SECTION A

43-44000 HEATER— AIR CONDITIONER SYSTEM

CONTENTS

DIVISION I SPECIFICATIONS AND ADJUSTMENTS

13-1 SPECIFICATIONS

a. Tightening Specifications

Part	Location	Torque Lb. Ft.
Nut	Drive Plate Nut to Compressor Shaft	14-16
Nuts	Rear Head to Shell	19-23
Cap	Schrader Service Valve	4-5

(For tightening specifications of compressor mounting bracket bolts and nuts see Figures 13-35 and 13-36).

Metal Tube Outside Diameter	Thread and Fitting Size	Steel Tubing Torque Lb.-Ft.	Aluminum or Copper Tubing Torque Lb.-Ft.	Nominal Torque Wrench Span
1/4	7/16	10-15	5-7	5/8
3/8	5/8	30-35	11-13	3/4
1/2	3/4	30-35	11-13	7/8
5/8	7/8	30-35	18-21	1 1/16
3/4	1 1/16	30-35	23-28	1 1/4

If a connection is made with steel to aluminum or copper, use torques for aluminum. In other words, use the lower torque specification.

Use steel torques only when both ends of connection are steel.

13-126 13-1 13-32 13-105A 13-118

Figure 13-1—Pipe and Hose Connection Torque Chart

b. Compressor Specifications

Type	Six Cylinder Axial Opposed
Make	Frigidaire
Effective Displacement (cu. in.)	12.6
Oil	Frigidaire 525 Viscosity
Oil Content (New)	10-1/2 fl. oz.
Air Gap Between Clutch Drive Plate and Pulley	0.022 to 0.057 inch
Clutch Type	Magnetic
Belt Tension	43-44000 Series - 120 lbs. New Belts - 110 lbs., Retensioned Belts 44600 Series - 100 lbs. New Belts - 90 lbs., Retensioned Belts

c. General Specifications

Type of Thermostat	180°
Capacity of Cooling System with Air Conditioner (Quarts)	(V-6) 11.2
	(V-8, 300 cu. in.) 14.0
	(V-8, 340 cu. in.) 14.7
	(V-8, 400 cu. in.) 18.5
Type of Refrigerant	Freon 12, Ucon 12, Genetron 12, Isotron 12
Refrigerant Capacity (Fully Charged)	3-3/4 lbs.

13-2 ADJUSTMENT OF TEMPERATURE CONTROL LEVER AND TEMPERATURE DOOR

It is suggested that control cables regulating the position of the temperature control lever and the temperature door be adjusted when: instrument panel control assembly or air conditioner heater assembly has been removed, or when temperature door does not properly regulate the mixing of, or blocking off of heated air. Adjustment of the temperature lever may be accomplished by placing control lever in cold detent and rotating the control cable adjuster nut until there is present 1/8 to 3/16 inch spring-back from end of travel.

13-3 ADJUSTMENT OF OUTSIDE AIR INLET DOOR

The linkage between the outside air inlet door and the vacuum diaphragm on the plenum blower and air door assembly may be adjusted to insure full closing of air door. To adjust, the plenum blower and air door assembly must be removed (refer to par. 13-2). To adjust merely loosen linkage and allow spring to close door fully, then resecure linkage.

13-4 ADJUSTMENT OF AIR CONTROL LEVER, DIVERTER AND DEFLECTOR DOORS

NOTE: It is suggested that the control cables regulating the action of the air control lever and the related doors be adjusted when: recommended control lever spring-back of 1/8 to 3/16 inch not present, the instrument panel control assembly or the air conditioner heater assembly has been removed, or when diverter, deflector, or defroster doors do not properly regulate flow of air.

Adjustment of the air lever, diverter and deflector doors may be accomplished by rotation of the control cable adjuster nut.

To adjust, position air control lever in A/C position and rotate the control wire adjuster nut until: (1) approximately 1/8 to 3/16 inch control lever spring-back is obtained when the air control lever is in A/C position, (2) approximately 1/16 inch clearance exists between surface of cable pin and edge of slot in instrument panel control assembly (see Figure 13-2).

NOTE: The air control lever will lock in the mid (HTR) position if less than 1/8 inch spring-back occurs. The diverter door will not fully open if more than 3/16 inch spring-back exists.

13-5 ADJUSTMENT OF MASTER VACUUM SWITCH

To adjust master switch (see Figure 13-2) on instrument panel control assembly proceed as follows:

1. Position the fan lever to OFF.

2. Loosen the vacuum switch attaching screws and move the switch forward until the plunger is fully depressed.

3. Secure vacuum switch in position and check operation.

13-6 ADJUSTMENT OF THROTTLE ADVANCE VACUUM SWITCH (V-6 ONLY)

To adjust throttle advance switch on air conditioner-heater assembly proceed as follows:

1. Position air control lever to A/C position.

2. Loosen vacuum switch attaching screws and move forward until the plunger is fully depressed.

3. Secure vacuum switch in position and check operation.

13-7 ADJUSTMENT OF COMPRESSOR CLUTCH SWITCH

To adjust the compressor clutch switch located on the instrument panel control assembly (see Figure 13-2) proceed as follows:

1. Place Air Control lever in A/C position.

2. Loosen screw securing compressor clutch switch in position and reposition switch until contacts just snap closed.

3. Secure switch in place.

4. Work Air Lever between A/C and HTR detents noting each time that switch snaps closed as it reaches A/C detent.

DIVISION II DESCRIPTION AND OPERATION

13-8 GENERAL DESCRIPTION OF SYSTEM

The heater-air conditioner is a series type system in which the cooling unit and the heating unit

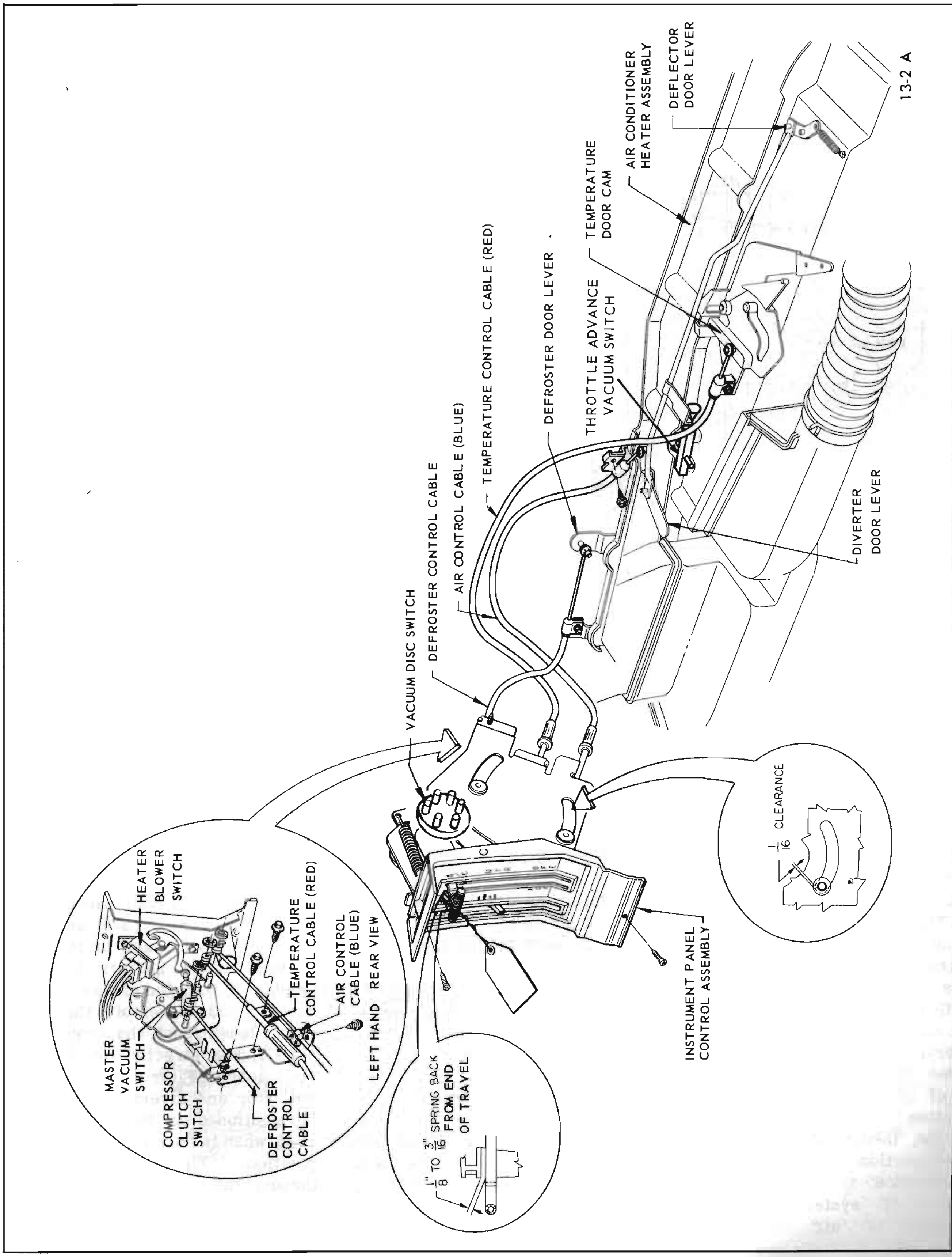


Figure 13-2—Control Wire Installation - 43-44000 Series

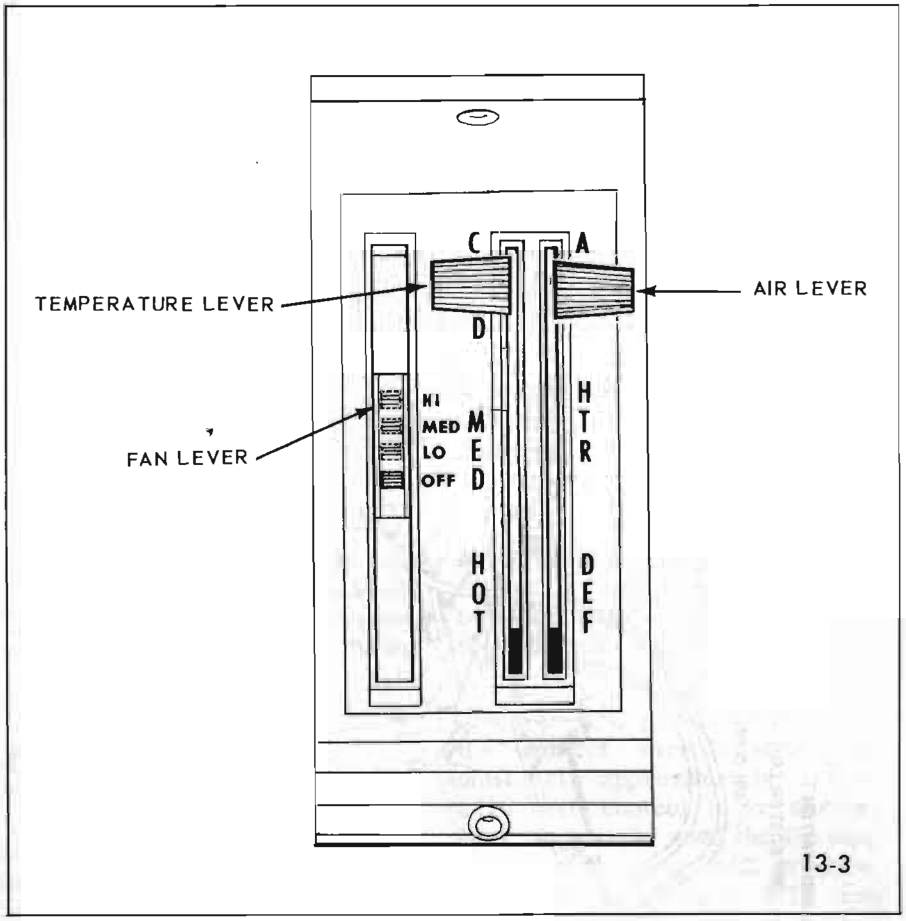


Figure 13-3—Air Conditioner Panel Control Assembly

are positioned in series with each other so that the air may be heated; dried and cooled; or dried, cooled and slightly reheated. The heating and air conditioning portions of the system are integral with each other. Air doors are used to mix and direct the flow of air thru the system. The following description of the heater-air conditioning system is divided into five areas: description of air flow through system, operation of instrument panel controls, theory of operation of heater portion of system, theory of operation of air conditioner portion of system, and description of air conditioning components.

13-9 DESCRIPTION OF AIR FLOW THRU SYSTEM

The following description for the flow of air in the heater-air conditioner system is divided into four groups: air flow for air conditioning, air flow for heating, air flow for defrosting, and air flow for both air conditioning and heating.

a. Air Flow For Air Conditioning

During air conditioner operation the temperature control lever (see Figure 13-3) may be set to COLD or just below COLD position. The air control lever is set at A/C position, and the FAN lever should be in LO, MED, or HI detents. Outside air enters the car through the air inlet grille and flows through the cowl air chamber and into the plenum blower and air door assembly (see Figure 13-4). When the fan lever is set at LO, MED or HI detents, the outside air inlet door partially opens (see Figure 13-5) and allows recirculated air from inside car to re-enter system and mix with outside air.

Positioning of the temperature lever to COLD provides maximum cooling of the passenger compartment. When the temperature lever is moved just past COLD position, the outside air inlet door fully opens and blocks off all recirculated air flow. From the plenum blower and air door assembly the air is directed into the evaporator assembly. Movement of the air flow through the system is initiated by the blower motor switch. During air conditioner operation, the air control lever is in A/C position and the deflector door and the diverter door are positioned so that they will divert the air flow to the air conditioner outlets.

b. Air Flow For Heating

During heater operation the temperature lever may be set anywhere between the range beginning just above the MED detent and ending at the HOT detent. The outside air inlet door will be fully open (see Figure 13-6) and only outside air will pass through the plenum blower and air door assembly. From the plenum blower and air door assembly, the air is channeled through the evaporator core and is directed into the air conditioner heater assembly. The deflector and diverter doors will be positioned as shown in Figure 13-6 when the air lever is in HTR position. The air is diverted through the heater core as shown. The amount of air allowed to pass through the heater core is regulated by the temperature door. A

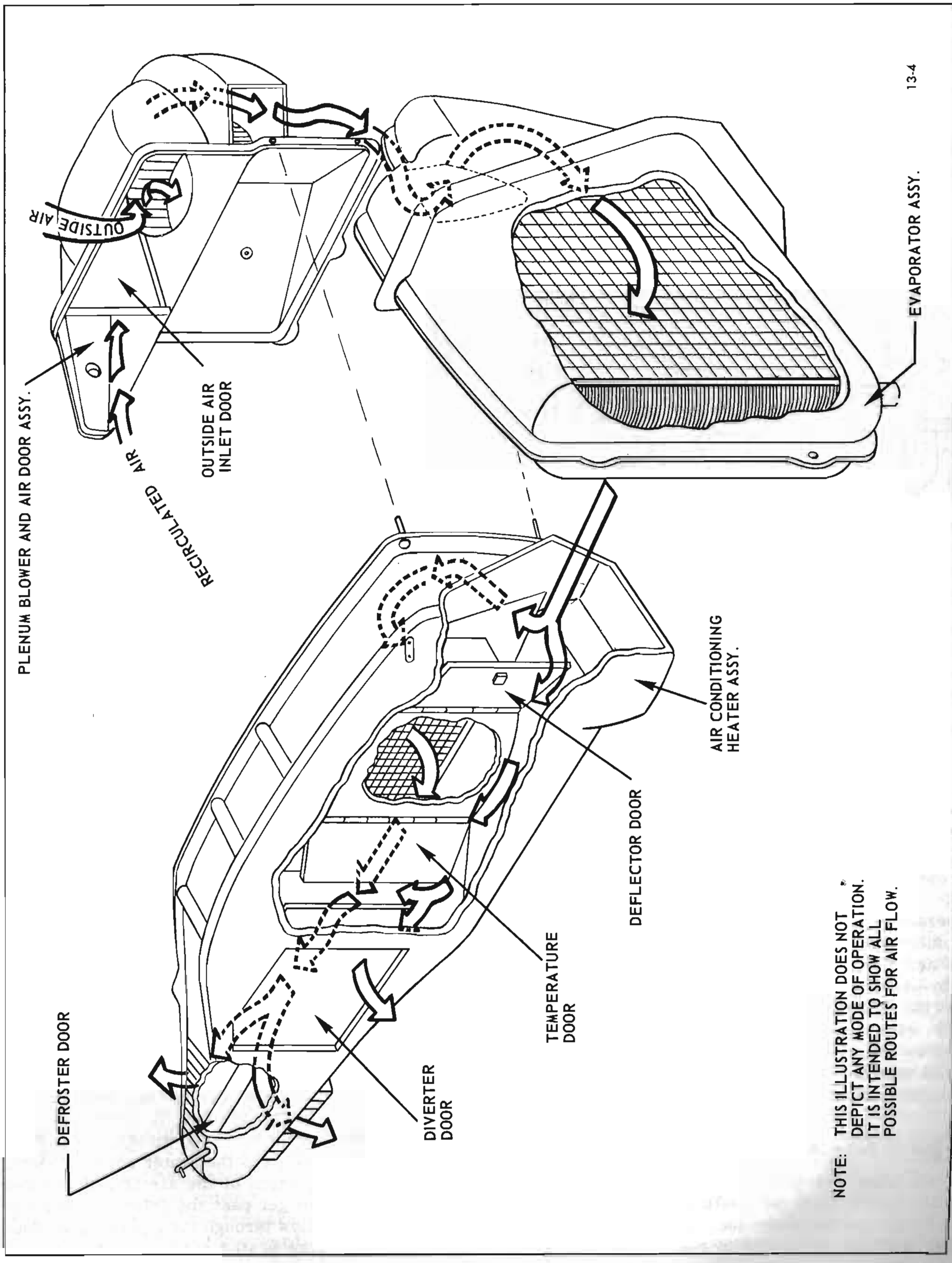


Figure 13-4—Air Flow through Heater - Air Conditioner System

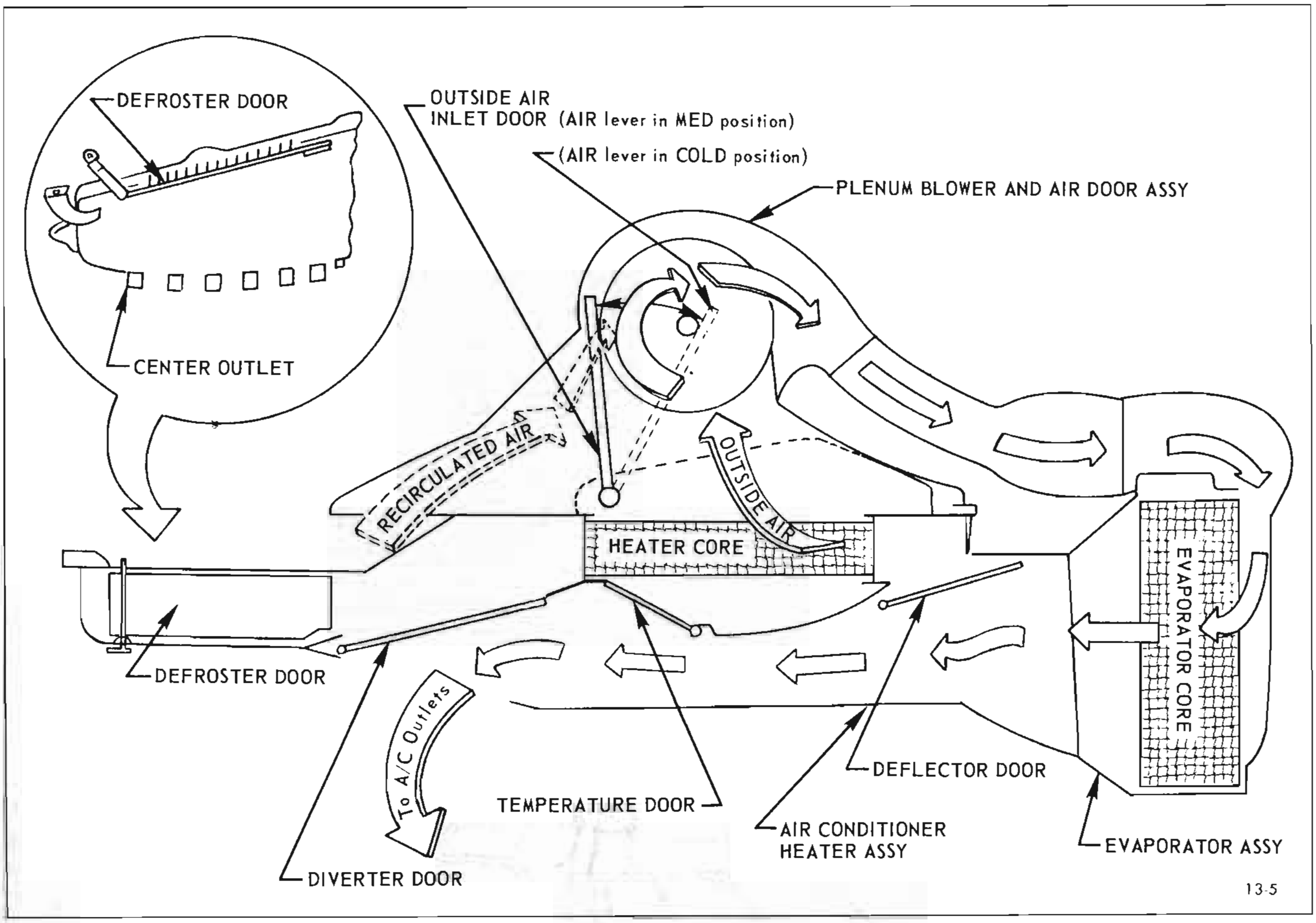


Figure 13-5—Air Flow for Air Conditioner Operation

small amount of unheated air is allowed to by-pass the deflector door. This unheated air will dilute the heated air depending on the opening of the temperature door. Maximum setting of the temperature lever to HOT position fully opens the temperature door and blocks off all unheated air by-passing the heater core. After the heated air leaves the heater core it passes thru the center outlet of the heater assembly and onto the front floor of the passenger compartment.

c. Air Flow For Defrosting

The air flow for defrosting is similar to air flow for heating, except that the defroster door is opened and air is routed to the defroster outlets. When the system is adjusted for defrosting (air control lever set between HTR and DEF position and temperature control lever set between MED and HOT positions) the doors will be positioned as shown in Figure 13-7. The balance of the air flow not diverted to the defroster outlets is channeled to the floor outlet.

d. Air Flow For Both Air Conditioning and Heating

To set the air conditioner system for combined heating and air conditioning operation, adjust the temperature control lever between MED and HOT and the air control lever to A/C.

When the temperature control lever is set between MED and HOT detents, the outside air door will have fully opened (blocking off recirculated air flow) and the temperature door will have partially opened (see Figure 13-8).

The air flows from the plenum blower and air door assembly to the evaporator assembly. The air, now cooled, flows from the evaporator assembly to the air conditioner heater assembly. Most of the air flow is diverted by the deflector and diverter doors to by-pass the heater core. A small portion of the air flow is allowed to get past the deflector door and flow through the heater core. Both the heated and the air conditioned

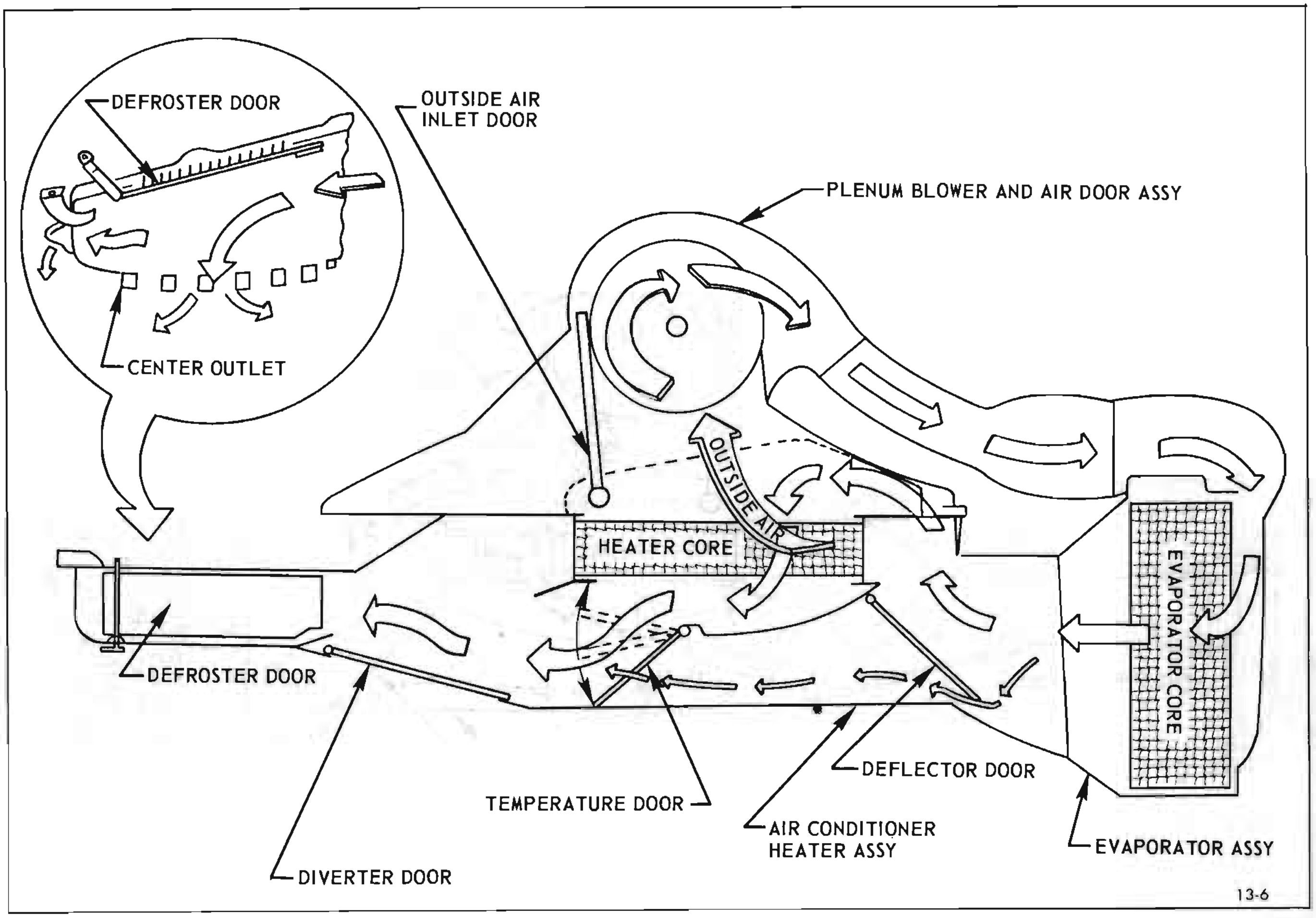


Figure 13-6—Air Flow for Heater Operation

air mix together and are channeled to the air conditioner outlets. The air flow under these conditions is dehumidified and slightly warmed and is particularly suited to provide comfortable driving conditions during relatively cool, damp weather.

NOTE: When the air control lever is positioned just below the A/C detent (move lever downward until a click is heard) the air conditioner will be shut off and non-cooled air will flow from the air conditioner outlets. This condition will be the same as the VENT condition on 45-46-48-49000 Series cars. Air also may be subsequently heated by moving the temperaturn control lever downward.

13-10 OPERATION OF INSTRUMENT PANEL CONTROLS

All the controls for regulation of the heater-air conditioner system are located on the instrument panel control assembly. They operate as follows:

a. Temperature Control Lever

The temperature control lever regulates the outside air inlet door, the temperature door, and the vacuum operated water valve (see Figures 13-9 and 13-2). When the temperature control lever is in COLD position, the temperature door and the vacuum operated water valve are closed and the outside air door will be in recirculated position provided the FAN lever is on (see Figure 13-9). Movement of the temperature control lever slightly past COLD position (see Figure 13-10) causes the outside air inlet door to fully open cutting off recirculated air flow from inside car. Thus, only outside air is used, and the previously cooled recirculated air is cut-off. The effect is an increase in the temperature in the car interior. Further movement of the control lever as shown in Figure 13-11 causes vacuum to be applied to the vacuum element of the water valve, thereby allowing coolant circulation through the heater core. This results in a further increase of the temperature of the air conditioned air. As the temperature lever is moved from

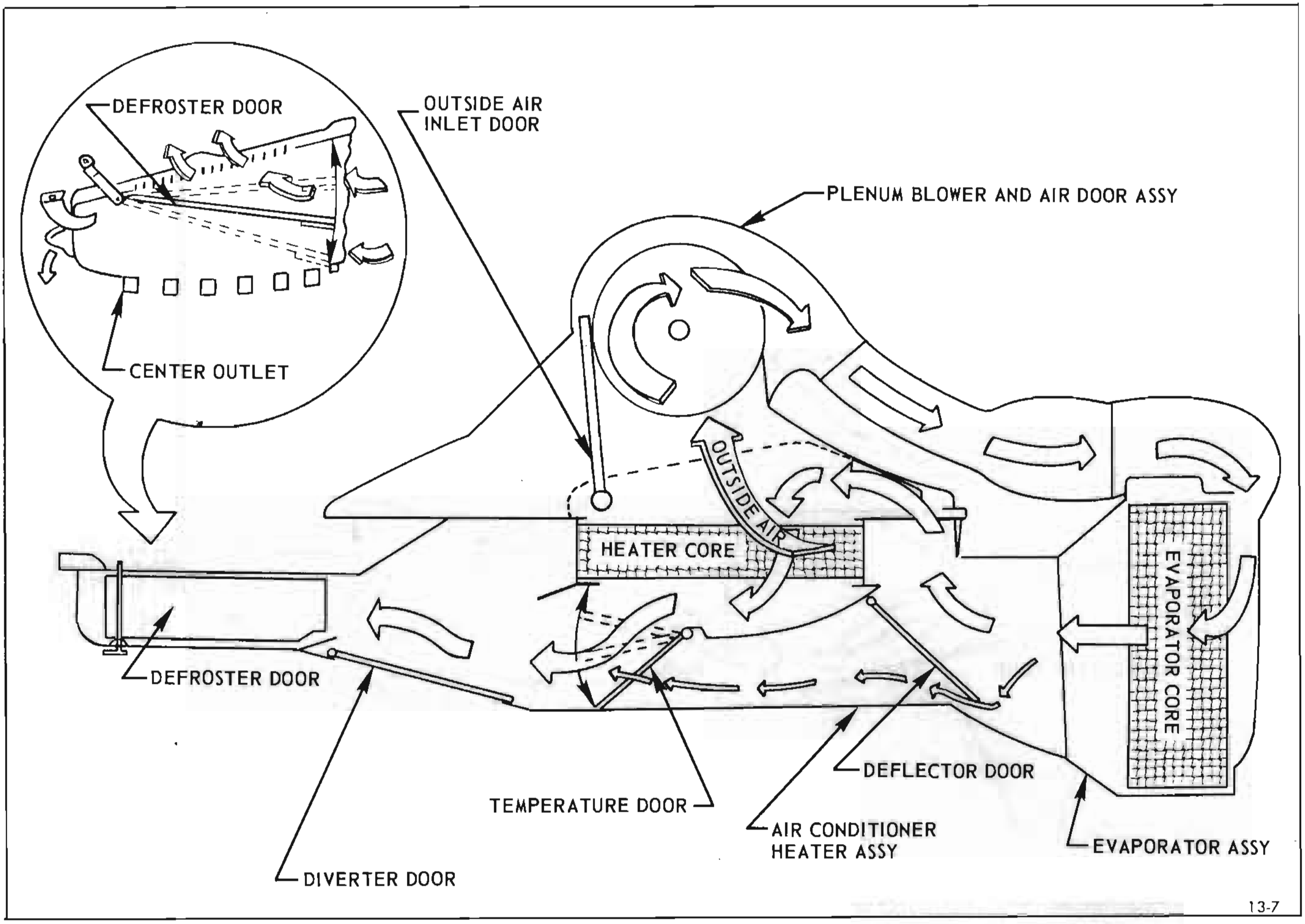


Figure 13-7—Air Flow for Defroster Operation

MED to HOT positions, the temperature door is proportionately opened and more air is forced to circulate around the heater core.

b. Air Control Lever

The air control lever (see Figures 13-9 and 13-2) regulates, thru control cables, the positions of the diverter, deflector, and defroster doors, and operates one of the two electrical switches (compressor clutch switch) in the air conditioner circuit and controls the application of vacuum on full outside air port of the outside air diaphragm. When the air control lever is in A/C position the diverter and deflector doors divert most of the air flow and cause it to by-pass the heater core (see Figure 13-5). In addition, when the air control lever is in A/C position, the air conditioner compressor clutch switch is held closed. This switch is one of two switches (see Figure 13-12) in the heater-air conditioner circuit which must be closed to operate the compressor.

