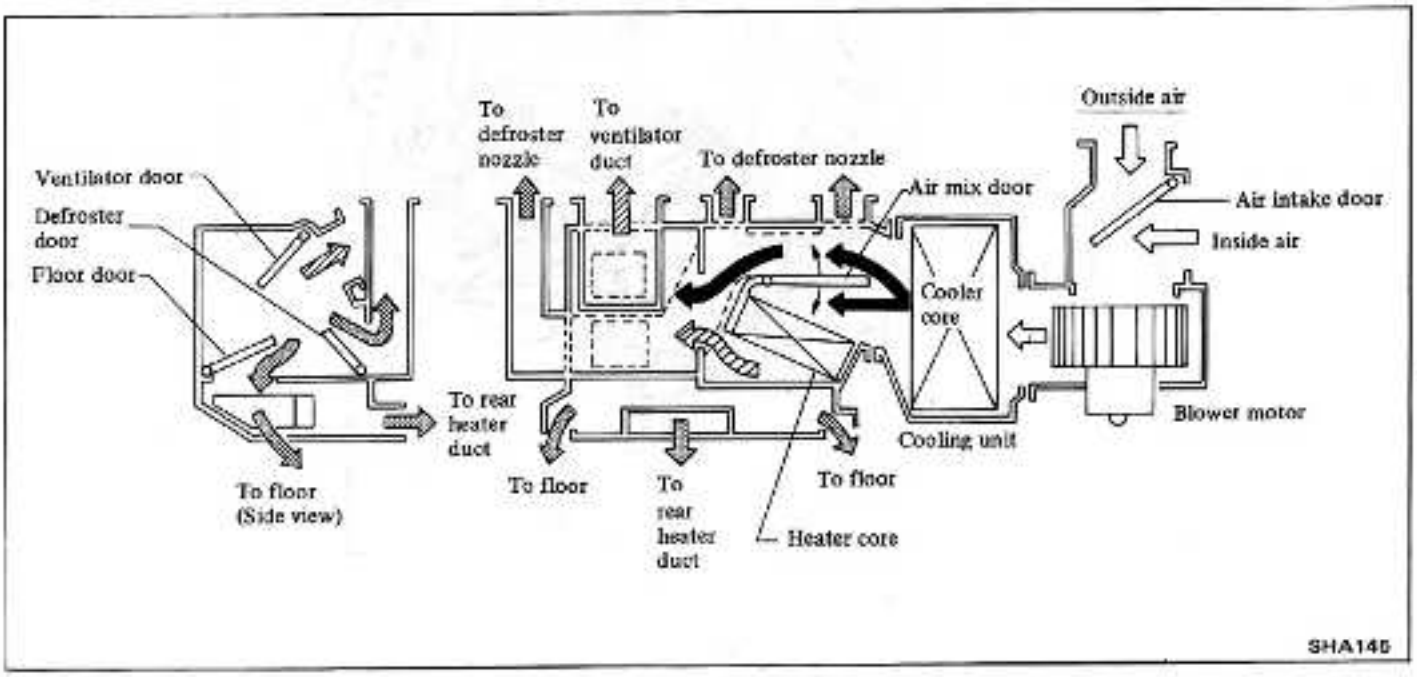


LOCATION OF ELECTRICAL AND VACUUM UNIT



AIR FLOW

Air flow at any position (VENT, B/L, HEAT, DEF and REC) is the same as that of HEATER except that all air discharged with blower unit passes through cooling unit.



GENERAL SERVICE

PRECAUTIONS

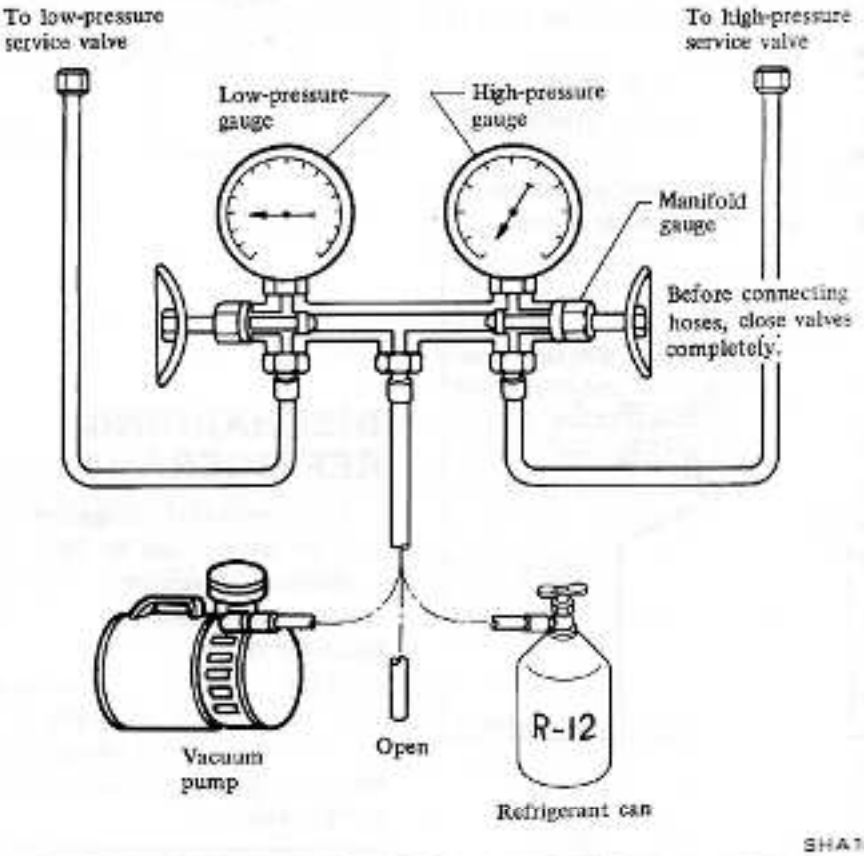
WARNING:

1. **Since direct contact of the liquid refrigerant with your skin will cause frostbite, always be careful when handling the refrigerant. Always wear goggles to protect your eyes when working around the system.**
2. **The refrigerant service container has a safe strength. However, if handled incorrectly, it will explode. Therefore, always follow the instructions on the label. In particular, never store it in a hot location [above 52°C (126°F)] or drop it from a high height.**
3. **The refrigerant gas is odorless and colorless and breathing may become difficult due to the lack of oxygen. Since the refrigerant gas is heavier than air and will lay close to the floor, be especially careful when handling it in small, confined spaces.**
4. **The refrigerant itself is nonflammable. However, a toxic gas (phosgene gas) is produced when it contacts fire and special care is therefore required when checking for leaks in the system with a halide torch.**
5. **Do not steam clean on the system, especially condenser since excessively high pressure will build up in the system, resulting in explosion of the system.**

INSTALLING MANIFOLD GAUGE

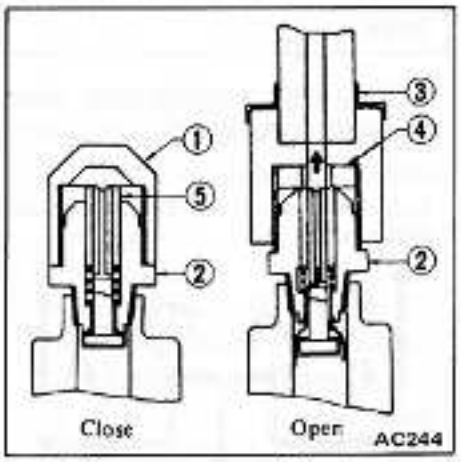
Hoses for the low-pressure service valve (suction valve) and high-pressure service valve (discharge valve) should be connected securely to "high" and "low" connection, respectively, on the manifold gauge.

Refer to identification marks ("S" or "D") on compressor or Refrigerant Lines.



Connection to service valve

1. Fully close both valves of manifold gauge. Connect high- and low-pressure charging hoses to manifold gauge.
2. Remove caps from service valves. Connect high- and low-pressure charging hoses to service valves in system.



1 Cap
2 Service valve
3 Charging hose
4 Packing
5 Check valve

Disconnection from service valve

1. Fully close both [illegible] fold gauge.
2. Quickly [illegible] hoses from service [illegible] caps on service [illegible].

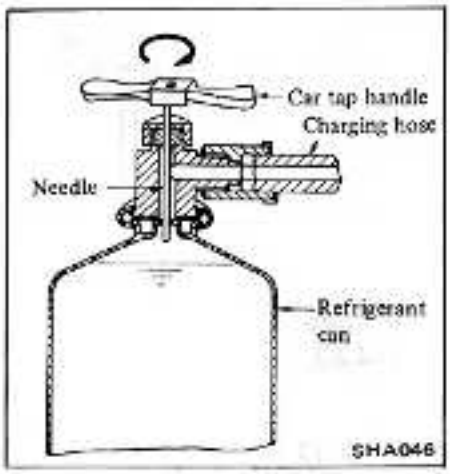
CAUTION:
Do not over-[illegible]

HANDLING REFRIGERANT SERVICE CAN TAP

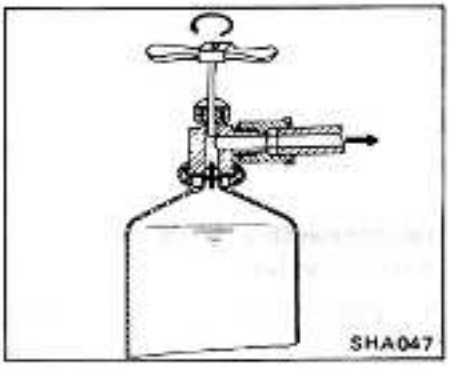
The following procedures apply to conventional can taps.

For correct usage, refer to the manufacturer's instructions.

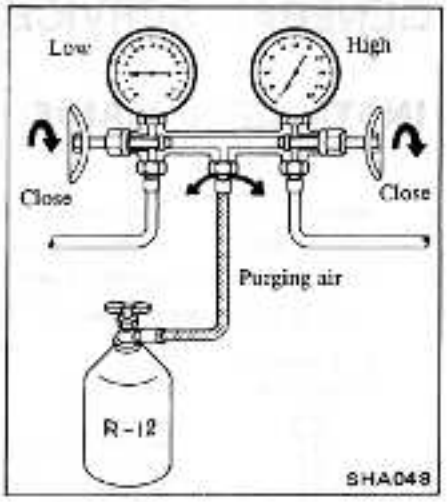
1. Connect charging hose between manifold gauge and can tap.
2. Fully turn in (close) valve stem of manifold gauge.
3. Attach can tap to refrigerant can by turning can tap handle fully counterclockwise.
4. Make a hole in refrigerant can by turning can tap handle clockwise.



5. Turn the handle fully counterclockwise to raise the needle. Refrigerant gas will flow up to the manifold gauge.



6. Purge air from charging hose by loosening charging hose nut at manifold gauge.



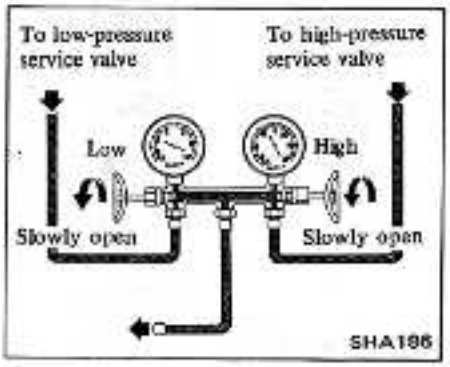
DISCHARGING REFRIGERANT

The pressurized refrigerant gas inside the system must be discharged at a pressure approaching atmospheric pressure prior to evacuating refrigerant inside the system.

1. Close high- and low-pressure valves of manifold gauge fully.
2. Connect two charging hoses of manifold gauge to their respective service vavles.

WARNING:
Securely connect high pressure (discharge) service valve to that of manifold gauge with a hose; also connect low pressure (suction) service valve to that of manifold gauge.

3. Open both manifold gauge valves and discharge refrigerant from system.



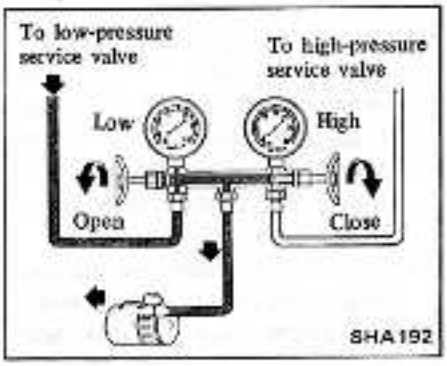
EVACUATING AND CHARGING REFRIGERANT SYSTEM

EVACUATING REFRIGERANT SYSTEM

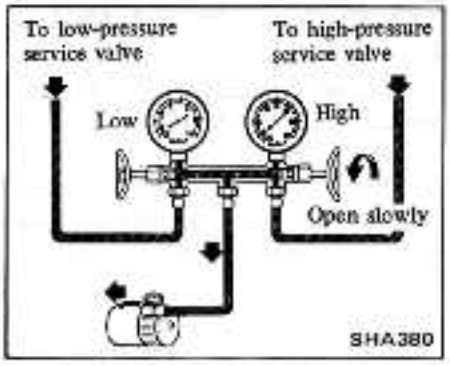
1. Install manifold gauge on system and discharge refrigerant from system until pressure reaches atmospheric pressure.

WARNING:
Securely connect high pressure (discharge) service valve to that of manifold gauge with a hose; also connect low pressure (suction) service valve to that of manifold gauge.

2. Connect center charging hose to vacuum pump.
3. Close both valves of manifold gauge fully. Then start vacuum pump.
4. Open low-pressure valve and suck old refrigerant from system.



5. When low-pressure gauge reading has reached to approximately 66.7 kPa (667 mbar, 500 mmHg, 19.69 inHg), slowly open high-pressure valve.



6. When pressure inside system has dropped to 94.6 kPa (946 mbar, 710 mmHg, 27.95 inHg), fully close both valves of manifold gauge and stop vacuum pump. Let it stand for 5 to 10 minutes in this state and confirm that the reading does not rise.

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.

Elevation m (ft)	Vacuum of system* kPa (mbar, mmHg, inHg)
0 (0)	94.6 (946, 710, 27.95)
300 (1,000)	91.3 (913, 685, 26.97)
600 (2,000)	88.0 (880, 660, 25.98)
900 (3,000)	84.6 (846, 635, 25.00)

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

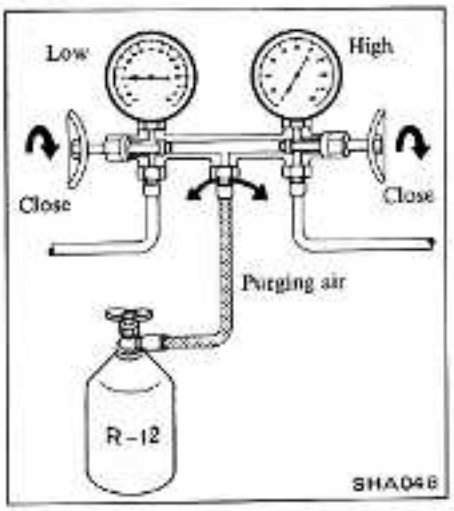
b. The rate of ascension of the low-pressure gauge should be less than 3.3 kPa (33 mbar, 25 mmHg, 0.98 inHg) in five minutes.

If the pressure rises or the specified negative pressure can not be obtained, there is a leak in the system. In this case, repair the leak as described in the following.

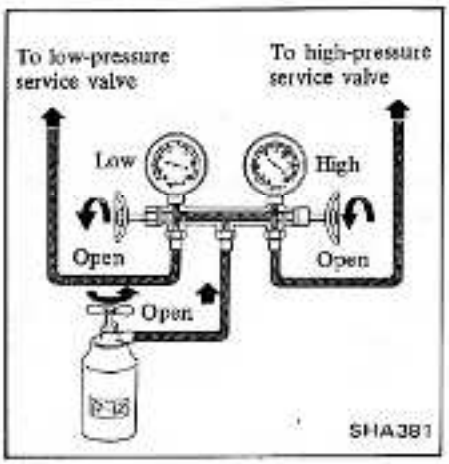
(1) Charge system with a can of refrigerant [about 0.4 kg (0.9 lb)]. Refer to Charging Refrigerant.
(2) Check for refrigerant leakage with a leak detector. Repair any leakages found. Refer to Checking for Leaks (MA section).
(3) Discharge refrigerant again, and then evacuate system.

CHARGING REFRIGERANT SYSTEM

1. Evacuate refrigerant system.
2. Close manifold gauge valves securely and disconnect charging hose from vacuum pump.
3. Purge air from center charging hose.
(1) Connect center charging hose to refrigerant can through can top.
(2) Break seal of refrigerant can and purge air.

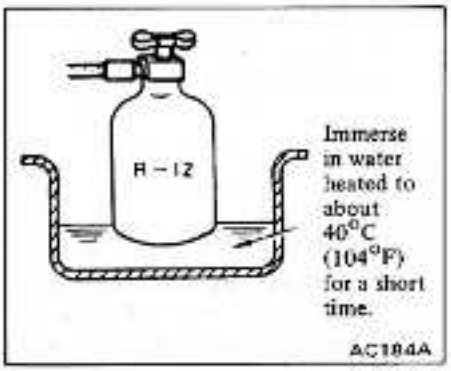


4. Charge refrigerant into system.
(1) In case of charging refrigerant gas
Open high- and low-pressure valves of manifold gauge and charge refrigerant into system.



When refrigerant charging speed is slow, immerse refrigerant can in water, heated to a temperature of about 40°C (104°F), for a short time.

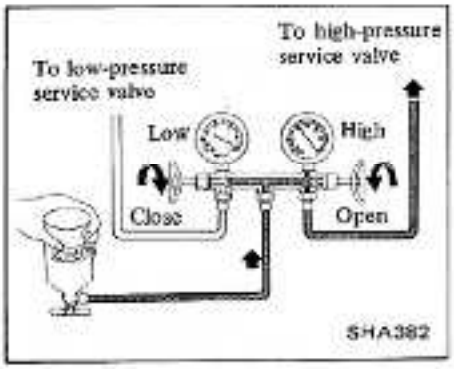
WARNING:
a. Under no circumstances the refrigerant can be warmed in water heated to a temperature of over 52°C (126°F).
b. A blow torch or stove must never be used to warm up the can.



(2) In case of charging liquefied refrigerant

Open high pressure valve of manifold gauge and charge liquefied refrigerant into system with can upside down.

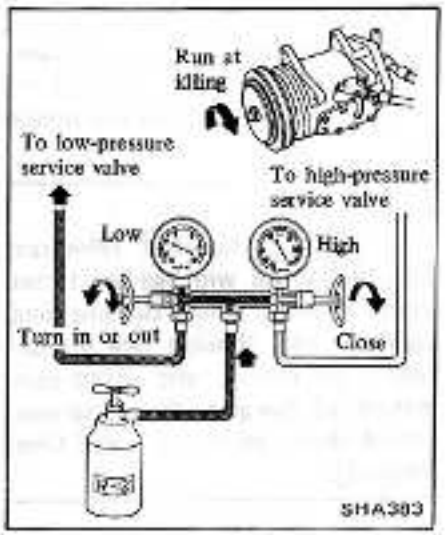
CAUTION:
When charging liquefied refrigerant into the system with the can turned upside down to reduce charging time, charge it only through high pressure (discharge) service valve. After completion of charging, the compressor should always be turned several times manually.



5. **When refrigerant charging speed slows down,** charge it while running the compressor for ease of charging. After having taken the steps up to 3 above, proceed with charging in the following order.
(1) Shut off high pressure valve of manifold gauge.
(2) Run the engine at idling speeds below 1,500 rpm.
(3) Set mode dial, temperature dial and fan lever at maximum cool and speed respectively.

(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.

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.

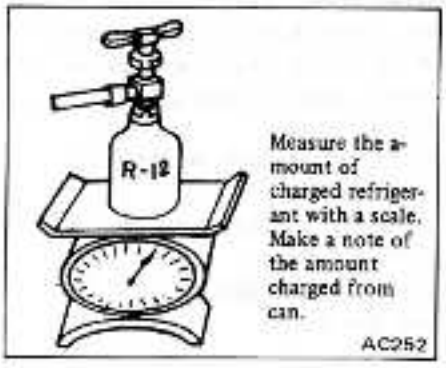


6. When refrigerant can is empty, fully close both valves of manifold gauge and replace refrigerant can with a new one.

Before charging refrigerant from new can, **purge air from inside charging hose.**

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

Refrigerant capacity:
0.9 - 1.1 kg (2.0 - 2.4 lb)



The state of the bubbles in sight glass should only be used for checking whether the amount of charged refrigerant is small or not. Refer to Checking Refrigerant Level (Section MA). The amount of charged refrigerant can be correctly judged by means of discharge pressure.

8. Close manifold gauge valves. Then detach charging hoses from service valves of system. Be sure to install valve cap on service valve.
9. Confirm that there are no leaks in system by checking with a leak detector.

Refer to Checking for Leaks (MA section).

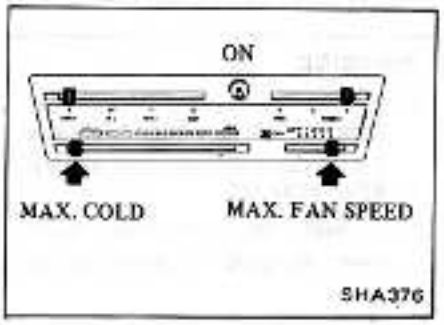
Conducting a performance test prior to removing manifold gauge is a good service operation. Refer to Performance Test.

