

REFRIGERANT COMPONENTS

ALL SERIES

WARNING: IF EQUIPPED WITH AIR CUSHION RESTRAINT SYSTEM, DO NOT ATTEMPT ANY ADJUSTMENT, REPAIR OR REMOVAL OF ANY PORTION OF THE AIR CONDITIONING SYSTEM WHICH WOULD REQUIRE REMOVAL OR DISCONNECTING OF ANY COMPONENT OF THE AIR CUSHION RESTRAINT SYSTEM UNTIL THE DISCONNECTION PROCEDURE IS COMPLETED. THIS PROCEDURE MUST BE FOLLOWED TO PREVENT ACCIDENTAL DEPLOYMENT OF THE SYSTEM WHICH COULD RESULT IN PERSONAL INJURY AND/OR DAMAGE TO THE SYSTEM'S COMPONENTS.

A.C.R.S. DISCONNECTION PROCEDURE

1. Turn ignition switch to "LOCK" position. Disconnect the negative battery cable from the battery and tape end.

CONTENTS

DESCRIPTION AND OPERATION

DESCRIPTION OF AIR CONDITIONING COMPONENTS

RADIAL 4-CYLINDER COMPRESSOR AND CLUTCH

The New Design Radial 4-Cylinder Compressor and Clutch Assembly, as compared to the 6-cylinder compressor, is more compact, lighter in weight, and has reduced power requirement due to a smaller displacement and improved efficiency.

The purpose of the compressor is to pump low pressure, low temperature refrigerant vapor produced by the evaporator and compress it into a high pressure, high temperature vapor which can then be readily condensed back to a liquid state by the condenser.

The compressor is mounted to the engine by mounting brackets and is belt driven by the engine when the electromagnetic clutch assembly on the compressor is energized by the air conditioning controls.

The compressor has a displacement of 10.0 cu. in. and is a superheat switch protected type and equipped with a high pressure relief valve.

The basic compressor mechanism is a modified scotch yoke with four cylinders located radially in the same plane. Opposed pistons are pressed into a yoke which rides upon a slider block located on the shaft eccentric. Rotation of the shaft provides reciprocating piston motion with no "connecting rods". The mechanism is completely balanced with counterweights. Needle bearings are used for the shaft journals and the shaft eccentric. Pistons and yokes, along with the main cylinder housing and front cover, are made from aluminum to provide light weight. Teflon piston rings are used to provide both a gas compression seal and piston-to-bore bearing surface. The outer shell is a simple steel band which encloses a large annular discharge muffler space.

Two O-rings provide a seal between the compressor shell and the compressor cylinder. A rubber seal ring seals the front head to the cylinder assembly and the shaft seal assembly provides a front head to shaft seal.

Refrigerant flows into the crankcase from the connector block at the rear, is drawn through the reeds attached to the piston top during the suction stroke, and is discharged outward through the discharge valve plate which is held in place at the top of the cylinder by a snap ring. Discharge gas flows out of the compressor muffler cavity through the connector block at the rear.

CLUTCH COIL — RADIAL 4-CYLINDER

The clutch coil is moulded into the steel coil housing and must be replaced as a complete assembly. Three protrusions on the rear of the housing fit into alignment holes in the compressor front head. The coil is secured to the front head by a pressed fit between the coil housing and neck portion of the front head. The coil has 3.65 ohms resistance at 80° F. ambient and will require no more than 3.2 amperes at 12 volts D.C. The clutch coil has two terminals for the power and ground leads.

CLUTCH-PULLEY — RADIAL 4 CYLINDER

The movable part of the clutch drive plate is in front of and adjacent to the rotor and bearing assembly. The armature plate, the movable member, is attached to the drive hub through driver springs riveted to both members. The hub of the drive plate is pressed on the compressor shaft and keyed to the shaft by a square drive key. A self-locking nut threads on the end of the shaft and is tightened against the shaft. The rotor and hub is a welded assembly and contains six threaded holes for mounting the pulley rim. The pulley rim is secured to the rear portion of the rotor by six screws and six special lock washers.

A two-row ball bearing is pressed into the rotor hub and held in place by three punch stakes, 120° apart, into the rotor hub near the hub bore. The entire clutch coil, pulley rim, rotor and bearing assembly is pressed on the front head of the compressor and secured by a retainer ring.

When power is supplied to the clutch coil the armature plate of the drive plate and hub assembly electromagnetically engages the slotted portion of the rotor face which then drives the crankshaft through the drive plate leaf springs and hub.

The main shaft seal, located in the neck of the compressor front head, consists of the seal assembly with its ceramic seal face in a spring loaded cage. An "O" ring seal, located within the ceramic seal, provides a seal to the shaft surface. The contact surface of the shaft seal seat is finished to a high polish and must be protected against nicks, scratches and even fingerprints. Any surface damage will cause a poor seal. An "O" ring, located in an internal groove in the neck of the front head provides a seal with the outer diameter of the seal seat. A retainer ring, tapered side away from the seat, secures the seat in place. The hub and armature plate must be removed to gain access to the seal. A shaft seal kit contains all necessary replacement parts for field service.

FRONT HEAD — RADIAL 4 CYLINDER

The front head contains the front main shaft bearing pressed in place and a drilled oil hole for lubrication to the shaft seal cavity. The front head is mounted to the cylinder assembly by four screw and washer assemblies.

THRUST WASHERS — RADIAL 4 CYLINDER

One thrust washer is used on the rear end of the crankshaft between the rear eccentric and the rear of the cylinder. A belleville washer, sandwiched between two thrust washers at the front of the shaft between the front eccentric and the front head controls the lateral thrust tolerance of the shaft and cylinder assembly. The two thrust washers have tangs and are assembled with the tangs facing inward to engage and cause the thrust and belleville washer assembly to rotate as a unit and not separately.

Compressor — 6 Cylinder

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

Pressure Relief Valve 4 & 6-Cylinder Compressor - The purpose of the pressure relief valve is to prevent the discharge pressure from exceeding 440 psi. 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.

Magnetic Clutch and Pulley Assembly 6-Cylinder Compressor - The magnetic clutch and pulley assembly (see Figure 9B-1) 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.

Condenser

The condenser which is made of aluminum is located in front of the radiator 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.

Evaporator

The function of the evaporator 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.

Table of Altitude-Corrected Gauge Pressure for Evaluating POA Valve Performance

Altitude of Locale (Ft.)	Gauge Pressure (PSI)	Altitude of Locale (Ft.)	Gauge Pressure (PSI)
0 (Sea Level)	28.5	6,000	31.4
1,000	29.0	7,000	31.8
2,000	29.5	8,000	32.3
3,000	30.0	9,000	32.7
4,000	30.5	10,000	33.2
5,000	31.0		

Allowable Tolerance of POA Valve is ± 1 PSI

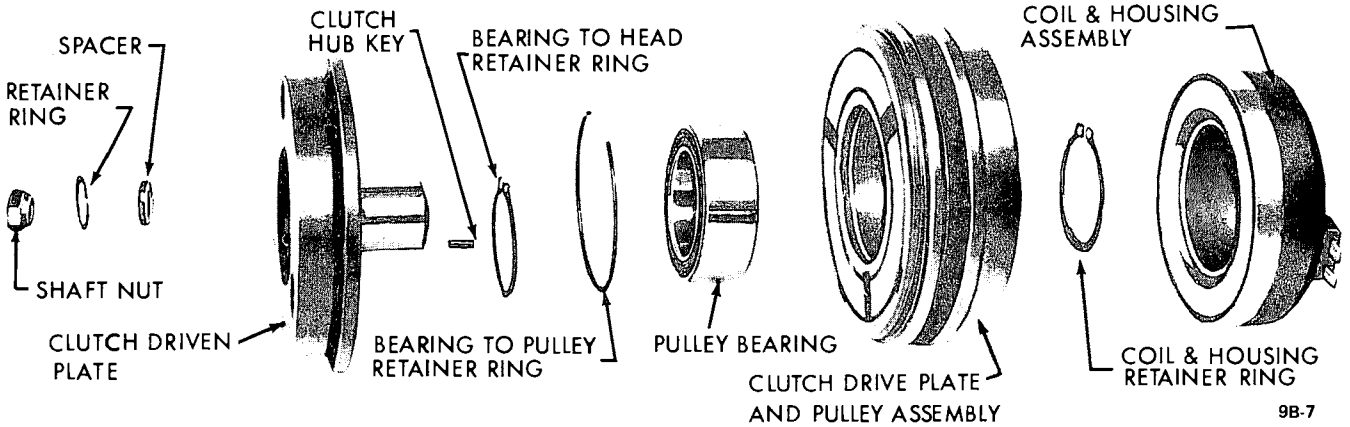


Figure 9B-1 Magnetic Clutch and Pulley Assembly 6-Cylinder Compressor

Construction of the Valves-In-Receiver Assembly (V.I.R.) Early Production H Series

The Valves-In-Receiver (VIR) Assembly, Figure 9B- 3, combines the thermostatic expansion valve, POA suction throttling valve, receiver-dehydrator and sight glass into one integral unit. It is mounted adjacent to the evaporator.

Construction of the valves-in-receiver assembly (VIR-EE) - X-A-B-C-E and Late Production H Series

The newly designed Valves-In-Receiver Assembly (VIR-EE) is similar in construction to the 1974 (VIR) except for the method of equalization for the TX Valve capsule diaphragm and special means of identification. The external means of identification for the EE model VIR is a red product label on the receiver shell and the gold allodine color of the valve housing exterior surface. Internally, the exterior surface of the TX valve is also a gold allodine color.

The EE model VIR assembly eliminates the equalizer port between the POA and TX Valve cavities in the valve housing. By omitting the O-ring from the upper O-ring groove of the TX valve, the equalizer function is accomplished by permitting pressure within the inlet connector shell assembly to be transmitted to the TX valve equalizer port. See Figure 9B-2.

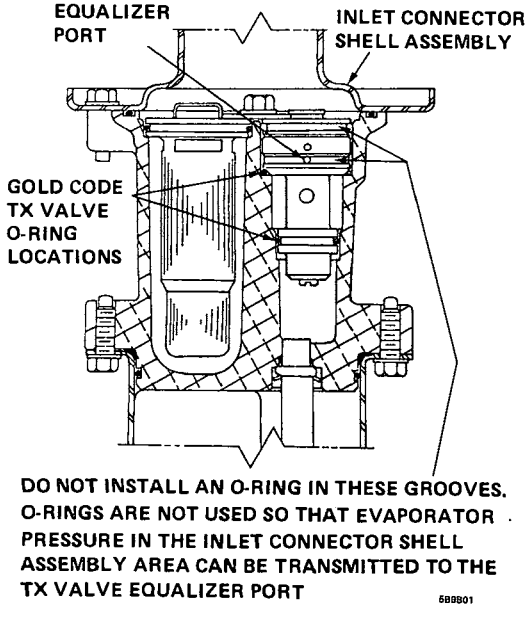


Figure 9B-2 - O-Rings Location on VIR-EE TX Valve Capsule

On the original design VIR, the external equalizer function was
accomplished by permitting suction line pressure to pass from the POA capsule cavity to the TX valve equalizer port located between the upper and center O-ring seals.

Operation of the Valves-In-Receiver Assembly (VIR-EE) - X-A-B-C-E and Late Production H Series

Expansion Valve (TX Valve)

The expansion valve, is a pressure-and temperature-sensitive, automatic valve used to control the amount of refrigerant entering the evaporator. The valve controls the flow of refrigerant by sensing the temperature and pressure of the refrigerant gas as it passes through the VIR unit on the return to the compressor.

The expansion valve cavity is divided into three separate pressure zones. The area below the bottom "O" ring is subjected to discharge or high side pressure. The area between the bottom "O" ring and the upper "O" ring corresponds to evaporator inlet pressure. The area above the upper "O" ring is evaporator outlet pressure.

The working part of the TX-Valve is the power diaphragm. The diaphragm controls the position of the valve seat in response to four forces: (1) the temperature of the return refrigerant passing across the top and around the sides of the expansion valve on its way to the STV valve; (2) the pressure of the refrigerant acting on the bottom side of the diaphragm as it passes around the valve and enters the equalizer port; (3) head pressure acting on the bottom of the valve, and; (4) spring pressure holding the valve closed. The power diaphragm is partially filled with charcoal granules and charged with a specific amount of R-22 refrigerant. As the refrigerant returning from the evaporator passes across the TX-Valve diaphragm cover and around the sides of the valve above the "O" ring, the temperature of the refrigerant is conducted to the valve. Slight changes in temperature will change the pressure of the R-22 gas on top of the diaphragm. Expansion of the diaphragm moves the operating pin and the valve seat to open the TX-Valve. Evaporator outlet pressure applied to the bottom of the diaphragm through the equalizer port, opposes the pressure of the diaphragm. Two additional but much smaller forces also act to offset the diaphragm. These are, as previously stated, head pressure and the pressure exerted by the spring in the bottom of the TX-Valve. As the pressures balance out, the valve seat is opened enough to provide a constant evaporator temperature. If the evaporator core runs short of liquid refrigerant, the refrigerant vapor will be too warm by the time it reaches the TX-Valve on its way to the STV valve. This will increase the R-22 gas pressure against the top of the diaphragm. As previously stated, acting through the operating pin, this opens the expansion valve to admit more liquid refrigerant to the evaporator core. Conversely if the evaporator core has too much liquid, the refrigerant passing over the TX-Valve will be too cold thus relaxing some of the pressure on the diaphragm allowing it to move toward its closed position thus reducing the flow of liquid refrigerant.

The TX-Valve is factory adjusted and cannot be reset or repaired in the field. When it is determined that the valve is malfunctioning, the entire capsule must be replaced.

Equalizer Functions of the VIR-EE Assembly

The equalizer port is used to speed up the opening of the expansion valve under certain conditions. If the STV is throttling toward the closed position to slow down cooling, the upper end of the evaporator core would in time become warm, and this heat would eventually open the expansion valve, due to the pressure of the R-22 gas in the power diaphragm. However, at higher car speeds, this length of time could be too great to provide an even outlet temperature because of the time it takes to cool the evaporator core after the expansion valve has opened. To

eliminate this fluctuation of temperature and smooth out the cooling to a more constant temperature the equalizer feature was added to help the TX-Valve power diaphragm move the valve to the open position without waiting for the TX-Valve to warm up.

As the pressure drops in the equalizer port and under the diaphragm, the expansion valve would operate the same as if the TX-Valve was being heated and exerting increased pressure on top of the diaphragm. The expansion valve, therefore, would open and allow refrigerant to flow into the evaporator core because of the reduced pressure under the diaphragm rather than due to a pressure increase on top of the diaphragm.

The equalizer port in the EEVIR is a drilled hole in the TX-Valve below the power diaphragm. This area is exposed to evaporator pressure by eliminating the top "O" ring used in previous VIR Assemblies. This allows evaporator pressure to enter the equalizer port and eliminates the need for a drilled passage between the STV and TX-Valve cavities found in previous assemblies.

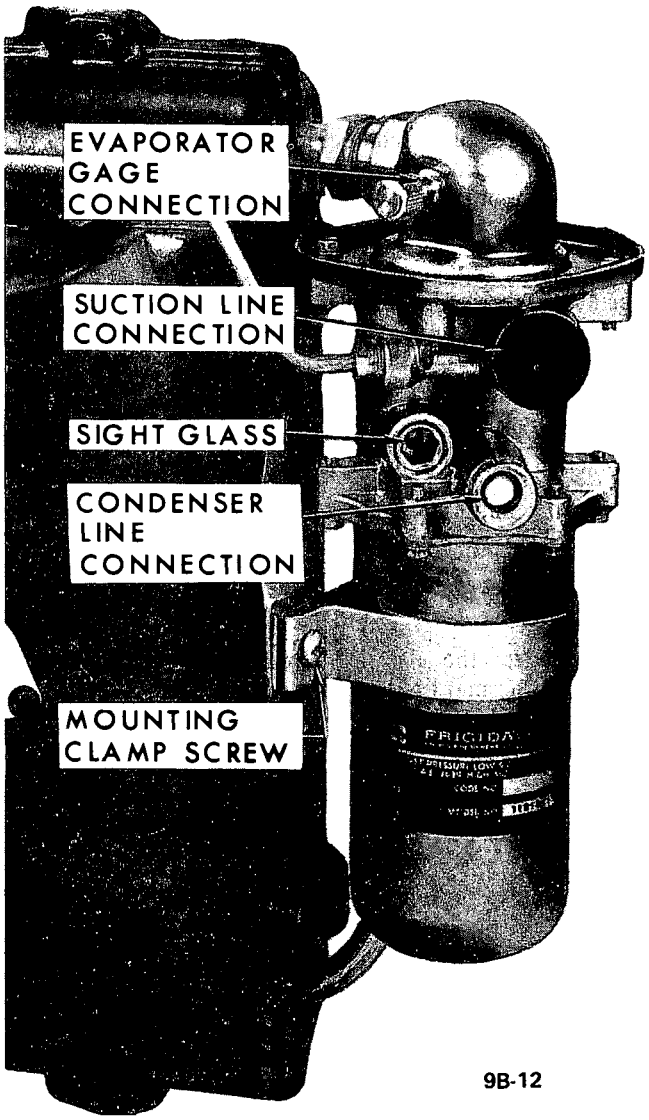


Figure 9B-3 Valves-In-Receiver Assembly - Typical

Thermostatic Expansion (TX) Valve Early Production H Series

The capsule type TX valve is located in the Valves-In-Receiver (VIR) unit. This valve controls the flow of refrigerant to the evaporator by sensing the temperature and pressure of the refrigerant gas as it passes through the VIR unit on the return to the compressor.

POA Suction Throttling Valve

The capsule type POA suction throttling valve is located in the Valves-In-Receiver (VIR) unit adjacent to the TX valve capsule. The function of this valve is to control the flow of refrigerant from the evaporator to maintain a constant evaporator pressure.

A new superheat switch with a higher setting to prevent "Blown Limiter Fuses" on normal operating systems under certain transient conditions of short duration, is being used on 1975 systems.

The new superheat switch is identified by a yellow dot on the flat surface around the superheat switch terminal area. See Figure 9B-4.

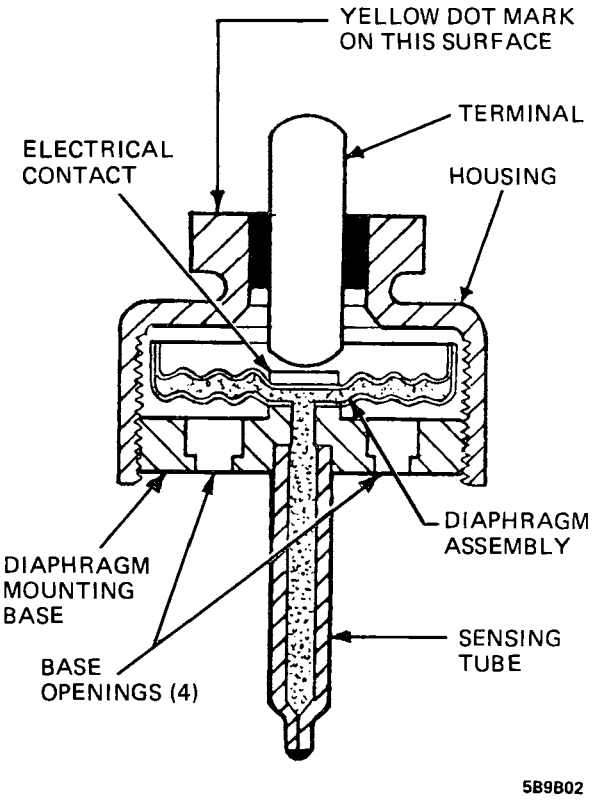


Figure 9B-4 - Superheat Switch with Yellow Dot Identification

Fan Drive Clutch Assembly

During periods of operation when radiator discharge air temperature is low (below approximately 150 degrees F.), the fan clutch limits the fan speed to 800-1600 RPM.

Superheat Switch 4 & 6-Cylinder Compressors

System Description

The low refrigerant charge protector system consists of a superheat shutoff switch located in the rear head of the compressor, connected in series by an electrical lead to the

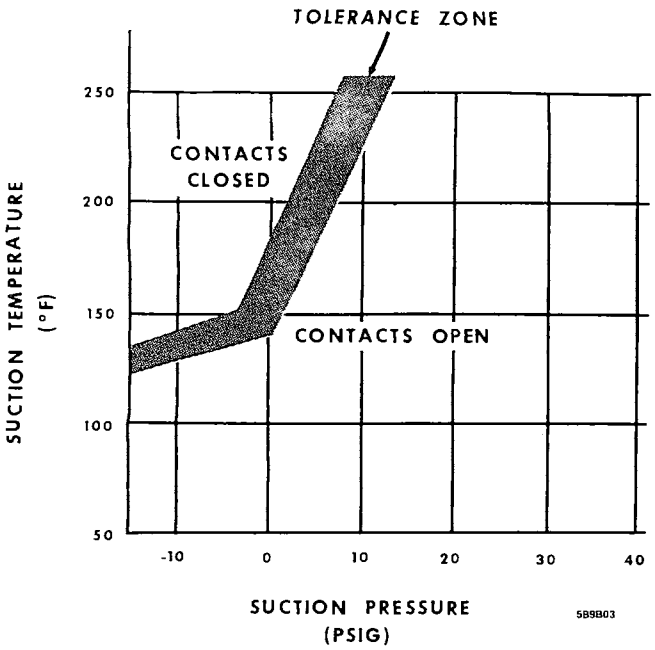


Figure 9B-5 - High Set Superheat Switch Operating Characteristics

thermal fuse which is basically a temperature sensitive fuse link between the air conditioning system ambient switch and the clutch coil connection.

A wiring diagram of the superheat shutoff switch and the thermal fuse interconnected with the associated system components is shown in Figure 9B-6. A schematic electrical diagram of the system circuiting is shown in Figure 9B-7.

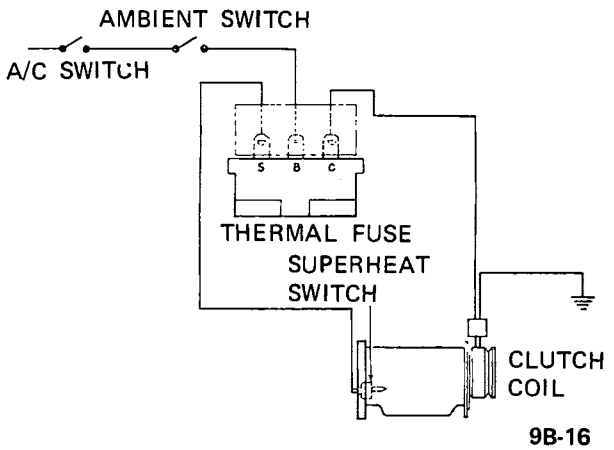


Figure 9B-6 Wiring Circuit Diagram - Superheat Shutoff System 4 & 6 Cylinder Compressors

DIAGNOSIS

GENERAL INFORMATION - 6 CYLINDER COMPRESSOR

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

Compressor

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

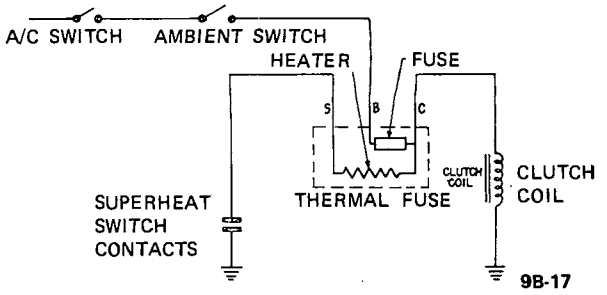


Figure 9B-7 Schematic - Superheat Shutoff System 4 & 6 Cylinder Compressors

Resonant compressor noises are not cause for alarm; however, irregular noise or rattles may indicate broken parts or excessive clearances due to wear.

When the air conditioning system has not been used for several months or the vehicle has been stored for a long period of time, the oil in the compressor is drained away from the surfaces of the pistons and axial plate. This can result in increased internal friction to the extent the compressor drive belt will slip as evidence by the screeching sound during initial compressor operation.

If the compressor clutch does not have any visual signs of overheating or mechanical damage, the following procedure is recommended to determine if the compressor is satisfactory:

1. With the engine off, disconnect the electrical connector at the clutch, or remove thermal limiter.

2. Manually rotate the compressor hub two or three turns counterclockwise, as viewed looking at the clutch from front of vehicle. This is opposite of its normal rotation. If the hub is not free to rotate by hand, a spanner type wrench (J-9403) should be used.

3. a. If compressor hub rotates, reverse the direction (clockwise) for two or three turns.

b. Check and tighten belt to specification for model being inspected.

c. Reconnect the electrical connection at compressor clutch or thermal limiter.

d. Start engine and operate at approximately 2,000 RPM, position control for compressor operation and run for at least one minute to determine system cool-down capability. If air condition system is functioning properly, the compressor is satisfactory.

4. If compressor hub will not rotate in Step 2 preceding, the compressor should be removed and repaired.

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; but, is not seized, check to see if current is being supplied to the magnetic clutch coil terminals.

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.

Expansion Valve

Expansion valve failures usually will be indicated by low suction and discharge pressures, and insufficient evaporator cooling.

The capillary line and temperature bulb for the expansion valve are eliminated with the VIR System, as the power element or diaphragm end of the expansion valve capsule is exposed directly to the refrigerant before entering the VIR unit from the outlet of the evaporator.

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.

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.

Refrigerant Line Restrictions

Restrictions in the refrigerant lines will be indicated as follows:

1. Suction Line - A restricted suction line 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.

Use of Sight Glass for Diagnosis

At temperatures higher than 70 degrees 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. V-6 & L-6 engines, 1 1/4 lb. V-8 engines, should be added as a reserve. In no case should the system be overcharged.

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.

The location of the VIR unit makes it vulnerable to accumulating road, engine oil and dirt, expecially since it has moisture condensing on its exterior surface when the system is operating.

Refrigerant acts as a carrier for the A/C system oil and past practice has always been to look for an oil show around a fitting or component if a leak was suspected. If the A/C system is low on refrigerant, do not misdiagnose the VIR unit as leaking by the presence of such dirt and oil.

The diagnosis chart will aid in troubleshooting the VIR and/or VIR EE Valves-In-Receiver System.

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.

"X" Series.

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.

FUNCTIONAL TESTING SYSTEM ALL SERIES

Functional 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:

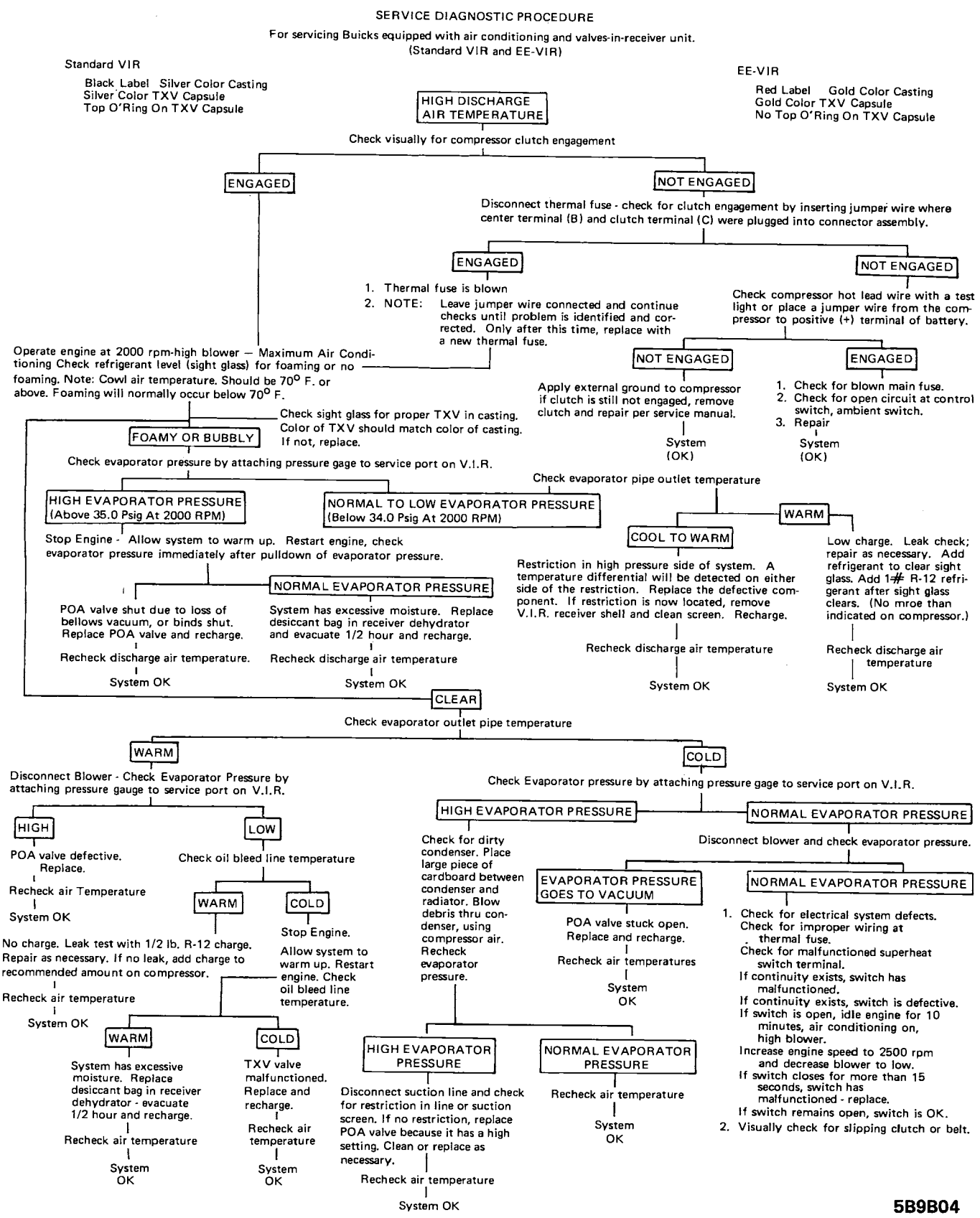
1. Remove protective cap from Schrader valve located on V.I.R. valve and Schrader valve located on compressor discharge port.

2. Interconnect manifold and gage set (J-23575), and gage adapters (J-5420) to air conditioning system.

3. Close doors, open windows and hood of the car.

4. Set temperature lever to cold position and fan to "HI", selector lever in "Max".

5. Idle engine at 2000 RPM in neutral.



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

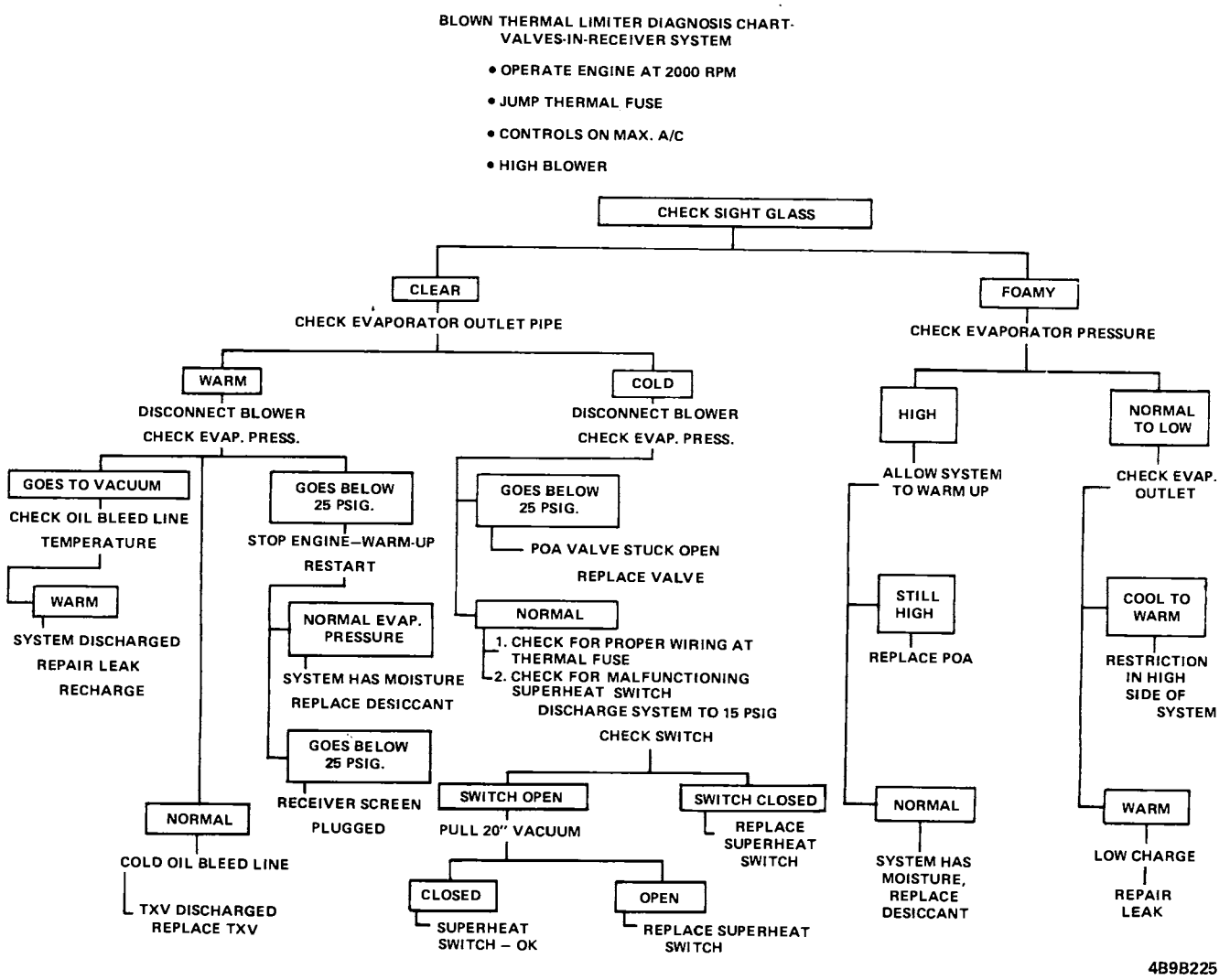


Figure 9B-8 Blown Thermal Limiter Diagnosis Chart - V.I.R. System

AMBIENT TEMP. °F.	EVAPORATOR PRESSURE P.S.I.G. AT VIR	COMPRESSOR HEAD PRESSURE P.S.I.G.	OUTLET LEFT	TEMP. °F. RIGHT
70	28.5 – 30	180 – 210	39 – 40	40 – 43
80	29 – 31	205 – 230	41 – 45	43 – 47
90	30 – 32	235 – 270	45 – 52	47 – 54
100	30 – 35	275 – 310	48 – 54	50 – 56

Air Conditioner Functional Test Table – H Series

SERIES	AMBIENT TEMP. °F.	EVAPORATOR PRESSURE P.S.I.G. AT VIR	COMPRESSOR HEAD PRESSURE P.S.I.G.	OUTLET TEMP. °F.	
				LEFT	RIGHT
"A"	80	28 - 30	200 - 245	40 - 45	40 - 45
	90	28 - 30	240 - 280	45 - 49	45 - 49
	100	28 - 30	260 - 320	48 - 52	48 - 52
	110	28 - 30	300 - 340	51 - 55	51 - 55
"B" "C" "E"	70	28 - 30	160 - 190	37 - 41	37 - 41
	80	28 - 30	180 - 230	41 - 45	41 - 45
	90	28 - 31	200 - 270	44 - 50	44 - 50
	100	28 - 30	235 - 275	46 - 52	46 - 52
	110	29 - 32	280 - 340	48 - 54	48 - 54

THE LOWER OUTLET TEMPERATURES CAN BE ACHIEVED ON DRY DAYS, AND THE HIGHER ON HUMID DAYS.

4B9B88

Figure 9B-10 Air Conditioner Functional Test Table - A-B-C-E Series

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 the Functional Test Table (see Figure 9B-11).

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 if necessary.

b. Check air hoses and ducts for proper connections.

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, "NORM" A/C selector lever 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, with blower wire disconnected, replace the POA valve.

f. If evaporator pressure is 30 psi plus or minus 1 psi (and discharge air temperatures are abnormal), 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 30 psi, install a new desiccant bag in the receiver dehydrator.

HEATER-AIR CONDITIONER REFRIGERANT CIRCUIT TROUBLE DIAGNOSIS GUIDE - ALL SERIES

Insufficient Cooling (Check Air Flow)

Normal Air Flow

(Inspect system for visual defects. Run functional tests.)

Discharge Air - Normal Temp Check for air leaks through dash, car body, windows, or from heater or ventilators.

Discharge Air - High Temp Check sight glass for foaming and compressor clutch for engagement.

No Compressor Clutch Engagement Check connections at clutch switch, harness connectors, and check clutch switch.

No Foaming Compare evaporator pressure to that on functional test table.

Foaming System is probably low on refrigerant. Check for leaks, repair, evacuate, and charge. If foaming still occurs, check for restriction in refrigerant lines between condenser and V.I.R. assembly.

Evaporator Pressure Normal Compare head pressure to pressure on functional test table.

TEST CONDITIONS:

Hood . . . . . Raised
Front Windows . . . . . Open
Doors . . . . . Closed
A/C Control Panel
Select Lever . . . . . A/C Mode
Fan Switch . . . . . HI
Temperature Lever . . . . . Full Cold
Nozzles and Air Outlets . . . . . Open
Engine Speed . . . . . 2000 RPM

TEST READINGS:

Ambient Air in Degrees F. (In Auxiliary Fan Air Blast Ahead of Condenser)	70°		80°		90°		100°		110°	
Air Quality	Arid	Humid	Arid	Humid	Arid	Humid	Arid	Humid	Arid	Humid
*Average Compressor Head Pressure in PSI	140	180	180	220	200	240	230	260	280	300
Average Evaporator Pressure **PSI AT SEA LEVEL	28	30	24	30	24	30	24	30	24	30
Center Outlet Temperature in Degrees F.	40°	42°	42°	44°	44°	47°	45°	48°	47°	51°

*NOTE: These pressures are for engine with engine fan clutch engaged. With fan clutch disengaged, pressures generally are 25-35 psi higher than shown here.

**NOTE: Interior pressure of the evaporator is isolated from exterior atmospheric pressure. As a result, the controlling element (vacuum bellows) of the P.O.A. valve is able to operate independently of the effect of atmospheric pressure. However, any gauge used to check the pressure will not be free from the effect of atmospheric pressure. This altitude effect on the gauge must be taken into account when interpreting a reading. As the altitude increases and atmospheric pressure goes down, the pressure reading on the gauge will go up.

The increase noted in the above readings will be approximately .5 psi per 1,000 feet above sea level. For example at 90°F, in an arid climate at 2,000 feet above sea level, evaporator pressures would be 29 to 31 psi.

5B9B05

Figure 9B-11 Air Conditioner Functional Test Table - X Series (V-6 Engine)

Evaporator Pressure Low Ice may be forming on evaporator. Low volume of air discharging at A/C outlet after system has been operating on the road for 15-30 minutes. Discharging air gradually elevating in temperature. Check expansion valve. If valve isn't permitting flow of liquid, this will be indicated by a warm pipe out of the evaporator.

POA valve may be inoperative because of ice formation inside POA due to excessive moisture in refrigerant system. This may be indicated by initially good POA valve temperature control and satisfactory cooling, then situation progressively becomes unsatisfactory with ice forming on evaporator and blocked air output at elevated temperatures. Stop engine, allow system to warm up, restart engine. If system indicates a duplication of okay-to-poor performance, replace POA valve capsule. POA may have too low a setting. Also, replace desiccant bag in the receiver-dehydrator and evacuate thoroughly.

Evaporator Pressure High Operate engine at 2000 RPM with maximum air conditioning setting. If evaporator pressure remains high, feel suction line. If line feels frosty or extremely cold with relative high ambient conditions, then partially cover the condenser to obtain head pres-

sures from 325 psi to 375 psi maximum. If evaporator pressure rises above 30 psi, change the expansion valve capsule.

Observe operation on functional test to see if pressures and temperatures at start are normal but become progressively higher in pressure and temperature. This may be the result of ice forming inside POA valve due to excessive moisture in the system. Replace the desiccant bag in the receiver-shell and evacuate thoroughly.

If correction is still not affected, malfunction may be the result of a malfunctioned POA valve. Replace valve.

Another possibility is a restriction in the suction line.

Also, check if compressor may be the cause due to some internal or external mechanical trouble which prevents reduction of pressure. Check for external troubles, slipping belt, malfunctioning clutch and/or pulley, or improper clutch engagement, before investigating the compressor internally.

Head Pressure High Check for the following: Condenser air flow low, air in system, excessive refrigerant in system, restriction in condenser.

Head Pressure Low Restriction in flow of refrigerant to evaporator, or expansion valve plugged or has malfunctioned.

Head Pressure Normal Check that temperature air door is in proper position.

Low Air Flow

(Check blower operation and evaporator. Check operation of controls.)

Ice Blocking Evaporator Run functional test. If evaporator pressure is low, ice may form on evaporator and reduce air flow.

Evaporator Pressure Low Ice may be forming on evaporator. Low volume of air discharging at A/C outlet after system has been operating on the road for 15-30 minutes. Discharging air gradually elevating in temperature. Check expansion valve. If valve isn't permitting flow of liquid, this will be indicated by a warm pipe out of the evaporator.

Blower Not Operating Check for the following: Fuse blown, blower switch has malfunctioned, wire broken or loose connection, poor ground connection, or blower motor has malfunctioned.

Blower Operating Normal Check for the following: Flexible air hose loose, restriction or leakage in air ducts, A/C outlet not opening, or kick panel inlet not fully open in recirc position - X Series only.

Blown Thermal Fuse

Possible Cause - Low refrigerant charge or totally discharged system.

Correction - Inspect for leaks, repair, evacuate, recharge system, and then replace thermal fuse according to procedures.

Possible Cause - Inoperative expansion valve.

Correction - Replace expansion valve according to normal procedures and then replace the thermal fuse.

Possible Cause - Thermal fuse installed in improper location where temperatures exceed 260 degrees F.

Correction - Install new thermal fuse in proper location.

Possible Cause - Thermal fuse blown during charging.

Correction - Jump connector plug during charging and replace thermal fuse.

Possible Cause - Malfunctioning superheat switch.

Correction - Replace superheat switch according to procedure, recharge system, and replace thermal fuse.

Superheat Heat Switch

Car engine off, lead disconnected from superheat switch terminal.

Check for the following: Continuity between switch housing and ground. (If not grounded, check continuity, switch housing to retainer ring, and retainer ring to rear head.)

Check for the following: Continuity between switch terminal and switch housing. (If no continuity, contacts are open. If continuity exists, contacts are closed.)

Install suction gauge and determine the suction pressure, determine the approximate rear head temperature, and compare conditions noted to Calibration Chart. If contacts are not OPEN or CLOSED according to temperature-pressure relations shown, discharge system and remove switch for bench check.

(Switch off of compressor.)

Check for the following: Closed contacts. (Housing to terminal contacts should be open at atmospheric pressure and temperatures below 100 degrees F.)

Check for the following: Closed contacts. (With switch in a hot bath 150 degrees F. or higher, or with sensing tube held in match flame 15-20 seconds.)

If switch contacts are not OPEN or CLOSED per these checks, the switch has malfunctioned and must be replaced.

MAINTENANCE AND ADJUSTMENTS

GENERAL SERVICE INFORMATION AND SAFETY PRECAUTIONS

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.

Do not clean fitting or hoses with solvents because they are contaminants. If dirt, grease or moisture gets inside the pipes or hoses and cannot be removed, the pipe or hose is to be replaced. Use a small amount of clean 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 (see Specifications).

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

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.

CHARGING AND DISCHARGING SYSTEM WITH LOW REFRIGERANT CHARGE PROTECTOR SYSTEM

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

Disconnect electrical connector from thermal limiter assembly. Insert a jumper wire between terminals B and C of connector, if compressor will be required prior to refrigerant system being fully charged.

Discharging the System (All Series)

1. With the engine stopped, remove the protective caps from the Schrader type valves located on the compressor discharge connector and the Valves- In-Receiver inlet connector shell assembly.

2. Connect the Gauge Set J-23575 with valve adapters J-5420 to the Schrader type valves. See Figure 9B-12.

3. Fully open both high and low pressure gauge valves and allow the refrigerant to escape through the center outlet of the gauge set and out the center fitting and hose. (Place end of hose in a clean container to collect oil loss due to rapid discharge of the system).

Place the end of the discharge hose into a clean open container to catch any oil discharged with the refrigerant so that the oil quantity may be measured and a like quantity of new oil be added to the system during system

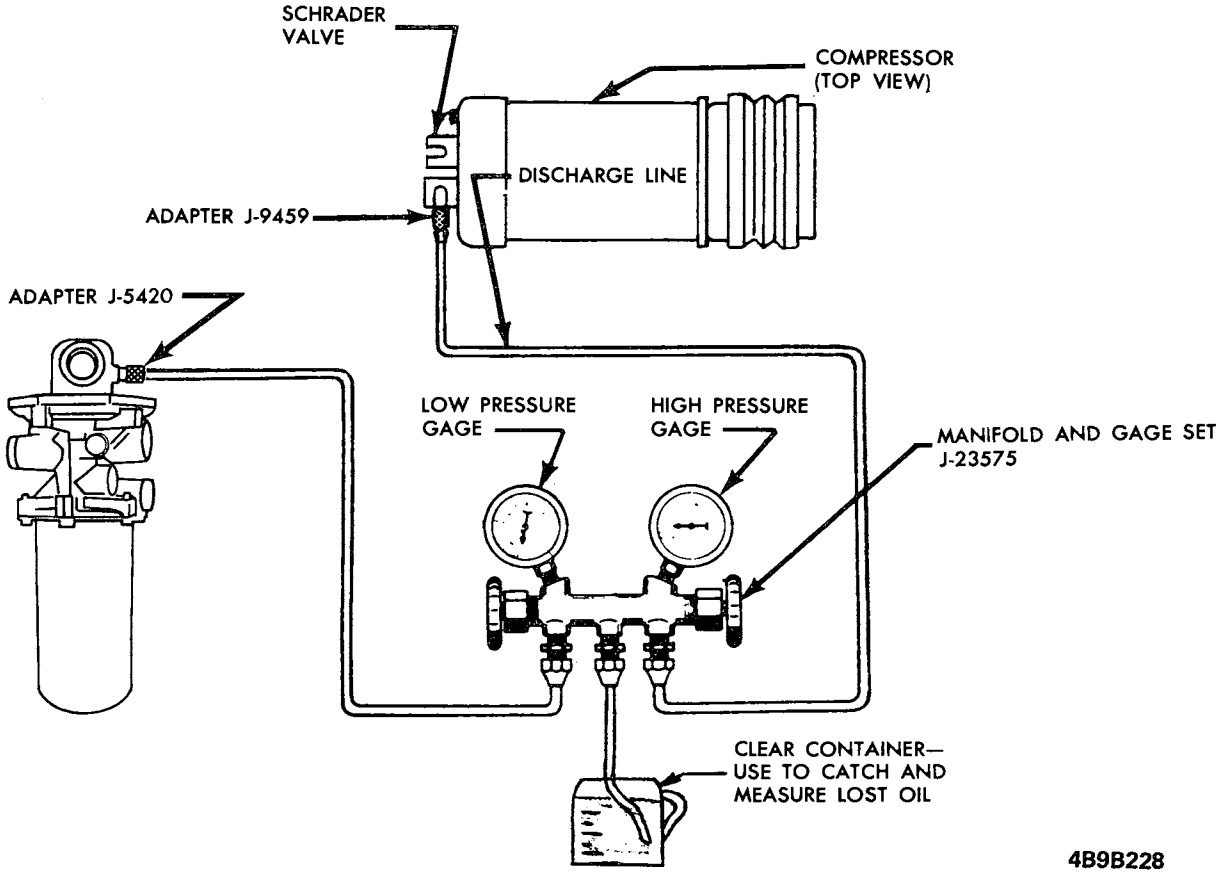


Figure 9B-12 Set Up For Discharging System - All Series

recharge. After the system has been completely discharged of refrigerant, any part of the refrigeration system may be serviced.

Evacuating the System

When the refrigeration system is depressurized and opened for service, some air will enter the lines, regardless of how quickly openings are capped. In order to remove this air and as much as possible of the moisture it contains, the complete system must be evacuated. Evacuating is merely the process of removing all air from the system, thereby creating a vacuum in the system.

Under no circumstances should alcohol be used in the system in an attempt to remove moisture, regardless of the successful use of alcohol in other refrigeration systems.

Preparations for Evacuating Complete System

1. Check the low pressure gauge for proper calibration. With the gauge disconnected from the refrigeration system, be sure that the pointer indicates to the center of zero. Lightly tap gauge a few times to be sure pointer is not sticking. If necessary, calibrate as follows:

a. Remove cover from gauge.

b. Holding gauge pointer adjusting screw firmly with one hand, carefully force pointer in the proper direction in proper amount to position pointer through the center of "0" position. Tap gauge a few times to be sure pointer is not sticking. Replace gauge cover.

2. If gauge set is not already connected to V.I.R. assembly and compressor, connect as follows:

a. Close hand shut-off valves on gauge set by turning clockwise.

b. Remove caps from gauge fittings on the V.I.R. valve assembly and compressor.

c. Attach valve adapter (J-5420) to end of the hose from the low pressure gauge and connect this adapter fitted hose to suction gauge fitting.

d. Attach valve adapter (J-9459) to end of hose from the high pressure gauge and connect this adapter fitted hose to the discharge fitting.

3. Attach a flexible gauge hose to center fitting of the gauge set and attach the other end of this hose to vacuum *pump* (J-5428-03).

Evacuating Complete System

1. Turn hand shut-off valve on low pressure gauge of gauge set to full clockwise position.

2. Slowly turn valve on high pressure gauge counterclockwise from full clockwise position, letting any pressure build-up escape completely. Close high pressure valve.

3. Check oil level in vacuum pump and, if necessary, add refrigeration oil. Make sure dust cap on discharge side of pump has been removed.

4. Start the vacuum pump and slowly open low and high pressure sides of manifold gauge set to avoid forcing oil out of refrigeration system and pump. Pressure is now being reduced on both sides of the refrigeration system. If oil is blown from the vacuum pump, it should be refilled to the proper level.