Movement of the air control lever to HTR position changes the angle of the diverter and deflector doors, and diverts most of the air flow through the heater core (see Figure 13-6). In addition vacuum is applied to the full outside air port of the outside air diaphragm (see Figure 13-10) causing the outside air door tc fully open. Further, when the air control lever is in HTR position the air conditioner compressor clutch switch is allowed to open shutting off the air conditioner compressor. Further movement of the air control lever to DEF position opens the defroster door and diverts air flow from floor outlet to defroster outlet. Midway location of air lever between HTR and DEF positions will apportion the air flow to both the defroster and floor outlets.

c. Fan Control Lever

The fan control lever (see Figure 13-9) operates the heater blower switch and applies vacuum to the vacuum diaphragm of

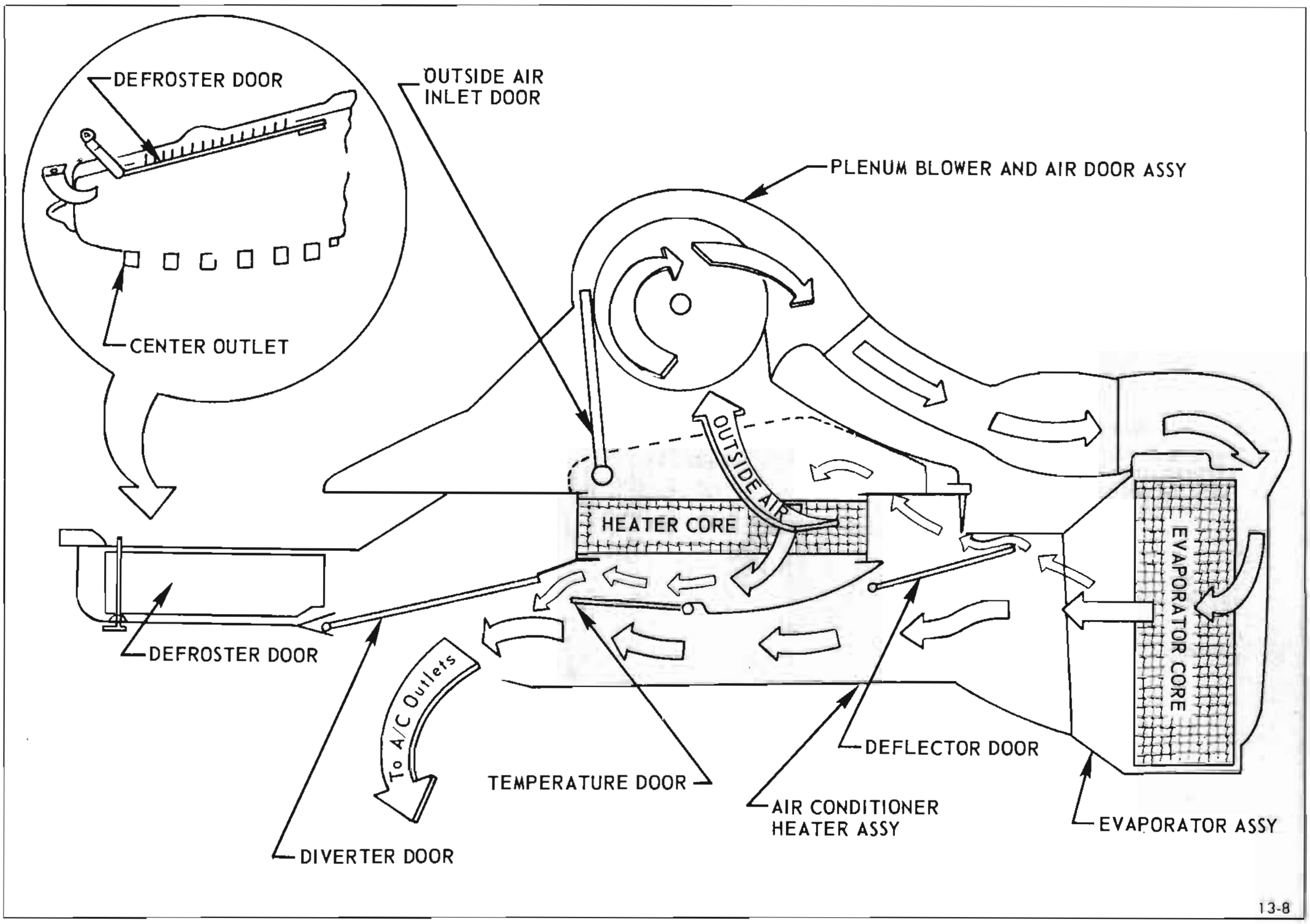


Figure 13-8—Air Flow for Both Air Conditioner and Heater Operation

the outside air inlet door. When the lever is moved to LO position three changes take place in the system, provided the air control lever is in A/C position. First, the blower motor is actuated and air is force fed through the system. Secondly, the magnetic clutch of the compressor is engaged and air conditioning system is in turn actuated. Thirdly, a vacuum is applied to the recirculated air port of the outside air inlet door diaphragm and the door partially opens permitting outside and recirculated air flow through system. Further movement of the fan lever to MED or HI positions proportionately increases the blower speed.

13-11 OPERATION OF HEATER PORTION OF SYSTEM

Engine heat is transmitted to the heater core by the flow of coolant through the core. The flow of coolant or water through the heater core of the heater-air conditioner system is as shown in Figure 13-13. Coolant enters the lower port of the heater core and exits from the upper port. The flow of coolant (hence operation of the heater core) is turned on and off by means of the water valve. The valve is vacuum operated and is actuated by a vacuum disc switch located on the instrument panel control assembly. The water valve is closed when the temperature control lever is at COLD or just off COLD position (see Figures 13-9, 13-10 and 13-11). The valve is fully opened whenever the temperature control lever is moved approximately halfway between the COLD and past the MED positions. It will stay fully open for the remainder of the travel of the temperature control lever to HOT position.

13-12 OPERATION OF AIR CONDITIONER PORTION OF SYSTEM

The state of the refrigerant at the inlet port of the compressor is a

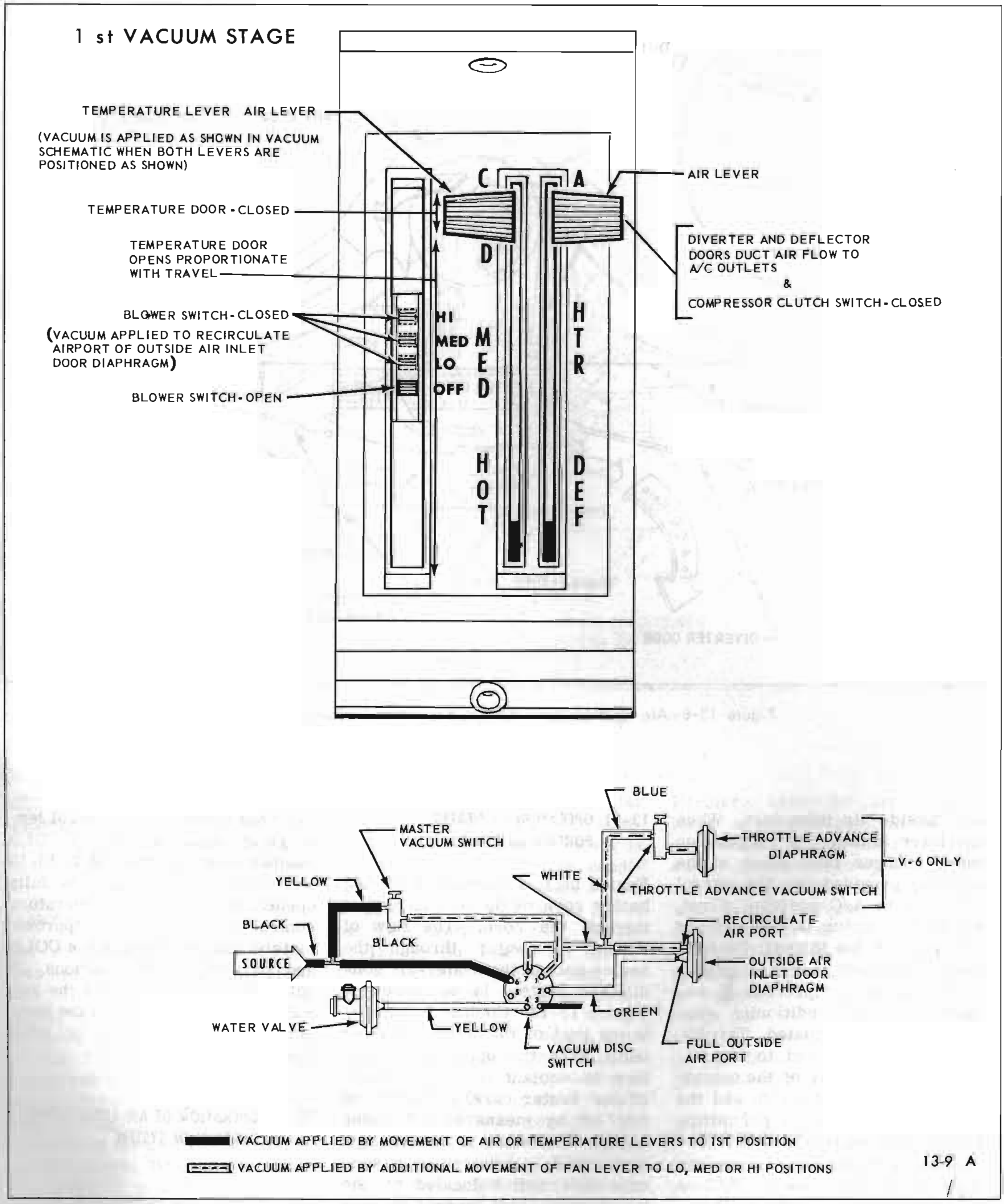


Figure 13-9—Vacuum Circuit Conditions When Both Control Levers Are Set Fully Upward

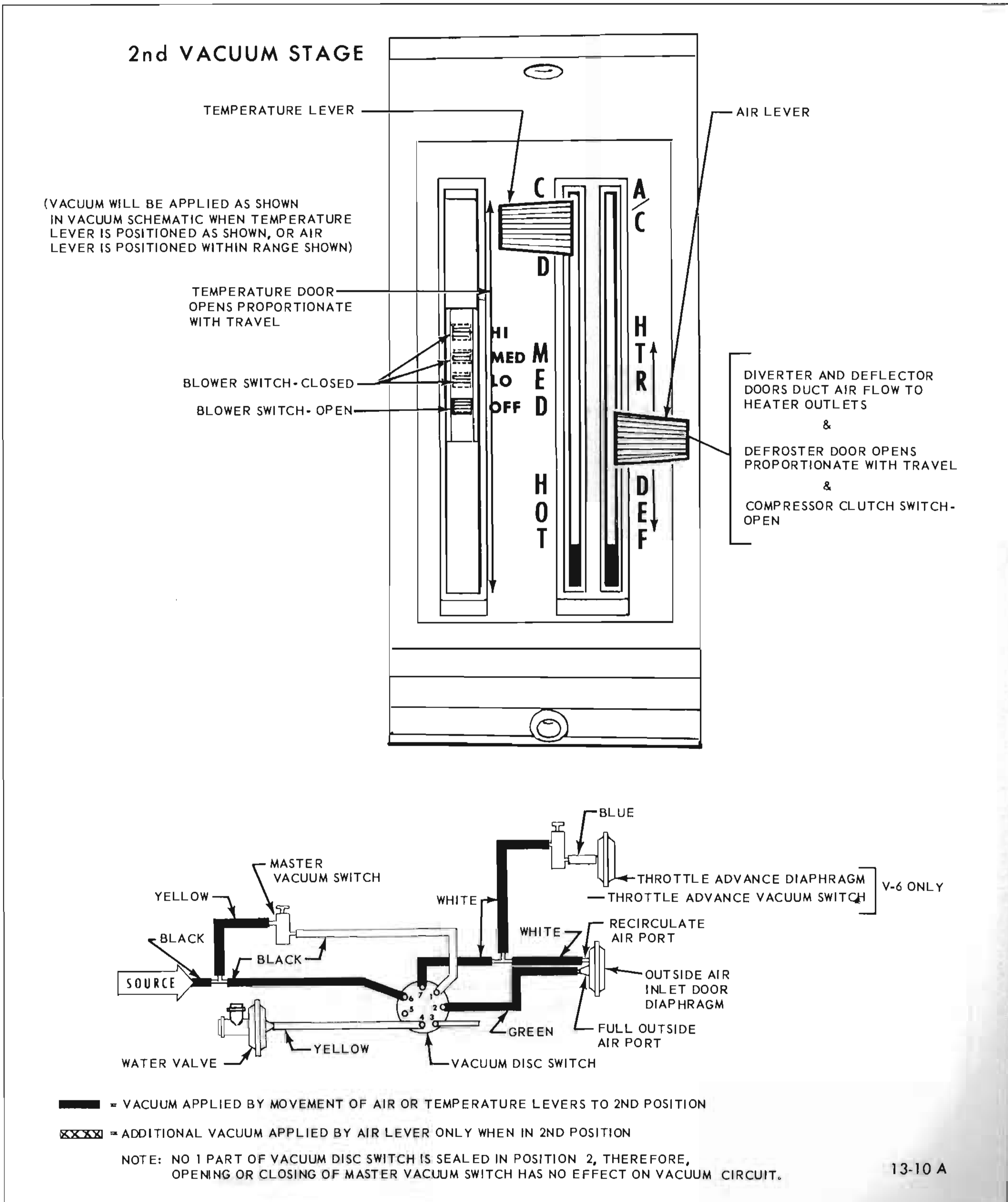
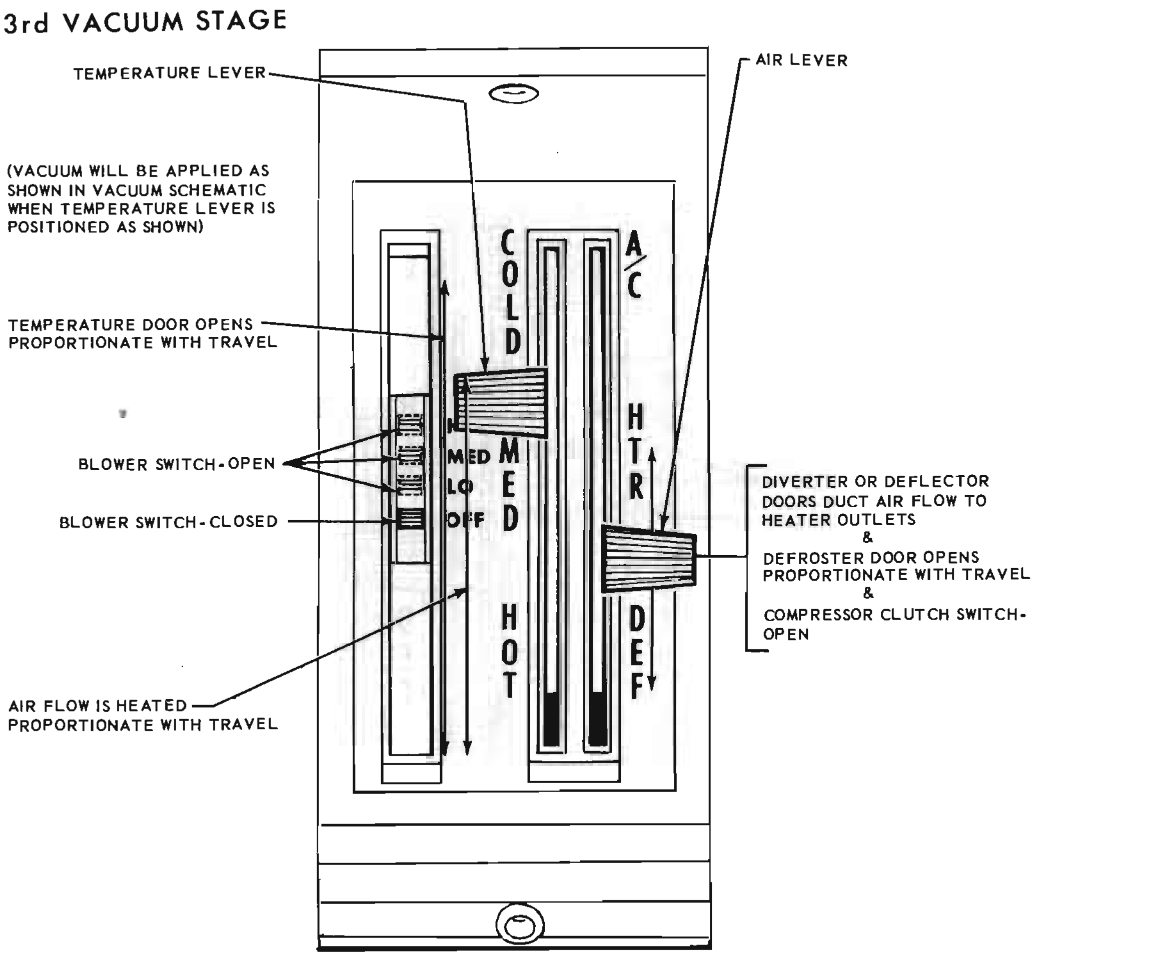


Figure 13-10—Vacuum Circuit Condition When Air or Temperature Levers Position Vacuum Disc Switch at Second Stage of Rotation



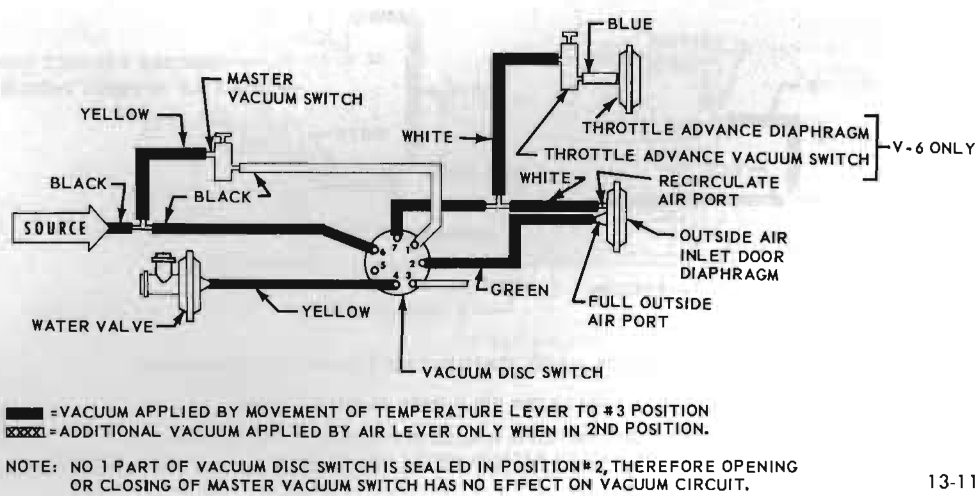


Figure 13-11—Vacuum Circuit Conditions When Temperature Lever Positions Vacuum Disc Switch at Third Stage of Rotation

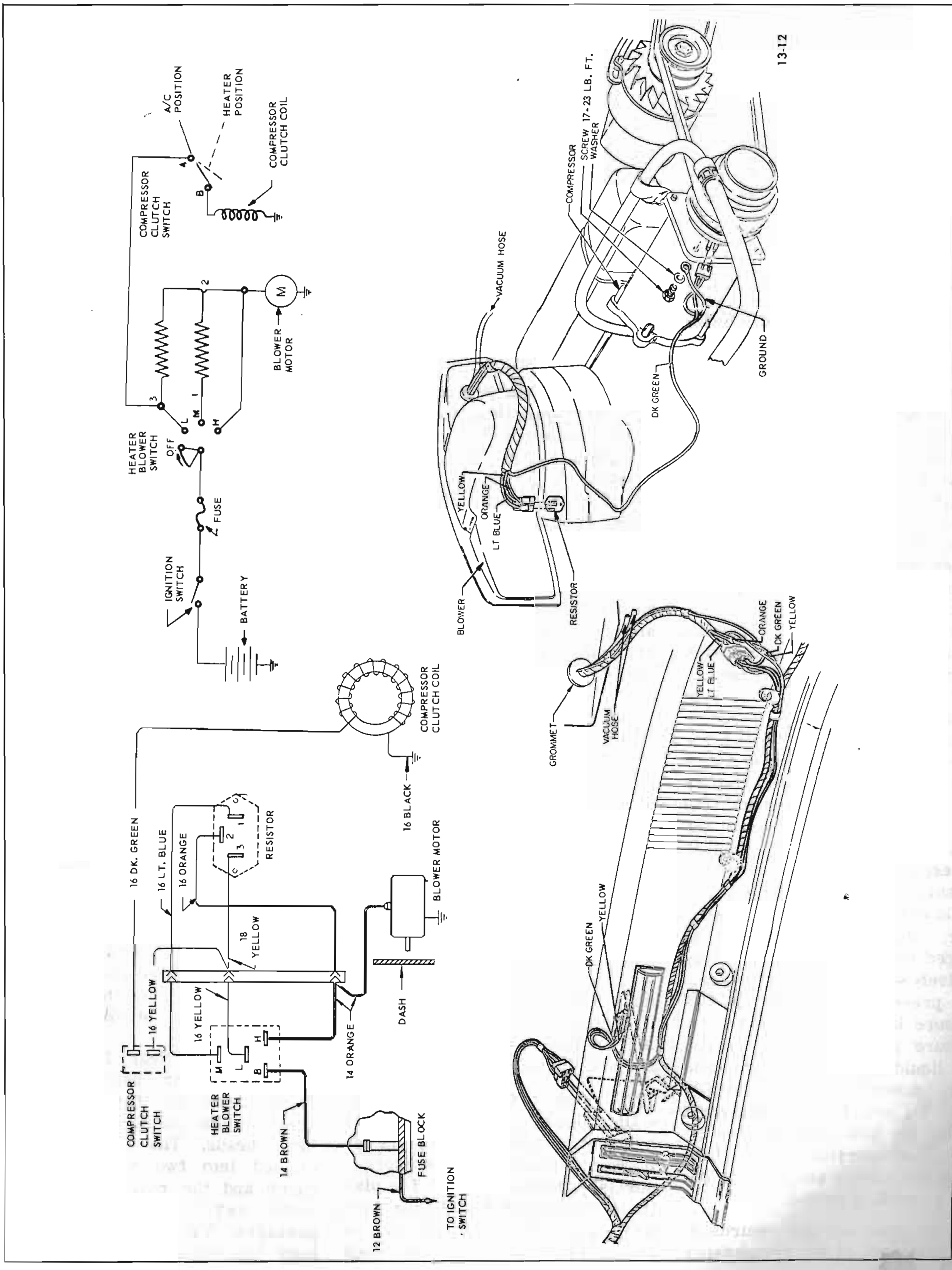


Figure 13-12—Electrical Circuit of Heater - Air Conditioner

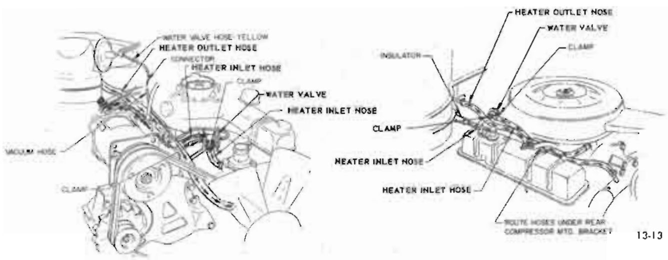


Figure 13-13—Heater Coolant Circulation

low pressure gas. The compressor compresses the gas into a high pressure high temperature gas (see Figure 13-14). Because of the increase in pressure, the heat in the gas has been concentrated and therefore is increased above the ambient (outside air) temperature. This heat in excess above the ambient temperature tends to dissipate itself. A condenser is utilized in the refrigeration circuit to provide a means whereby the heat of the refrigerant can be easily dissipated. The high pressure, high temperature (hot) gas flows through the condenser and is cooled to a high pressure liquid as it gives up its heat. From the condenser the high pressure liquid flows to the receiver-dehydrator and then to the expansion valve where the pressure is reduced and the liquid is allowed to expand in the evaporator. When the pressure is reduced the refrigerant will successively transform itself from a high pressure liquid to a low pressure liquid, and then to a low pressure gas. As the low pressure liquid expands and becomes a low pressure gas it absorbs heat. To satisfy the refrigerant demand for heat, the air passing over the evaporator gives up heat to the evaporator and in doing so, it as a result is cooled.

The low pressure gas returns to the inlet port of the compressor (the original starting point) where the cycle just described repeats itself. Although the foregoing description holds true in actual system operation, it should be qualified insofar as whenever the compressor is running, a portion of the refrigerant remains in a liquid state and consequently there is a certain amount of continuous liquid flow of refrigerant and oil throughout the system at all times during the refrigerating cycle.

13-13 DESCRIPTION OF AIR CONDITIONING COMPONENTS

a. Compressor

The compressor is located on right side of the engine compartment (see Figure 13-15). The purpose of the unit is to draw the low pressure vapor from the evaporator and compress this vapor into a high temperature and high pressure gas. This action will result in the refrigerant having a higher temperature than the surrounding air.

The compressor is of basic double action piston design. Three horizontal double acting pistons make up a six cylinder compressor (see Figure 13-16). The pistons operate in 1-1/2 inch bore and have a 1-1/8 inch stroke. A swash plate keyed to the shaft drives the pistons. The shaft is belt driven through a magnetic clutch and pulley arrangement. An oil pump mounted at the rear of the compressor picks up oil from the bottom of the compressor and lubricates the bearings and other internal parts of the compressor.

Reed type valves at each end of the compressor open or close to control the flow of incoming and outgoing refrigerant. Two gas tight passages interconnect chambers of the front and rear heads so that there is one common suction port, and one common discharge port. The internal parts of the compressor function as follows:

1. Suction Valve Reed Discs and Discharge Valve Plates--The two suction valve reed discs and two discharge valve plates (see Figure 13-17) operate in a similar but opposite manner. The discs are composed of three reeds and function to open when the pistons are on the intake portion of their stroke (downstroke), and close on the compression stroke. The reeds allow low pressure gas to enter the cylinder heads. The discharge valve plates also have three reeds, however, they function to open when the pistons are on the compression portion of their stroke (upstroke), and close on the intake stroke. High pressure gas exits from the cylinder head discharge port. Three retainers riveted directly above the reeds on the valve plate serve to limit the opening of the reeds on the compression stroke.