COMPRESSOR OIL LEVEL CHECK

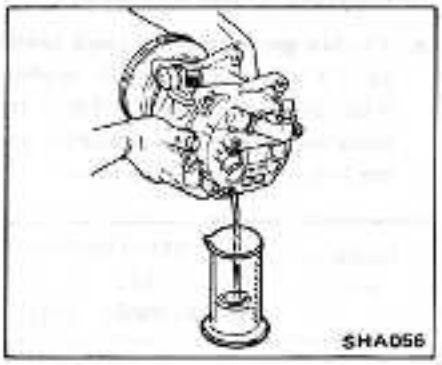
The oil used to lubricate the compressor circulates into the system from the oil sump while compressor is operating. Therefore, to correctly measure compressor oil, the amount of oil flowing in the system must be considered. **If a considerable amount of leakage of refrigerant gas occurs, the leakage of compressor oil is also considered.**

When checking the level of compressor oil or when replacing any component part of the system, use the following service procedure. This helps to return oil to compressor.

1. Operate compressor at engine idling speed (1,000 rpm or below), with controls set for maximum cooling and high blower speed, for 20 to 30 minutes in order to return compressor oil to compressor.



2. Stop the engine and discharge refrigerant of system and then remove compressor from the car.
3. Remove compressor drain plug. Drain compressor oil from compressor oil sump and **measure the amount.**



Residual oil level:

Unit: mℓ (Imp fl oz)

SWP167 (HITACHI-make, L.H. drive)	167 AXIAL (DKC-make, R.H. drive)
160 - 190 (5.6 - 6.7)	190 - 220 (6.7 - 7.7)

4. If the amount is less than the above, refrigerant may have leaked. Conduct leak tests on connections of each system, and if necessary repair or replace faulty parts.
5. Check the purity of the oil. If the oil contains chips or other foreign material, clean oil sump with new oil.
6. Discard the used oil and fill with the same amount of new oil as was drained and measured when removing compressor. Add oil to the minimum level if level is less than the residual oil level.

PERFORMANCE TEST

PERFORMANCE CHART

TEST CONDITION

Testing must be performed as follows.

Car location:	Indoors or in the shade (outside wind velocity: Less than 2 m (7 ft)/sec.)
Doors:	Closed
Door window:	Open
Hood:	Open
MODE dial:	Max. COLD position
TEMP dial:	Max. COLD position
FAN lever:	4 positions
Engine speed:	1,500 rpm (constant)
Manifold gauge:	Connect manifold gauge to high (discharge) and low (suction) service valves.
Measurement of discharge air temperature:	Center outlet grille
Measurement of inside air relative humidity and temperature:	Blower assembly inlet
Measurement of ambient air relative humidity and temperature:	A point 1 m (3 ft) in front of condenser

TEST READING

Inside air (Recirculating air) at blower assembly inlet		Discharge air temperature at center ventilator °C(°F)
Relative humidity %	Air temperature °C (°F)	
40 - 50	15 (59)	4.5 - 5.2 (40 - 41)
	20 (68)	6.5 - 7.5 (44 - 46)
	25 (77)	8.7 - 9.8 (48 - 50)
	30 (86)	10.8 - 12.2 (51 - 54)
	35 (95)	12.9 - 14.5 (55 - 58)
	40 (104)	15.0 - 17.0 (59 - 63)
50 - 60	15 (59)	5.2 - 5.8 (41 - 42)
	20 (68)	7.5 - 8.5 (46 - 47)
	25 (77)	9.8 - 11.0 (50 - 52)
	30 (86)	12.2 - 13.5 (54 - 56)
	35 (95)	14.5 - 16.2 (58 - 61)
	40 (104)	17.0 - 18.9 (63 - 66)
60 - 70	15 (59)	5.8 - 6.5 (42 - 44)
	20 (68)	8.5 - 9.4 (47 - 49)
	25 (77)	11.0 - 12.3 (52 - 54)
	30 (86)	13.5 - 15.2 (56 - 59)
	35 (95)	16.2 - 18.2 (61 - 65)
	40 (104)	18.9 - 21.1 (66 - 70)
70 - 80	15 (59)	6.5 - 7.1 (44 - 45)
	20 (68)	9.4 - 10.3 (49 - 51)
	25 (77)	12.3 - 13.7 (54 - 57)
	30 (86)	15.2 - 17.0 (59 - 63)
	35 (95)	18.2 - 20.2 (65 - 68)
	40 (104)	21.1 - 23.5 (70 - 74)
80 - 90	15 (59)	7.1 - 7.9 (45 - 46)
	25 (68)	10.3 - 11.5 (51 - 53)
	30 (77)	13.7 - 15.0 (57 - 59)
	35 (86)	17.0 - 18.6 (63 - 65)
	40 (95)	20.2 - 22.2 (68 - 72)
	45 (104)	23.5 - 26.0 (74 - 79)

Ambient air		Pressure high (Discharge side) kPa (bar, kg/cm^2, psi)	Pressure low (Suction side) kPa (bar, kg/cm^2, psi)
Relative humidity %	Temperature °C (°F)		
40 - 65	15 (59)	500 - 657 (5.00 - 6.57, 5.1 - 6.7, 73 - 95)	93.2 - 981 (0.932 - 0.981, 0.95 - 1.00, 13.5 - 14.2)
	20 (68)	755 - 834 (7.55 - 8.34, 7.7 - 8.5, 109 - 121)	103.0 - 112.8 (1.030 - 1.128, 1.05 - 1.15, 14.9 - 16.4)
	25 (77)	922 - 1,010 (9.22 - 10.10, 9.4 - 10.3, 134 - 146)	122.6 - 137.3 (1.226 - 1.373, 1.25 - 1.40, 17.8 - 19.9)
	30 (86)	1,079 - 1,196 (10.79 - 11.96, 11.0 - 12.2, 156 - 173)	142.2 - 156.9 (1.422 - 1.569, 1.45 - 1.60, 20.6 - 22.8)
	35 (95)	1,245 - 1,373 (12.45 - 13.73, 12.7 - 14.0, 181 - 199)	156.9 - 176.5 (1.569 - 1.765, 1.60 - 1.80, 22.8 - 25.6)
	40 (104)	1,393 - 1,550 (13.93 - 15.50, 14.2 - 15.8, 202 - 225)	176.5 - 196.1 (1.765 - 1.961, 1.80 - 2.00, 25.6 - 28.4)
65 - 90	15 (59)	657 - 726 (6.57 - 7.26, 6.7 - 7.4, 95 - 105)	98.1 - 112.8 (0.981 - 1.128, 1.00 - 1.15, 14.2 - 16.4)
	20 (68)	834 - 922 (8.34 - 9.22, 8.5 - 9.4, 121 - 134)	112.8 - 132.4 (1.128 - 1.324, 1.15 - 1.35, 16.4 - 19.2)
	25 (77)	1,010 - 1,118 (10.10 - 11.18, 10.3 - 11.4, 146 - 162)	137.3 - 152.0 (1.373 - 1.520, 1.40 - 1.55, 19.9 - 22.0)
	30 (86)	1,196 - 1,314 (11.96 - 13.14, 12.2 - 13.4, 173 - 191)	156.9 - 171.6 (1.569 - 1.716, 1.60 - 1.75, 22.8 - 24.9)
	35 (95)	1,372 - 1,510 (13.72 - 15.10, 14.0 - 15.4, 199 - 219)	176.5 - 196.1 (1.765 - 1.961, 1.80 - 2.00, 25.6 - 28.4)
	40 (104)	1,550 - 1,716 (15.50 - 17.16, 15.8 - 17.5, 225 - 249)	196.1 - 220.7 (1.961 - 2.207, 2.00 - 2.25, 28.4 - 32.0)

a. The pressure will change in the following manner with changes in conditions:

- **When blower speed is low, discharge pressure will drop.**
- **When the relative humidity of intake air is low, discharge pressure will drop.**

b. The temperature will change in the following manner with changes in conditions:

When the ambient air temperature is low, the outlet air temperature will become low.

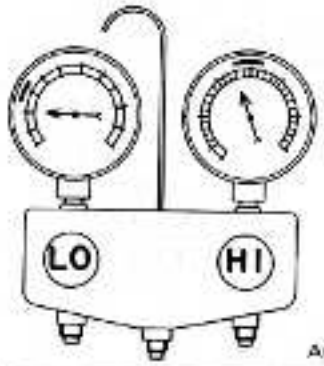
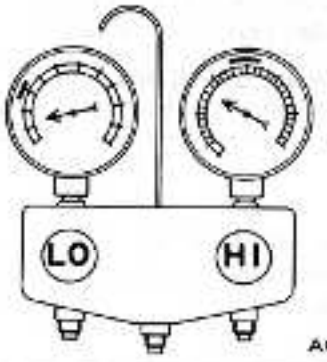
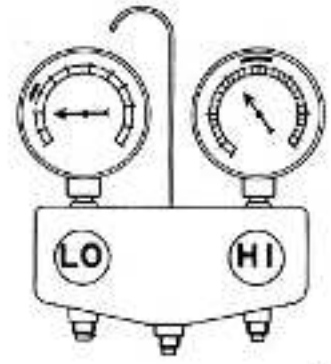
If the test reveals that there is any abnormality in system pressure, isolate the cause and repair. Refer to Performance Test Diagnoses.

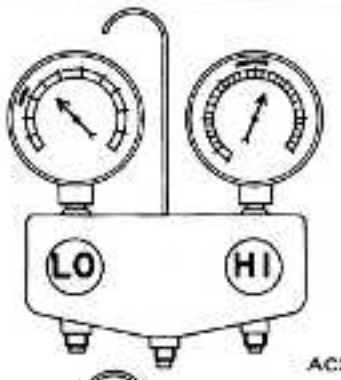
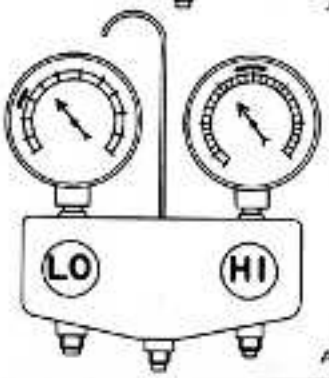
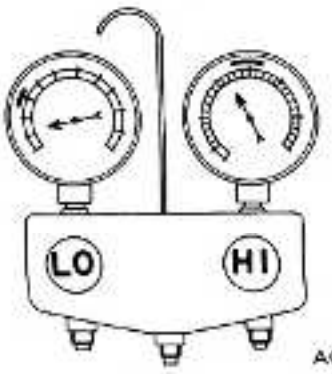
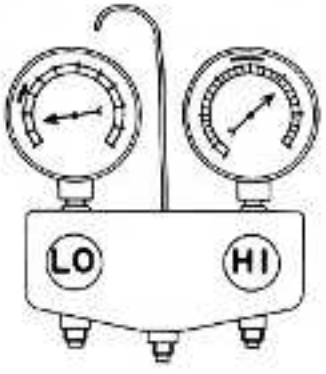
PERFORMANCE TEST DIAGNOSES

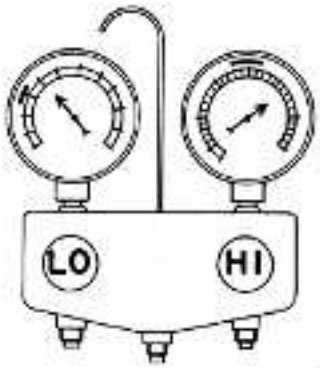
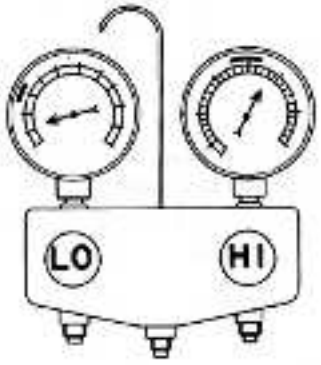
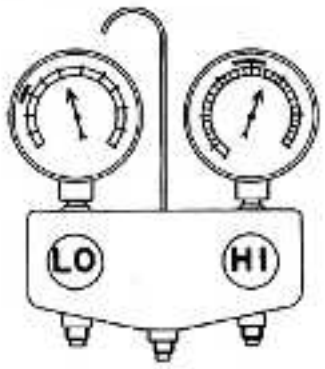
Characteristics revealed on the manifold gauge reading for the air conditioning system are shown in the following.

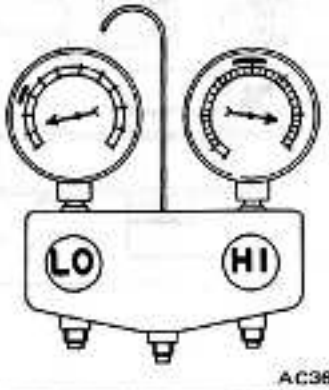
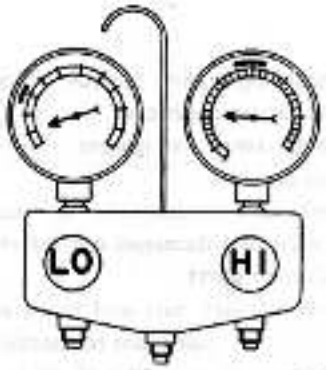
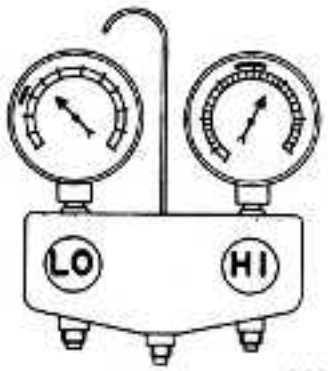
As to the method of a performance test, refer to the item of "Performance Test".

In the following table, the portion smeared with ink on each gauge scale indicates a range based on the assumption 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 small, or leaking a little.	1. Leak test. 2. Repair leak. 3. Charge system. **Evacuate, as necessary, and recharge system.**
ALMOST NO REFRIGERANT  AC353A No cooling action. In sight glass appear a lot of bubbles or something like mist.	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.
FAULTY EXPANSION VALVE  AC354A Sight cooling. Sweating or frosted 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.

Condition		Probable cause	Corrective action
 AC355A	Insufficient cooling. Sweated 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. Sweating or frosted suction line.	Faulty expansion valve.	1. Discharge system. 2. Replace valve. 3. Evacuate and replace system.
FAULTY SUCTION THROTTLE VALVE  AC357A	Insufficient cooling. Frosted evaporator.	Suction throttle valve is inoperative.	1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.
 AC358A	Insufficient cooling.	Suction throttle valve restricts refrigerant flow.	1. Discharge system. 2. Replace valve. 3. Evacuate and charge system.

Condition	Probable cause	Corrective action
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 operation for a while, pressure on suction side may show vacuum pressure reading. During this condition, discharge air will be warm. As a warning of this, reading shows 39 kPa (0.39 bar, 0.4 kg/cm^2, 6 psi) vibration.	Drier is saturated with moisture. Moisture has frozen at expansion valve. Refrigerant flow is restricted.	1. Discharge system. 2. Replace receiver drier (twice if necessary). 3. Evacuate system completely. (Repeat 30-minute evacuating three times.) 4. Recharge system.
FAULTY 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 for dirt accumulation. • Check engine cooling system for overheat. • Check for refrigerant overcharge. **If pressure remains high in spite of all above actions taken, remove and inspect the condenser for possible oil clogging.**

Condition	Probable cause	Corrective action
HIGH PRESSURE LINE BLOCKED  AC382A 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.
FAULTY 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.
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 Oil Level Check for correcting oil level.

SERVICE PROCEDURE

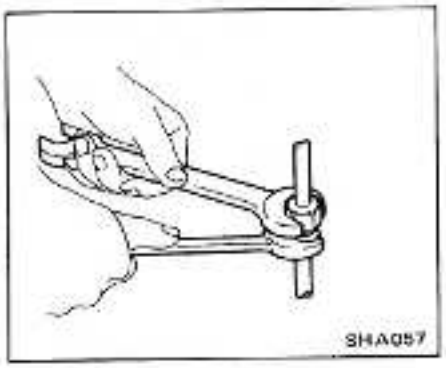
PRECAUTIONS FOR REMOVAL AND INSTALLATION

When replacing refrigerant cycle components, observe the following:

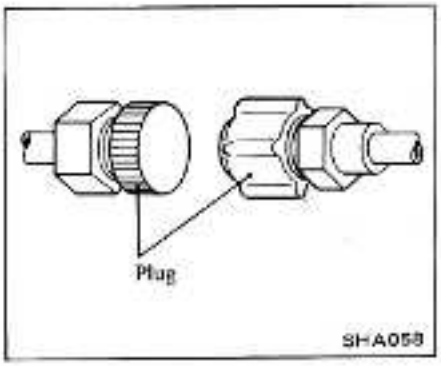
1. Disconnect battery ground cable.
2. Before starting work, be sure to discharge system.

WARNING:
Gradually loosen discharge side hose fitting, and remove it after remaining pressure has been released.

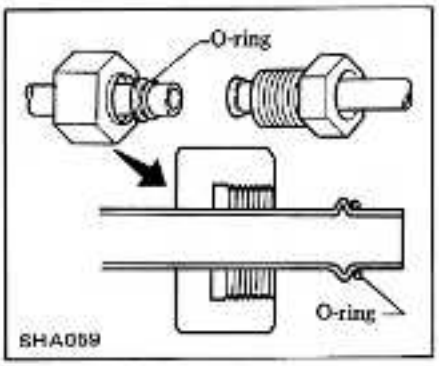
3. When disconnecting or connecting tubes, be sure to use two wrenches on both tubes.



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



5. Compressed air must never be used to clean dirty line. Clean with refrigerant gas.
6. When connecting tubes, install new O-ring (never reuse used one) into connection and be sure to apply compressor oil to seating surface and O-ring.



7. Check tightening torque of connections to specification.
8. Make sure refrigerant line is clamped securely.

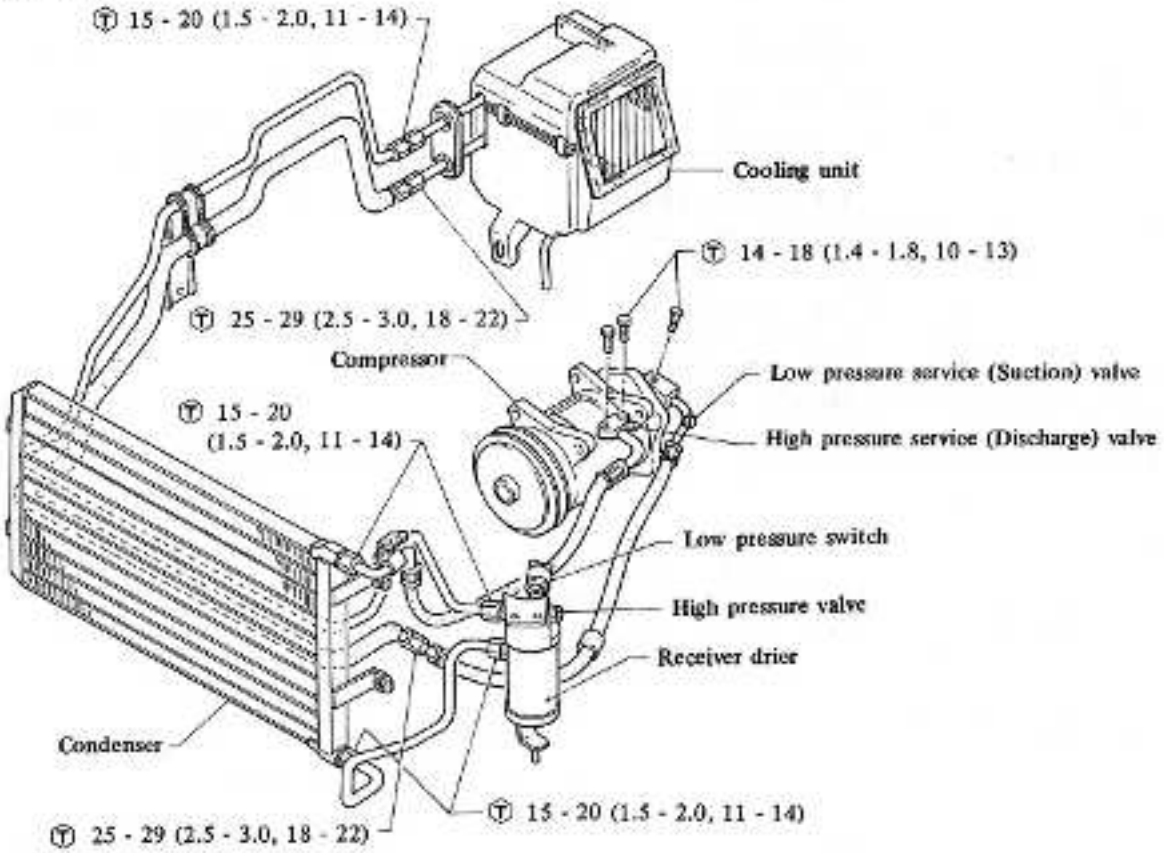
Check all components to insure they are neither damaged nor interfere with adjacent parts.

9. Conduct leak test and make sure that there is no leak from connections.
10. Determine quantity of oil to be charged into compressor by referring to Compressor Oil Level. Check in General Service.