5. Observe low pressure gauge and operate vacuum pump until gauge shows 28-29 inches vacuum. In all evacuating procedures, specifications of 28-29 inches of vacuum is used. This evacuation can only be attained at or near sea level.

For each 1000 feet above sea level where this operation is being performed, the specification should be lowered by one inch of mercury vacuum. At 5000 feet elevation, only 23 inches to 24 inches of vacuum can normally be obtained.

If vacuum cannot be pulled to the minimum specification for the respective altitude, it indicates a leak in the system or gauge connections or a defective vacuum pump. In this case, it will be necessary to check for leaks as described under "Leak Testing Refrigerant System".

When specified vacuum level (28-29 inches at sea level) is obtained, continue to run vacuum pump for ten (10) additional minutes. During these ten (10) minutes:

a. Prepare for charging the system. If using a charging station, fill charging cylinder. If using manifold gauge set, make all preparations for charging system as described under "Disposable Can Method" or "Refrigerant Drum Method".

b. Measure oil loss collected as a result of rapid discharge.

c. Uncap compressor oil injector (J-24095) and open valve. Flush J-24095 with refrigerant, close valve and insert pick-up tube into graduated container of clean refrigerant oil.

d. Connect J-24095 to suction fitting at V.I.R. assembly. When valve on J-24095 is opened, the vacuum applied to the discharge side of the system will suck oil into system from container. Therefore, close observation of oil level in the container is necessary.

e. Note level of oil in container. Open valve on J- 24095 until oil level in container is reduced by an amount equal to that lost during discharge of system, then shut valve. Take care not to add more oil than was lost.

f. Disconnect J-24095 and attach pick-up tube fitting to schrader fitting to cap tool.

6. Turn hand shut-off valves at low and high pressure gauges of gauge set to full clockwise position with vacuum pump operating, then stop pump. Carefully check low pressure gauge approximately for two (2) minutes to see that vacuum remains constant. If vacuum reduces, it indicates a leak in the system or gauge connections.

Charging the System

The system should be charged only after being evacuated as outlined in "Evacuating the System".

Disconnect electrical connector from thermal limiter assembly. Insert a jumper wire between terminals B and C of connector, if compressor operation will be required prior to refrigerant system being fully charged.

Refrigerant Drum Method

1. Connect center flexible line of gauge set to refrigerant drum.

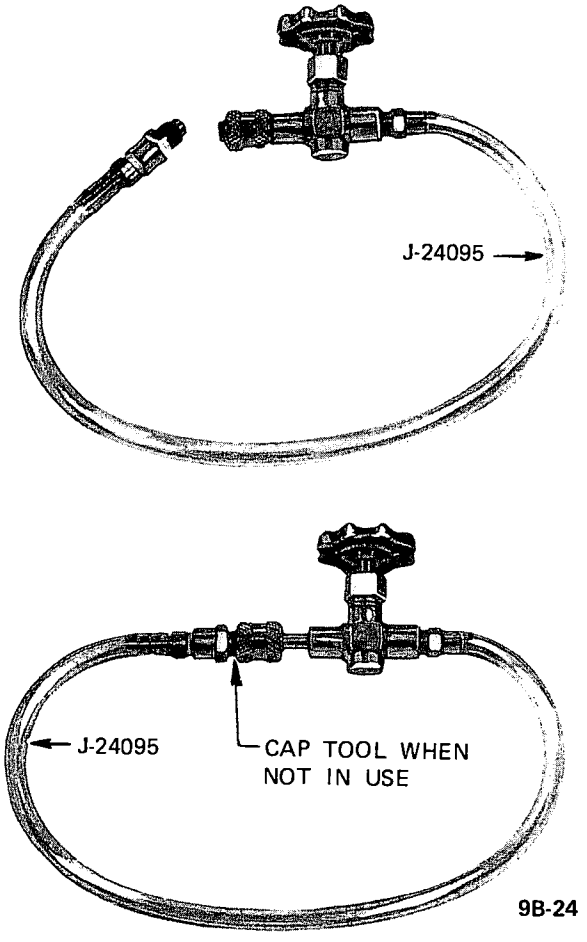


Figure 9B-13 Oil Injector J-24095

2. Place refrigerant drum in a pail of water which has been heated to a maximum of 125 degrees F.

WARNING: DO NOT ALLOW TEMPERATURE OF WATER TO EXCEED 125 DEGREES F. HIGH TEMPERATURE WILL CAUSE EXCESSIVE PRESSURE AND POSSIBLE SOFTENING OF FUSIBLE SAFETY PLUGS IN THE REFRIGERANT DRUM. IT MAY NOT BE NECESSARY TO USE HOT WATER IF A LARGE DRUM IS USED (OVER APPROXIMATELY 100 LBS.).

3. Place refrigerant drum (in pail of water) on scales (bathroom or commercial, preferably commercial).

Do not turn refrigerant drum upside down, as this would allow liquid refrigerant to enter compressor which may cause damage.

4. If line at center gauge fitting has not been purged of air, loosen line at center fitting on gauge set and crack valve on refrigerant drum to blow air from line. Retighten line at center fitting and record exact weight of refrigerant tank in water on the scales.

5. Open valve on refrigerant drum and both valves on gauge set to allow refrigerant to flow into system. Continue charging until the scales show that 3.0 lbs. of refrigerant - H Series; 3.5 lbs. - X Series and 3.75 lbs. - B-C-E Series have been transferred from refrigerant drum to system.

If full charge cannot be obtained, close both valves on gauge set, start engine, and set temperature control lever to full cold position with system in "MAX" A/C mode. Open low pressure valve on gauge set slowly and leave open until full charge is added.

WARNING: OBSERVE HIGH PRESSURE GAUGE WHILE CHARGING WITH COMPRESSOR RUNNING. SHUT OFF ENGINE IF PRESSURE EXCEEDS 435 PSI. A LARGE FAN PLACED IN FRONT OF THE CAR WILL HELP REDUCE EXCESSIVELY HIGH HEAD PRESSURE.

6. Close both valves on gauge set (high pressure valve will already be closed if charging was completed by running compressor) and close valve on refrigerant drum.

If the engine was used to complete the charge into the system, close valve on refrigerant drum to permit compressor to draw any refrigerant left in the line from the drum to the center fitting of the gauge set, then close the low pressure valve on the gauge set.

7. Operate engine at 2000 RPM with temperature control lever at full cold, blower speed switch on high and system in the "MAX" A/C position. After ten minutes of operation, observe appearance of refrigerant in sight glass. If bubbles are observed, open low pressure gauge valve and valve on refrigerant drum to allow more refrigerant to enter system. Close valve when sight glass clears up.

If air inlet temperature is below 70 degrees F. when this check is made, bubbles may appear, even though the proper amount of refrigerant is in the system. Air inlet temperature must be 70 degrees F. or above to make an accurate check.

8. When refrigerant has been installed, continue to operate system and test for proper operation as outlined under "Operational Test".

9. When satisfied that the air conditioning system is operating properly, stop engine, remove gauge set and replace protective caps on the V.I.R. assembly and compressor fittings.

WARNING: A CONSIDERABLE AMOUNT OF REFRIGERANT WILL COLLECT IN THE HIGH PRESSURE LINE, SINCE SOME OF THIS REFRIGERANT WILL HAVE CONDENSED INTO LIQUID REFRIGERANT. WRAP THE HIGH PRESSURE GAUGE FITTING AT THE COMPRESSOR WITH A SHOP CLOTH BEFORE DISCONNECTING THE VALVE FROM THE GAUGE FITTING, TO PREVENT INJURY TO PERSONNEL.

10. Using a leak detector, check the complete system for leaks.

Disposable Can Method

After having depressurized, repaired (if necessary) and evacuated the refrigerant system, the system may be charged as follows using refrigerant in disposable cans:

1. Obtain five 1 lb. cans or one 12 lb. can of refrigerant.

2. If using 1 lb. cans, mount four cans in J-6272-02 (multi-opener) or attach J-6271 (single-can opener valve) on one can. If using the 12 lb. disposable can, attach J-23390 (disposable can control valve) on can.

WARNING: MAKE SURE OUTLET VALVE ON OPENER IS CLOSED (CLOCKWISE) BEFORE INSTALLING OPENER.

a. If the J-6272-02 multi-opener is used, raise locking lever, position four cans of refrigerant and force locking lever down to secure cans and at same time puncture top of can to make it ready for charging.

b. If the J-6271 valve is used, back off the valve from the can top retainer, slip the valve onto the can and turn the valve into retainer until tight. DO NOT open outlet valve during this operation, as turning the valve into the retainer punctures top of can to make it ready for charging.

3. Connect center flexible line of gauge set to fitting on a can opener valve. If the line at center gauge fitting has not been purged of air, loosen line at center fitting on gauge set and "crack" valve at can opener (for a second or two) to force air from the line. Retighten line at center fitting.

4. Open valve at refrigerant source and at low and high pressure valves on manifold gauge set. Leave valve open at refrigerant source until all refrigerant (when using 1 lb. can) has entered the refrigeration system or system is fully charged. Close valve on can.

a. If the system is charged using 1 lb. cans and the J-6271 valve, disconnect valve from can. Leave valve closed to flexible line to the center fitting of the manifold gauge set. Install valve on a new and full disposable can of refrigerant.

b. If system is charged using J-6272-02, close the valve of opener after all cans are empty. Release the locking lever and discard the four empty cans. If this tool will be used to complete the charge with additional cans to provide the required refrigerant charge, leave three of the empty cans in positon, locate one full can and lock the lever into place. These empty cans balance the assembly and prevent the loss of refrigerant through the open "series" passage. Align the pierced hole in the empty can with the punch in the cover of the tool.

If the J-6271 valve for single cans is available, complete charging as explained in 4a preceding.

5. Close high side valve on manifold gauge set.

WARNING: PRIOR TO STARTING UP ENGINE, THE HIGH SIDE VALVE ON THE CHARGING MANIFOLD MUST BE CLOSED DUE TO EXCESSIVE PRESSURE BUILD-UP WHICH CAN RESULT IN BURSTING OF THE CONTAINER(S) CAUSING SERIOUS INJURY. IF YOU ARE INEXPERIENCED IN THE USE OF THIS PROCEDURE, SEEK PROFESSIONAL ASSISTANCE.

6. Operate engine at 2000 RPM with temperature control lever at full cold position and blower speed on high in "NORM" A/C mode. If air inlet temperature at the condenser is below 70 degrees F. when this check is made, bubbles may appear, even though the proper amount of refrigerant is in the system. Air inlet temperature must be 70 degrees F. or above to make an accurate check.

7. When refrigerant has been installed, continue to operate system and test for proper operation as outlined under "Operational Test".

8. When satisfied that the air conditioning system is operating properly, stop engine, remove gauge set and replace protective caps on suction and discharge fittings.

9. Using a leak detector, check the complete system for leaks.

Charging Station Method

INSTALLING J-23500

1. Be certain all valves on charging station are closed.

2. Connect high pressure gauge line to high pressure gauge fitting and low pressure gauge line to low pressure gauge fitting.

FILLING CHARGING CYLINDER

1. Open control valve on refrigerant container.

2. Open valve on bottom of charging cylinder, allowing refrigerant to enter cylinder.

3. Bleed charging cylinder to valve (above control panel) only as required to allow refrigerant to enter cylinder. When refrigerant reaches desired charge level, close valve at bottom of charging cylinder and be certain cylinder bleed valve is closed securely.

While filling the cylinder, it will be necessary to close the bleed valve periodically to allow boiling to subside so that refrigerant level in the charging cylinder, valve on refrigerant container can be accurately read.

EVACUATING AND CHARGING THE SYSTEM USING J-23500

1. With charging station connected, as previously described, fully open high and low pressure control valves on station and allow refrigerant gas to escape rapidly from system through the center fitting and hose. (Place end of hose in clean container to collect oil loss due to rapid discharge of system).

2. When hissing ceases, indicating all refrigerant has escaped close high pressure valve by turning valve clockwise. Connect the center fitting hose to the vacuum pump and open the vacuum control valve.

3. With system discharged, run pump until 26-28 inches of vacuum is obtained. Continue to run pump for 15 minutes after the system reaches 26-28 inches vacuum.

In all evacuating procedures, the specification of 26- 28 inches of mercury vacuum is used. These figures are only attainable at or near sea level. For each 1000 feet above sea level where this operation is being performed, the specifications should be lowered by 1 inch. For example, at 5000 feet elevation, only 21 to 23 inches vacuum can normally be obtained.

4. If 26-28 inches vacuum (corrected to sea level) cannot be obtained, close vacuum control valve and shut off vacuum pump. Open refrigerant control valve and allow some refrigerant to enter system. Locate and repair all leaks.

5. After evacuating for 15 minutes, add 1/2 lb. of refrigerant to system. Purge this 1/2 lb. and re- evacuate for 15 minutes. This second evacuation is to be certain that as much contamination is removed from the system as possible.

6. Only after evacuating as above, system is ready for charging. Note reading on sight glass of charging cylinder. If it does not contain a sufficient amount for a full charge, fill to proper level.

7. Fully open refrigerant control valve and allow all liquid refrigerant to enter the system. When full charge of refrigerant has entered the system, turn off ALL valves.

8. If full charge of refrigerant will not enter system, close high pressure control and refrigerant control valves. Start engine and run at low idle with compressor operating. Crack refrigerant control valve and low pressure control on station. Watch low side gauge and keep gauge below 50 psi by regulating refrigerant control valve. Closing valve will lower pressure. This is to prevent liquid refrigerant from reaching the compressor while the compressor is operating. When required charge has entered system, close refrigerant control valve and close low pressure control.

9. System is now charged and should be performance-tested before removing gauges.

Adding Refrigerant

The following procedure should be used in adding small amounts of refrigerant that may have been lost by leaks or while opening system for servicing the compressor. Before adding refrigerant to replace that was lost by leaks, check for evidence of oil loss and add oil if necessary.

This procedure will only apply if the air inlet temperature is above 70 degrees F. at the condenser.

1. Remove cap from the V.I.R. assembly and compressor gauge fitting. Attach gauge set to gauge fittings, making sure adapter (J-5420) is between low pressure gauge hose and suction gauge fitting, and J-9459 is between high pressure gauge hose and discharge gauge fitting.

2. Start engine, turn air conditioning temperature control lever to full cold position, blower switch to high speed and system selector lever to the "MAX" A/C mode. Operate for ten (10) minutes at 2000 RPM to stabilize system.

3. Observe the refrigerant through the sight glass with the system operating, to see if there are any bubbles evident.

a. If no bubbles are evident, then bleed system slowly through the discharge valve until bubbles appear in the sight glass. Add necessary refrigerant as explained under "Charging the System".

b. If bubbles are visible in the receiver-dehydrator with the temperature control lever in the full cold position and the blower at HI speed, it indicates a partial or complete plug in a line, a shortage of refrigerant, or both. Correct condition. Add refrigerant until the sight glass clears, then add necessary amount of refrigerant as explained under "Charging the System."

4. Attach flexible hose from center fitting of gauge set loosely to refrigerant drum or on disposable can valves. Open high and low pressure valves on the gauge set slightly to purge pressure gauge lines of air. Tighten fitting of refrigerant drum or can when satisfied that all air has been removed from gauge lines. Close (clockwise) both hand shut-off valves or gauge set.

5. Partially charge system.

REFRIGERANT DRUM METHOD:

a. Place pail containing hot water that does not have a temperature exceeding 125 degrees F. on scales, place refrigerant drum in pan containing water, note weight and only open low pressure valve on gauge set.

b. Start engine, move temperature control lever to full cold position and place blower switch on high speed. Operate engine for ten (10) minutes at 2000 RPM to stabilize system.

c. With compressor operating, slowly open valve on refrigerant drum and allow refrigerant to flow into system (through manifold gauge set) until liquid indicator clears up and immediately shut off valve at gauge set or on refrigerant drum. Check weight of refrigerant drum and pail of water. Then slowly open valve on gauge set (or refrigerant drum) and add one more lb. of refrigerant. Note total amount of refrigerant added.

DISPOSABLE CAN METHOD:

a. Make sure the outlet valve on the J-6271 valve is fully clockwise and attach the J-6271 to a 1 lb. can of refrigerant by backing off the valve from the top of the retainer, slipping the valve onto the can and turning the valve into the retainer until tight. DO NOT accidentally open outlet valve during this operation, as turning the valve into the retainer punctures the top of the can to make it ready for charging.

b. Connect center flexible line of gauge set to the fitting on the valve.

c. Start engine, move temperature control lever to full cold position, set blower switch to high speed and system to "MAX" A/C mode. Operate engine for ten (10) minutes at 2000 RPM to stabilize system.

d. With compressor operating, slowly open valve on refrigerant can and allow refrigerant to flow into system (through manifold gauge set) until liquid indicator clears up and immediately shut off valve at gauge set and on refrigerant can. Check weight of can and valve assembly and record.

e. Add an additional 1 lb. of refrigerant by adding refrigerant from the can just weighed until can is empty. Attach another can and add refrigerant until can and valve assembly weigh the same as recorded.

6. Close valves at refrigerant drum or can.

7. Test for leaks and make operational check of system.

ADDING OIL TO THE SYSTEM (MAJOR OVERHAUL)

The oil in the refrigeration system does not remain in the compressor during system operation, but circulates throughout the system. The 4 cylinder compressor is initially charged with 5.5 - 6.5 ounces of 525 oil and the 6 cylinder 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 5.5 - 6.5 ounces (4 cylinder compressor) and 10-1/2 ounces (6 cylinder compressor). Excessive oil content will reduce cooling capacity. Inadequate oil content may result in damage to compressor moving parts.

The refrigeration 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, desiccant bag, 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 for this condition (6 cylinder compressor, and through both of the compressor discharge and suction ports 4 cylinder 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, desiccant bag 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 the compressor is being serviced, remove compressor, drain and measure oil, and replace oil amount specified in the Oil Replacement Table.

OIL CHARGE — 4 CYLINDER COMPRESSOR REPLACEMENT

1. Position the new compressor with the shaft end "up" and drain the oil through both of the compressor discharge and suction ports. The compressor should gravity drain for 10 minutes.

2. Slowly discharge the R-12 from the system at the VIR evaporator gage connection.

3. Remove the compressor from the car, gravity drain the oil from the compressor as in Step 1 and determine the amount of oil drained from the original compressor.

4. Add the same amount of new 525 viscosity oil to the new replacement compressor as was drained from the original compressor.

OIL CHARGE CORRECTION — SYSTEM LEAK CONDITIONS — 4 CYLINDER COMPRESSOR

Component Rupture — Fast Discharge

1. Correct the leak and flush the system with refrigerant —11.

2. Drain the compressor and add 5.5 ounces of 525 viscosity oil to the compressor crankcase through the suction port of the compressor.

3. Recharge the system with R-12, leak check and performance check according to the evacuation and charging procedure.

Slow Leak

1. When loss of refrigerant has occurred over an extended period of time add 3 ounces of 525 viscosity oil to the system. Recharge or evacuate and recharge as required according to procedure.

SYSTEM PERFORMANCE EVALUATION — 4 CYLINDER COMPRESSOR

1. When system performance, efficiency and proper oil change is in doubt and must be evaluated accurately, it is recommended that the system be flushed with Refrigerant —11 and the exact oil change (5.5-6.5 ounces) of 525 viscosity oil be added to the compressor prior to any further checks of the system.

OIL CHARGE — 4 CYLINDER COMPRESSOR

The R-4 (Radial-Four Cylinder) compressor is charged with 5.5-6.5 ounces of 525 viscosity oil. During normal operation a certain amount of oil will circulate with the refrigerant—12 in the system. When necessary to replace a system component it is recommended that oil be added to the system in accordance to the following:

If the compressor is operable, idle the vehicle for 10 minutes with the A/C controls set for maximum cooling and high blower prior to discharging the system.

Component	Amount to Add
Condenser	1 Ounce
Evaporator	3 Ounces
VIR Desiccant	1 Ounce
Compressor	Amount Drained

Oil Replacement Table 6 Cylinder Compressor

Condition	Amount of Oil Drained From Compressor	Amount of 525 Oil to Install In Compressor
1. Major loss of oil and a component (condenser,desiccant bag 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. Desiccant bag - Add 1 oz.

Condition	Amount of Oil Drained From Compressor	Amount of 525 Oil to Install In Compressor
	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.

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. to "Flushing the System") and the desiccant bag in V.I.R. assembly be replaced. A full oil charge of 10-1/2 oz. of 525 viscosity refrigeration oil should be replaced in the system, 6 cylinder compressor and 5.5-6.5 ounces of 525 viscosity refrigeration oil in the 4 cylinder compressor. It should be noted that all service replacement 6 cylinder compressors will be supplied with 10-1/2 oz. of oil and 5.5-6.5 ounces in the 4 cylinder compressor. In most cases it will be necessary to drain oil from service replacement compressor and refill it with amount as specified in the Oil Replacement Table.

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 or hoses attached to component. To perform flushing operation, connect a cylinder of refrigerant-11 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.

In all cases where a complete system flushing operation is performed, the desiccant bag and the filter screen on the pickup tube should be cleaned.

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-11, which results in thickening of refrigerant oil. Dry nitrogen has the additional advantage of removing moisture from the system.

MAJOR REPAIR

SERVICING OF THE REFRIGERATION SYSTEM COMPONENTS

In removing and replacing any part of the refrigeration system the following must be considered and performed as required.

To prevent an unnecessary "blown thermal fuse" in the Low Refrigerant Charge Protector System when evacuating and charging the system, disconnect the thermal limiter connector plug.

1. Discharge the system refrigerant to the atmosphere, see "Discharging the System".

2. Remove and replace the component part according to the appropriate recommended step procedure.

3. Add oil to system according to the quantity lost during

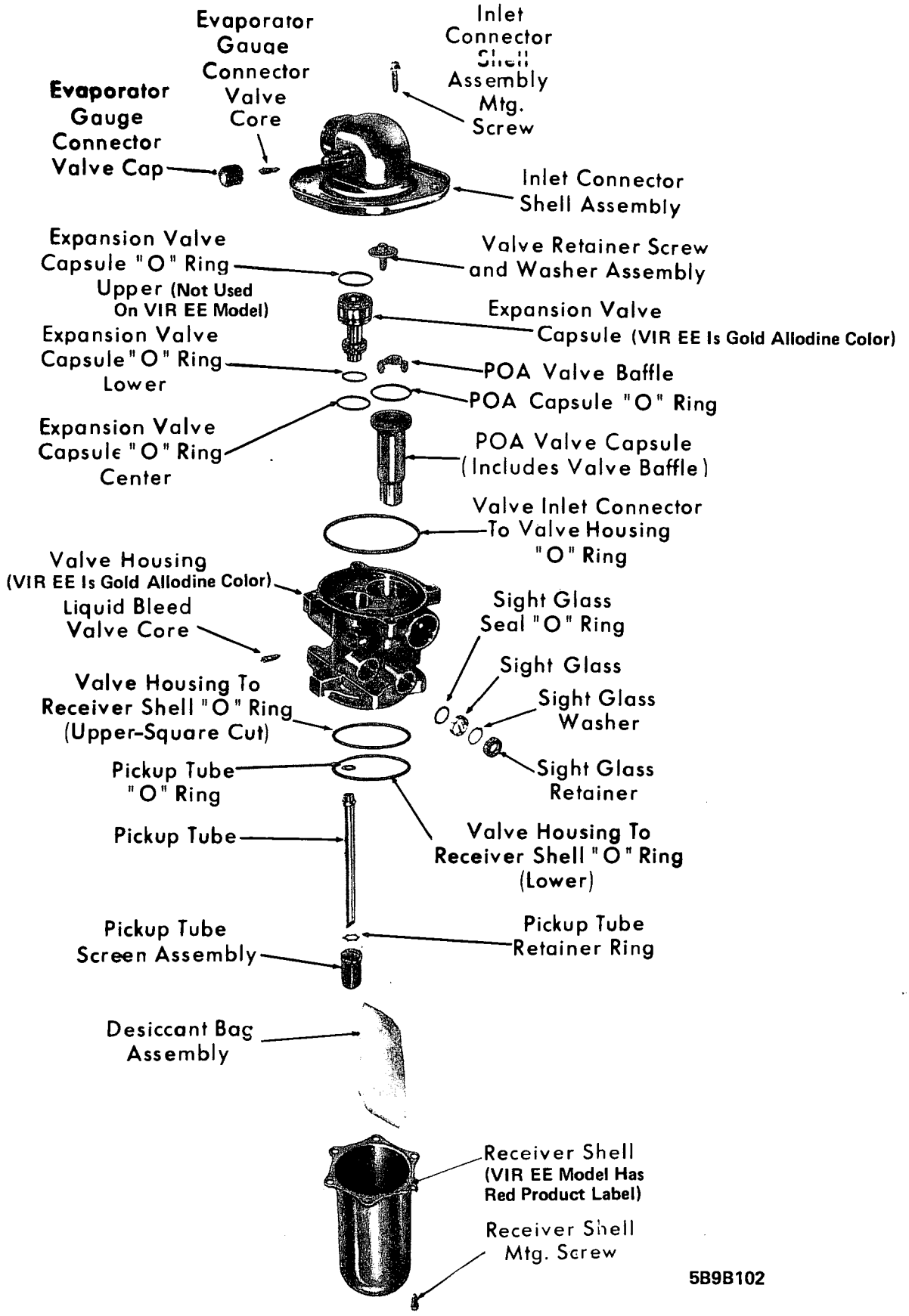


Figure 9B-14 Exploded View - VIR and VIR EE Assembly

the discharge of the system plus the recommended quantity to be added for the specific component changed.

It is recommended that the desiccant bag be changed each time it is necessary to service the VIR unit. Do not expose the desiccant bag to the atmosphere any longer than necessary to remove the bag from its shipping container, place it in the receiver shell and immediately install the receiver shell on the valve housing. See Drier Desiccant - Remove and Replace.

4. Evacuate the system according to the System Evacuation Procedure.

5. Charge the system with the proper amount of Refrigerant 12 specified for the refrigerant system.

6. Leak test the refrigerant system, particularly the connections which were disconnected.

REMOVAL AND INSTALLATION OR VIR AND VIREE ASSEMBLY

All servicing procedures for the "EE" Model are similar to those for the VIR used on early production H Series except as applies to the gold color coded TX valve capsule and valve housing. Gold color coded parts must be used when changing a TX Valve Capsule or Valve Housing on an "EE" Model VIR. The parts are not interchangeable with other VIR assemblies and improper, unsatisfactory operation of the air conditioning system could result if an interchange of parts other than specified are used.

1. Disconnect the thermal limiter connector plug and discharge the refrigerant from the system. See "Discharging The System".

While the system is discharging, clean the surface dirt from the exterior surface of the VIR Assembly and the line connection areas. Blow any loose dirt away with an air hose.

2. When the system is completely discharged (high and low sides), loosen and remove the suction line, the liquid line and the liquid bleed line connections from the VIR assembly.

3. Loosen the evaporator inlet and outlet connection nuts at the VIR assembly.

4. Remove the VIR mounting clamp from the liquid receiver and carefully slide the VIR assembly off the evaporator outlet tube first and then off the evaporator inlet tube.

5. Remove and discard all of the old line connection "O" rings. At this point the VIR assembly may be replaced by a complete VIR assembly or disassembled for the replacement of individual parts as required. An exploded view of the VIR and VIR EE assembly is shown in Figure 9B-14. Refer to Disassembly procedures and observe all warnings.

All line connections and openings should be plugged or sealed to prevent the entry of dirt and moisture into the system. The new VIR assembly should remain capped and sealed until ready for immediate installation. If the VIR assembly has been reoperated the VIR connection openings should be plugged during reassembly and the desiccant bag added to the receiver shell just prior to the receiver shell being assembled to the valve body and the immediate installation of the complete VIR assembly.

6. Lubricate all VIR assembly connection "O" rings liberally with refrigerant oil (525 Viscosity) and install the O-Rings on the connection tubes. When making all connections use care to prevent nicking the "O" rings and cross threading the connection threads. See Figure 9B-15.

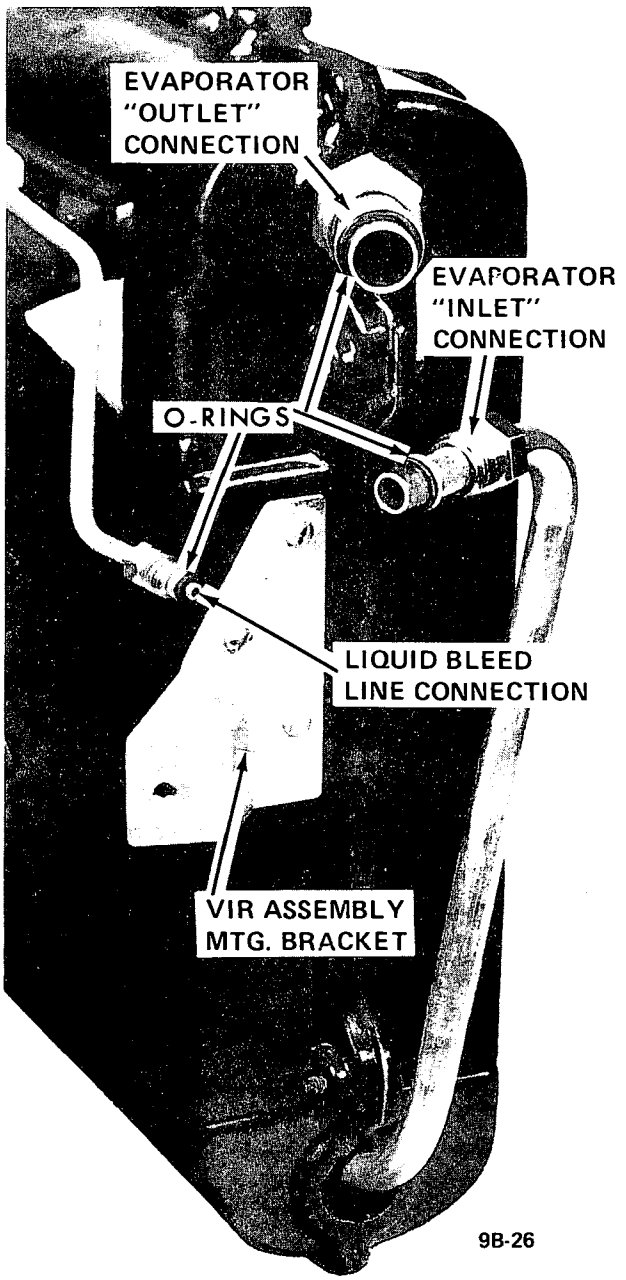


Figure 9B-15 Evaporator Connections to the VIR Assembly

7. Remove the plugs from the evaporator inlet and outlet tube connection openings of the VIR Assembly. Assemble the VIR assembly onto the evaporator inlet tube first and then onto the outlet tube. When the assembly is in proper position install the VIR mounting clamp. Tighten the evaporator inlet connection to a 15 to 20 Lbs. Ft. torque and the evaporator outlet connection to a 28 to 33 Lbs. Ft. torque.

8. Remove the plug from the liquid bleed line connection

opening of the VIR assembly. Connect and tighten the liquid bleed line connection to the VIR assembly to a 5 to 7 Lbs. Ft. torque.

9. Remove the plug from the liquid line connection opening in the VIR assembly. Connect and tighten the liquid line connection to the VIR assembly to a 11 to 13 Lbs. Ft. torque.

10. Remove the plug from the suction line connection opening in the VIR assembly. Connect and tighten the suction line connection at the VIR assembly to a 28 to 33 Lbs. Ft. torque.

11. Evacuate, leak check and charge the system.

12. Reconnect the thermal limiter connector plug.

REMOVAL AND INSTALLATION OF DRIER DESICCANT

1. Disconnect the thermal limiter connector plug and discharge the refrigerant from the system. See "Discharging the System". While the system is discharging, clean the surface dirt from the exterior of the VIR assembly. Use an air hose to blow the area free of loose dirt.

2. When the system is completely discharged, loosen the screws that mount the receiver shell to the VIR valve housing. Partially remove the screws approximately 3 turns.

WARNING: FOR PERSONAL SAFETY DO NOT REMOVE THE SCREWS ENTIRELY UNTIL STEP 5.

3. Remove the VIR mounting bracket from the receiver.

4. Hold the VIR valve housing and push on the lower end of the receiver to break the seal to the housing.

If the receiver sticks and is hard to cock to one side, use a flat blade screwdriver and carefully pry between the receiver mounting flange and the condenser line connection to free the receiver.

5. Remove the receiver mounting screws and remove the receiver by lowering it downward to clear the liquid pickup tube and filter screen. See Figure 9B-16.

6. Discard the bag of old desiccant and the valve housing to receiver shell "O" ring (lower) and valve housing to receiver shell "O" ring (upper-square cut). Wash the liquid pickup tube filter screen and the interior of the receiver with clean solvent as required and blow dry with air.

7. Lubricate the new valve housing to receiver shell "O" ring (lower) and valve housing to receiver shell "O" ring (upper-square cut) with clean refrigerant oil (525 Viscosity) and install the "O" rings to the valve housing.

8. Add a film of oil at the inner top of the receiver to facilitate assembly. Reassemble the filter screen to the liquid pickup tube. Be sure the screen is all the way onto the tube.

9. Add one ounce of new refrigerant oil and a new bag of drier desiccant to the receiver and assemble the receiver

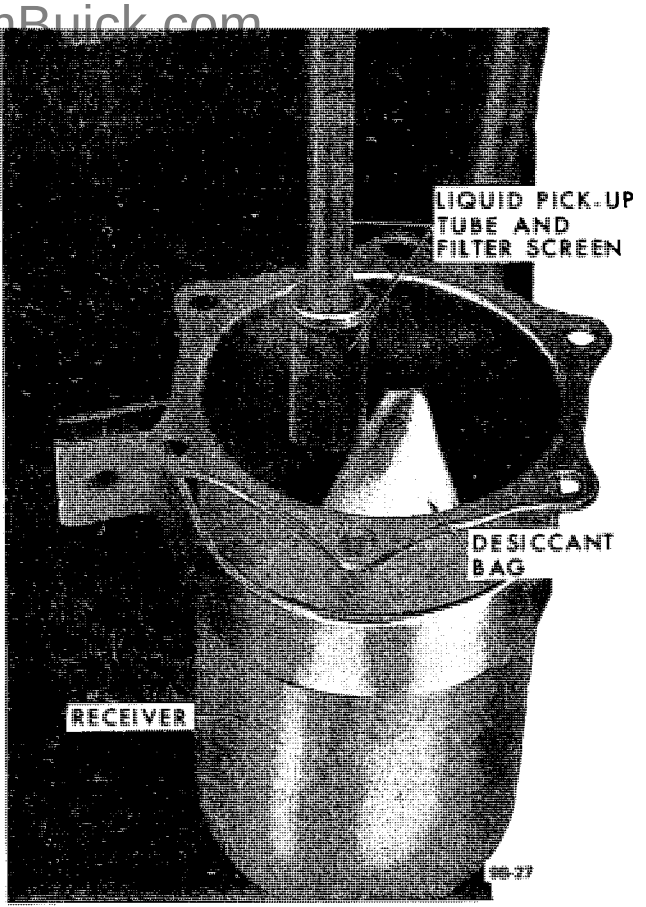


Figure 9B-16 Receiver Shell Removed for Access to Desiccant Bag

to the valve housing. Tighten the receiver mounting screws to 10 Lbs. Ft. torque.

10. Reassemble the VIR mounting bracket to the receiver.

11. Evacuate, leak check and charge the system.

12. Reconnect the thermal limiter connector plug.

REMOVAL AND INSTALLATION OF THERMOSTATIC EXPANSION (TX) VALVE CAPSULE

All servicing procedures for the "EE" Model VIR are similar to those for the VIR used on early production H Series except as applies to the gold color coded TX valve capsule and valve housing. Gold color coded parts must be used when changing a TX Valve Capsule or Valve Housing on an "EE" Model VIR. The parts are not interchangeable with other VIR assemblies and improper, unsatisfactory operation of the air conditioning system could result if an interchange of parts other than specified are used.

1. Disconnect the thermal limiter connector plug and discharge the refrigerant from the system. See "Discharging the System". While the system is discharging, clean the surface dirt from the upper exterior surface of the valve housing and the inlet connector shell assembly. Blow any loose dirt away with an air hose.

2. When the system is completely discharged (high and low sides) loosen the evaporator tube connection at the VIR inlet connector shell assembly.

3. Loosen and remove all the screws that mount the inlet connector shell assembly to the valve housing.

Slip the inlet connector shell assembly off the evaporator tube carefully to avoid damaging either the "O"ring sealing area of the valve housing or scratching the "O" ring sealing surface of the inlet connector shell assembly with the valve capsule retaining screws or the POA valve baffle. Discard both the evaporator outlet tube connection "O" ring. Place the inlet connector shell assembly in a location where the sealing surface of the flange will not be scratched or damaged.

4. Clean the top area of the valve housing of any dirt dislodged from the bottom flange of the inlet connector shell assembly during removal. Blow any loose dirt away with an air hose.

WARNING: BE CERTAIN THAT THE COMPLETE REFRIGERATION SYSTEM IS "TOTALLY DISCHARGED OF REFRIGERANT". ALL PRESSURE MUST BE RELEASED AND THE TX VALVE AND POA VALVE FREED IN THEIR CAVITIES BEFORE REMOVING THE CAPSULE RETAINING SCREW AND WASHER ASSEMBLY IN STEP 8. PERFORM STEPS 5 THROUGH 8 IN SEQUENCE AS FOLLOWS FOR PERSONAL SAFETY.

5. Loosen the TX valve and POA valve capsule retaining screws and remove one of the screw and washer assemblies entirely. See Figure 9B-17.

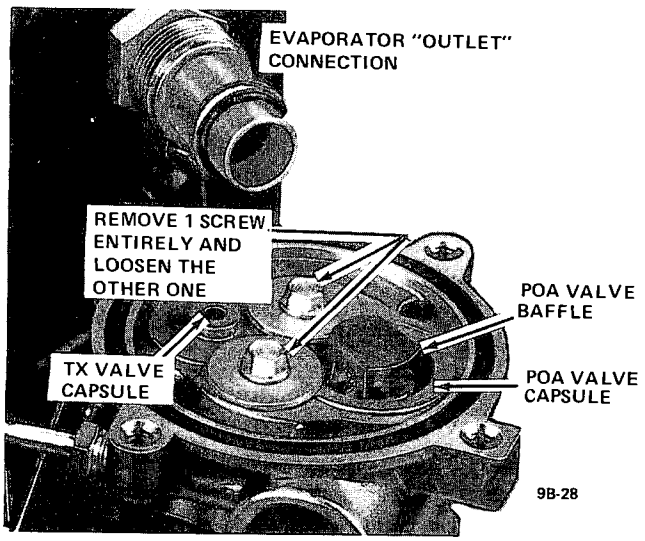


Figure 9B-17 VIR Assembly with Inlet Connector Shell Assembly Removed

6. Attach the TX valve removal tool J-24182-1 to the tapered groove projection on the diaphragm end of the TX valve. See Figure 9B-18.

7. Position the handle of the removal tool over the partially removed retaining screw and press down on the tool handle to lift and free the TX valve in its cavity. See Figure 9B-18.

WARNING: THE POA VALVE MUST BE FREED IN ITS CAVITY BEFORE REMOVING THE TX VALVE.

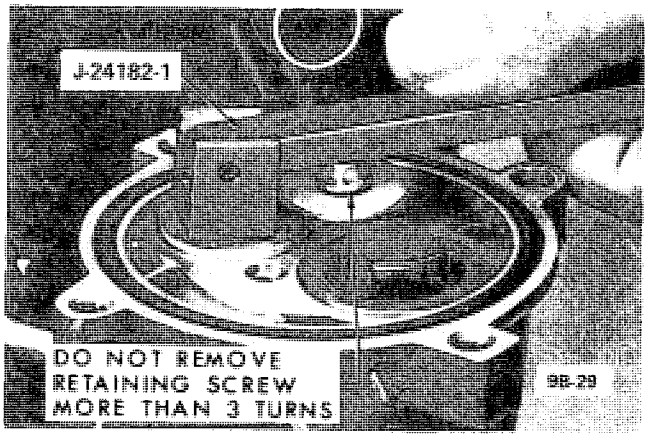


Figure 9B-18 Capsule Removal Tool Attached to TX Valve Capsule

8. When the TX valve lifts free, remove the removal tool, the retaining screw and washer assembly and remove the TX valve capsule.

9. Using "O" ring removal tool J-9553, remove the "O" ring from the TX valve cavity. Wipe the TX valve cavity clean with a clean lint free cloth, if any residue is visible.

10. Lubricate the (two) VIR EE and (three) VIR TX valve "O" rings and TX valve cavity with clean refrigerant oil (525 viscosity).

11. Install the new TX valve "O" ring to the TX valve cavity. The center "O" ring seals between bottom of expansion valve capsule and casting cavity, not around equalizer groove. Carefully install the new TX valve capsule in the valve cavity and press into place by hand. See Figure 9B-20.

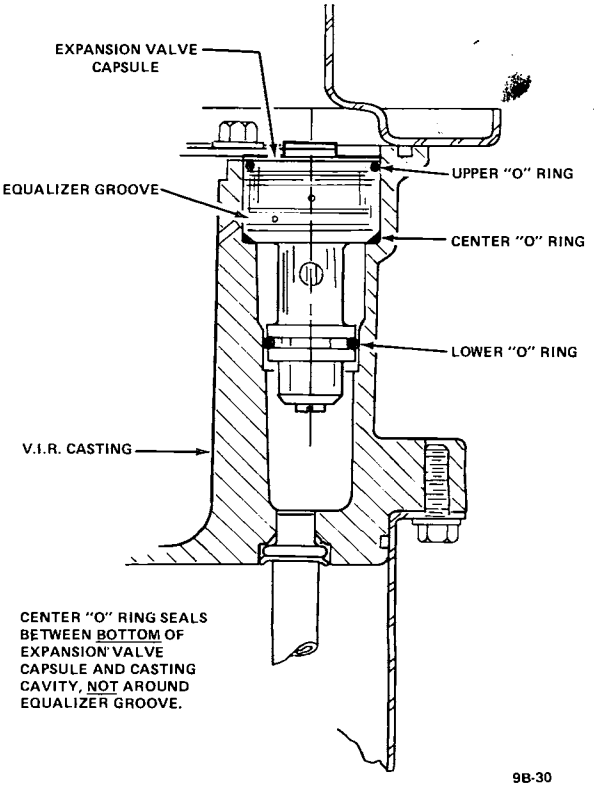


Figure 9B-20 Location of Upper and Lower "O" Rings on TX Valve - Early Production H Series

12. Reinstall the two valve retaining screw and washer assemblies and tighten to 5-7 Lbs. Ft. torque.

13. Clean the entire bottom flange surface of the inlet connector shell assembly to be free of all dirt. Inspect the "O" ring sealing area of the flange for any scratches that could result in a leak.

14. Apply clean refrigerant oil to the new valve housing to inlet connector shell assembly "O" ring and the new evaporator outlet tube to VIR inlet connector shell assembly "O" ring. Carefully install the VIR inlet connector shell assembly onto the evaporator outlet tube and start the thread of the nut into the connector of the VIR inlet connector shell assembly but do not tighten.

Use care in moving the inlet connector shell assembly across the top of the VIR valve housing to prevent scratching the flange sealing surface.

15. Position the inlet connector shell assembly over the valve housing and install the mounting screws. Tighten the screws to 10 Lbs. Ft. torque.

16. Tighten the evaporator outlet tube connection nut at the VIR inlet connector shell assembly to 28 to 33 Lbs. Ft. torque.

17. Replace the desiccant bag. See "Drier Desiccant - REMOVAL AND INSTALLATION".

18. Evacuate leak check and charge the system.

19. Reconnect the thermal limiter connector plug.

Removal and Installation of POA Valve Capsule

1. Disconnect the thermal limiter connector plug and discharge the refrigerant from the system. See "Discharging the System". While the system is discharging clean the surface dirt from the upper exterior surface of the valve housing and inlet connector shell assembly. Blow any loose dirt away with an air hose.

2. When the system is completely discharged (high and low sides) loosen the evaporator tube connection at the VIR inlet connector shell assembly.

3. Loosen and remove all the screws that mount the inlet connector shell assembly to the valve housing.

Slip the inlet connector shell assembly off the evaporator outlet tube carefully to avoid damaging either the "O" ring sealing area of the valve housing or scratching the "O" ring sealing surface of the inlet connector shell assembly with the valve retaining screws or the POA valve baffle.

4. Place the inlet connector shell assembly in a location where the sealing surface of the flange will not be scratched or damaged. Discard both the evaporator outlet tube connection "O" ring and the inlet connector shell assembly to valve housing "O" ring.

5. Clean the top area of the valve housing of any dirt dislodged from the bottom flange of the inlet connector shell assembly during removal. Blow any loose dirt away with an air hose.

6. Loosen the TX valve and POA valve capsule retaining screw and washer assemblies and partially remove one of the screw and washer assembly 3 turns. Remove the other screw and washer assembly entirely. See Figure 9B-21.

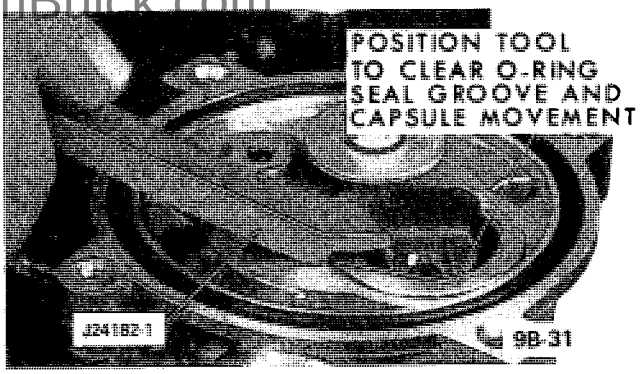


Figure 9B-21 Removing POA Valve Capsule with Removal Tool

WARNING: BE CERTAIN THAT THE COMPLETE REFRIGERATION SYSTEM IS "TOTALLY DISCHARGED OF REFRIGERANT". ALL PRESSURE MUST BE RELEASED AND THE POA VALVE AND TX VALVE FREED IN THEIR CAVITIES BEFORE REMOVING THE CAPSULE RETAINING SCREW AND WASHER ASSEMBLY IN STEP 9. FOR PERSONAL SAFETY AND TO ENSURE THAT THE PRESSURE IN THE RECEIVER AND INLET SIDE OF THE TX VALVE IS RELEASED, PERFORM STEPS 1 THROUGH 4 of "DRIER DISICCANT - REMOVE AND INSTALL" BEFORE REMOVING THE RETAINING SCREW AND WASHER ASSEMBLY.

7. Insert the POA valve capsule removal tool J24182-1 into the valve baffle of the POA valve, Figure 9B-21, so that the step edge of the tool clears the edge of the POA valve capsule.

Position the fulcrum heel of the removal tool away from the "O" ring sealing area to prevent damaging the "O" ring groove of the valve housing.

8. Keep the tool firmly engaged with the valve baffle while pressing down on the handle of the removal tool to free the POA valve capsule in the cavity.

WARNING: THE TX VALVE MUST BE FREED IN ITS CAVITY BEFORE REMOVING THE POA VALVE.

9. When the POA valve capsule breaks free, remove the removal tool, the retaining screw and washer assembly and remove the POA valve capsule.

10. Wipe the POA valve cavity and mounting flange recess clean, using a clean lint free cloth if residue is visible.

11. Lubricate the new POA valve capsule "O" ring and the POA valve cavity mounting flange recess area with clean refrigerant oil (525 Viscosity).

12. Install the new "O" ring on the new POA valve capsule and carefully install the POA valve capsule in the valve cavity. Press into place by hand.

13. Reinstall the two valve capsule retaining screw and washer assemblies and tighten to 5 to 7 Lbs. Ft. torque.

14. Clean the entire bottom flange surface of the inlet connector shell assembly to be free of all dirt. Inspect the

"O" ring sealing area of the flange for any scratches that could result in a leak.

15. Apply clean refrigerant oil to the new valve housing to inlet connector shell assembly "O" ring and the new evaporator outlet tube to VIR inlet connector shell assembly "O" ring. Carefully install the VIR inlet connector shell assembly onto the evaporator outlet tube and start the thread of the nut into the connector of the VIR inlet connector shell assembly but do not tighten.

16. Position the inlet connector shell assembly over the valve housing and install the mounting screws. Tighten the screws to 10 Ft. torque.

17. Tighten the evaporator outlet tube connection nut at the VIR inlet connector shell assembly to 28 to 33 Lbs. Ft. torque.

18. Complete the "Drier Desiccant - Remove and Replace".

19. Evacuate, leak check and charge the system.

20. Reconnect the thermal limiter connector plug.

REMOVAL AND INSTALLATION OF VIR OR VIREE VALVE HOUSING

All servicing procedures for the "EE" Model VIR are similar to those for the VIR used on early production H Series except as applies to the gold color coded TX valve capsule and valve housing. Gold color coded parts must be used when changing a TX Valve Capsule or Valve Housing on an "EE" Model VIR. The parts are not interchangeable with other VIR assemblies and improper, unsatisfactory operation of the air conditioning system could result if an interchange of parts other than specified are used.

1. Disconnect the thermal limiter connector plug and discharge the refrigerant from the system. See "Discharging the System". While the system is discharging, clean the surface dirt from the exterior of the VIR assembly, particularly in the area of the external connections. Use an air hose to blow the line connection areas free of any loose dirt.

2. When the system is completely discharged, loosen all line connections to the VIR assembly.

3. Remove the VIR assembly mounting bracket screw and carefully disconnect each line from the VIR and remove the VIR assembly. Plug or cap all refrigerant lines and openings to prevent entry of dirt and moisture to the evaporator, compressor and condenser lines. Discard all external connection "O" rings.

4. Remove the inlet connector shell assembly mounting screws and remove the inlet connector shell assembly. Discard the inlet connector shell assembly to valve housing "O" ring.

5. Remove one of the two valve capsule retaining screw and washer assemblies. Loosen the other screw and washer assembly and partially remove 3 turns.

6. Using Tool J24182-1, lift the TX valve capsule free in its cavity, Figure 9B-18.

7. Remove the remaining screw and washer assembly and the TX valve capsule. Remove and discard the three TX valve "O" rings (two from the TX valve capsule and one from the TX valve cavity in the valve housing).