2. Front and Rear Heads--The front and rear heads (Figure 13-18) serve to channel the refrigerant into and out of the cylinder heads. The front head is divided into two separate passages and the rear head is divided into three separate passages. The outer passage on both the front and rear heads

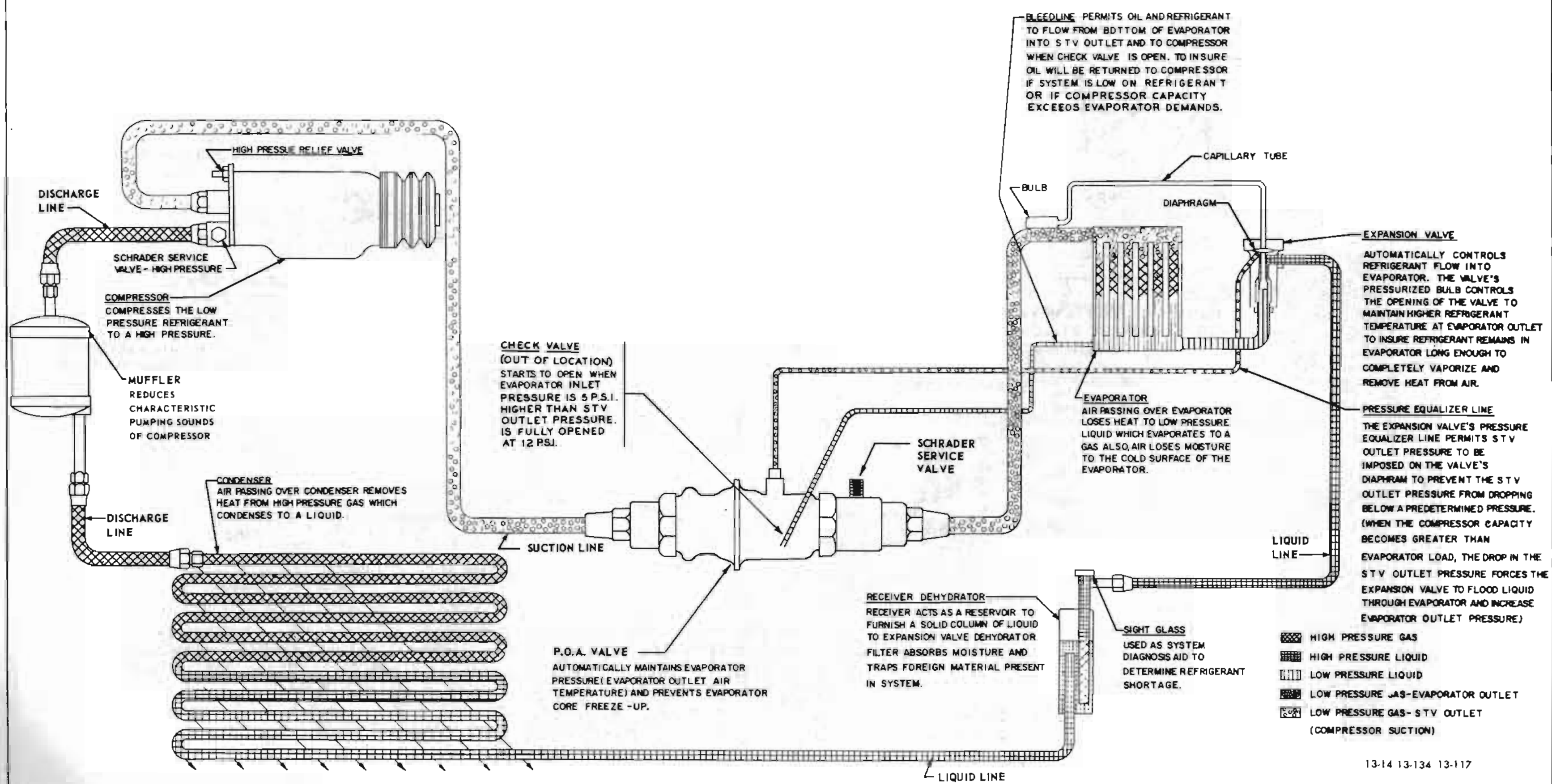


Figure 13-14—Air Conditioner Refrigeration Circuit

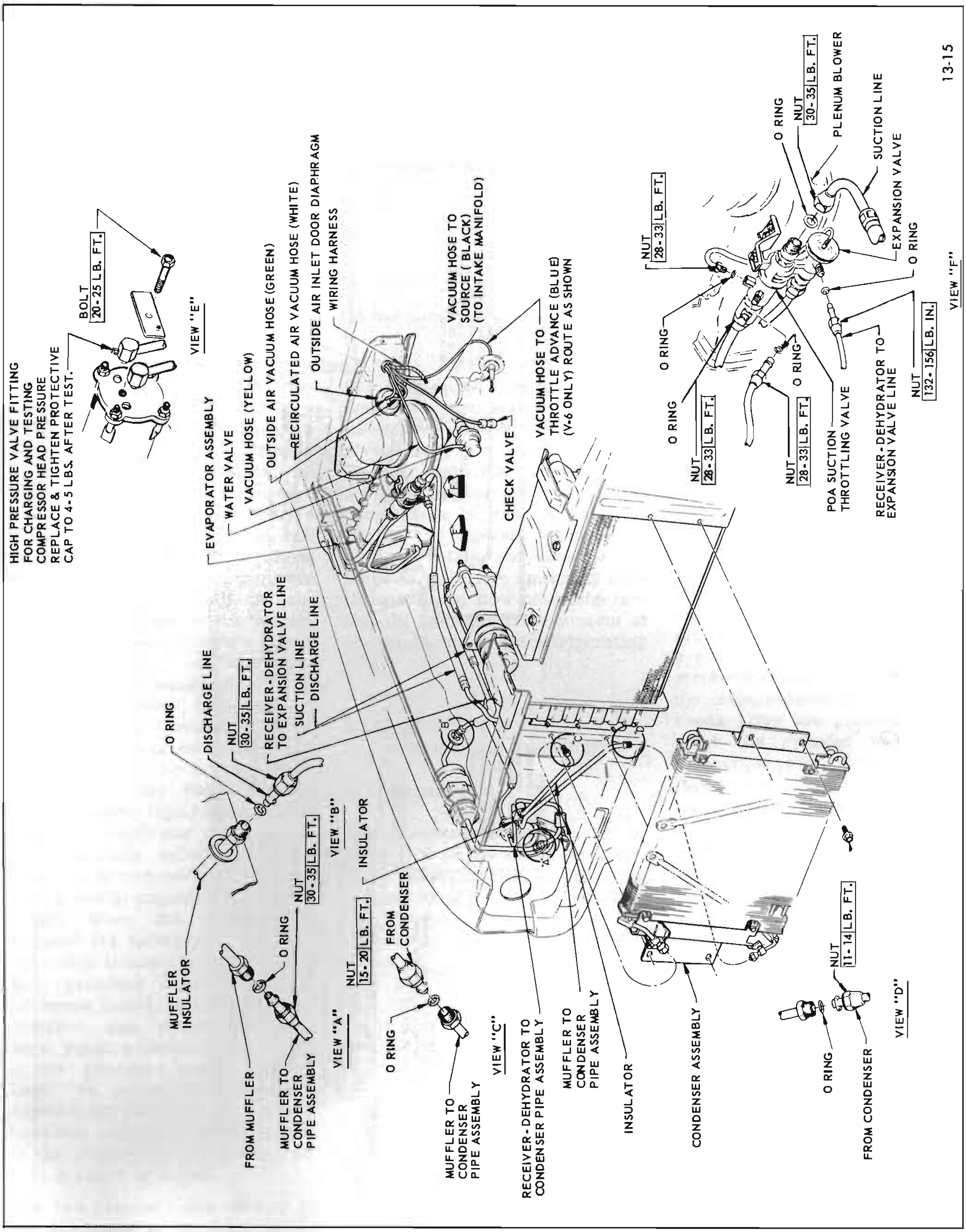


Figure 13-15—Air Conditioner Refrigerant Components Installed

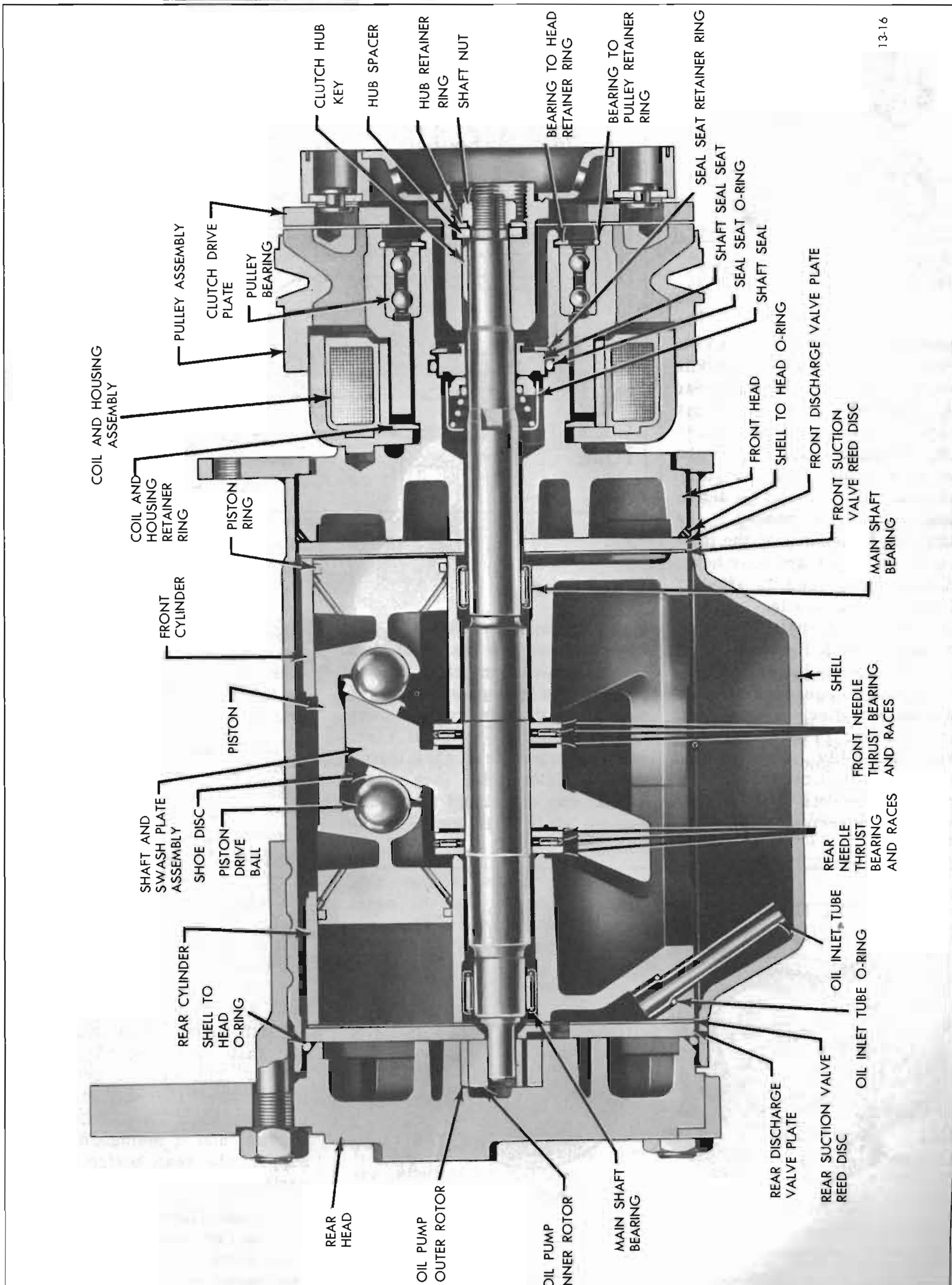


Figure 13-16—Compressor (Sectional View)

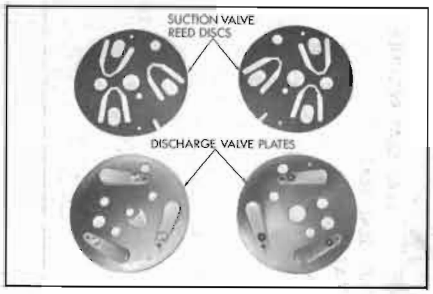


Figure 13-17—Compressor Suction Valve Reed Discs and Discharge Valve Plates

channels low pressure gas to the suction valve reeds. The middle passage on both front and rear heads channels high pressure gas to the discharge valve plate reeds. The inner passage on the rear head houses the oil pump inner and outer rotors. A teflon sealing material is bonded to the sealing edges separating the passages in the front and rear head. "O" rings are used to affect a seal between the mating edges of the heads and the shell. The front head suction and discharge passages are connected to the suction and discharge passages of the rear head by a discharge tube and suction passage in the body of the cylinder assembly. A screen located in the suction port of the rear head prevents foreign material from entering the circuit.

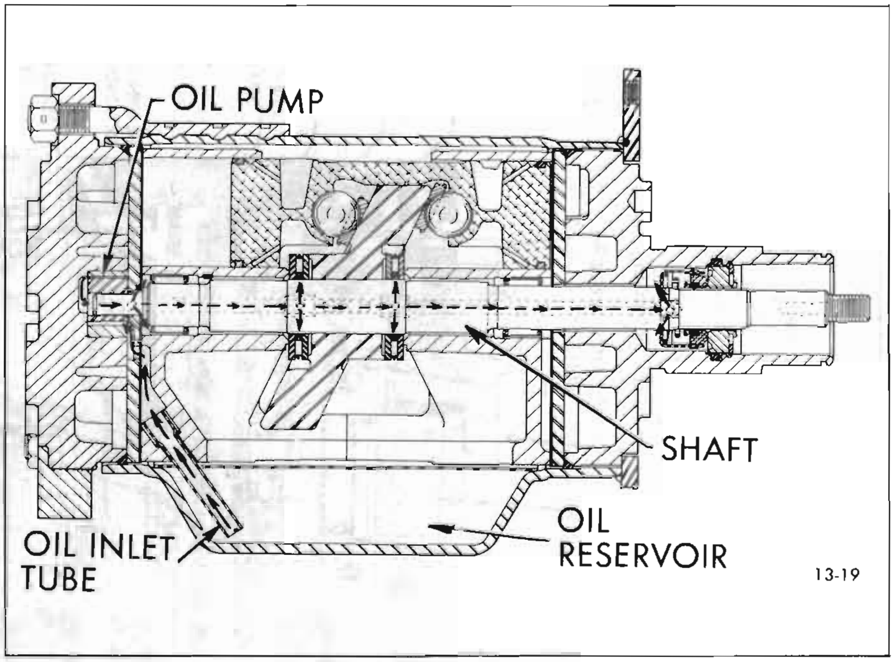


Figure 13-19—Compressor Oil Flow

3. Oil Pump--An internal tooth outer rotor and external tooth inner rotor comprise the oil pump. The pump works on the principle of a rotary type pump. Oil is drawn up from oil reservoir in underside of shell through the oil inlet tube (see Figure 13-19) and circulated through the system via a 3/16 inch diameter oil passage through the shaft center and also four 5/64 inch diameter holes drilled perpendicular to the shaft. The inner rotor is driven by the shaft.

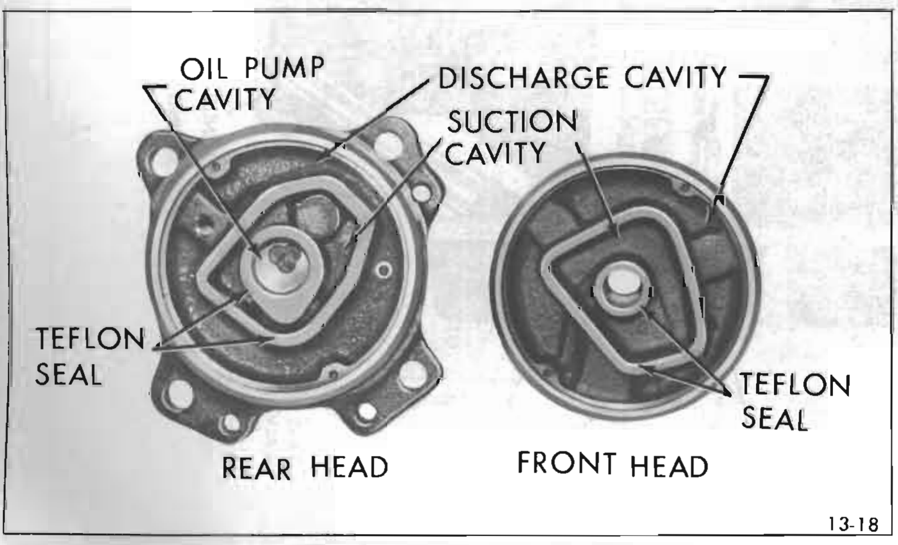


Figure 13-18—Compressor Front and Rear Heads

4. Shaft and Swash Plate Assembly--The shaft and swash plate assembly (see Figure 13-16) consists of an elliptical plate positioned obliquely to the shaft. As the plate rotates on the shaft, the surface of the plate moves to and fro lengthwise relative to the centerline of the shaft. This reciprocating motion is transmitted to the pistons which contact the surface of the swash plate. A woodruff key locks the swash plate onto the shaft. The swash plate and shaft are serviced as an assembly. The shaft is driven by a pulley when the magnetic clutch is energized. A needle thrust bearing and a mainshaft bearing support the shaft horizontally and vertically.

5. Needle Thrust Bearing and Races--Two needle thrust bearings, each "sandwiched" between two races are located on either

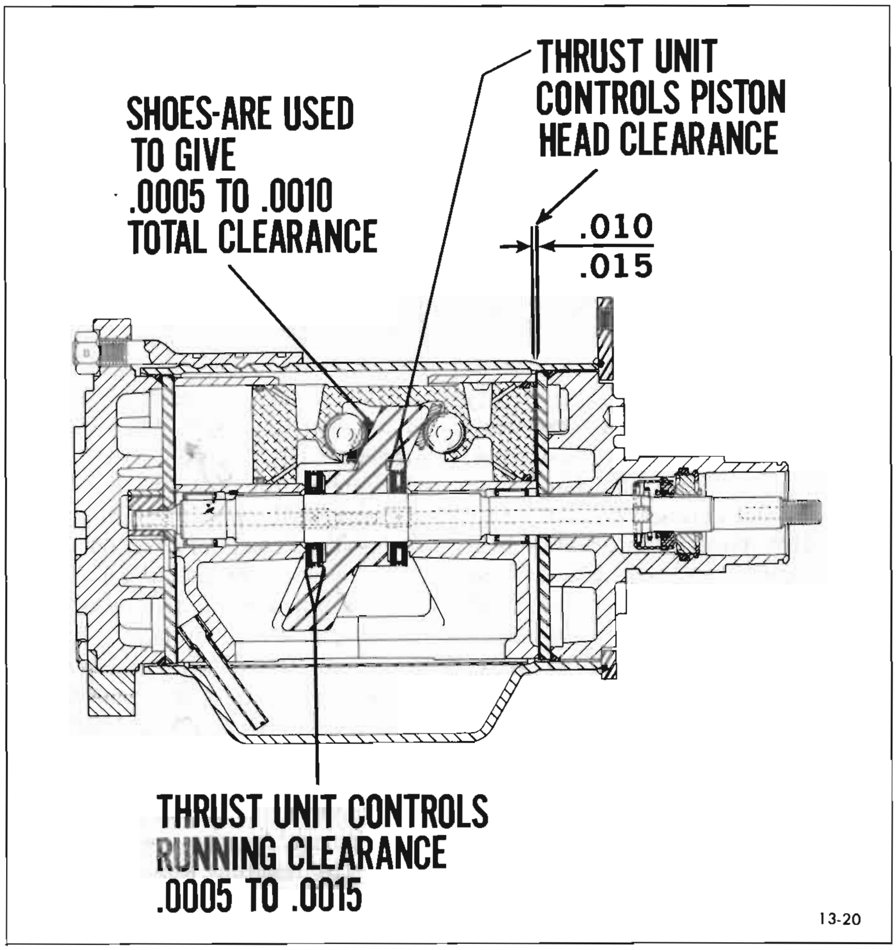


Figure 13-20—Compressor Needle Thrust Bearings and Races

side of the swash plate hub. The front needle thrust bearing and races provide 0.010" to 0.015" clearance between the top of the pistons and the rear side of the front suction valve reed disc (see Figure 13-20). The rear needle thrust bearings and races provide 0.0005" to 0.0015" clearance between the hub of the swash plate and the rear hub of the rear cylinder. Races of various thicknesses are provided for service replacement to achieve required clearances when rebuilding units.

6. Cylinder Assembly and Pistons --The cylinder assembly (front cylinder and rear cylinder) is serviced only as a matched set. Alignment of the two halves is maintained by two dowel (locater) pins.

The double ended pistons are made of cast aluminum. There are two grooves on each end of the piston. The outer grooves will receive a piston ring. The inner grooves act as oil scraper grooves to collect any excess oil. Two oil return holes are drilled into the scraper grooves and allow oil to drain back into the reservoir.

7. Shoe Discs--The shoe discs are made of bronze and act as a bearing between the ball and the swash plate. An oil circulation hole is provided through the center of each shoe for lubrication purposes. These shoes are of various thicknesses and are provided in 0.0005 inch increments. Ten sizes are available for service replacement. A basic "zero" shoe size is available for preliminary gauging procedures when rebuilding a cylinder assembly.

8. Suction Pass Cover and Seal--The suction pass cover fits over a suction passage (see Figure 13-21) in the body at the cylinder assembly. Low pressure vapor flows from the suction port through the suction passage in the cylinder assembly, and into the suction cavity of the front head.

9. Discharge Tube-The discharge tube is used to connect the discharge cavity in the front head with the discharge port in the rear head. High pressure vapor discharge is channeled via the tube to discharge port. A slightly modified discharge tube is provided to be used as a service replacement tube (see Figure 13-22). The service replacement tube has a reduced end and a built up shoulder to accommodate an "O" ring and bushing. These added parts achieve the necessary sealing of the high pressure vapor within the compressor.

10. Pressure Relief Valve--The purpose of the pressure relief valve is to prevent the discharge pressure from exceeding 440 psi.

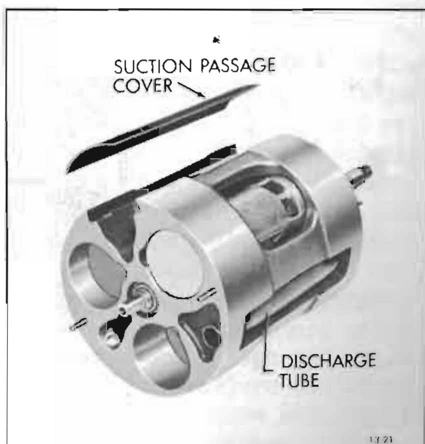


Figure 13-21—Suction Passage and Discharge Tube

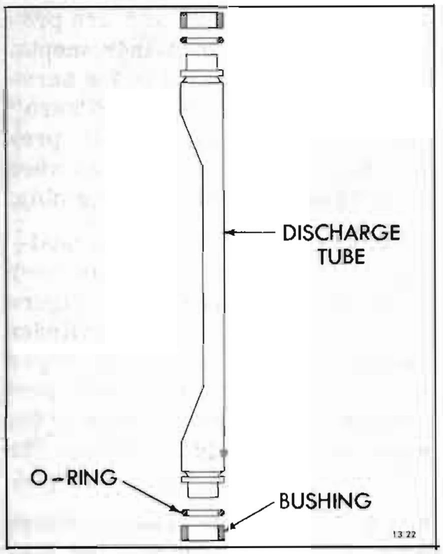


Figure 13-22—Service Replacement Discharge Tube

Opening of the pressure relief valve will be accompanied by a loud popping noise and the ejection of some refrigerant from the valve. If the pressure relief valve is actuated due to excessive pressures in the compressor, the cause of the malfunction should be corrected immediately. The pressure relief valve is located on the rear head of the compressor.

11. Shell and Oil Drain Screw-- The shell of the compressor contains a reservoir which furnishes a continuous supply of oil to the moving parts of the compressor. A baffle plate covers the reservoir and is tack-welded to the inside of the shell. In addition an oil drain screw and gasket are located on the side of the reservoir and are provided for draining or adding of oil to system. To add oil, compressor must be removed from car. The necessity to add oil should only be required when the system has ruptured violently and oil has been lost along with refrigerant. Under controlled conditions or slow leak conditions it is possible to lose only a small amount of oil with the refrigerant gas. The serial number, part or model number, and rating of the compressor is stamped on name plates located on top of shell.

12. Magnetic Clutch and Pulley Assembly-- The magnetic clutch and pulley assembly (see Figure 13-23) together transmit power from the engine crankshaft to the compressor. The magnetic clutch is actuated when the air conditioning clutch compressor switch and the fan switch located on the instrument panel control assembly, are closed. When the switches are closed (air lever in A/C position and fan lever in LO, MED, or HI positions) the coil sets up a magnetic field and attracts the armature plate (movable element of the clutch drive plate). The armature plate portion of the clutch drive plate moves forward and contacts the friction surface of the pulley assembly, thereby mechanically linking the compressor to the engine. The compressor will operate continuously whenever the air conditioner clutch compressor switch and the fan switch are closed. When one or both of the switches are open the armature plate will be released due to spring tension, and move away from the pulley assembly. This allows the pulley to rotate without driving the shaft. It should be noted that if the air conditioner system was in use when the engine was turned off, the armature plate may remain in contact with the pulley due to residual magnetism. When the

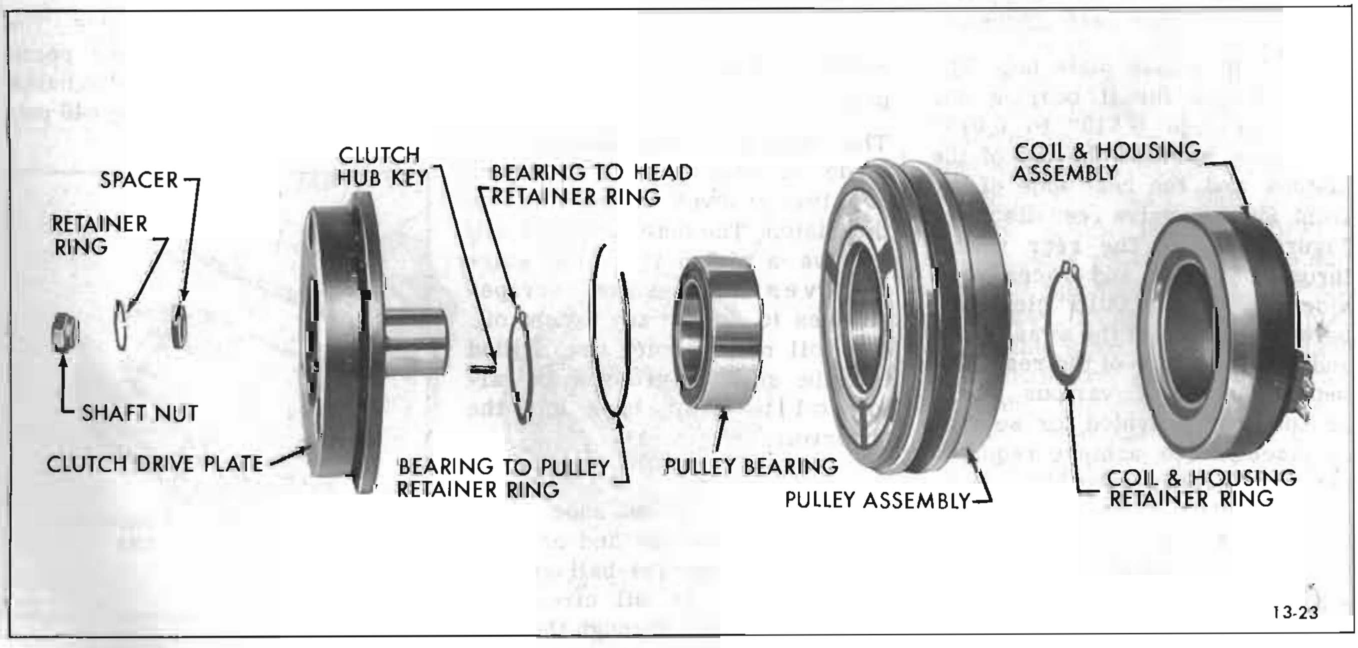


Figure 13-23—Magnetic Clutch Assembly

engine is started the armature plate will separate from the pulley assembly. The coil is rated at 3.85 ohms (85°F.) and will draw 3.2 amperes at 12 volts d.c.

b. Muffler

A muffler is located on the discharge line side of the compressor. The muffler acts to reduce the characteristic pumping sound of the compressor. To further reduce compressor noise transfer through the body to the passenger compartment, a sheet of soft rubber insulation is wrapped around the outside of the muffler.

c. Condenser

The condenser which is made of aluminum is located in front of the radiator (see Figure 13-15) so that it receives a high volume of air flow. Air passing over the condenser absorbs the heat from the high pressure gas and causes the refrigerant to condense into a high pressure liquid.

d. Receiver—Dehydrator

The receiver-dehydrator is located on the right front side of the engine compartment (see Figure 13-15). The purpose of the receiver-dehydrator is twofold: the unit insures a solid column of liquid refrigerant to the expansion valve at all times, and also absorbs any moisture in the system that might be present. A bag of desiccant (moisture absorbing material) is provided to absorb moisture. A sight glass (see Figure 13-24) permits visual checking of the refrigerant flow for bubbles or foam. The appearance of bubbles or foam above an ambient temperature of 70°F. indicates air in the line or an inadequate refrigerant charge. Bubbles or foam appearing at ambient temperatures below 70°F. do not necessarily indicate air or an inadequate charge and may appear

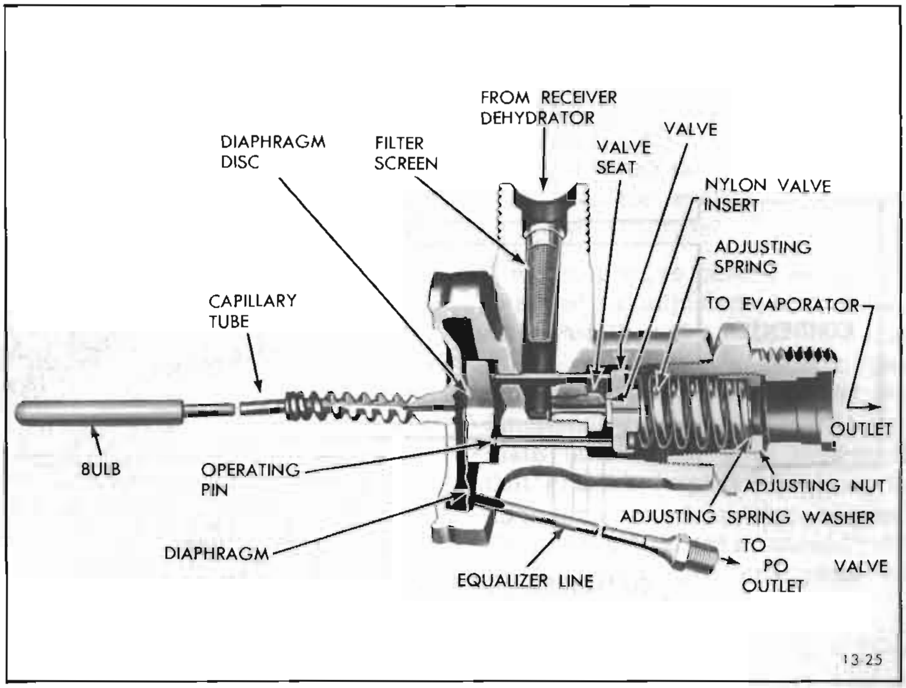


Figure 13-25—Expansion Valve

even when the system is operating properly. A filter screen in the unit prevents foreign material from circulating through the system.

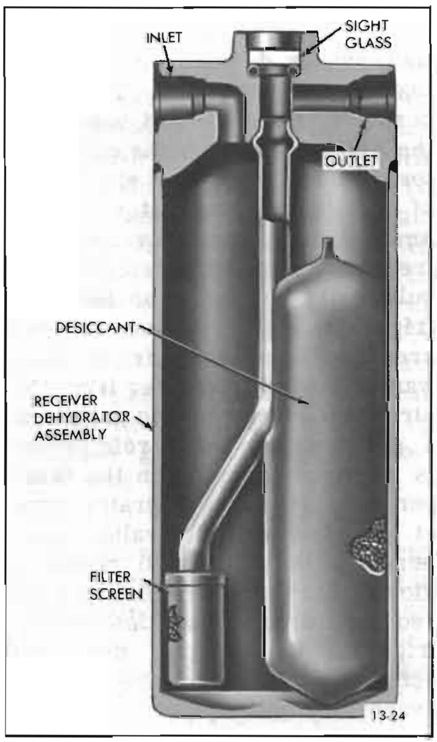


Figure 13-24—Receiver Dehydrator Assembly

e. Expansion Valve

The expansion valve is located at the rear of the engine compartment on the passenger side of the car (see Figure 13-15). It is held secure by a bracket which is attached to the plenum blower and air door assembly. The function of the expansion valve is to automatically regulate the flow of refrigerant in the evaporator. The expansion valve is the dividing point in the system between the high and low pressure liquid refrigerant. A temperature sensing bulb is connected by a capillary tube to the expansion valve (see Figure 13-25). The temperature sensing bulb (clamped to the outlet pipe on the evaporator) measures the temperature of the evaporator outlet pipe and transmits the temperature variations to the expansion valve (see Figure 13-26). The capillary tube and bulb are filled with carbon dioxide and sealed to one side of the expansion valve diaphragm.