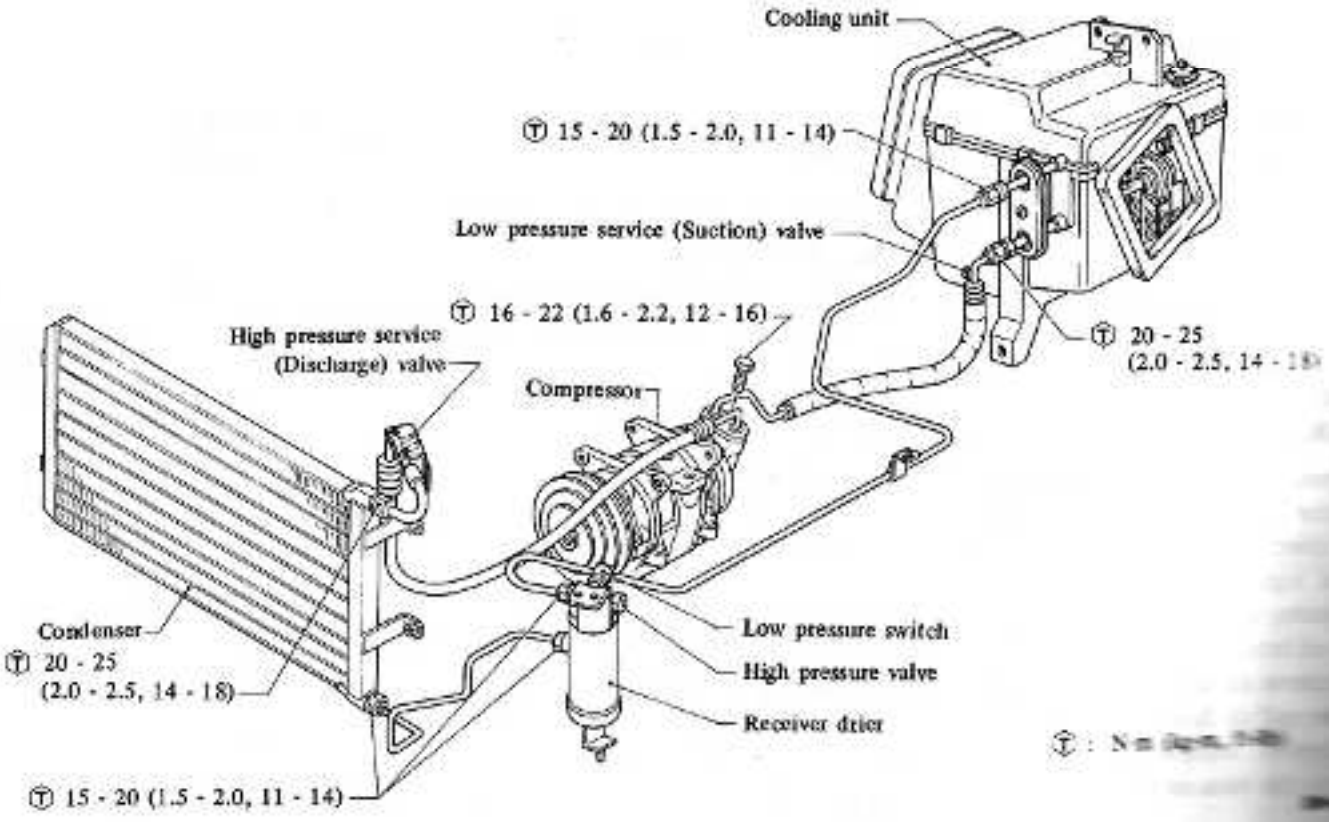
REFRIGERANT LINES

L.H. drive model

Install new O-ring into each connection of tubes.

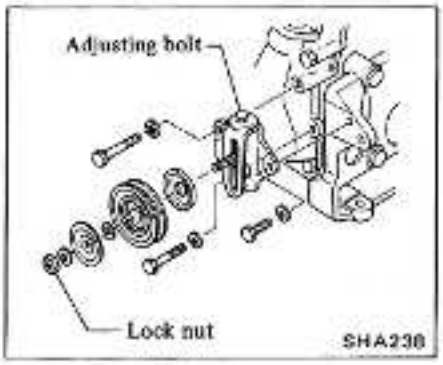


R.H. drive model



Ⓣ : N·m (kg-m, ft-lb)

COMPRESSOR IDLER PULLEY

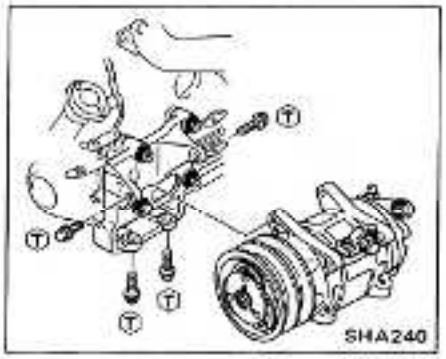


REMOVAL AND INSTALLATION

1. Loosen idler pulley lock nut and fully loosen adjusting bolt.
2. Remove drive belt.
3. Remove idler pulley assembly.
4. Installation is in the reverse order of removal.

Refer to checking and Adjusting Drive Belts (Section MA) for drive belt tension.

COMPRESSOR



Ⓣ: 44 - 54 N·m (4.5 - 5.5 kg-m, 33 - 40 ft-lb)

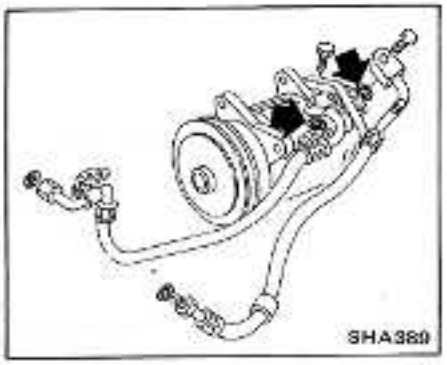
REMOVAL AND INSTALLATION

1. Operate compressor, if possible, at engine idling speed with air conditioner controls set for maximum cooling and high blower speed, for 10 to 15 minutes with all windows open to return oil into compressor.
2. Remove air duct between throttle chamber and air flow meter.
3. Remove compressor drive belt. Refer to the item on Compressor Idler Pulley.
4. Disconnect compressor clutch harness.
5. Remove compressor with its clutch facing up.

CAUTION:
Do not attempt to leave the compressor on its side or upside down for more than 10 minutes, as the compressor oil will enter the low pressure chambers. If, under that condition, compressor should be operated suddenly, internal damage would result. To expel oil from chambers, hand-crank compressor several times in its installed condition.

6. Installation is in the reverse order of removal.

When connecting high and low flexible hoses to compressor, install new O-ring into connection.



CONDENSER

REMOVAL AND INSTALLATION

1. Remove radiator grille.
2. Remove stay for hood lock support.
3. Disconnect refrigerant lines from condenser.
4. Remove condenser.
5. Installation is in the reverse order of removal.

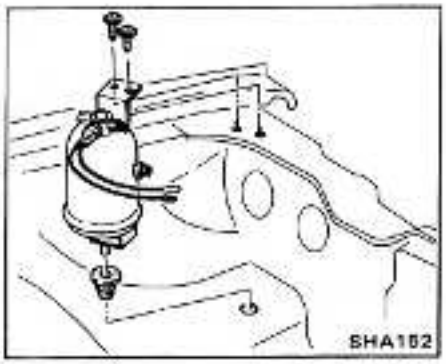
INSPECTION

Inspect joints of inlet and outlet pipes for cracks and scratches. Upon finding any problem which may cause gas to leak, repair or replace condenser.

Condenser fins or air passages clogged with dirt, insects or leaves will reduce cooling efficiency of condenser. In such a case, clean fins or air passages with compressed air.

CAUTION:
Do not clean condenser with steam. Be sure to use cold water or compressed air.

RECEIVER DRIER (Liquid tank)



REMOVAL AND INSTALLATION

1. Disconnect refrigerant line from receiver drier.

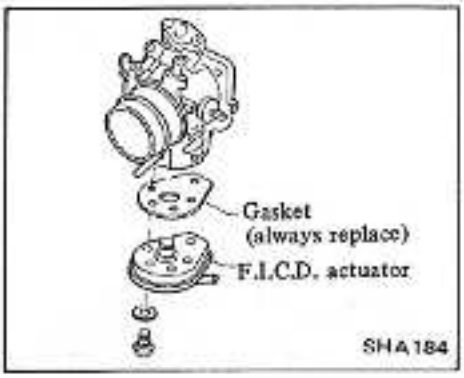
CAUTION:
Plug all openings to prevent entrance of dirt and moisture into receiver drier.

2. Disconnect harness for low pressure switch.
3. Remove receiver drier.
4. Installation is in the reverse order of removal.

INSPECTION

Check receiver drier for leaks or damage. If necessary, replace.

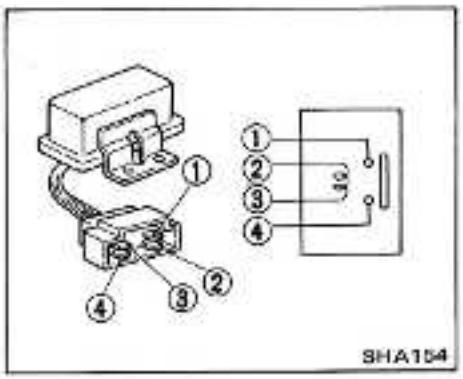
FAST IDLE CONTROL DEVICE (F.I.C.D.)



INSPECTION

Refer to Trouble Diagnoses and Corrections.

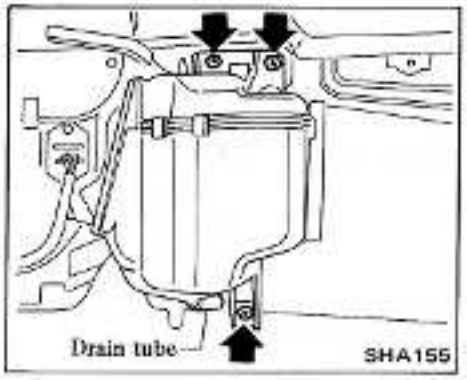
COOLER RELAY



COOLING UNIT

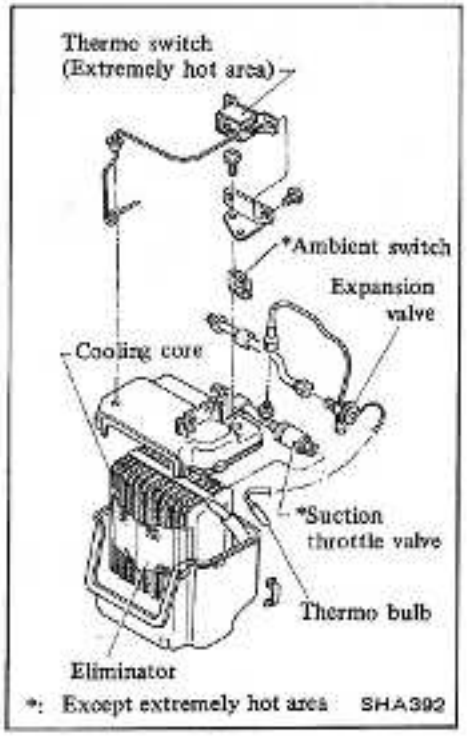
REMOVAL AND INSTALLATION

1. Remove instrument lower cover and cluster lid.
2. Disconnect refrigerant lines and harness from cooling unit.
3. Remove cooling unit with drain tube.



4. Installation is in the reverse order of removal.

DISASSEMBLY AND ASSEMBLY



1. Pull out capillary tube end from cooling core (extremely hot area).
2. Remove clips fixing upper case to lower case.
3. Withdraw evaporator assembly.
4. Assembly is in the reverse order of disassembly.

INSPECTION

Case

Check for cracked or deformed case.

Evaporator assembly

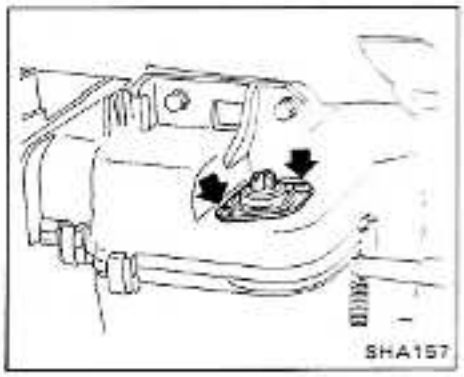
1. Clean fins and check for corrosion. If fins are corroded, replace.

CAUTION:
Do not clean evaporator with steam. Be sure to use cold water or compressed air.

2. Check for gas leaks at expansion valve and suction throttle valve. If there are leaks, retighten or replace the defective part with a new assembly.

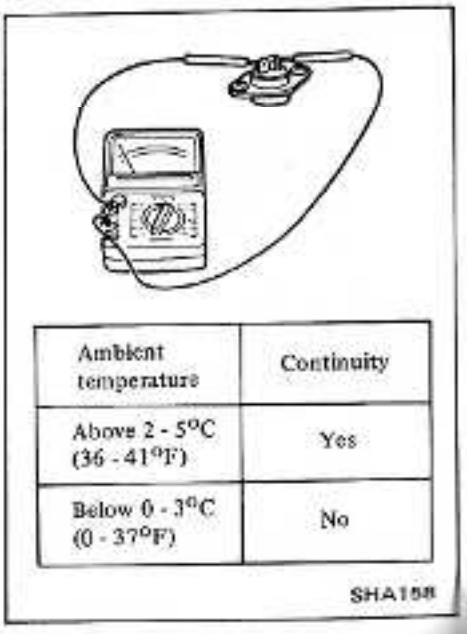
AMBIENT SWITCH (Except extremely hot area)

REMOVAL AND INSTALLATION



1. Remove instrument lower cover and cluster lid.
2. Disconnect harness connector and remove ambient switch.
3. Installation is in the reverse order of removal.

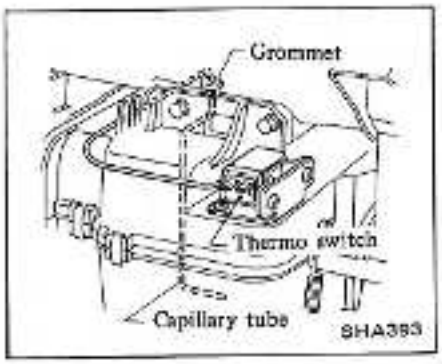
INSPECTION



Ambient temperature	Continuity
Above 2 - 5°C (36 - 41°F)	Yes
Below 0 - 3°C (0 - 37°F)	No

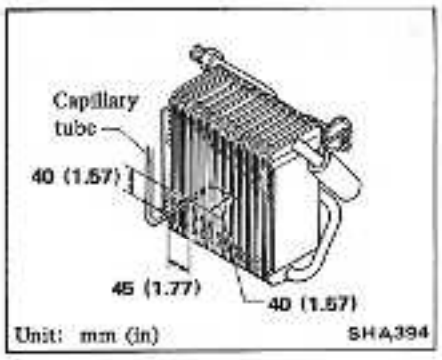
THERMO SWITCH (Extremely hot area)

REMOVAL AND INSTALLATION

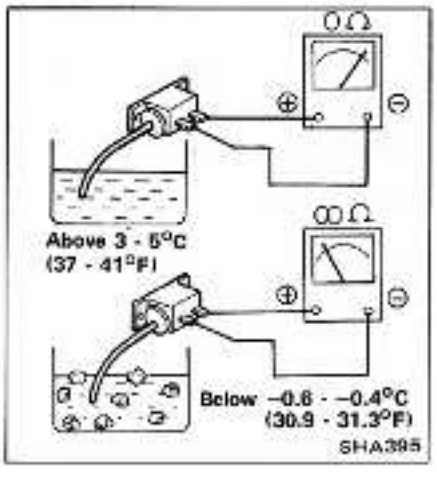


1. Remove cooling unit.
Refer to Cooling Unit.
2. Pull out capillary tube end from cooling core.
3. Remove thermo switch with capillary tube.
4. Installation is in the reverse order of removal.

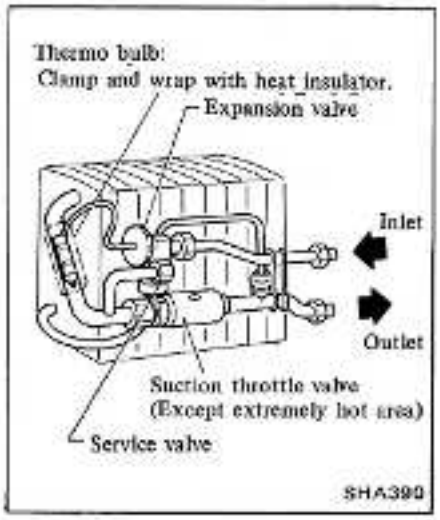
Capillary tube end should be inserted into cooling core up to a 40 mm (1.57 in) depth.



INSPECTION



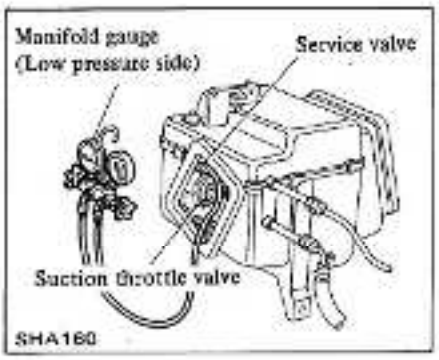
EXPANSION VALVE AND SUCTION THROTTLE VALVE



Do not disassemble valves. If necessary, replace as assembly.

INSPECTION

Suction throttle valve (S.T.V.)



1. Remove blower unit.
2. Connect manifold gauge hose of low pressure side with service valve on S.T.V.
3. Temporarily install blower unit.
4. Set air conditioner "ON" and fan lever at "1" position.
5. Run engine at 3,000 to 3,500 rpm under no load and check manifold gauge pressure (S.T.V. operating pressure).

S.T.V. operating pressure:
196 ± 2.5 kPa (1.96 ± 0.025 bar, 2.0 ± 0.025 kg/cm^2, 28 ± 0.36 psi) (gauge pressure)

CAUTION:
On automatic transmission equipped models, set select lever at "N" position and depress brake pedal to prevent car from moving.

AIR CONDITIONER CONTROL ASSEMBLY

REMOVAL AND INSTALLATION

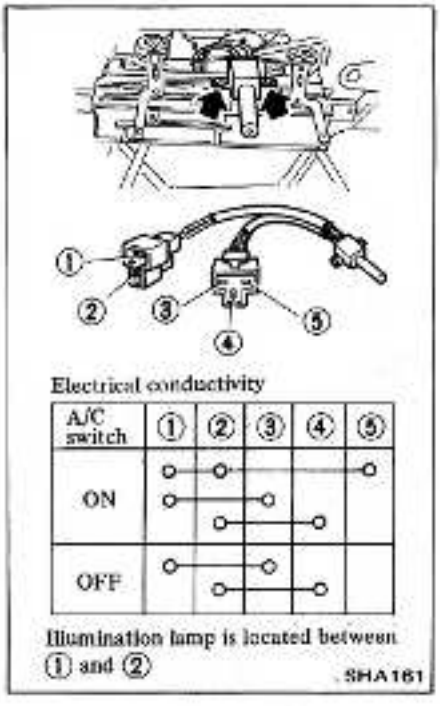
Refer to Heater Control Assembly.

INSPECTION

Fan switch

Refer to Fan Switch in Heater.

Air conditioner switch



BLOWER UNIT

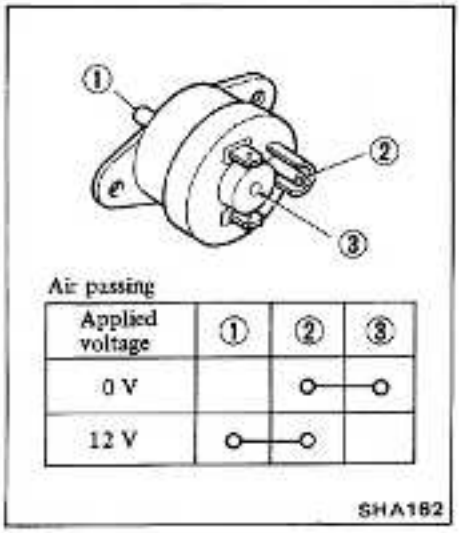
Refer to Blower Unit in Heater.

RESISTOR

Refer to Resistor in Heater.