8. Using Tool J24182-1, lift the POA valve capsule free in its cavity and remove the capsule, Figure 9B- 21. Remove and discard the POA valve capsule "O" ring.

9. Remove the receiver shell mounting screws and remove the receiver shell. Discard the receiver shell to valve housing O-Ring (lower) and valve housing to receiver shell "O" Ring (upper square cut) and the desiccant bag. Clean the receiver shell and liquid pickup tube screen as required before reassembling.

10. Using a small screwdriver blade, or similar tool, raise each tang of the pickup tube retainer ring a little at a time, moving around the retainer in a circular manner until the retainer ring is free of the valve housing opening, Figure 9B-22.

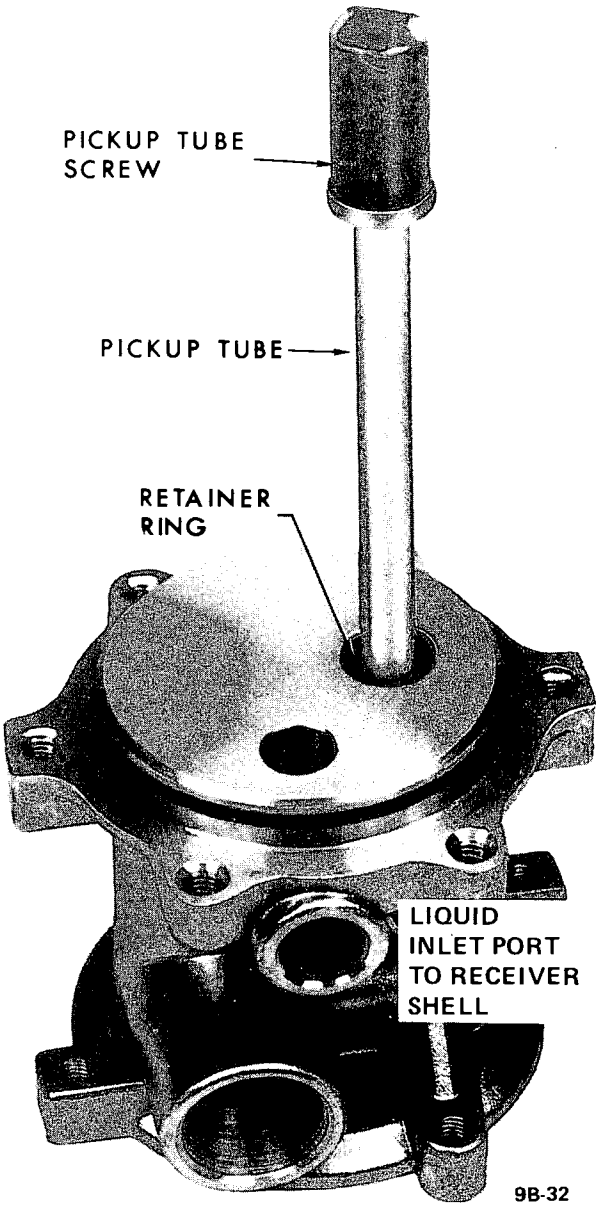


Figure 9B-22 Pick-Up Tube Assembly to Valve Housing

11. Remove the pickup tube and discard the pickup tube retainer and O-Ring.

12. Reassemble the VIR using the new valve housing and all new O-Rings according to the following procedure.

The new valve housing contains the liquid bleed valve core and sight glass assembly. These parts are factory assembled into the housing and torqued in place. Check to be sure the new valve assembly is free of lint or dirt in all cavities and connections. Clean with solvent if necessary and blow dry with air.

13. Place the new valve housing upside down on a clean flat surface. Install a new O-Ring and pickup tube retainer on the pickup tube. Lubricate the O-Ring with clean 525 Viscosity oil.

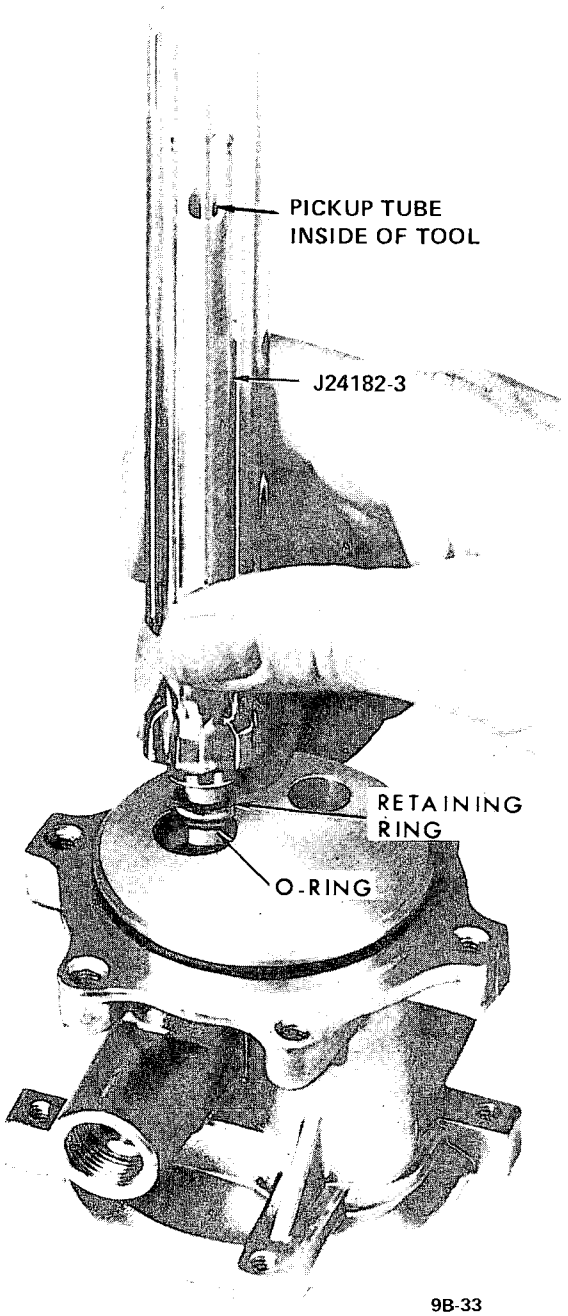


Figure 9B-23 Installing Pick-Up Tube with Retaining Ring Installing Tool

14. Using tool J24182-3, install the pickup tube into the valve housing. Be sure the tube is bottomed in the opening and the tool vertically in line before seating the tube retainer in place. Visually check the seating of the retainer ring tangs and that no tang fractured during the installation. See Figures 9B-22 and 9B-23.

15. Lubricate the top of the POA valve capsule cavity of the valve housing and the new POA valve capsule O-Ring with clean 525 Viscosity oil and install the POA valve in its cavity in the valve housing. Thumb or hand press into place.

16. Lubricate the TX valve cavity of the valve housing and the new TX valve capsule O-Rings with clean 525 Viscosity oil. Install the upper (not on "EE" Model) and lower O-Rings to the capsule and the center O-Ring in the TX valve capsule cavity of the valve housing. The center "O" Ring seals between the bottom of the expansion valve capsule and casting cavity, not around equalizer groove.

17. Install the TX valve capsule and thumb or hand press into place. Install both capsule retaining screw and washer assemblies and torque to 5 to 7 Lbs. Ft. torque.

18. Lubricate the inlet connector shell assembly to valve housing O-Ring with clean 525 Viscosity oil and install in the valve housing O-Ring groove.

19. Install the inlet connector shell assembly in proper alignment and torque the mounting screws to 7 to 12 Lbs. Ft. torque.

20. Lubricate the valve housing to receiver shell O- Ring (lower) and valve housing to receiver shell "O" ring (upper square cut) with clean 525 Viscosity oil and install the O rings.

21. Lubricate the inner top surface of the receiver shell with clean 525 Viscosity oil and install the pickup tube screen to the pickup tube.

22. Unpack the new desiccant bag and immediately place the bag in the receiver shell and install the receiver shell to the valve housing. Torque the mounting bolts to 7 - 12 Lbs. Ft. torque.

23. Lubricate all external connection O-Rings and install the O-Rings on the respective connection tubes.

24. Carefully reconnect the tubes and lines to the VIR assembly to prevent damaging the O-Rings or the connection threads. Torque the line connections as follows:

Evaporator outlet and suction line connections to VIR 28-33 Lbs. Ft.

Evaporator inlet connection to VIR 15-20 Lbs. Ft.

Liquid line connection to VIR 11-13 Lbs. Ft.

25. Evacuate, leak check and charge the system.

26. Reconnect the thermal limiter connector plug.

Sight Glass - Removal and Installation

1. Disconnect the thermal limiter connector plug and discharge the refrigerant from the system. See "Discharging the System". While the system is being discharged, clean the surface dirt from the exterior of the valve housing in the vicinity of the sight glass. Use an air hose to blow the area free of loose dirt.

2. When the system is completely discharged remove the sight glass retaining nut by using a 7/16" male hex drive tool or allen wrench.

3. Hold a finger in the sight glass opening to lightly hold the glass. Slightly pressurize the system with refrigerant vapor to eject the glass and force it out of the opening.

It may be necessary to shift the finger pressure from side to side to guide the glass out of the opening but only a very minimum of refrigerant pressure is necessary to expel the glass.

4. Remove the sight glass "O"Ring using Tool J9533. Discard all the old sight glass parts and install the new sight glass parts kit.

5. Coat the new "O"Ring, sight glass, nylon thrust washer and retaining nut with clean refrigerant oil and install them in that order being careful to prevent dirt from getting on the parts.

6. Tighten the sight glass nut to 20 to 25 Lbs. In. torque.

7. Evacuate, leak check and charge the system.

8. Reconnect the thermal limiter connector plug.

Core Liquid Bleed Valve - Removal and Installation

1. Disconnect the thermal limiter connector plug and discharge the refrigerant from the system. See "Discharging the System". While the system is discharging clean the surface dirt from the exterior of the VIR assembly in the area of the liquid bleed line connection. Use an air hose to blow the line connection area of any loose dirt.

2. When the system is completely discharged, disconnect the liquid bleed line, remove and replace the bleed valve core using tool J24182-2. Discard the old valve core. See Figure 9B-24.

When tightening the new valve core, turn the core inward until the core threads just start to tighten. Note the position of the tool and rotate the tool an additional travel of 180 degrees to approximate a setting of 24-36 ounce inches of torque. The proper valve core is 6551178 and is different from the evaporator gage core.

3. Install a new liquid bleed line connector O-Ring and reconnect the liquid bleed line. Torque the line connection to a 5 to 7 Lbs. Ft. torque.

4. Evacuate, leak check and charge the system.

5. Reconnect the thermal limiter connector plug.

CORE EVAPORATOR GAUGE VALVE — REMOVAL AND INSTALLATION

1. Disconnect the thermal limiter connector plug and discharge the refrigerant from the system. See "Discharging the System". While the system is discharging, clean the surface dirt from the exterior of the VIR assembly in the area of the Evaporator Gage connector. Use an air hose to blow the area free of any loose dirt.

2. When the system is completely discharged, disconnect the gage line from the connector. Remove and replace the valve core using tool J24182-2. Discard the old valve core.

When tightening the valve core, turn the core inward until the core threads just start to tighten. Note the position of the tool and rotate the tool an additional travel of 180 degrees to approximate a setting of 24-36 ounce inches of torque. The proper valve core is 1138041 and is different from the liquid bleed core.

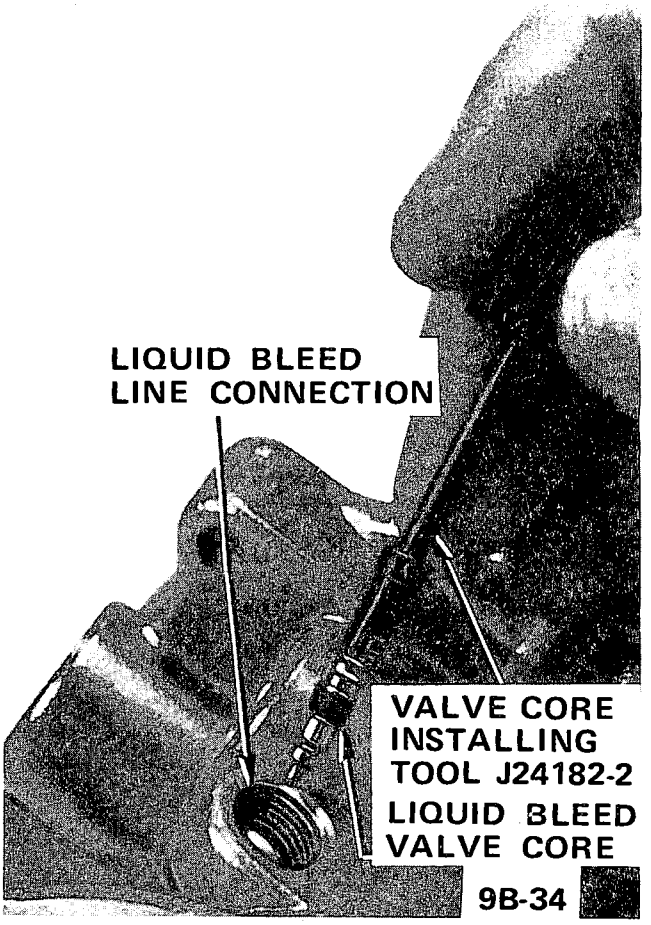


Figure 9B-24 Installing or Removing Liquid Bleed Valve Core with Tool J-24182-2

3. Evacuate leak check and charge the system.

4. Reconnect the thermal limiter connector plug.

REMOVAL AND INSTALLATION OF MUFFLER

Removal

1. Discharge system (refer to "Discharging the System").

2. Disconnect refrigerant lines connected to muffler and tape closed both open ends of refrigerant lines.

Installation

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

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 "Flushing the System". Install a new receiver-dehydrator in system.

2. Charge the system (refer to "Charging the System").

REMOVAL AND INSTALLATION OF CONDENSER — H SERIES

1. Disconnect the negative battery ground cable.
2. Discharge the system.
3. Remove the valance panel.
4. Remove the grille center support.
5. Disconnect the condenser inlet and outlet lines and cap or plug all open connections.
6. Remove the condenser bracket to radiator support screws and carefully lower the condenser from the vehicle.
7. To install, reverse removal procedures. Add one fluid ounce of clear refrigeration oil to a new condenser. Use new "O" rings coated with clean 525 viscosity refrigeration oil when connecting the refrigerant lines.
8. Evacuate, charge and leak check system.

REMOVAL AND INSTALLATION OF EVAPORATOR — H SERIES

Removal

1. Disconnect battery ground cable.
2. Remove glove box.
3. Remove right air outlet duct - deflector.
4. Remove instrument bezel.
5. Remove instrument pad.
6. Remove left air outlet duct deflector and feed duct.
7. Lower steering column.
8. Remove instrument panel assembly.
9. Remove control assembly from instrument panel.
10. Remove radio.
11. Remove defroster duct.
12. Remove center (large) distribution duct.
13. Purge system of refrigerant.
14. Remove heater hoses at core pipes.
15. Clean surface dirt from exterior of VIR assembly and all line connections. Blow any loose dirt away with an air hose.
16. Disconnect compressor inlet line, oil bleed line and condenser outlet line. Cap or plug all open connections.
17. Loosen the evaporator inlet and outlet connections. Remove the VIR mounting clamp screw and remove the clamp from the assembly. Slide the VIR assembly off the evaporator outlet line first and then the evaporator inlet line.
18. Remove and discard all old "O" rings. All line connections and openings should be plugged or sealed to prevent entry of dirt and moisture into the system.
19. Remove heater-distributor case stud to cowl attaching nuts.
20. Remove heater and distributor assembly, disconnecting electrical connectors at control and vacuum plenum and vacuum tank hoses.
21. Separate heater case from A/C evaporator case.
22. Remove evaporator core from case.

Installation

1. Install evaporator core to case.
2. Assemble evaporator case to distributor.
3. Install evaporator and distributor assembly, connecting electrical connectors at control and vacuum plenum and vacuum tank hoses.
4. Install heater-distributor case attaching nuts. When connecting refrigerant lines, be sure to install NEW "O" rings, coated with clean refrigeration oil.
5. Lubricate all VIR assembly connection "O" rings with clean refrigeration oil and install the "O" rings onto the connecting lines. When making all connections use care to prevent nicking the "O" rings and cross threading the connection threads.
6. Remove the plugs from the evaporator inlet and outlet tube openings of the VIR Assembly. Assemble the VIR assembly onto the evaporator inlet tube first and then onto the outlet tube. When the assembly is in proper position install the VIR mounting clamp. Tighten the evaporator inlet connection to 18 ft. lbs. torque and the evaporator outlet connection to 30 ft. lbs. torque.
7. Remove the plug from the liquid bleed line connection opening of the VIR assembly. Connect and tighten the liquid bleed line connection to the VIR assembly to 6 ft. lbs. torque.
8. Remove the plug from the liquid line connection opening in the VIR assembly. Connect and tighten the condenser line connection to the VIR assembly to 12 ft. lbs. torque.
9. Remove the plug from the compressor line connection opening in the VIR assembly. Connect and tighten the compressor line connection at the VIR assembly to 30 ft. lbs. torque.
10. Install heater hoses and check coolant and add as required.
11. Install center duct to vehicle.
12. Install defroster duct, screw and clip to center duct.
13. Install radio.
14. Install instrument panel.
15. Connect steering column.

CAUTION: *This steering column to dash bracket fastener is an important attaching part in that it could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number, or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.*

16. Install left air outlet duct and feed duct.
17. Install instrument pad.
18. Install instrument cluster bezel.
19. Install right air outlet duct.
20. Install glove box.
21. Evacuate, charge and leak check the system.
22. Connect the battery ground cable.

REMOVAL AND INSTALLATION OF CONDENSER — X SERIES

Removal

1. Disconnect thermal limiter and discharge system (refer to "Discharging the System").
2. Remove right and left front end panel fillers.
3. Disconnect hood latch cable and remove hood latch.
4. Remove upper radiator support.
5. Disconnect refrigerant lines and cap all openings.
6. Remove condenser attaching screws and remove condenser.

Installation

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

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 "Flushing the System").

2. Charge system (refer to "Charging the System").
3. Connect the thermal limiter.

REMOVAL AND INSTALLATION OF EVAPORATOR — X SERIES

1. Disconnect thermal limiter and depressurize refrigerant system.
2. Disconnect oil bleed line and equalizer line at POA valve.
3. Disconnect evaporator outlet fitting at POA valve and evaporator inlet fitting at expansion valve and cap all openings.
4. Remove thermo bulb from evaporator outlet line.
5. Disconnect all electrical connections at evaporator case.
6. Remove all screws and nuts retaining left half of evaporator case to right half of case and to dash.
7. Disconnect and remove expansion valve.
8. Pull left half of evaporator case outward and upward from core, being careful not to damage core.
9. Remove core retaining screws and remove core.
10. Add three fluid ounces of clean refrigerant oil to new core.
11. Replace core by reversing steps 1 through 9. Use new O-ring seals coated with clean refrigerant oil.
12. Evacuate, leak check and charge refrigerant system. Connect thermal limiter.

REMOVAL AND INSTALLATION OF EVAPORATOR A-B-C-E SERIES

Removal

(A Series)

1. Discharge the refrigerant from the system. (ref to "Discharging The System").
2. Disconnect the battery.
3. Disconnect all evaporator-blower case attaching wiring including the blower motor ground wire to dash.
4. Remove V.I.R. assembly (refer to V.I.R. assembly remove and replace).
5. Remove all the attaching screws and stamped nuts from the evaporator-blower case.
6. Remove the evaporator-blower assembly from the engine compartment.
7. Remove the screws that secure the evaporator-blower assembly halves together and remove the evaporator.
8. Tape closed all refrigerant line openings.
9. Reverse the removal procedures to install using new "O" rings on line fittings.
10. Evacuate, charge and leak test system.

(B-C-E Series)

1. Discharge refrigerant from system (refer to "Discharging the System").
2. Disconnect blower motor, resistor and ambient switch electrical connectors.
3. Remove V.I.R. Assembly (refer to V.I.R. Assembly - Remove and Replace).
4. Loosen the bolts holding the case to the bulkhead so the case can be rotated to clear the studs through the bulkhead.
5. Remove the screws securing the 2 sections of the case and remove the inboard half.
6. Remove the evaporator core.
7. Tape closed all refrigerant line openings.

Installation

(ALL SERIES)

1. Reverse removal procedure to install, using new "O" rings on line fittings.
2. Evacuate, charge and leak test system.

REMOVAL AND INSTALLATION OF CONDENSER ASSEMBLY B-C-E SERIES

1. Discharge the system (refer to "Discharging the System").

2. While the system is discharging remove the upper *radiator mounting* screws and panel.

3. Remove the upper condenser mounting bolts and bracket on each side of the upper tie bar so that the refrigerant pipes on the condenser will clear the upper tie bar when removing the condenser.

4. Disconnect the inlet and outlet pipes and tape closed the open ends; also tape closed the open ends of the refrigerant lines. Remove the condenser.

5. Install the condenser in reverse of the removal procedure using new O-rings during installation. Lubricate O-rings prior to installation, using No. 525 Viscosity Refrigerant Oil.

If the refrigerant hoses or the condenser has been exposed to the atmosphere and moisture may be present, the desiccant bag should be changed and the system and/or condenser flushed prior to installation (refer to "Flushing the System").

6. Charge the system (refer to "Charging the System").

REMOVAL AND INSTALLATION OF SUPERHEAT SWITCH 4 & 6 CYLINDER COMPRESSORS

Removal

1. Completely discharge the air conditioning system according to procedure.

2. After the system is discharged, remove the superheat switch retainer ring, Figure 9B-25, using Tool J-5403.

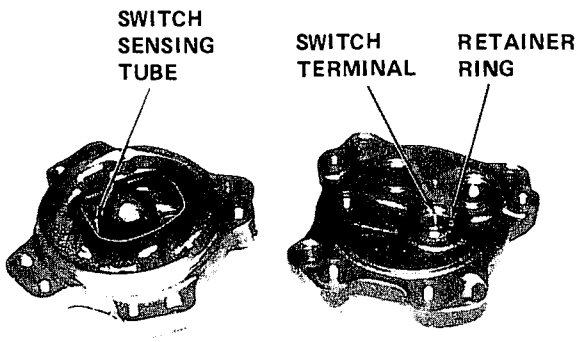


Figure 9B-25 Superheat Shutoff Switch Installed in Rear Head - 6 Cylinder Compressor

3. Remove the superheat switch from the rear head by pulling at the terminal housing groove with seal seat remover and installer (J-9392).

4. Remove the O ring from the switch cavity in the rear head. Use O ring removal (J-9553).

5. Recheck the superheat switch for closed contacts. See Superheat Switch Check in Diagnosis section. Replace as necessary.

Installation

1. Check the superheat switch cavity and O ring groove in the rear head for dirt or foreign material and be sure area is clean before installing the O ring. Install a new O ring in the groove of the superheat switch cavity in the rear head. Lubricate the O ring liberally with 525 viscosity oil before installing.

2. Lubricate the housing of the superheat switch with 525 viscosity oil and insert the switch carefully into the switch cavity until the switch bottoms. The seal seat remover and installer (J-9392) may be used to install the switch.

3. Using internal snap ring pliers (J-5403), install the superheat switch retaining ring with the high point of the curved sides adjacent to the switch housing. Be sure the retainer ring is properly seated in the snap ring groove.

4. Check for electrical continuity between the switch housing and the rear head. Also check for continuity between the switch terminal and switch housing to be sure the contacts are open according to the Calibration Chart.

5. Evacuate and recharge the system with refrigerant according to the following special charging procedure:

To prevent the possibility of "blowing" the new thermal fuse during evacuation, charging or analysis of the system, disconnect the connector plug from the thermal fuse and install a jumper between the center terminal (B) and the clutch lead terminal (C) of the connector plug.

6. Evacuate, recharge, and leak check the entire air conditioning system according to normal procedures. Repair any leaks, check and add oil, as required and deemed necessary for proper operation of the system.

7. When the system is operating normally, remove the jumper from the connector plug and reconnect the plug to the thermal fuse.

REMOVAL AND INSTALLATION OF COMPRESSOR — 4 CYLINDER

1. Discharge system (Refer to "Discharging the System.)

2. Remove refrigerant hoses and protect the ends so dirt etc., can't enter. Plug compressor openings.

3. Remove 1 through bolt at the bottom of the delcotron.

4. Remove 2 upper brace to adapter bolts.

5. Remove 3 remaining bolts through the compressor to mounting adapters.

6. Install in reverse of removal retightening bolts to proper torque. When tensioning belt (new 125 lbs. old 95 lbs.) Do not pry on compressor.

Compressor Service — 4 Cylinder

When servicing the compressor, it is essential that steps be taken to prevent dirt or foreign material from getting on or into the compressor parts and system during disassembly or reassembly of the compressor. Clean tools, a clean workbench and a clean work area are very important for proper service. The compressor connection areas and the exterior of the compressor should be cleaned off as much as possible prior to any "on car" repairs or removing the compressor for workbench service. The parts must be kept clean at all times and any parts to be reassembled should be cleaned with clean solvent and dried with dry air. When necessary to use a cloth on any part, it should be of a

non-lint producing type. Refer to figure 9B-117 for the exploded view of the compressor parts and nomenclature.

When a compressor is removed from the car for servicing, the amount of oil remaining in the compressor should be drained through both the suction and discharge ports and measured. The old oil should then be discarded and new 525 viscosity oil added to the compressor as described under "Oil Charge". Before the compressor is again placed in operation on the car.

Some service operations can be performed without disturbing the internal mechanism or completely removing the compressor from the car. Among them are replacement of the clutch drive plate and hub assembly, clutch rotor and bearing assembly, clutch coil and pulley rim will not require discharging the system. The system must be discharged, evacuated and charged to replace the compressor shaft seal, pressure relief valve and super heat switch whether the compressor is removed from the car or not. The following operations are based on bench overhaul with the compressor removed from the car. For those operations possible to be performed with the compressor "on the car", the procedure is essentially the same. When necessary to adjust the compressor belt tension, do not pry on the compressor shell, pry on the compressor mounting bracket.

The J-25008-1 compressor holding fixture is to be used for all "workbench" procedures to keep the compressor assembly off the workbench and help prevent any possible dirt contamination of parts. Figure 9B-30 shows the J-25008-1 compressor holding fixture attached to the compressor. The compressor holding fixture may be clamped in a vise with the shaft end of the compressor in a vertical, horizontal or down position for service, depending on the service to be performed.

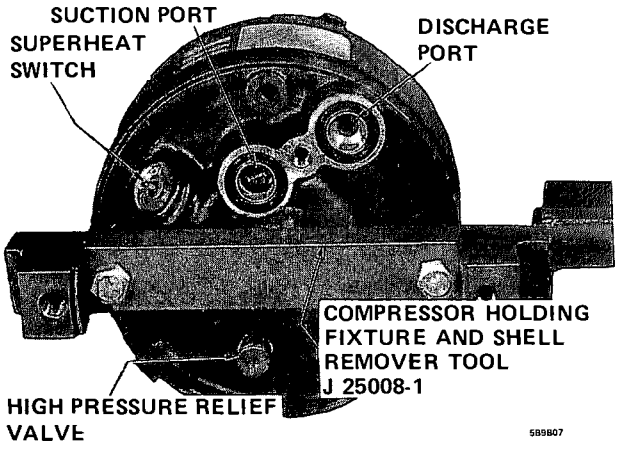


Figure 9B-30 - Compressor Holding Fixture Attached To Compressor - 4 Cylinder

REMOVAL AND INSTALLATION OF COMPRESSOR CLUTCH PLATE AND HUB ASSEMBLY — 4 CYLINDER COMPRESSOR

Removal

1. Attach the compressor to the holding fixture, J25008-1 and clamp in a vise. See figure 9B-30.

2. Keep the clutch hub from turning with the clutch hub holding tool, J25030, and remove the shaft nut using thin wall socket J9399, and discard the nut. See figure 9B-31.

3. Thread the clutch plate and hub assembly remover, J9401, into the hub. Hold the body of the tool with a wrench and turn the center screw into the J9401 remover body to remove the clutch plate and hub assembly. See figure 9B-32.

4. Remove the shaft key.

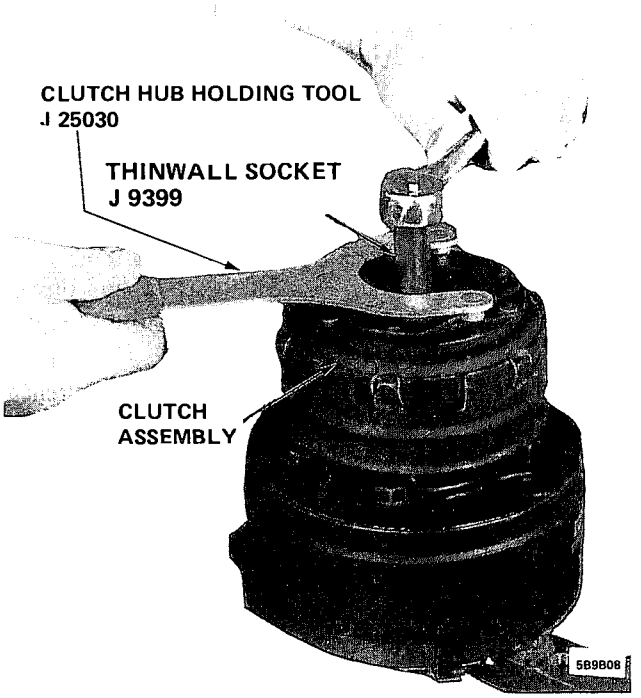


Figure 9B-31 - Removing Shaft Nut - 4 Cylinder Compressor

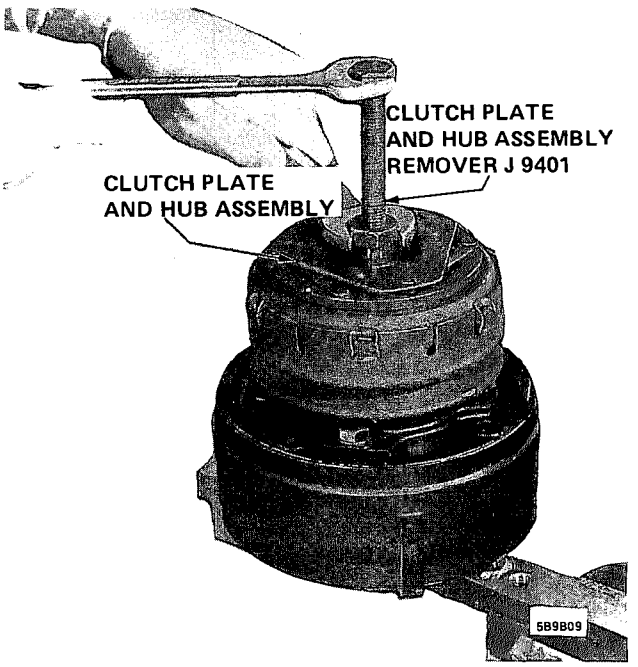


Figure 9B-32 - Removing Clutch Plate and Hub Assembly - 4 Cylinder Compressor

Installation

1. Install the shaft key into the hub key groove. Allow the key to project approximately 3/16 inch out of the keyway. The shaft key is curved slightly to provide an interference fit in the shaft key groove, to permit the key projection without falling out. See figure 9B-33.

2. Clean the frictional surface of the clutch plate and the clutch rotor before installing the clutch plate and hub assembly.

3. Align the shaft key with the shaft keyway and assemble the clutch plate and hub assembly on the compressor shaft.

CAUTION: *To avoid internal damage to the compressor, Do not drive or pound on the clutch hub or shaft.*

4. Place the spacer bearing, J9480-2, on the hub and insert the end of the clutch plate and hub assembly installer, J9480-1, through the J9480-2, spacer and thread the tool onto the end of the compressor shaft. See figure 9B-34.

5. Hold the hex portion of the tool body with a wrench and tighten the center screw to press the hub onto the shaft until there is approximately a .020 to .040 inch air gap between the frictional surfaces of the clutch plate and clutch rotor.

6. Install a new shaft nut with the small diameter boss of the nut against the crankshaft shoulder, using the special thin wall socket J9399. Hold the clutch plate and hub assembly with the clutch hub holding tool, J25030, and tighten to 8-12 lb. ft. The air gap between frictional surfaces of the clutch plate and clutch rotor should be .020 to .040 inches. See figure 9B-34.

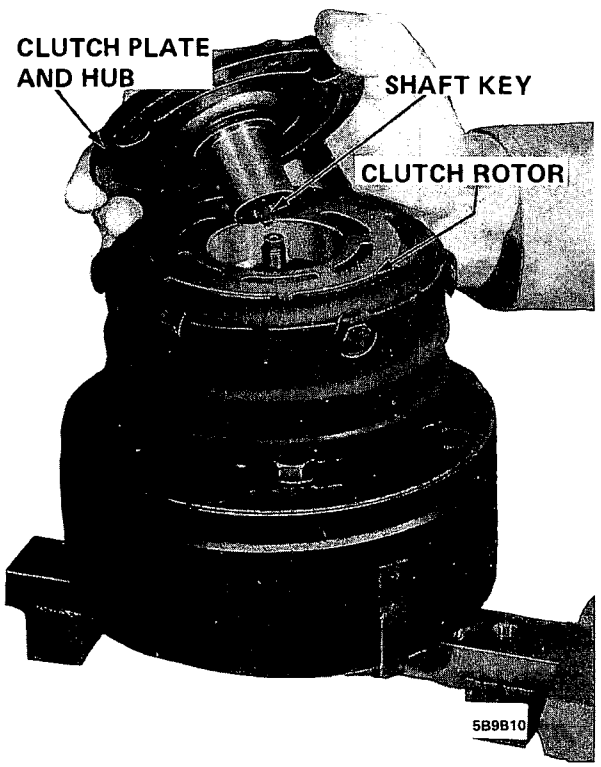


Figure 9B-33 - Installing Shaft Key - 4 Cylinder Compressor

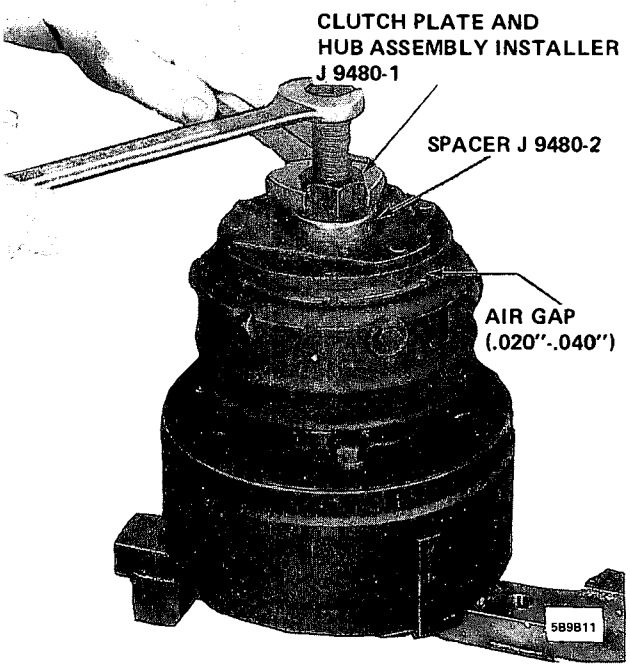


Figure 9B-34 - Installing Clutch Plate and Hub Assembly - 4 Cylinder Compressor

REMOVAL AND INSTALLATION OF COMPRESSOR SHAFT SEAL ASSEMBLY — 4 CYLINDER COMPRESSOR

Removal

1. Discharge the system and remove the clutch plate and hub assembly.

2. Remove the shaft seal seat retainer ring using snap ring pliers J5403 (#21).

3. Thoroughly clean the inside of the compressor neck area surrounding the compressor shaft, seal seat and shaft, to remove all dirt and foreign material before removing the seal seat.

4. Insert seal seat remover and installer tool, J23128, figure 9B-35 over the shaft into the recessed area of the seal seat and tighten tool clockwise to securely engage the knurled tangs of the J23128 tool with the seal seat. Remove the seal seat with a twisting and pull motion. Discard the seat.

5. Insert the seal remover and installer, J9392, figure 9B-36 over the shaft and engage the shaft seal by pressing downward on the tool to overcome the shaft seal spring pressure and turn the tool clockwise to engage the seal assembly tabs with the tangs of the J9392 tool. Remove the seal assembly by pulling straight out from the compressor shaft. Discard the seal.

6. Remove the seal seat O-ring from the compressor neck using tool J9553. Discard the O-ring.

Installation

Inspect the inside of the compressor neck and shaft area

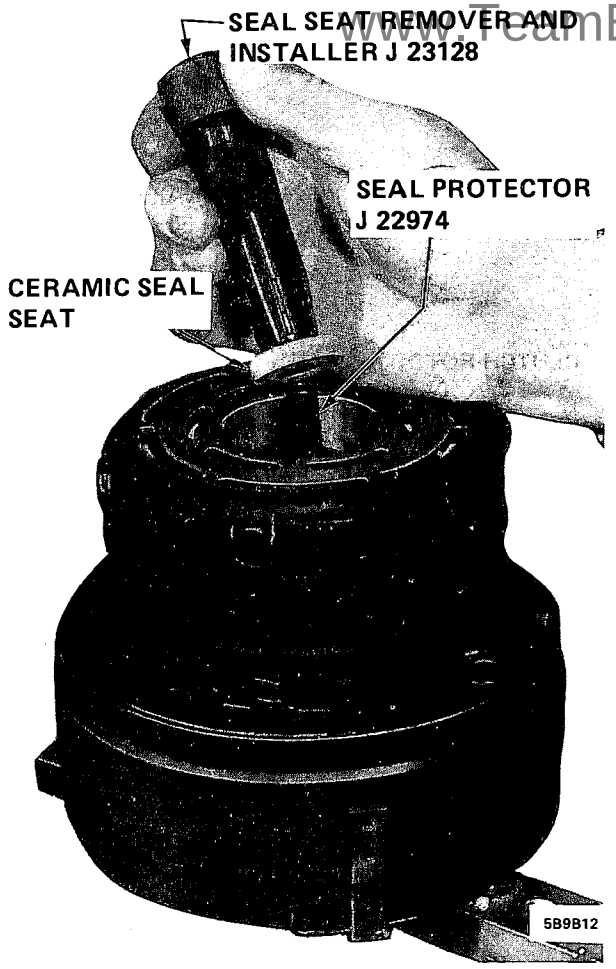


Figure 9B-35 - Using Tool J23128 - 4 Cylinder Compressor

for any lint, dirt or foreign material and be sure these areas are perfectly clean before installing the new seal parts. Be sure the seal remover and installer, J9392, seal protector, J22974, and O-ring installer, J21508, are clean internally and externally. The seal seat O-ring, shaft seal and seal seat should be dipped in clean 525 viscosity oil and not handled anymore than is absolutely necessary by hand, particularly the mating surfaces. Any dirt or lint on the sealing surfaces could cause a seal leak or seal damage.

1. Dip the new seal seat O-ring in clean 525 viscosity oil and assemble onto O-ring installer, J21508 as shown in figure 9B-37.

2. Insert the O-ring installer, J21508 into the compressor neck until the tool "Bottoms". Lower the movable slide of the O-ring installer to replace the O-ring into the seal seat O-ring groove rotate the installer tool to seat the O-ring and remove the tool. Inspect the internal neck area for cleanliness and proper O-ring positioning.

3. Dip the new shaft seal O-ring and seal face in clean 525 viscosity oil and carefully engage the shaft seal assembly with the locking tangs of tool J9392 seal remover and installer as shown in figure 9B-36.

4. Install the shaft seal protector, J22974 over the end of the compressor shaft and slide the shaft seal onto the compressor shaft. Slowly turn the tool clockwise while applying light pressure until the seal engages the flats of the compressor shaft and can be seated into place. Rotate the J9392 tool counterclockwise to disengage the tool from the seal tabs and remove the tool.

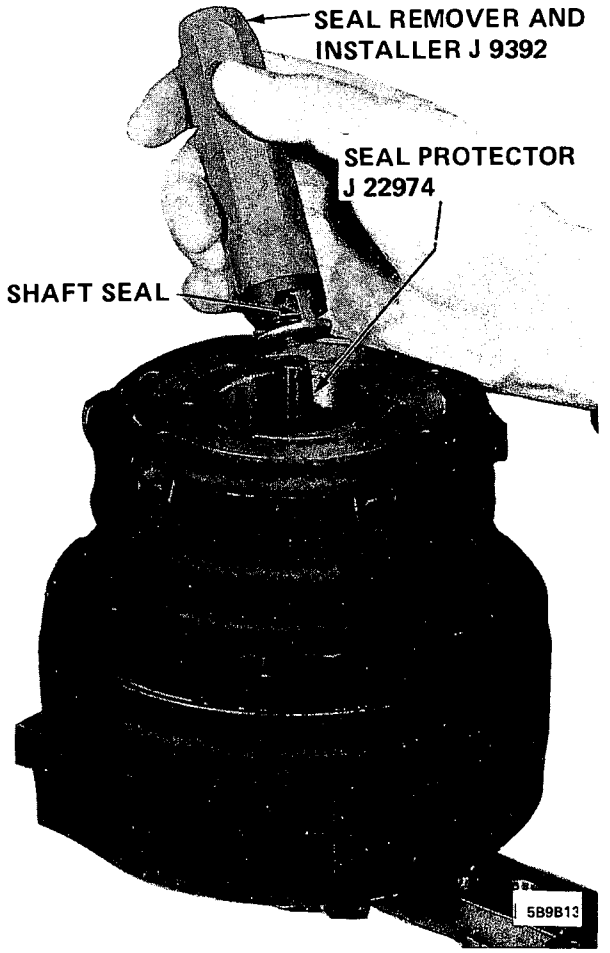


Figure 9B-36 - Using Remover and Installer J9392 - 4 Cylinder Compressor

5. Attach the ceramic seal seat to the seal seat remover and installer, J23128 and dip the ceramic seat in clean 525 viscosity oil to coat the seal face and outer surface. Carefully install the seat over the compressor shaft and J22974 seal protector and push the seat into place with a rotary motion. Remove tools J23128 and J22974.

6. Install the new seal seat retainer ring with snap ring pliers J5403 (#21).

7. Leak test the compressor as described under "leak testing the compressor."

8. Reinstall the clutch plate and hub assembly.

REMOVAL AND INSTALLATION OF CLUTCH ROTOR AND BEARING ASSEMBLY, CLUTCH COIL AND PULLEY RIM — 4 CYLINDER COMPRESSOR

Removal

1. Remove the clutch plate and hub assembly.

2. Remove the rotor and bearing assembly retaining ring using snap ring pliers J6083. Mark the location of the clutch coil terminals.

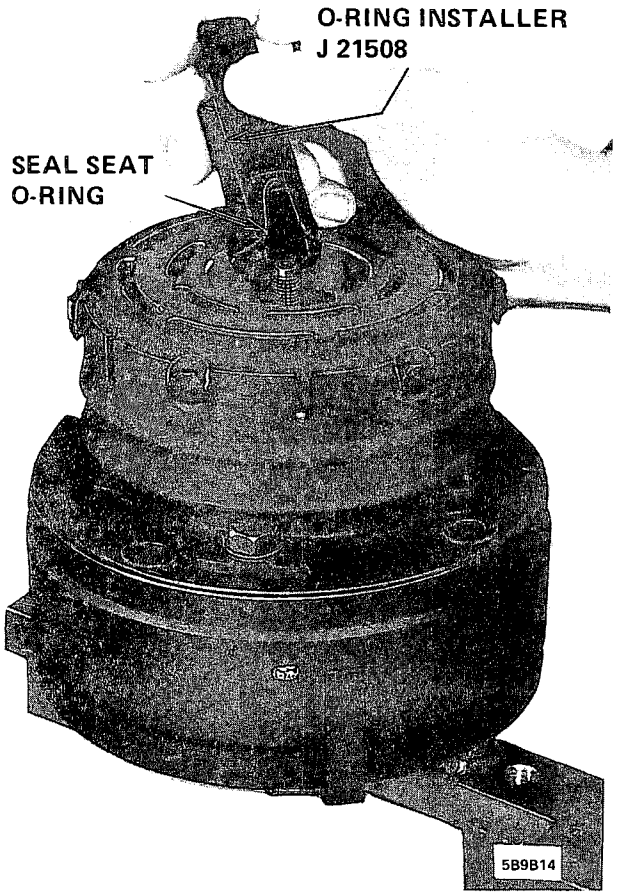


Figure 9B-37 - Installing Seal Seat O-Ring - 4 Cylinder Compressor

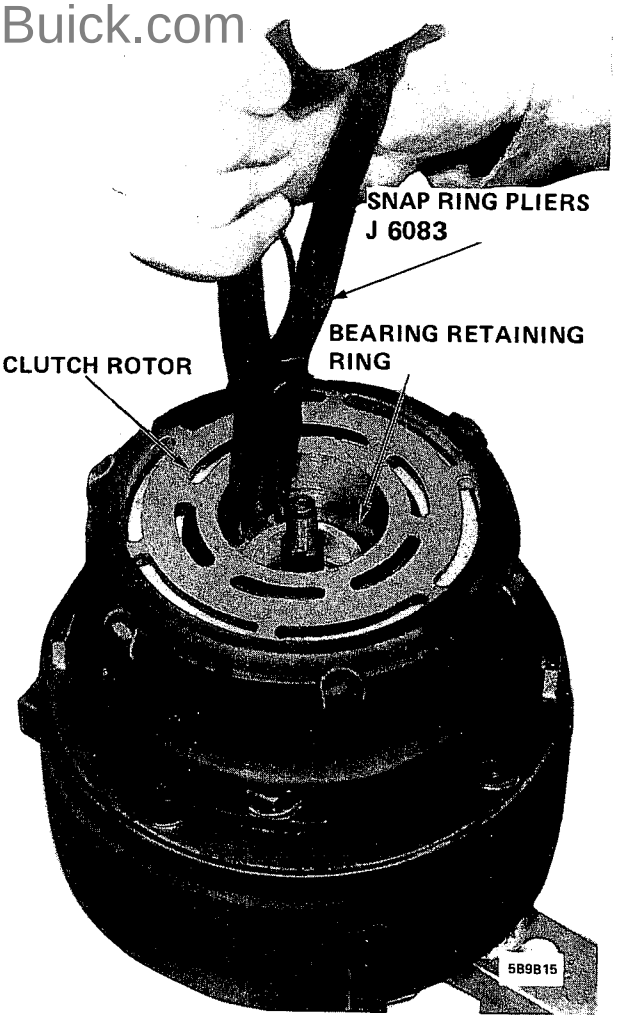


Figure 9B-38 - Removing Rotor and Bearing Assembly Retaining Ring - 4 Cylinder Compressor

If the clutch rotor and/or rotor bearing only are to be replaced, bend the lockwashers away from the pulley rim mounting screws, and remove the six mounting screws and special lockwashers before proceding with step 3.

3. Install rotor and bearing puller guide, J25031 over the end of the compressor shaft and seat on the front head of the compressor.

4. Install the rotor and bearing puller, J25031 down into the rotor until the puller areas engage the recessed edge of the rotor hub. Hold the puller and arms in place and tighten the puller screw against the puller guide to remove the clutch rotor and assembly parts.

If the pulley rim mounting screws and washers were removed in step 2, only the clutch rotor and bearing assembly will be removed for replacement. The clutch coil and housing assembly is pressed onto the front head of the compressor with an interference fit and will not be removed unless the pulley rim mounting screws are left securely in place and the pulley rim pulls the coil and housing assembly off with the total clutch rotor and pulley rim assembly.

REMOVAL AND INSTALLATION OF CLUTCH ROTOR BEARING — 4 CYLINDER COMPRESSOR

Removal

1. Perform Steps 1 through 4 of compressor clutch rotor and bearing assembly removal and remove the pulley rim mounting screws. Remove the clutch rotor and bearing assembly, being careful not to drop the puller guide J25031 when removing the assembly.

2. Place the rotor and bearing assembly on blocks as shown in figure 9B-42 and drive the bearing out of the rotor hub with rotor bearing remover and rotor assembly installer J25029. It will not be necessary to remove the staking at the rear of the rotor hub to remove the bearing. See Figure 9B-43.

Installation

1. Place the rotor and hub assembly face down on a clean, flat and firm surface. See figure 9B-44.

2. Align the new bearing squarely with the hub bore and using pulley and bearing installer J9481 with universal handle, J8092, drive the bearing fully into the hub. The tool will apply force to the outer race of the bearing.

3. At a 45 degree angle and .045"-0.55" deep, stake the bearing in place as shown in figure 9B-43, but do not stake too deep and possibly distort the outer race of the bearing. Use new stake locations 120 degrees apart. Do not use the old stake locations.