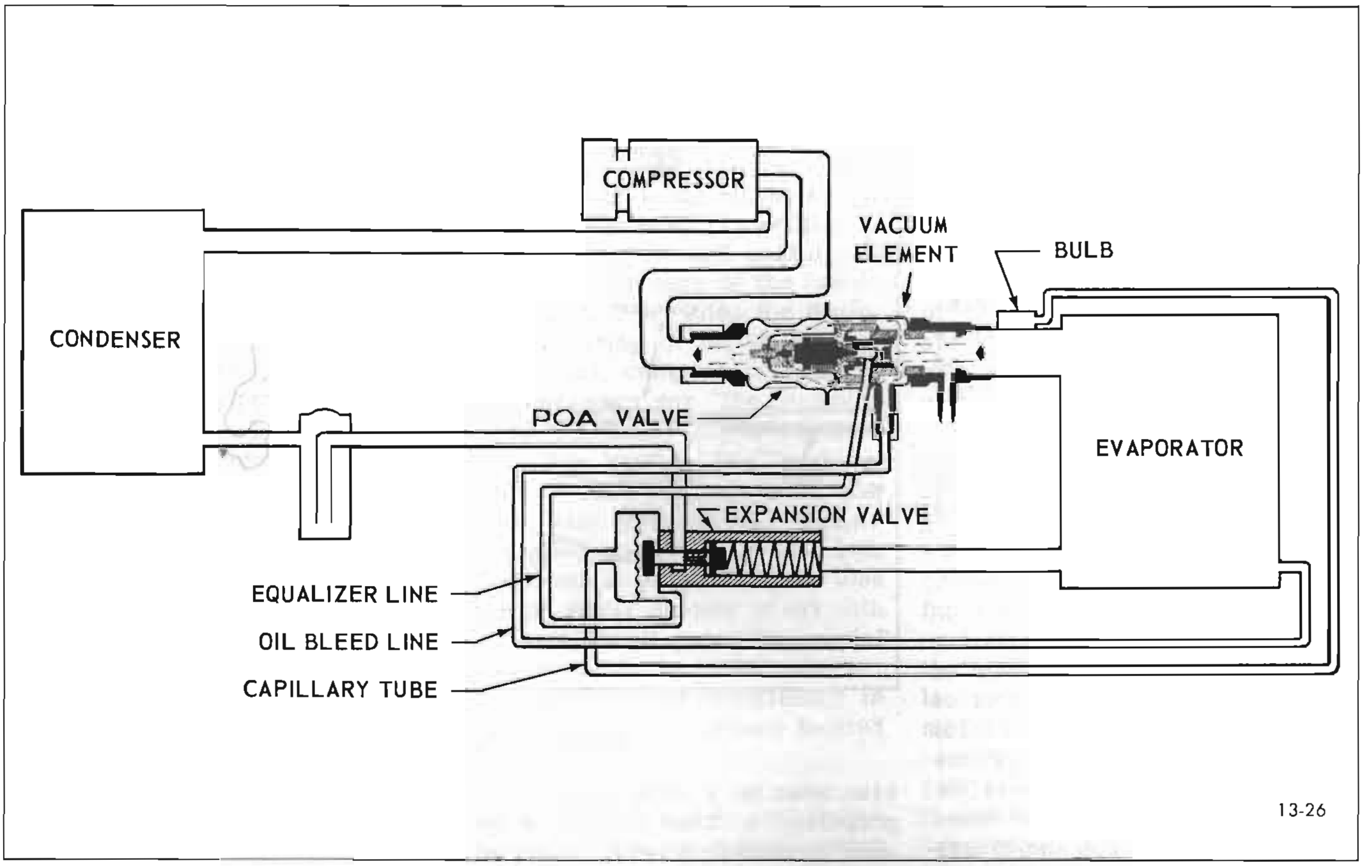


Figure 13-26—POA Valve and Expansion Valve in Refrigeration Circuit

An increase in temperature will cause the carbon dioxide in the bulb and capillary tube to expand, overcoming the spring pressure and pushing the diaphragm against the operating pins (see Figure 13-25). This in turn will force the needle valve off its seat. When the refrigerant low pressure gas flowing through the outlet pipe of the evaporator becomes more than 6° higher or warmer than the temperature at which it originally began to vaporize or boil, then the expansion valve will automatically allow more refrigerant to enter evaporator. If the temperature of the low pressure gas decreases more than 6° below the temperature at which it originally began to vaporize or boil, then the expansion valve will automatically reduce the flow of refrigerant. Thus, an increase or decrease in the flow of refrigerant through the evaporator will result in an increase or decrease in the cooling by the evaporator. The temperature, humidity and volume of the air passing over the evaporator affects the rate of absorption of heat by the evaporator. As the ambient temperature varies, the frequency which the temperature bulb calls for more or less refrigerant will increase or decrease. When the air is very warm, the heat transfer from the air to the refrigerant is great and a greater quantity of refrigerant is required to maintain the temperature at the evaporator pipe at the predetermined value. Conversely, cool days will result in slower heat transfer and thereby require lesser quantities of refrigerant to maintain the predetermined temperature of the evaporator outlet pipe.

An equalizer line connects the expansion valve to the suction throttling valve. The equalizer line is used primarily to prevent prolonged and constant operation of the compressor under conditions where it is not receiving enough refrigerant. This operation is undesirable due to the resultant noise factor, and also due to the possibility of subjecting the compressor to reduced oil return. The equalizer line functions to permit the outlet pressure of the POA valve to be imposed

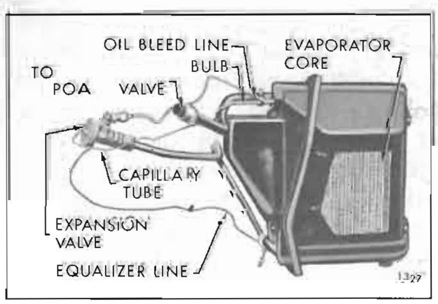


Figure 13-27—Evaporator Assembly

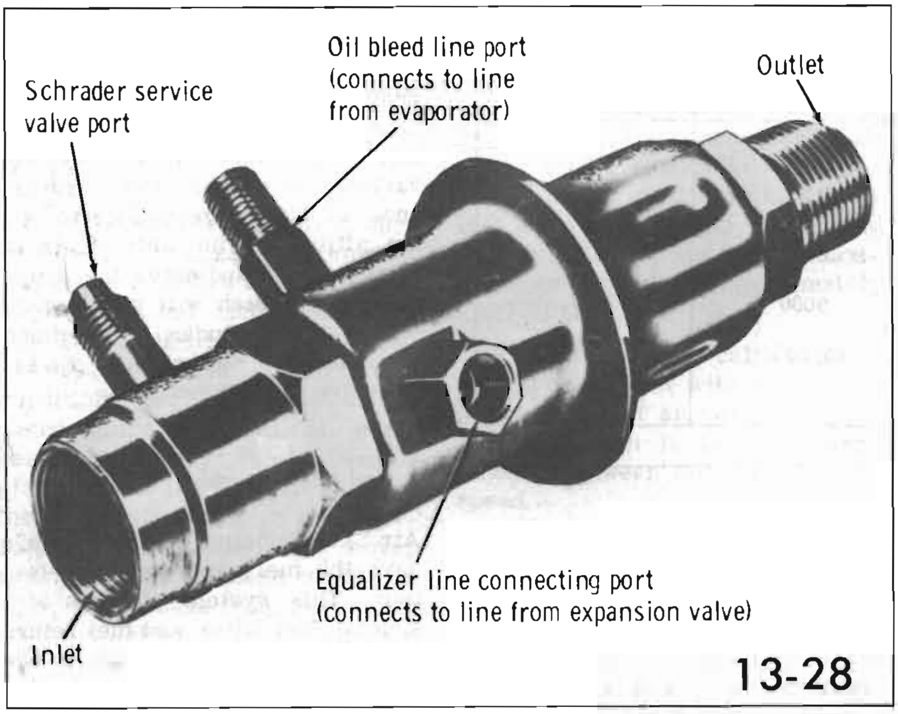


Figure 13-28—Pilot Operated Absolute Valve (POA)

on the diaphragm of the expansion valve. When the outlet pressure of the suction throttling valve drops below a predetermined pressure, this decrease in pressure is also transmitted to the diaphragm of the expansion valve, via the equalizer line. The expansion valve is caused to open and flood refrigerant through the evaporator, thereby resulting in an increase in the evaporator pressure. This action only occurs during times when the compressor capacity becomes greater than the evaporator output with the resultant drop in suction throttling valve outlet pressure.

f. Evaporator

The function of the evaporator (see Figure 13-27) is to cool and dehumidify the air flow before it enters the passenger compartment. The evaporator assembly consists of an aluminum core enclosed in a reinforced plastic housing. A water drain port is located in the bottom of the housing. Two refrigerant pipe lines are connected to the side of the evaporator core: one at the bottom and one at the top. The expansion valve is attached to the lower inlet pipe, and the suction throttling valve is attached to the upper outlet pipe. The temperature sensing bulb of the expansing valve is clamped to the outlet pipe of the evaporator core. The high pressure liquid refrigerant, after it is metered through the expansion valve, passes into the evaporator core where it is allowed to expand under reduced pressure. As a result of the reduced pressure the refrigerant begins to expand and return to the original gaseous state. To accomplish this transformation it begins to boil.

The boiling action of the refrigerant demands heat. To satisfy the demand for heat, the air passing over the core gives up heat to the evaporator and is subsequently cooled.

g. POA Valve

This valve (see Figure 13-28) replaces the previously used Suction Throttling Valve (STV). The difference between the STV and the POA valve is that no neoprene or vacuum element diaphragms are used. The advantage is that the valve will not change calibration when the system is operated at higher altitudes.

The POA valve cannot be disassembled or adjusted. If it is determined that the POA valve has failed, it should be replaced. The amount of freon charge and the functional test specifications remain unchanged. It is important that greater emphasis be given to maintaining a clean, dry system. Replacement parts should not be uncapped until just prior to installation.

NOTE: When replacing a POA valve, the serviceman should check the interior of the old valve for corrosion or crystalization of salts. This would indicate excessive moisture in the system. If this condition exists, the receiver-dehydrator should be replaced and the system evacuated for one hour.

When leak testing the POA valve, it is necessary to check only the hose coupling ends. When using the low sensitivity propane torch leak detector, no evidence of freon should be present at the POA valve.

Due to the elimination of the vacuum element diaphragm, the interior pressure of the valve is isolated from the exterior atmospheric pressure. As a result, the controlling element (bronze bellows) of the POA valve is able to operate independently of the effect of atmospheric pressure. However, any gauge used to check the valve pressure will not be free from the effect of atmospheric pressure. For this reason, it might appear (when considering the fact that the POA valve pressure gauge reading varies with altitude changes) that it is the pressure within the valve that is

ALTITUDE OF LOCAL (FT)	GAGE PRESSURE (PSI)	ALTITUDE OF LOCAL	GAGE PRESSURE (PSI)
0 (Sea Level)	28.5	6000	31.4
1000	29.0	7000	31.8
2000	29.5	8000	32.3
3000	30.0	9000	32.7
4000	30.5	10,000	33.2
5000	31.0		
Allowable tolerance of POA valve is ± 1 psi			13-29

Figure 13-29—Table of Altitude Corrected Gauge Pressure for Evaluating POA Valve Performance

changing. Actually the reverse is true. The pressure within the valve remains unaffected by atmospheric variations, while the gauge used to read these pressures is affected by atmospheric pressure. It is important to remember when checking pressures on a POA valve that the alitiude effect on the gauge must be taken into account when interpreting a reading. The gauge pressure increase exists not because the internal pressure in the system varies, but because the performance of the gauge is affected by the altitude. The table shown in Figure 13-29 indicates the gauge pressures which will be obtained at various altitudes. If readings are obtained other than these, the valve is malfunctioning.

h. Fuel Filter Assembly

Air conditioning equipped cars have the fuel vapor by-pass system. This system consists of a special fuel filter and fuel return lines which allow a constant flow of fuel from gas tank to filter and back to tank (see Figure 13-30).

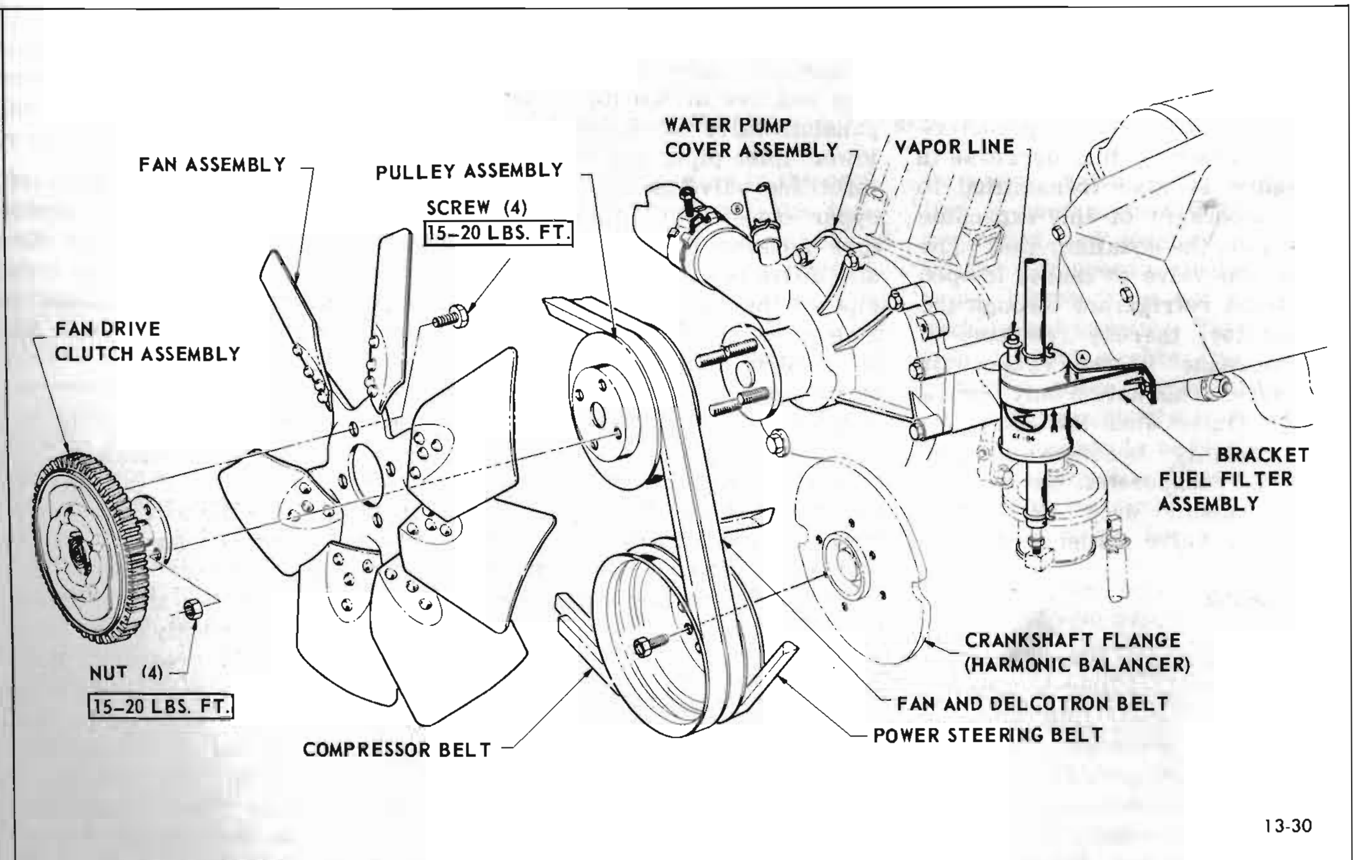


Figure 13-30—Fan Drive Clutch and Pulley Installation

The system reduces the possibility of vapor lock when operating in extreme hot weather.

i. Fan Drive Clutch Assembly

During periods of operation when radiator discharge air temperature is low (below approximately 150°F), the fan clutch (see Figure 13-30) limits the fan speed to 800-1600 RPM. Under these conditions the clutch is disengaged since a small oil pump gear driven by the separator plate forces the silicone oil into the reservoir between the separator plate and the front cover assembly. Under these conditions also, the passage from this cavity to the clutch area is closed by the coil spring leaf valve. As operating conditions produce a high radiator discharge air temperature (above approximately 150°F.), the temperature sensitive bimetal coil tightens to move the leak valve (attached to the coil) which opens a port in the separator plate. Silicone oil flows into the clutch chamber engaging the clutch and providing a maximum fan speed of approximately 2350 RPM.

The clutch coil is calibrated so that at road load with an ambient temperature of approximately 90° F., the clutch is just at a point of shift between high and low fan speed.

No attempt should be made to disturb the calibration of the engine fan clutch assembly as each assembly is individually calibrated at the time of manufacture.

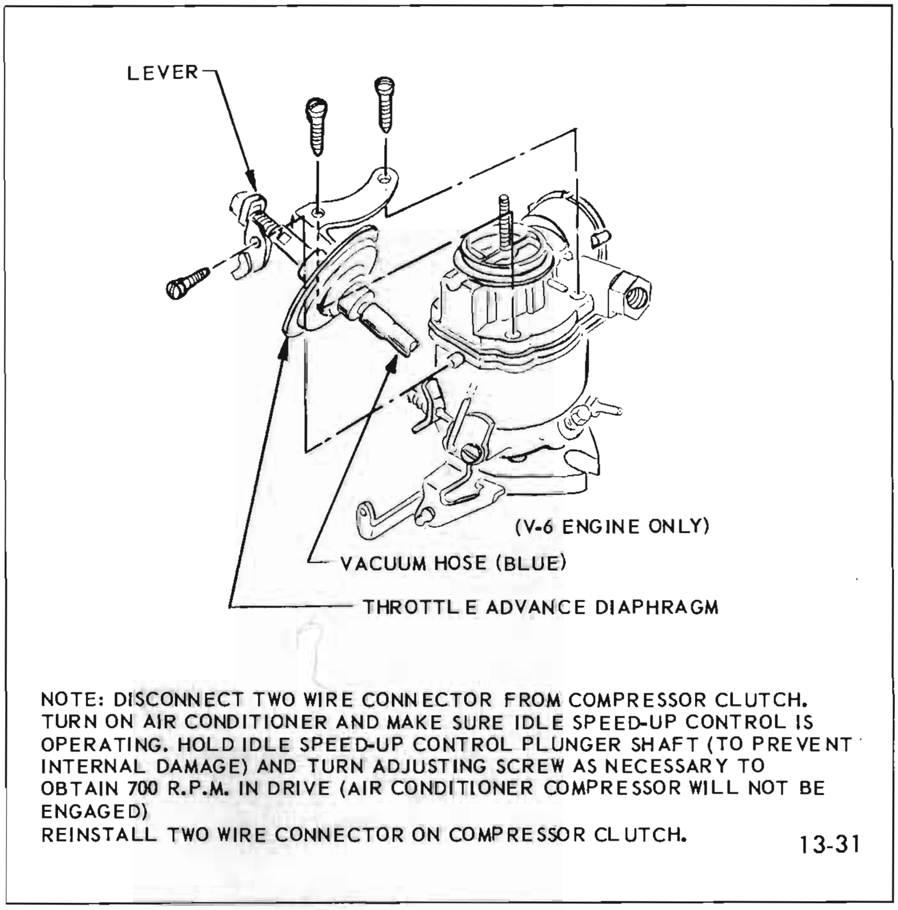


Figure 13-31—Throttle Advance Diaphragm (Idle Speed-Up Control)

j. Throttle Advance Diaphragm (Idle Speed-Up Control)

The throttle advance diaphragm (see Figure 13-31) is used on V-6 engines only and functions to increase the speed of the engine whenever the air conditioner is turned on. Control over application of vacuum to the diaphragm is effected thru a vacuum switch (throttle advance vacuum switch, see Figures 13-9 thru 13-11) located on the air conditioner heater assembly (see Figure 13-2). When the air lever on the instrument panel control is moved to A/C position, the switch plunger is depressed and vacuum is applied to the throttle advance diaphragm.

DIVISION III

SERVICE PROCEDURES

(SERVICING REFRIGERANT CHARGED COMPONENTS)

13-14 GENERAL SERVICE INFORMATION AND SAFETY PRECAUTIONS

a. General Information

All subassemblies are shipped sealed and dehydrated. They are to remain sealed until just prior to making connections, and should be at room temperature before uncapping. This prevents condensation of moisture from air that enters the system.

All precautions should be taken to prevent damage to fittings or connections. Even minute damage to a connection could cause it to leak. Any fittings with grease or dirt on them should be wiped clean with a cloth dipped in alcohol.

Metal Tube Outside Diameter	Thread and Fitting Size	Steel Tubing Torque Lb.-Ft.	Aluminum or Copper Tubing Torque Lb.-Ft.	Nominal Torque Wrench Span
1/4	7/16	10-15	5-7	5/8
3/8	5/8	30-35	11-13	3/4
1/2	3/4	30-35	11-13	7/8
5/8	7/8	30-35	18-21	1 1/16
3/4	1 1/16	30-35	23-28	1 1/4

If a connection is made with steel to aluminum or copper, use torques for aluminum. In other words, use the lower torque specification.

Use steel torques only when both ends of connection are steel.

13-126 13-1 13-32 13-105A 13-118

Figure 13-32—Pipe and Hose Connection Hose Chart

Do not clean fitting or hoses with solvents because they are contaminants. If dirt, grease or moisture gets inside the pipes and cannot be removed, the pipe is to be replaced. Use a small amount of refrigeration oil on all tube and hose connecting joints, and lubricate the "O" ring gasket with this oil before assembling the joint. The oil will help in effecting a leak-proof joint and assist the "O" ring to slip into the proper location without being cut or damaged. Always use new "O" rings.

When tightening joints, use a second wrench to hold the stationary part of the connection to prevent twisting and to prevent hose kinking. Kinked hoses are apt to transmit noise and vibration. Tighten all connections in accordance with recommended torques (ref. Figure 13-32).

Do not connect receiver-dehydrator assembly until all other connections have been made. This is necessary to insure maximum moisture removal from system.

It is important that air conditioning hoses do not rest on or contact body sheet metal except where necessary. Because of the high frequency at which the compressor operates, the passenger compartment is susceptible to transfer of noise.

b. Safety Precautions

The following safety precautions should always be followed when servicing refrigerant charged components:

1. Do not leave refrigerant-12 cylinder uncapped.

2. Do not carry cylinder in passenger compartment of car.

3. Do not subject cylinder to high temperatures.

4. Do not weld or steam clean on or near cylinder.

5. Do not fill cylinder completely.

6. Do not discharge vapor into area where flame is exposed or directly into engine air intake.

7. Do not expose eyes to liquid - wear safety goggles whenever discharging, charging or leak testing system.

13-15 DISCHARGING SYSTEM

Removal of any part in the refrigerant circuit will require discharging of the entire system.

1. Remove protective cap from the Scrader valve located on the POA valve and Schrader valve located on discharge port of compressor.

2. Install Adapters J-5420) onto each Schrader valve, see Figure 13-33 and connect a Gauge Charging Line (J-5418) between each adapter and the outer connecting ports of the manifold and Gauge Set (J-5725-01). Both valves of manifold and gauge set must be closed.

3. Hold a large size rag over center port of manifold and gauge set and slowly open both valves on manifold and gauge set until refrigerant starts to flow without discharging refrigerant oil.

NOTE: Do not open valves too fast as oil will be blown out of system.

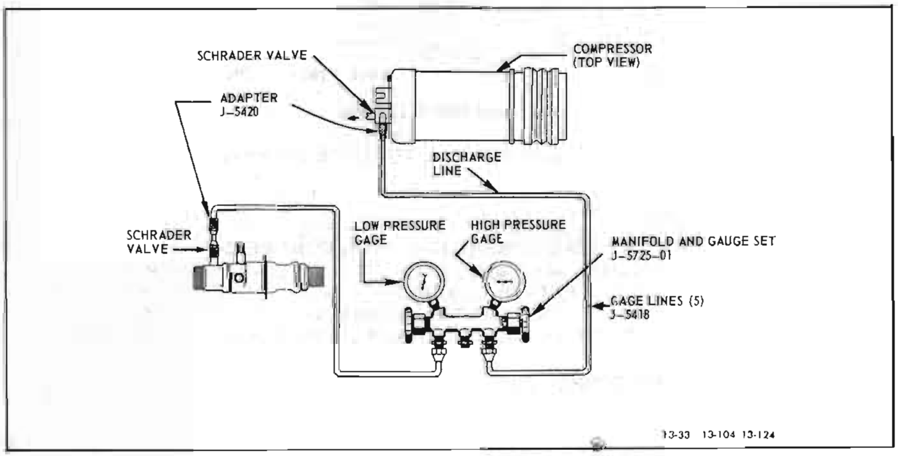


Figure 13-33—Set Up for Discharging System

CONDITION	AMOUNT OF OIL DRAINED FROM COMPRESSOR	AMOUNT OF 525 OIL TO INSTALL IN COMPRESSOR
1. Major loss of oil and a component (condenser, receiver-dehydrator, or evaporator) has to be replaced.	a. More than 4 oz.	a. Amount drained from compressor plus amount for component being replaced: Evaporator— Add 2 oz. Condenser — Add 1 oz. Receiver Dehydrator - Add 1 oz.
	b. Less than 4 oz.	b. Install 6 oz. plus amount for component being replaced as shown above.
2. Compressor being replaced with a service replacement compressor —no major oil loss.	a. More than 1-1/2 oz.	a. Same amount as drained from compressor being replaced.
	b. Less than 1-1/2 oz.	b. Install 6 oz.
3. Compressor being replaced with a service replacement compressor —major oil loss evident.	a. More than 4 oz.	a. Same amount as drained from compressor being replaced.
	b. Less than 4 oz.	b. Install 6 oz.
4. Compressor being rebuilt or repaired—no major oil loss evident.	a. More than 1-1/2 oz.	a. Same amount as drained from compressor plus 1 oz. additional.
	b. Less than 1-1/2 oz.	b. Install 7 oz.
5. Compressor being rebuilt or repaired— major loss of oil evident.	a. More than 4 oz.	a. Same amount as drained from compressor plus 1 oz. additional.
	b. Less than 4 oz.	b. Install 7 oz.

13-34

Figure 13-34—Oil Replacement Table

13-16 ADDING OIL TO THE SYSTEM

The oil in the refrigerant circuit does not remain in the compressor during system operation, but circulates throughout the system. The compressor is initially charged with 10-1/2 oz. of 525 viscosity oil. After system has been in operation the oil content in the compressor will vary depending on the engine RPM and air conditioning load. At higher engine RPM's a lesser amount of oil will be retained in the compressor reservoir. It is important that the total system oil content does not vary from a total of 10-1/2 oz. Excessive oil content will reduce cooling capacity. Inadequate oil content may result in damage to compressor moving parts.

The refrigerant system will not require adding of oil unless there is an oil loss because of a ruptured line, badly leaking compressor seal, replacement of evaporator compressor, receiver-dehydrator, or loss due to a collision. Oil is generally added to the system via the oil drain hole in the lower side of the compressor. To add oil to the system via the compressor, the compressor must be removed. If no major loss of oil has occurred and a component (condenser, receiver-dehydrator or evaporator) is removed for servicing, the oil may be added directly to the component. To add oil to a component removed for servicing and when no major loss has occurred, drain and measure oil in component, then replace with a like amount. To add oil to the system when a major loss of oil is evidenced, or when compressor is being serviced, remove compressor, drain and measure oil, and replace oil amount specified in Figure 13-34.

If foreign material is noted in oil drained from system or evidence of moisture is obvious in the components removed it is recommended that the entire system be flushed (ref. par. 13-17) and the receiver-dehydrator be replaced. A full oil charge of 10-1/2 oz. of 525 viscosity refrigerant oil should be replaced in the system. It should be noted that all service replacement compressors will be supplied with 10-1/2 oz. of oil. In most cases it will be necessary to drain oil from service replacement compressor and refill it with amount as specified in table (ref. Figure 13-34).

13-17 FLUSHING THE SYSTEM

Flushing of the system may involve all the components of the system or individual components in the system. The components may be flushed while mounted in the engine compartment or may be removed for flushing. When a component is not removed, disconnect all refrigerant lines attached to component. To perform flushing operation, connect a cylinder of refrigerant-12 to the component to be flushed, then invert the cylinder and open the cylinder valve so that the liquid refrigerant pours out and through the component.

CAUTION: When liquid refrigerant-12 reaches atmospheric pressure it immediately drops to -21.7°F. Insure that area immediately surrounding outlet of component is clear of anything that may be damaged by contact because of the sudden drop in temperature.

In all cases where a complete system flushing operation is performed, the receiver-dehydrator and the filter screen on the expansion valve should be replaced. If the evaporator assembly is flushed while installed in the car, the temperature bulb on the evaporator outlet pipe must be disconnected to keep the expansion valve from closing at the inlet source.

NOTE: It is recommended that dry nitrogen be used as a flushing agent due to the low cost involved. In addition, dry nitrogen will not cause a temperature drop, as in the case of refrigerant-12, which results in thickening of refrigerant oil. Dry nitrogen has the additional advantage of removing moisture from the system.

13-18 REMOVAL AND INSTALLATION OF COMPRESSOR (43-44000 SERIES EXCEPT 44600 SERIES)

a. Removal

1. Discharge refrigerant from system (refer to par. 13-15).

2. Remove two wire connectors from compressor.

3. Remove bolt and plate holding suction and discharge lines into rear head (see Figure 13-15). Disengage both lines from compressor and tape closed openings in both lines and ports in rear head.

NOTE: It is important to seal compressor ports to avoid a loss of refrigerant oil and also to prevent foreign material and moisture from entering compressor.

4. Remove bolts in slots of front and rear compressor braces (see Figure 13-35) and tilt compressor inward. Move belt off compressor pulley.