F.I.C.D. MAGNET VALVE

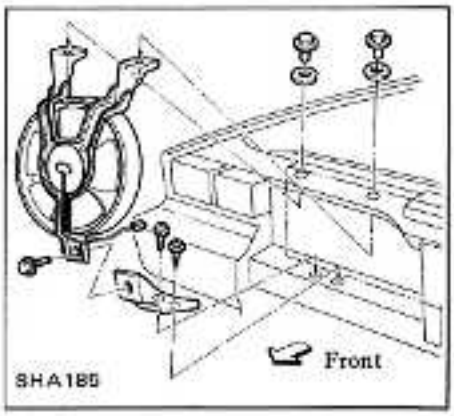
INSPECTION



Air passing

Applied voltage	①	②	③
0 V		○—○	
12 V	○—○		

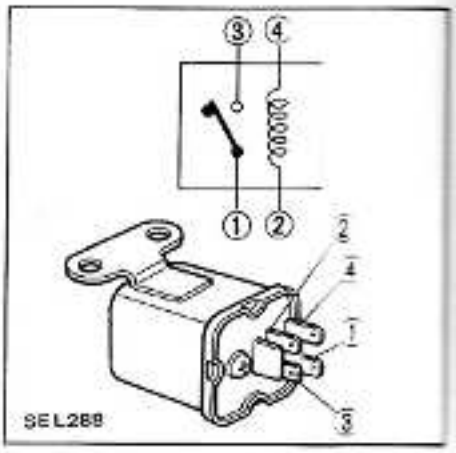
CONDENSER MOTOR (Extremely hot area)



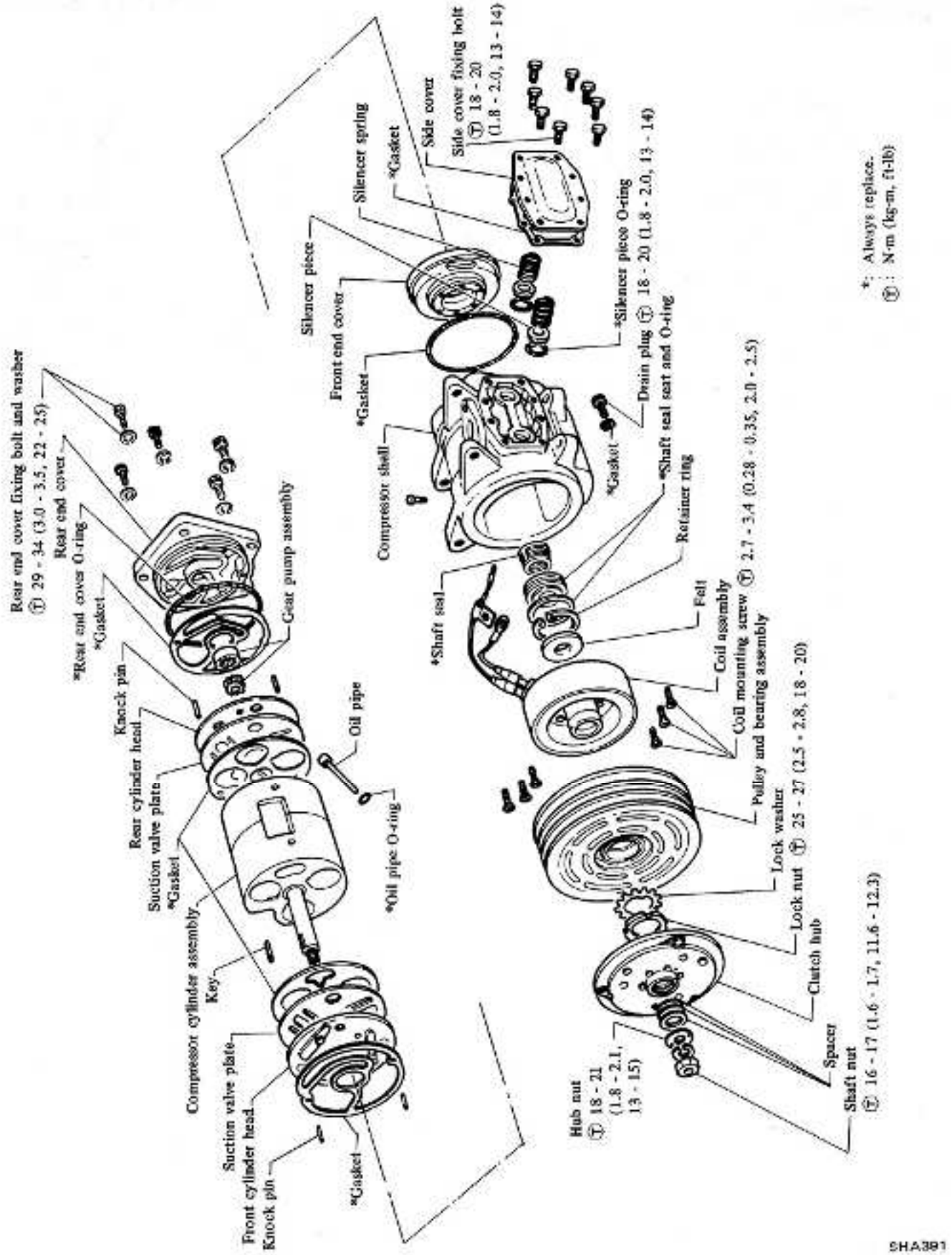
REMOVAL

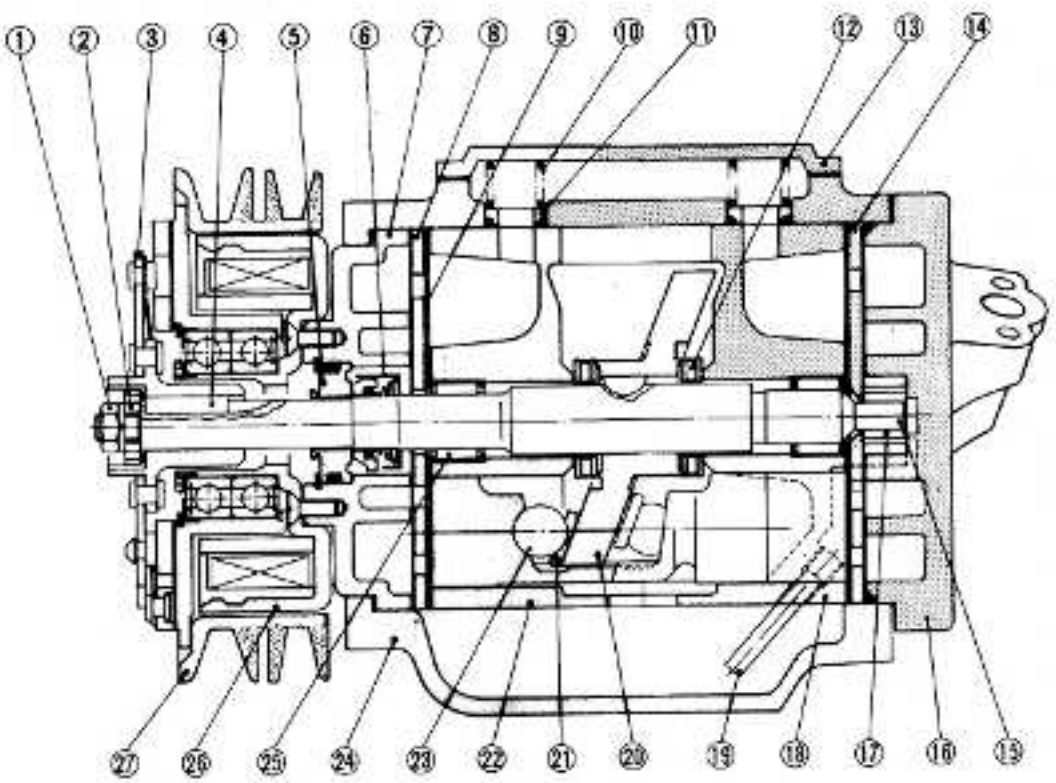
Fan motor can be removed without removing any other parts.

CONDENSER MOTOR RELAY (Extremely hot area)



COMPRESSOR-MODEL SWP167 (HITACHI make-L.H. drive model)





1 Shaft nut
2 Hub nut
3 Clutch hub
4 Key
5 Shaft seal seat
6 Shaft seal
7 Front end cover
8 Front cylinder head
9 Suction valve plate
10 Silencer spring
11 Silencer piece
12 Thrust bearing
13 Side cover
14 Rear cylinder head
15 Compressor shaft
16 Rear end cover
17 Oil pump
18 Rear cylinder
19 Oil pipe
20 Swash plate
21 Shoe disc
22 Front cylinder
23 Drive ball
24 Shell
25 Needle bearing
26 Clutch coil
27 Pulley and bearing assembly

SHA164

PRECAUTIONS

1. **Plug all openings** in compressor to prevent from entering of moisture and foreign matter.
2. **Do not leave the compressor on its side or upside down for more than 10 minutes, as the lubricating oil will enter the low pressure chambers.** If, under that condition, compressor should be operated suddenly, internal damage would result. To expel oil from chambers, hand-crank compressor several times in its installed condition.
3. **Before replacing with the new compressor, completely drain oil from the new compressor and fill with an amount of oil equaling that remaining in the old compressor.**
4. When replacing parts or oil, **always replace gaskets, O-ring and oil seal with new ones.**
5. When storing a compressor, be sure to fill it with refrigerant to prevent rusting. Add refrigerant at the low pressure side and purge air at the high pressure side.

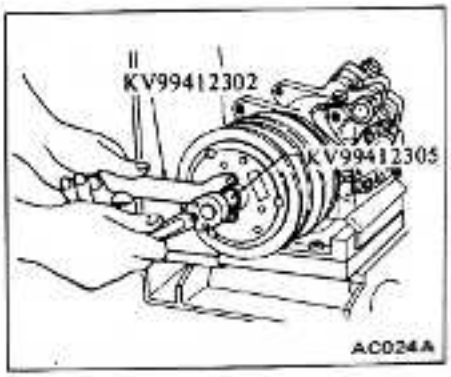
COMPRESSOR CLUTCH

The most common problem is clutch slippage. Service procedures are listed below. Exercise care.

1. Clearance between clutch hub and pulley should be 0.5 to 0.8 mm (0.020 to 0.031 in) at all peripheral points.
2. Make sure that there is no oil or dirt on friction surfaces of clutch disc (clutch hub) and pulley. Remove any oil or dirt with a dry rag.
3. Make sure that terminal voltage at magnetic coil is above 10.5V.

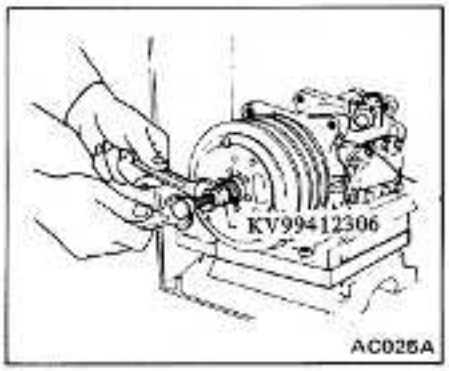
REMOVAL

1. Using Tool KV99412302, hold clutch hub. With suitable socket wrench, remove shaft nut from shaft.
2. Then, using Tool, remove clutch hub nut. Remove spacers.

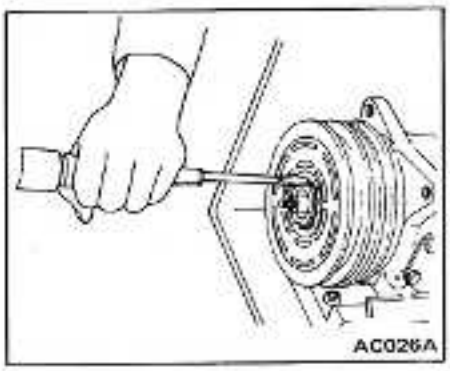


AC024A

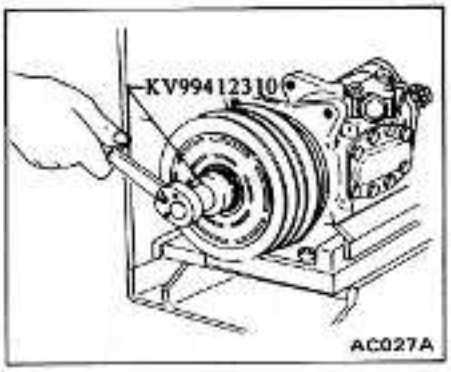
3. Using Tool, remove clutch hub. Thread tool into the bore of clutch hub, hold tool with wrench, and then thread in center bolt.



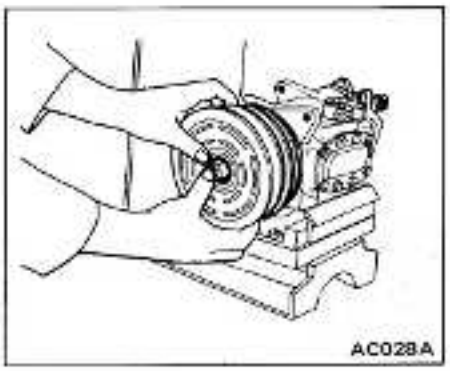
4. With an ordinary screwdriver, flatten lock washer tab.



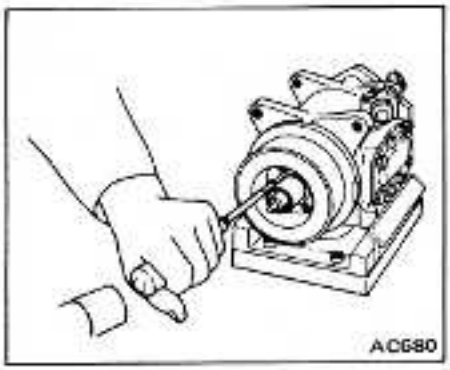
5. Using Tool, loosen lock nut. Remove lock nut and lock washer.



6. Remove pulley and bearing assembly. When the assembly can not be removed by hand, use a puller, Tool KV99412313 and Tool KV99412312.



7. Using an impact tool, loosen six coil mounting screws. Use of the impact tool is advisable as screws have been calked.



8. Remove coil mounting screws and separate coil assembly.

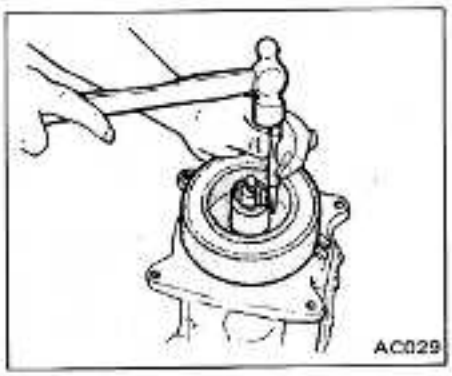
INSPECTION

1. Check the friction surfaces of the clutch for damage due to excessive heat, or excessive grooving due to slippage. If necessary, replace coil, pulley and bearing assembly, and clutch hub as a set.
2. Oil or dirt on the friction surfaces should be cleaned with a suitable solvent and a dry rag.
3. Check coil for shorted or opened binding leads.

INSTALLATION

1. Using a Phillips screwdriver, tighten coil assembly mounting screws in an alternating pattern. After screws have been firmly tightened, punchlock each at one location to prevent loosening.

Ⓣ : **Coil mounting screw**
2.7 - 3.4 N·m
(0.28 - 0.35 kg-m,
2.0 - 2.5 ft-lb)



2. Using a plastic mallet, drive pulley and bearing assembly onto the neck of the installed coil assembly. Turn the pulley, making sure that there is no noise and that rotation is free. Also make sure that there is no pulley play.
3. Position lock washer and lock nut in place. Using Tool KV99412310, tighten lock nut firmly. With lock washer tab and lock nut cutouts matched, bend the tab with the screwdriver. Proceed carefully to avoid bearing cage damage.

Ⓣ : **Lock nut**
25 - 27 N·m
(2.5 - 2.8 kg-m,
18 - 20 ft-lb)

4. Fit key and clutch hub to the shaft. Select adjusting spacer which gives the correct clearance between the pulley and clutch hub.

Ⓣ : **Hub nut**
18 - 21 N·m
(1.8 - 2.1 kg-m,
13 - 15 ft-lb)

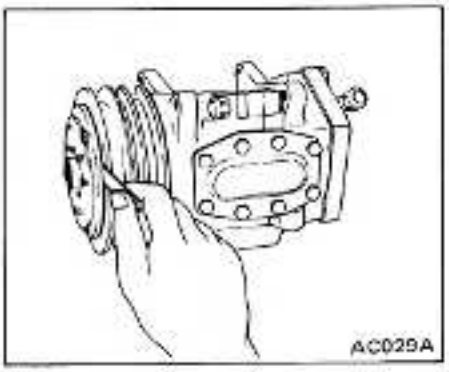
5. Tighten shaft nut with locking agent in place.

Ⓣ : **Shaft nut**
16 - 17 N·m
(1.6 - 1.7 kg-m,
11.6 - 12.3 ft-lb)

6. Using a thickness gauge, measure the clutch hub-to-pulley clearance.

Hub-to-pulley clearance:
0.5 - 0.8 mm
(0.020 - 0.031 in)

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

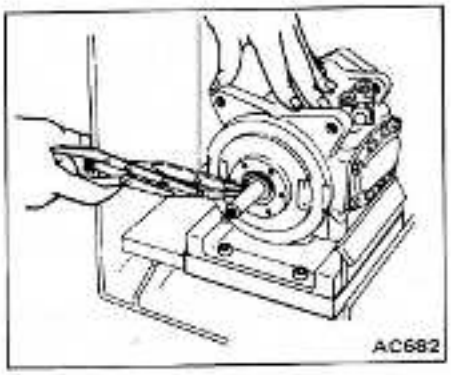


When replacing compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch some thirty times. Break-in operation raises the level of transmitted torque.

SHAFT SEAL

REMOVAL

1. Remove drain plug, thereby draining the oil.
2. Remove clutch hub, pulley and bearing assembly, and coil assembly. Proceed according to information under "Compressor Clutch".
3. Using snap ring pliers, compress and remove retainer ring.



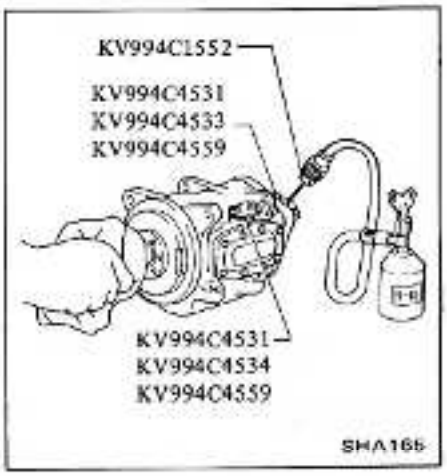
4. To remove shaft seal seat, proceed as follows:

(1) Plug high (discharge) and low (suction) pressure openings of compressor using Tool KV994C4548 or blind cover and gasket which are installed on service compressor.

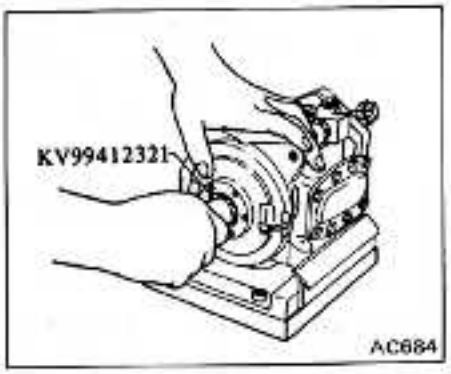
(2) Connect charging hose to refrigerant can. Install Tool KV994C1552 to other end of charging hose and insert it into hole in middle of blind cover at low pressure side.

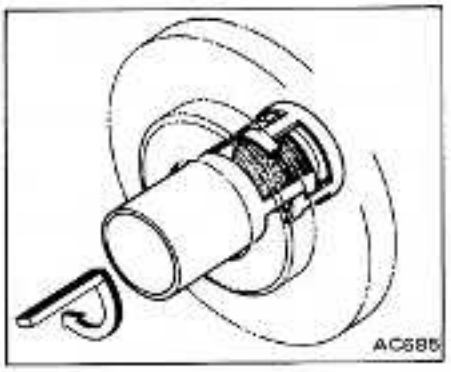
5. Wrap shaft end with rag. Apply refrigerant pressure of 196 to 490 kPa (1.96 to 4.90 bar, 2 to 5 kg/cm^2, 28 to 71 psi) through low pressure line of compressor until shaft seal seat is received at rag.

CAUTION:
a. Do not use air to prevent entry of moisture, dust, etc.
b. If shaft seal seat is not plucked out, install it again and apply refrigerant pressure.



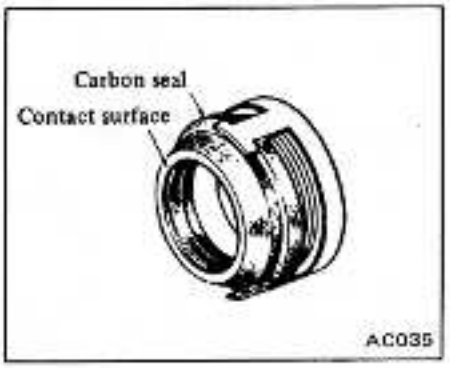
6. Insert Tool through the open end of front end cover. Depress the carbon seal and hook the tool at the case projection of shaft seal. Slowly pull out the tool, thereby removing shaft seal.



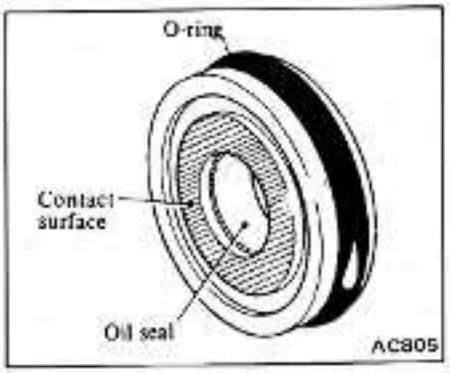


INSPECTION

1. Check the carbon seal surface of shaft seal for damage.



2. Check O-ring and the carbon seal contact surface of shaft seal seat for damage. Make sure that O-ring contact surface at front end cover is not damaged.



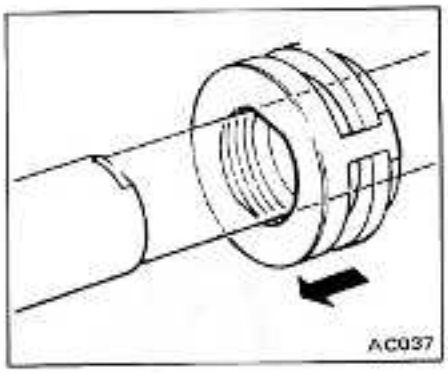
INSTALLATION

Do not re-use shaft seal seat and shaft seal.

CAUTION:
In placing a new seal on the workbench, make sure that the contact surface faces upward. Take necessary steps to avoid damage.

1. Make sure that the shaft seal contact surface is free of dirt and amply lubricated with compressor oil.
2. Cap Tool KV99412322 to the top end of compressor shaft.
3. Using Tool KV99412321, insert shaft seal with shaft seal case and shaft cutout aligned.

Apply force to turn the seal somewhat to the left and right. Insure that shaft seal seats properly in the shaft cutout.



4. Fit O-ring to the outside groove of shaft seal seat, making sure that it seats properly.
5. Apply an ample coat of oil to contact surface and shaft seal seat so that seat easily slides on inner side of front end cover.

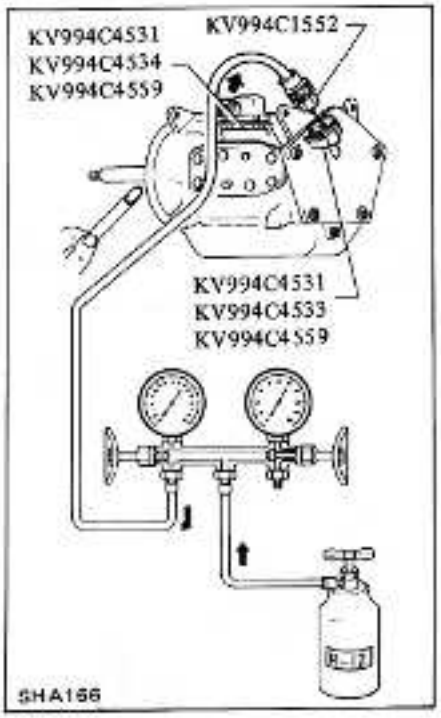
Also apply a thin coat of grease or oil to shaft. Push shaft seal seat into front end cover until it bottoms up to land.