4. Reassemble the rotor and bearing assembly to the front head of the compressor using rotor bearing remover and rotor assembly installer, J25029. With tool J25029

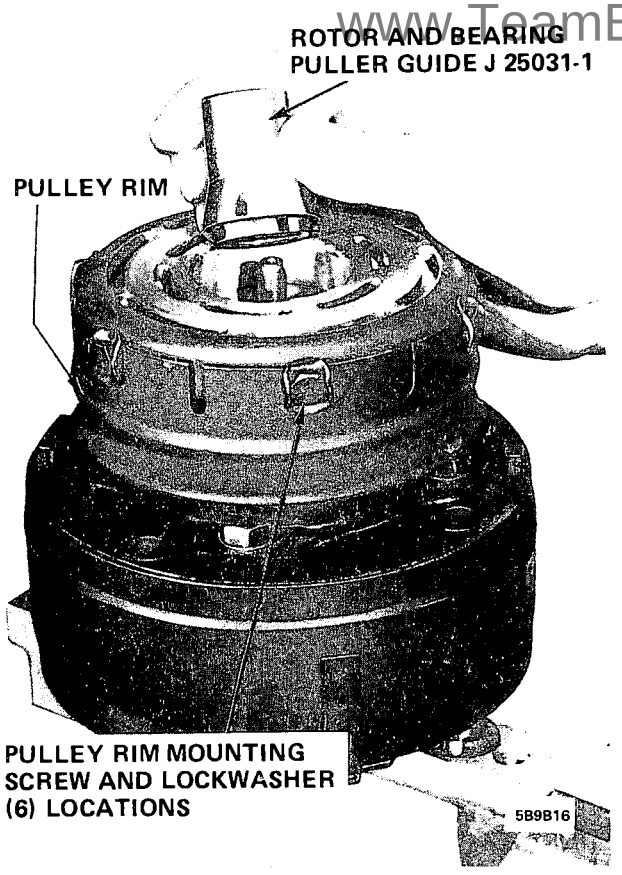


Figure 9B-40 - Installing Rotor and Bearing Pulley Guide - 4 Cylinder Compressor

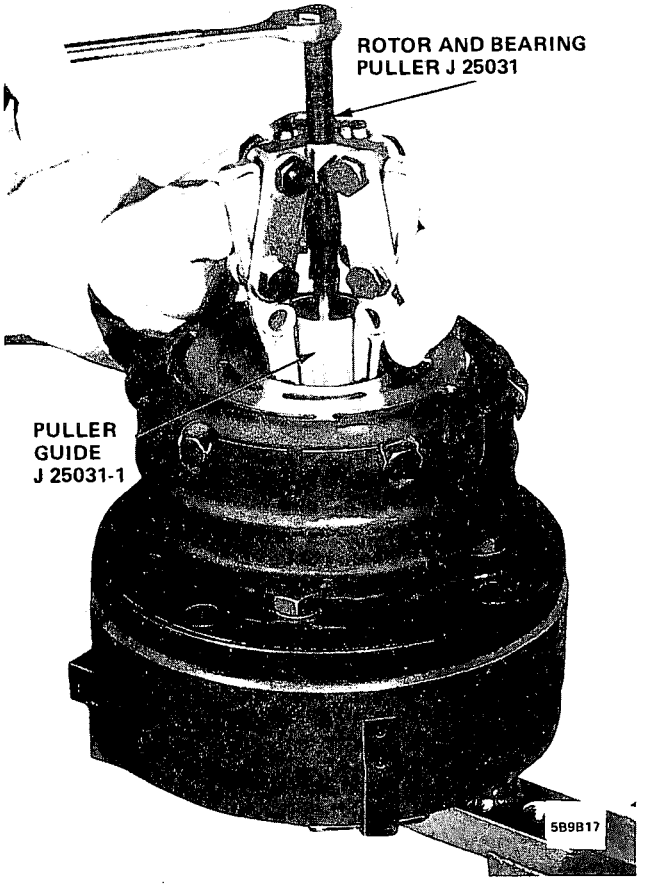


Figure 9B-41 - Removing Clutch Rotor and Assembly Parts - 4 Cylinder Compressor

assembled to the handle as shown in figure 9B-45, the tool will apply force to the inner race of the bearing when installing the clutch and pulley assembly on the front head of the compressor.

5. Install the rotor and bearing assembly retaining ring.

6. Assemble and fully seat the pulley rim to the clutch rotor and bearing assembly, using Loctite RC-75 or equivalent on the screw threads and use new lock washers. Do not torque the mounting screws to final torque limits until pulley rim is checked to be rotating "In-Line".

7. Tighten the pulley rim mounting screws to 100 pounds inch torque and lock the screw heads in place.

8. Assemble the clutch plate and hub assembly.

REMOVAL AND INSTALLATION OF CLUTCH COIL AND PULLEY RIM — 4 CYLINDER COMPRESSOR

Removal

1. Perform steps 1 through 4 of clutch rotor and bearing assembly, clutch coil and pulley rim removal but do not loosen or remove the pulley rim mounting screws until the clutch rotor, coil and pulley rim assembly have been removed from the front head in step 4. Be careful not to drop the puller guide, J25031 when removing the assembly.

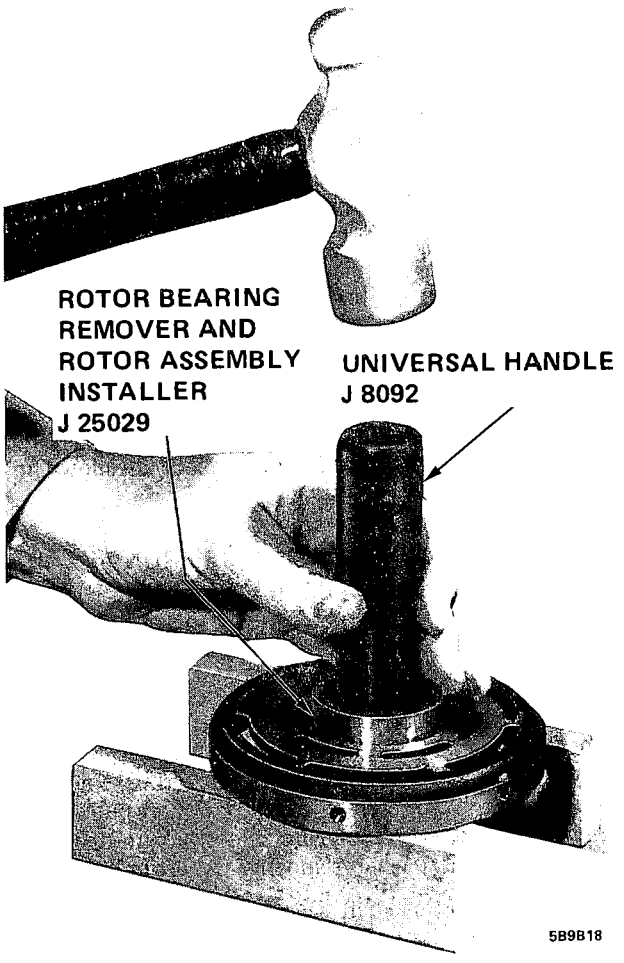


Figure 9B-42 - Driving the Bearing Out of Rotor Hub - 4 Cylinder Compressor

2. Remove the pulley rim mounting screws and slide the pulley rim off the rotor and hub assembly. The pulley rim and the clutch coil are replaceable at this point.

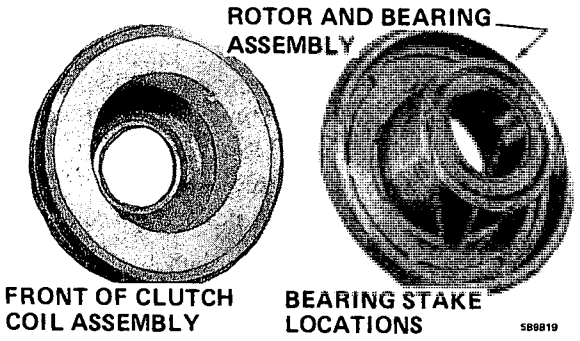


Figure 9B-43 - Bearing Stake Locations - 4 Cylinder Compressor

Installation

1. Assemble the clutch coil, pulley rim and the clutch rotor and bearing assembly as shown in figure 9B-46. Place a small amount of Loctite RC-75 or equivalent on the screws but do not lock screw heads in place.

2. Place the assembly on the neck of the front head and seat into place using rotor bearing remover and rotor assembly installer, J25029 as shown in figure9B-45. Before fully seating the assembly on the front head, be sure the clutch coil terminals are in the proper location in relation to the compressor and that the three protrusions on the rear of the clutch coil align with the locator holes in the front head.

3. Install the rotor and bearing assembly retaining ring and reassemble the clutch plate and hub assembly. Check the clutch plate to clutch rotor air gap (.20"-.040"). Rotate the pulley rim and rotor to be sure the pulley rim is rotating "in line" and adjust or replace as required.

4. Tighten the pulley rim mounting screws to 100 lb. in. torque and lock the screw heads in place as shown in figure 9B-45.

REMOVAL AND INSTALLATION OF FRONT HEAD AND MAIN BEARING ASSEMBLY — 4 CYLINDER COMPRESSOR

Removal

1. Perform steps 1 through 4 of compressor clutch rotor and bearing assembly, clutch coil and pulley rim removal but do not loosen or remove the pulley rim mounting screws and remove the clutch rotor, coil and pulley rim assembly as a total assembly. Be careful not to drop the puller guide, J25031 when removing the assembly.

2. Remove the crankshaft seal parts as in compressor shaft seal assembly removal procedure and discard the seal parts.

3. Remove the four front head mounting screws and remove the front head assembly. See figure 9B-47. At this point the front head and bearing assembly, the front head seal ring or the Belleville and thrust washers may be replaced. See figure 9B-48. Cleanliness must be exercised to keep the parts and internal compressor mechanism from being contaminated by dirt, lint, etc.

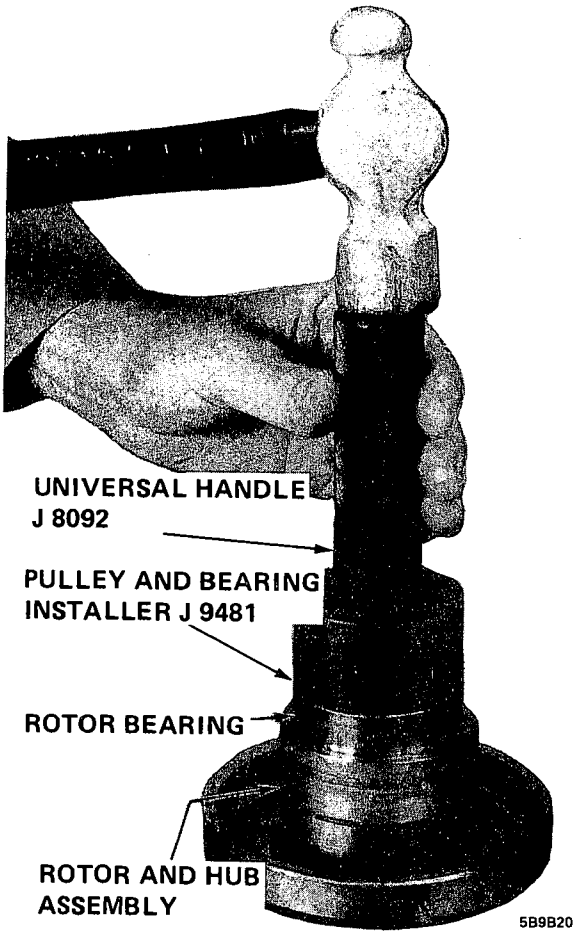


Figure 9B-44 - Installing Bearing Into Hub - 4 Cylinder Compressor

Installation

1. Check the front head and compressor cylinder area for any dirt, lint, etc. Install a new thrust washer kit if required.

2. Dip the new front head seal ring in 525 viscosity oil and install the seal in the seal groove of the front head. See figure 9B-48.

3. Position the oil hole in the front head to be "up" when assembled to the compressor cylinder to correspond with the "up" position of the compressor. Install the front head and tighten the front head mounting screws to an 18-22 lb. ft. torque.

4. Install a new crankshaft seal.

5. Install the clutch rotor and bearing assembly, clutch coil and pulley rim assembly to the front head using tool J25029. See figure 9B-45. Before fully seating the assembly on the front head be sure the clutch coil terminals are in the proper location in relation to the compressor and that the three protrusions on the rear of the clutch coil align with the locator holes in the front head.

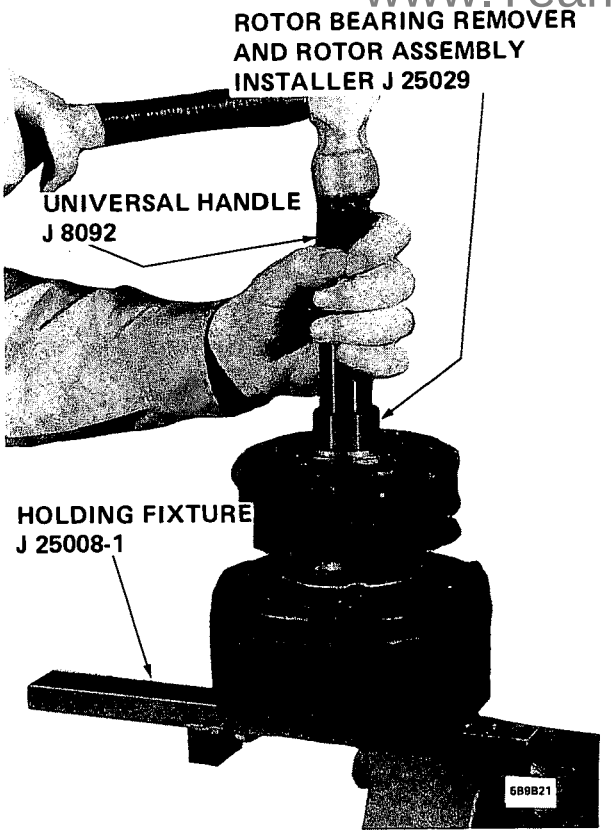


Figure 9B-45 - Installing Clutch and Pulley Assembly - 4 Cylinder Compressor

6. Install the rotor and bearing assembly retaining ring and reassemble the clutch plate and hub assembly. Check the clutch plate to clutch rotor gap (.020"-.040")

7. Leak test the compressor as described under "leak testing the compressor."

REMOVAL AND INSTALLATION OF THRUST AND BELLEVILLE WASHER — 4 CYLINDER COMPRESSOR

1. Perform steps 1 through 3 of the front head and main bearing assembly procedure.

2. Remove the two thrust and one Belleville washer from the compressor shaft. Note the assembled position of the washers.

3. Install a new thrust washer on the compressor shaft with the thrust washer tang pointing up. See figure 9B-50.

4. Install the new Belleville washer on the shaft with the high center of the washer up. Figure 9B-50.

5. Install the remaining thrust washer on the shaft with the tang pointing down. Figure 9B-50.

6. Lubricate the three washers with clean 525 viscosity oil and assemble the front head to the cylinder.

REMOVAL AND INSTALLATION OF MAIN BEARING — 4 CYLINDER COMPRESSOR

Removal

1. Remove the front head assembly. Refer to front head and main bearing assembly procedure.

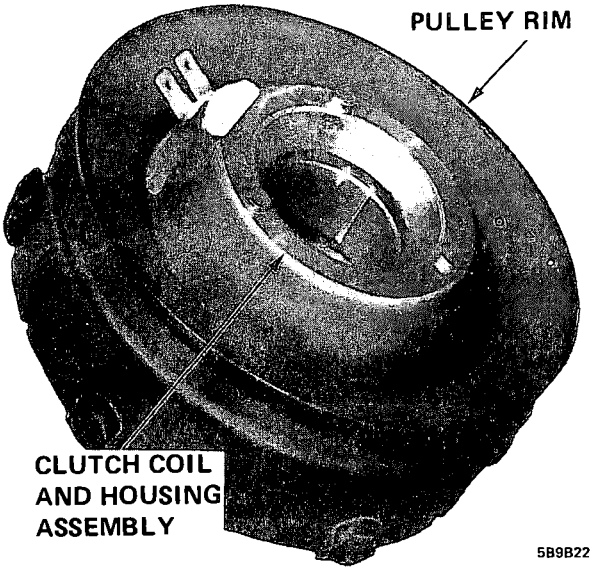


Figure 9B-46 - Pulley Rim, Clutch Coil and Housing Assembly - 4 Cylinder Compressor

2. Place the front head assembly on two blocks as shown in figure 9B-51 and using main bearing remover, J24896, drive the bearing out of the front head.

Installation

1. Place the front head with neck end down on a flat, solid surface.

2. Align the new bearing and bearing installer, J24895 squarely with the bearing hole of the front head and drive the bearing into the front head. The J24895 tool must seat against the front head to insert the bearing to the proper clearance depth. See figure 9B-52.

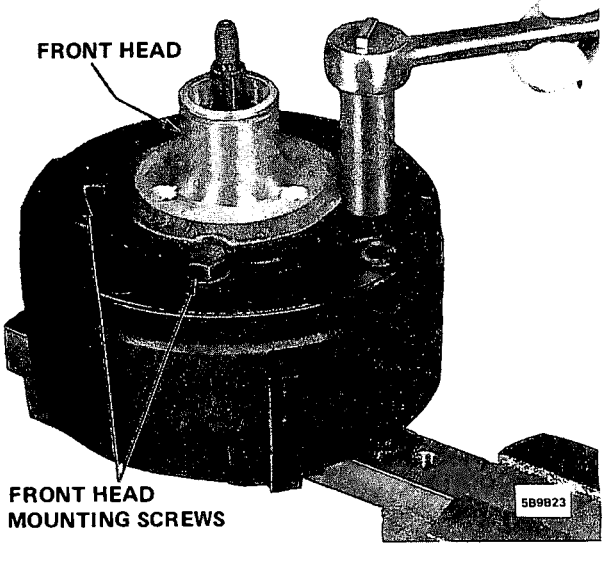


Figure 9B-47 - Removing the Front Head Mounting Screws - 4 Cylinder Compressor

3. Assemble the front head to the cylinder and complete the assembly following Steps 1 through 7 of Removal and Installation of the front head and main bearing procedure.

REMOVAL AND INSTALLATION OF THE COMPRESSOR SHELL, SHELL TO CYLINDER O-RING AND VALVE PLATE — 4 CYLINDER COMPRESSOR

When removing the compressor shell it will be necessary to
discharge the refrigerant from the system before removing the shell. Also remove the clutch plate and hub assembly, (Removal and Installation of the compressor clutch plate and hub assembly), clutch rotor and bearing assembly, clutch coil and pulley rim. (Removal and Installation of compressor clutch rotor and bearing assembly), clutch coil and pulley rim, steps 1 through 4, but do not loosen or remove the pulley rim mounting screws. Mark the location of the clutch coil terminals for reference on reassembly. Clean the exterior of the compressor as thoroughly as possible to remove all dirt before removing the compressor shell.

Removal

1. Pry the shell retaining strap away from the cylinder and position the strap high enough to clear the cylinder as the shell is removed. See figure 9B-53.

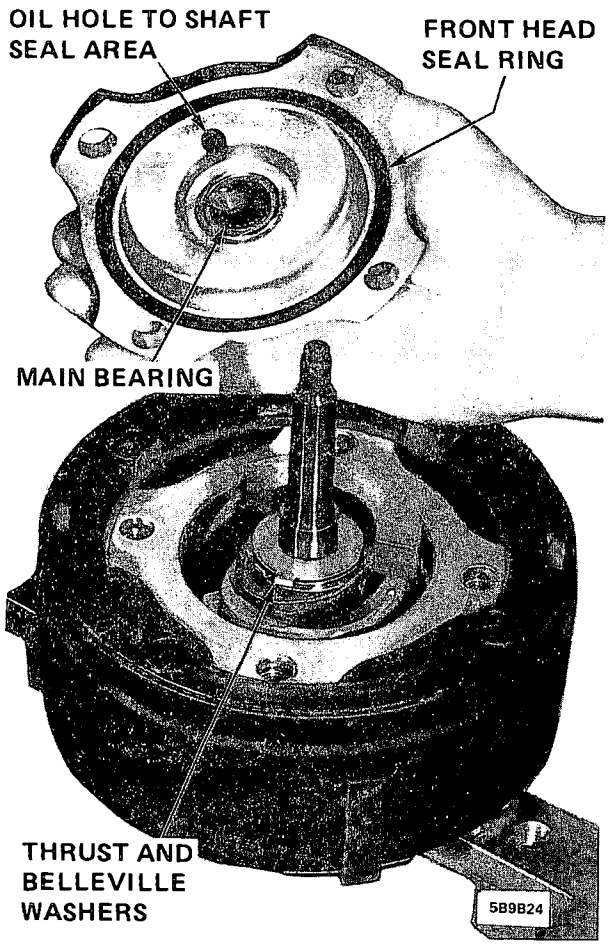


Figure 9B-48 - Front Head Removed - 4 Cylinder Compressor

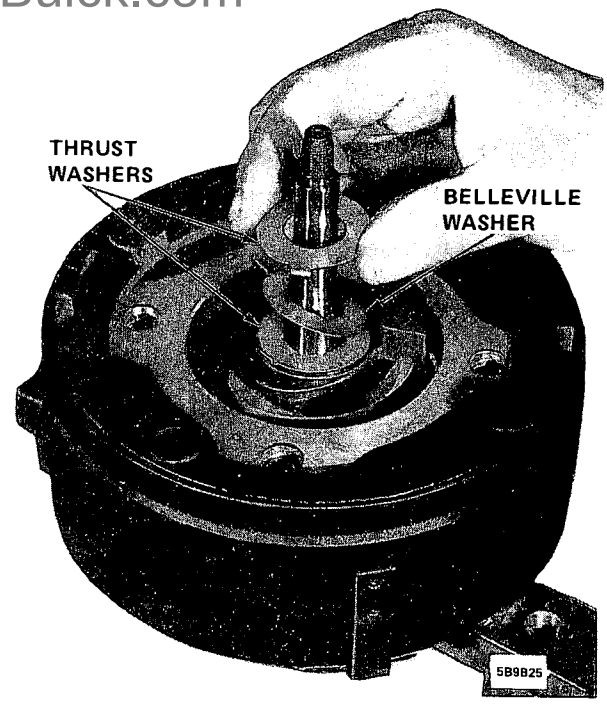


Figure 9B-50 - Installing Thrust and Belleville Washers - 4 Cylinder Compressor

2. Remove the compressor holding fixture J25008-1 and reverse the holding fixture step block protrusions engaging the compressor shell. Install the medium length bolts through the holding fixture and thread them into the compressor cylinder until the step of the fixture protrusions contact the compressor shell, finger tight, both sides. Check to be sure the step protrusions do not overlap the cylinder but will pass both sides as shown in figure 9B-54.

3. Allow the compressor shell to reach room temperature and using a wrench, alternately tighten each bolt approximately 1/4 turn to push the shell free of the O-rings on the cylinder. If one screw appears to require more force to turn than the other, immediately turn the other screw to bring the screw threading sequence in step or the shell will be cocked and made more difficult to remove. Normal removal does not require much force on the wrench if the screws are kept in step while turning. The shell can be removed by hand as soon as the shell is free of the shell to cylinder O-rings. Do not turn the screws any further than necessary to release the shell.

4. Remove the compressor shell, remove the J25008-1 holding fixture from the compressor, reverse the fixture to again hold the compressor by the opposite side using the short length screws. At this point the valve plate retainer ring may be removed using internal snap ring pliers, J4245, figure 9B-55, and remove the compressor valve plate as shown in figure 9B-56 for replacement or piston inspection.

Installation

1. Remove the old cylinder to shell O-rings and discard. Check the compressor assembly and interior of the compressor shell to be sure they are free of lint, dirt, etc.

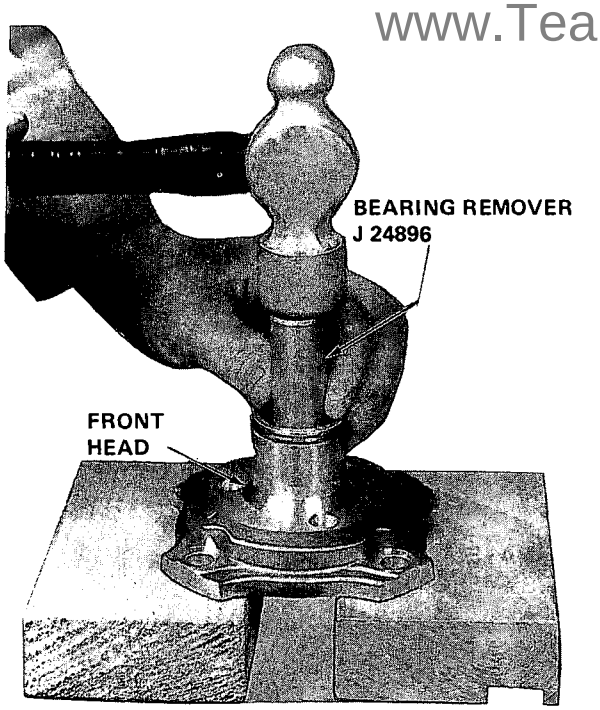


Figure 9B-51 - Driving the Main Bearing Out of the Front Head - 4 Cylinder Compressor

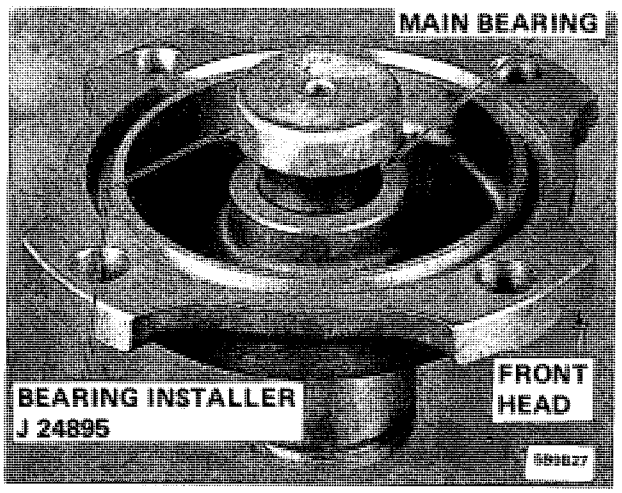


Figure 9B-52 - Installing Main Bearing - 4 Cylinder Compressor

2. Dip a cylinder to shell O-ring in 525 viscosity oil and install in the rear O-ring groove of the cylinder. Be careful in moving the O-ring across the cylinder surface to prevent damaging the O-ring.

3. Dip the remaining cylinder to shell O-ring in oil and install it in the front O-ring groove of the cylinder.

4. Place the compressor shell on the cylinder and rotate the retaining strap to its original location. See figure 9B-54.

5. Attach the shell installing fixture J25008-2 to the holding fixture J25008-1, using the long bolts and plate washers of the tool set. Align the step projections of the shell installing fixture J25008-2 to contact the compressor shell evenly on both sides.

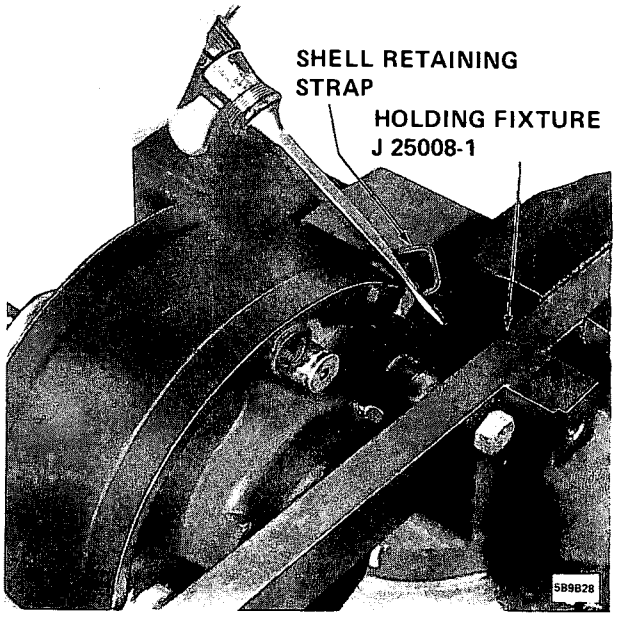


Figure 9B-53 - Prying Out Shell Retainer Strap - 4 Cylinder Compressor

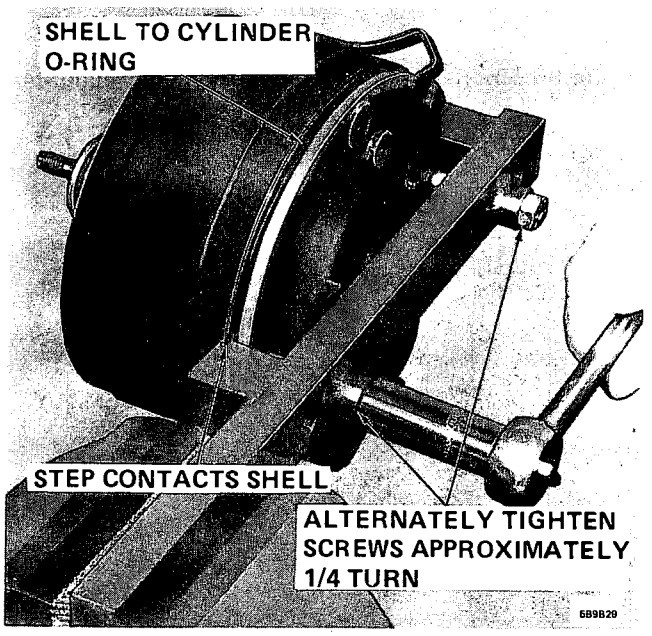


Figure 9B-54 - Removing Compressor Shell - 4 Cylinder Compressor

6. Push the compressor shell as close to the O-ring, figure 9B-57, as possible by hand and check for equal alignment of the shell around the cylinder. Tighten the fixture screws finger tight.

7. Using a wrench, alternately tighten each bolt approximately 1/4 turn to push the compressor shell over the O-rings and back against the shell stop flange at the rear of the compressor cylinder.

If one screw appears to require more force to turn than the

other, immediately turn the other screw to bring the screw threading sequence in step or the shell will be cocked and made more difficult to install. Normal installation does not require much force on the wrench if the screws are kept in step while turning.

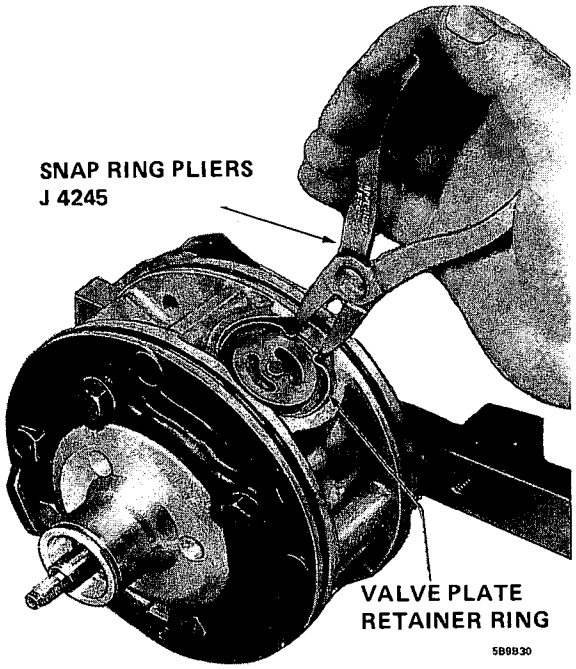


Figure 9B-55 - Removing Valve Plate Retainer Ring - 4 Cylinder Compressor

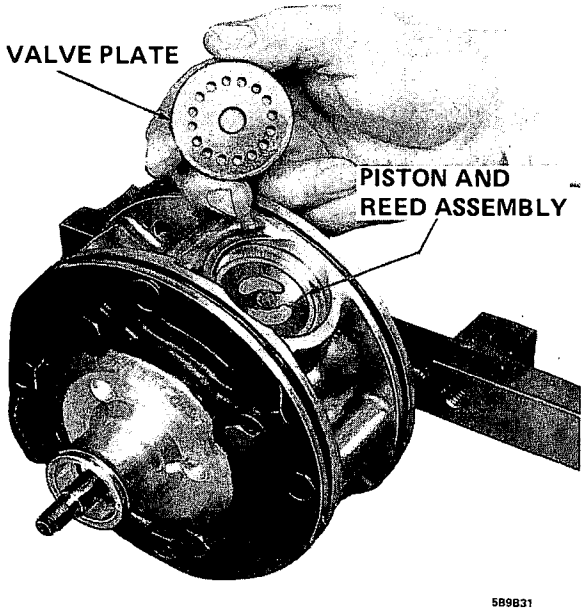


Figure 9B-56 - Valve Plate Removed - 4 Cylinder Compressor

8. When the shell is seated against the stops, bend the shell retaining strap down into place by tapping gently with a hammer.

9. Remove the shell installing fixture J25008-2 and leak test the compressor.

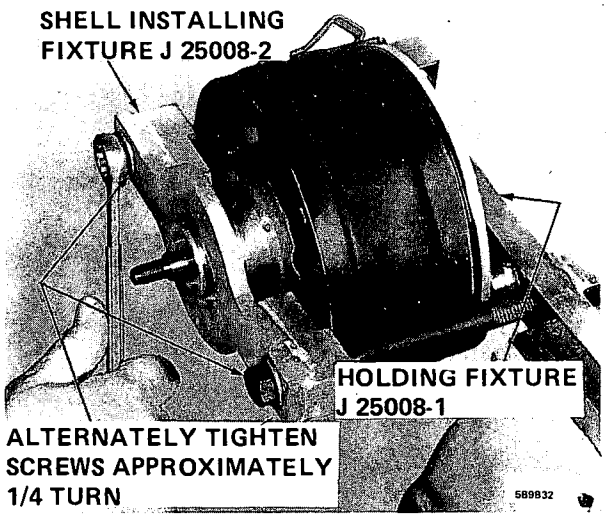


Figure 9B-57 - Installing Compressor Shell - 4 Cylinder Compressor

DISASSEMBLY AND REASSEMBLY OF CLUTCH DRIVE PLATE AND SHAFT SEAL — 6 CYLINDER COMPRESSOR

It is not necessary to remove the compressor or disconnect refrigerant lines to remove or install clutch parts. However, it is necessary to position the compressor out of the mounting brackets for tool clearance.

Disassembly

1. Firmly clamp holding fixture (J-9396) in a vise and attach compressor assembly to fixture (see Figure 9B-58).

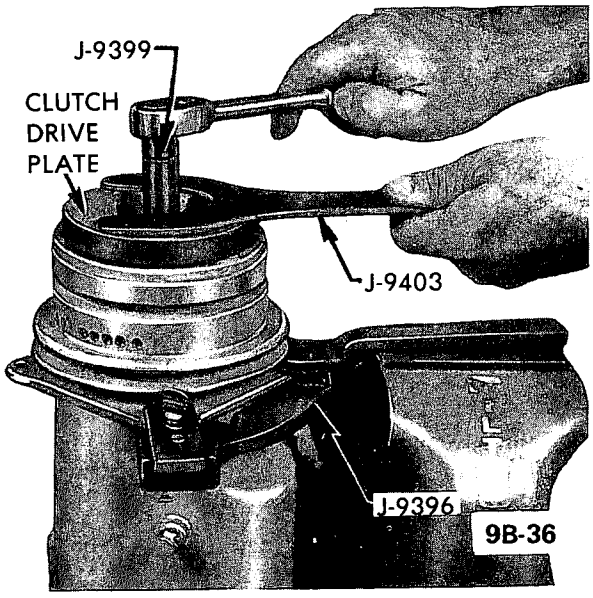


Figure 9B-58 Removing or Installing Shaft Nut - 6 Cylinder Compressor

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, remove shaft nut.

3. Install threaded hub puller (J-9401) onto hub of clutch drive plate (see Figure 9B-60). Hold body of hub puller with wrench, tighten center screw of hub puller, and lift off clutch drive plate and woodruff key.

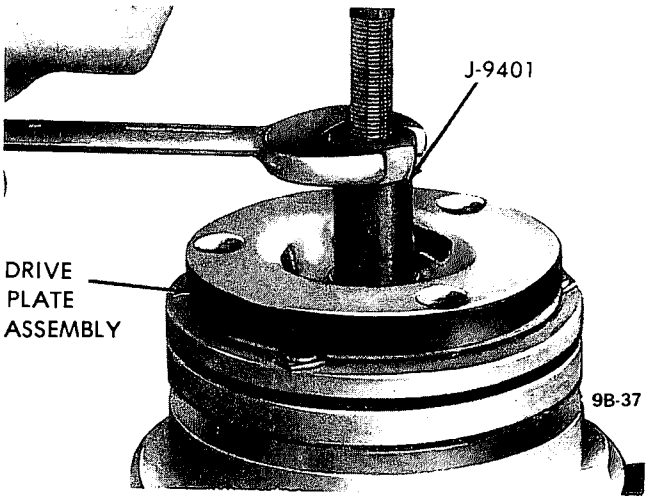


Figure 9B-60 Removing Clutch Drive Plate - 6 Cylinder Compressor

4. Using No. 21 Truarc pliers (J-5403) take out retainer ring from hub of clutch drive plate (see Figure 9B-61). Lift out spacer.

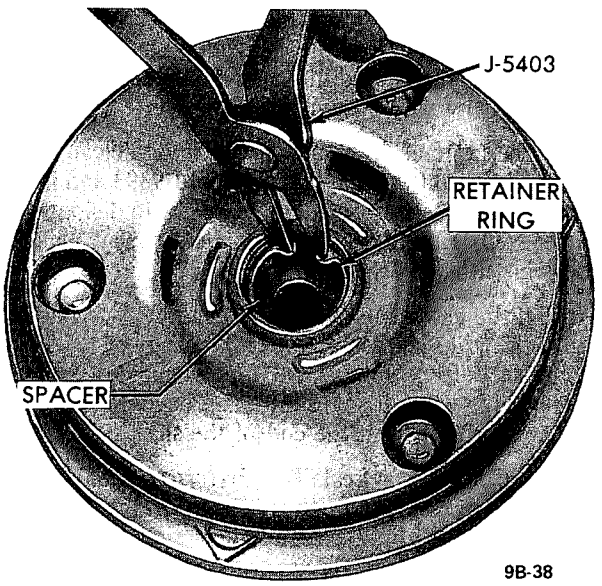


Figure 9B-61 - Removing or Installing Retainer Ring in Clutch Drive Plate - 6 Cylinder Compressor

5. If compressor has an absorbent sleeve in the neck, pry out the sleeve retainer and remove the sleeve. Remove the seal seat retainer ring, using No. 21 Truarc pliers, Tool J-5403, (see Figure 9B-62).

6. Thoroughly clean the area inside the compressor neck surrounding the shaft, the exposed portion of the seal seat and the shaft itself of any dirt or foreign material. This is

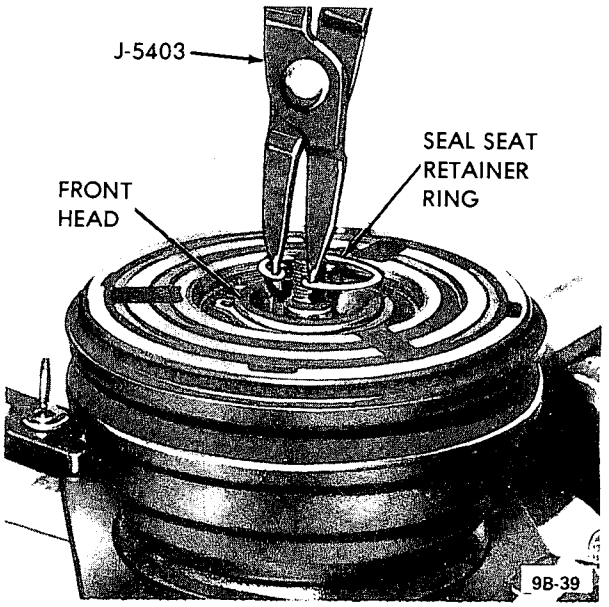


Figure 9B-62 Removing or Installing Shaft Seal Seat Retaining Ring - 6 Cylinder Compressor

absolutely necessary to prevent any such material from getting into the compressor.

7. Remove the seal seat (see Figure 9B-63) using Tool J-23128. Insert Tool J-23128 into seal seat and tighten, using a twisting motion remove the seal seat.

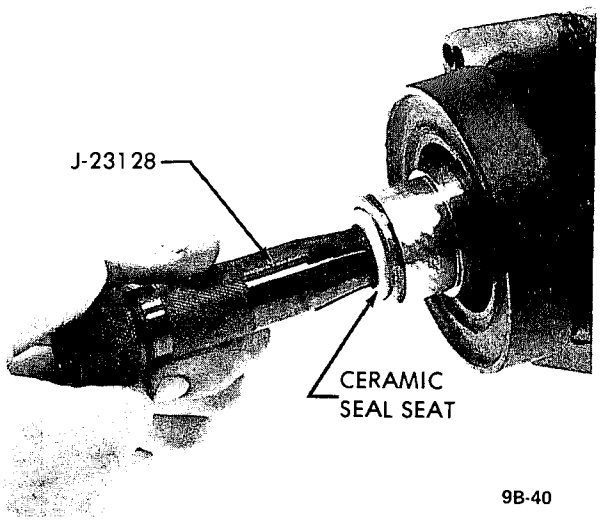


Figure 9B-63 Removing or Installing Ceramic Shaft Seal Seat - 6 Cylinder Compressor

8. Remove the seal assembly, using Tool J-9392. Press tool downward on seal while twisting it clockwise to engage the tabs of the seal assembly. Gently but firmly, pull tool straight out (see Figure 9B-64).

9. Remove the seal seat "O" ring, using Tool J- 9553 (see Figure 9B-65).

10. Re-check the inside of the compressor neck and the shaft. Be sure these areas are perfectly clean before installing new parts.

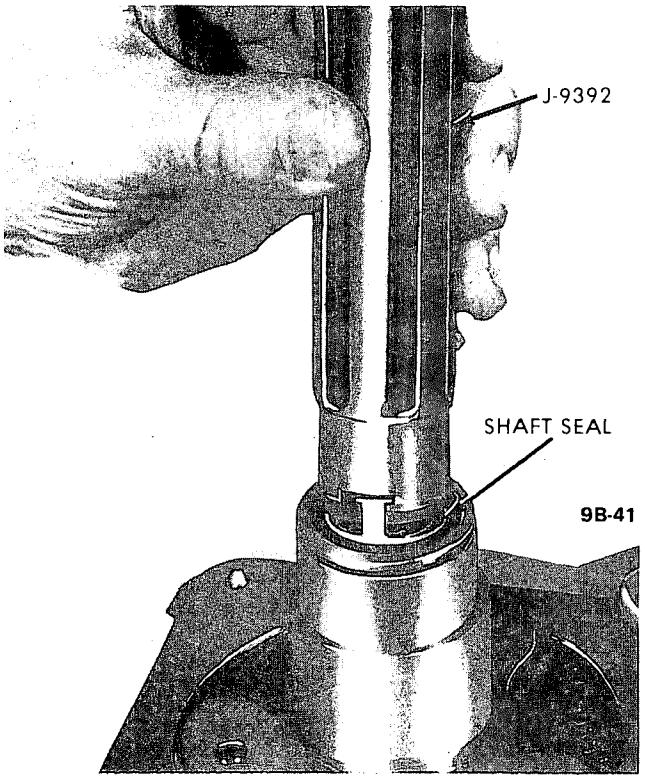


Figure 9B-64 Removing or Installing Shaft Seal - 6 Cylinder Compressor

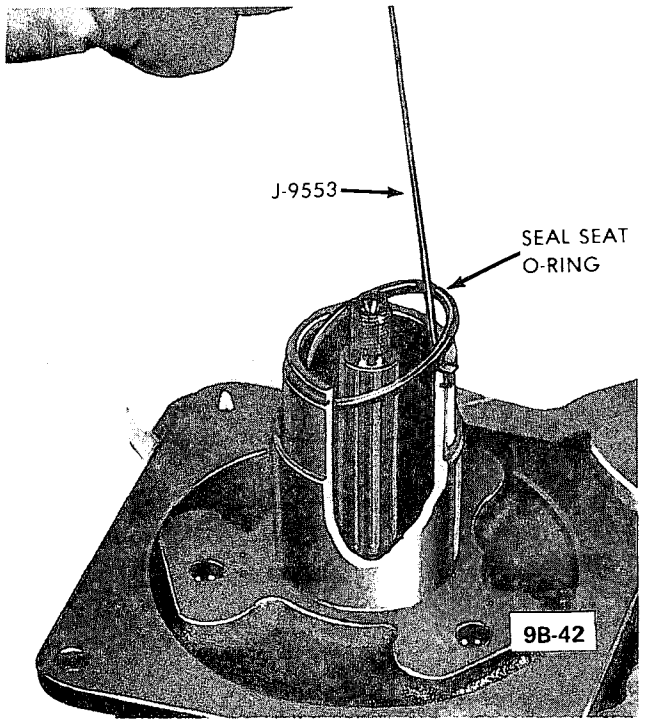


Figure 9B-65 Removing Seal Seat O Ring - 6 Cylinder Compressor

Reassembly

1. Coat the new seal seat "O" ring with clean refrigeration oil and install it in its groove in the compressor neck. Tool J-21508 may be used to accomplish this (see Figure 9B-66).

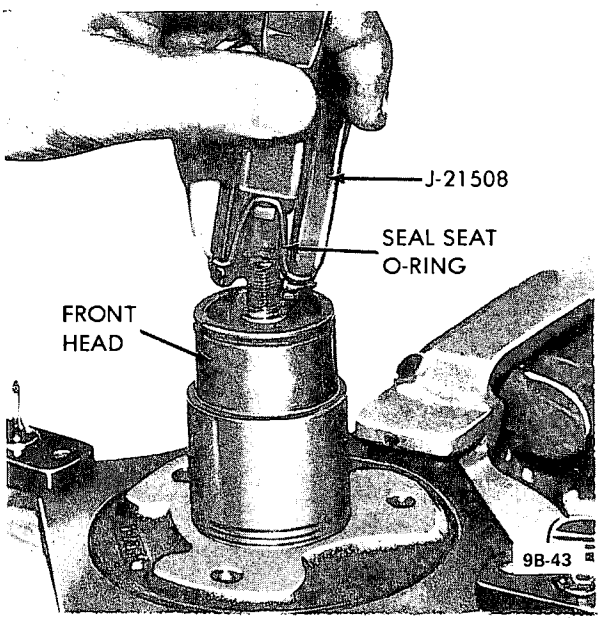


Figure 9B-66 Installing Seal Seat O Ring - 6 Cylinder Compressor

2. Coat the "O" ring and seal face of the new seal assembly with clean refrigeration oil. Carefully mount the seal assembly to Tool J-9392 by engaging the tabs of the seal with the tangs of the tool.

3. Place seal protector, Tool J-22974, over end of shaft and carefully slide the new seal assembly onto the shaft. Gently twist the tool clockwise while pushing the seal assembly down the shaft until the seal assembly engages the flats on the shaft and is seated in place. Disengage the tool by pressing downward and twisting tool counterclockwise.

4. Coat the seal face of the new seal seat with clean refrigeration oil. Mount the seal seat on Tool J-9393 and install it in the compressor neck, taking care not to dislodge the seal seat "O" ring and being sure the seal seat makes a good seal with the "O" ring.

5. Install the new seal seat retainer ring with its flat side against the seal seat, using No. 21 Truarc pliers (J-5403). Use the sleeve from Tool J-9393 to press in on the seal seat retainer ring so that it snaps into its groove. Remove seal protector J-22974 from the end of the shaft.

6. Install Compressor Leak Test Fixture (J-9625) on rear head of compressor and connect gage charging lines as shown in Figure 9B-67. Pressurize suction side of compressor with Refrigerant-12 vapor to drum pressure. Temporarily install the shaft nut and, with compressor horizontal and oil sump down, rotate the compressor shaft in normal direction of rotation several times by hand. Leak test the seal with a propane torch type leak detector in good condition. Correct any leak found. Remove and discard the shaft nut.

7. Remove any excess oil, resulting from installing the new seal parts, from the shaft and inside the compressor neck.

8. Install the new absorbent sleeve by rolling the material into a cylinder, overlapping the ends, and slipping it into the compressor neck with the overlap at the top of the compressor. Using a small screwdriver or similar instru-

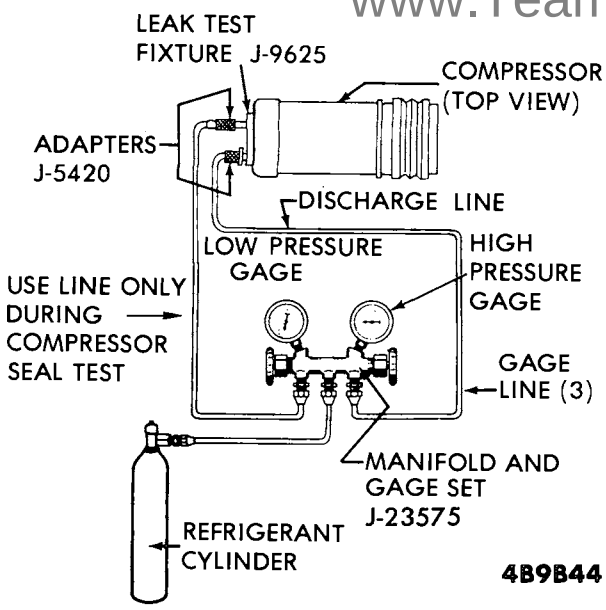


Figure 9B-67 Leak Testing Shaft Seal and Seal Seat O Ring - 6 Cylinder Compressor

ment, carefully spread the sleeve so that in its final position, the ends butt together at the top vertical centerline. Install the new sleeve retainer so that its flange face will be against the front end of the sleeve. Using the sleeve from Tool J-9393, press and tap with a mallet, setting the retainer and sleeve into place, until the outer edge of the sleeve retainer is recessed approximately 1/32" from the face of the compressor neck.

9. Insert woodruff key into hub of clutch drive plate so that it projects out approximately 3/16 inch (see Figure 9B-68) and position clutch drive plate onto shaft.

Figure 9B-68 Positioning Clutch Drive Plate on Shaft - 6 Cylinder Compressor

10. Using drive plate installer (J-9480), screw installer on end of shaft as shown in Figure 9B-70. Hold nut and turn bolt until clutch drive plate is pressed within 3/32 inch of the pulley assembly.

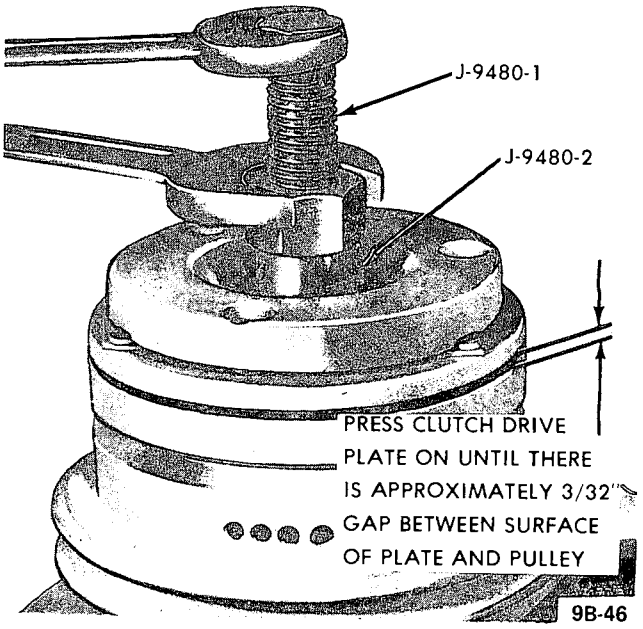


Figure 9B-70 Installing Clutch Drive Plate - 6 Cylinder Compressor

11. Reassemble spacer into hub of clutch drive plate.

12. Reassemble retainer ring into hub of clutch drive plate (see Figure 9B-61) using No. 21 truarc pliers (J-5403).

13. Thread on new shaft nut using special thin wall 9/16 inch 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 9B-71).