5. Remove two bolts holding front and rear adapter plates to compressor mounting bracket and lift out compressor.

NOTE: During removal maintain the compressor positioned so that the sump is downward. Do not rotate compressor shaft.

b. Installation

1. Installation is reverse of removal. Torque bolts as specified in Figure 13-35.

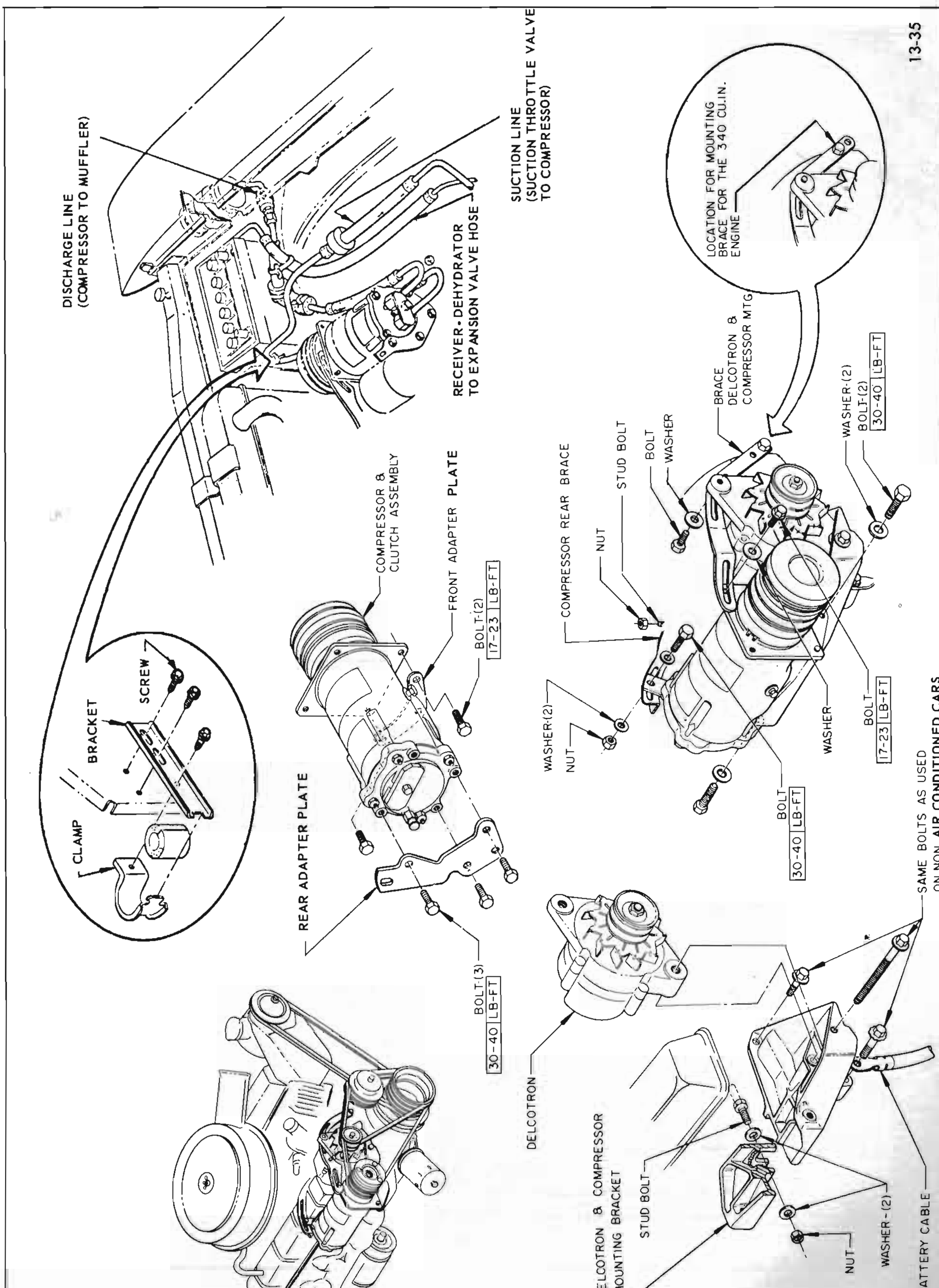


Figure 13-35—Compressor Installation 43-44000 Series

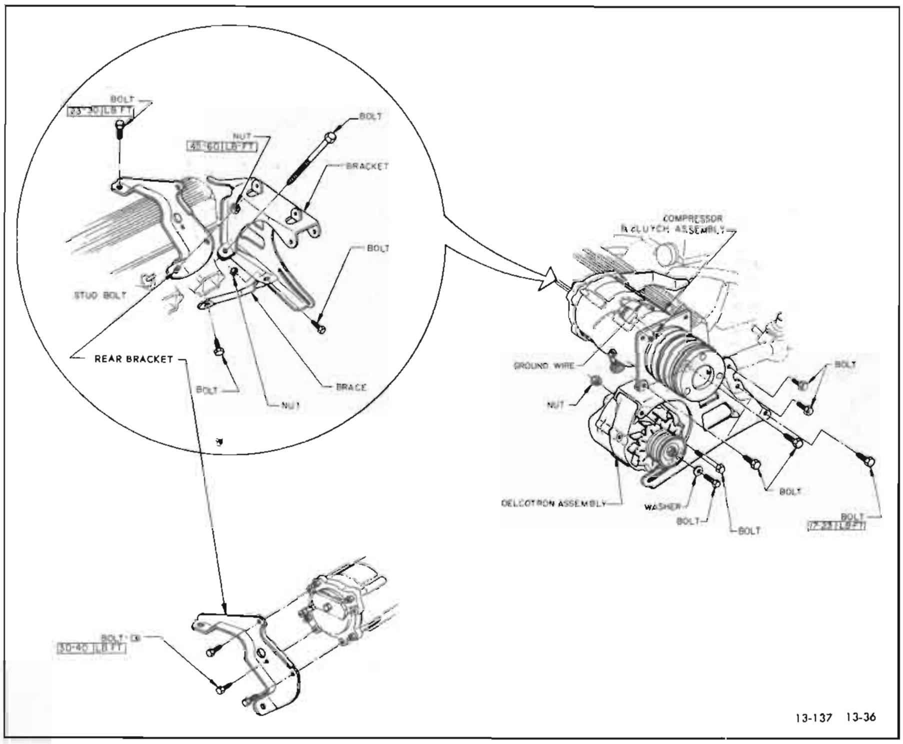


Figure 13-36—Compressor Installation 46000 Series Only

NOTE: Insure that compressor has sufficient oil charge.

2. Use new "O" rings when attaching suction and discharge lines.

3. Adjust compressor belt tension to 110 pounds using Belt Tension Gauge (J-7316).

4. Charge compressor (refer to par. 13-29).

5. Make sure compressor hoses are properly aligned and do not have any direct contact with sheet metal or each other.

13-19 REMOVAL AND INSTALLATION OF COMPRESSOR (44600 SERIES ONLY)

a. Removal

1. Discharge refrigerant from system (refer to par. 13-15).

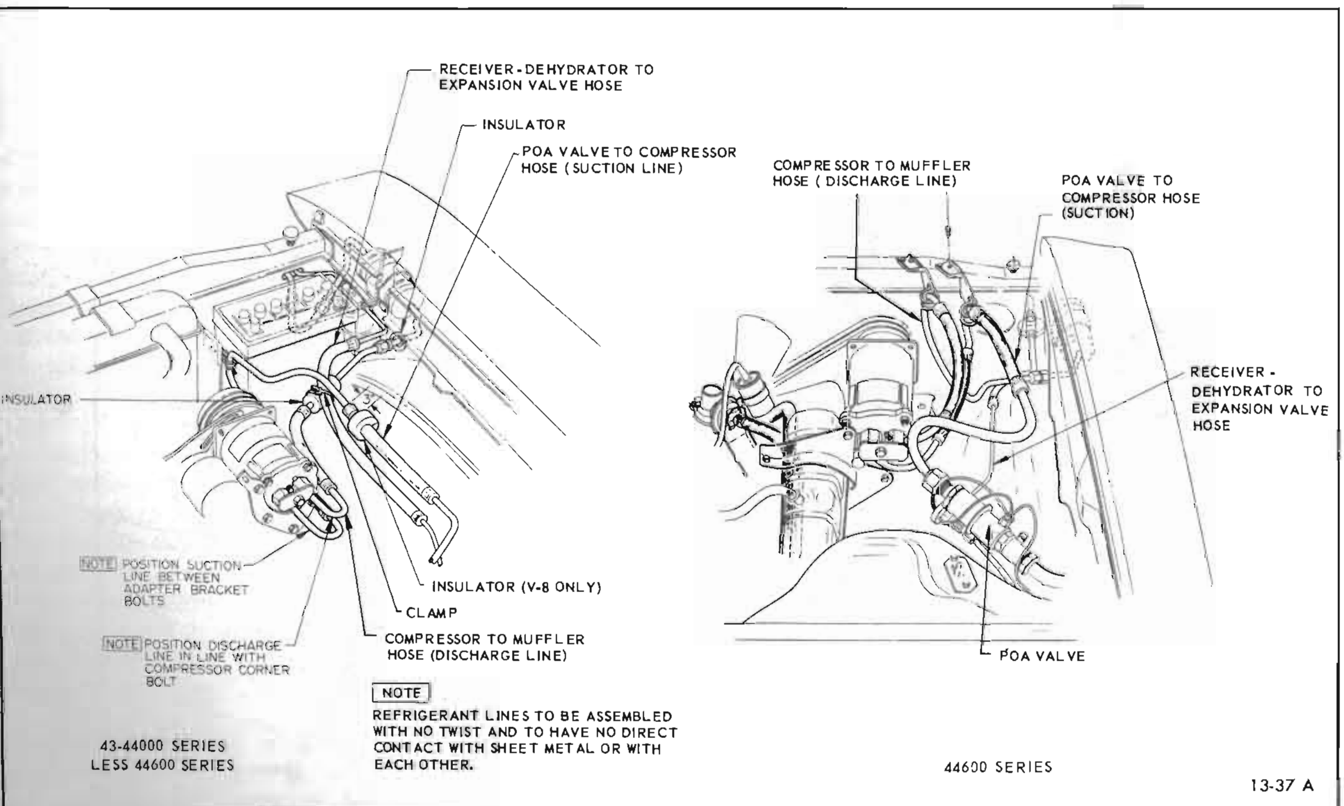


Figure 13-37—Refrigerant Hose Installation

2. Remove two wire connector from compressor.

3. Remove bolt and plate holding suction and discharge lines into rear head (see Figure 13-15). Disengage lines from compressor and tape closed openings in lines and compressor.

4. Loosen clamping bolt on Delcotron and move it inboard.

5. Remove two bolts holding front of compressor to bracket assembly.

6. Remove three bolts from rear of compressor securing it to rear compressor mounting bracket. Lift up compressor.

b. Installation

1. Install reverse of removal and use new "O" rings. Torque bolts as specified in Figure 13-36.

2. Adjust compressor belt tension to 90 lbs. and Delcotron belt tension to 80 lbs. using Belt Tension Gage (J-7316).

3. Charge compressor (refer to par. 13-29).

4. Check that compressor lines are properly aligned and do not have any direct contact with sheet metal or each other (see Figure 13-37).

13-20 DISASSEMBLY AND REASSEMBLY OF CLUTCH DRIVE PLATE AND SHAFT SEAL

NOTE: The following procedure can be performed with the compressor mounted in the engine compartment, or the compressor may be removed for greater accessibility. The following procedure is performed under the assumption that the compressor has been removed.

a. Disassembly

1. Firmly clamp Holding Fixture (J-9396) in a vise and attach compressor assembly to fixture (see Figure 13-38).

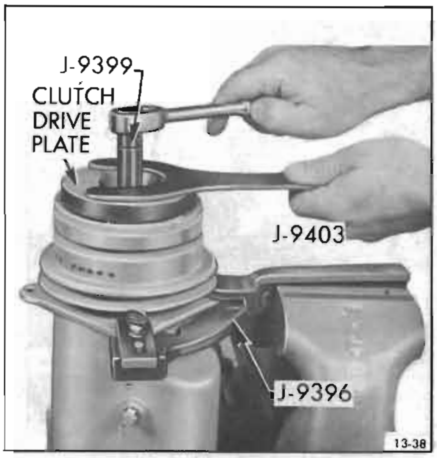


Figure 13-38—Removing or Installing Shaft Nut

2. Hold hub of clutch drive plate with Wrench (J-9403). Using special thin wall 9/16 inch Socket (J-9399) and 3/8 inch drive, take off shaft nut.

3. Install threaded Hub Puller (J-9401) onto hub of clutch drive plate (see Figure 13-39). Hold body of hub puller with wrench, tighten center screw of hub puller, and lift off clutch drive plate and woodruff key.

4. Using No. 21 Truarc Pliers (J-5403) take out retainer ring from hub of clutch drive plate (see Figure 13-40). Lift out spacer.

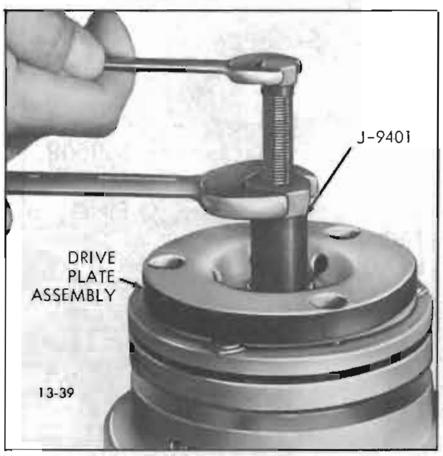


Figure 13-39—Removing Clutch Drive Plate

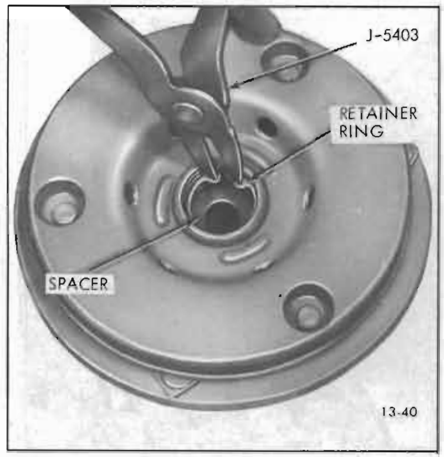


Figure 13-40—Removing or Installing Retainer Ring in Clutch Drive Plate

5. Using No. 21 Truarc Pliers (J-5403) take out seal seat retainer ring (see Figure 13-41) from inside front head.

6. Disassemble shaft seal seat (see Figure 13-42) by use of Seal Seat Remover and Installer (J-9393). Grasp flange of shaft seal seat with tool and pull straight out.

7. Using Seal Remover and Installer (J-9392) insert tool into hub of front head, press downward and twist clockwise to engage tabs of shaft seal, and gently

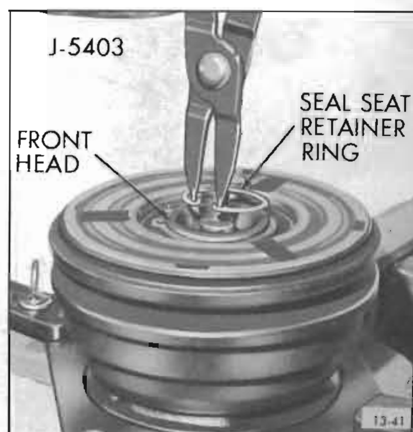


Figure 13-41—Removing or Installing Shaft Seal Seat Retaining Ring

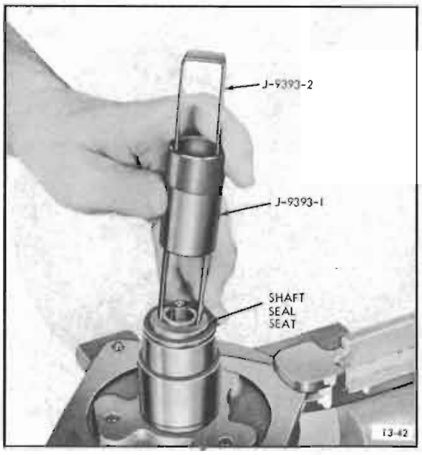


Figure 13-42—Removing or Installing Shaft Seal Seat

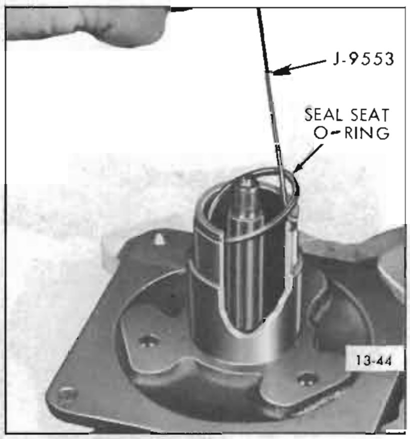


Figure 13-44—Removing Seal Seat O-Ring

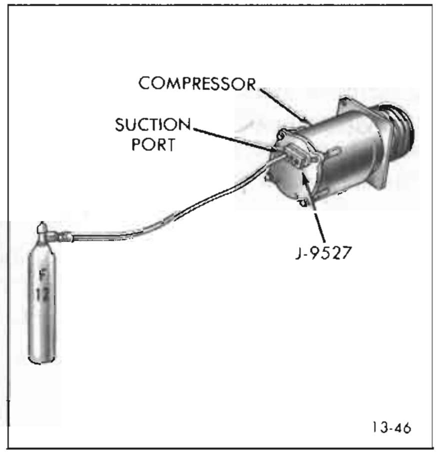


Figure 13-46—Leak Testing Shaft Seal and Seal Seat O-Ring

but firmly, pull tool straight out (see Figure 13-43).

8. Take out seal seat "O" ring (see Figure 13-44) from inside hub of front head using "O" ring Remover (J-9553).

b. Reassembly

1. Liberally coat seal seat "O" ring with 525 viscosity oil and insert "O" ring into hub of front head (see Figure 13-45) with seal seat "O" ring Installer (J-21508).

2. Generously coat shaft seal with 525 viscosity oil, mount shaft seal on Seal Remover and Installer (J-9392) and insert in hub of front head (see Figure 13-43).

Press downward and turn counterclockwise on installer to release shaft seal.

3. Lubricate shaft seal seat with 525 viscosity oil, mount seat on Seal Seat Remover and Installer (J-9393) and reassemble into hub of front head (see Figure 13-42).

4. Using No. 21 Truarc Pliers (J-5403) reassemble seal seat retainer ring (flat side of retainer ring downward) into hub of front head and engage retainer ring in ring groove (see Figure 13-41). If necessary, retainer ring may be pushed into groove using sleeve portion of Seal Seat Remover and Installer (J-9393).

5. Attach Compressor Leak Test Fixture (J-9527) on rear head of compressor and connect gauge charging lines as shown in Figure 13-46. Pressurize suction side of compressor with refrigerant 12 (cylinder at room temperature). Temporarily install shaft nut and rotate compressor shaft several times. Leak test seal and correct any leaks as necessary. Remove and discard shaft nut.

Figure 13-43—Removing or Installing Shaft Seal

Figure 13-45—Installing Seal Seat O-Ring

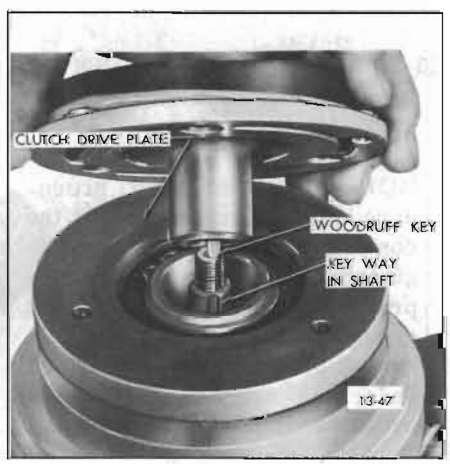


Figure 13-47—Positioning Clutch Drive Plate on Shaft

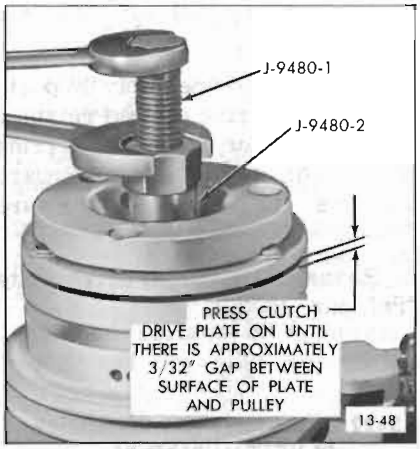


Figure 13-48—Installing Clutch Drive Plate

Figure 13-51—Removing Pulley Assembly

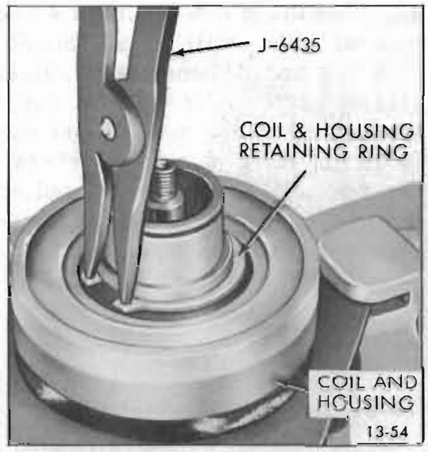


Figure 13-54—Removing and Installing Coil and Housing Retainer Ring

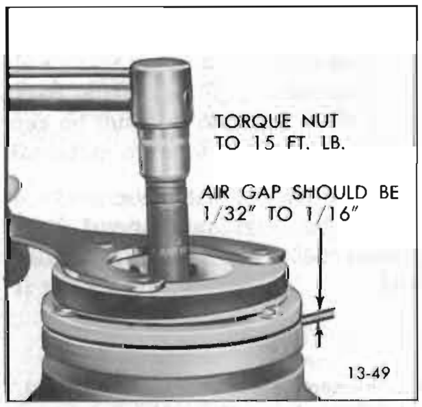


Figure 13-49—Torquing Shaft Nut

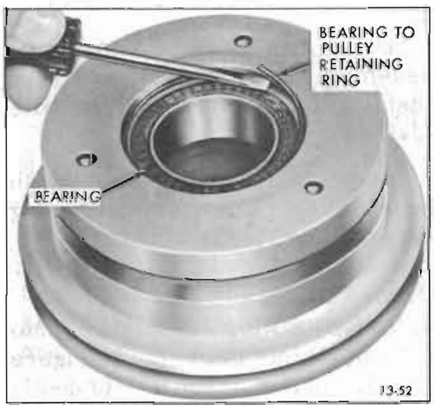


Figure 13-52—Removing Bearing Retainer Wire

6. Insert woodruff key into hub of clutch drive plate so that it projects out approximately 3/16 inch (see Figure 13-47) and position clutch drive plate onto shaft.

7. Using Drive Plate Installer (J-9480), screw installer on end of shaft as shown in Figure 13-48. Hold nut and turn bolt until clutch drive plate is pressed within 3/32 inch of the pulley assembly.

8. Reassemble spacer into hub of clutch drive plate.

9. Reassemble retainer ring into hub of clutch drive plate (see Figure 13-40) using No. 21 Truarc Pliers (J-5403).

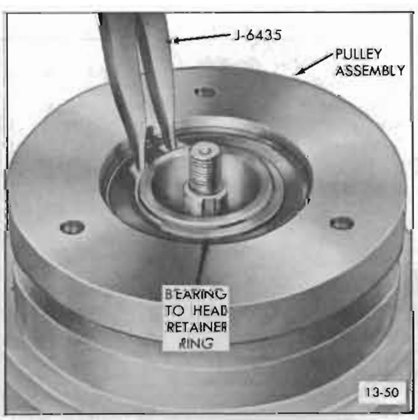


Figure 13-50—Removing or Installing Bearing to Head Retainer Ring

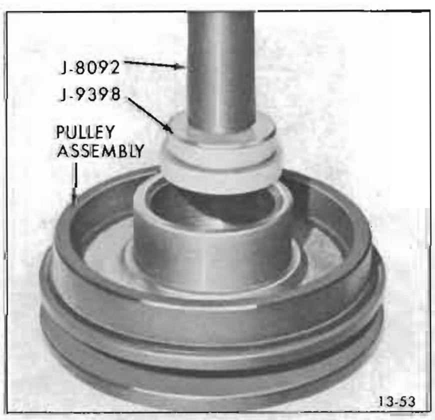


Figure 13-53—Removing Bearing from Pulley Assembly

Figure 13-55—Installing Bearing into Pulley Assembly

10. Thread on new shaft nut using special thin wall 9/16 Socket (J-9399) and 3/8 inch drive. Hold clutch drive plate secure using Wrench (J-9403) and torque nut to 15 lb. ft. The air gap between the friction surfaces of the pulley assembly and clutch drive plate should be approximately 1/32 to 1/16 inch (see Figure 13-49).

13-21 DISASSEMBLY AND REASSEMBLY OF PULLEY ASSEMBLY, AND COIL AND HOUSING ASSEMBLY

a. Disassembly

1. Disassemble clutch drive plate (ref. par. 13-20).

2. Using No. 26 Truarc Pliers (J-6435) take out bearing to head retainer ring (see Figure 13-50).

3. Place Puller Pilot (J-9395) on hub of front head and take off pulley assembly (see Figure 13-51), using Pulley Puller (J-8433).

CAUTION: Puller pilot must be used. If force is exerted on shaft, damage will result to the internal parts of the compressor.

4. Withdraw bearing to pulley retaining ring with a small screwdriver (see Figure 13-52).

5. Drive out bearing (see Figure 13-53) by use of Puller Pilot (J-9398) and Handle (J-8092).

NOTE: Do not take out pulley bearing unless it is going to be replaced as removal may damage bearing.

6. Mark position of coil and housing assembly in relationship to shell of compressor, withdraw coil and housing retainer ring (see Figure 13-54) using No. 26 Truarc Pliers (J-6435), and lift out coil and housing assembly.

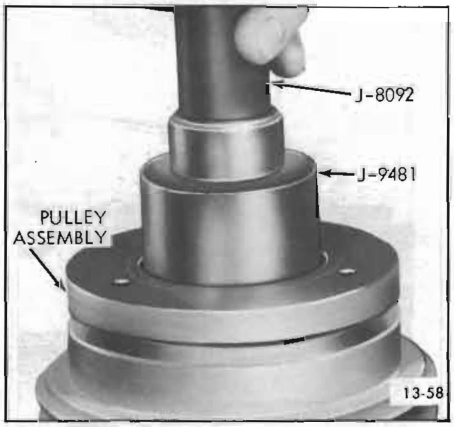


Figure 13-58—Installing Pulley Assembly

b. Reassembly

1. Reassemble coil and housing assembly reverse of disassembly.

2. Drive new bearing into pulley assembly (see Figure 13-55) with Installer (J-9481) and Handle (J-8092).

3. Lock bearing in position with bearing to pulley retainer ring (see Figure 13-52).

4. Drive pulley assembly onto hub of front head (see Figure 13-58) using Installer (J-9481) and Handle (J-8092).

NOTE: If the pulley assembly is going to be reused; clean the friction surface with trichlorethylene, alcohol or a similar solvent.

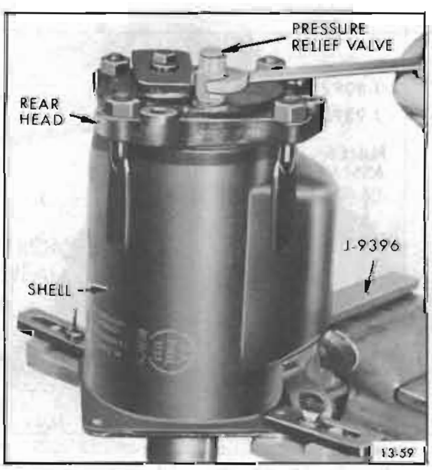


Figure 13-59—Compressor Installed Holding Fixture

5. Lock pulley assembly in position with bearing to head retainer ring (flat side of retainer ring downward) using No. 26 Truarc Pliers (J-6435). See Figure 13-50.

6. Reassemble clutch drive plate (ref. par. 13-20).

13-22 DISASSEMBLY AND REASSEMBLY OF INTERNAL PARTS OF COMPRESSOR AND LEAK TESTING COMPRESSOR

CAUTION: A clean work area and a place for each part removed is required to properly disassemble and reassemble compressor. The internal parts of the compressor must be kept free of dirt or foreign material.

When working with compressor, under no circumstances should compressor be rested on pulley end.

a. Disassembly of Rear Head, Oil Pump, Rear Discharge Valve Plate, and Rear Suction Valve Reed Disc

NOTE: If compressor is not going to be disassembled any further than removal of rear

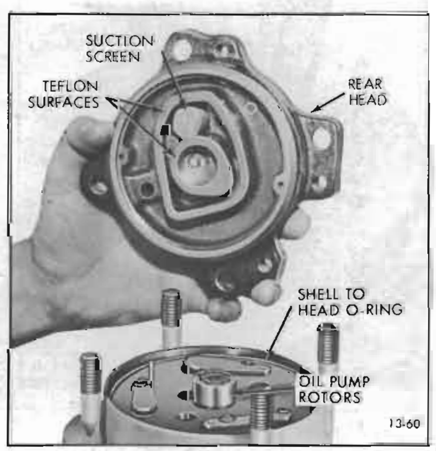


Figure 13-60—Rear Head Removal

head, oil pump, rear discharge valve plate, or rear suction valve reed disc, omit Steps "1, 2 and 4".

1. Disassemble clutch drive plate and shaft seal (ref. par. 13-20).

2. Disassemble pulley assembly, and coil and housing assembly (ref. par. 13-21).

3. Clean surface of compressor shell and dry with compressed air.

4. Remove compressor from Holding Fixture (J-9396), unscrew drain screw, and remove oil plugs in ports of rear head. Drain, measure and record amount of oil in compressor.

5. Reinstall compressor in Holding Fixture (J-9396) positioned as shown in Figure 13-59.

6. Unscrew and discard four lock nuts from rear of compressor, and lift off rear head by tapping it with a mallet.

NOTE: If teflon surfaces are damaged (see Figure 13-60), replace rear head. Clean or replace suction screen as necessary.

7. Pencil mark top side of both oil pump rotors and lift out rotors.

NOTE: Replace both oil pump inner and outer rotors if one or both are damaged or worn.

8. Take out and discard shell to head "O" ring.

9. Carefully pry out rear discharge valve plate and rear suction valve reed disc with screwdrivers (see Figures 13-61 and 13-62). Check both pieces and replace as necessary.

NOTE: During disassembly, the disc generally adheres to the plate and both pieces lift out together.