6. Using snap ring pliers, compress retainer ring and fit it into front end cover. Seat retainer ring firmly in the groove.
7. Install Tool KV99412329 to compressor shaft and turn shaft 5 to 6 turns clockwise. Then, check for gas leakage as follows:

(1) Plug high- and low-pressure joints on compressor using tool KV994C4548 or blind covers and gaskets which are installed on service compressor.
(2) Connect charging hose to low pressure gauge of manifold gauge. Install Tool KV994C1552 to other end of charging hose and insert it into hole in middle of blind cover at low pressure side.

Connect center hose of manifold gauge to refrigerany can.

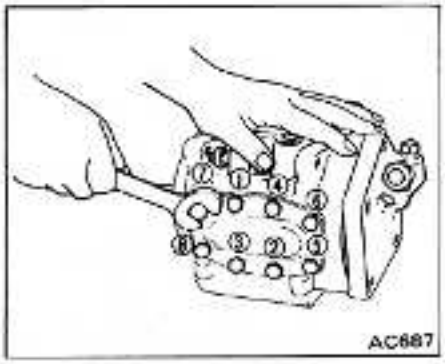
(3) Open valve of can tap, charge refrigerant from low pressure side and purge air from high pressure side by loosening blind cap.
(4) Conduct a leak test. If there is a leak, remove and then install again.



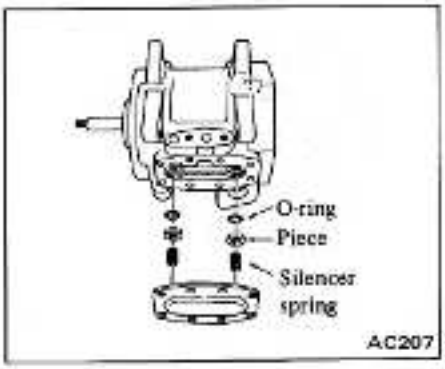
SIDE COVER

REMOVAL

1. Drain oil.
2. Loosen and remove eight side cover mounting bolts in an alternate pattern. Note that two silencer springs inside the cover will force up side cover.



3. Remove side cover and side cover gasket. Discard the gasket.
4. Remove silencer springs, pieces, and O-rings. Do not damage O-ring surface of silencer piece during this process. Discard used O-rings.



INSPECTION

1. Make sure that side cover gasket surface and shell gasket surface are not damaged.
2. Make sure that silencer pieces and shell contact surfaces in contact with O-ring are not damaged.
3. Do not reuse old gasket and O-rings.

INSTALLATION

Do not tap on the compressor shaft.

1. Place the mounting surface of side cover upward.
2. Make sure that holes of cylinder and shell are aligned and install O-rings.
3. Coat O-ring and the area around shell hole with an ample amount of compressor oil. Using Tool KV99412328, install O-ring into the shell hole. Then install silencer piece with Tool KV99412327.
4. Coat the gasket surface of shell with compressor oil and position gasket and side cover.
5. Hold side cover in place by hand and thread in eight mounting bolts. Tighten these bolts evenly in an alternating pattern.

Ⓣ: Side cover bolt
18 - 20 N·m
(1.8 - 2.0 kg-m,
13 - 14 ft-lb)

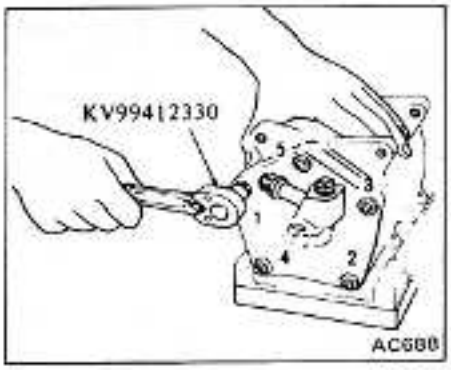
6. Fill with compressor oil.
7. Upon completion of the above operations, conduct a gas leak test by

referring to the item "Installation" under the topic "Shaft Seal".

REAR END COVER AND REAR CYLINDER HEAD

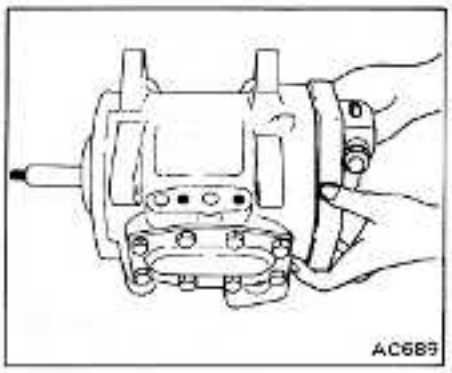
REMOVAL

1. Drain oil.
2. Remove five rear end cover mounting bolts with Tool. Starting at the top, loosen all bolts one turn in an alternating pattern. Then remove bolts in turn.

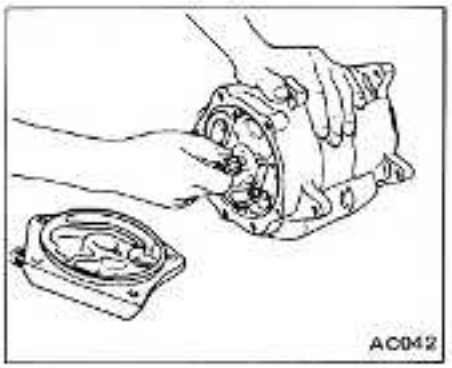


3. Grasp rear end cover and carefully separate it from compressor. Tap the flange lightly and alternately as required with a plastic mallet.

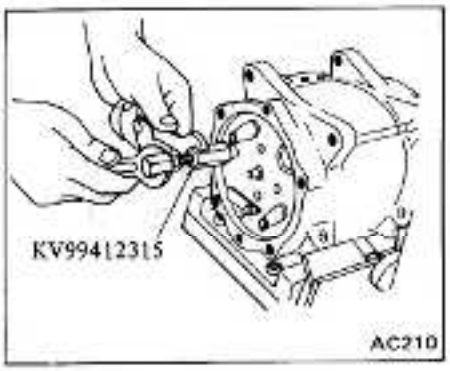
Do not reuse old gasket and O-ring.



4. Remove pump gear. Do not allow pump gear to damage the surface.



5. Remove O-ring, gasket and two pins. Discard the O-ring and gasket.
6. Remove rear cylinder head, suction valve plate and gasket. Discard the gasket. Carefully remove suction valve plate, avoiding deformation.
7. When removal proves difficult, use Tool. Insert this tool into hole in cylinder head. With the nut in firm contact with the back side of cylinder head, tighten the bolt slowly to break loose the head.



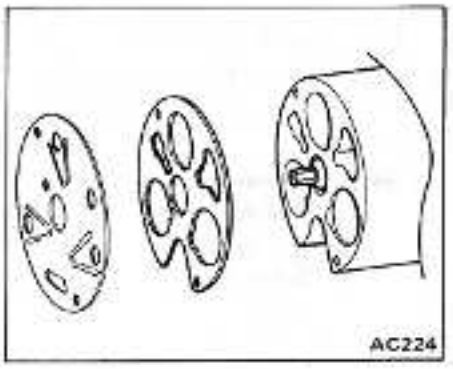
INSPECTION

1. Make sure that the gasket contact surface is free of damage.
2. If replacement of rear end cover connector and check valve is necessary, replace rear end cover with a new one.
3. Check suction valve plate and cylinder head for broken valves.
4. Check pump gear for wear and damage.

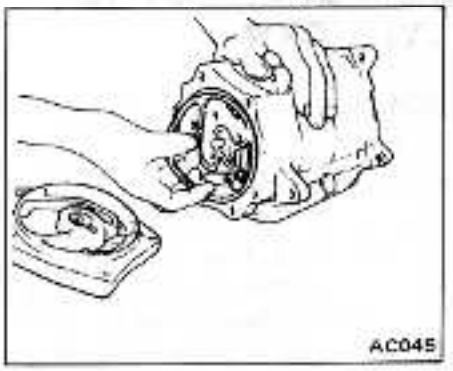
INSTALLATION

Do not reuse old gasket and O-ring.

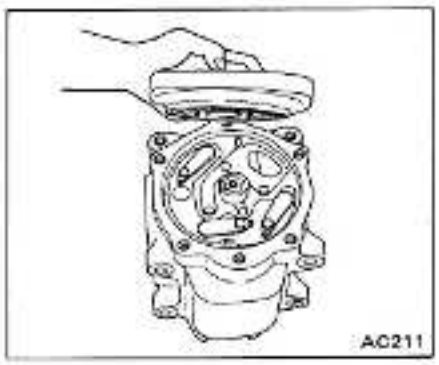
1. Using suitable blocks, position compressor with the front face downward and the rear upward.
2. Insert two pins in the rear of cylinder.
3. Coat both surfaces of cylinder head gasket with compressor oil and align gasket with cylinder.
4. Install suction valve plate, making sure that the three valves properly align with cylinders and gasket cut-outs.



5. Install cylinder head, gasket, and O-ring in the order listed. Coat gasket and O-ring beforehand with an ample amount of compressor oil.



6. Fit pump gear to rear end cover.
7. Carefully fit rear end cover to the rear of compressor.



8. Using Tool KV99412330, tighten up five bolts in an alternating pattern, starting at the top. Do not forget lock washers.

Ⓣ : **Rear end cover bolt**
29 - 34 N·m
(3.0 - 3.5 kg-m,
22 - 25 ft-lb)

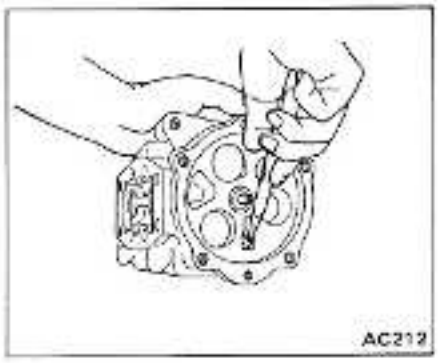
9. Fill with compressor oil.
10. Upon completion of the above operation, conduct a leak test by referring to the topic under "Shaft Seal".

REPLACEMENT OF CYLINDER

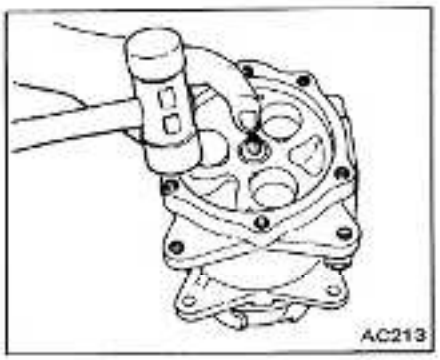
REMOVAL

1. Drain oil.
2. Remove compressor clutch assembly. Refer to "Compressor Clutch".
3. Using snap ring pliers, remove shaft seal retainer ring. Then remove shaft seal seat. Refer to "Shaft Seal". Removal of shaft seal is not absolutely necessary. It may be removed when cylinder assembly is removed from front end cover. In fact, this approach facilitates work.
4. Remove side cover. Refer to "Side Cover".
5. Remove rear end cover. Refer to "Rear End Cover and Rear Cylinder Head". Remove O-ring, gasket, two pins, cylinder head, suction valve plate, and gasket in the order listed. This exposes the rear part of cylinder.
6. Using long nose pliers or other suitable tool, pull out oil pipe. Proceed carefully as oil pipe is easily bent.

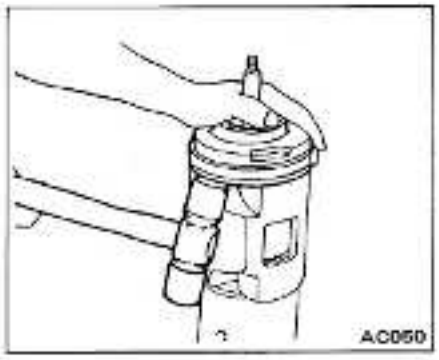
CAUTION:
Unless oil pipe has been removed, do not attempt the following steps.



7. With the front facing downward support compressor shell. Using a plastic mallet, tap at the rear end of the shell flange, driving shell straight downward. Discard front end cover gasket.



8. Detach front end cover from cylinder assembly. Using a plastic mallet, drive end cover upward. Refrain from excessive force to avoid cover damage.

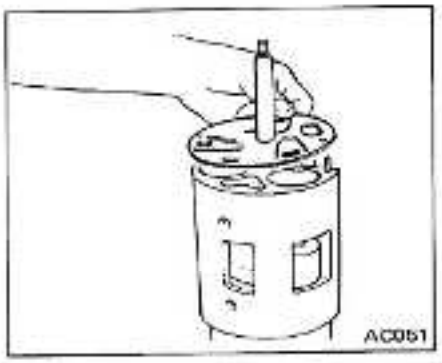


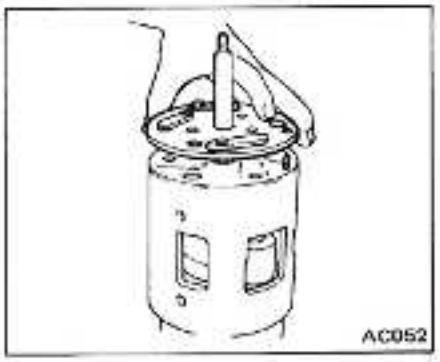
9. Remove shaft seal from the shaft.
10. Remove two pins, gasket, cylinder head, suction valve plate, and gasket. When removing two pins, proceed carefully to avoid cylinder head damage. Do not deform suction valve plate in removing suction valve plate. Discard oil gasket.

CAUTION:
Do not deform suction valve plate when removing it.

INSTALLATION

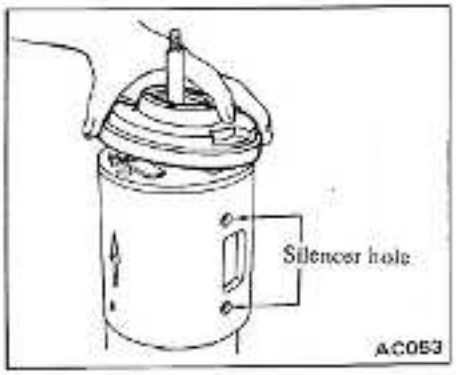
1. Using suitable blocks, face cylinder assembly upward. Insert two pins. Position gasket and suction valve plate in the order listed while making sure that three valves of suction valve plate are aligned with the cylinder and gasket cutouts. Coat gasket with compressor oil prior to assembly. Gaskets and suction valve plates are the same for front and rear. The cylinder head with the smaller numbers of holes goes to the front. Do not mix front and rear parts.



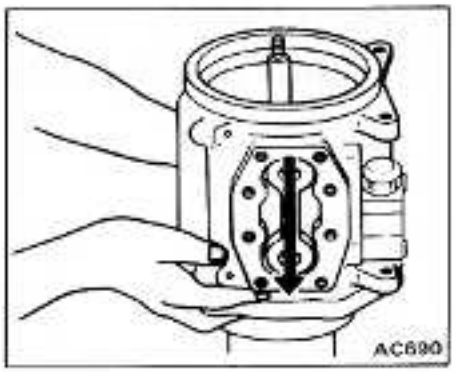


2. Align shaft seal with the shaft cutaway. Firmly seat shaft seal at the shaft land. Attempt to turn shaft seal to the left and right, confirming that it is seated properly.

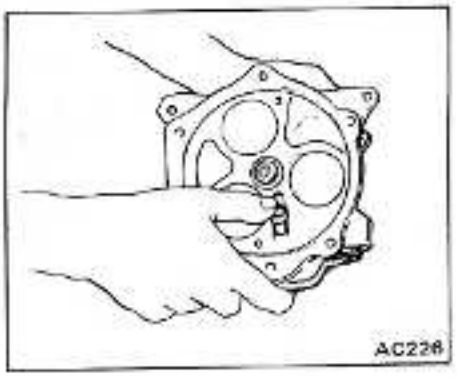
3. Place gasket on cylinder head and install front end cover. Coat gasket with compressor oil beforehand. Gasket differs for the front and rear. Make sure that the correct gasket is used. After completing this work, gasket protruding from front end cover and cylinder head should be adjusted by hand.



4. Fit gasket to front end cover. Then bring the shell into place over the cylinder assembly. At this time, make sure that the two holes of side cover and the cylinder holes are matched. Note that later adjustment will no longer be possible, as inside and outside diameters of these are not perfectly round. Note that moving the shell up and down may cause the gasket to slip out of place.



5. Turn over the assembled shell and cylinder assembly, so that the front may face downward.
6. Coat oil pipe and O-ring with an ample amount of oil. Insert oil pipe at the rear of the cylinder. After making sure that the hole lines are matched as specified in step (4), continue with stepp (6) work.

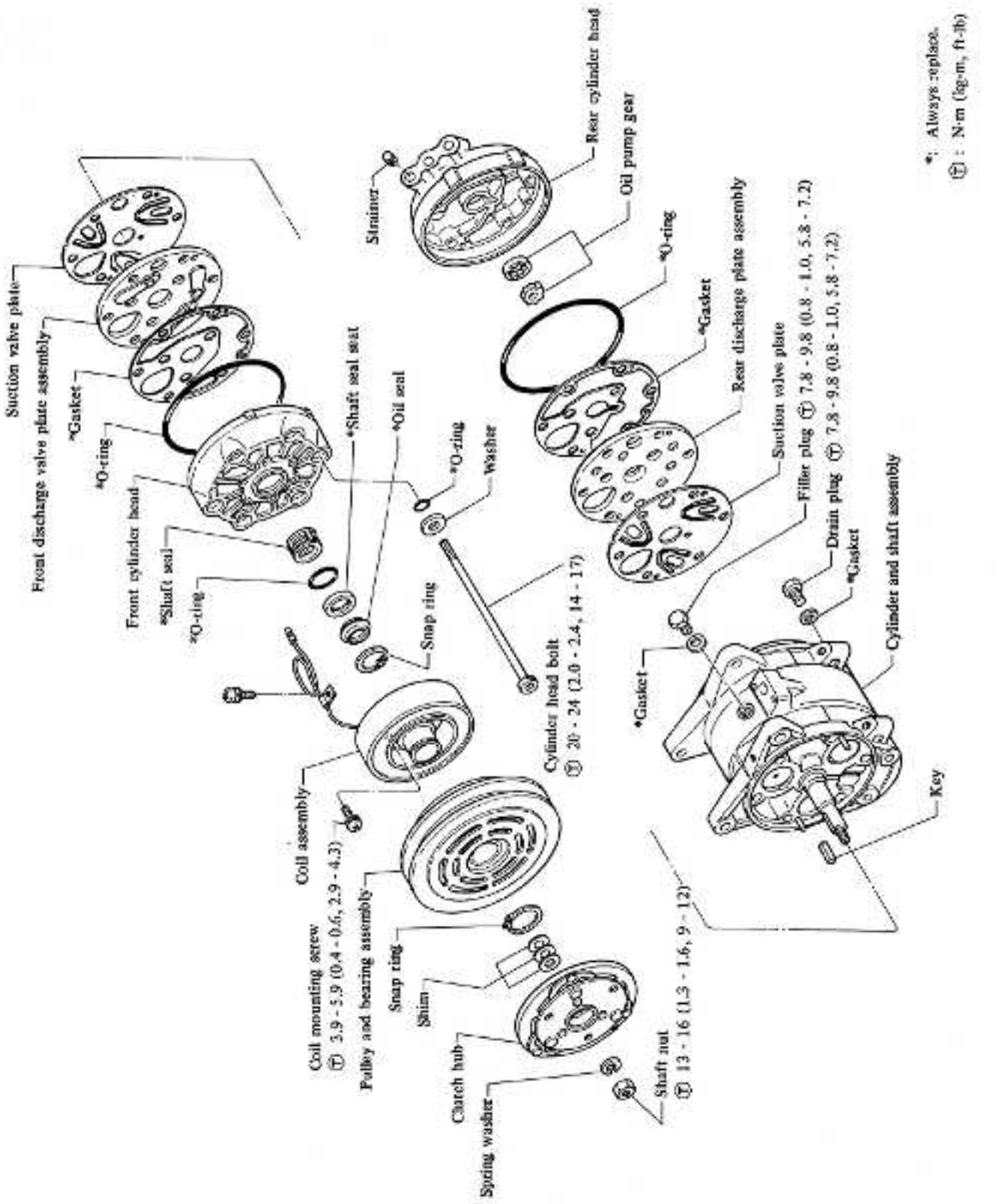


7. Continue with work up to installation of rear end cover, according to "Installation" under "Rear End Cover and Rear Cylinder Head".
8. Continue with work up to installation of side cover, according to "Installation" under "Side Cover".
9. Install shaft seal seat according to instructions in "Installation" under "Shaft Seal".
10. Install and adjust compressor clutch according to instructions in "Installation" under "Compressor Clutch".
11. Fill with compressor oil, and tighten oil plug with copper gasket in place.