DISASSEMBLY AND REASSEMBLY OF PULLEY ASSEMBLY, COIL AND HOUSING ASSEMBLY — 6 CYLINDER COMPRESSOR

It is not necessary to remove the compressor assembly or disconnect refrigerant lines to perform the following operations. However, it is necessary to position the compressor out of the mounting brackets for tool clearance.

Disassembly

1. Disassemble clutch drive plate (ref. to "Disassembly and Reassembly of Clutch Drive Plate and Shaft Seal").

2. Using No. 26 Truarc pliers (J-6435) remove bearing to head retainer ring (see Figure 9B-72).

3. Place puller pilot (J-9395) on hub of front head and take off pulley assembly (see Figure 9B-73), using pulley puller (J-8433).

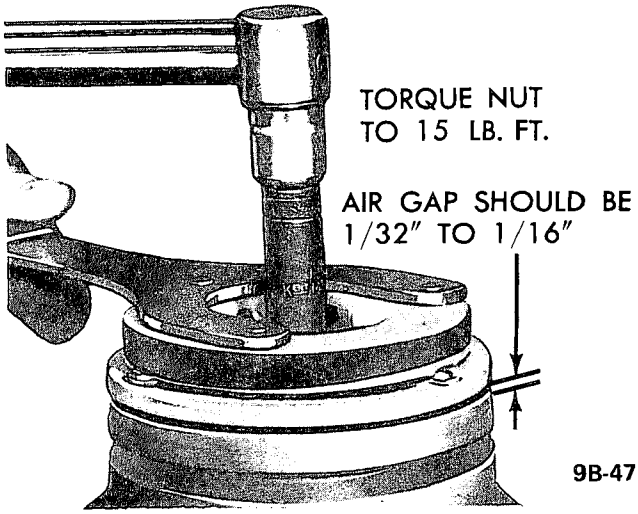


Figure 9B-71 Torquing Shaft Nut - 6 Cylinder Compressor

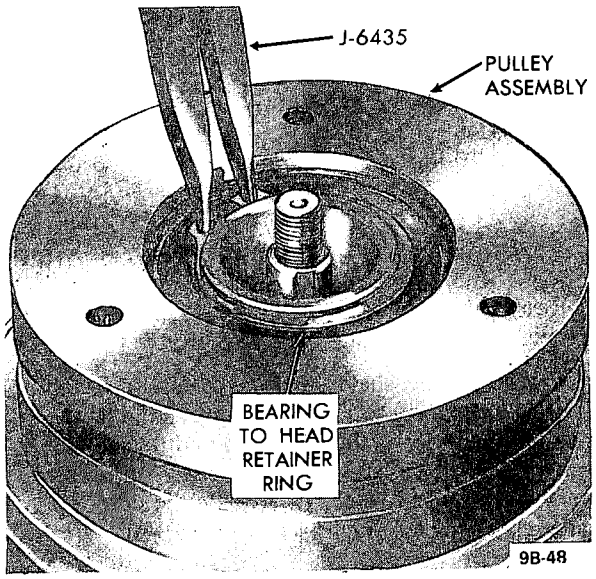


Figure 9B-72 Removing or Installing Bearing to Head Retainer Ring

Puller pilot (J-9395) must be used. If force is exerted on shaft, damage will result to the internal parts of the compressor.

4. Remove bearing to pulley retaining ring with a small screwdriver (see Figure 9B-74).

5. Drive out bearing (see Figure 9B-75) by use of puller Pilot (J-9398) and Handle (J-8092).

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, remove coil and housing retainer ring (see Figure 9B-76) using No. 26 truarc pliers (J-6435), and lift out coil and housing assembly.

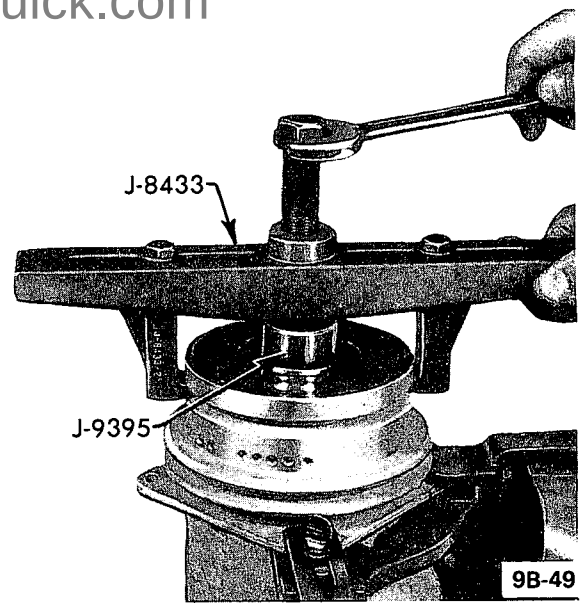


Figure 9B-73 Removing Pulley Assembly - 6 Cylinder Compressor

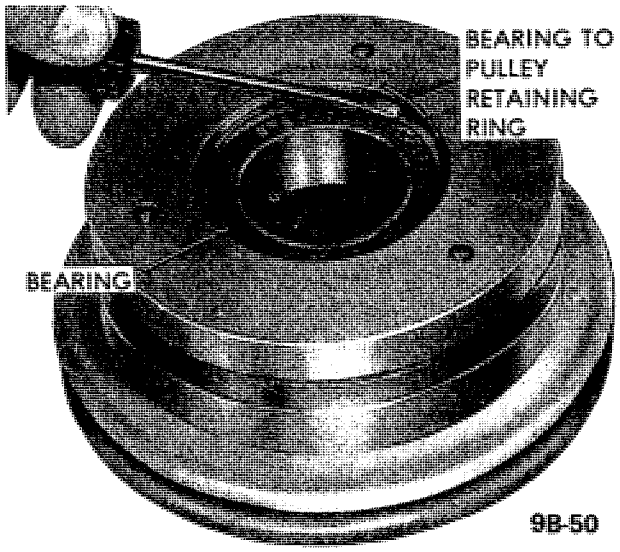


Figure 9B-74 Removing Pulley Bearing Retainer - 6 Cylinder Compressor

Reassembly

1. Reassemble coil and housing assembly reverse of disassembly.

2. Drive new bearing into pulley assembly (see Figure 9B-77) with installer (J-9481) and handle (J-8092).

3. Lock bearing in position with bearing to pulley retainer ring (see Figure 9B-74).

4. Drive pulley assembly onto hub of front head (see Figure 9B-78) using installer (J-9481) and handle (J-8092).

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

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 9B-72.

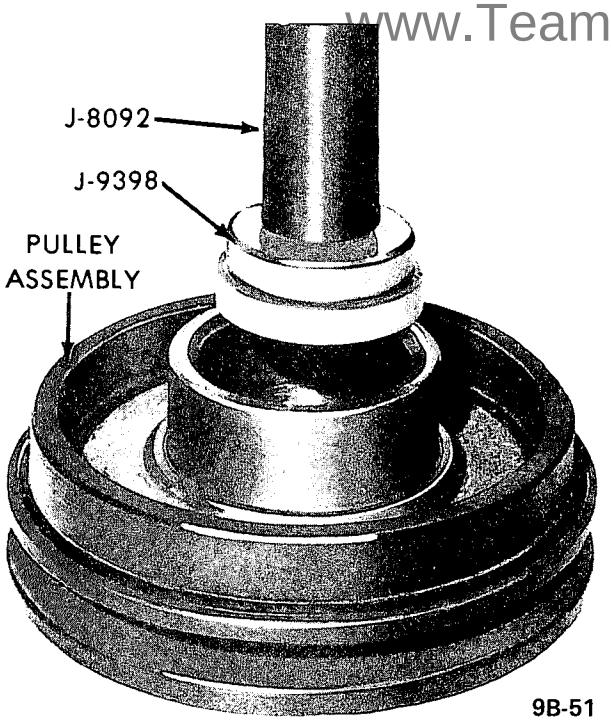


Figure 9B-75 Removing Bearing from Pulley Assembly - 6 Cylinder Compressor

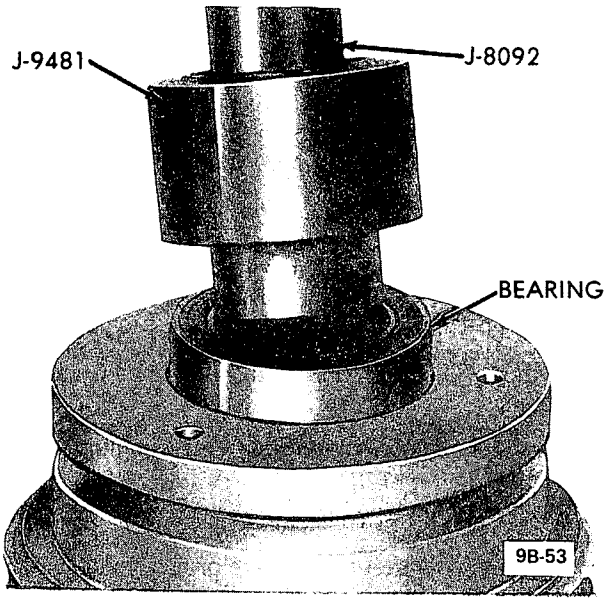


Figure 9B-77 Installing Bearing into Pulley Assembly - 6 Cylinder Compressor

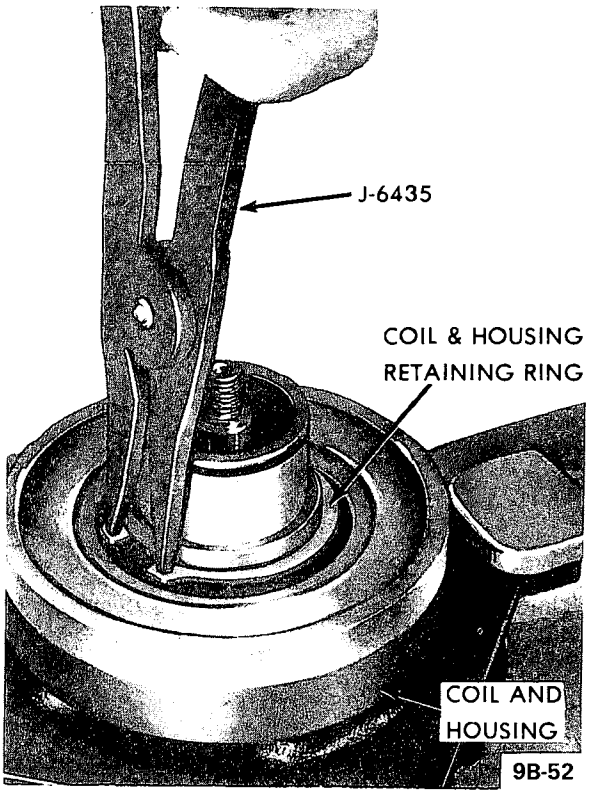


Figure 9B-76 Removing or Installing Coil and Housing Retainer Ring - 6 Cylinder Compressor

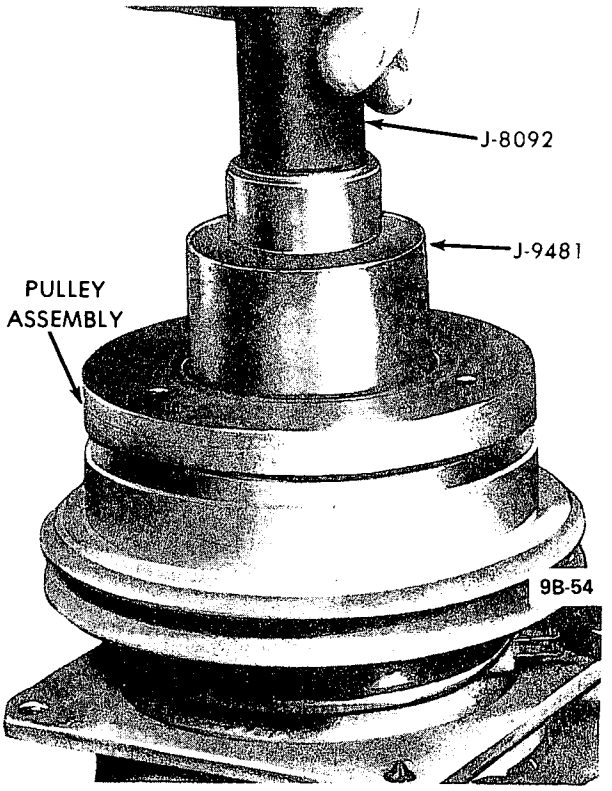


Figure 9B-78 Installing Pulley Assembly - 6 Cylinder Compressor

6. Reassemble clutch drive plate (refer to "Disassembly and Reassembly of Clutch Drive Plate and Shaft Seal").

REMOVAL AND INSTALLATION OF COMPRESSOR — 6 CYLINDER

Removal

1. Discharge refrigerant from system (refer to "Discharging the System").

2. Remove wire connector from compressor.

3. Remove bolt and plate holding suction and discharge lines into rear head. Disengage both lines from compressor and tape closed openings in both lines and ports in rear head. It is important to seal compressor ports to avoid a loss of refrigeration oil and also to prevent foreign material and moisture from entering compressor.

4. Remove bolts in slots of compressor mounting brace and tilt compressor inward.

5. Remove two bolts holding front and rear adapter plates to compressor mounting bracket and lift out compressor. During removal, maintain the compressor position so that the sump is downward. Do not rotate compressor shaft.

Installation

1. Installation is reverse of removal. Torque bolts as specified in "SPECIFICATIONS". Insure that compressor has sufficient oil charge.

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

3. Adjust compressor belt tension to 100 pounds using a reliable belt tension gage.

4. Charge compressor (refer to "Charging the System").

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

DISASSEMBLY AND REASSEMBLY OF INTERNAL PARTS OF COMPRESSOR AND LEAK TESTING COMPRESSOR — 6 CYLINDER

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.

Disassembly of Rear Head, Oil Pump, Rear Discharge Valve Plate, and Rear Suction Valve Reed Disc — 6 Cylinder Compressor

If compressor is not going to be disassembled any further than removal of rear 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. to "Disassembly and Reassembly of Clutch Drive Plate and Shaft Seal").

2. Disassemble pulley assembly, and coil and housing assembly (ref. "Disassembly and Reassembly of Pulley Assembly, and Coil and Housing Assembly ").

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

4. Remove compressor from holding fixture (J-9396), unscrew drain screw. Drain, measure and record amount of oil in compressor.

5. Reinstall compressor in holding fixture (J-9396) positioned as shown in Figure 9B-80.

6. Unscrew and discard four lock nuts from rear of compressor, and lift off rear head by tapping it with a mallet. If sealing surface is damaged (see Figure 9B-81), replace rear head. Clean or replace suction screen as necessary.

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

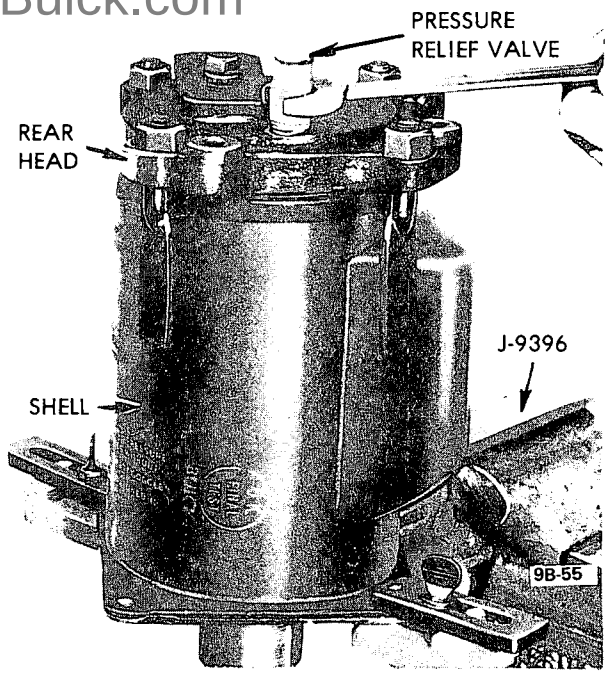


Figure 9B-80 Compressor Installed in Holding Fixture - 6 Cylinder Compressor

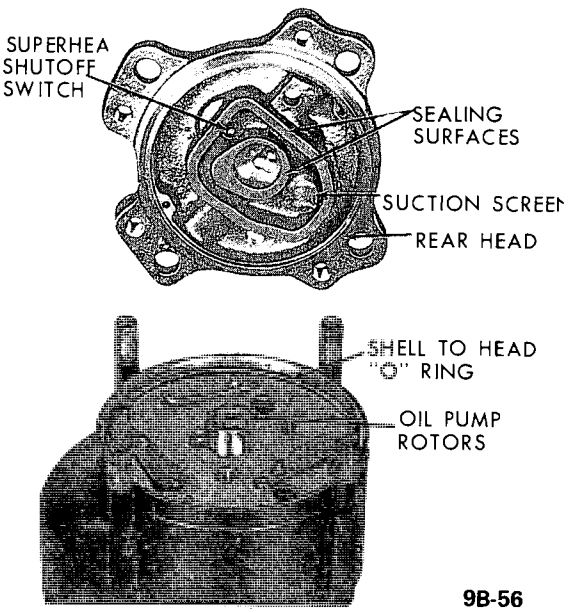


Figure 9B-81 Rear Head Removal - 6 Cylinder Compressor

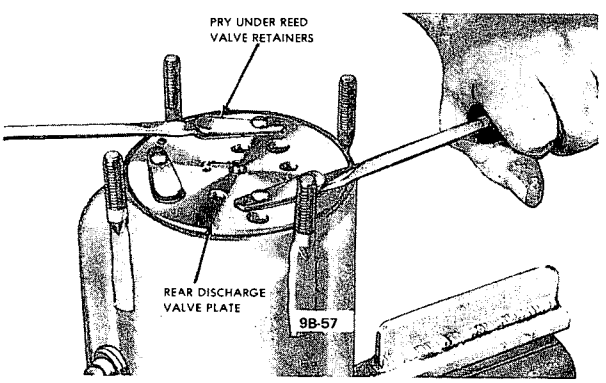


Figure 9B-82 Removing Rear Discharge Valve Plate - 6 Cylinder Compressor

rotors. 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 Figure 9B-82 and 9B-83). Check both pieces and replace as necessary.

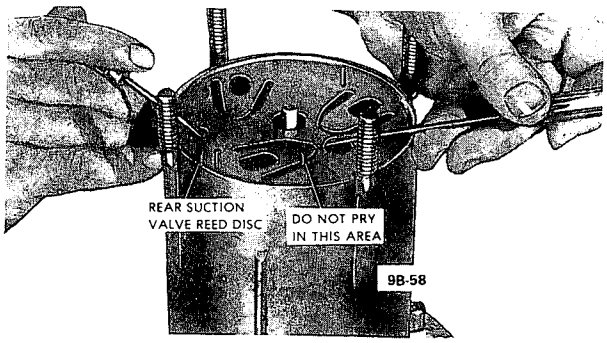


Figure 9B-83 Removing Rear Suction Valve Reed Disc - 6 Cylinder Compressor

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

Removing Cylinder Assembly, and Disassembly of Front Suction Valve Reed Disc, Front Discharge Valve Plate, and Front Head - 6 Cylinder Compressor

1. Pull out oil inlet tube (see Figure 9B-84) and oil inlet tube "O" ring using Remover (J-6586).

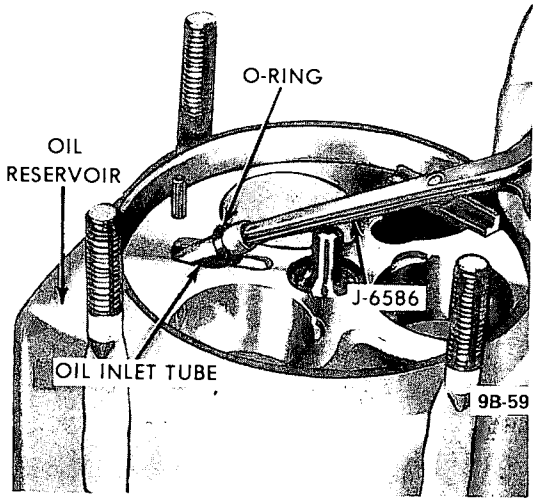


Figure 9B-84 Removing Oil Inlet Tube - 6 Cylinder Compressor

2. Push shaft upward from front head and lift out cylinder assembly (see Figure 9B-85), front suction valve reed disc, and front discharge valve plate.

When lifting out the cylinder assembly, the front suction valve reed disc and the front discharge valve plate generally adhere to the cylinder assembly and lift out with it. Check and replace if necessary.

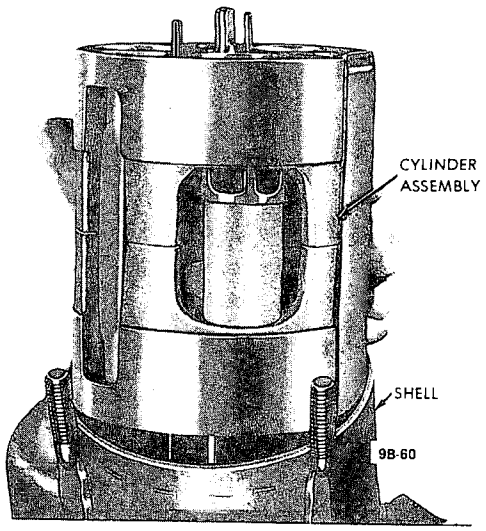


Figure 9B-85 Removing Internal Cylinder Assembly - 6 Cylinder Compressor

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 9B-86). Discard "O" ring.

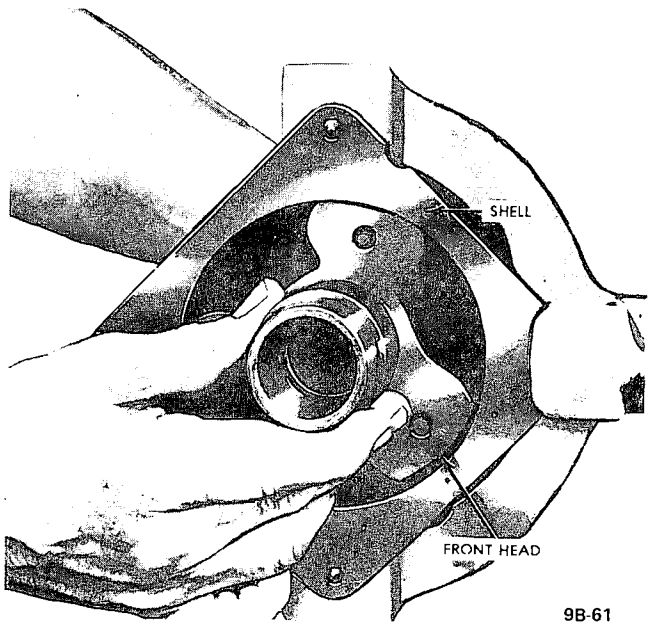


Figure 9B-86 Removing Front Head - 6 Cylinder Compressor

If sealing surfaces of front head (see Figure 9B- 87) are damaged, replace front head.

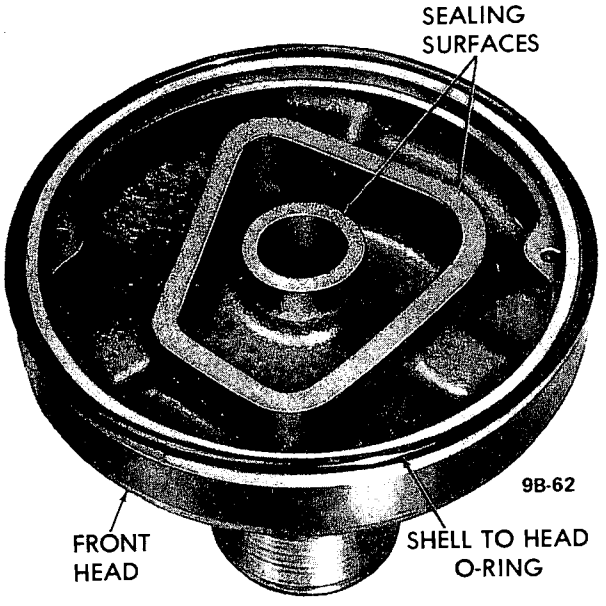


Figure 9B-87 Front Head Sealing Surfaces - 6 Cylinder Compressor

Disassembly of Cylinder Assembly - 6 Cylinder Compressor

1. Pry off suction pass cover using screwdriver (see Figure 9B-88).

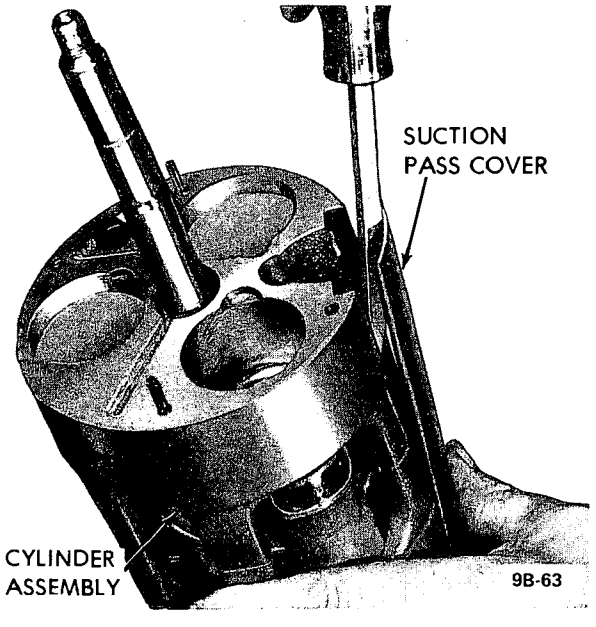


Figure 9B-88 Removing Suction Pass Cover - 6 Cylinder Compressor

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 9B-90), and separate cylinder halves using a hard rubber mallet or hammer and wood block.

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

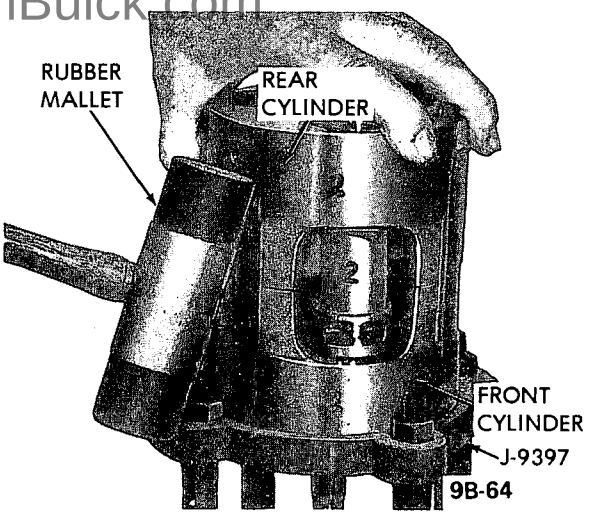


Figure 9B-90 Separating Cylinder Halves - 6 Cylinder Compressor

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 axial plate assembly (using 9/16 inch opened wrench on shaft seal portion of shaft) to achieve necessary clearance.

4. Carefully disassemble from cylinder assembly (see Figure 9B-91) 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 axial plate until piston is at highest point, raise axial plate approximately 1/2 inch and lift out piston and related parts one at a time. Discard shoe discs and rear needle thrust bearing and races.

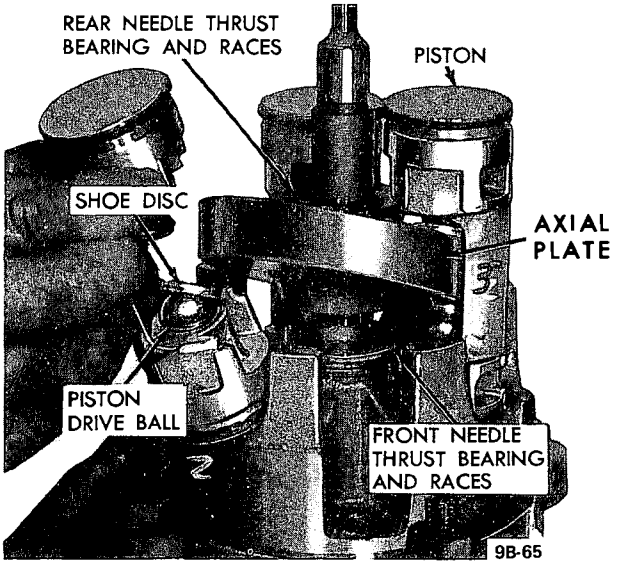


Figure 9B-91 Disassembly of Cylinder Assembly - 6 Cylinder Compressor

Examine piston drive balls and replace if necessary. The front end of the piston may be identified by a recessed notch (see Figure 9B-92).

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

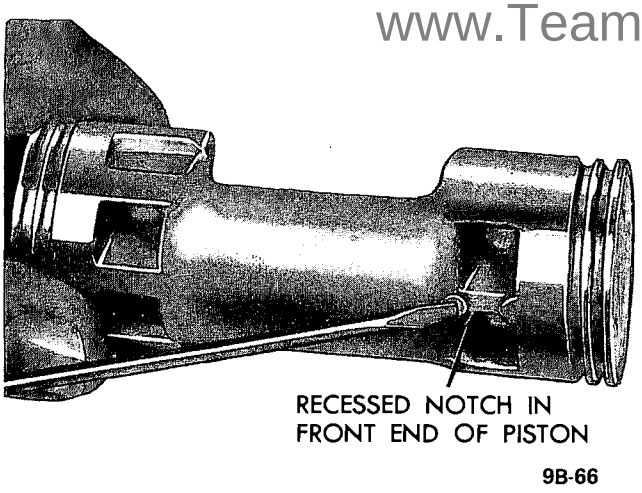


Figure 9B-92 Piston Identification - 6 Cylinder Compressor

Examine shaft and axial 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.

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 9B-93.

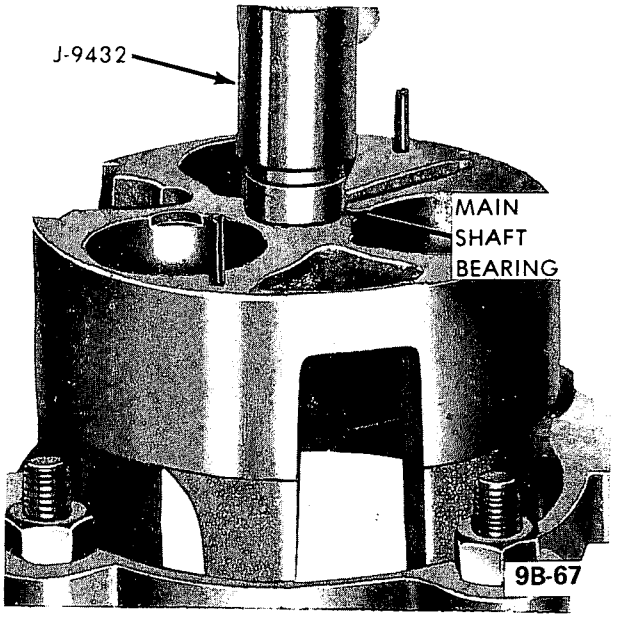


Figure 9B-93 Installing Main Shaft Bearing - 6 Cylinder Compressor

Partial Reassembly of Cylinder Assembly, and Gaging of Piston Play and Shaft End Play - 6 Cylinder Compressor

1. Obtain 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 9B-94.

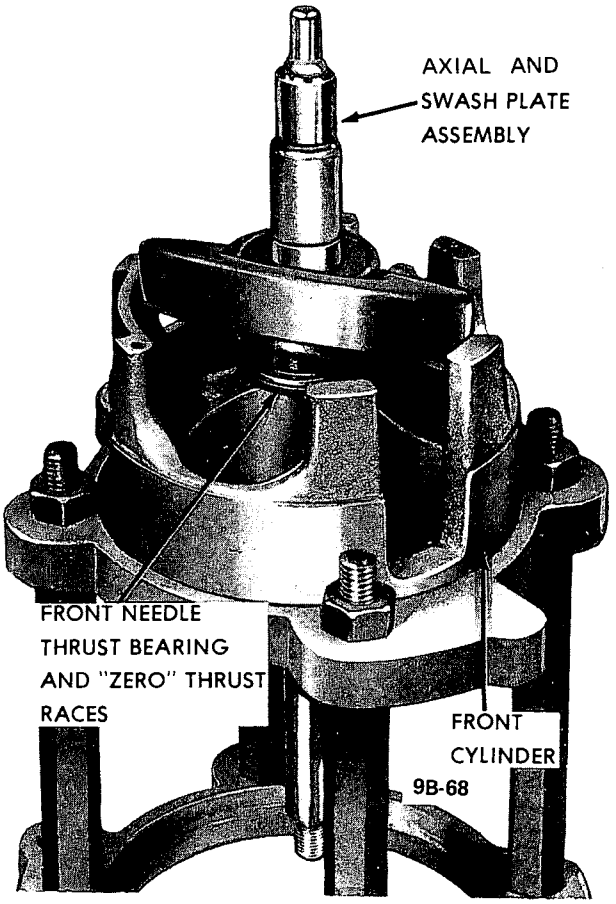


Figure 9B-94 Shaft and Front Needle Thrust Bearing in Cylinder Half - 6 Cylinder Compressor

3. Generously coat with clean No. 525 Viscosity Oil two "zero" thrust races, and a new needle thrust bearing. Assemble races and bearing to front end of shaft and axial plate assembly and insert assembly into front cylinder (see Figure 9B-94.)

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

5. Lightly coat ball pockets of the three pistons with clean No. 525 Viscosity Oil and place a piston drive ball in each pocket.

6. Lightly coat the three "zero" shoe discs with clean No. 525 Viscosity Oil and place a disc on only the piston drive ball at the front of each piston.

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 axial plate assembly until high point of axial plate is over No. "1" cylinder bore. Position No. "1" piston onto axial plate (see Figure 9B-94) and lower the piston and axial plate so the front end (notched end - see Figure 9B-95) of the piston enters the cylinder bore.

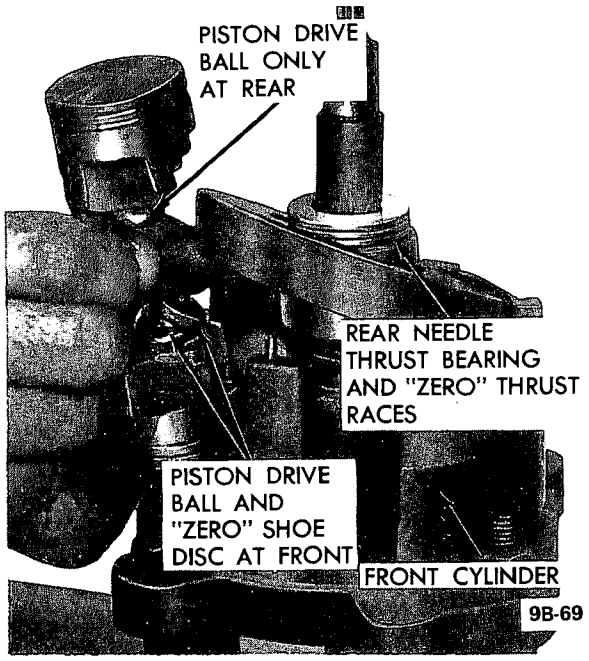


Figure 9B-95 Installing Piston into Cylinder Half - 6 Cylinder Compressor

In order to fit the piston onto the axial plate, the shaft and axial 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 axial 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 9B-96).

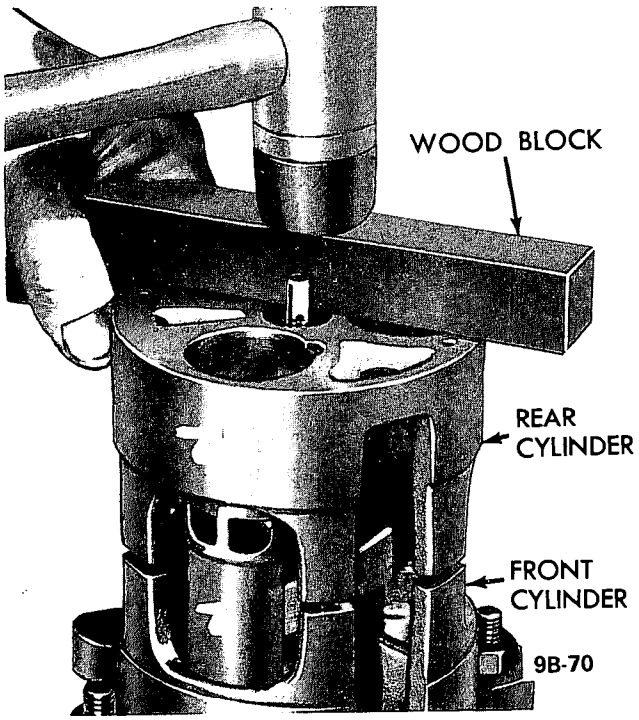


Figure 9B-96 Assembling Rear Cylinder Half - 6 Cylinder Compressor

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 gage, select a leaf or combination of leaves which result in satisfactory "feel" when inserted between rear piston drive ball and axial plate (see Figures 9B-97 and 9B-98).

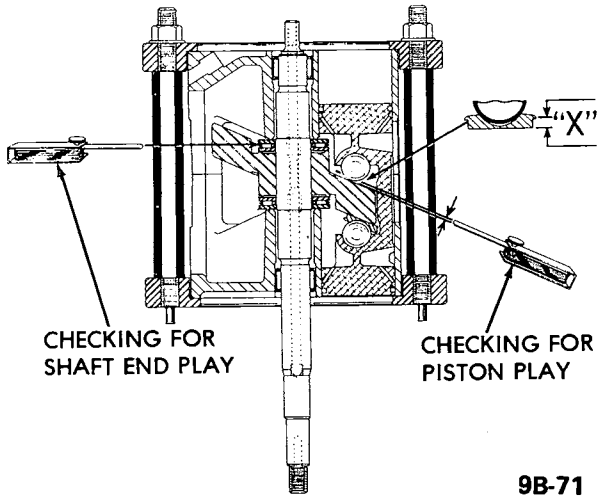


Figure 9B-97 Checking Piston and Shaft End Play - 6 Cylinder Compressor

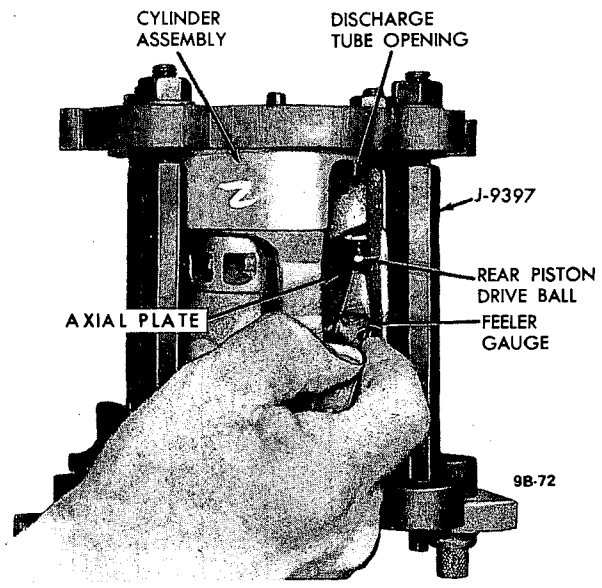


Figure 9B-98 Checking Clearance Between Rear Piston Drive Ball and Axial Plate - 6 Cylinder Compressor

(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).

(c) Reinsert feeler gage leaf or leaves between rear piston drive ball and axial plate and draw leaf or leaves out again, simultaneously measuring "drag" on leaf or leaves (see Figure 9B-100). 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.

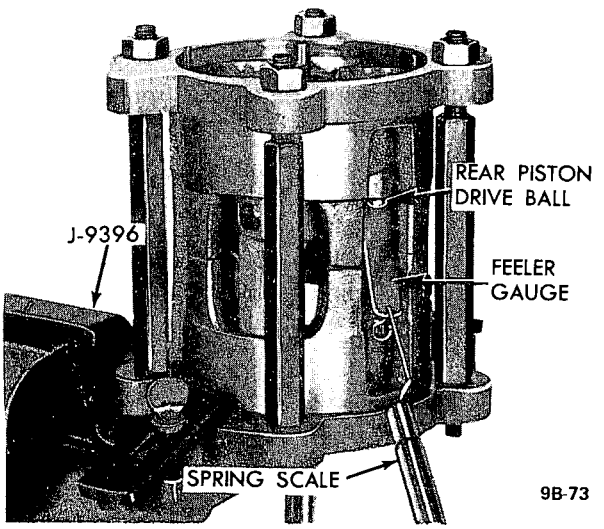


Figure 9B-100 Checking Drag on Selected Feeler Gage Leaf with Spring Scale - 6 Cylinder Compressor

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

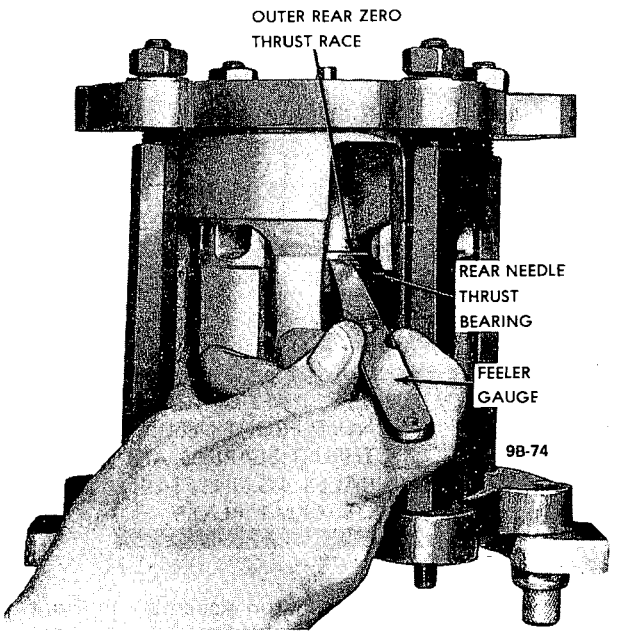


Figure 9B-101 Gaging Clearance Between Rear Needle Thrust Bearing and Outer Rear Thrust Race - 6 Cylinder Compressor

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

(e) Rotate shaft and axial plate again approximately 120 degrees and repeat third check (Steps "a, b and c") between same piston drive ball and axial plate. Record gage dimension.

(f) From the three recorded checks (Steps "c, d and e") select minimum feeler gage reading and obtain from stock (ref. Shoe Disc Table 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).

Shoe Disc Table - 6 Cylinder Compressor

SERVICE PART NO.	ID NO. STAMPED SHOE DISC
6557000	0 ("Zero" Shoe Disc)
6556175	17 1/2
6556180	18
6556185	18 1/2
6556190	19
6556195	19 1/2
6556200	20
6556205	20 1/2
6556210	21
6556215	21 1/2
6556220	22

EXAMPLE

Piston No.	1st Check	2nd Check	3rd Check
1	.019	.020	.019
(Select No. 19 - Shoe Disc)			
2	.020	.020	.019
(Select No. 19 - Shoe Disc)			
3	.021	.020	.021
(Select No. 20 - Shoe Disc)			

(g) Repeat Steps "c, d, e and f" for other two pistons and obtain two more selected shoe discs for other two pistons. 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 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 9B-101).

(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 9B-102). 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.

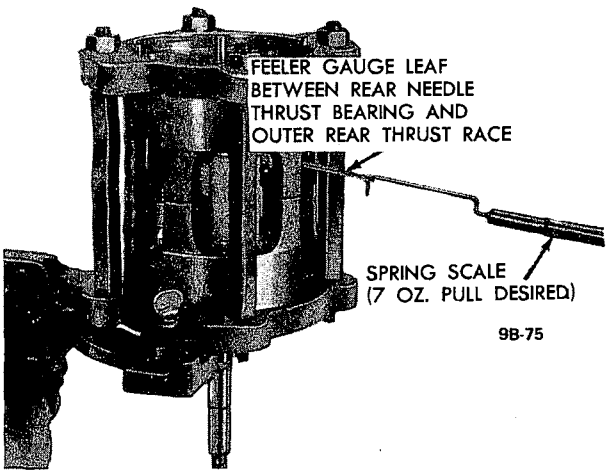


Figure 9B-102 Checking Drag on Selected Feeler Gage Leaf with Spring Scale - 6 Cylinder Compressor

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

(d) Select from stock one thrust race (ref. Thrust Race Table 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.

Thrust Race Table - 6 Cylinder Compressor

SERVICE PART NO.	ID NO. ON RACE	THICK-NESS
6556000	0	.0920
6556050	5	.0965
6556055	5 1/2	.0970
6556060	6	.0975
6556065	6 1/2	.0980
6556070	7	.0985
6556075	7 1/2	.0990
6556080	8	.0995
6556085	8 1/2	.1000
6556090	9	.1005
6556095	9 1/2	.1010
6556100	10	.1015
6556105	10 1/2	.1020
6556110	11	.1025
6556115	11 1/2	.1030
6556120	12	.1035

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 9B-90) and disassemble rear cylinder from front cylinder using rubber mallet or hammer 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 axial plate until piston is at highest point, raise axial plate approximately 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 No. 525 Viscosity Oil and assemble onto shaft.

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. BE SURE to reassemble balls and shoe discs into their specific positions on front and rear of piston.

3. Rotate shaft and axial plate assembly until high point of swash plate is over No. "1" cylinder bore. Position No. "1" piston onto axial plate (see Figure 9B-103) and lower the piston and axial plate so that the front end (notched end) of the piston enters the cylinder bore.

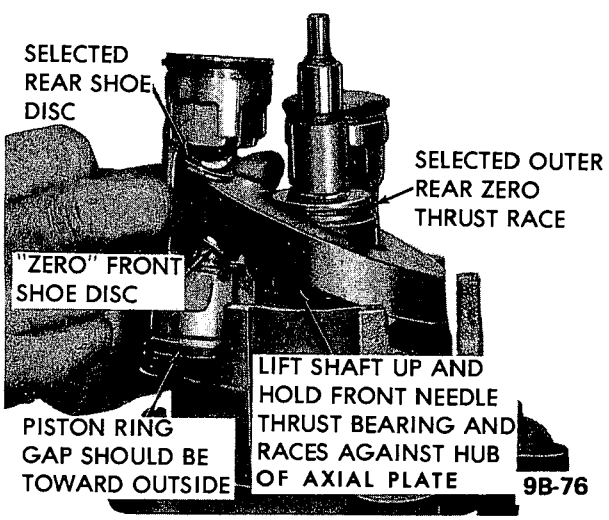


Figure 9B-103 Installing Piston Assembly in Front Cylinder Half - 6 Cylinder Compressor

In order to fit the piston onto the axial plate and into the cylinder bore, the axial plate must be raised approximately

1/2 inch, the front needle thrust bearing and races must be held up against the hub of the axial plate, and the piston rings must be squeezed together (see Figure 9B-104). Lubricate cylinder bore, piston assembly and axial plate with No. 525 viscosity oil to facilitate reassembly.

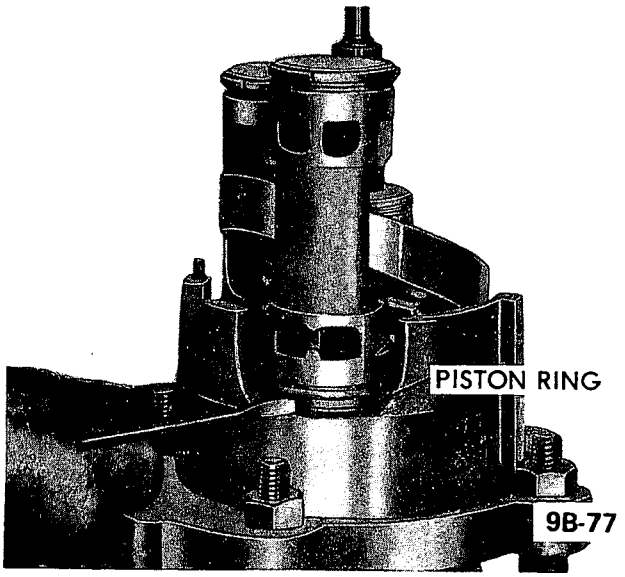


Figure 9B-104 Compressing Front Piston Rings - 6 Cylinder Compressor

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

5. Liberally lubricate cylinder bores of rear cylinder with No. 525 viscosity oil 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.

If pistons are postioned in a "stair-step" arrangement (see Figure 9B-105), 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.