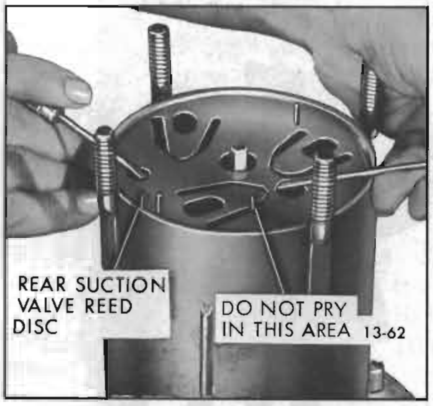


Figure 13-62—Removing Rear Suction Valve Reed Disc

Figure 13-64—Removing Cylinder Assembly

b. Removing Cylinder Assembly, and Disassembly of Front Suction Valve Reed Disc, Front Discharge Valve Plate, and Front Head

1. Pull out oil inlet tube (see Figure 13-63) and oil inlet tube "O" ring using Remover (J-6386).

2. Push shaft upward from front head and lift out cylinder assembly (see Figure 13-64), front suction valve reed disc, and front discharge valve plate.

NOTE: When lifting out the cylinder assembly, the front suction valve reed disc and the front discharge valve plate generally adhere to the cylinder

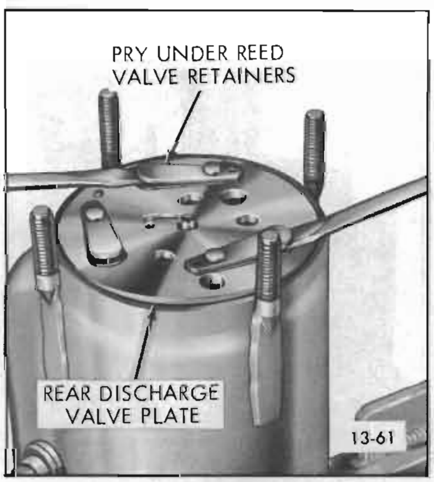


Figure 13-61—Removing Rear Discharge Valve Plate

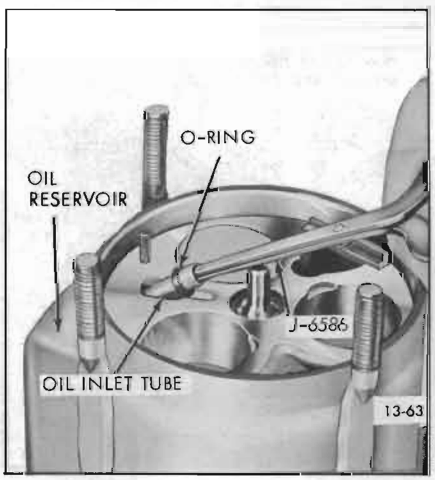


Figure 13-63—Removing Oil Inlet Tube

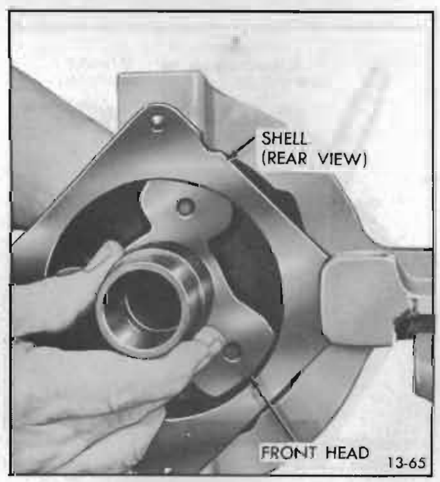


Figure 13-65—Removing Front Head

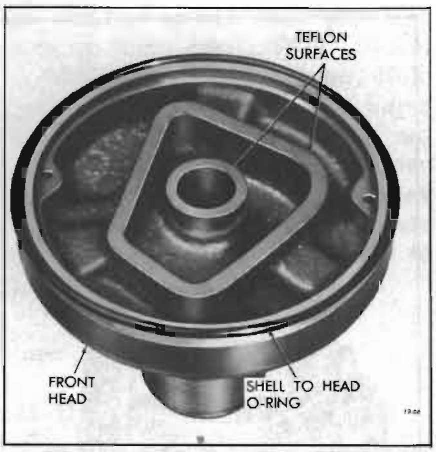


Figure 13-66—Front Head Teflon Sealing Surfaces

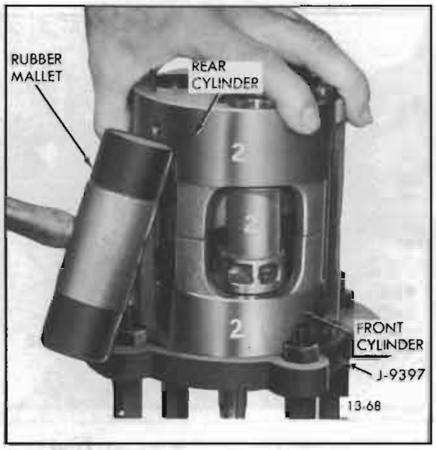


Figure 13-68—Separating Cylinder Halves

Figure 13-70—Piston Identification

assembly and lift out with it. Check and replace if necessary.

Depending on wear or damage to cylinder assembly, it may be advisable to replace complete cylinder assembly. If service replacement cylinder is used omit following steps and continue on with subparagraph entitled "FINAL REASSEMBLY OF CYLINDER ASSEMBLY".

3. Disassemble front head from shell by tapping front head with a mallet to unseat head, and lifting straight out through rear of shell the front head and shell to head "O" ring (see Figure 13-65). Discard "O" ring.

NOTE: If teflon surfaces of front head (see Figure 13-66) are damaged, replace front head.

c. Disassembly of Cylinder Assembly

1. Pry off suction pass cover using screwdriver (see Figure 13-67) and discard seal.

2. Place cylinder assembly (front end downward) on top of Compressing Fixture (J-9397), number pistons and cylinders "1, 2 and 3" to facilitate reassembly (see Figure 13-68), and separate cylinder halves using a rubber mallet and wood block.

3. Disassemble rear cylinder half and discharge tube from cylinder assembly and discard discharge tube.

NOTE: Depending on whether or not discharge tube comes out with rear cylinder half or remains in front cylinder half - it may be necessary to rotate shaft and swash plate assembly (using 9/16 inch open end wrench on shaft seal portion of shaft) to achieve necessary clearance.

Figure 13-67—Removing Suction Pass Cover and Seal

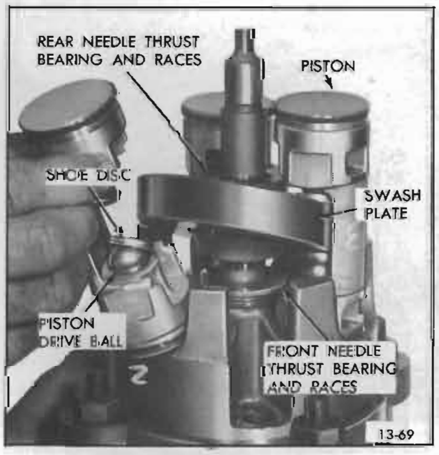


Figure 13-69—Disassembly of Cylinder Assembly

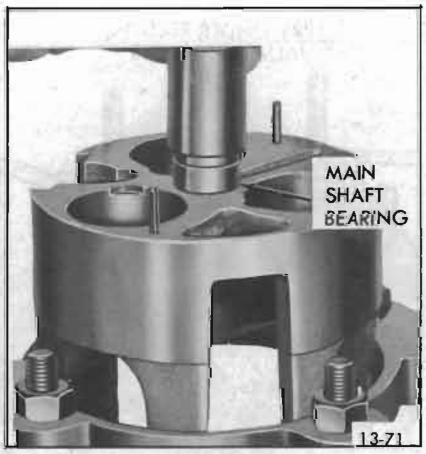


Figure 13-71—Installing Main Shaft Bearing

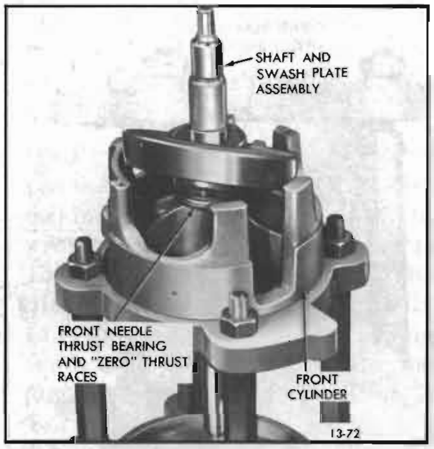


Figure 13-72—Shaft and Front Needle Thrust Bearing in Cylinder Half

4. Carefully disassemble from cylinder assembly (see Figure 13-69) and lay in respective place on Parts Tray (J-9402) the following: number "1, 2 and 3" pistons, piston drive balls, and piston rings. To disassemble, rotate swash plate until piston is at highest point, raise swash plate approximately 1/2 inch and lift out piston and related parts one at a time. Discard shoe discs and rear needle thrust bearings and races.

NOTE: Examine piston drive balls and replace if necessary. The front end of the piston may be identified by a recessed notch (see Figure 13-70).

5. Lift out shaft and swash plate assembly and front needle thrust bearing races. Discard front needle thrust bearing and races.

NOTE: Examine shaft and swash plate assembly and replace as necessary.

6. Wash all salvaged parts of cylinder assembly in bath of trichlorethylene, alcohol, or similar solvent and dry parts with filtered, dry compressed air.

NOTE: Examine front and rear cylinder halves, front and rear main shaft bearings, and replace as necessary. If bearings are to be replaced, drive out of cylinder halves with suitable socket or punch. Install new bearing (lettering on bearing edge facing outward) using Bearing Installer (J-9432). See Figure 13-71.

d. Partial Reassembly of Cylinder Assembly, and Gaging of Piston Play and Shaft End Play

1. Procure from parts stock four "zero" thrust races, two needle thrust bearings, and three "zero" shoe discs.

2. Place front cylinder on top of Compressing Fixture (J-9397) as shown in Figure 13-72.

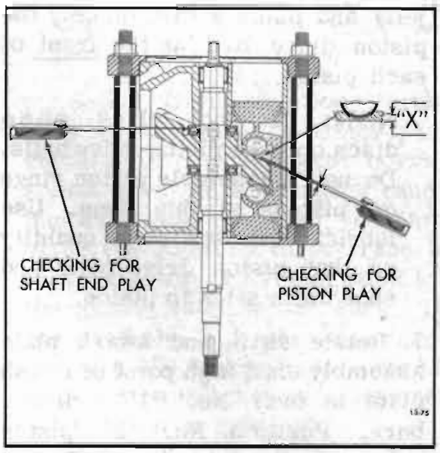


Figure 13-75—Checking Piston Play and Shaft End Play

3. Generously coat with clean petroleum jelly two "zero" thrust races, and a new needle thrust bearing. Assemble races and bearing to front end of shaft and swash plate assembly and insert assembly into front cylinder (see Figure 13-72).

4. Assemble two additional "zero" thrust races and a new needle thrust bearing to rear end of shaft and swash plate assembly.

5. Lightly coat ball pockets of the three pistons and place a piston drive ball in each pocket.

6. Lightly coat the three "zero" shoe discs with clean petroleum

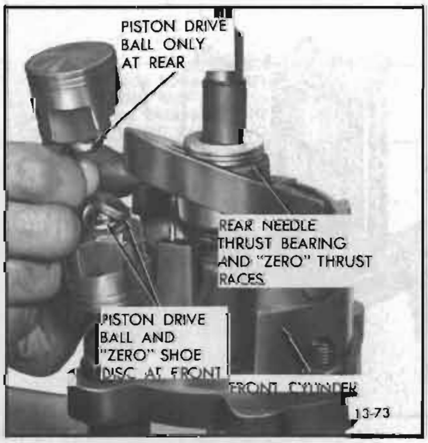


Figure 13-73—Installing Piston into Cylinder Half

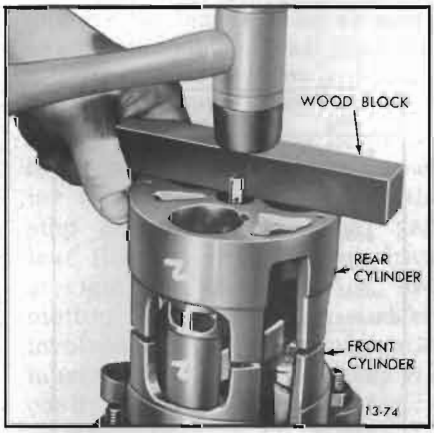


Figure 13-74—Assembling Rear Cylinder Half

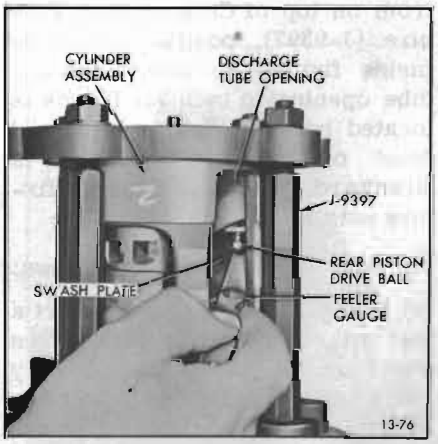


Figure 13-76—Checking Clearance Between Rear Piston Drive Ball and Swashplate

jelly and place a disc on only the piston drive ball at the front of each piston.

NOTE: Do not place shoe discs on rear piston drive balls. Do not reassemble piston rings on pistons at this time. Use lubricant in sufficient quantity so that piston drive balls and shoe discs stick to piston.

7. Rotate shaft and swash plate assembly until high point of swash plate is over No. "1" cylinder bore. Position No. "1" piston onto swash plate (see Figure 13-73) and lower the piston and swash plate so the front end (notched end - see Figure 13-70) of the piston enters the cylinder bore.

NOTE: In order to fit the piston onto the swash plate, the shaft and swash plate assembly must be raised approximately 1/2 inch, and also the front needle thrust bearing and races must be held up against the hub of the swash plate.

8. Repeat preceding step for reassembly of pistons No. "2" and No. "3".

9. Reassemble rear cylinder onto front cylinder using wood block and mallet (see Figure 13-74).

10. Remove cylinder assembly from on top of Compressing Fixture (J-9397), position assembly inside fixture so that discharge tube opening in cylinder halves is located between fixture legs, and front of cylinder assembly is downward. Install and torque fixture nuts to 15 lb. ft.

11. Gage piston play as follows:

(a) Using a feeler gauge, select a leaf or combination of leaves which result in satisfactory "feel" which inserted between rear piston drive ball and swash plate (see Figures 13-75 and 13-76).

(b) Remove selected leaf or leaves from feeler gage and attach end of spring scale that is calibrated in ounces. (A Generator Brush Spring Scale (J-5184) or the spring scale for checking distributor point setting may be used for this step).

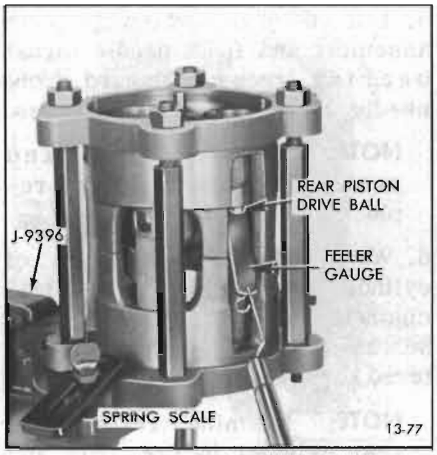


Figure 13-77—Checking "Drag" on Selected Feeler Gauge Leaf with Spring Scale

(c) Reinsert feeler gage leaf or leaves between rear piston drive ball and swash plate and draw leaf or leaves out again, simultaneously measuring "drag" on leaf or leaves (see Figure 13-77). If correct leaf (leaves) has been selected, spring scale will read between 4 to 8 ounces pull (the higher reading is desired). To perform this step correctly, feeler gage leaf (leaves) must be withdrawn straight out with a steady even motion, and all surfaces involved must be coated with No. 525 viscosity oil. Record gage dimension.

SHOE DISC CHART

SERVICE PART NO.	IDENTIFICATION NO. STAMPED SHOE DISC
6557000	0 ("ZERO" SHOE DISC)
6556175	17½
6556180	18
6556185	18½
6556190	19
6556195	19½
6556200	20
6556205	20½
6556210	21
6556215	21½
6556220	22

13-78

Figure 13-78—Shoe Disc Table

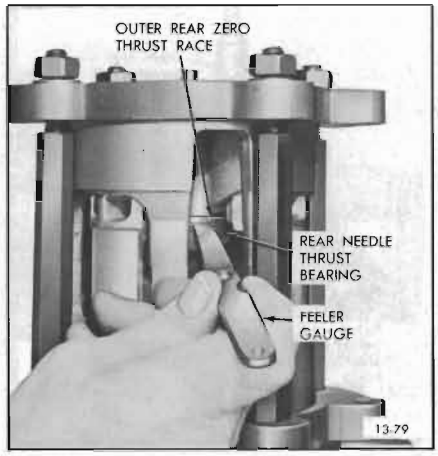


Figure 13-79—Gauging Clearance Between Rear Needle Thrust Bearing and Outer Rear Thrust Race

NOTE: Use of the spring scale establishes a standard of measurement of the amount of feeler gauge leaf "drag" required.

(d) Rotate the shaft and swash plate assembly 120 degrees and perform a second check (Steps "a, b and c") between same piston drive ball and swash plate. Record gage dimension.

(e) Rotate shaft and swash plate again approximately 120 degrees

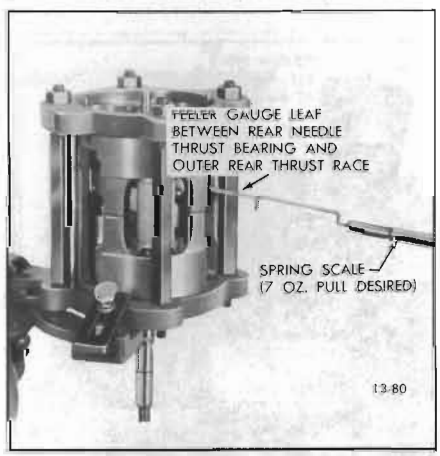


Figure 13-80—Checking "Drag" on Selected Feeler Gauge Leaf with Spring Scale

and repeat third check (Steps "a, b and c") between same piston drive ball and swash plate. Record gage dimension.

(f) From the three recorded checks (Steps "c, d and e") select minimum feeler gage reading and procure from stock (ref. Figure 13-78 for part number of shoe disc) one shoe disc corresponding to the minimum gage reading (ref. example below). Place shoe disc in respective position on Parts Tray (J-9402).

EXAMPLE:

	1st check	2nd check	3rd check
Piston #1	.019	.020	.019
(Select No. 19 shoe disc)			
Piston #2	.020	.020	.020
(Select No. 20 shoe disc)			
Piston #3	.021	.020	.021
(Select No. 20 shoe disc)			

(g) Repeat Steps "c, d, e and f" for other two pistons and procure two more selected shoe discs for other two pistons.

NOTE: In the rebuilt cylinder assembly, each piston will have one selected shoe disc and one "zero" shoe disc.

12. Gage shaft end play as follows:

(a) Using a feeler gage, select

SERVICE PART NO.	IDENTIFICATION NO. STAMPED ON RACE
6556000	0
6556055	5½
6556060	6
6556065	6½
6556070	7
6556075	7½
6556080	8
6556085	8½
6556090	9
6556095	9½
6556100	10
6556105	10½
6556110	11
6556115	11½
6556120	12

13-81

Figure 13-81—Thrust Race Table

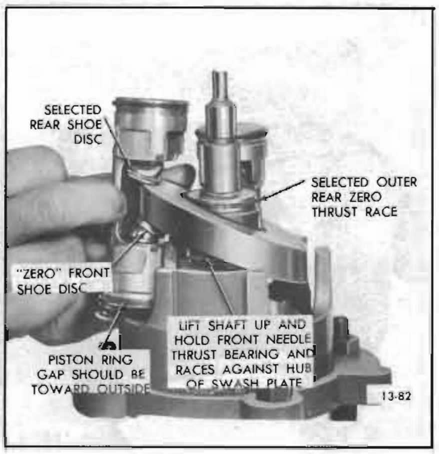


Figure 13-82—Installing Piston Assembly in Front Cylinder Half

a leaf or combination of leaves which result in satisfactory "feel" when inserted between rear needle thrust bearing and outer rear thrust race (see Figure 13-79).

(b) Remove selected leaf or leaves from feeler gage. Attach to end of spring scale calibrated in ounces. (A Generator Brush Spring Scale (J-5184) or the spring scale for checking distributor point setting may be used for this step).

(c) Reinsert feeler gage leaf (leaves) between rear needle thrust bearing and outer rear thrust race and draw leaf (leaves) out again, this time simultaneously noting the "drag" or pull on the leaf (leaves) as measured by the spring scale (see Figure 13-80). If correct leaf (leaves) have been selected, spring scale will read between 4 to 8 ounces pull (the higher reading is desired). To perform this step correctly, the feeler gage leaf (leaves) must be withdrawn straight out with a steady, even motion. All contacting surfaces involved in gaging operation must be coated with No. 525 viscosity oil.

NOTE: The measurement for selection of the thrust race needs to be performed at only one place on the shaft and swash plate assembly.

(d) Select from stock one thrust race (ref. Figure 13-81 for part number of thrust race) corresponding to the feeler gage reading determined in Step "c", and place the selected thrust race in the parts tray slot designated for the outer rear thrust race. If, for example, a feeler gage reading of 0.009 inch results, a thrust race with a number "9", stamped on it should be selected.

NOTE: The selected thrust race will replace only the "zero" outer rear thrust race. The remaining three "zero" thrust races will remain as part of the cylinder assembly.

13. Remove cylinder assembly from inside Compressing Fixture (J-9397), place on top of compressing fixture (see Figure 13-72) and disassemble rear cylinder from front cylinder using rubber mallet and wood block.

14. Carefully disassemble one piston at a time from front cylinder and lay piston, front and rear piston drive balls and front "zero" shoe disc in respective slot of Parts Tray (J-9402). To disassemble, rotate swash plate until piston is at highest point, raise swash plate approximately

Figure 13-83—Compressing Front Piston Rings

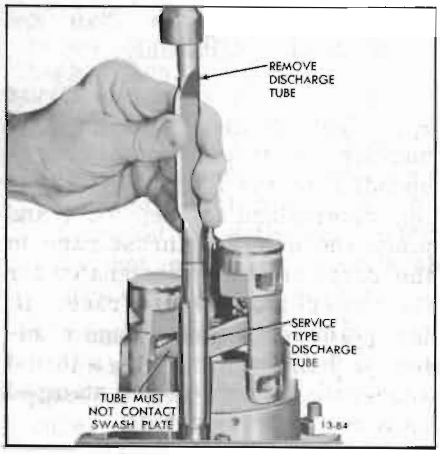


Figure 13-84—Installing Service Type Discharge Tube

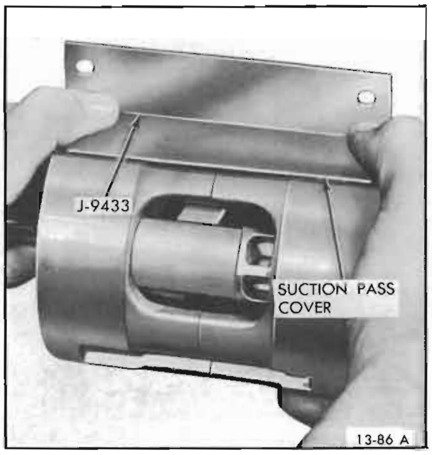


Figure 13-86—Installing Suction Pass Cover and Seal

Figure 13-88—Installing Discharge Tube O-Ring and Bushing

1/2 inch and lift out piston and related parts, one at a time.

15. Remove outer rear "zero" thrust race from shaft and set it aside for future gaging procedures.

16. Remove previously selected outer rear thrust race from parts tray, lightly coat with clear petroleum jelly and assemble onto shaft.

e. Final Reassembly of Cylinder Assembly

1. Reassemble piston rings onto pistons (ring scraper groove toward center of piston) and rotate ring so that break or gap in ring can be squeezed together when piston is being inserted into cylinder bore.

2. Reassemble piston drive balls, "zero" and selected shoe discs onto No. "1" piston, and apply clear petroleum jelly to piston pockets and shoe discs so that balls and discs stick to piston.

NOTE: Be sure to reassemble balls and shoe discs into their specific positions on front and rear of piston.

3. Rotate shaft and swash plate assembly until high point of swash plate is over No. "1" cylinder bore. Position No. "1" piston onto swash plate (see Figure 13-82) and lower the piston and swash plate so that the front end (notched end) of the piston enters the cylinder bore.

NOTE: In order to fit the piston onto the swash plate and into the cylinder bore, the swash plate must be raised approximately 1/2 inch, the front needle thrust bearing and races must be held up against the hub of the swash plate, and the piston rings must be squeezed together (see Figure 13-83). Lubricate cylinder bore, piston assembly and swash plate with No. 525 viscosity oil to facilitate reassembly.

Figure 13-85—Pistons Position in "Stair-Step" Arrangement

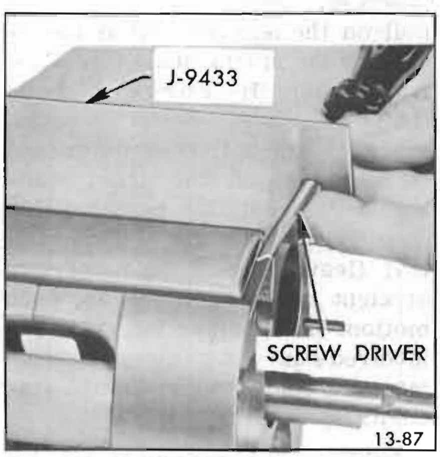


Figure 13-87—Removing Installer J-9433

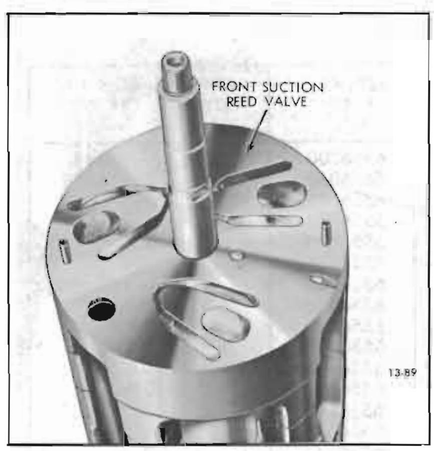


Figure 13-89—Front Suction Valve Reed Disc Installed

Figure 13-90—Placing Front Head on Cylinder Assembly

4. Repeat procedure in Steps 1 and 2 for installation of No. 2 and No. 3 pistons.

5. Obtain new service replacement discharge tube and assemble into front cylinder (see Figure 13-84).

6. Liberally lubricate cylinder bores of rear cylinder and reassemble rear cylinder onto front cylinder being sure to compress piston rings. Align discharge tube and dowel pins, and tap cylinder halves together. Check for free rotation of shaft.

NOTE: If pistons are positioned in a "stair-step" arrangement (see Figure 13-85), installation of rear cylinder will be facilitated. In addition once the piston and ring are started into the cylinder, slight rotation of the shaft to and fro will work the ring into the bore.

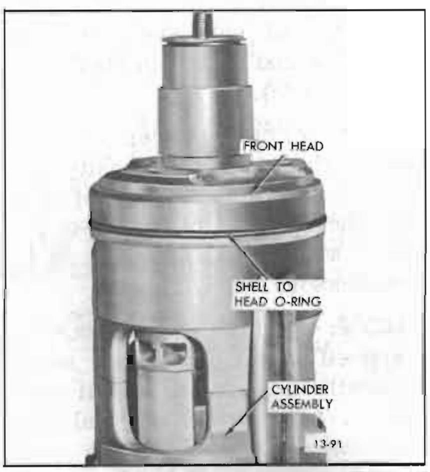


Figure 13-91—Shell to Head O-Ring Installation

Figure 13-92—Installing Cylinder Assembly and Front Head in Shell

7. Liberally lubricate with No. 525 viscosity oil, suction pass cover seal and lips of suction passage in body of cylinder assembly, and reassemble suction pass cover over suction passage (see Figures 13-86 and 13-87 using Installer (J-9433).

NOTE: Use Seal Installer (J-9433) as a shoe horn and snap cover into place.

8. Assemble both service replacement discharge tube "O" rings and bushings (see Figure 13-88) onto cylinder assembly.

f. Reassembly of Front Suction Valve Reed Disc, Front Discharge Valve Plate, Front Head, and Installing of Cylinder Assembly

1. Assemble suction reed valve disc to front of cylinder assembly and align with dowel pins, suction port and discharge port (see Figure 13-89).

2. Assemble front discharge valve plate to front of cylinder assembly and align with dowel pins.

3. Coat teflon surfaces on front head (see Figure 13-90) with No. 525 viscosity oil.

4. Mark with pencil on side of front head the location of dowel pin holes (see Figure 13-90), align front head with dowel pins, and tap head lightly with mallet to seat on cylinder assembly.

Figure 13-93—Positioning Oil Pump Outer Rotor

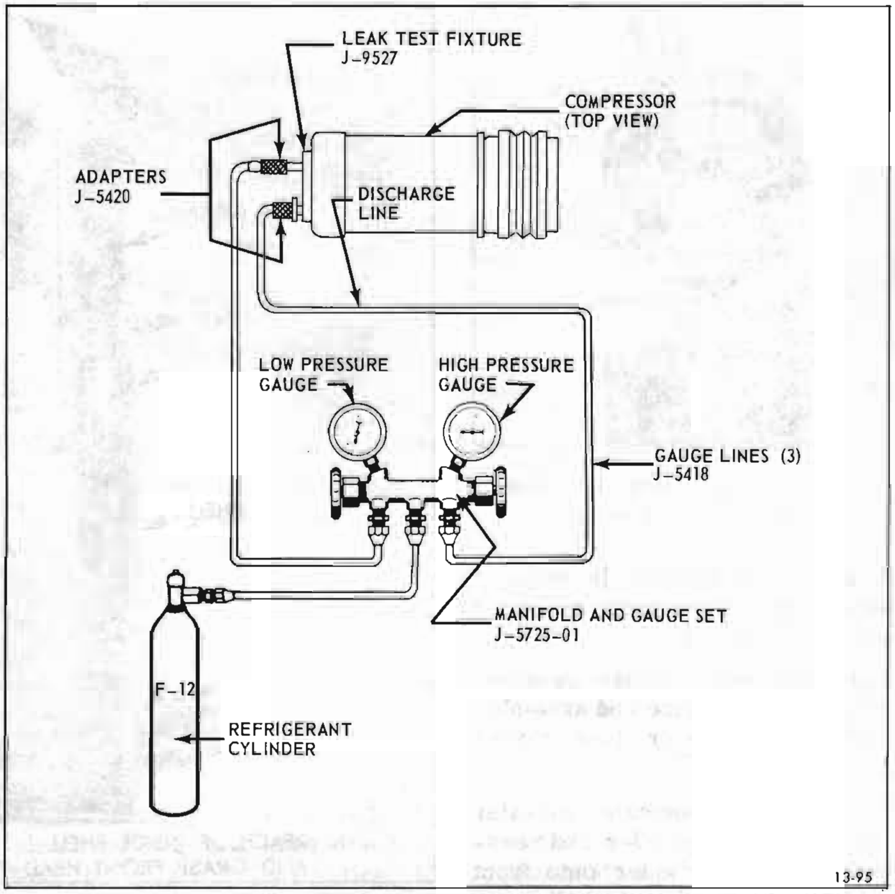


Figure 13-95—Compressor Internal Leak Test

5. Place new shell to head "O" ring on shoulder of front head (see Figure 13-91) and liberally coat "O" ring and front head surface with No. 525 viscosity oil.