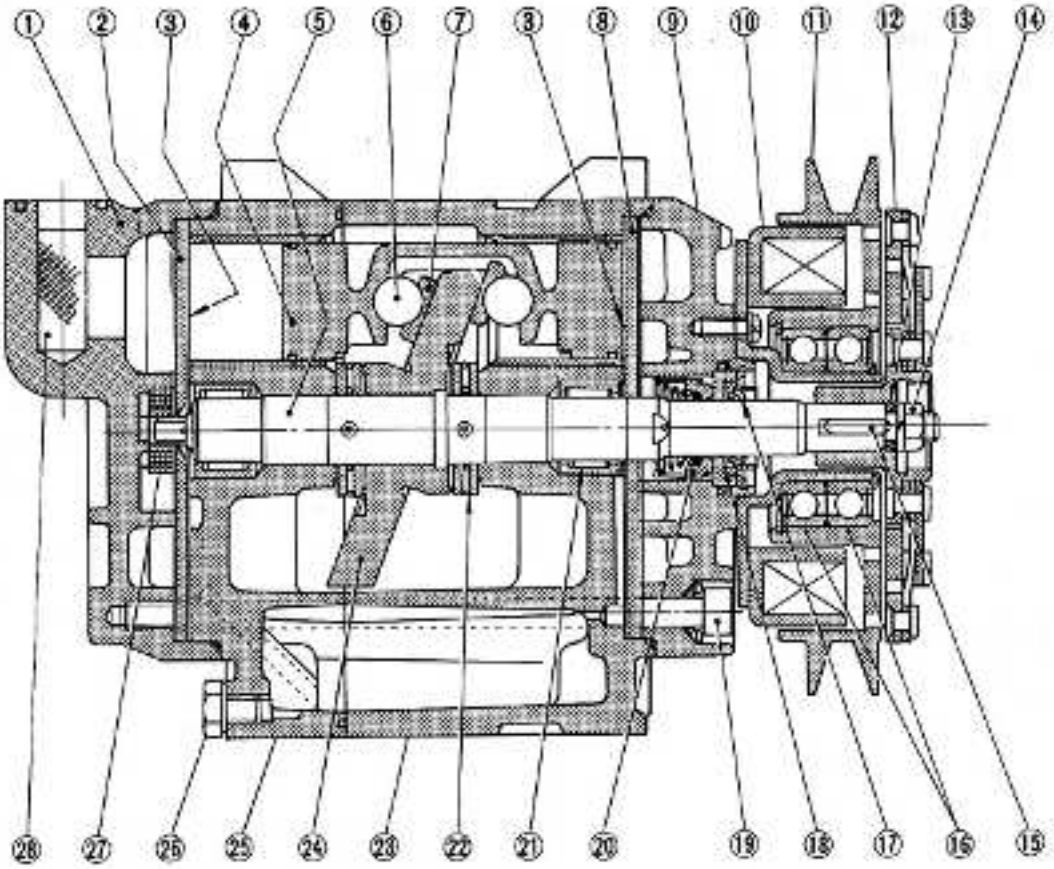
Ⓣ : **Oil plug**
18 - 20 N-m
(1.8 - 2.0 kg-m,
13 - 14 ft-lb)

12. Conduct a leak test by referring to the topic under "Shaft Seal".

COMPRESSOR-MODEL 167 AXIAL (DIESEL KIKI make-R.H. drive model)



SHA187



PRECAUTIONS

1. **Plug all openings** in compressor to prevent moisture and foreign matter from entering.
2. **Do not leave the compressor in its side or upside down for more than 10 minutes, as the lubricating oil will enter the low pressure chambers.** If under that condition, compressor should be operated suddenly, internal damage would result. To expel oil from chambers, hand-crank compressor several times in its installed condition.
3. **Before replacing with a new compressor, completely drain oil from the new compressor and fill with an amount of oil equaling that remaining in the old compressor.**
4. When replacing parts or oil, **always replace gaskets, O-ring and oil seal with new ones.**
5. When storing a compressor, be sure to fill it with refrigerant to prevent rusting. Add refrigerant at the low pressure side and purge air at the high pressure side.

COMPRESSOR CLUTCH

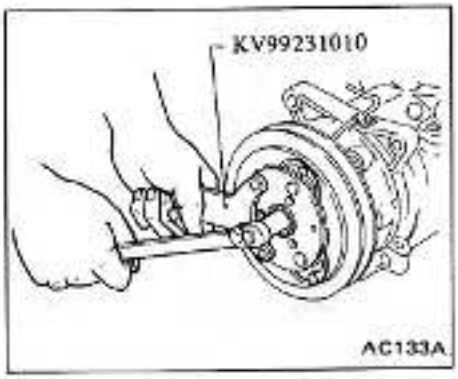
The most common trouble is clutch slippage. Service procedures are listed below. Exercise care.

1. Clearance between clutch disc (clutch wheel) and pulley should be 0.3 to 0.6 mm (0.012 to 0.024 in) at all peripheral points.
2. Make sure that there is no oil or dirt on friction surfaces of clutch disc (clutch wheel) and pulley. Remove any oil or dirt with a dry rag.
3. Make sure that terminal voltage at magnetic coil is above 10.5V.

REMOVAL

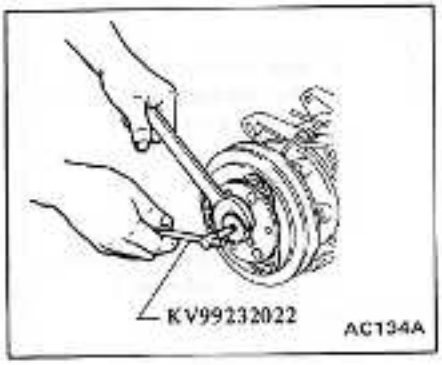
The illustration shows the compressor dismounted from the car. This operation, however, may be made with compressor mounted on car since refrigerant need not be discharged from the system to remove compressor clutch.

1. Using Tool, hold clutch wheel. Loosen shaft nut with socket wrench and remove shaft nut and spring washer from shaft.

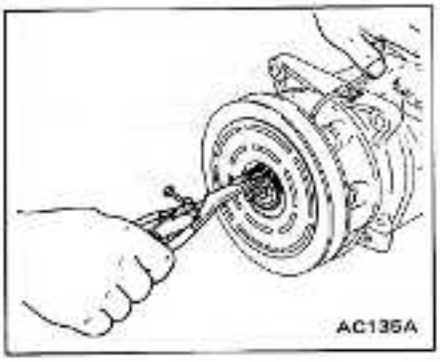


2. Using Tool, remove clutch wheel. Thread tool into the bore of clutch wheel and hold tool with wrench.

Then thread in center bolt until clutch wheel can be removed.

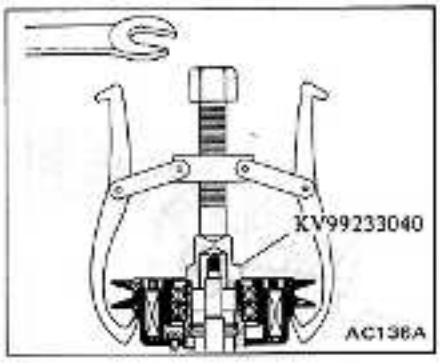


3. Using snap ring pliers, remove inside snap ring.



4. Place Tool over compressor shaft and pull off pulley assembly using suitable pulley puller.

a. Do not attach puller teeth to pulley except at designated spots or pulley may be deformed.



b. Be sure to use pulley puller with Tool.

5. Loosen coil mounting screws and remove coil assembly.

INSPECTION

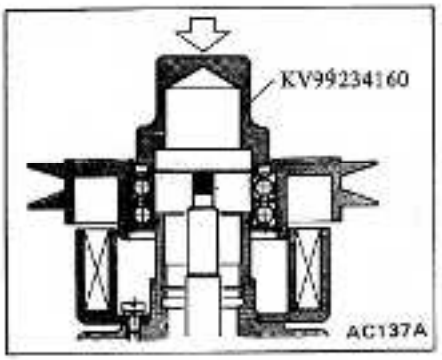
1. Check the friction surfaces of the clutch for damage due to excessive heat, or excessive grooving due to slippage. If necessary, replace coil, pulley and bearing assembly, or clutch wheel.
2. Oil or dirt on the friction surfaces should be cleaned with a suitable solvent and a dry rag.
3. Check coil for shorted or opened binding leads.

INSTALLATION

1. 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.

Ⓣ: Coil mounting screw
3.9 - 5.9 N-m
(0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)

2. Press pulley assembly onto the neck of coil assembly using Tool.



3. Install inside snap ring using snap ring pliers.
4. Key must be a tight pressure fit to key groove in drive shaft. If necessary, try the othrer sides of the key for tighter fitting to groove.

Wipe oil thoroughly off the clutch surface.

5. Select adjusting shims which give the correct clearance between pulley and clutch wheel.

Adjusting shim:

No.	Thickness mm (in)
1	0.1 (0.004)
2	0.3 (0.012)
3	0.5 (0.020)
4	0.8 (0.031)

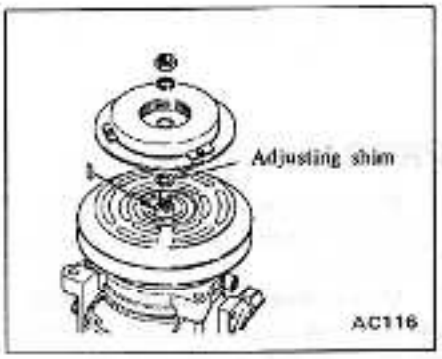
6. Using a plastic mallet, tape clutch wheel in place on drive shaft.

Do not use excessive force with a plastic mallet or in a press, or internal damages may result.

7. Place spring washer and center nut onto drive shaft. Tighten center nut to drive clutch wheel onto drive shaft.

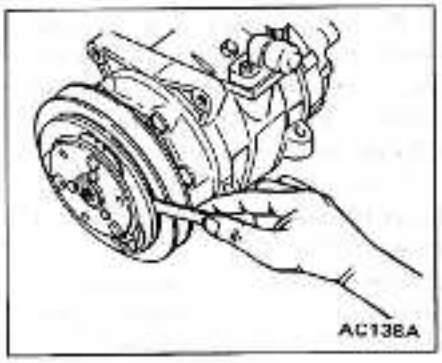
Ⓣ: Clutch hub nut
13 - 16 N-m
(1.3 - 1.6 kg-m, 9 - 12 ft-lb)

At this time, hold clutch wheel with Tool KV99231010.



8. Check clearance around the entire periphery of clutch wheel.

Hub-to-pulley clearance:
0.3 - 0.6 mm (0.012 - 0.024 in)



9. After assembling compressor clutch assembly, do not forget break-in operation, accomplished by engaging and disengaging the clutch some thirty times. Break-in operation raises the amount of torque transmitted.

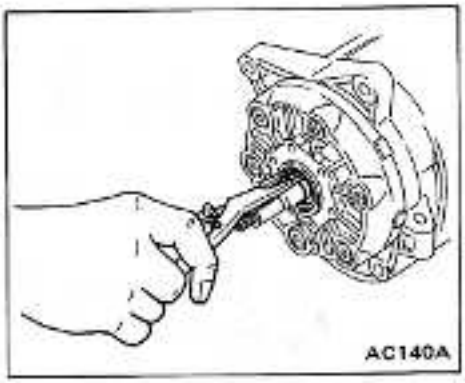
SHAFT SEAL

REMOVAL

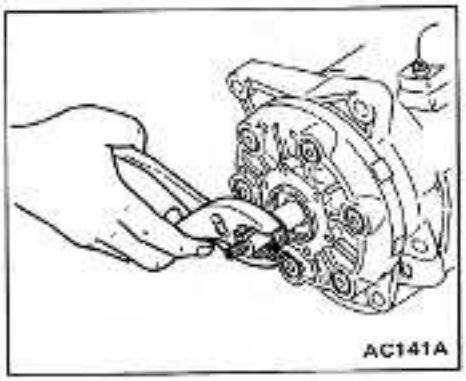
Discharge the system. Clean compressor exterior, workbench, tools and hands.

1. Remove oil filler and drain plugs; drain compressor oil. Note amount of compressor oil drained.

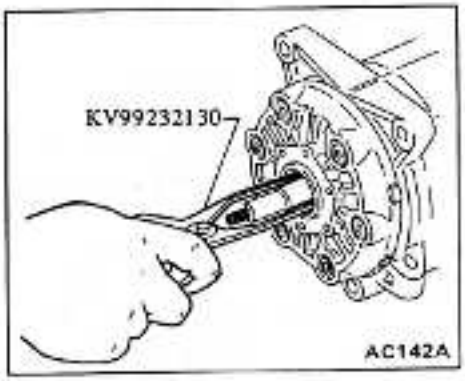
2. Remove clutch wheel, pulley and bearing assembly and coil assembly. Proceed according to information under Compressor Clutch.
3. Using snap ring pliers, compress and remove snap ring from inside the neck of compressor body.



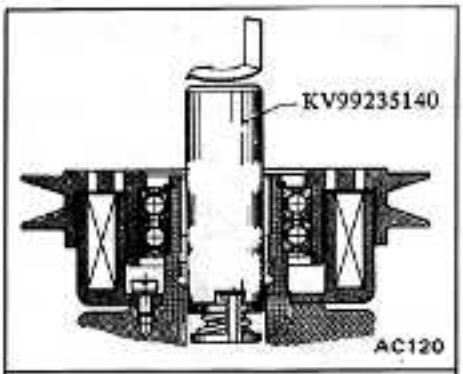
4. Pull off oil seal with pliers.

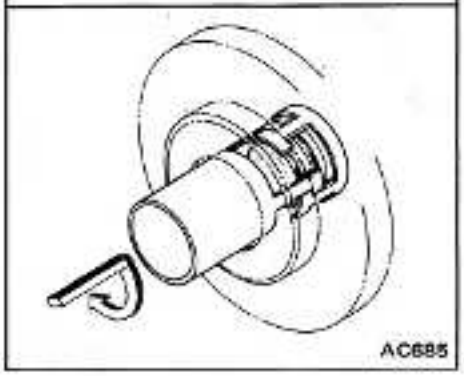


5. Using Tool, pull off seal seat.



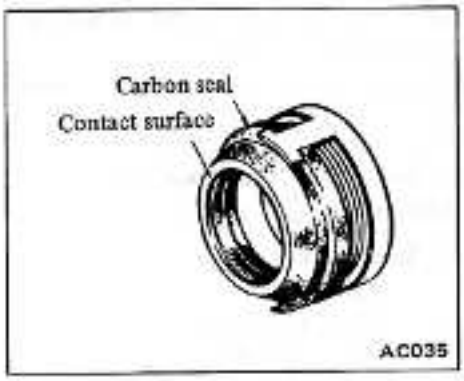
6. Remove seal seat O-ring.
7. Using Tool, depress carbon seal against spring pressure and hook shaft seal with locking tongs of tool. Then, slowly pull out the tool, thereby removing shaft seal.



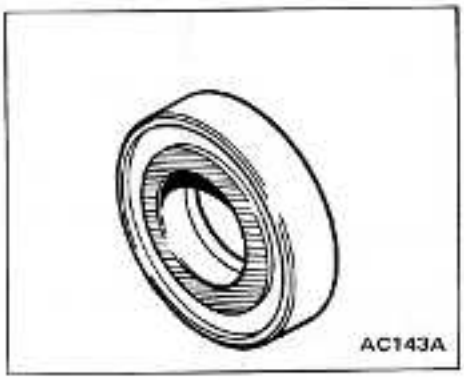


INSPECTION

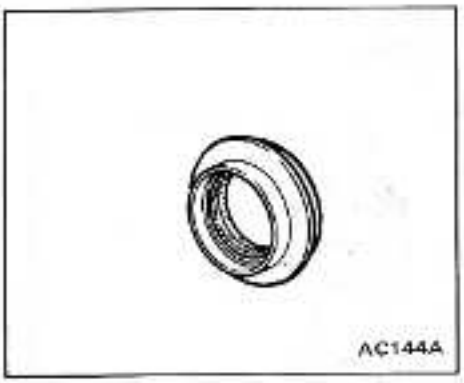
1. Check the carbon seal surface of shaft seal for damage.



2. Check seal seat to seet whether its contact surfaces are scratched and/or damaged or not.



3. Check seal seat O-ring for damage.
4. Make sure grease is applied to oil seal.



INSTALLATION

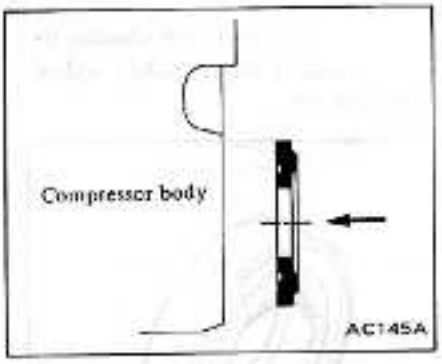
Do not re-use shaft seal, seal seat, O-ring and oil seal.

CAUTION:
In placing a new seal on the workbench, make sure that the contact surface faces upward. Take necessary steps to avoid damage.

1. Install new drain plug gasket and drain plug.

Ⓣ : **Drain plug**
7.8 - 9.8 N·m
(0.8 - 1.0 kg-m,
5.8 - 7.2 ft-lb)

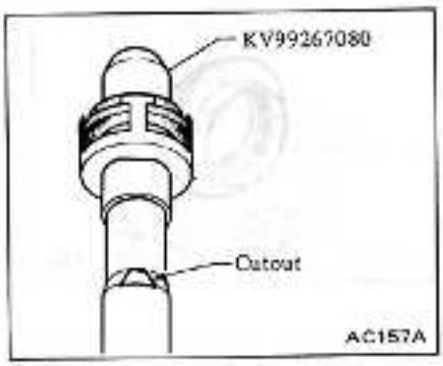
Install drain plug gasket with its groove toward compressor.



2. Cap Tool KV99267080 over the end of compressor shaft.
3. Coat O-ring and carbon seal face of shaft seal with clean compressor oil.

Make sure that shaft seal is free of dirt.

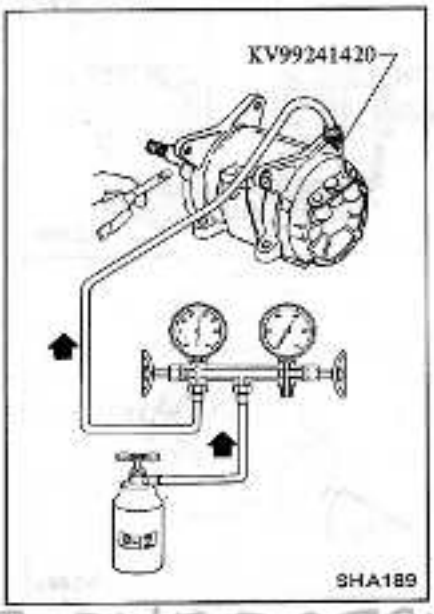
4. Engage shaft seal with the tip of Tool KV99235140. With shaft seal and cutout of drive shaft aligned, insert shaft seal into bore of compressor body neck.



5. Insure that shaft seal is seated properly in shaft cutout and turn tool counterclockwise to remove tool.
6. Coat seal seat O-ring with clean compressor oil and fit it to inside groove of compressor body neck.
7. Lightly coat Shaft Seal Guide and compressor shaft with recommended multi-purpose grease (or compressor oil).
8. Coat seal face and periphery of shaft seal seat and oil seal assembly with an ample amount of compressor oil. Then push in seal seat and oil seal assembly with Tool KV99235140 so that it seats properly on shaft seal.
9. Install Tool DK97063010 to shaft of compressor, and turn the shaft 5 to 6 turns clockwise. Then, check for gas leakage as follows:
(1) Plug high and low pressure joints on compressor using Tool KV99241420 or blind cover and gasket which are installed on service compressor.
(2) Connect charging hose to low pressure gauge of manifold gauge. Install Tool KV994C1552 to other end of charging hose and insert it into hole on blind cover at low pressure side.

Connect center hose of manifold gauge to refrigerant can.

(3) Open valve of can tap, charge refrigerant from low pressure side and purge air from high pressure side by inserting Tool KV994C1552 into hole on blind cover at high pressure side.
(4) Conduct a leak test. If there is a leak, remove and then install parts again.



10. Install compressor clutch assembly. Refer to Compressor Clutch.
11. Fill compressor with required amount of compressor oil. Refer to Compressor Oil Level Check in General Service.
12. Install new filler plug gasket and filler plug.

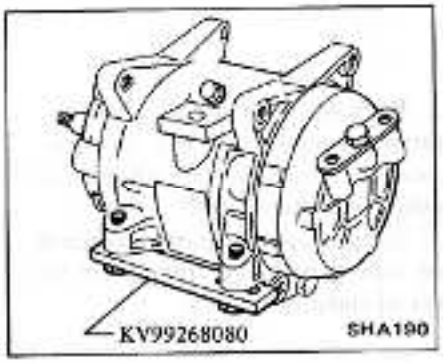
Ⓣ : **Filler plug**
7.8 - 9.8 N·m
(0.8 - 1.0 kg-m,
5.8 - 7.2 ft-lb)

Install filler plug gasket with its groove toward compressor.

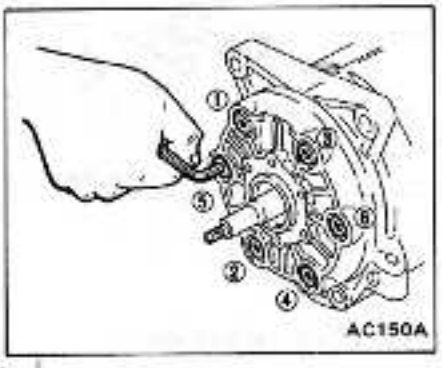
FRONT AND REAR CYLINDER HEADS

REMOVAL

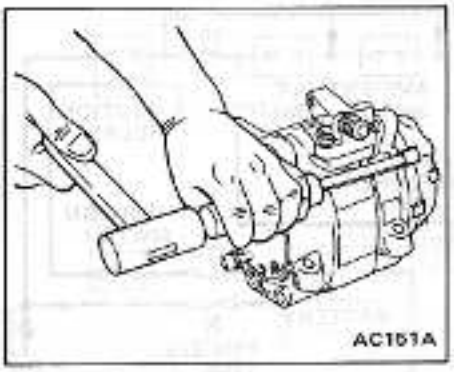
1. Remove oil filler and drain plugs; drain compressor oil. Note amount of oil drained.
2. Remove magnetic clutch assembly. For details, refer to Compressor Clutch.
3. Remove shaft seal seat, shaft seal, and O-ring. For details, refer to Shaft Seal.
4. Attach Tool to cylinder block.