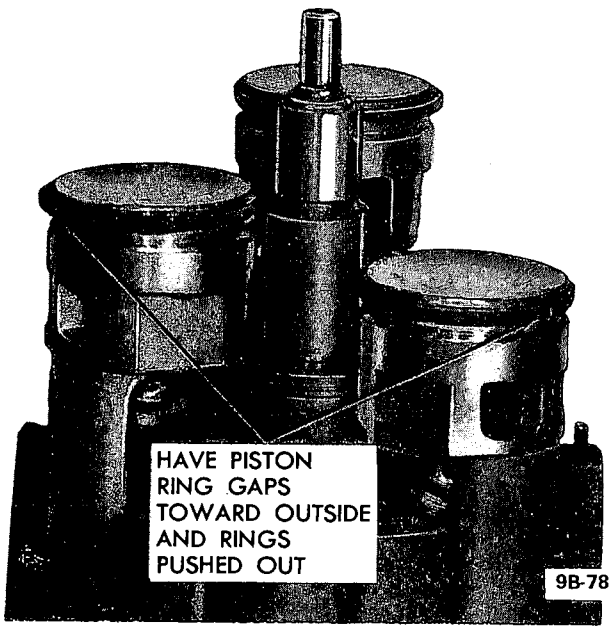


Figure 9B-105 Pistons Postioned in Stair-Step Arrangement - 6 Cylinder Compressor

7. Assemble both service replacement discharge tube "O" rings and bushings (see Figure 9B-106) onto cylinder assembly.

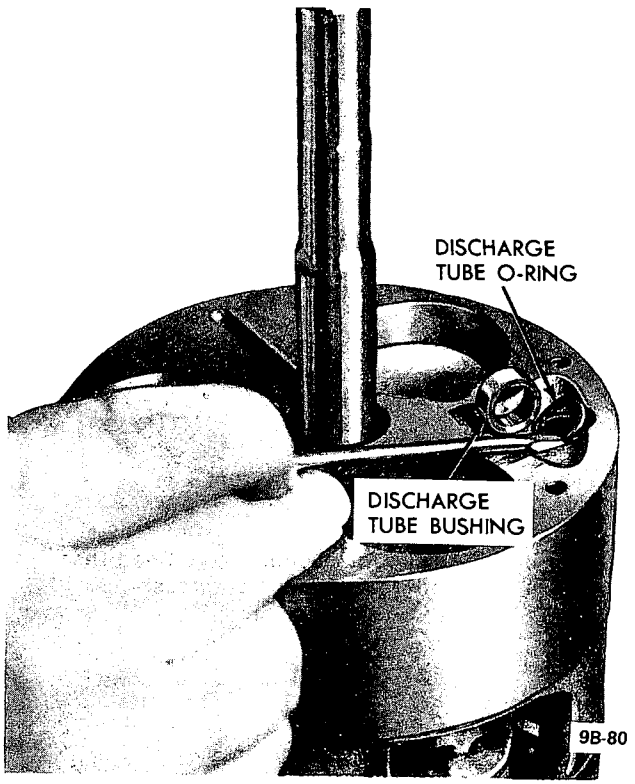


Figure 9B-106 Installing Discharge Tube O Ring and Bushing - 6 Cylinder Compressor

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 9B-107).

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

3. Coat sealing surfaces on front head (see Figure 9B- 108) with No. 525 viscosity oil.

4. Mark with pencil on side of front head the location of dowel pin holes (see Figure 9B-108), align front head with dowel pins, and tap head lightly with mallet to seat on cylinder assembly.

5. Place new shell to head "O" ring on shoulder of front head (see Figure 9B-110) and liberally coat "O" ring and front head sealing surface with No. 525 viscosity oil.

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

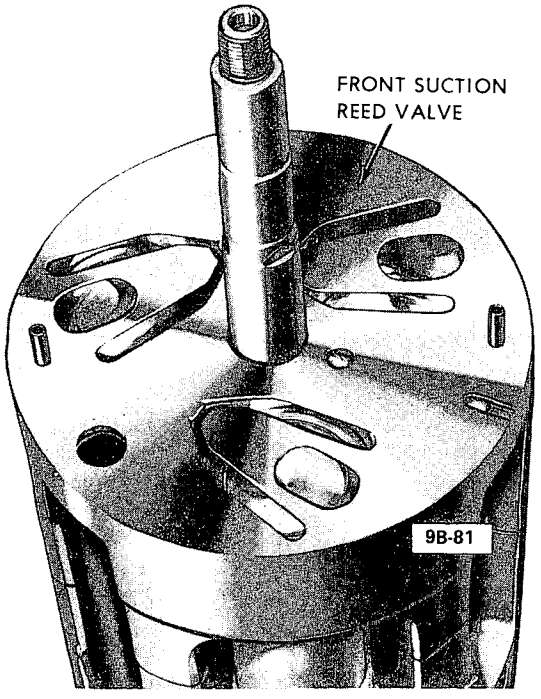


Figure 9B-107 Front Suction Valve Reed Disc Installed - 6 Cylinder Compressor

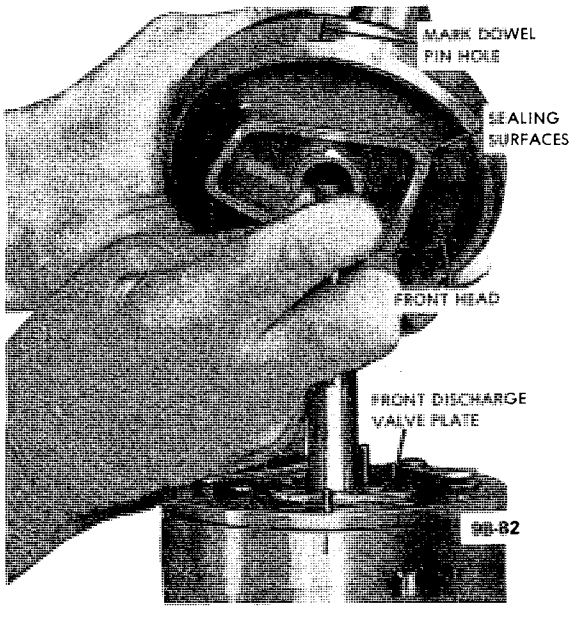


Figure 9B-108 Placing Front Head on Cylinder Assembly - 6 Cylinder Compressor

7. Reassemble, as a unit, cylinder assembly and front head into the shell. See Figure 9B-111. Extreme care must be used to prevent shell to head "O" ring seal from being damaged.

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.

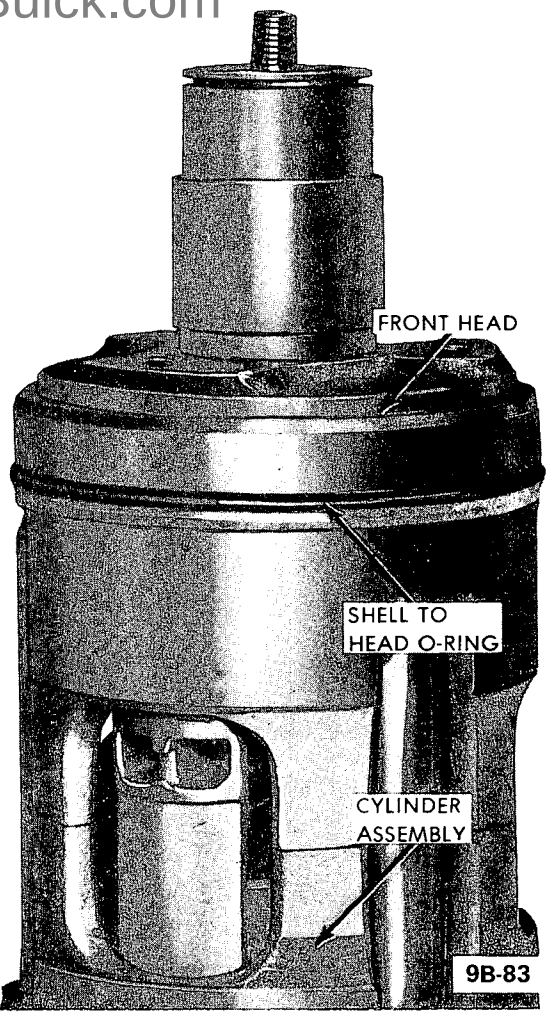


Figure 9B-110 Shell to Front Head O Ring Installation - 6 Cylinder Compressor

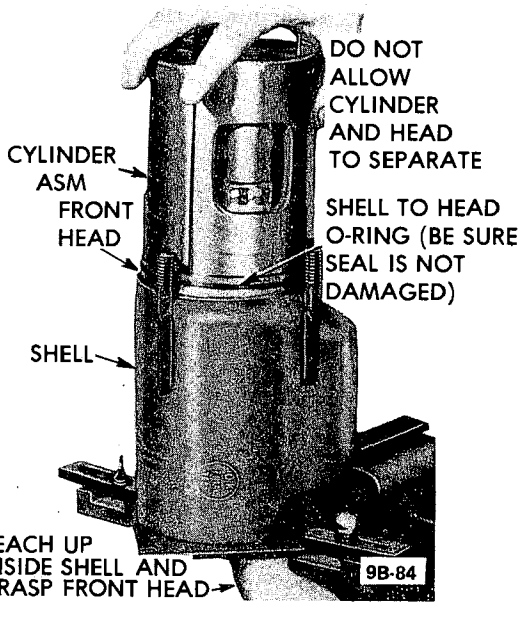


Figure 9B-111 Installing Front Head and Cylinder Assembly in Shell - 6 Cylinder Compressor

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 9B-112.

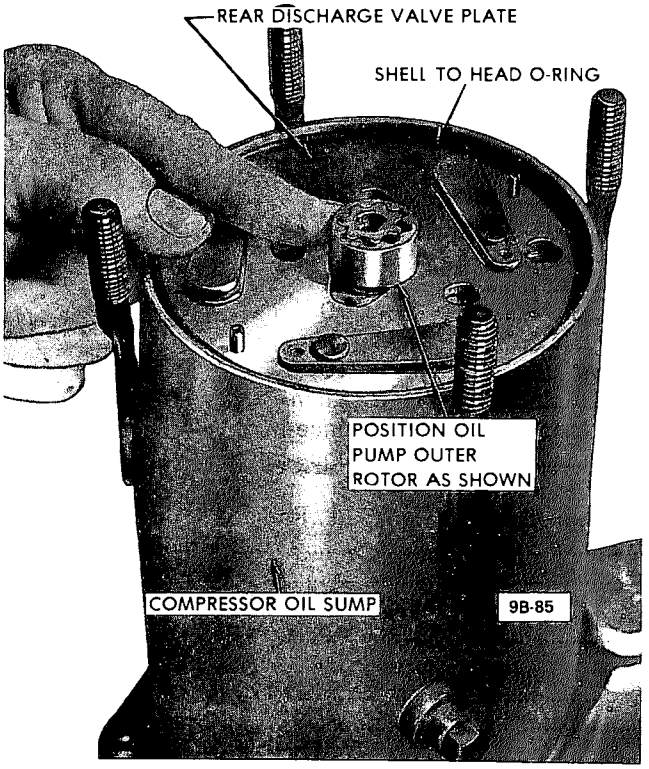


Figure 9B-112 Positioning Oil Pump Outer Rotor - 6 Cylinder Compressor

5. Generously coat with No. 525 viscosity oil new shell to head "O" ring and install in shell (see Figure 9B-112).

6. Coat sealing surface 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.

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 9B-113).

7. Assemble new nuts to threaded shell studs and torque to 20 lb.ft. 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. Assemble shaft seal onto compressor shaft (ref. to Disassembly and Reassembly of Clutch Drive Plate and Shaft Seal"). Do not reassemble clutch drive plate at this time.

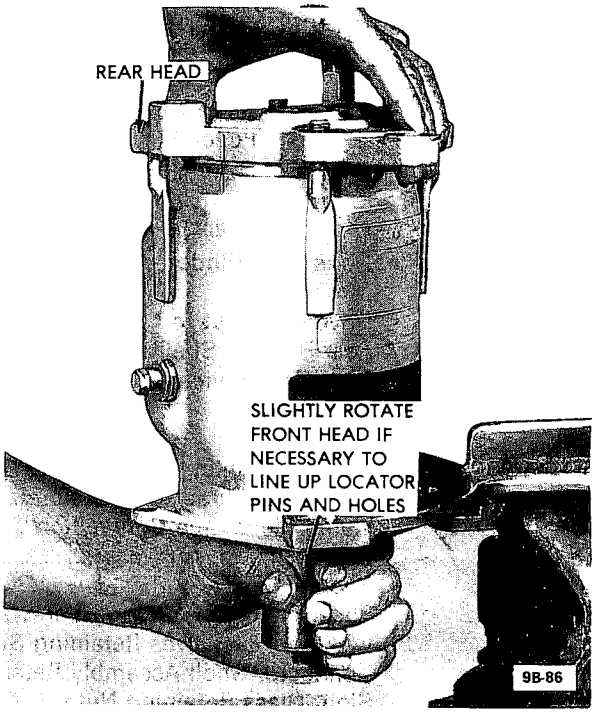


Figure 9B-113 Installing Rear Head - 6 Cylinder Compressor

Leak Testing Compressor

1. After the shaft seal pressure test (ref. to "Disassembly and Reassembly of Clutch Drive Plate and Shaft Seal") has been performed, change the test circuit to the configuration shown in Figure 9B-114.

2. With hose attached only to high pressure side of Leak Test Fixture J-9625, open high pressure valve to charge high pressure side of compressor. As soon as high pressure gage stabilizes reading, close valve. If high pressure gage drops back immediately when valve is closed, an internal leak is indicated. Correct leak as necessary.

If an internal leak is indicated, the leak may exist about the head sealing surface, discharge tube, shell to head "O" rings, or suction valve reed discs.

3. Remove drain screw from shell and add No. 525 viscosity oil as specified in "Adding Oil to the System".

4. Reassemble pulley assembly, and coil and housing assembly onto hub of front head (ref. to "Disassembly and Reassembly of PUlley Assembly, Coil and Housing Assembly").

5. Complete reassembly by installing clutch drive plate onto hub of front head (refer to "Disassembly and Reassembly of Clutch Drive Plate and Shaft Seal"). See Figure 9B-121 disassembled view of compressor.

SPECIFICATIONS

TIGHTENING SPECIFICATIONS RADIAL 4 COMPRESSOR

Part	Location	Torque Lb. Ft./In.
Nut	Shaft Nut	8-12 Lb. Ft.
Screw	Pulley Rim	100 Lb. In.
Screw	Front Head	18-22 Lb. Ft.
Pressure Relief Valve	Rear of Compressor	10-14 Lb. Ft.

Tightening Specifications - 6 Cylinder Compressor

Part	Location	Torque Lb.Ft.
Nut	Drive Plate Nut to Compressor Shaft	15
Nut	Rear Head to Shell	21
Cap	Schrader Service Valve	5

Tightening Specifications V.I.R.

Part	Location	Torque Lb. Ft.
Nut	Evaporator Inlet Connection	18
Nut	Evaporator Outlet Connection	31
Nut	Liquid Bleed Line Connection	6
Nut	Liquid Line to VIR	12
Nut	Suction Line to VIR	31
Screw	Receiver Shell Mounting Screws	10
Screw	POA and TX Valves Retaining Screws	6
Screw	Connector Shell Assembly Retaining Screws	10
Nut	Sight Glass Retaining Nut	23 Lb.In.
Valve Core	Liquid Bleed Valve Core	30 Ounce In.
Valve Core	Evaporator Gage Valve Core	30 Ounce In.

COMPRESSOR SPECIFICATIONS RADIAL 4

Type ..... Radial 4 Cylinder
Make ..... Frigidaire
Effective Displacement (Cu. In.) 10.0
Oil ..... 525 Viscosity
Oil Content (New) ..... 5.5—6.5 Ounces
Air Gap Between Clutch Drive Plate and Rotor ..... 0.20 to 0.40 In.
Clutch Type ..... Magnetic
Belt Tension ..... Used 90—100 Lbs.
Belt Tension ..... New 120—130 Lbs.

Compressor Specifications - 6 Cylinder

Type ..... Six Cylinder Axial Opposed
Make ..... Frigidaire
Effective Displacement (Cu.In.) 12.6
Oil ..... 525 Viscosity
Oil Content (New) ..... 10 1/2 Fl.Oz.
Air Gap Between Clutch Drive Plate and Pulley ..... 0.022 to 0.057 In.
Clutch Type ..... Magnetic
Belt Tension ..... 100 Lbs.

Pipe and Hose Connection Torque Chart

Metal Tube Outside Dia.	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
5/8	7/8	30-35	21-27	1 1/16
3/4	1 1/16	30-35	28-33	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.

General Specifications

Type of Refrigerant ..... Refrigerant 12
Refrigerant Capacity (Fully Charged)
V-6 ..... 3 Lb.
V-8 ..... 3.75 Lb.