6. Install shell in Holding Fixture (J-9396) and position so that rear studs of shell are up. Coat inside surface of shell with No. 525 viscosity oil.

7. Reassemble as a unit cylinder assembly and front head into the shell (see Figure 13-92).

NOTE: Extreme care must be used to prevent shell to head "O" ring seal from being damaged.

Figure 13-94—Installing Rear Head

g. Reassembly of Rear Suction Valve Reed Disc, Rear Discharge Valve Plate, Oil Pump and Rear Head

1. Rotate the cylinder assembly and front head until the hole for the oil inlet tube in the cylinder assembly is aligned with the reservoir hole in the shell, and reassemble the oil inlet tube and "O" ring.

2. Assemble suction reed valve disc to rear of cylinder assembly and align with dowel pins, suction port, and discharge port of cylinder assembly.

3. Assemble rear discharge valve plate to rear of cylinder assembly and align with dowel pins.

4. Reassemble inner and outer oil pump rotors so that the sides previously identified are in their original location, and then position oil pump outer rotor as shown in Figure 13-93.

5. Generously coat with No. 525 viscosity oil new shell to head "O" ring and install in shell (see Figure 13-93).

6. Coat teflon surfaces of rear head with No. 525 viscosity oil, mark with pencil on side of rear head the location of the dowel pin holes and reassemble onto compressor.

NOTE: It may be necessary to reposition oil pump outer rotor slightly in order to install rear head. In addition, if dowel pins do not engage holes in rear head, grasp front head and rotate cylinder assembly slightly (see Figure 13-94).

7. Assemble new nuts to threaded shell studs and torque to 20 lb. ft.

NOTE: If pressure relief valve has been removed, reassemble using a new pressure relief valve gasket.

8. Reassemble new lubricated suction and discharge "O" rings into suction and discharge ports of rear head.

9. Reassemble shaft seal onto front of shaft and swash plate assembly (ref. par. 13-20).

NOTE: Do not reassemble clutch drive plate at this time.

h. Leak Testing Compressor Gage

1. After the shaft seal pressure test (ref. par. 13-20, Step 5) has been performed, change the test circuit to the configuration shown in Figure 13-95.

2. Pressurize only discharge side (refrigerant cylinder at room temperature) of compressor by opening cylinder valve, lower pressure gage valve and high pressure gage valve. If the same pressure is noted on the discharge high pressure gage as on the low pressure gage - an internal leak exists. Correct leak as necessary.

NOTE: If internal leak exists, leak may exist in sealing surface of teflon seal, discharge tube, shell to head "O" rings, or suction valve reed discs.

3. Close high pressure gage valve and observe if high pressure gage drops more than 10 pounds in 30 seconds. Indication of this also evidences an internal leak. Correct leak as necessary.

4. Remove drain screw from shell and add No. 525 viscosity oil as specified in par. 13-16.

5. Reassemble pulley assembly, and coil and housing assembly onto hub of front head (ref. par. 13-21).

6. Complete reassembly by installing clutch drive plate onto hub of front head (ref. par. 13-20). See Figure 13-96 disassembled view of compressor.

13-23 REMOVAL AND INSTALLATION OF MUFFLER

a. Removal

1. Discharge system (refer to par. 13-15).

2. Remove battery (except on 44600 Series).

3. Disconnect refrigerant lines connected to muffler (see Figure 13-97) and tape closed both open ends of refrigerant lines and both ends of muffler.

4. Remove two screws holding muffler clamp to inner portion of fender and take out muffler.

b. Installation

1. Install muffler reverse of removal, using new "O" rings during installation coated with No. 525 viscosity oil.

NOTE: If refrigerant circuit or muffler has been exposed to the atmosphere for any amount of time and moisture may be present in the circuit, flush the muffler or system as necessary (refer to par. 13-17). Install a new receiver-dehydrator in system.

2. Charge the system (refer to par. 13-29).

13-24 REMOVAL AND INSTALLATION OF CONDENSER

a. Removal

1. Discharge system (refer to par. 13-15).

2. Disconnect inlet and outlet pipes of condenser (see Figure 13-98), and tape closed open ends of refrigerant lines, and also the open ends of the inlet and outlet pipes of the condenser.

3. Remove one bolt securing each cross brace to the upper tie bar and position braces out of way.

4. Remove three screws securing underside of center support and locking mechanism to upper tie bar, one screw securing lower end of center support to lower tie bar, and two nuts securing center support to grille. Then remove center support locking mechanism.

5. Remove screws holding right and left flanges of condenser to radiator baffle (see Figure 13-98) and remove condenser.

b. Installation

1. Install condenser reverse of removal and use new "O" rings during installation. Lubricate "O" rings prior to installation using No. 525 viscosity oil.

NOTE: If refrigerant circuit or condenser has been exposed to the atmosphere and moisture may be present in circuit, the system and/or component must be flushed prior to installation (refer to par. 13-17).

2. Charge the refrigerant circuit (refer to par. 13-29).

13-25 REMOVAL AND INSTALLATION OF RECEIVER—DEHYDRATOR

a. Removal

1. Discharge system (refer to par. 13-15).

2. Remove battery (except on 44600 Series).

3. Disconnect refrigerant lines to both ends of receiver-dehydrator (see Figure 13-97) and tape closed open ends of refrigerant

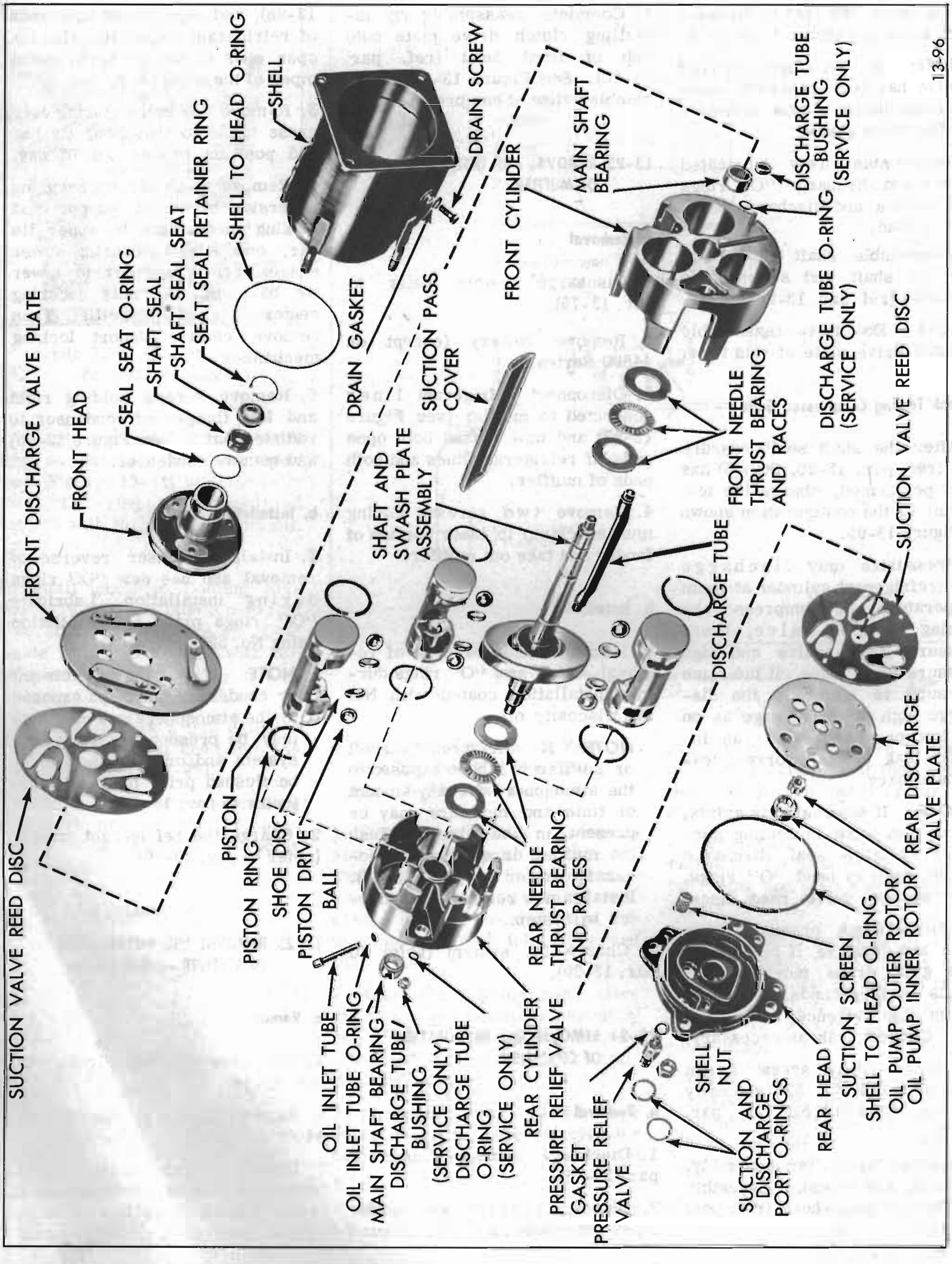


Figure 13-96—Compressor (Exploded View)

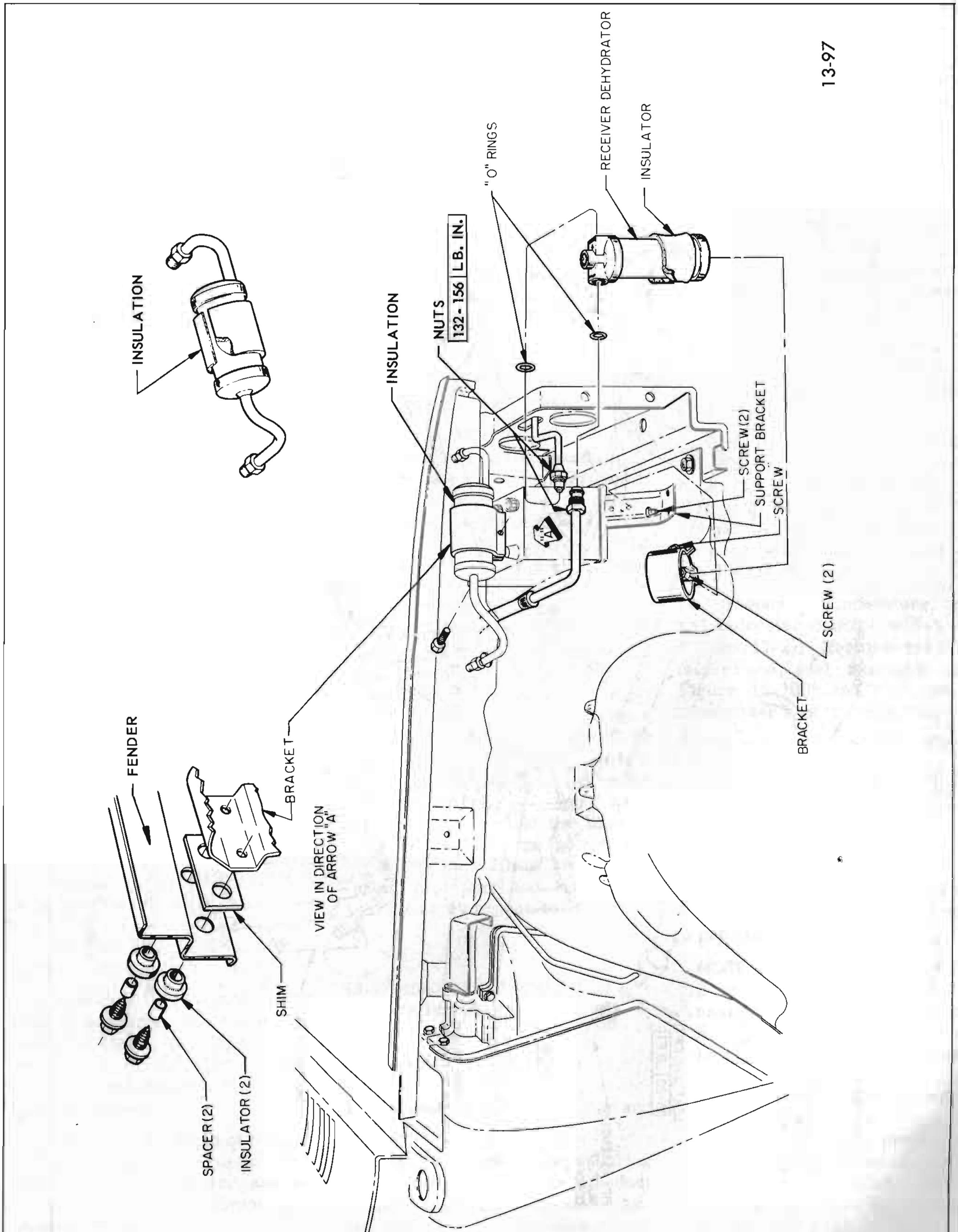


Figure 13-97—Muffler and Receiver - Dehydrator Installation 43-44000 Series

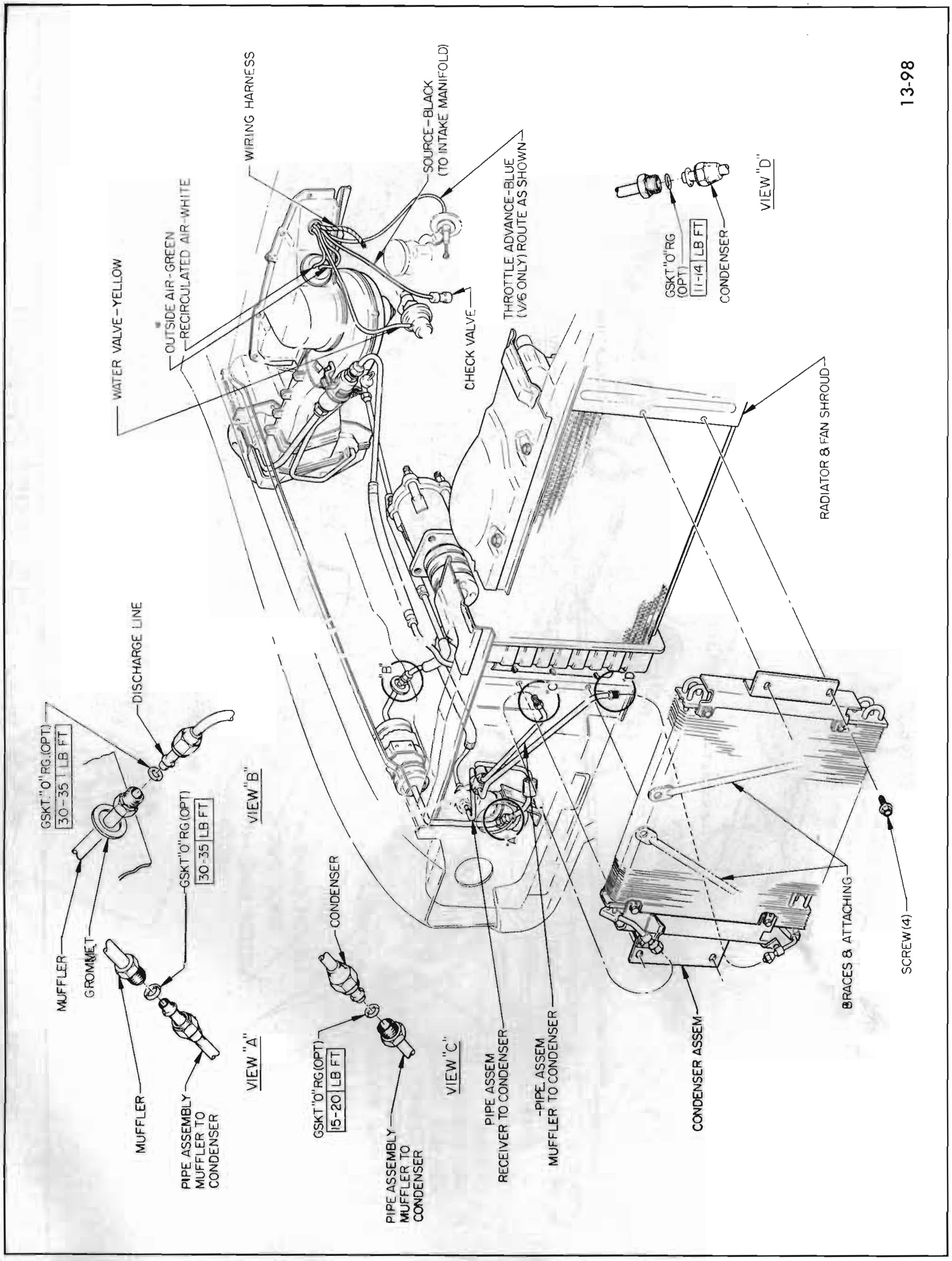


Figure 13-98—Air Conditioner Refrigerant Component Installation

lines, and also the open ends of the inlet and outlet pipes of the receiver-dehydrator.

4. Remove two screws securing receiver-dehydrator and clamp to support bracket and lift out receiver-dehydrator.

b. Installation

1. Install receiver-dehydrator reverse of removal and use new "O" rings during installation. Lubricate "O" rings with No. 525 viscosity oil prior to installation.

> **NOTE:** If the receiver-dehydrator has been exposed to the atmosphere for any amount of time, the receiver-dehydrator should be replaced, since the life of dessicant is probably expended.

2. Charge refrigerant circuit (refer to par. 13-29).

13-26 REMOVAL AND INSTALLATION OF EXPANSION VALVE

a. Removal

1. Remove right front fender and skirt (refer to par. 110-7).

2. Discharge system (ref. par. 13-15) and disconnect expansion valve capillary tube bulb attached to the outlet pipe of the evaporator. (See Figure 13-27).

3. Disconnect the equalizer line from the body of valve. (See Figure 13-27). Tape closed equalizer line port on POA valve, and also open end of equalizer line.

4. Disconnect inlet and outlet ends of expansion valve from refrigerant lines, and tape closed open ends of refrigerant lines and inlet and outlet ports of expansion valve.

5. Remove outer clamp of bracket securing expansion valve and POA valve to plenum blower and air valve assembly, and remove expansion valve.

b. Installation

1. Install expansion valve reverse of removal, and use new "O" rings during installation. Lubricate "O" rings prior to installation using No. 525 viscosity oil.

> **NOTE:** If expansion valve or refrigerant lines have been exposed to the atmosphere for any amount of time and moisture may have entered the valve or the system, flush the system or valve as necessary (refer to par. 13-17).

2. Install new receiver-dehydrator.

3. Charge system (refer to par. 13-29).

> **NOTE:** Due to the possible adjustment difficulties involved if the expansion valve is disassembled, disassembly of the valve is not recommended. The valve may be cleaned by submerging it in a bath of trichlorethylene, alcohol, or similar solvent. Dry by blowing filtered compressed air through the outlet port of the valve. The filter screen at the inlet port may be replaced. Remove screen by threading a 10-32 NF screw into old filter screen. With a washer and a nut on the screw arranged to work as a puller screw, hold the body of the screw and turn the nut. Insert the new filter screen into the inlet port and lightly tap screen only enough to seat.

13-27 REMOVAL AND INSTALLATION OF EVAPORATOR

a. Removal

1. Remove right front fender and skirt (refer to par. 110-7).

2. Remove eight screws securing front and rear halves of duct situated between evaporator assembly, and plenum blower and air door assembly (see Figure 13-99).

3. Discharge system (ref. par. 13-15) and disconnect oil bleed line from POA valve and capillary tube bulb from outlet pipe of evaporator (see Figure 13-27). Tape closed openings in valve and line.

4. Disconnect POA valve and expansion valve from evaporator outlet and inlet pipes of evaporator. Tape closed all connection openings.

5. Remove five stamped nuts from studs of air conditioner heater assembly (see Figure 13-99).

6. Remove glove box and disconnect air conditioner outlet hoses from distributor duct (see Figure 13-100). Remove two screws securing duct to air conditioner heater assembly and take out distributor duct.

7. Disconnect temperature, air and defroster control cables (see Figure 13-2). Remove rear retainer and seal assembly (see Figure 13-100) and pull out air conditioner heater assembly.

8. Remove eight screws securing evaporator to front retainer and seal assembly and pull out evaporator.

b. Installation

Install evaporator reverse of removal and charge system (refer to par. 13-29).

> **NOTE:** It is recommended that a rubber lubricant be used to assist in effecting a good seal between side of evaporator and front seal. After evaporator is reassembled to the cowl, reposition front edge of rubber seal on front retainer and seal assembly so that a proper seal is created. Poor sealing action may seriously affect system performance and cause water leaks inside car.

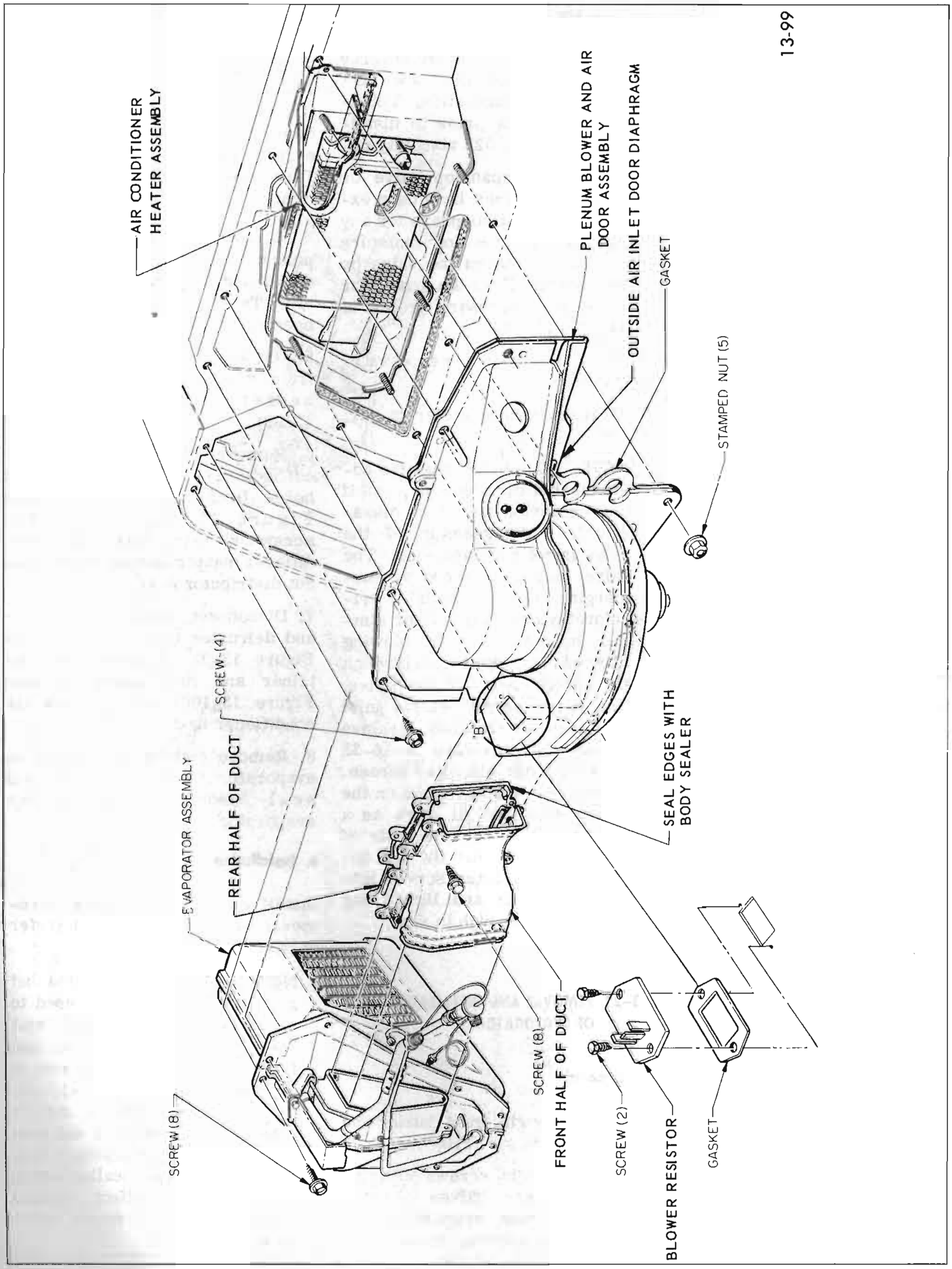


Figure 13-99—Evaporator Assembly, and Plenum Blower and Air Valve Assembly Installation

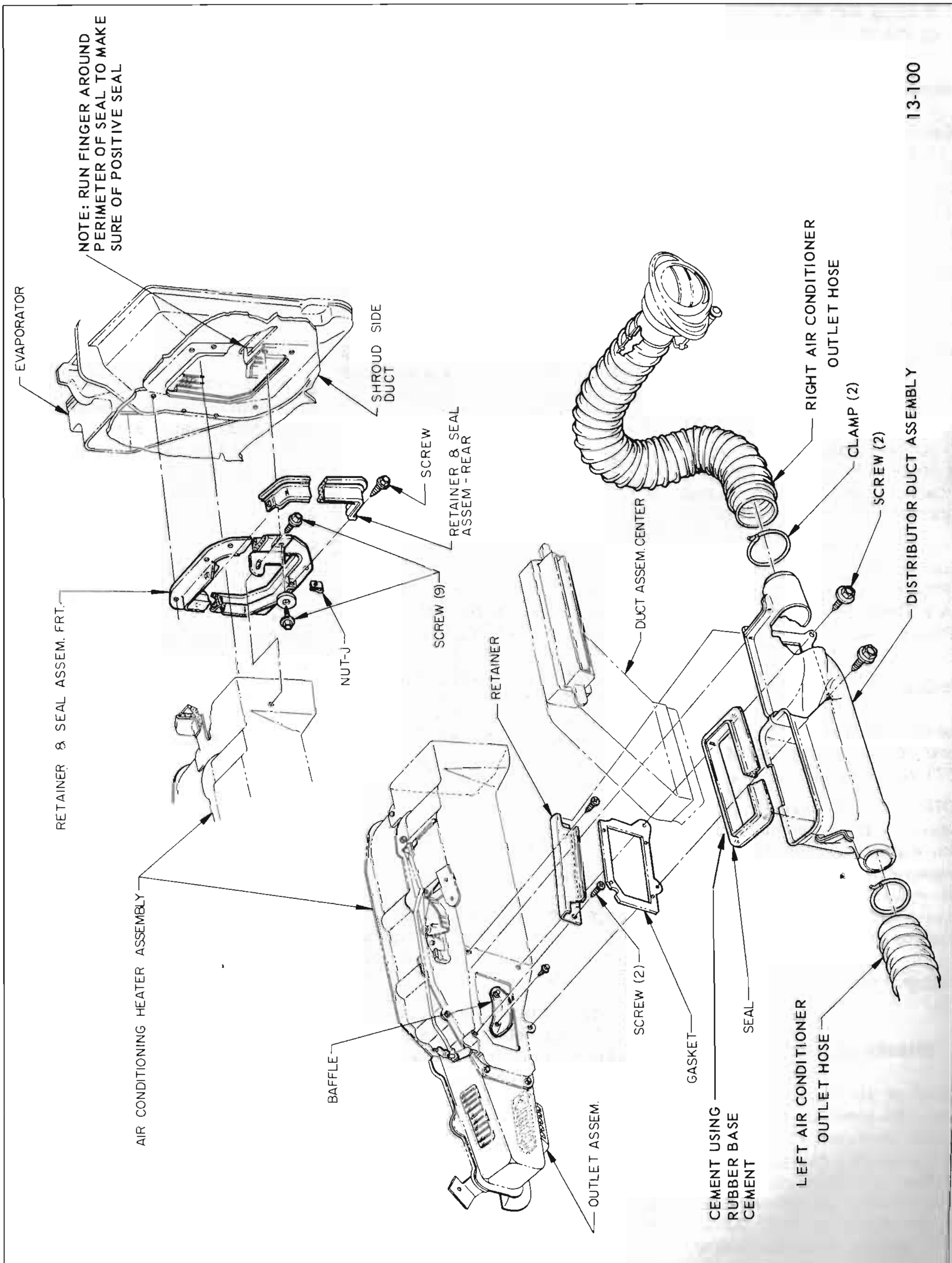


Figure 13-100—Distributor Duct Assembly, and Front Retainer and Seal Installation

13-28 REMOVAL AND INSTALLATION OF POA VALVE

a. Removal

1. Discharge system (refer to par. 13-15).

2. Disconnect evaporator oil bleed line from body of POA valve (see Figure 13-27) and tape closed opening on POA valve and also end of oil bleed line.

3. Disconnect equalizer line from the body of the POA valve. Tape closed equalizer line port on body of valve and also end of equalizer line.

4. Disconnect inlet and outlet ends of POA valve from refrigerant lines, and tape closed inlet and outlet ends of valve. Also tape closed both refrigerant lines.

5. Remove lower clamp of bracket securing expansion valve and POA valve to Plenum Blower and Air Door Assembly and take out POA valve.

b. Installation

1. Install reverse of removal using new "O" rings lubricated with No. 525 viscosity oil.

> **NOTE:** If POA valve and refrigerant line openings have been exposed excessively to the atmosphere it is recommended that system be flushed out to remove any traces of moisture (refer to par. 13-17).

2. Charge system (refer to par. 13-29).

13-29 CHARGING SYSTEM

Charging of air conditioner system consists essentially of evacuating the system, checking for leaks, primary charging, final evacuation and final charging of system. Proceed as follows using either the Cylinder-Pail Method or the Service Station Method.

a. Cylinder-Pail Method of Charging Evacuating System

Evacuating System

1. Remove protective cap from Schrader valve located on suction throttling valve, and Schrader valve located on discharge port of compressor.

2. Interconnect vacuum pump (J-5428), Manifold and Gage Set (J-5225-01), Gage Hook-Up Set (J-5462), Gage Adapters (J-5420), five Gage Charging Lines (J-5418) and refrigerant-12 cylinder with air conditioning system (see Figure 13-101). Be sure all valves are closed.

3. Start vacuum pump and open both high and low pressure valves on manifold and gage set. Slowly open shut-off valve of gage hook-up set.

> **NOTE:** If shut off valve is opened too quickly, oil may be forced out of vacuum pump.