5. Using allen wrench, loosen bolts evenly; remove bolts, O-ring and washers. Discard O-ring.



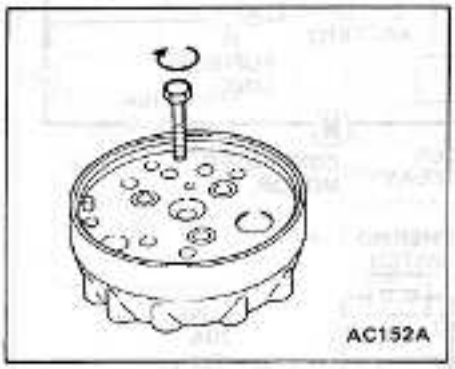
6. Separate front cylinder head and rear cylinder head from cylinder body by lightly tapping the flange evenly with a suitable drift and a plastic mallet.


AC151A

When separating cylinder heads, do not use excessive force since this ruins center sealing, resulting in gas leaks.

7. Remove and discard O-rings and gaskets.
8. Carefully remove discharge valve plate assembly and suction valve plate.

If cylinder head, discharge valve plate and suction valve plate are removed as a unit, screw a suitable bolt into threaded hole in discharge valve plate assembly to drive out suction valve plate and discharge valve plate.


AC152A

a. When removing suction valve plate, do not pry reed valves.
b. Be careful not to bend suction valve plate.

9. Remove oil pump.

Be careful not to scratch oil pump surfaces.

INSPECTION

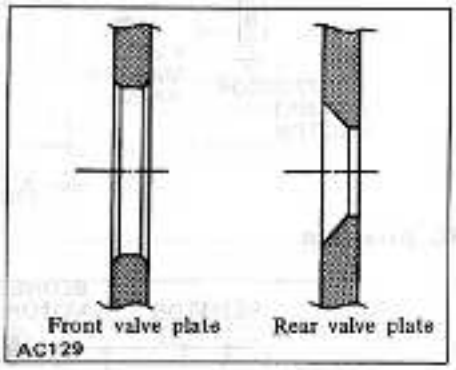
1. Check suction valve plate and discharge valve plate assembly for broken reeds.
2. Check oil pump for wear and damage. If either of pump gears show wear or damage, replace both gears.

INSTALLATION

Do not reuse old gasket and O-ring.

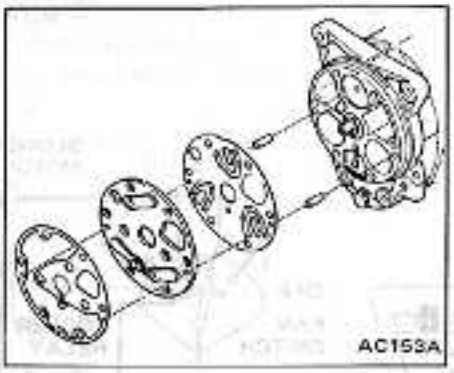
Suction valve plates are the same for front and rear.

Front discharge valve plate assembly has a large diameter hole in its center.

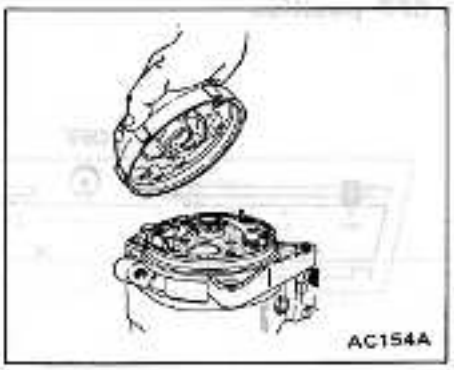

Front valve plate Rear valve plate
AC129

1. Place cylinder shaft assembly on a bench with its rear side facing upward.
2. Coat O-ring with clean compressor oil and install O-ring in rear of cylinder.
3. Dip suction valve plate and discharge plate into compressor oil and then install them.

Make sure reed valves properly align with cylinders.


AC153A

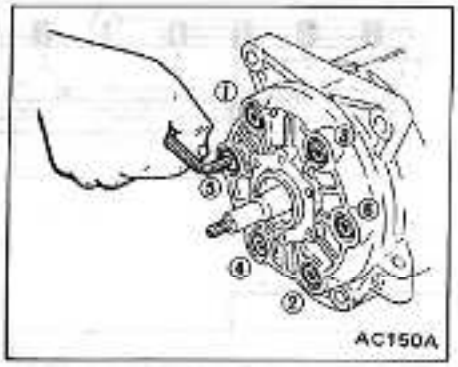
4. Sparingly coat oil pump with compressor oil and install it on shaft.
5. Coat both surfaces of rear cylinder head gasket with compressor oil and align gasket with discharge valve plate.
6. Aligning cylinder head with roll pins and oil pump, install it on cylinder block. Evenly tap cylinder head with a soft-faced hammer until it properly fits to cylinder block.


AC154A

7. Install front head in a similar manner as for rear head.
8. Install O-rings and washers on socket head bolts.

Tighten bolts evenly. First give each a short turn, then another. Finish tightening on third round.

Ⓣ : Cylinder head bolt
20 - 24 N·m
(2.0 - 2.4 kg-m,
14 to 17 ft-lb)



AC150A

9. Install shaft seal. Refer to Shaft Seal.
10. Conduct a leak test by referring to Shaft Seal.
11. Install and adjust compressor clutch. Refer to Compressor Clutch.
12. Fill compressor with required amount of compressor oil. Refer to Compressor Oil Level Check in General Service.

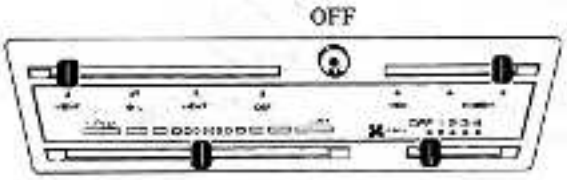
Ⓣ : Filler plug
7.8 - 9.8 N·m
(0.8 - 1.0 kg-m,
5.8 - 7.2 ft-lb)

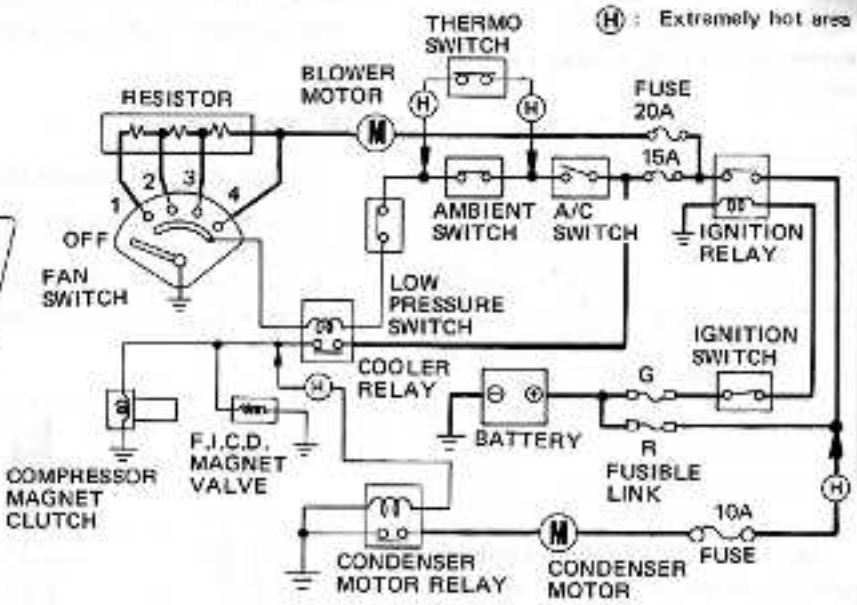
Install new filler plug gasket with its groove toward compressor.

ELECTRICAL CIRCUIT

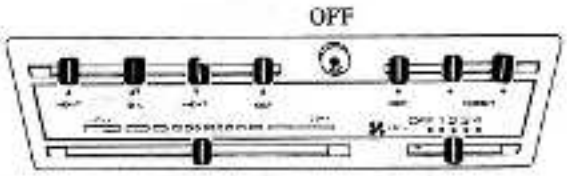
Ⓗ : Extremely hot area

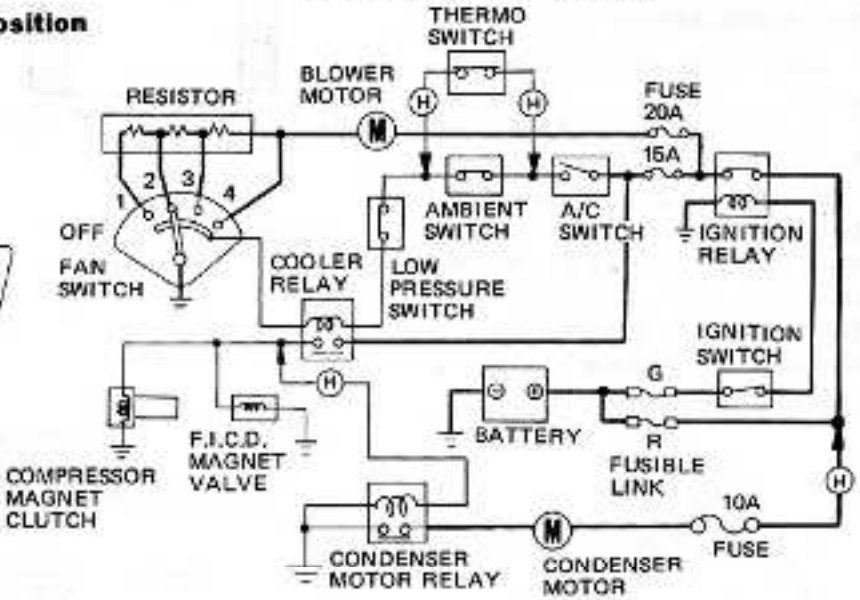
OFF position



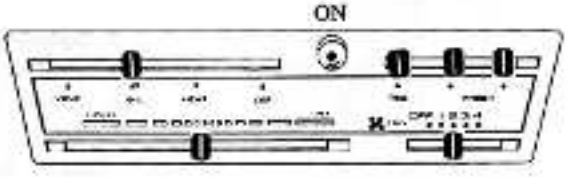


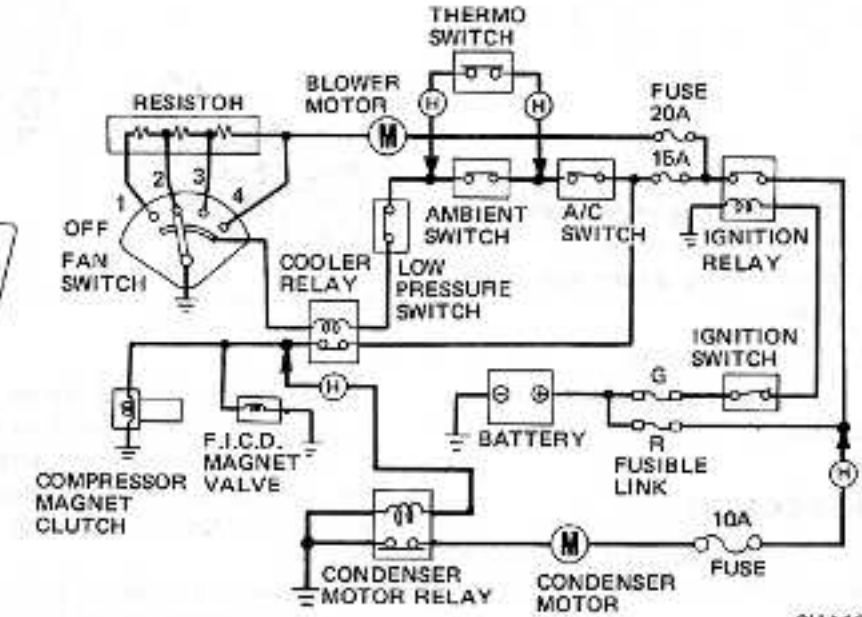
VENT, B/L, HEAT, DEF and RECIRC position





A/C position

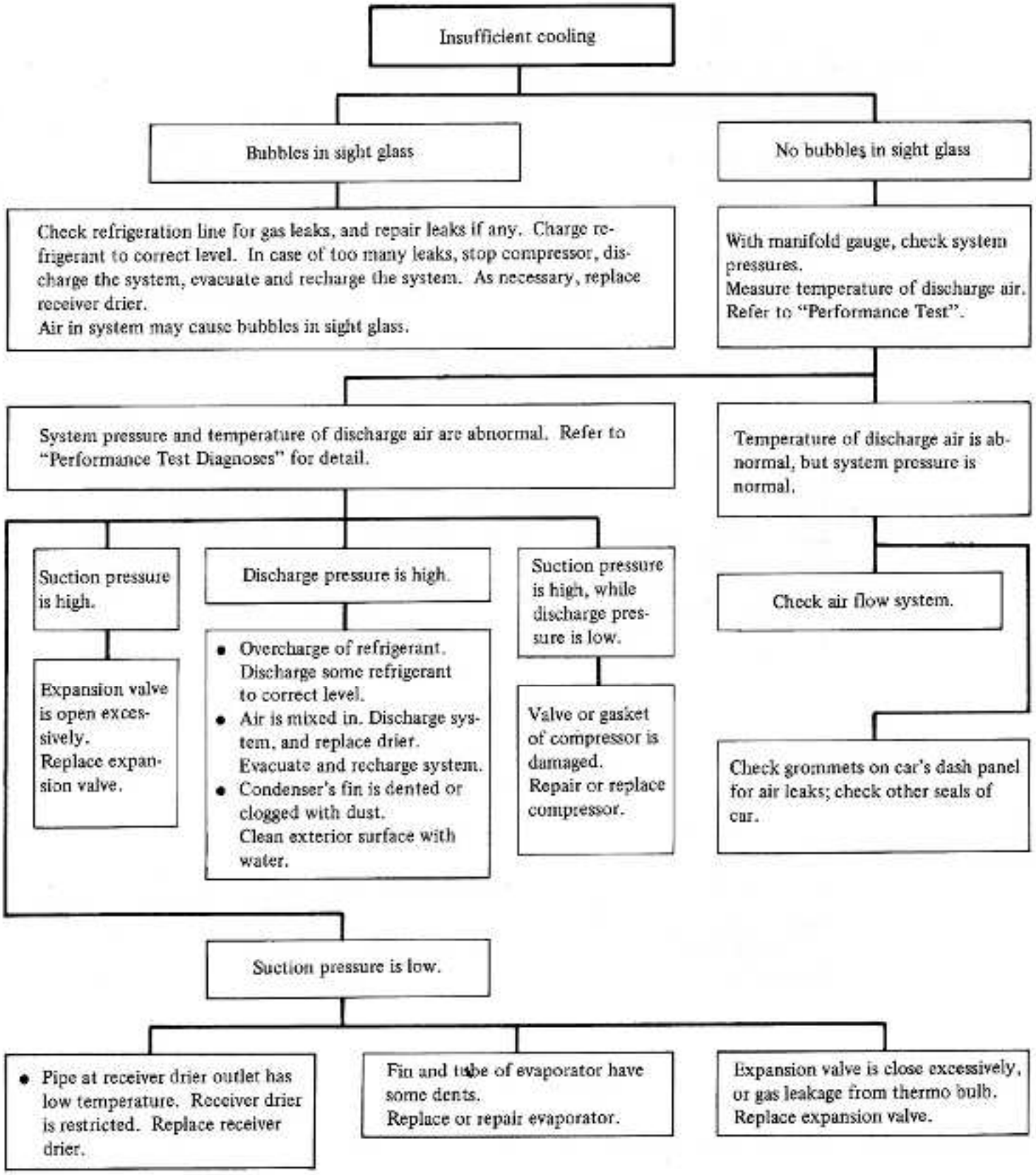


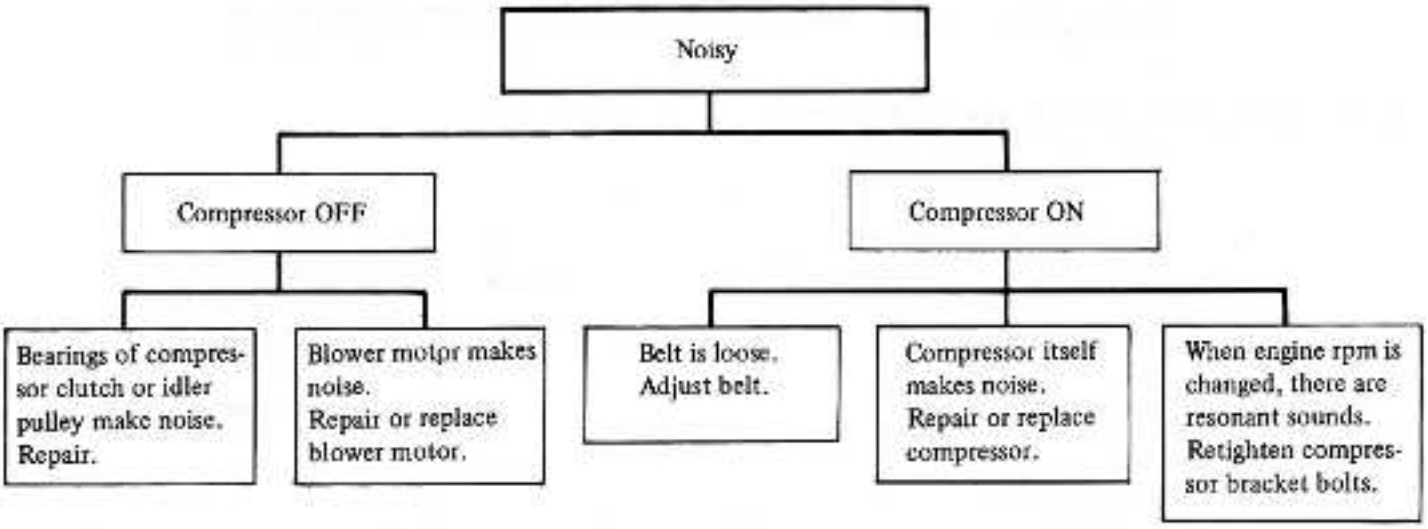


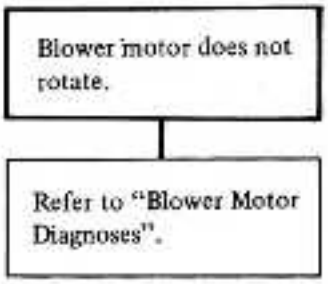
SHA191

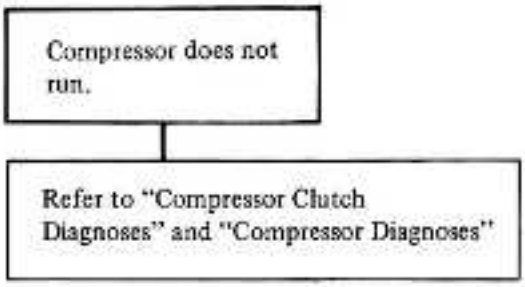
TROUBLE DIAGNOSES AND CORRECTIONS

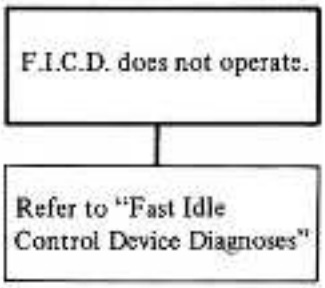
AIR CONDITIONER DIAGNOSES




Noisy
Compressor OFF
Compressor ON
Bearings of compressor clutch or idler pulley make noise. Repair.
Blower motor makes noise. Repair or replace blower motor.
Belt is loose. Adjust belt.
Compressor itself makes noise. Repair or replace compressor.
When engine rpm is changed, there are resonant sounds. Retighten compressor bracket bolts.


Blower motor does not rotate.
Refer to "Blower Motor Diagnoses".


Compressor does not run.
Refer to "Compressor Clutch Diagnoses" and "Compressor Diagnoses"


F.I.C.D. does not operate.
Refer to "Fast Idle Control Device Diagnoses"

BLOWER MOTOR DIAGNOSES

: Condition
: Check
: Probable cause

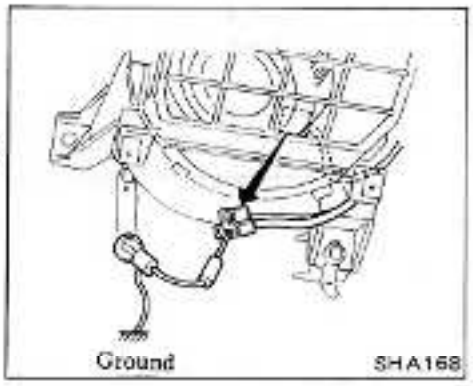
Test conditions

Battery	: O.K.	Quick check : Check that wiper and washer operate. (If they do not operate, check fuse 15A in fuse block at first.)
Fusible link (Red and green)	: O.K.	
Ignition switch	: O.K.	
Ignition relay	: O.K.	
Fuse 20A (in fuse block)	: O.K.	
Position of ignition switch	: ACC	
Position of fan switch	: ON	

Blower motor does not run.

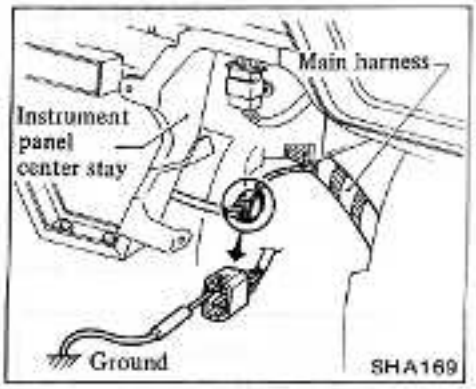
(Remove instrument lower cover and cluster lid.)

Connect test light to blue-white wire leading to blower motor.



Light ON — Light OFF

Ground blue-black wire leading to blower motor.



Motor does not run. — Motor runs.