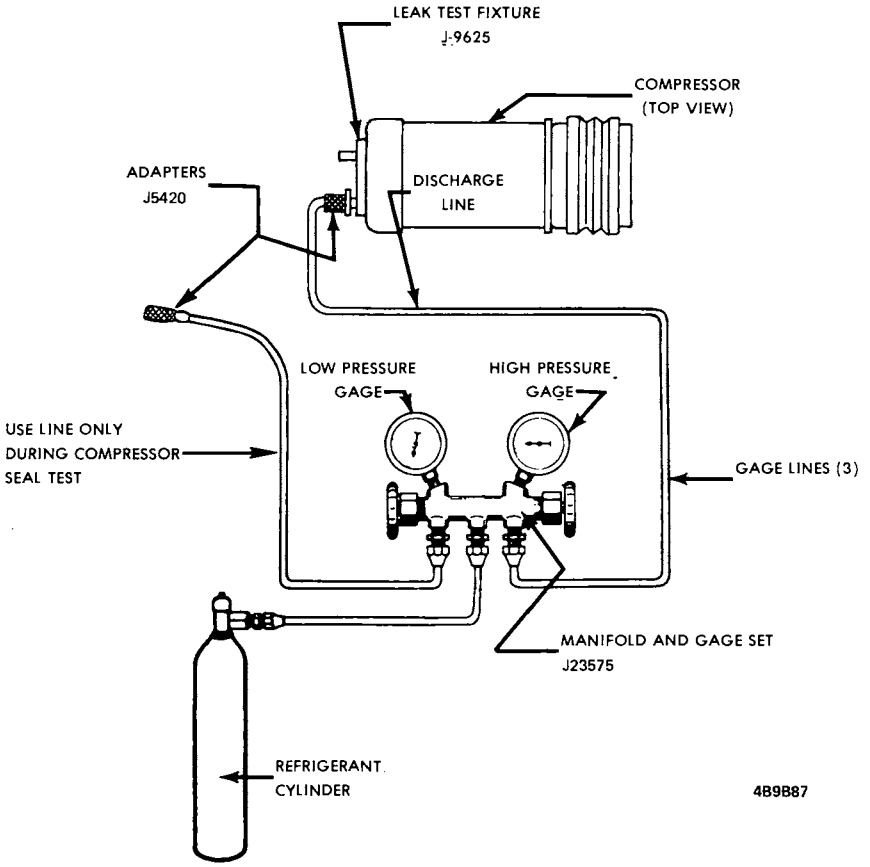


Figure 9B-114 Compressor Internal Leak Test - 6 Cylinder Compressor

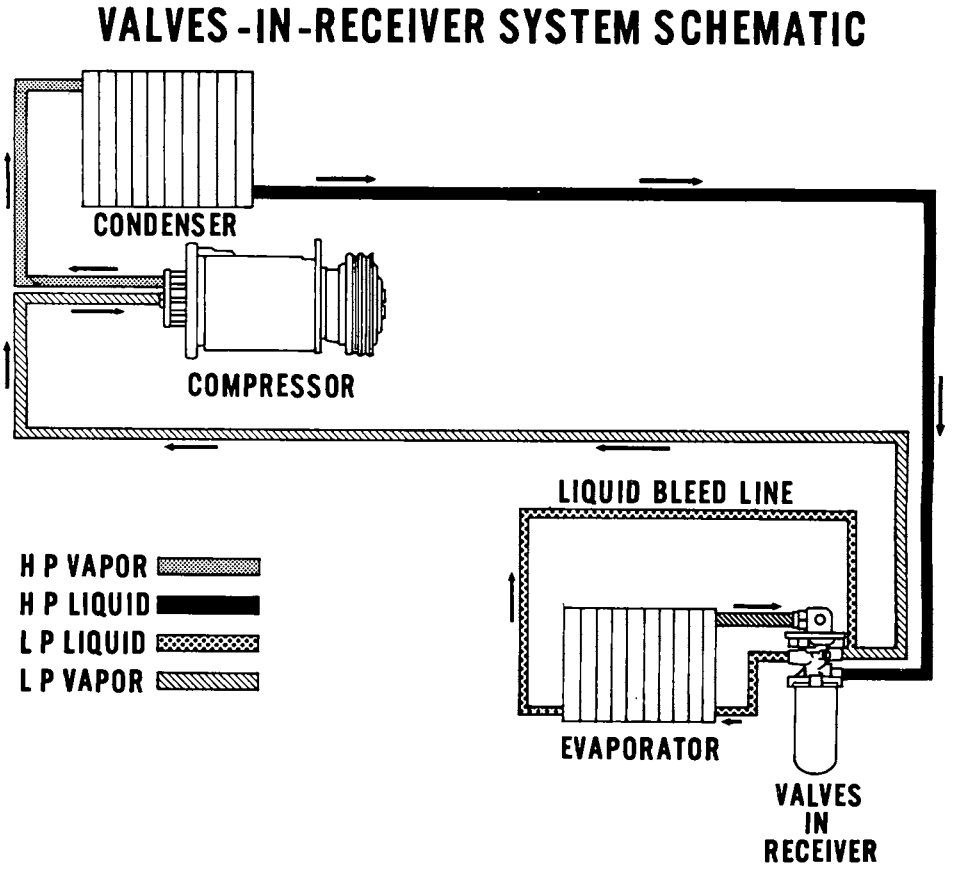


Figure 9B-115 Refrigeration Circuit - All Series

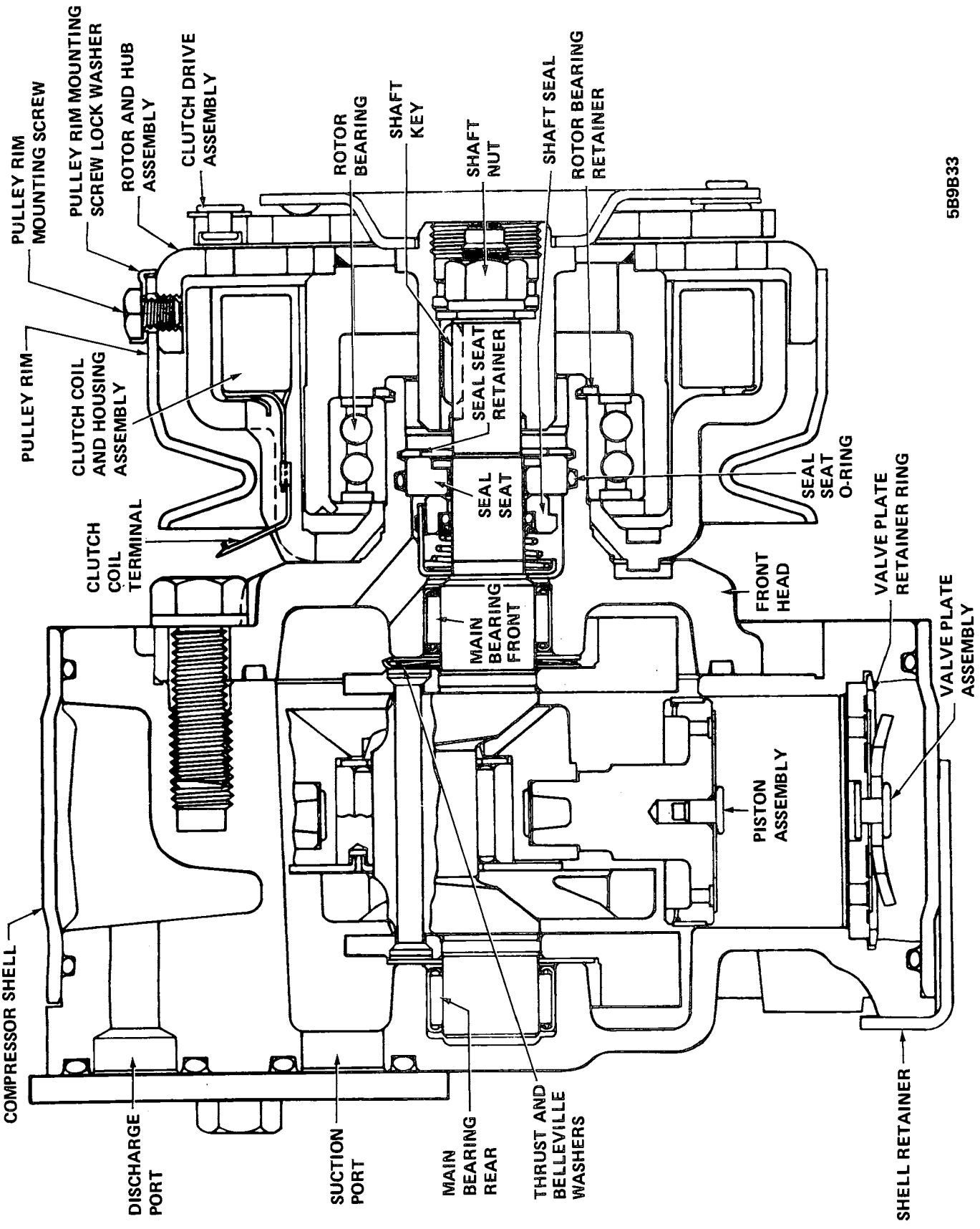


Figure 9B-116 - Radial 4-Cylinder Compressor-Cross Sectional View

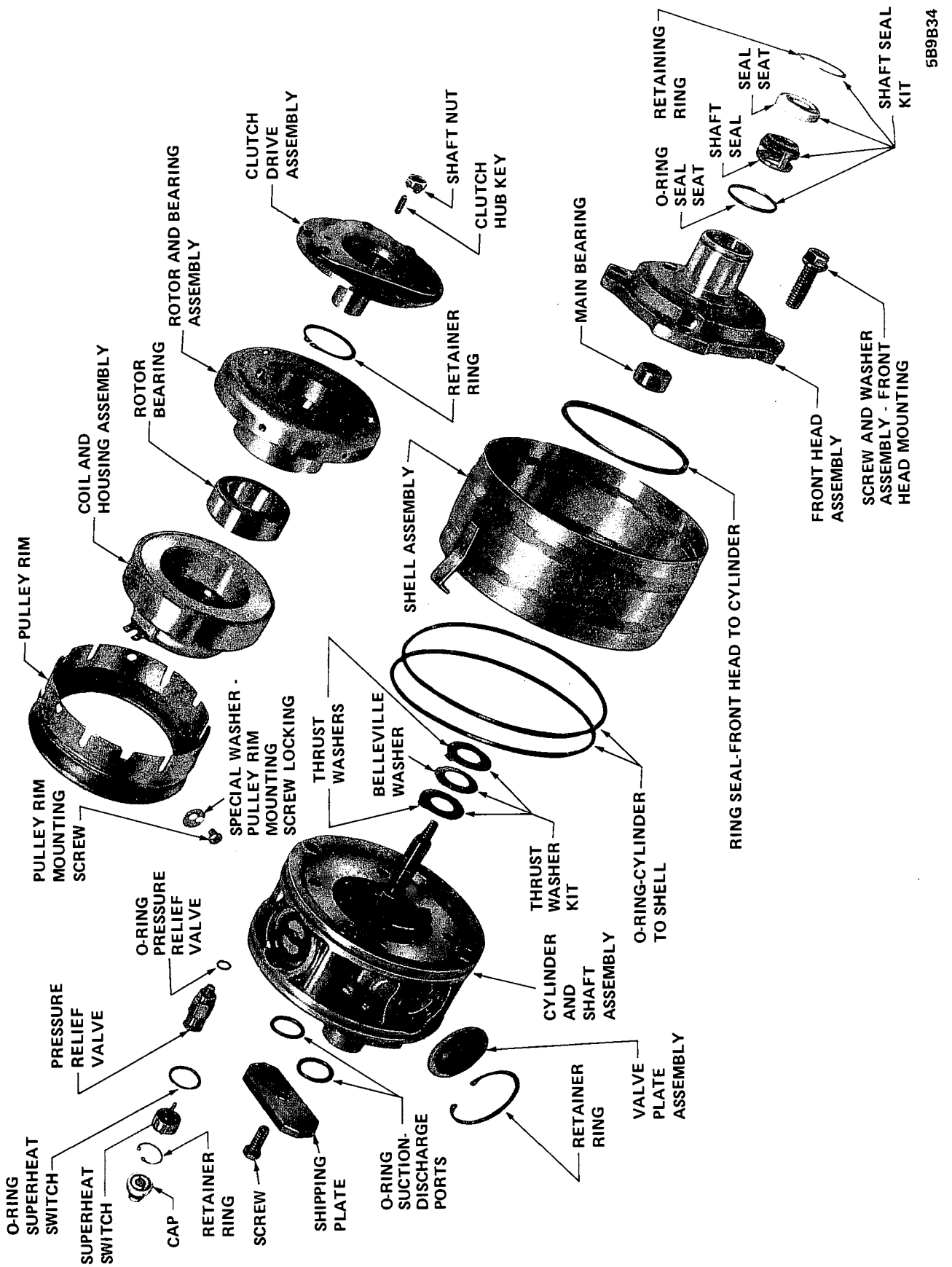


Figure 9B-117 - Radial 4-Cylinder Compressor-Exploded View

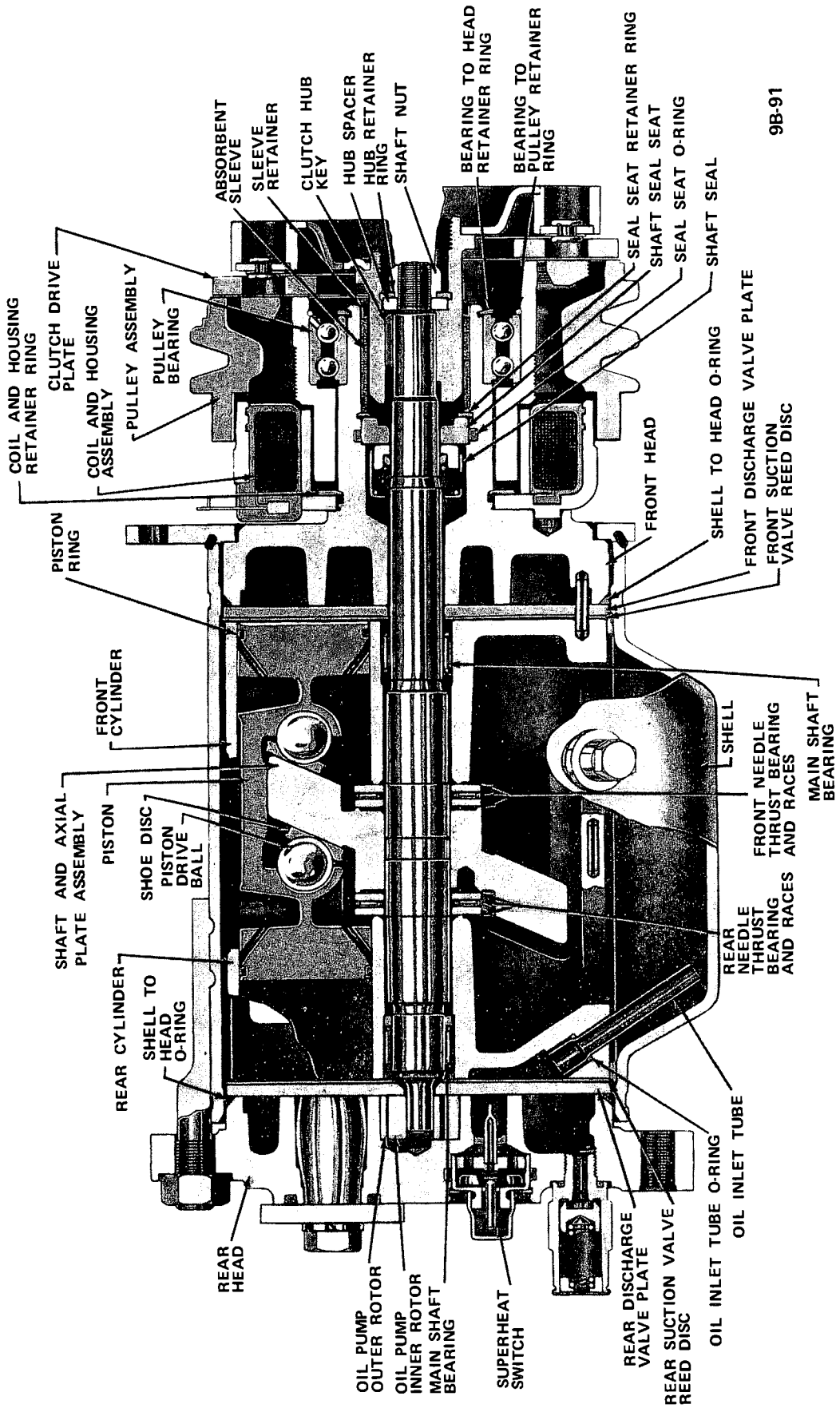


Figure 9B-118 Compressor - Section View - 6 Cylinder Compressor

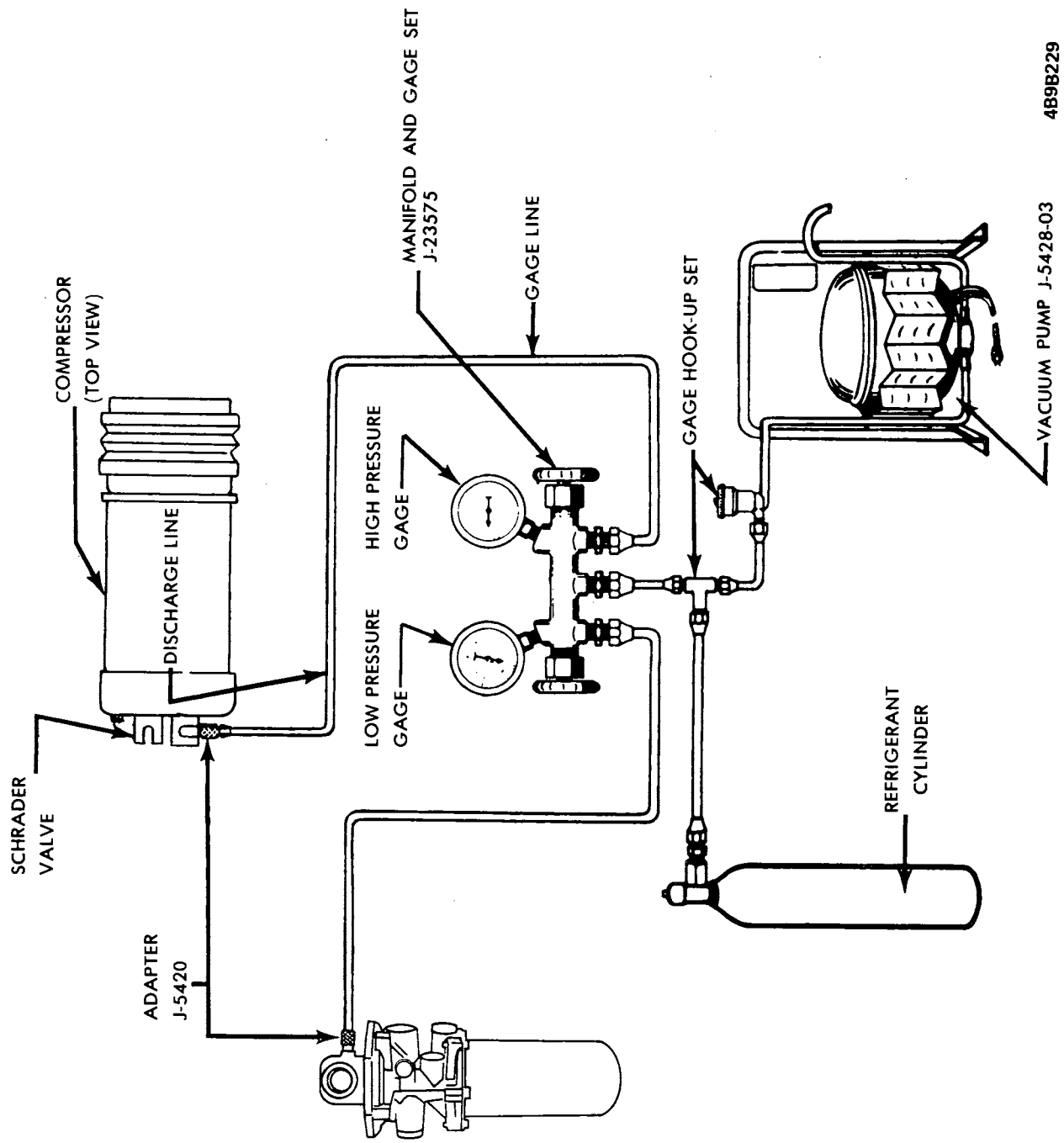


Figure 9B-120 Charging Air Conditioner System - A-B-C-E Series

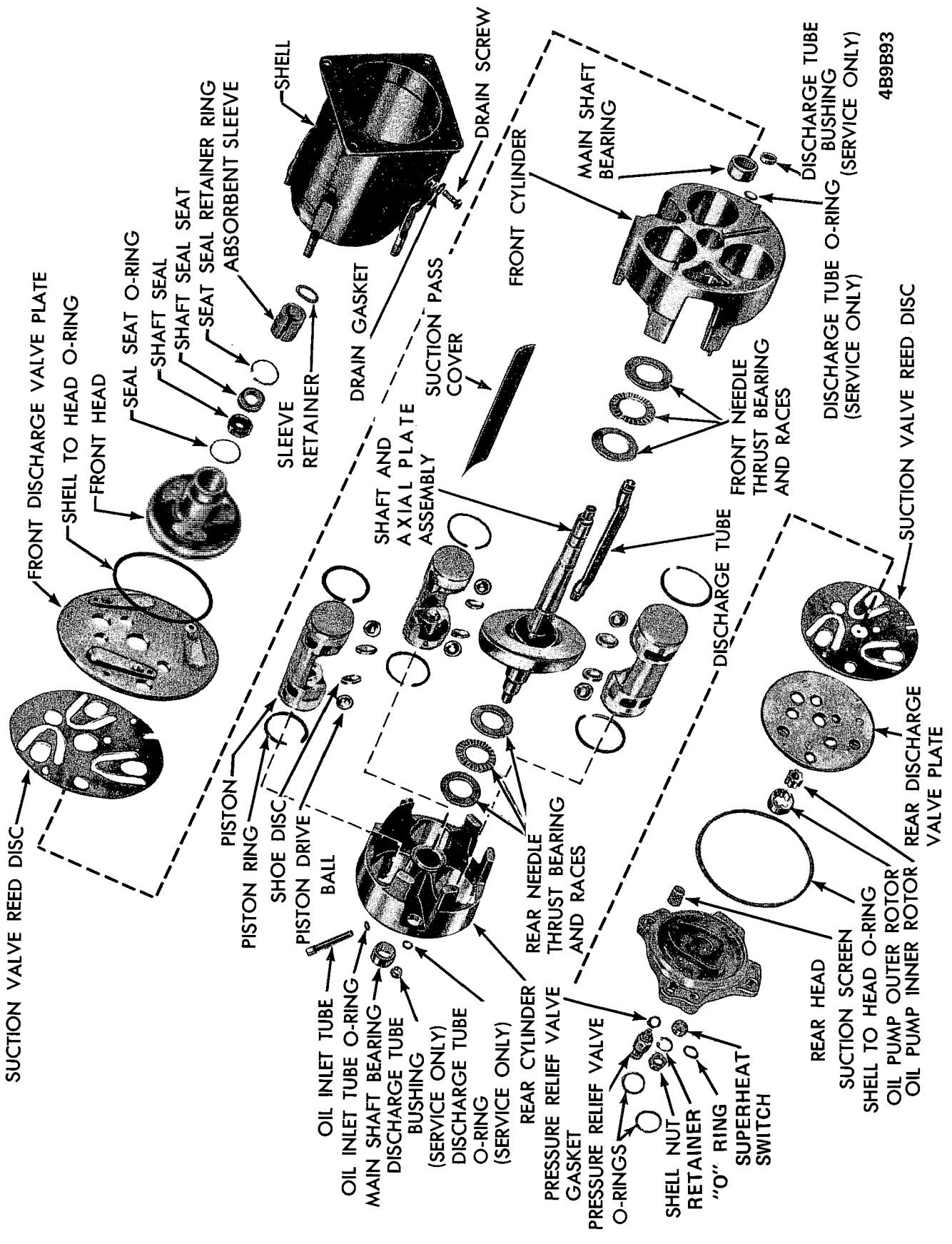


Figure 9B-121 Compressor - Exploded View

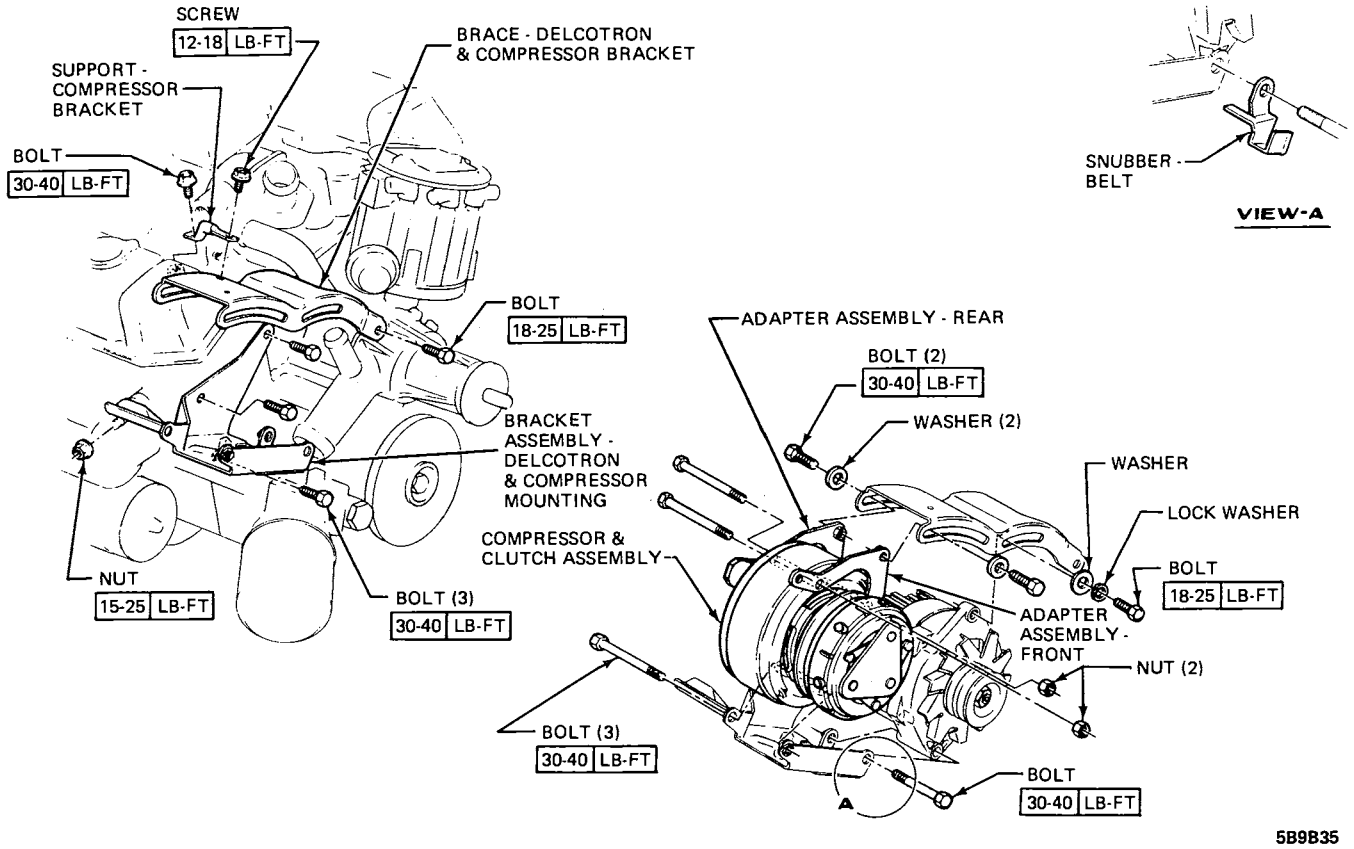


Figure 9B-125 - A/C Compressor Mounting - V-6 231 Engine - H Series

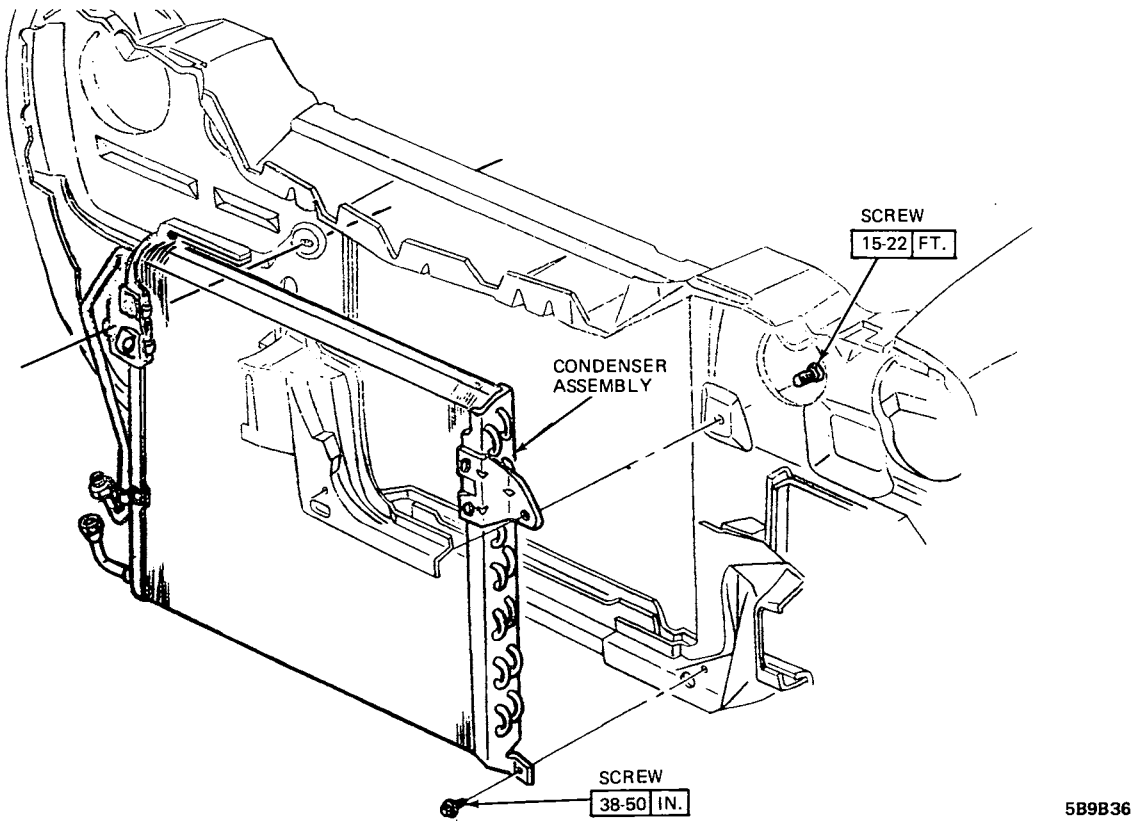


Figure 9B-126 - Condenser Assembly - H Series

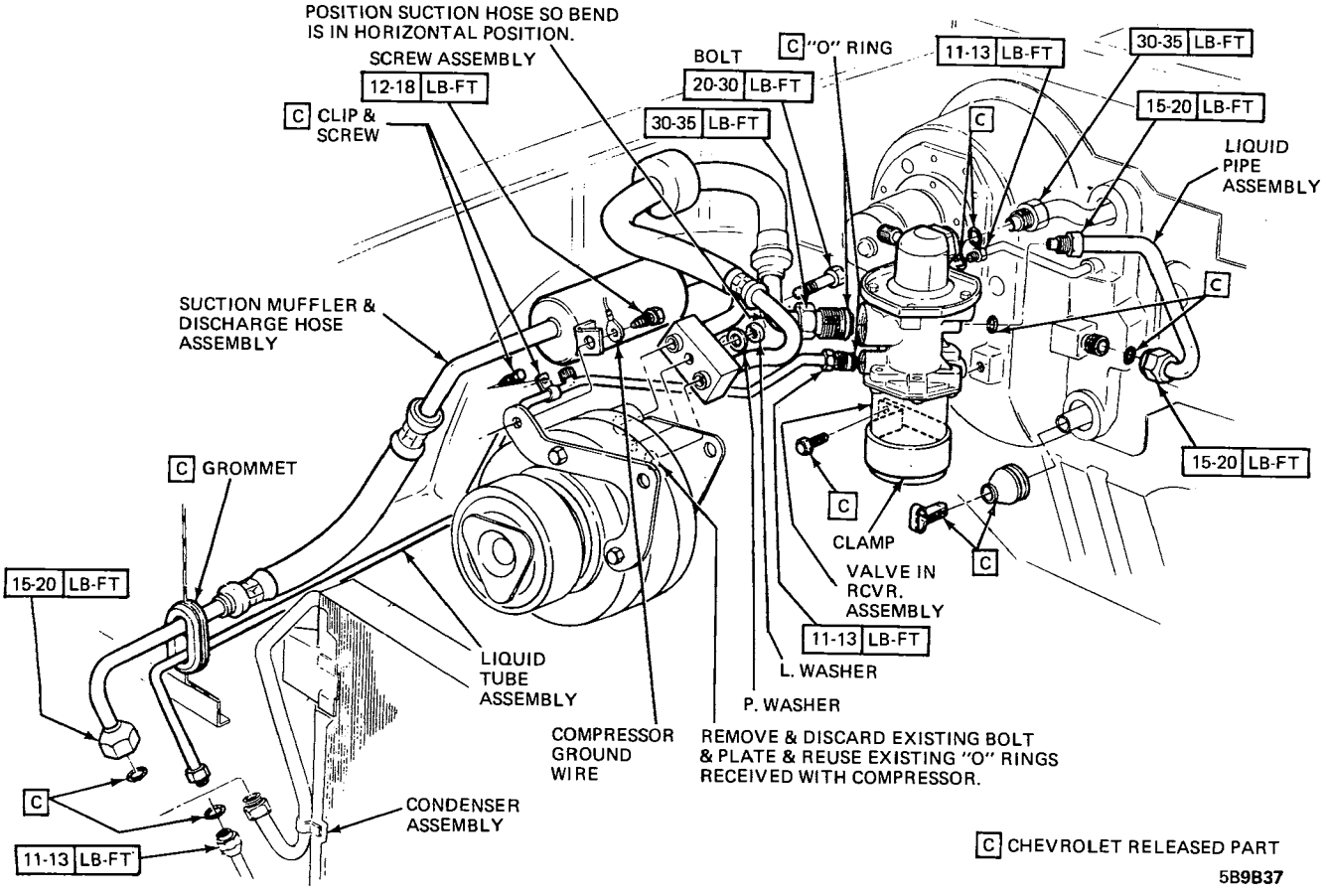


Figure 9B-127 - Refrigerant Hoses- V-6 231 Engine - H Series

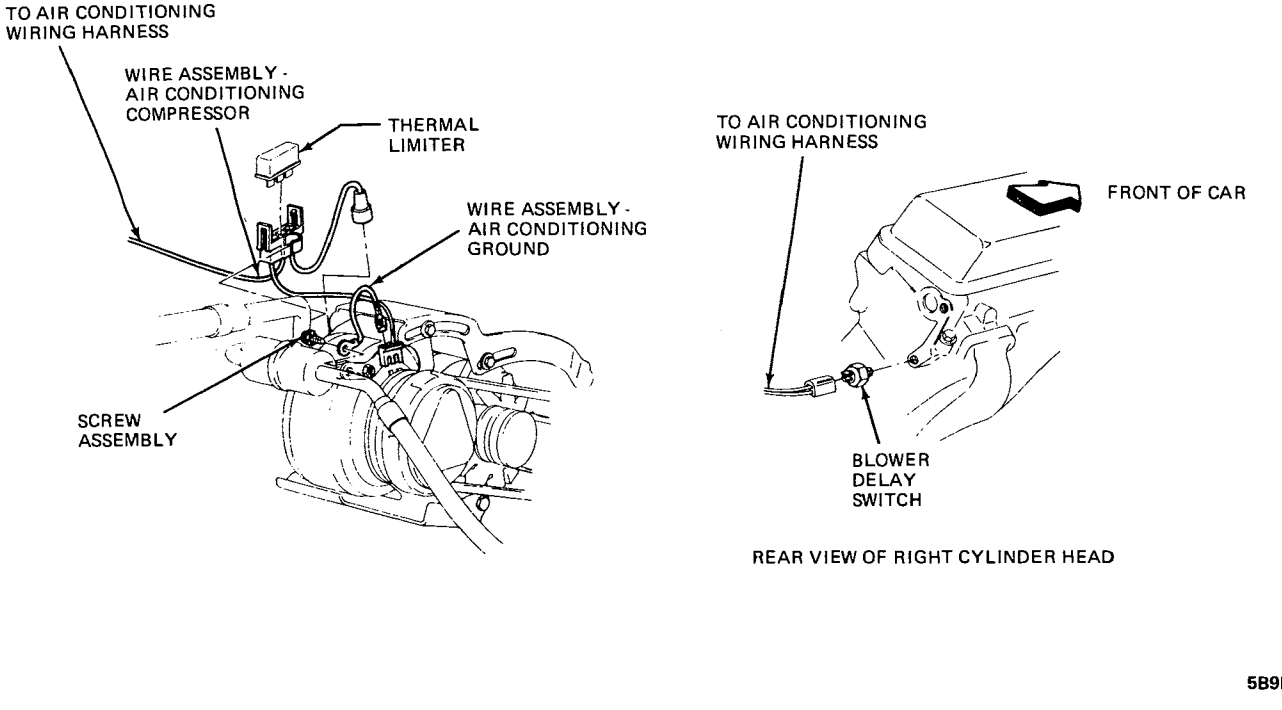


Figure 9B-128 - A/C Compressor Wiring - H Series

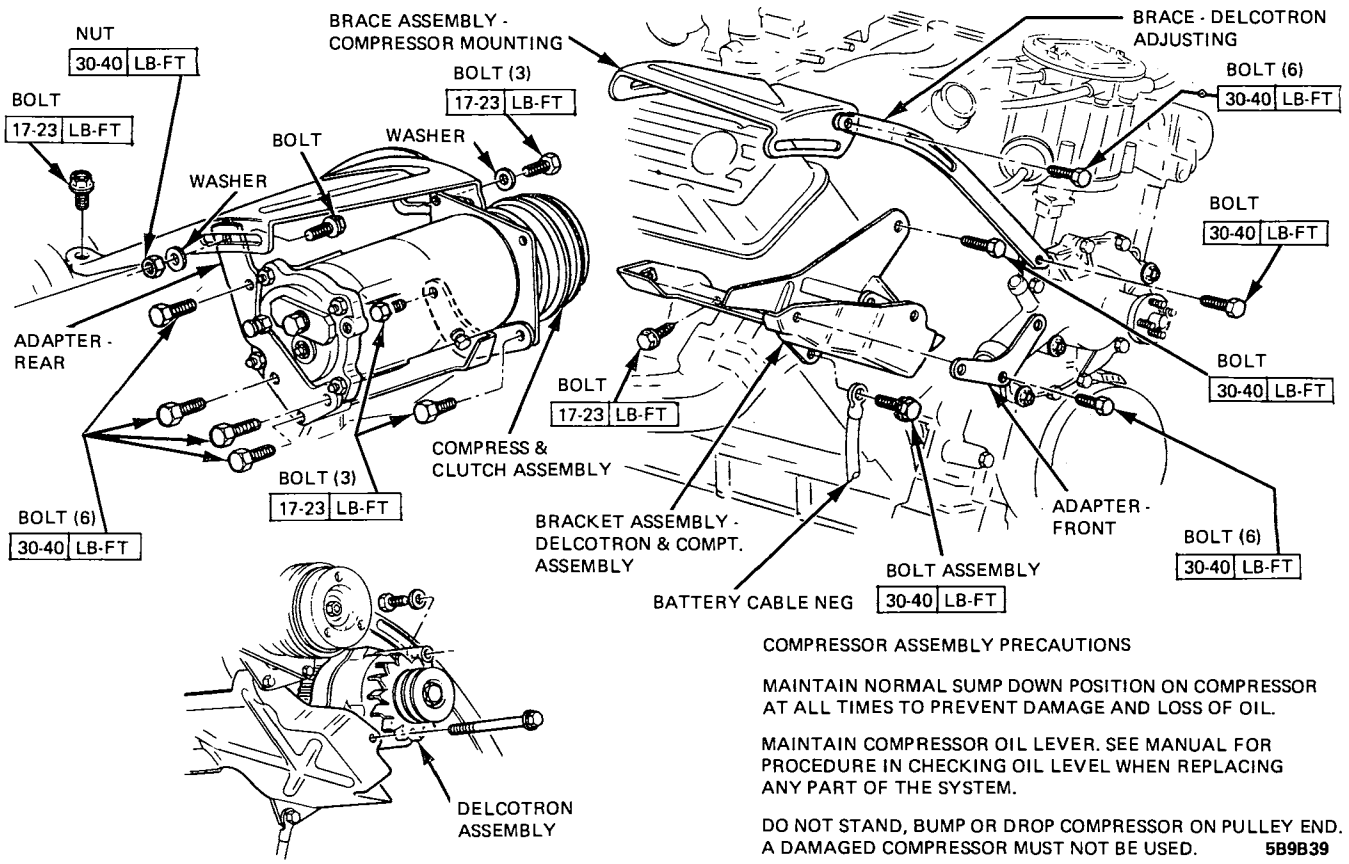


Figure 9B-130 - A/C Compressor Mounting - V-8 350 - X Series

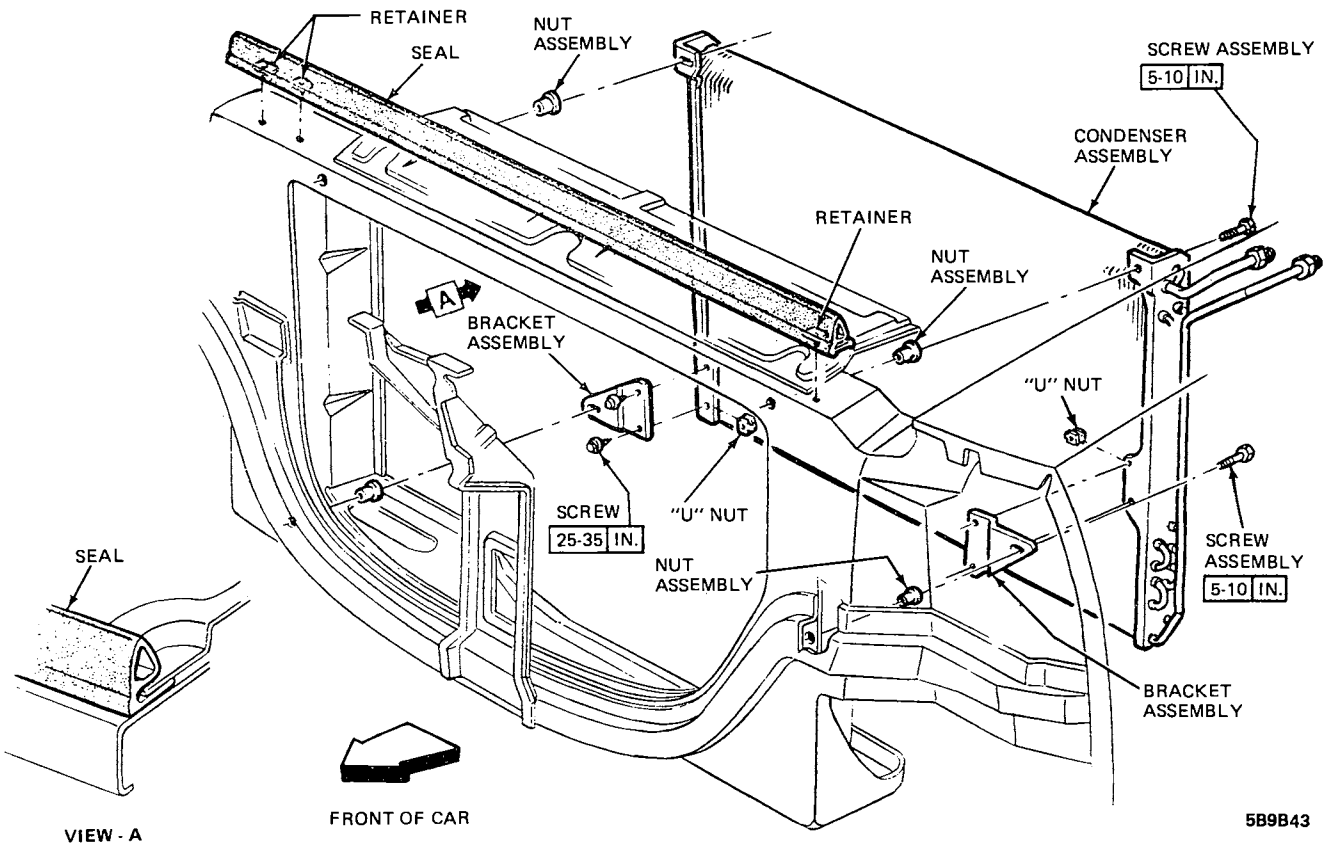


Figure 9B-131 - Condenser Mounting - X Series

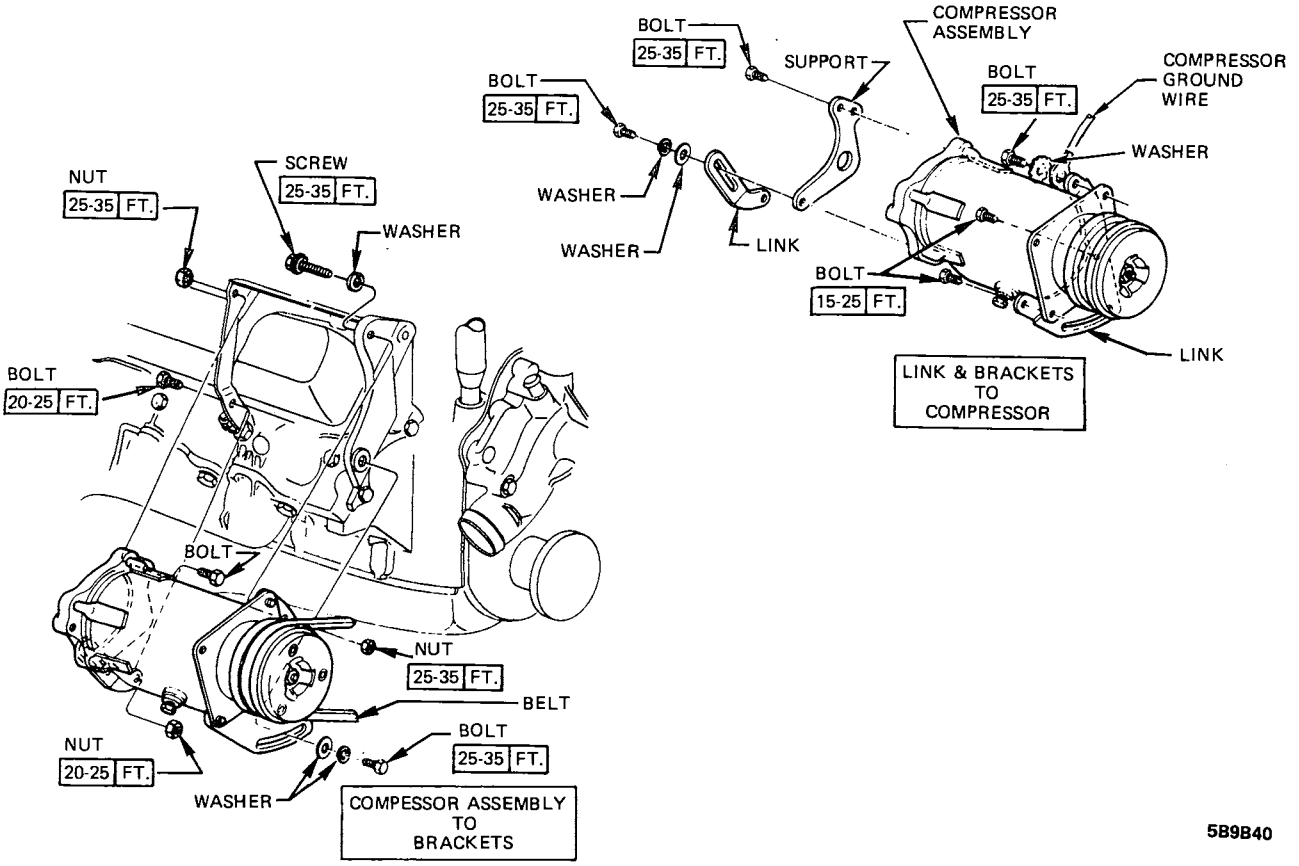


Figure 9B-132 - A/C Compressor to Brackets - V-8 260 - X Series

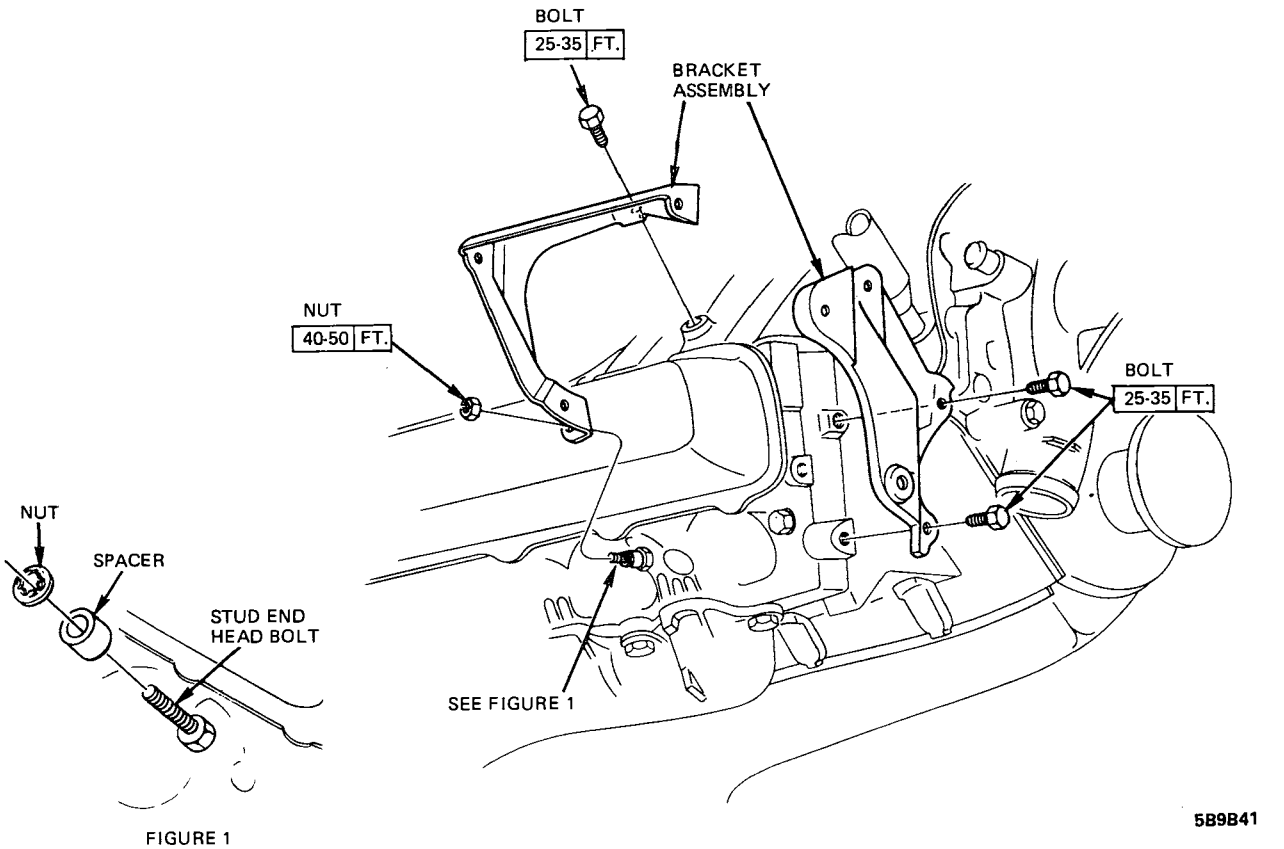


FIGURE 1

Figure 9B-133 - A/C Compressor Brackets to Engine - V-8 260 - X Series

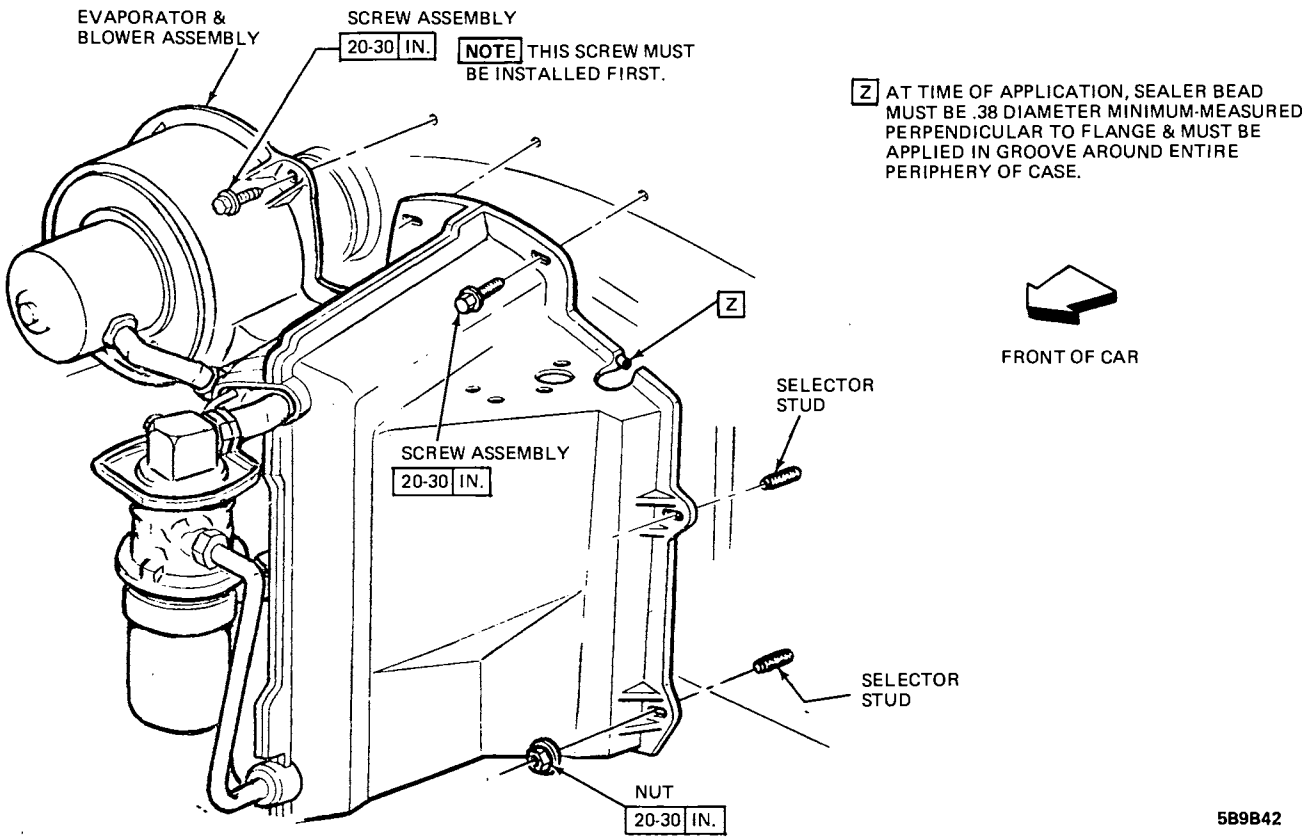


Figure 9B-134 - Evaporator and Blower Assembly - X Series

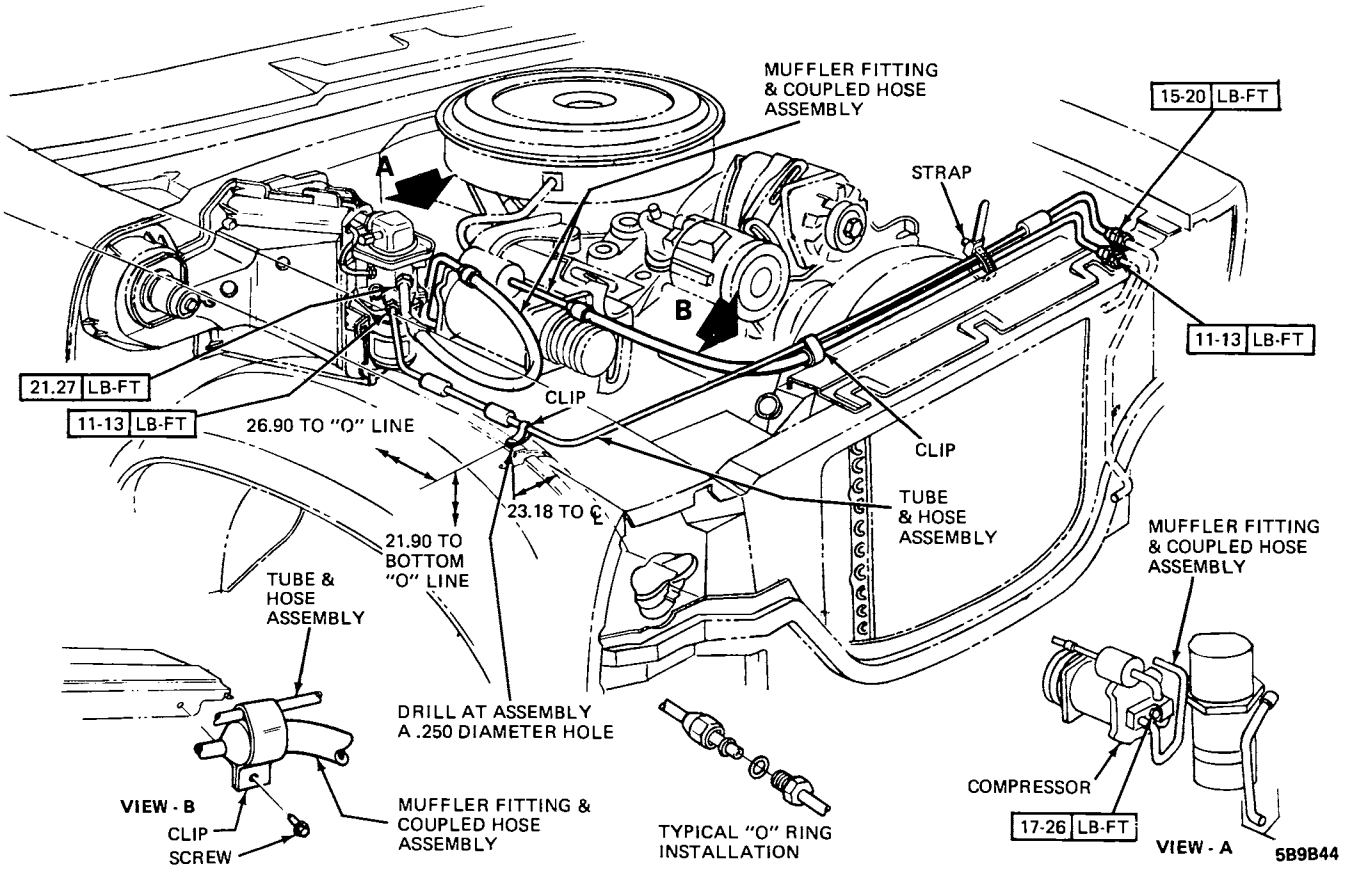


Figure 9B-135 - Refrigerant Hoses - V-8 260 & 350 Engines - X Series

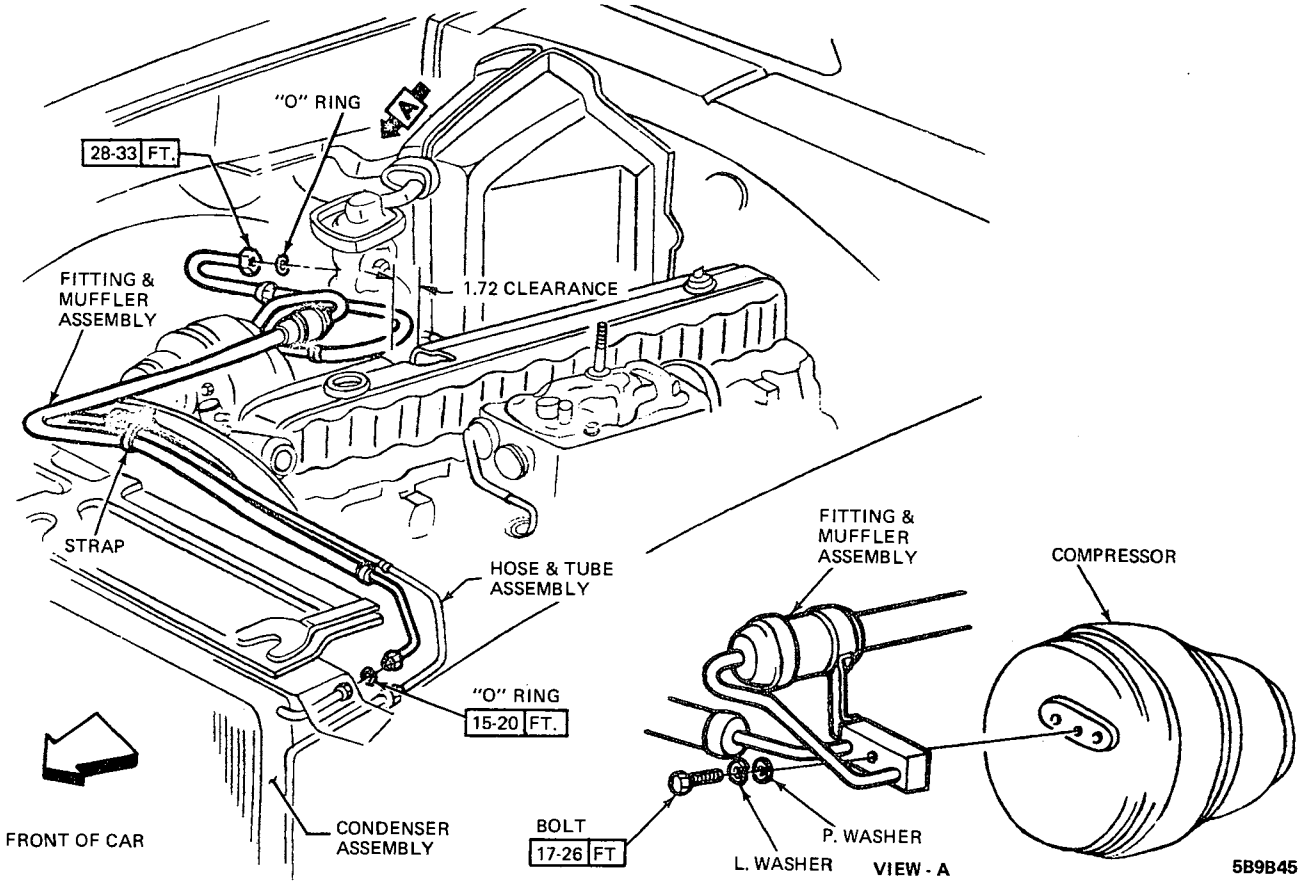


Figure 9B-136 - Fitting and Muffler Assembly - L-6 250 Engine - X Series

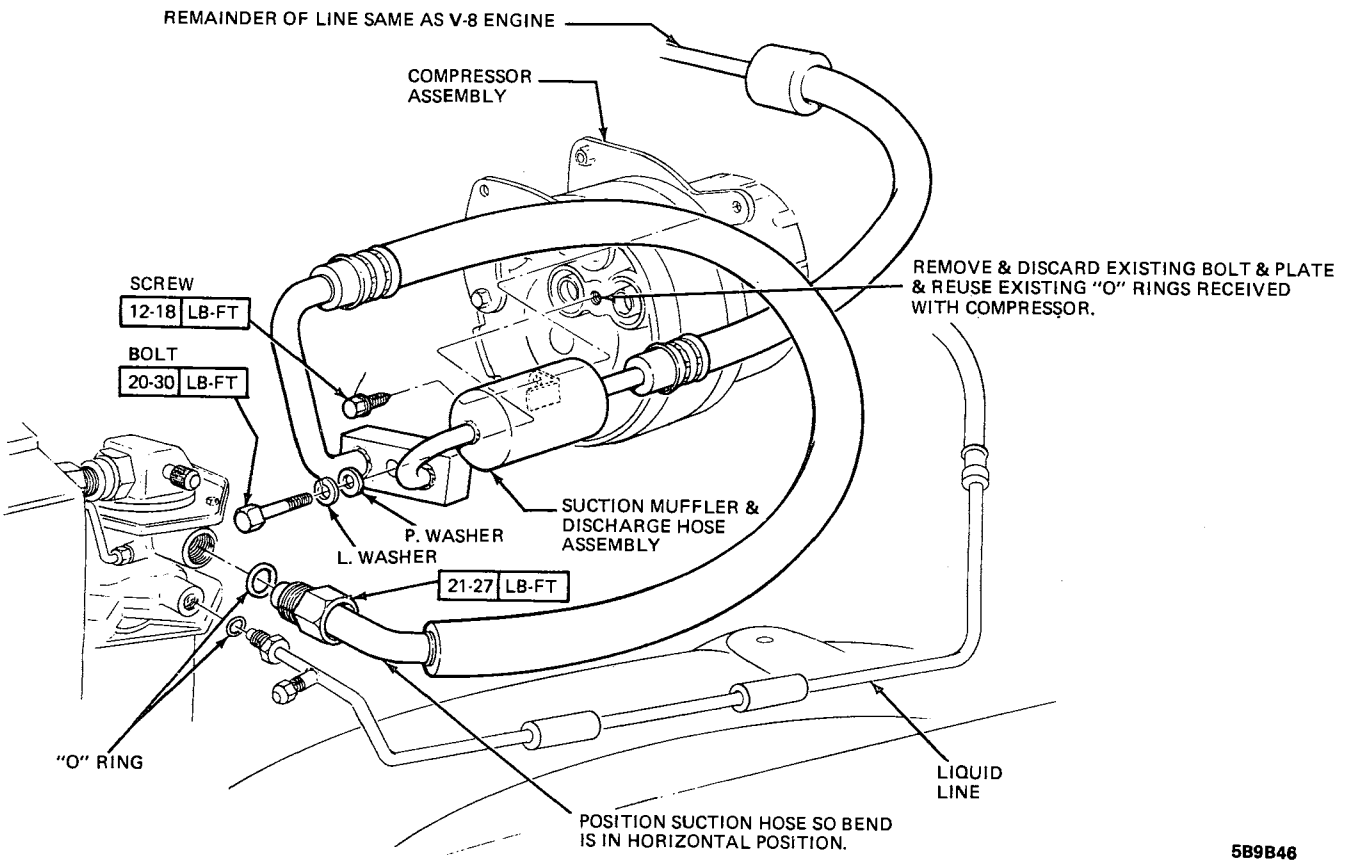


Figure 9B-137 - Refrigerant Hoses - V-6 231 Engine - X Series

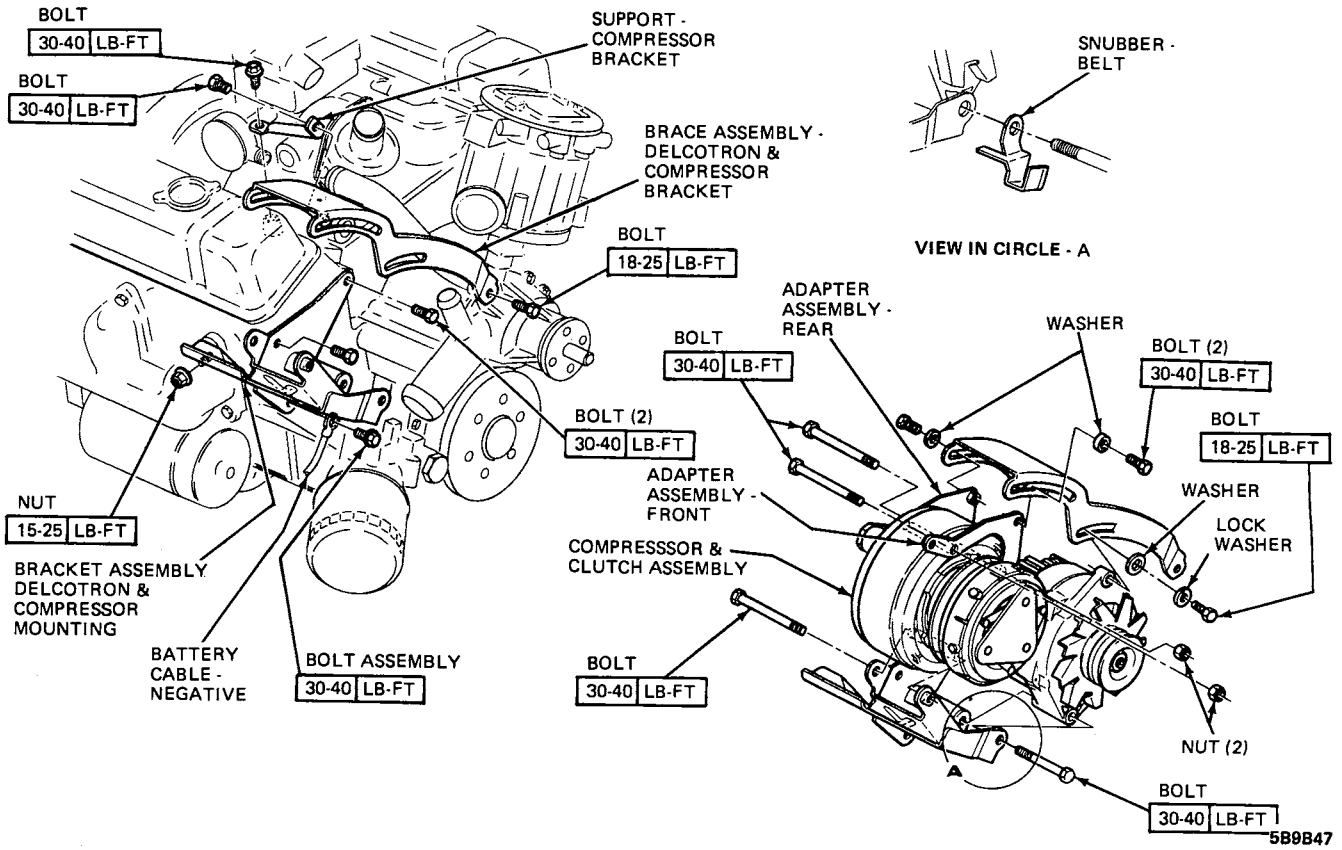


Figure 9B-138 - A/C Compressor Mounting - V-6 231 Engine - A, X Series

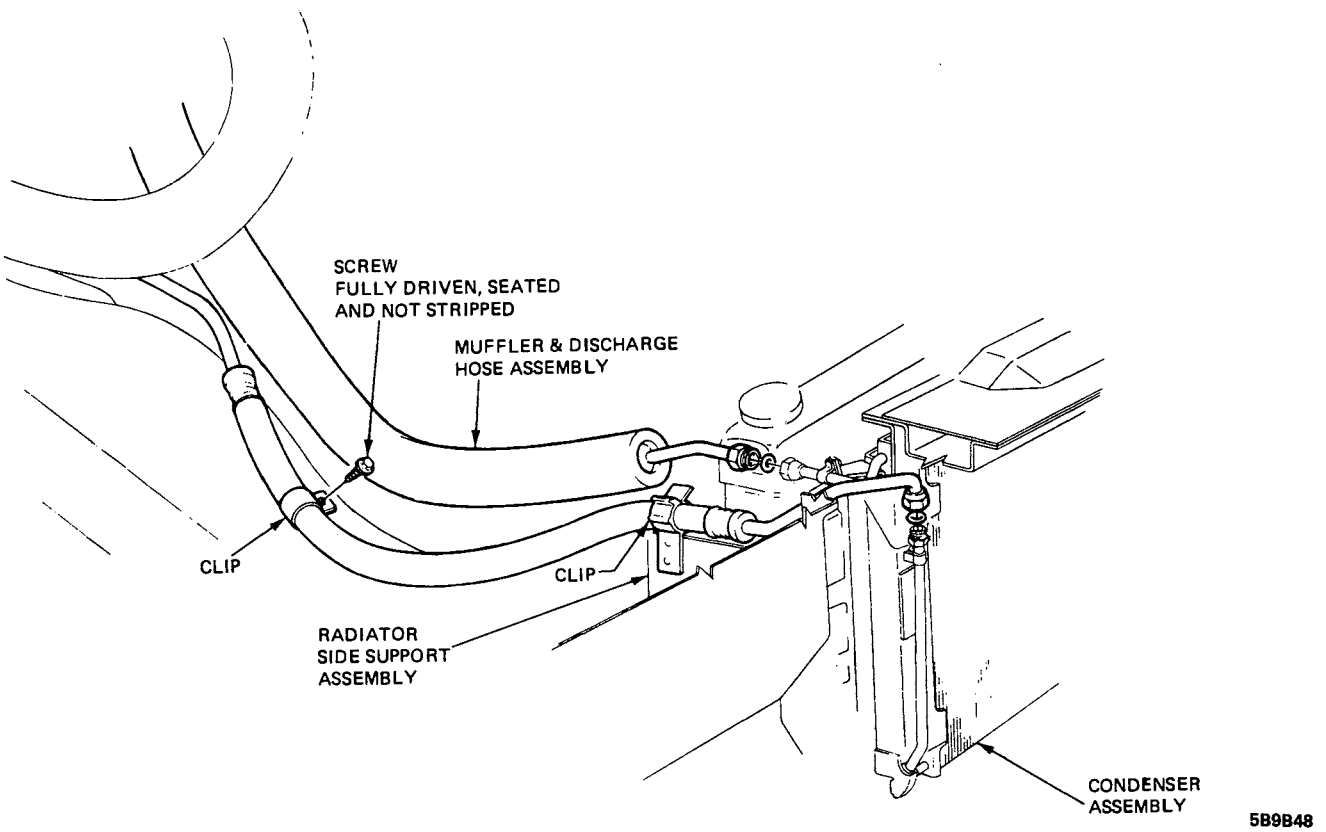


Figure 9B-140 - Discharge and Liquid Hose to Condenser - A Series

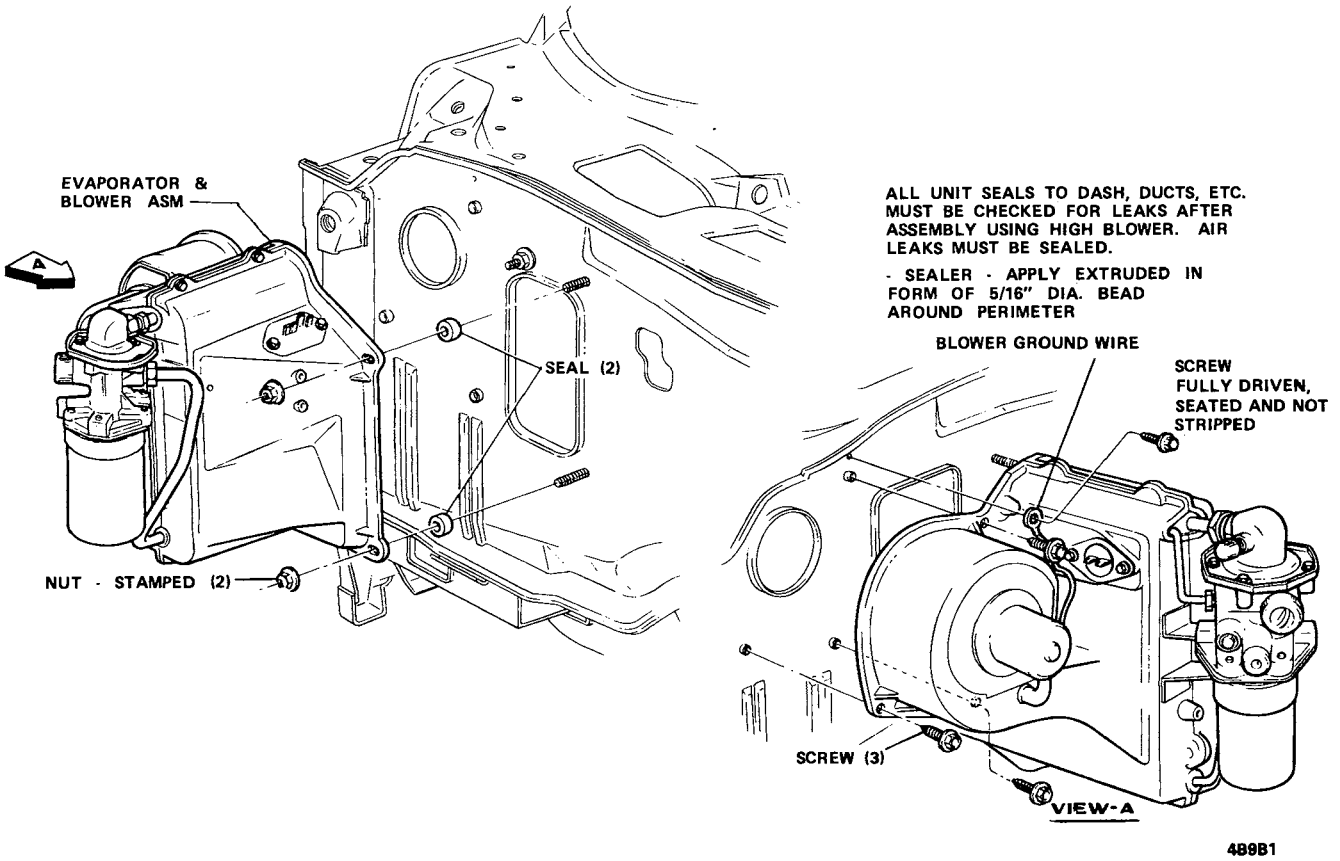


Figure 9B-141 - Evaporator and Blower Assembly - A Series

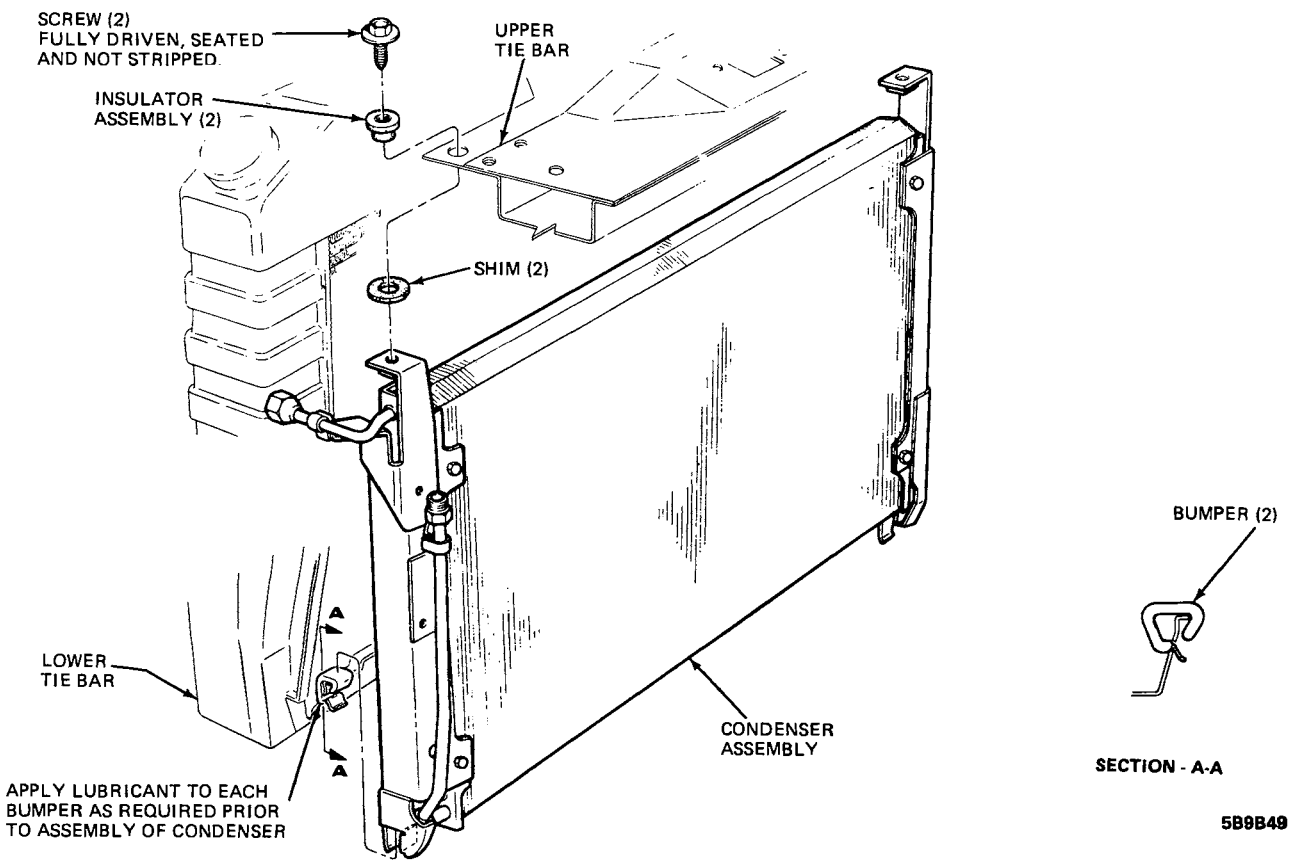


Figure 9B-142 - Condenser Mounting - A Series

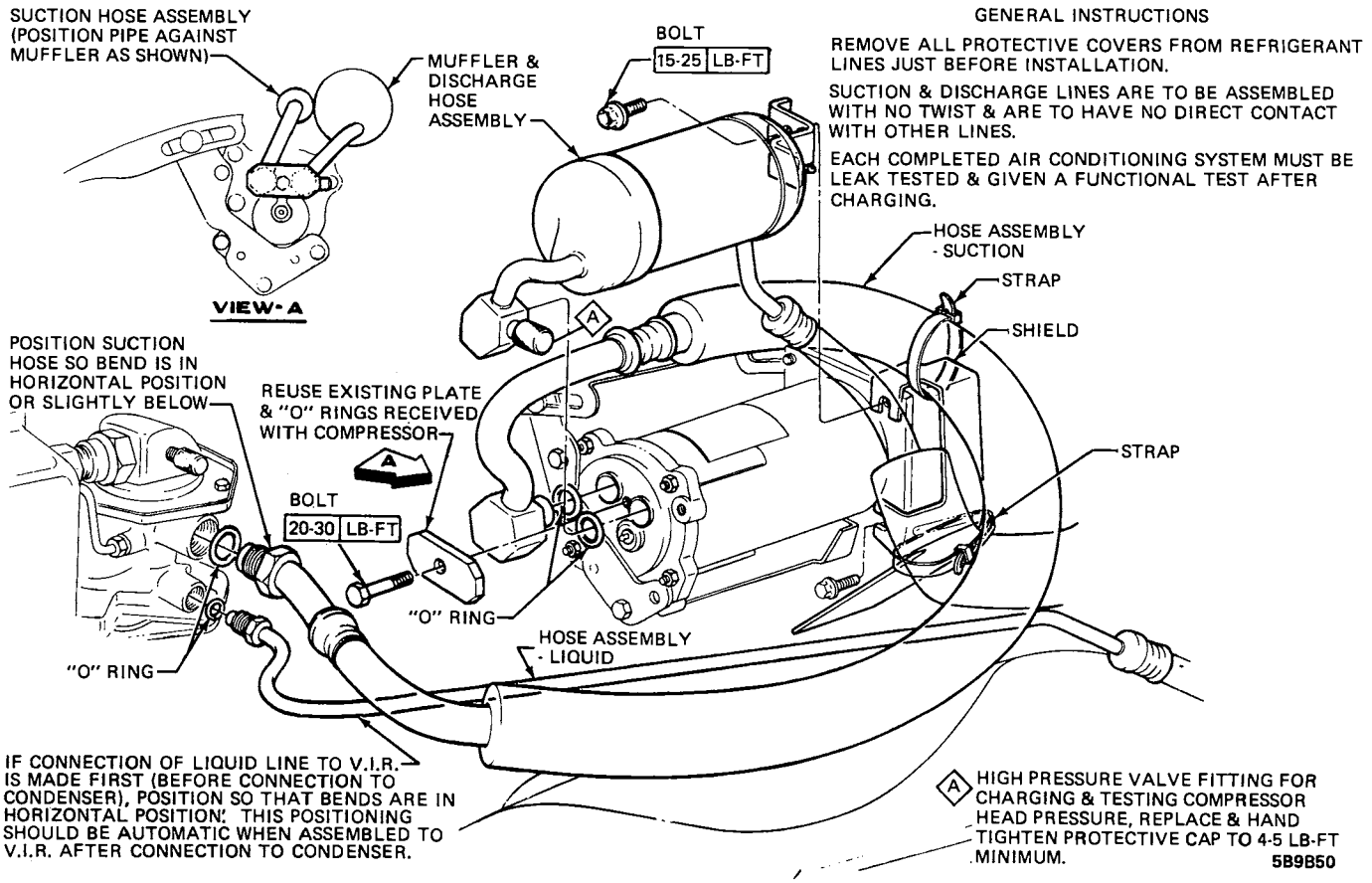


Figure 9B-143 - A/C Muffler - Discharge - Liquid and Suction Hoses - V-8 350 Engine - A Series