4. Operate pump until at least 28 inches of vacuum (at sea level) registers on the low pressure gage of the manifold and gage set and operate vacuum for 10 minutes at or below this vacuum level.

(CHECKING FOR LEAKS)

5. Stop vacuum pump, close shut-off valve and observe that vacuum does not drop more than 2 inches in 5 minutes.

> **NOTE:** Allowance should be made for elevation when obtaining a vacuum. Compute vacuum level to be obtained by subtracting 1 inch of vacuum for each 1000 feet of elevation above sea level.

6. If 28 inches of vacuum (sea level) cannot be obtained, or if vacuum drop with vacuum pump off is more than 2 inches in 5 minutes, then open cylinder valve to charge system at ambient cylinder pressure. Close cylinder valve, test the system for leaks using appropriate equipment and correct any leaks found. Repeat preceding Step 5.

(PRIMARY CHARGING)

7. Primary charge system at ambient cylinder pressure by opening cylinder valve allowing Freon to flow into system.

(FINAL EVACUATION)

8. Final-evacuate system by closing cylinder valve, starting vacuum pump, and slowly opening shut-off valve. Maintain 28 inches of vacuum for 10 minutes and then close shut-off valve and stop vacuum pump.

9. Close high pressure valve on manifold and gage set.

(FINAL CHARGING)

10. Heat a pail of water to 125°F and place it on a scale. Place Freon cylinder in bucket and record total weight.

> **CAUTION:** Never heat cylinder above 125°F as dangerous hydrostatic pressures result in cylinder. When there is danger of cylinder overheating, a suitable pressure relief valve should be connected into the circuit. It may be necessary to reheat the water during charging operation to maintain proper temperature.

11. Open cylinder valve, idle engine and operate compressor until scale has decreased by 3-3/4 lbs. This indicates that 3-3/4 lbs. of Freon-12 has been charged into the system.

12. Close valve on Freon-12 cylinder, low pressure valve, and remove cylinder from bucket of water.

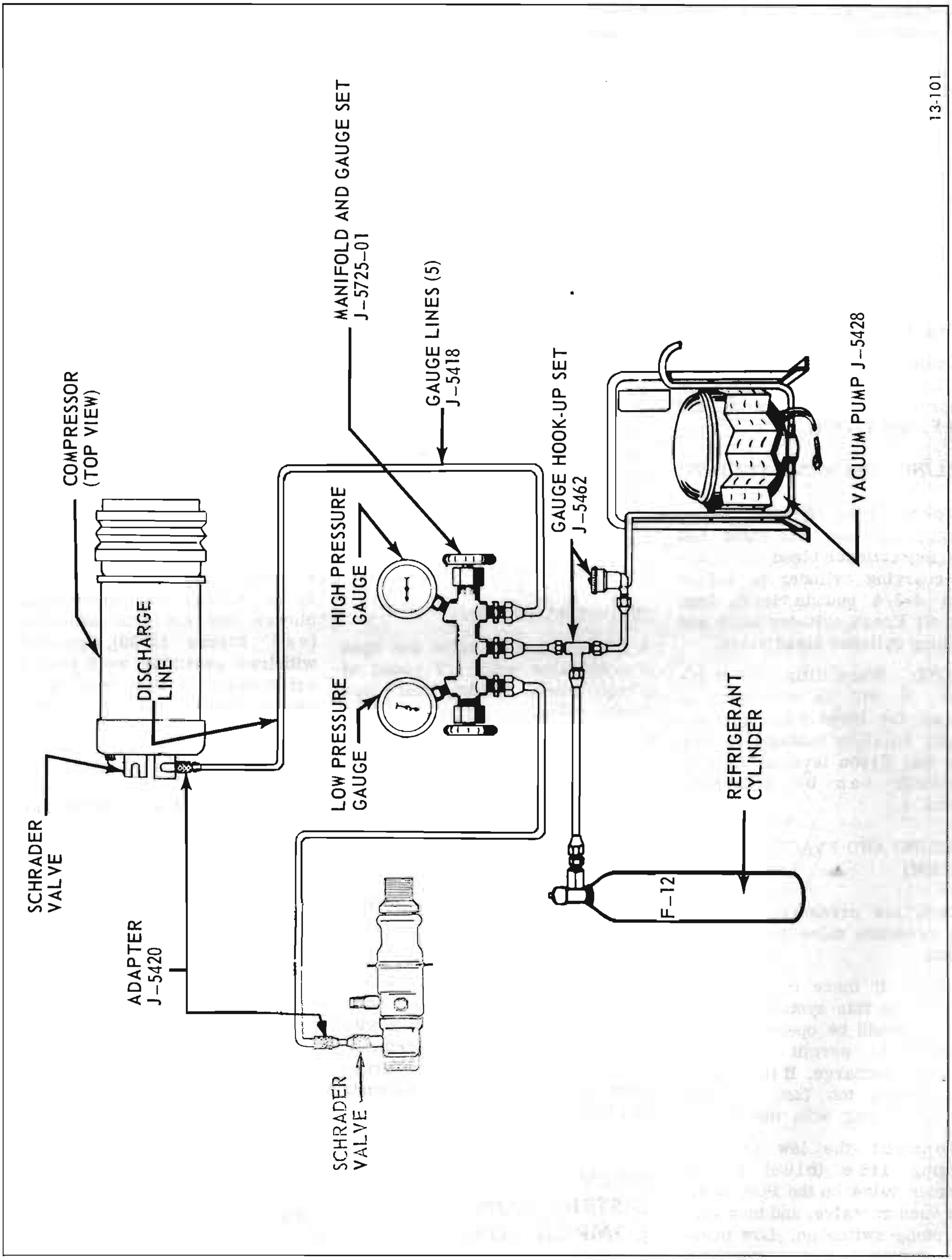


Figure 13-101—Charging Air Conditioner System

13. Perform functional test (refer to par. 13-35).

14. Remove gage charging lines from system and replace protective caps over Schrader valve fittings and tighten caps securely.

b. Charging Station Method of Charging

(INITIAL HOOK-UP OF CHARGING STATION)

1. Close all valves on Charging Station J-8393.

2. Connect high pressure charging line to Schrader valve on compressor using Adapter J-5420 (see Figure 13-101).

(FILLING CHARGING STATION)

3. Open Freon cylinder valve, charging cylinder fill valve and charging cylinder bleed valve, allow charging cylinder to fill to about 4-3/4 pounds level, then shut off Freon cylinder valve and charging cylinder bleed valve.

> **NOTE:** When filling the cylinder, it will be necessary to close the bleed valve periodically to allow bubbling to stop so that Freon level in charging cylinder can be accurately read.

(PURGING AND EVACUATING SYSTEM)

4. Open low pressure valve and high pressure valve on Charging Station.

> **NOTE:** If there is any Freon charge in this system the controls should be opened only far enough to permit Freon to slowly discharge. If the system discharges too fast, oil will escape along with the Freon.

5. Connect the low pressure charging line (blue) to the Schrader valve on the POA valve, open vacuum valve, and turn vacuum pump switch on. Low pressure gage reading should decrease to 26 to 28 inches of vacuum. Allow pump to operate for 15 minutes after this gage reading is obtained, then shut off vacuum pump switch.

> **NOTE:** The specified vacuum of 26 to 28 inches is obtainable only in areas situated at or near sea level. For each 1000 feet above sea level where this procedure is performed, the specification of 26 to 28 inches should be lowered by one inch.

6. If 26 to 28 inches of vacuum (corrected to the area in which this procedure is performed) cannot be obtained, then close vacuum valve, open Freon valve and allow about one pound of Freon to enter system. Close Freon valve and using a leak detector, locate the source of the leak and correct condition.

7. Repeat Step 5.

(FLUSHING SYSTEM)

8. Close vacuum valve and open Freon valve until 1/2 pound of Freon enters system, then close Freon valve.

9. Open vacuum valve, turn on vacuum pump switch and operate pump for about 15 minutes. Then close vacuum valve, and shut off vacuum pump switch.

(CHARGING SYSTEM)

10. Close low pressure valve, open Freon valve and allow 3-3/4 pounds of Freon to enter system.

11. If full 3-3/4 pounds of Freon will not enter system, then start engine and run it at fast idle with compressor operating. Intermittently open and close low pressure valve until full 3-3/4 pounds of Freon enter system.

(SERVICING AIR DISTRIBUTION COMPONENTS)

13-30 REMOVAL AND INSTALLATION OF PLENUM BLOWER AND AIR DOOR ASSEMBLY

a. Removal

1. Remove right front fender (refer to par. 110-7).

2. Remove eight screws securing plastic duct situated between plenum blower and air door assembly and evaporator assembly (see Figure 13-99), then take out front and rear halves of duct.

3. Disconnect vacuum hoses from outside air inlet door diaphragm.

4. Disconnect blower motor connector, blower resistor connector and compressor connector.

5. Pull vacuum hose grommet from plenum blower and air door assembly and separate rubber plug from grommet. (See Figure 13-102). Separate electrical harness from grommet.

6. Remove five stamped nuts and four screws securing plenum blower and air door assembly, (see Figure 13-99), partially withdraw assembly, work electrical connectors thru hole in assembly and complete removal of assembly.

b. Installation

Install assembly reverse of removal.

> **NOTE:** During installation, mating edges between the assembly and cowl must effect a good seal. Use body sealer as required along edges of plenum chamber and also recirculate to outside air dividing rib of plenum chamber.

13-31 REMOVAL AND INSTALLATION OF AIR CONDITIONER HEATER ASSEMBLY

Removal

1. Drain radiator and disconnect heater hoses from air conditioner heater assembly. Insert cork plugs in heater core inlet and outlet pipes.

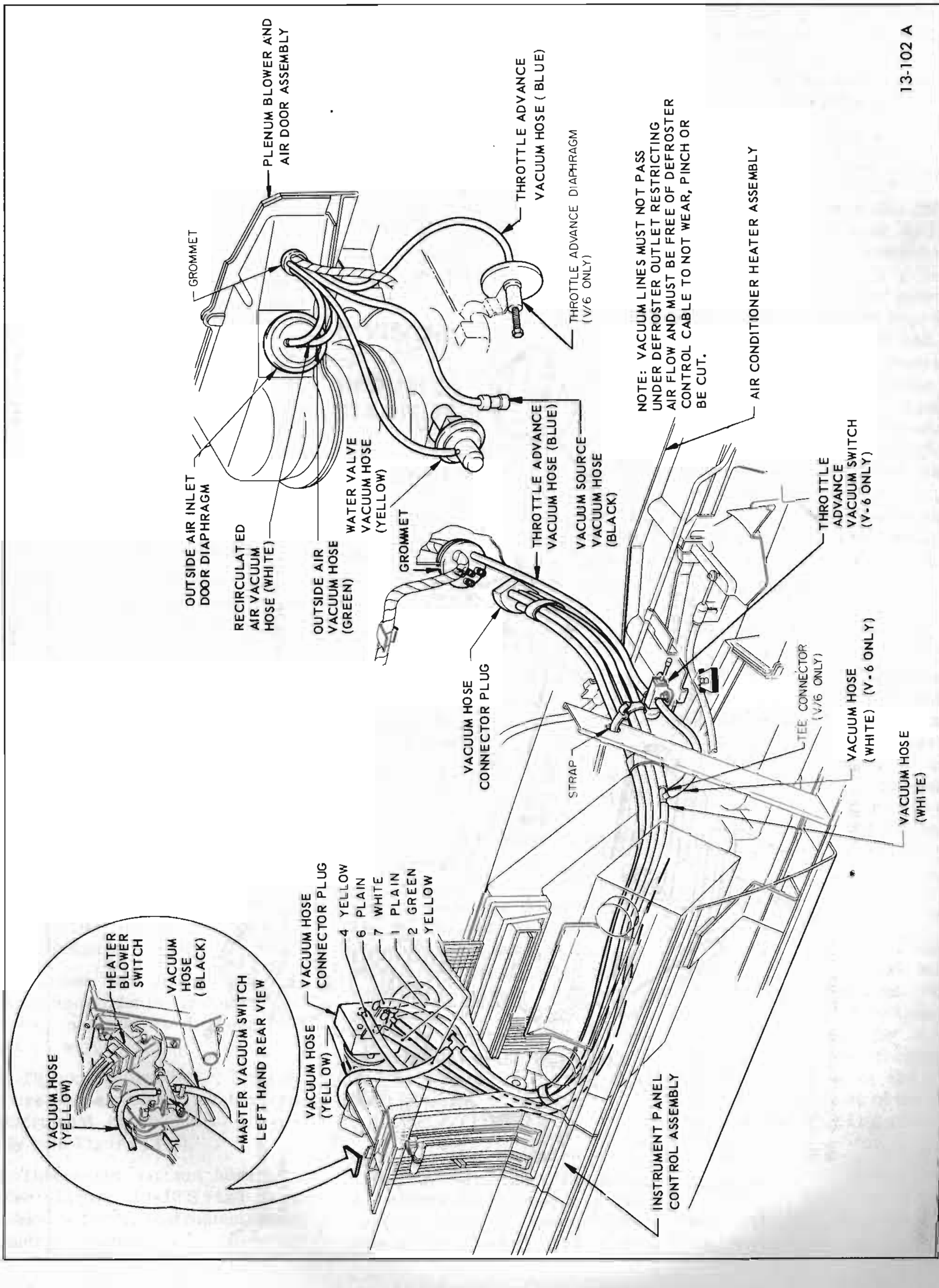


Figure 13-102—Vacuum Hose Installation - 43-44000 Series

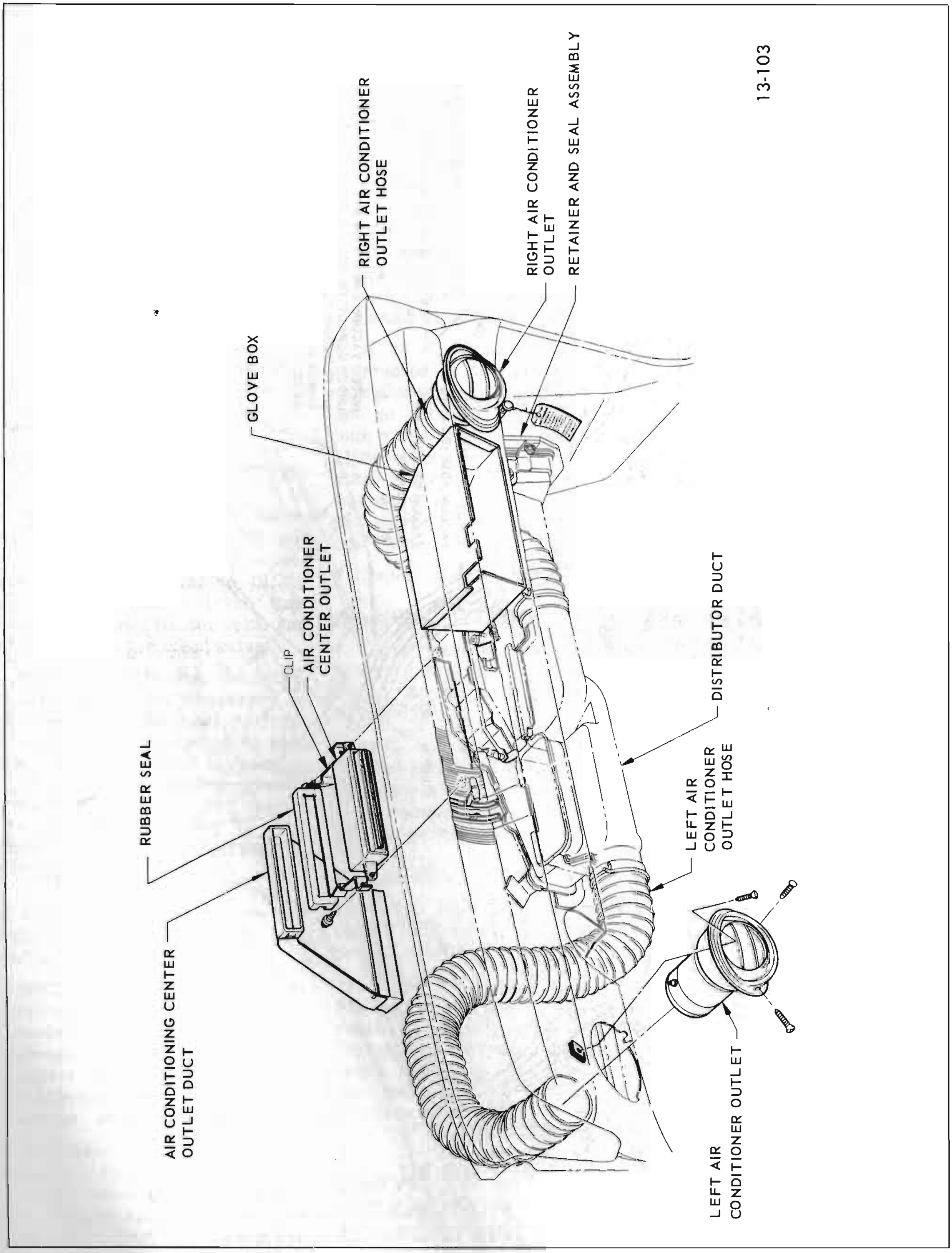


Figure 13-103—Air Conditioner Left, Right and Center Outlets Installation

2. Remove five stamped nuts (see Figure 13-99) securing studs of air conditioner heater assembly to cowl.

3. Remove ash tray assembly and glove box.

4. Disconnect clamp from right air conditioner outlet hose (see Figure 13-100) and disengage hose from distributor duct.

5. Remove two screws securing distributor duct to air conditioner heater assembly and lower duct out of way.

6. Remove screw securing defroster duct to air conditioner heater assembly.

7. Disconnect defroster temperature and air control cables (see Figure 13-2) from air conditioner heater assembly.

8. Remove rear retainer and seal assembly (see Figure 13-100).

9. Work air conditioner heater assembly from cowl and lower out from under instrument panel.

13-32 REMOVAL AND INSTALLATION OF AIR CONDITIONER CONTROL ASSEMBLY

a. Removal

1. Disconnect clamp from left air conditioner outlet hose (see Figure 13-100) and disengage hose from distributor duct.

2. Remove two screws securing distributor duct to air conditioner heater assembly and lower duct out of way.

3. Disconnect defroster, temperature and air control cables from instrument panel control assembly (see Figure 13-2).

4. Disconnect vacuum hose plug (see Figure 13-102) and lamp sockets from instrument panel control assembly.

5. Disconnect electrical connector from compressor clutch and heater blower switches on control assembly.

6. Remove two screws securing front of control assembly to instrument panel and withdraw assembly.

b. Installation

Reverse removal procedure and check control operation.

DIVISION IV

TROUBLE DIAGNOSIS

13-33 GENERAL INFORMATION

The following is a brief description of the type of symptom each refrigerant component will evidence if a malfunction occurs:

a. Compressor

Compressor malfunction will appear in one of four ways: noise, seizure, Freon leakage, or low discharge pressure.

NOTE: Resonant compressor noises are not cause for alarm; however, irregular noise or rattles are likely to indicate broken parts. To check seizure, de-energize the magnetic clutch and check to see if drive plate can be rotated. If rotation is impossible, compressor is seized. To check for a leak, refer to paragraph 13-22 subparagraph h. Low discharge pressure may be due to a faulty internal seal of the compressor, or a restriction in the compressor.

NOTE: Low discharge pressure may also be due to an insufficient refrigerant charge or a restriction elsewhere in the system. These possibilities should be checked prior to servicing the compressor. If the compressor is inoperative; however, is not seized, check to see if current is being supplied to the magnetic clutch coil terminals.

b. Condenser

A condenser may malfunction in two ways: it may leak, or it may be restricted. A condenser restriction will result in excessive compressor discharge pressure. If a partial restriction is present, sometimes ice or frost will form immediately after the restriction as the refrigerant expands after passing through the restriction. If air flow through the condenser or radiator is blocked, high discharge pressures will result. During normal condenser operation, the outlet pipe will be slightly cooler than the inlet pipe.

c. Receiver-Dehydrator

A receiver-dehydrator may fail due to a restriction inside of body of the unit. A restriction at the inlet to the receiver-dehydrator will cause high head pressures. Outlet tube restrictions will be indicated by low head pressures and little or no cooling. An excessively cold receiver-dehydrator outlet may be indicative of a restriction.

d. Expansion Valve

Expansion valve failures usually will be indicated by low suction and discharge pressures, and insufficient evaporator cooling. The failure is generally due to malfunction of the power element and subsequent closing of the valve. A less common cause of the above symptom is a clogged inlet screen.

e. Evaporator

When the evaporator malfunctions, the trouble will show up as inadequate supply of cool air. A partially plugged core due to dirt, a cracked case, or a leaking seal will generally be the cause.

f. POA Valve

If the POA valve is defective, it may cause evaporator pressure (hence air temperature) to be either too high or too low depending on the type of failure. No adjustment is possible on POA valves. If it is determined that a POA valve has failed it should be replaced. See paragraph 13-35.

g. Refrigerant Line Restrictions

Restrictions in the refrigerant lines will be indicated as follows:

1. Suction - A restricted suction line (see Figure 13-37) will cause low suction pressure at the compressor, low discharge pressure and little or no cooling.

2. Discharge Line - A restriction in the discharge line generally will cause the pressure relief valve to open.

3. Liquid Line - A liquid line restriction will be evidenced by low discharge and suction pressure, and insufficient cooling.

h. Use of Receiver-Dehydrator Sight Glass for Diagnosis

At temperatures higher than 70°F., the sight glass may indicate whether the refrigerant charge is sufficient. A shortage of liquid refrigerant is indicated after about five minutes of compressor operation by the appearance of slow-moving bubbles (vapor) or a broken column of refrigerant under the glass. Continuous bubbles may appear in a properly charged system on a cool day. This is a normal situation. If the sight glass is generally clear and performance is satisfactory, occasional bubbles do not indicate refrigerant shortage.

If the sight glass consistently shows foaming or a broken liquid column, it should be observed after partially blocking the air to the condenser. If under this condition the sight glass clears and the performance is otherwise satisfactory, the charge shall be considered adequate.

In all instances where the indications of refrigerant shortage continues, additional refrigerant should be added in 1/4 lb. increments until the sight glass is clear. An additional charge of 1/2 lb. should be added as a reserve. In no case should the system be overcharged.

13-34 LEAK TESTING SYSTEM

The following two methods are recommended when attempting to locate refrigerant leaks in the system. Loss of refrigerant is always indicative of a leak since refrigerant is not consumed and does not wear out.

1. Open Flame Method - This method utilizes a gas operated torch type Leak Detector (J-6084). Use of this method is recommended when checking for leaks in confined areas. To perform test, light torch and adjust to obtain a pale blue flame, approximately 3/8 inch in height, in burner.

Explore for leaks by moving end of search tube around suspected area. Check bottom of connections since refrigerant-12 is heavier than air and will be more apparent at underside of fittings. The flame color will turn yellow-green when a small leak is detected. Large leaks will turn the flame blue or purple.

CAUTION: Do not breath fumes resulting from burning of refrigerant gas. These fumes are extremely poisonous.

2. Liquid Leak Detectors - This method utilizes a solution which will bubble (soap solution) to signify a gas leak. Use of this method of checking is recommended for locating small leaks.

13-35 FUNCTIONAL TESTING SYSTEM

Function testing is a measurement of the air conditioner system performance to determine if discharge air temperature, pressure in suction line, and pressure in discharge line are within specific limitations.

To perform functional test proceed as follows:

1. Remove protective caps from Schrader valve located on suction throttle valve and Schrader valve located on compressor discharge port.

2. Interconnect Manifold and Gage Set (J-5725-01), Gage Charging Lines (J-5418) and Gage Adapters (J-5420) to air conditioning system as shown in Figure 13-101.

3. Open doors and hood of car.

4. Set temperature lever to COLD position and fan lever to HI. Air control lever in A/C position.

5. Idle engine at 2000 RPM.

6. Place a high volume industrial type fan in front of radiator grille to insure minimum differential between temperature of air passing through radiator grille and condenser, and temperature of air flow through cowl air inlet and past evaporator core.

7. Measure relative humidity and ambient temperature in immediate vicinity of car to be tested.

NOTE: The temperature obtained at the air outlets will be lower on dry days and higher on humid days.

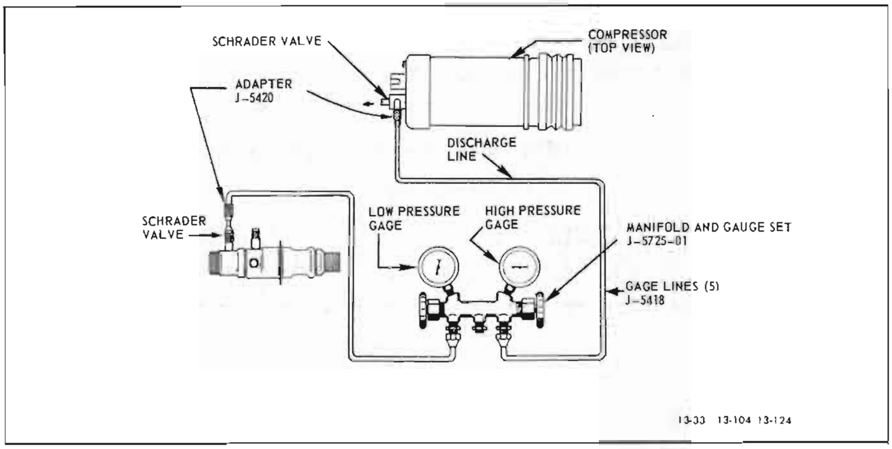


Figure 13-104—Functional Test Hook-Up

8. Open all air conditioner outlets and measure temperature at right and left outlets.

9. Compare the actual pressures and temperatures with the pressures and temperatures indicated in Test #1 of Functional Test Table (see Figure 13-105).

If it appears from the test results that either the POA valve or the expansion valve is at fault, the following procedure will help determine which to replace.

a. Check temperature door, make sure the door seals in the cool position, readjust the bowden cable if necessary.

b. Check air hoses and ducts for proper connection.

c. Check the sight glass for "clear" condition and make sure compressor clutch is engaged.

After these basic visual checks, install evaporator and head pressure gages. Operate the engine at 1500 RPM, "Recirc" control setting and "Lo" blower.

d. If evaporator pressure is 30 psi or less (and discharge air temperatures are too warm) replace the expansion valve.

e. If evaporator pressure is above 30 psi, even with blower wire disconnected, make sure the expansion valve feeler bulb is clamped tightly to the evaporator outlet pipe and the feeler bulb insulation is in place. If the bulb and insulation are OK, replace the POA valve.

f. If evaporator pressure is 29 psi ± 1 psi (and discharge air

43-44000 SERIES FUNCTIONAL TEST

TEST #1

Ambient Temperature (°F)	Evaporator Pressure (PSIG)	Compressor Pressure (PSIG)	Right A/C Outlet (TEMP)	Left A/C Outlet (TEMP)
70	28.5 - 30	150 - 225	39 - 42	39 - 42
80	28.5 - 30	200 - 245	40 - 43	40 - 43
90	28.5 - 30	240 - 290	42 - 45	43 - 45
100	28.5 - 30	270 - 330	44 - 47	45 - 48
110	28.5 - 30	310 - 345	47 - 52	47 - 52

TEST #2

Ambient Temperature (°F)	Humidity	Engine RPM	Evaporator Pressure (PSIG)	Compressor Pressure (PSIG)	Right A/C Outlet (°F)	Left A/C Outlet (°F)
90	High	480	35	210	59	57
90	Low	400	35	190	54	52
100	High	570	35	235	60	58
100	Low	550	35	230	55	54
110	High	940	35	320	59	59
110	Low	615	35	270	58	58

13-105

Figure 13-105—Functional Test

temperatures are normal), partially cover the condenser to obtain head pressure from 325 psi to 375 psi maximum. If evaporator pressure rises above 30 psi, change the expansion valve. If expansion pressure remains at 29 psi, install a new receiver dehydrator.

13-36 HEATER-AIR CONDITIONER VACUUM AND ELECTRICAL CIRCUITS TEST SEQUENCE AND TROUBLE DIAGNOSIS TABLE

SEQUENCE OF OPERATION OF CONTROLS	CHANGES THAT SHOULD TAKE PLACE IN SYSTEM	POSSIBLE CAUSE OF MALFUNCTIONS
PRE TEST CONDITIONS Fan Lever - OFF Temperature Lever - COLD Air Lever - A/C		
Engine Idling	Vacuum should be applied to #6 port of vacuum disc switch and to master vacuum switch on instrument panel control assembly (see Figure 13-9).	Incorrect installation of vacuum hoses or kinked vacuum lines.
Move Fan lever to LO position	Master vacuum switch on instrument panel control assembly should open applying vacuum to recirculated air port of ourside air inlet door diaphragm and to (on V-6 only) throttle advance diaphragm (see Figure 13-9). Outside air door diaphragm opens outside air door to recirculate position (partially open), and throttle advance diaphragm (V-6 only) speeds up engine's RPM's	Kinked hose(s) defective vacuum disc switch, master vacuum switch, outside air door diaphragm or (V-6 only) throttle advance diaphragm or vacuum switch.
	Blower operates on low speed	Blown fuse, defective resistor assembly, defective, heater blower switch, loose connections, open wires, defective blower motor.
	Compressor operates	Misadjusted or defective compressor clutch switch, loose connectors or wires, defective compressor clutch.
Move Fan lever to MED position and then to HI position	Blower motor increase speed to medium and then to high	Defective blower resistor, heater blower motor or loose wire or connections.
Position Temperature lever slightly away from COLD	Vacuum should be applied to the full outside air port of the outside air inlet door diaphragm which is situated on the plenum blower and door assembly. Vacuum diaphragm should also be applied to the re-circulate port of this diaphragm and to the throttle advance vacuum switch (V-6 only)	Kinked hose(s) - Defective vacuum disc switch, outside air inlet door diaphragm or throttle advance diaphragm.

SEQUENCE OF OPERATION OF CONTROLS	CHANGES THAT SHOULD TAKE PLACE IN SYSTEM	POSSIBLE CAUSE OF MALFUNCTIONS
Position Temperature lever slightly away from COLD (Continued)	With vacuum applied to both ports of the outside air inlet door diaphragm the outside air door fully opens	
Move Temperature lever MED detent	Vacuum should be applied to the water valve and moderately warm air should flow from air conditioner outlets.	Kinked vacuum hoses, defective water valve or vacuum disc switch. Plugged heater core or heater lines.
Move Air Lever to HTR position	Compressor shuts off	Sticking compressor clutch switch.
	Engine RPM decreases slightly due to removal of vacuum on throttle advance diaphragm (V-6 only)	Defective or misadjusted throttle advance vacuum switch.

13-37 HEATER-AIR CONDITIONER REFRIGERANT CIRCUIT TROUBLE DIAGNOSIS TABLE

INSUFFICIENT COOLING