Faulty blower motor without problem in lead wire connection.

Replace.

Ⓐ Ⓑ

Ⓐ Ⓑ

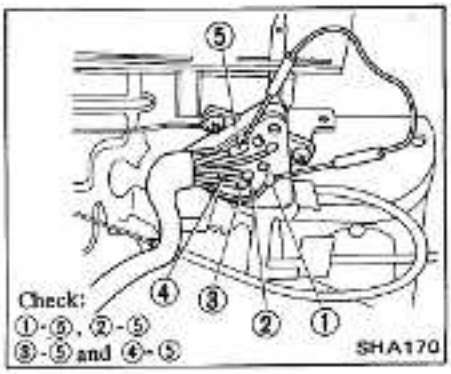
Broken lead wire between ignition relay and blower motor.

Repair.

Check fan switch for conductivity.
Refer to **Fan Switch.**

Motor runs.

Motor does not run.



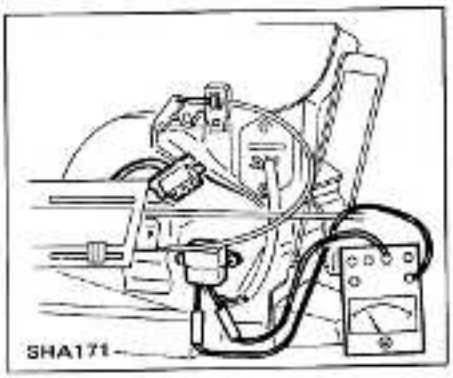
Faulty fan switch without problem in lead wire connection.

Replace.

Check resistor for conductivity.
Refer to **Resistor.**

N.G.

O.K.



Faulty resistor without problem lead wire connection.

Replace.

Check other lead wire and connection.

Speed of blower motor does not change.

(Remove instrument lower cover and cluster lid.)

Check resistor on heater unit.
Refer to **Resistor.**

N.G.

O.K.

Faulty resistor without problem in lead wire connection.

Replace.

Check other lead wire and connection.

COMPRESSOR CLUTCH DIAGNOSES

: Condition
: Check
: Probable cause

Test conditions

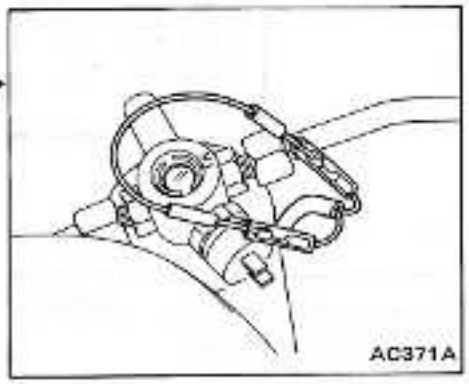
Battery	:	O.K.
Fusible link (Red and green)	:	O.K.
Ignition switch	:	O.K.
Ignition relay	:	O.K.
Fuse 15A (in fuse block)	:	O.K.

Quick check : Check that wiper and washer operate.

Position of ignition switch : ACC
Position of fan switch : ON
Position of air conditioner switch: ON

Compressor clutch is not engaged.

Connect two wires leading to low pressure switch.



Clutch is engaged.

Clutch is not engaged.

Check refrigerant level.

O.K.

N.G.

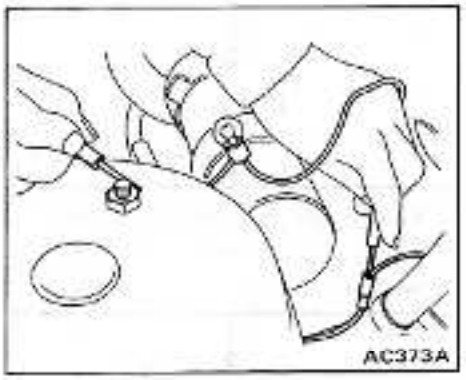
Faulty low pressure switch without problem lead wire connection.

Replace.

Insufficient refrigerant.

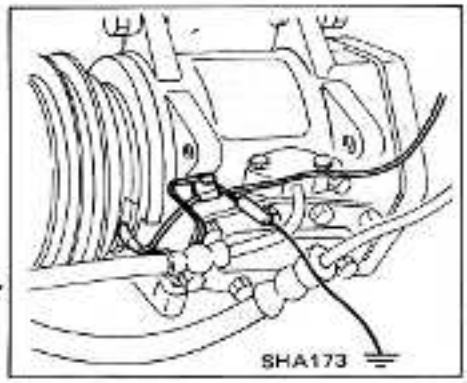
Add.

Connect test light to blue-black wire leading to magnet clutch.



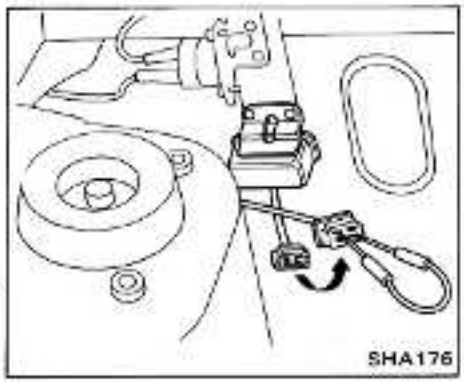
Light ON

Light OFF



Ground earth terminals leading to magnet clutch.

Connect wire between two terminals leading to cooler relay.



Clutch is not engaged. Ⓐ

Clutch is engaged. Ⓑ

Clutch is engaged Ⓒ

Clutch is not engaged. Ⓓ

Ⓐ Ⓑ Ⓒ Ⓓ

Faulty magnet clutch without problem in lead wire connection.

Repair.

Broken ground wire of magnet clutch.

Repair.

Faulty cooler relay without problem in lead wire connection.

Replace.

Faulty ambient switch or thermo switch without problem in lead wire connection.

Replace.

Faulty air conditioner switch without problem in lead wire connection.

Replace.

Remove instrument lower cover and cluster lid.

Connect wire between terminals leading to ambient switch or thermo switch.

Clutch is engaged.

Clutch is not engaged.

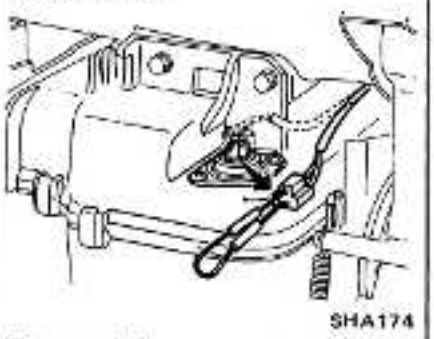
Connect wire between green and blue wire leading to air conditioner switch.

Clutch is engaged.

Clutch is not engaged.

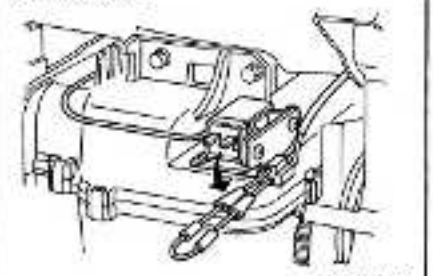
Check other lead wire and connection.

Ambient switch

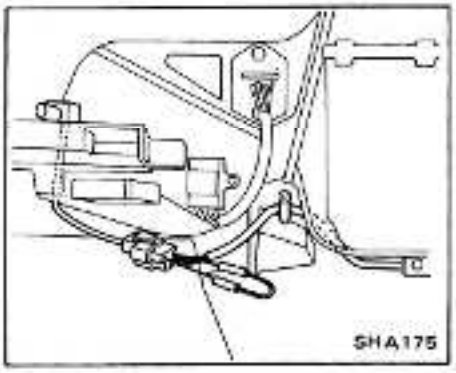


SHA174

Thermo switch

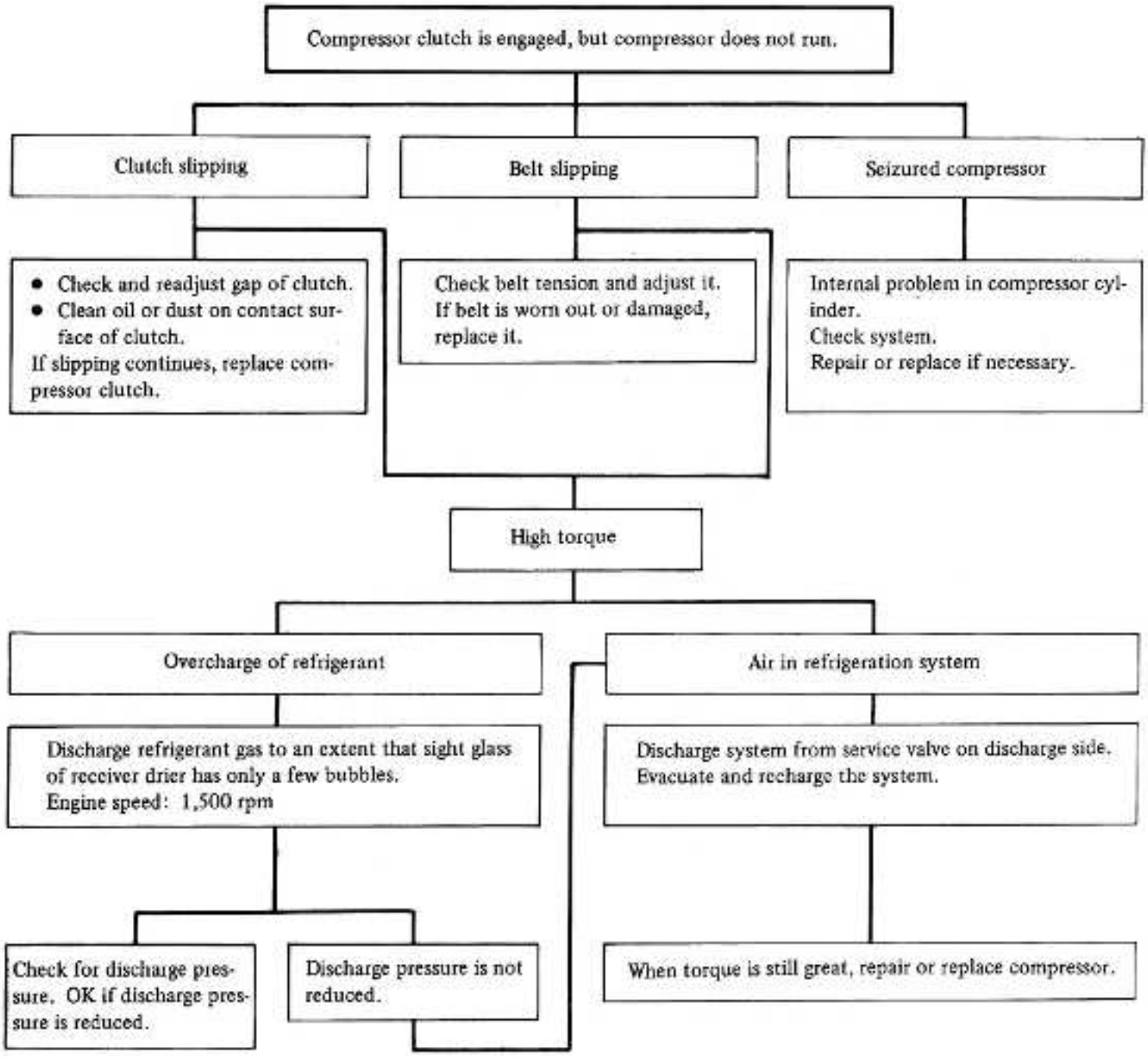


SHA396



SHA175

COMPRESSOR DIAGNOSES



Compressor oil leaking

Air-blow on spot where oil leak evidence is found. Then check for refrigerant leaks using leak detector.

- Refrigerant leaking. → Repair or replace compressor.
- No refrigerant leaking. → Wipe - clean oil with rag.

Compressor is noisy.

- Noisy only when clutch is engaged.
  - Check for loose compressor mounting bolts. Retighten bolts.
  - Compressor drive belt is loose. Adjust belt tension.
  - If compressor is still noisy, repair or replace compressor.
- Noisy when clutch is not engaged. → Remove compressor belt. Turn pulley of compressor clutch by hand, and check for noise. If noise is heard, repair compressor clutch.

FAST IDLE CONTROL DEVICE DIAGNOSES

: Condition
: Check
: Probable cause

Test condition:

Battery	: O.K.	Quick check : Check that wiper and washer operate.
Fusible link (Red and green)	: O.K.	
Ignition switch	: O.K.	
Ignition relay	: O.K.	
Fuse 15A (in fuse block)	: O.K.	
Position of ignition switch	: ACC	
Position of fan switch	: ON	
Position of air conditioner switch	: ON	

F.I.C.D. is not operated.

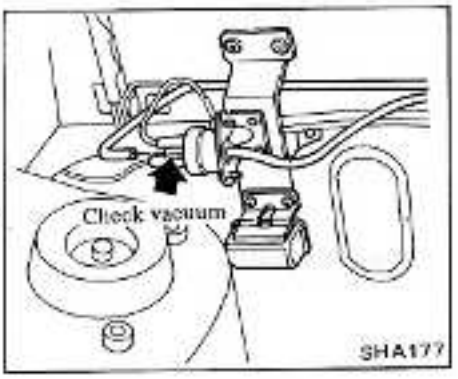
Check operation of compressor clutch.

Clutch is not engaged.

Check electric circuit of clutch, referring to compressor clutch diagnoses.

Clutch is engaged.

Run engine at idle speed. Disconnect vacuum F.I.C.D. magnet valve-to-F.I.C.D. device hose at F.I.C.D. magnet valve and check vacuum.



Vacuum N.G.

Faulty F.I.C.D. magnet valve.

Replace.

Vacuum O.K.

Disconnect vacuum F.I.C.D. magnet valve-to-F.I.C.D. device hose at F.I.C.D. device and check vacuum.

Vacuum O.K.

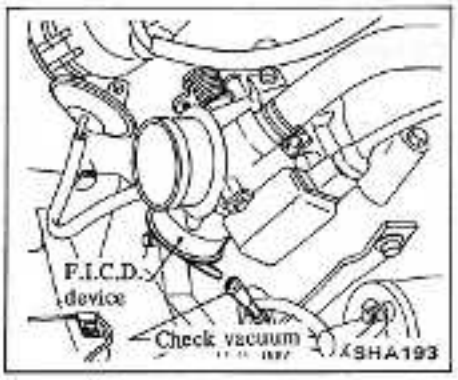
Faulty F.I.C.D. device.

Replace.

Vacuum N.G.

Broken vacuum hose.

Repair.



SERVICE DATA AND SPECIFICATIONS

GENERAL SPECIFICATIONS

COMPRESSOR

Model	SWP167	167AXIAL
Type	Swash plate	Swash plate
Displacement cm³ (cu in)/rev.	167 (10.19)	167 (10.19)
Cylinder bore x stroke mm (in)	37.2 x 25.7 (1.465 x 1.012)	37.0 x 25.8 (1.457 x 1.016)
Direction of rotation	Clockwise (viewed from drive end)	
Type of driving belt	A type	A type

LUBRICATING OIL

Model	SWP167	167 AXIAL
Type	SUNISO 6GS	
Capacity mℓ (Imp fl oz)	270 (9.5)	260 (8.8)

REFRIGERANT

Type	R-12
Capacity kg (lb)	0.9 - 1.1 (2.0 - 2.4)

ENGINE IDLING SPEED

Transmission	When A/C is ON
Manual	About 800 rpm
Automatic (At "N" range)	About 850 rpm

INSPECTION AND ADJUSTMENT

BELT TENSION

Fan belt/Applied pressure mm (in)/N (kg, lb)	8 - 12 (0.31 - 0.47)/98 (10, 22)

COMPRESSOR

Model	SWP167	167AXIAL
Clutch hub to pulley clearance mm (in)	0.5 - 0.8 (0.020 - 0.031)	0.3 - 0.6 (0.012 - 0.024)

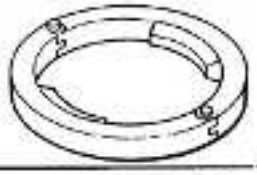
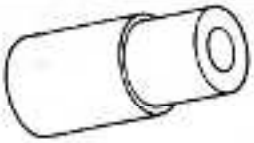
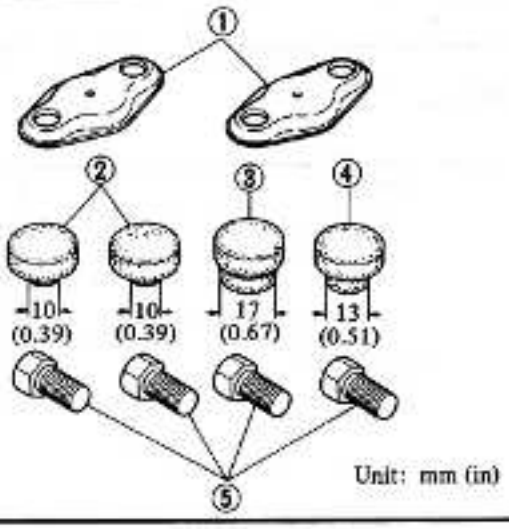
TIGHTENING TORQUE

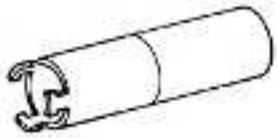
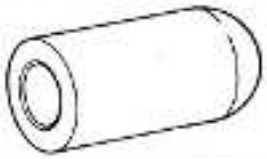
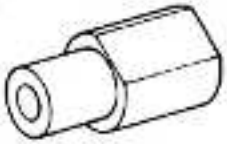
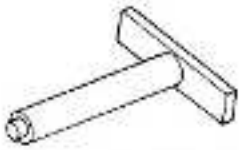
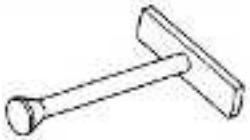
Unit		N-m	kg-m	ft-lb
Compressor bracket to cylinder block	L.H.	44 - 54	4.5 - 5.5	33 - 40
	R.H.	44 - 54	4.5 - 5.5	33 - 40
Compressor to compressor bracket	L.H.	44 - 54	4.5 - 5.5	33 - 40
	R.H.	44 - 54	4.5 - 5.5	33 - 40
Refrigerant line connection: Flexible tube to compressor	L.H.	14 - 18	1.4 - 1.8	10 - 13
	R.H.	16 - 22	1.6 - 2.2	12 - 16
Refrigerant line connection: Others (Tube outer diameter mm (in))	9 (0.31)	15 - 20	1.5 - 2.0	11 - 14
	12 (0.47)	20 - 25	2.0 - 2.5	14 - 18
	16 (0.63)	25 - 29	2.5 - 3.0	18 - 22
Compressor: Lock nut	SWP167	25 - 27	2.5 - 2.8	18 - 20
Compressor: Clutch hub nut	SWP167	18 - 21	1.8 - 2.1	13 - 15
	167 AXIAL	13 - 16	1.3 - 1.6	9 - 12
Compressor: Coil mounting screw	SWP167	2.7 - 3.4	0.28 - 0.35	2.0 - 2.5
	167 AXIAL	3.9 - 5.9	0.4 - 0.6	2.9 - 4.3
Compressor: Rear end cover bolt	SWP167	29 - 34	3.0 - 3.5	22 - 25
Compressor: Cylinder head bolt	167 AXIAL	20 - 24	2.0 - 2.4	14 - 17
Compressor: Side cover bolt	SWP167	18 - 20	1.8 - 2.0	13 - 14
Compressor: Oil drain plug	SWP167	18 - 20	1.8 - 2.0	13 - 14
	167 AXIAL	7.8 - 9.8	0.8 - 1.0	5.8 - 7.2
Compressor: Oil filler plug	167 AXIAL	7.8 - 9.8	0.8 - 1.0	5.8 - 7.2

L.H.: Left-hand drive models
R.H.: Right-hand drive models

SPECIAL SERVICE TOOLS

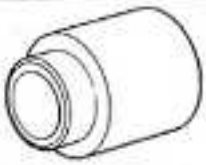
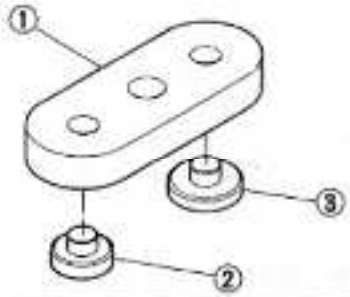
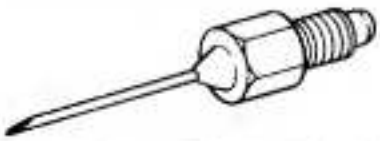
SWP167

Tool number	Tool name
KV99412302	Clutch hub wrench 
KV99412305	Hub nut socket 
KV99412306	Clutch hub puller 
KV99412310	Lock nut socket 
KV99412313	Puller adapter 
KV99412312	Puller pilot 
KV994C1552	Charge nozzle 
KV994C4548 ①KV994C4531 ②KV994C4532 ③KV994C4533 ④KV994C4534 ⑤KV994C4559	Blind cover set Blind cover Gasket (Useless) Gasket Gasket Bolt 

Tool number	Tool name
KV99412321	Shaft seal remover and installer 
KV99412322	Shaft seal pilot 
KV99412329	Shaft handle socket 
KV99412327	Silencer piece installer 
KV99412328	O-ring installer 
KV99412330	Allen socket 
KV99412315	Cylinder head remover 

167 AXIAL

Tool number	Tool name
KV99231010	Clutch wheel holder 
KV99232022	Clutch wheel puller 

Tool number	Tool name
KV99233040	Puller pilot 
KV99234160	Pulley installer 
KV99232130	Seal seat remover 
KV99235140	Shaft seal remover & installer 
KV99267080	Shaft seal guide 
KV99241420 ① KV99241400 ② KV99211100 ③ KV99211300	Blind cover set Blind cover Gasket Gasket 
KV994C1552	Charge nozzle **At leak test, two pieces are required.** 
DK97063010	Shaft handle installer 
KV99268080	Cylinder holder