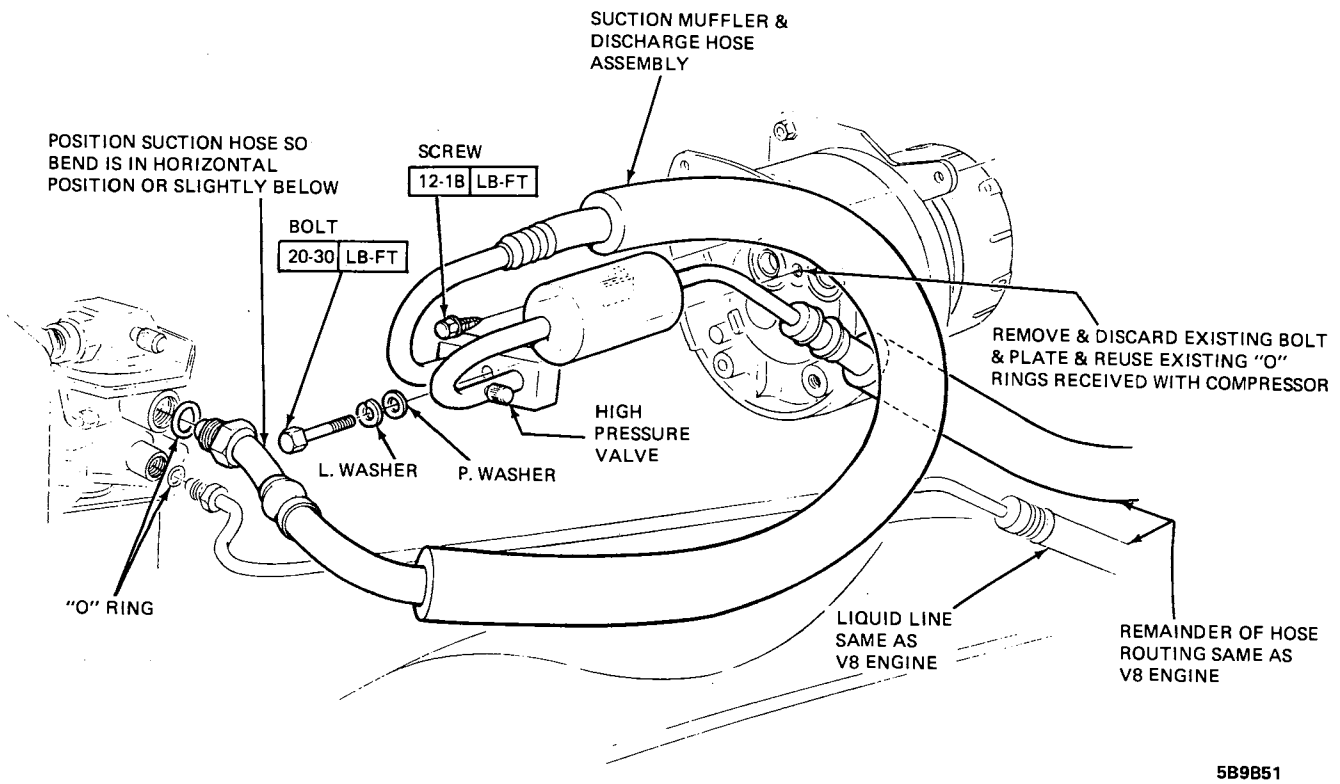


Figure 9B-144 - A/C Muffler - Discharge - Liquid and Suction Hoses - V-6 231 Engine - A Series

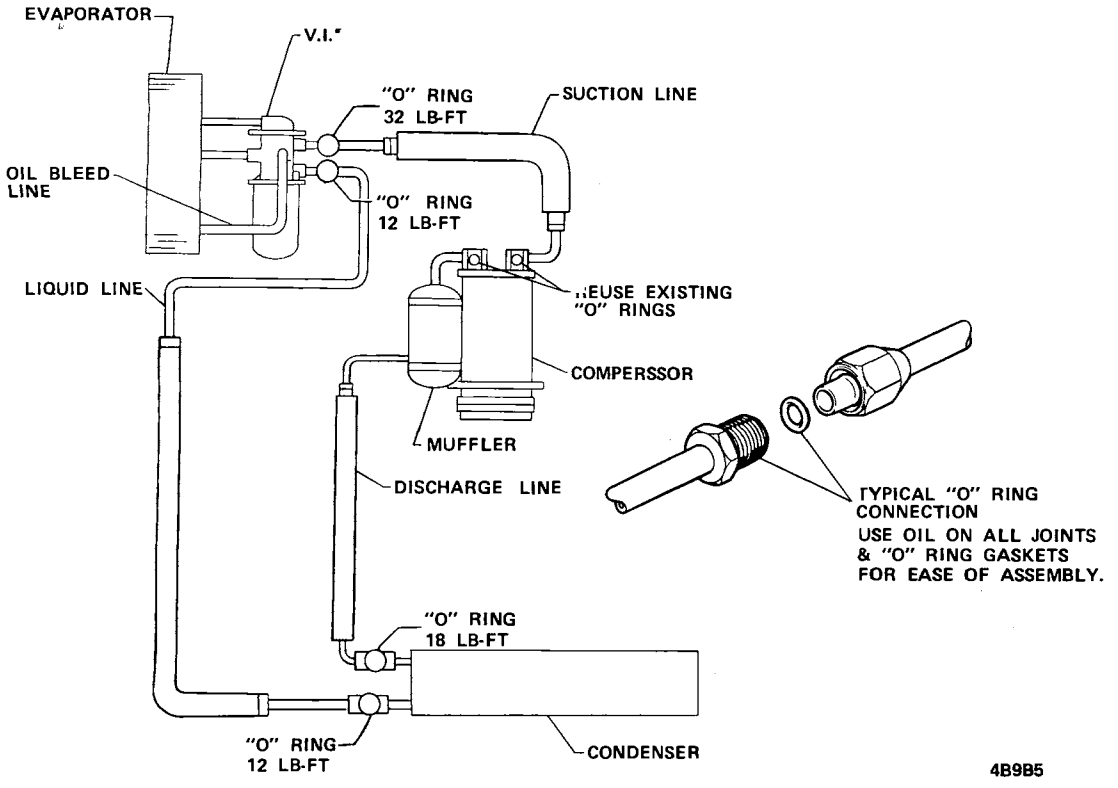


Figure 9B-145 - O-Ring Schematic - A Series

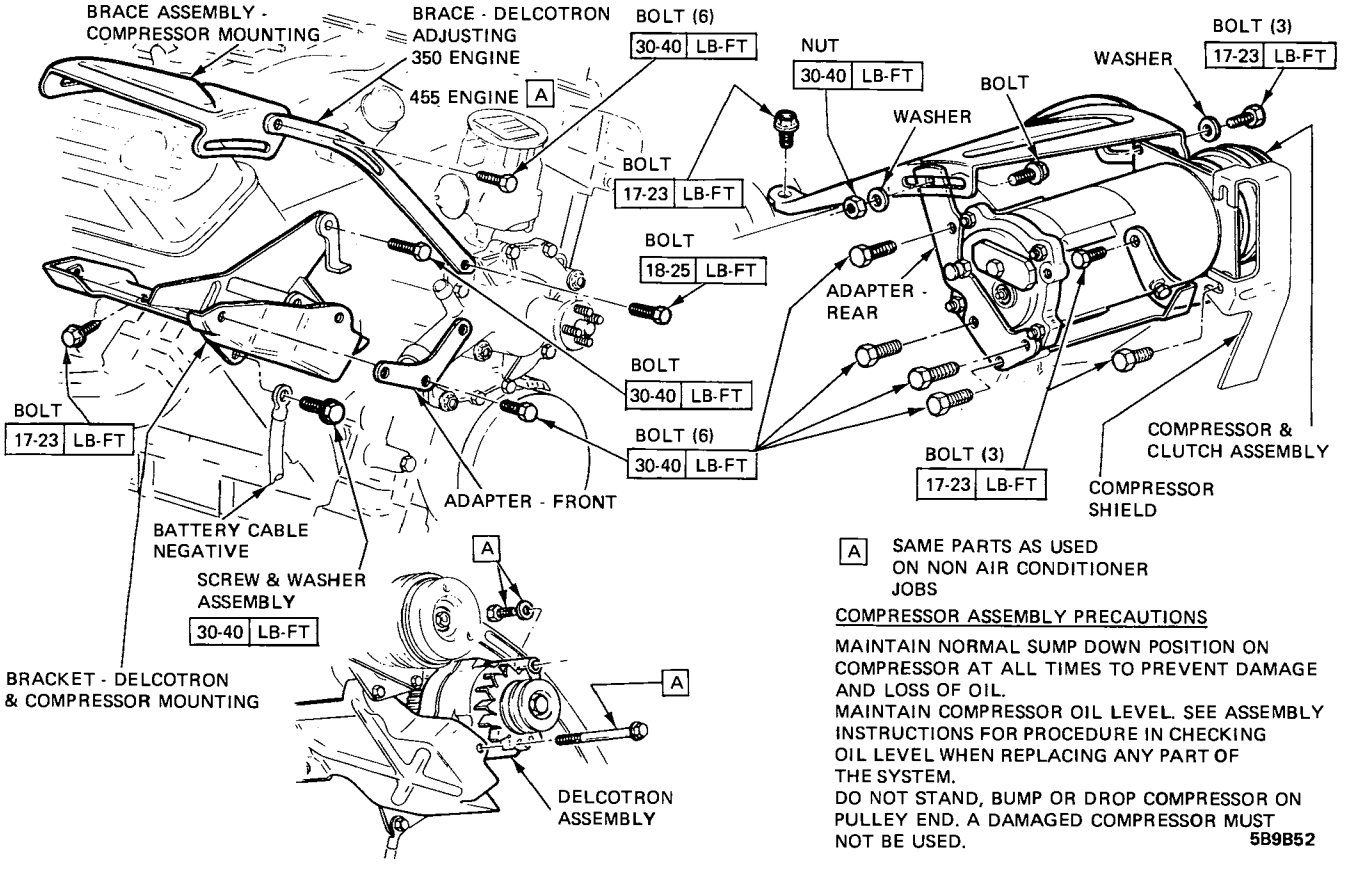


Figure 9B-146 - A/C Compressor Mounting - V-8 350-455 Engines - A-B-C-E Series

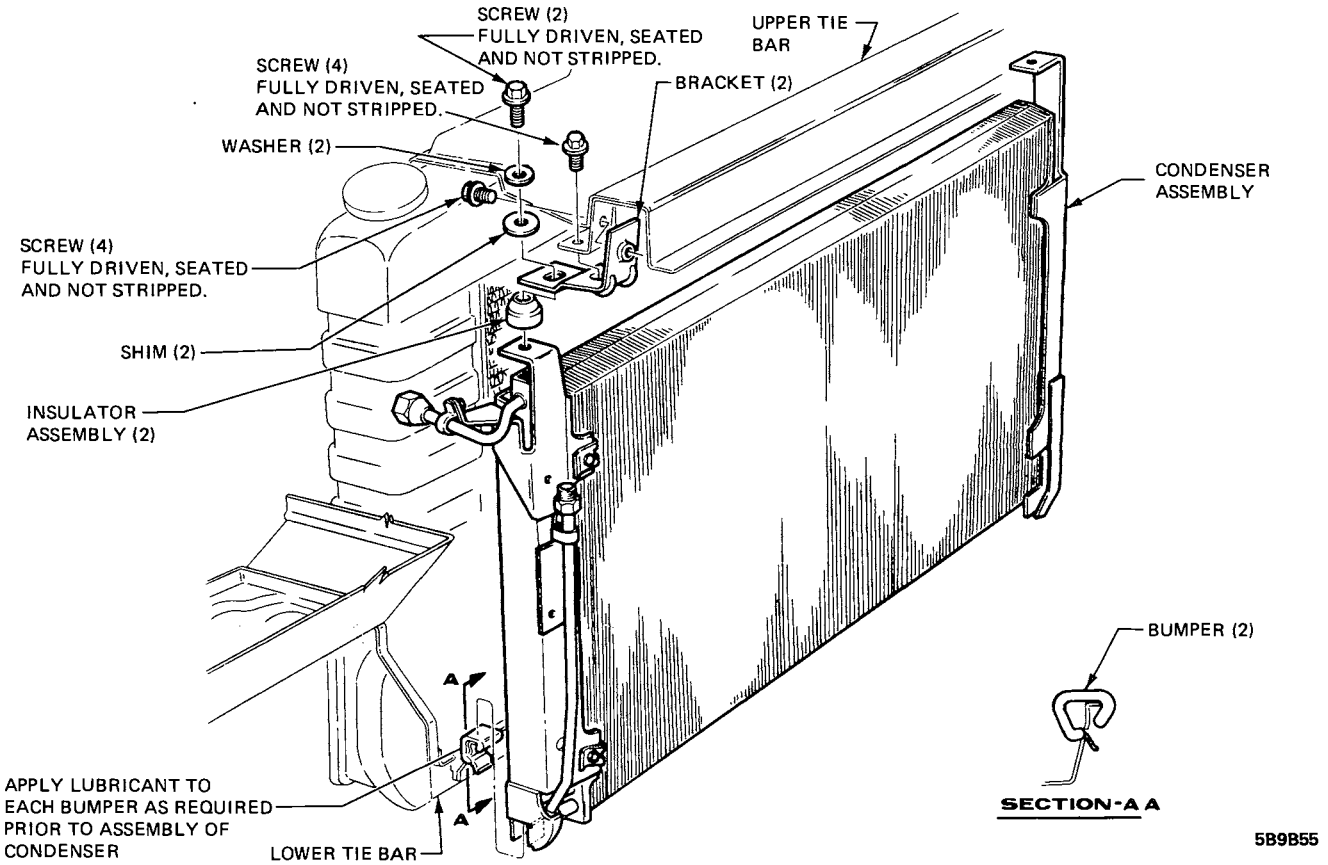


Figure 9B-147 - Condenser Mounting - B-C-E Series

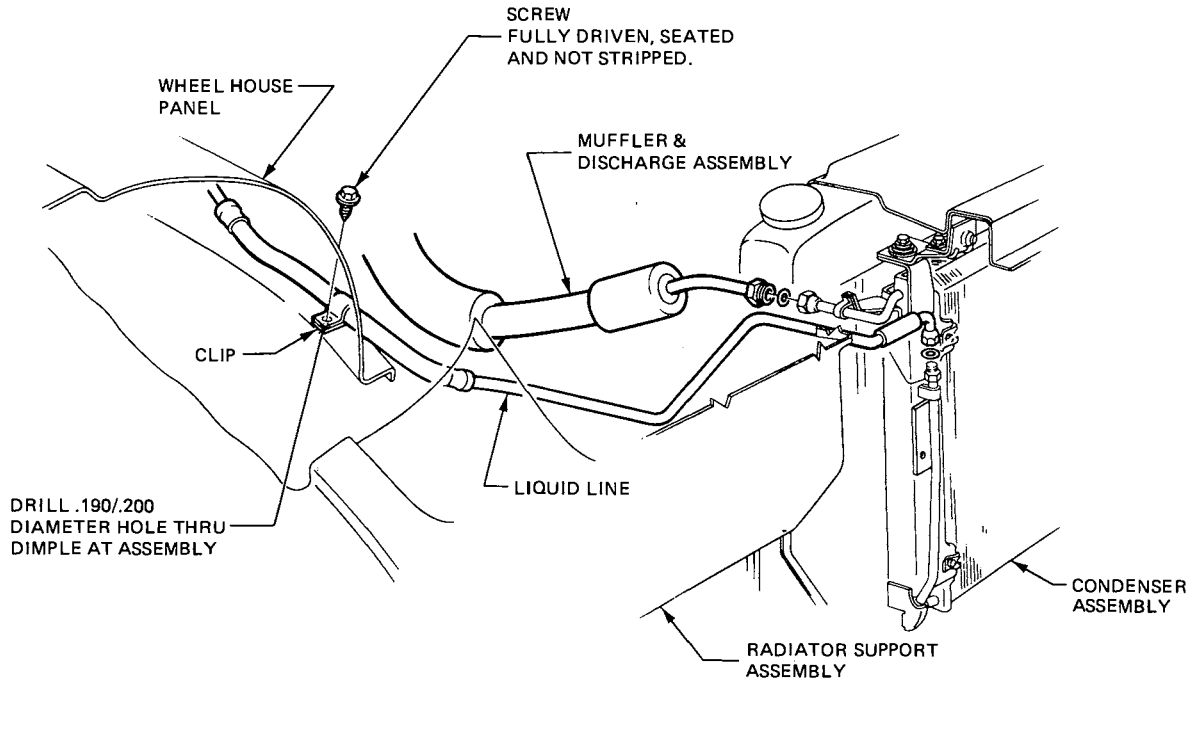


Figure 9B-148 - Discharge and Liquid Hose to Condenser - B-C Series

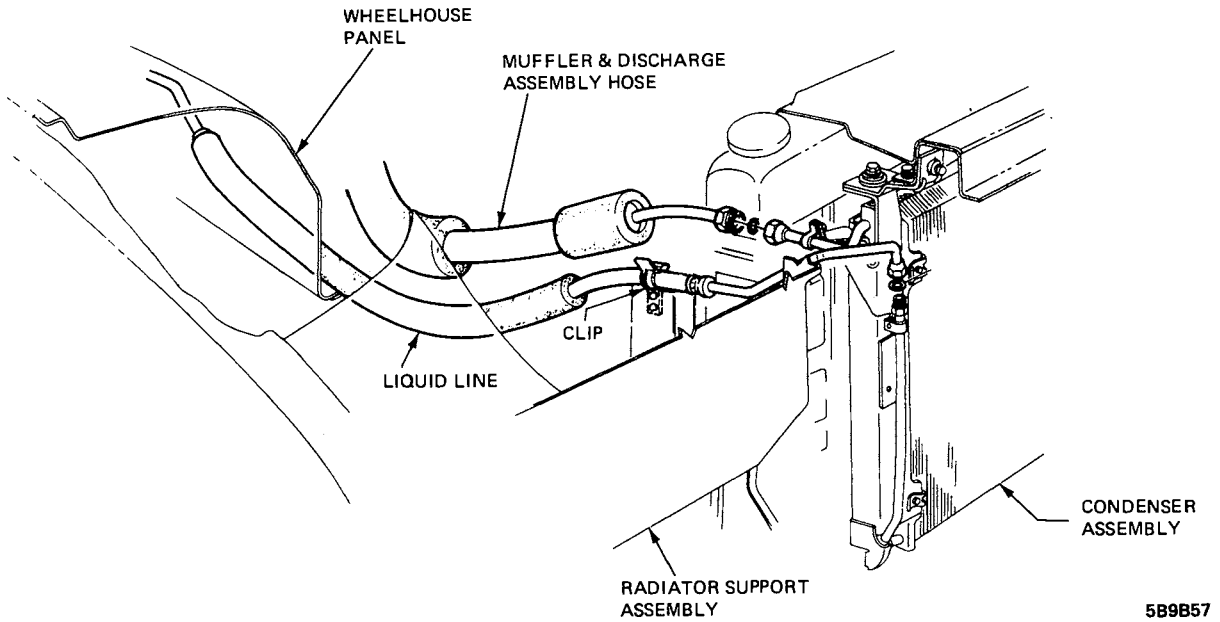


Figure 9B-150 - Discharge and Liquid Hose to Condenser - E Series

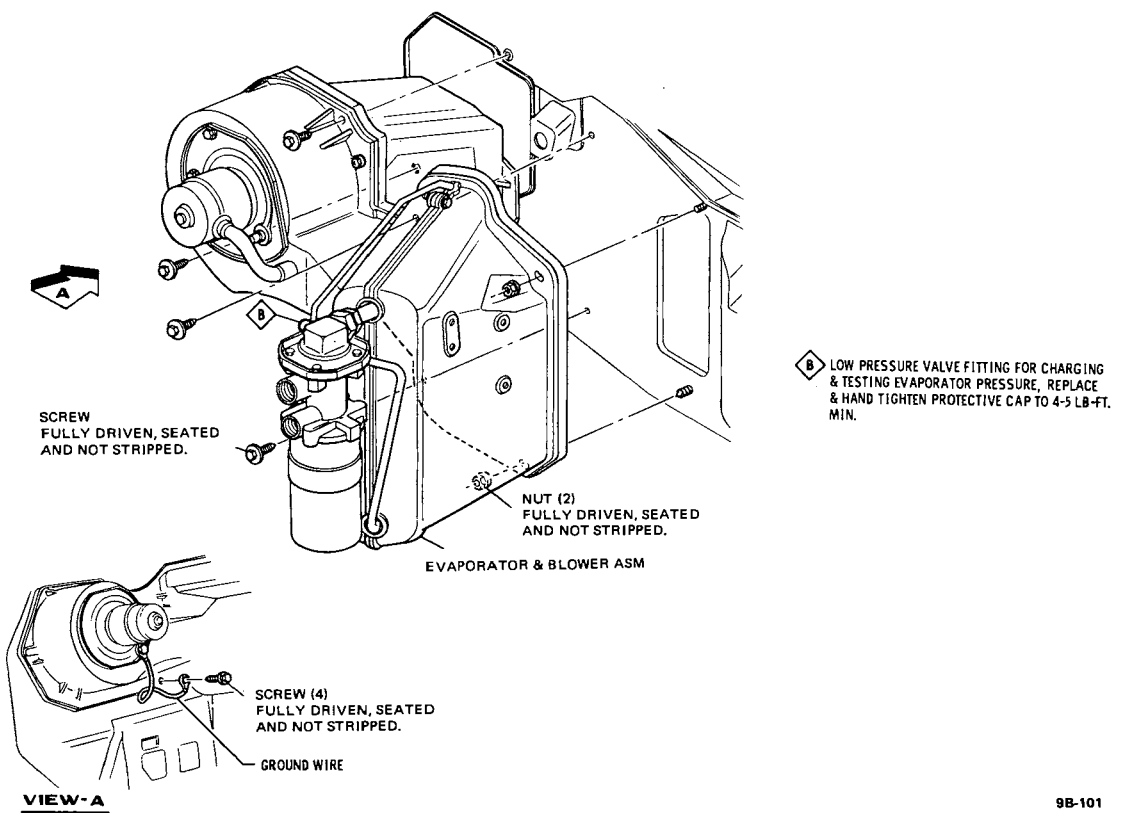


Figure 9B-151 - Evaporator and Blower Assembly - B-C-E Series

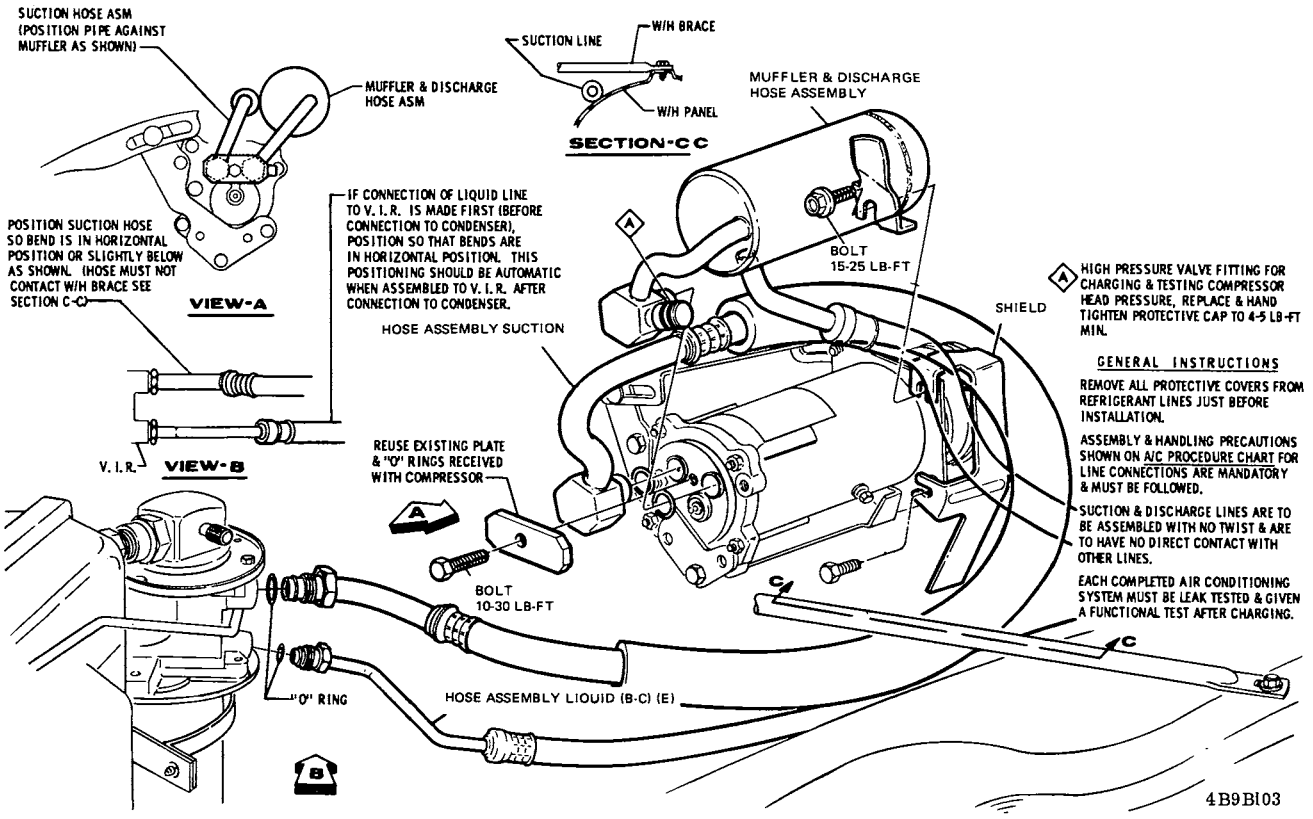


Figure 9B-152 - A/C Muffler - Discharge - Liquid and Suction Hoses - B-C-E Series

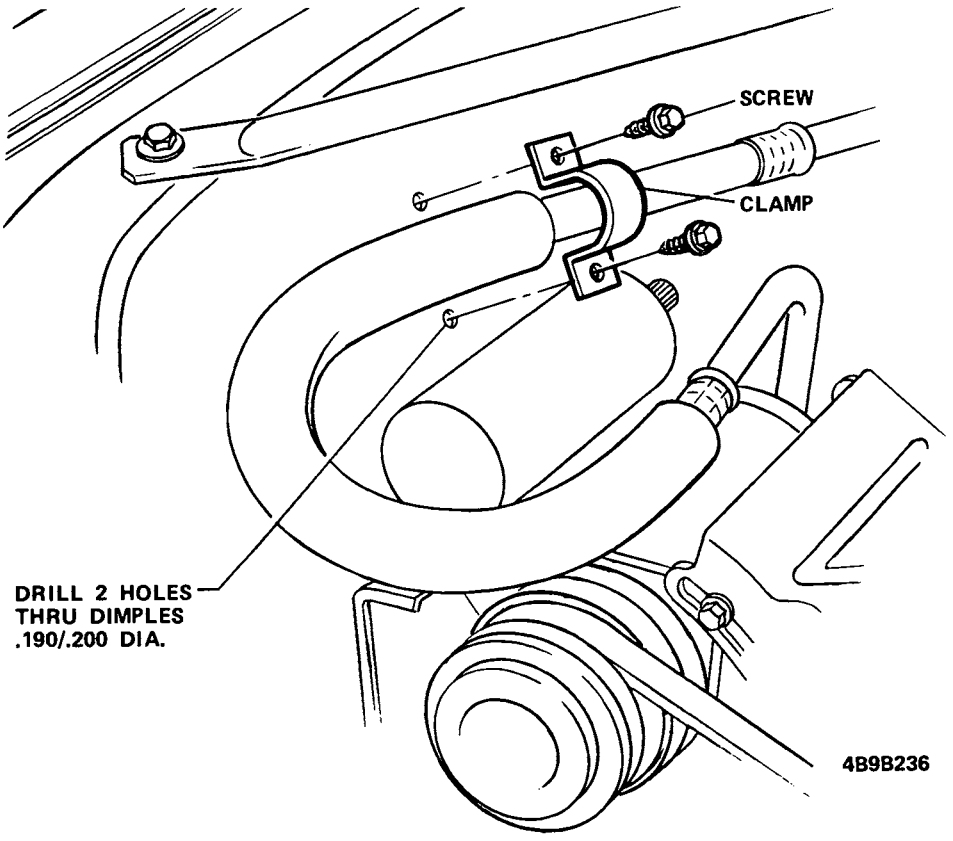


Figure 9B-153 - Suction Hose Clamp - B-C-E Series

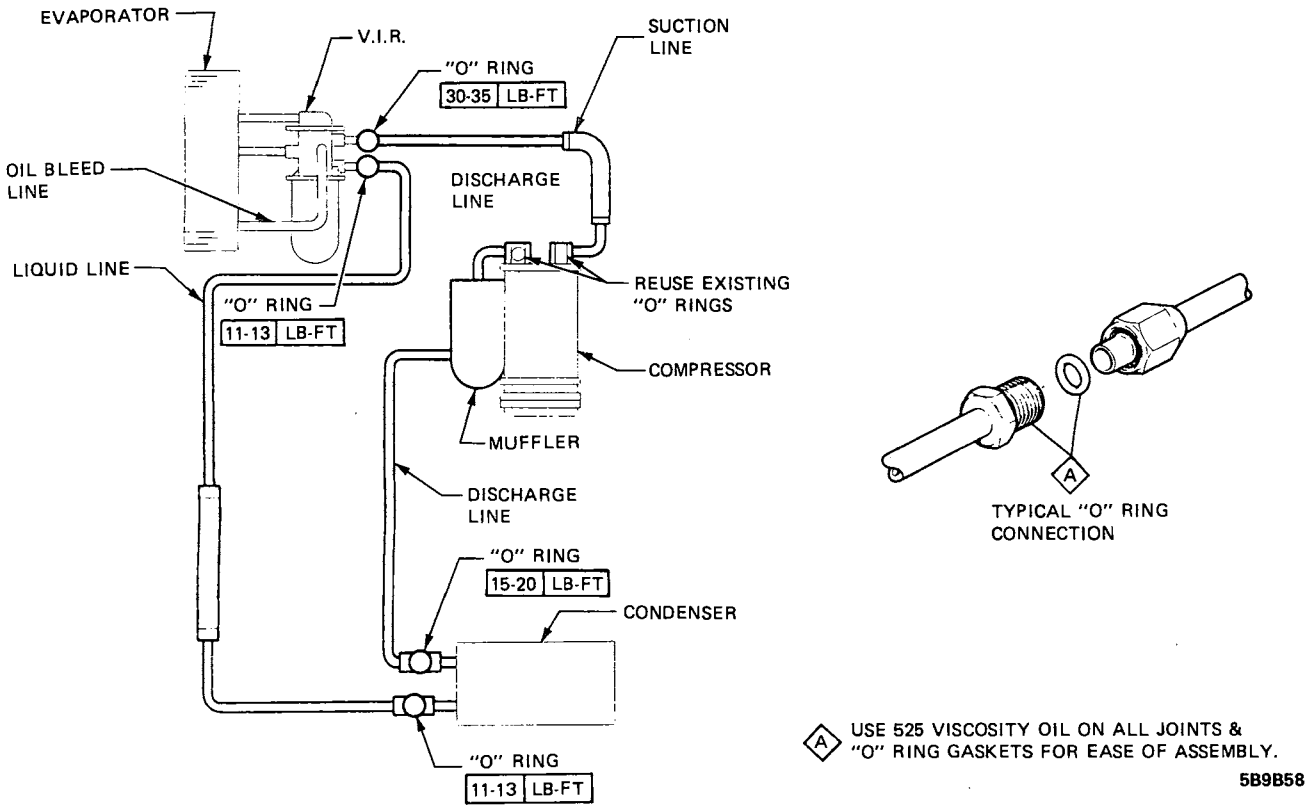


Figure 9B-154 - O-Ring Schematic - B-C-E Series

HEATER - AIR CONDITIONER SYSTEM

ALL SERIES

WARNING: IF EQUIPPED WITH AIR CUSHION RESTRAINT SYSTEM, DO NOT ATTEMPT ANY ADJUSTMENT, REPAIR OR REMOVAL OF ANY PORTION OF THE AIR CONDITIONING SYSTEM WHICH WOULD REQUIRE REMOVAL OR DISCONNECTING OF ANY COMPONENT OF THE AIR CUSHION RESTRAINT SYSTEM UNTIL THE DISCONNECTION PROCEDURE IS COMPLETED. THIS PROCEDURE MUST BE FOLLOWED TO PREVENT ACCIDENTAL DEPLOYMENT OF THE SYSTEM WHICH COULD RESULT IN PERSONAL INJURY AND/OR DAMAGE TO THE SYSTEM'S COMPONENTS.

A.C.R.S. DISCONNECTION PROCEDURE

1. Turn ignition switch to "LOCK" position. Disconnect the negative battery cable from the battery and tape end.

CONTENTS

DESCRIPTION AND OPERATION

BASIC DESCRIPTION OF SYSTEM OPERATION — H SERIES

Off Position

The heater - A/C systems blower motor will automatically run in "Lo" when the ignition switch is turned on and engine coolant temperature reaches 140 degrees F.

Ventilation Position (Economy)

The blower motor will automatically run in "Lo" when the ignition switch is turned on and engine coolant temperature reaches 140 degrees F. Outside air is distributed into the passenger compartment through the A/C outlets and can be warmed by positioning the temperature lever towards "HOT".

Heat Position

The blower motor will automatically run in "LO" when the ignition switch is turned on and engine coolant temperature reaches 140 degrees F. Air is distributed through the heater outlet with some air out of the defroster outlets.

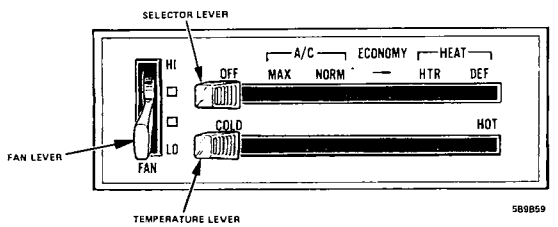


Figure 9B-160 - Heater - A/C Control Panel - H Series

Def. Position (Windshield Defrosting)

The blower motor will run in "LO" automatically when the ignition switch is turned on and engine coolant temperature reaches 140 degrees F. Air is distributed through the defroster outlets with some air out the heater outlet.

A/C Position

The air-conditioning mode has 2 positions, "MAX" and "NORM". In the "MAX" position air from the passenger compartment is recirculated through the system and discharged from the A/C outlets. The blower motor will automatically run in the "HI" position regardless of fan switch position.

In the "NORM" position the outside air is passed through the A/C outlets and blower motor speed is controlled by the position of the fan switch.

The compressor will not run if outside temperatures are below 45 degrees F.

HEATER COMPONENTS - X SERIES

Evaporator Case

The evaporator case serves as a housing for the evaporator core and blower motor. Inlet air to the A/C system passes through the evaporator case, evaporator core and on to the heater system to be re-heated if desired.

The evaporator case is constructed of reinforced plastic for strength. Provision for drainage of condensation from the evaporator core fins is provided in the bottom of the case through a self-opening rubber nozzle (drain tube).

HEATER CORE AND CASE - X SERIES

The heater core consists of coolant tubes with air fins between the tubes. Because of the core design, coolant travels a relatively short distance, maintaining a nearly equal pressure at the inlet and outlet. This controlled pressure maintains a higher coolant boiling point (cooling system pressure will not allow coolant to boil below approximately 250°F.)

Air passing between the core fins is warmed by hot coolant flowing through the coolant tubes. This warm air is then directed into the passenger compartment by the blower and ducts.

CONTROL PANEL - X SERIES

The control panel is a slide-lever design and controls the A/C system by means of two levers and a fan switch. See Figure 9B-150.

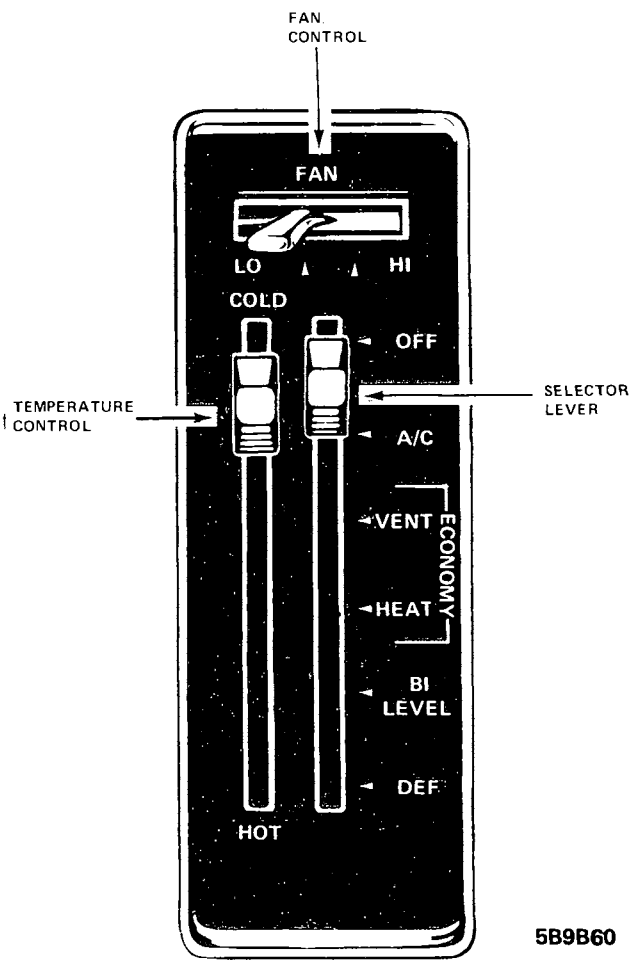


Figure 9B-161 A/C Control Panel - X Series

Off Position

The heater-A/C system is completely "Shut-Off" when the ignition switch is in the Off position. When the ignition switch is turned on the electrical circuit is completed and the "LO" blower will come on after the engine coolant reaches 140 degrees F.

Ventilation Position (Economy)

The blower will come on in "LO" automatically after the engine coolant temperature reaches 140 degrees F. and the outside air is distributed into the passenger compartment through the A/C outlets. The outside air can be warmed by positioning the temperature lever toward the "HOT" position. The blower will run in 2 "Med." speeds or "Hi" immediately, regardless of engine coolant temperature.

Heat Position (Economy)

The blower will come on in "LO" automatically after the engine coolant temperature reaches 140 degrees F. and air is distributed into the passenger compartment through the heater and through the defroster ducts after a 30 to 60 seconds delay. The blower will run in 2 "MED" speeds or "HI" immediately, regardless of engine coolant temperature.

Def. Position (Windshield Defrosting)

The blower will come on in "LO" automatically after the engine coolant temperature reaches 140 degrees F. and the A/C compressor will run to dehumidify the air if temperature is above 45 degrees F. A majority of air will flow out of the defroster outlets with some air flowing out the heater outlet. The blower will run in 2 "MED" speeds or "HI" immediately regardless of engine coolant temperature.

BASIC DESCRIPTION OF SYSTEM OPERATION - A-B-C-E SERIES

Off Position

The Climate Control System is completely "shut-off" when the ignition switch of the car is in the "OFF" position. However, when the ignition switch is turned on, the electrical circuit to the Climate Control system is completed and the "LO" blower will come on after the engine coolant reaches 140 degrees F.

A/C Position

The compressor will run at temperatures above 45 degrees F. Cooled conditioned air will flow out of all six outlets, and in "MAX", recirculated air at "HI" blower speed will occur automatically until a alternate mode is selected. After passenger comfort is obtained, move the selector lever to the "NORM" mode for normal air conditioning.

Vent Position - Economy (Temperature Lever in Cold)

The blower will come on in "LO" automatically after the engine water temperature reaches 140 degrees F, and outside air is distributed into the passenger compartment through the A/C outlets. The blower will run in two (2) "MED" speeds or "HI", immediately, regardless of engine coolant temperature.

Heater Position (Temperature Lever in Mid Range)

The blower will come on in "LO" automatically after the engine coolant temperature reaches 140 degrees F., and air is distributed into the passenger compartment through the heater and through defroster ducts after 30 to 60 seconds. The blower will run in two (2) "MED" speeds or "HI", immediately, regardless of engine coolant temperature.

Bi Level Position (Temperature Lever in Mid Range)

The blower will come on in "LO" automatically after the engine water temperature reaches 140 degrees F., and the A/C compressor is running to provide dehumidified air flow from the A/C, heater, and defroster outlets. Air is bled through the defroster outlets after a 30 to 60 second delay. The blower will run in two (2) "MED" or "HI", immediately, regardless of engine coolant temperature.

Def Position (Temperature Lever in Hot)

The blower will come on in "LO" automatically after the engine water temperature reaches 140 degrees F., and the A/C compressor will run to dehumidify air if temperature is above 45 degrees F. A majority of air will flow out of the defroster outlets with some air flowing out the heater outlet. The blower will run in two (2) "MED" speeds or "HI", immediately, regardless of engine coolant temperature.

ELECTRICAL SYSTEM OPERATION - A-B-C-E SERIES

Off Position

When the selector lever is in the "OFF" position, the system is locked in "LO" blower operation. When the fan switch is in the "LO" position, the ignition switch in the "RUN" position, and the engine thermoswitch is open, the blower motor will not run until engine coolant reaches approximately 140 degrees F. Then the thermoswitch will close allowing current to flow to the blower motor.

A/C Position

With the ignition switch in "RUN", the selector lever in the "MAX" position, the fan is in fixed "HI" blower

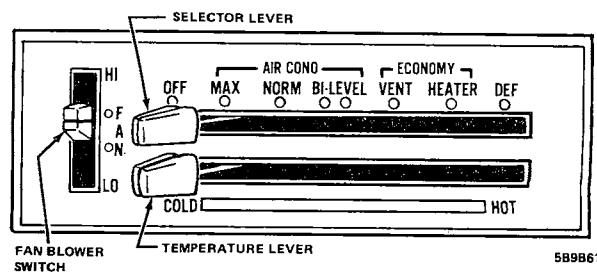


Figure 9B-162 - Heater - A/C Control - A Series

regardless of fan switch position. In "MAX" position also, the recirculate door and water valve are actuated through the dash control.

The compressor will run above 45 degrees F. which is controlled by the opening (below 45 degrees F.) and closing (above 45 degrees F.) of the ambient switch.

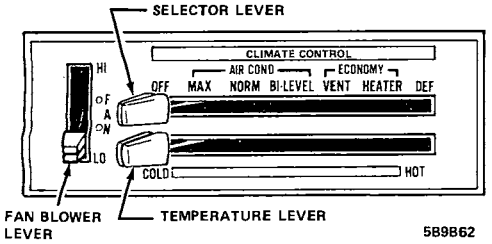


Figure 9B-163 Instrument Panel Control Assembly - B-C-E Series

Vent Position - Economy

With the ignition switch in "RUN" and the selector lever in the "VENT" position, the fan is controlled by the fan switch. Compressor is shut off.

The engine thermoswitch closes when the engine coolant temperature reaches 140 degrees F. allowing current to flow to the blower motor or "LO" fan speed. If fan switch is in "MED" or "HI", the blower will run regardless of engine coolant temperature, because the thermoswitch is by-passed.

Heater Position

With the ignition switch in "RUN" and the selector lever in the "HEATER" position, the fan speed is controlled by the fan switch.

The engine thermoswitch closes when the engine coolant temperature reaches 140 degrees F. allowing current to flow to the blower motor or "LO" fan speed.

If the fan switch is in two (2) "MED" speeds or "HI", the blower will run, regardless of engine coolant temperature because the thermal switch is by-passed.

Bi-Level Position

With the ignition switch in "RUN" and the selector lever in the "BI-LEVEL" position, the fan is locked in "LO" blower operation when the fan switch is in the "LO" position.

The compressor runs in this position above 45 degrees F. which is controlled by the opening (below 45 degrees F.) and closing (above 45 degrees F.) of the ambient switch, to provide dehumidified air regardless of temperature lever position.

The engine thermoswitch closes when the engine coolant temperature reaches 140 degrees F., and allows current to flow to the blower motor.

If the fan switch is in "MED" or "HI", the blower will run regardless of engine coolant temperature because the thermal switch is by-passed.

Def Position

With the ignition switch in "RUN" and the selector lever in the "DEF" position, the fan is locked in "LO" blower operation when the fan switch is in the "LO" position.

The compressor runs in this position above 45 degrees F., which is controlled by the opening (below 45 degrees F.) and closing (above 45 degrees F.) of the ambient switch, to provide dehumidified air regardless of temperature lever position.

The engine thermoswitch closes when the engine coolant temperature reaches 140 degrees F., and allows current to flow to the blower motor.

If the fan switch is in "MED" or "HI", the blower will run regardless of engine coolant temperature because the thermal switch is by-passed.

VACUUM SYSTEM OPERATION A-B-C-E SERIES

Off Position

With the selector lever in the "OFF" position and the engine running, the system is turned on whenever the thermoswitch closes. Air flows from the heater outlets at "LO" blower speed. Vacuum is applied to the water valve holding the valve closed.

A/C Position

With the selector lever in the "MAX" position, vacuum is applied to the recirc door diaphragm closing the door to the outside air causing recirculation of most of the air while introducing some outside air into the passenger compartment. Vacuum is also applied to the upper and lower heater door diaphragms causing the doors to open, allowing air to flow from the A/C outlets. Vacuum is applied to the water valve holding the valve closed. After passenger comfort is obtained, move the selector lever to the "NORM" position for normal air conditioning.

Vent Position-Economy (Temperature Lever in Cold)

Air is drawn in through the outside air door and is distributed from the A/C outlets at whatever blower speed is selected.

Vacuum is applied to the water valve holding the valve closed.

Heater Position (Temperature Lever in Mid Range)

In this position, outside air is drawn in through the outside air door and then is divided by the air mix door. Part of the air passes through the heater core to be warmed while the rest of the air by-passes the core. The air is then mixed and distributed into the passenger compartment through the heater and defroster outlets.

Vacuum is applied to the defroster door diaphragm and is restricted to delay partial bleed to the windshield for 30-60 seconds. No vacuum is applied to the upper and lower mode door diaphragm so the majority of the air is directed through the heater outlets. No vacuum is applied to the water valve allowing the valve to open.

Bi-Level Position (Temperature Lever in Mid Range Position)

In this position outside air is drawn in through the outside air door and then is divided by the mix door. Part of the air passes through the heater core to be warmed while the rest of the air bypasses the core. The incoming air is dehumidified before it reaches the mix-door since the A/C compressor is running if the outside temperature is above 45 degrees F. The air is then mixed and distributed into the passenger compartment through the heater, A/C, and defroster outlets. Defroster bleed air is delayed 30 to 60 seconds. Vacuum is applied to the lower mode door diaphragm opening the door, allowing a portion of the air to flow out of the A/C outlets while no vacuum is applied to the upper mode door diaphragm allowing air to flow from the heater outlets. Vacuum is applied to the defroster door diaphragm but is restricted not to allow the door to open only partially. No vacuum is applied to the water valve allowing the valve to open.

Def Position (Temperature Lever in Hot Position)

In this position outside air is drawn in through the outside air door and then is directed through the heater core. The incoming air is dehumidified before it reaches the heater core since the A/C compressor is running if the outside temperature is above 45 degrees F. Vacuum is applied to both defroster door diaphragm ports causing the door to fully open, directing the majority of the air to flow out of the defroster outlets. A small portion of air will come out of the heater outlets since no vacuum is applied to the upper and lower mode doors. No vacuum is applied to the water valve allowing the valve to open.

DIAGNOSIS

TROUBLE DIAGNOSIS GUIDE — H & X SERIES

Blower Inoperative

Possible Causes

Disconnected, Loose, or corroded blower ground wire.

Disconnected feed wire.

Malfunctioned blower motor.

Malfunctioned fuse.

Malfunctioned high blower relay.

LO Blower Only

Possible Cause

Disconnected plug at control head to instrument harness.

Malfunctioned engine thermoswitch.

No LO Blower In OFF

Malfunctioning wiring.

Possible Causes

Disconnected engine thermoswitch.

Open engine thermoswitch.

Malfunctioning wiring.

Immediate LO Blower — Car Start-Up

Possible Causes

Malfunctioned engine thermoswitch.

Warm engine - normal operation.

Temperature of Discharge Air Too Hot or Too Cool

Possible Cause

Misadjusted or disconnected temperature door cable.

Insufficient Heat

Possible Causes

Misadjusted or disconnected temperature door cable.

Malfunctioned water valve.

Malfunctioned engine thermostat.

Low Coolant.

Malfunctioned water valve.

Malfunctioned engine thermostat.

Low Coolant.

No Full A/C or Heater (Only Bi-Level)

Possible Cause

Vacuum lines switched at upper and lower mode door diaphragms.

Partial Air Flow to Windshield in DEF and No Air Flow to Windshield in BI-LEVEL Position

Possible Cause

Vacuum lines to defroster (dual) diaphragm switched. Normal "BI-LEVEL" operation has a delay before door opens.

No Air Flow to Windshield in Either BI-LEVEL or DEF Position

Possible Causes

Either vacuum line to defroster diaphragm disconnected. Leaking dual diaphragm.

TROUBLE DIAGNOSIS GUIDE A-B-C-E SERIES

Blower Inoperative

Possible Causes

Disconnected, loose, or corroded blower ground wire.

Disconnected feed wire.

Malfunctioned blower.

Malfunctioned fuse.

Malfunctioned high blower relay

LO Blower Only

Possible Cause

Disconnected plug at control head to instrument harness.

Malfunctioned engine thermoswitch

No LO Blower in OFF

Malfunctioning wiring

Possible Causes

Disconnected engine thermoswitch

Open engine thermoswitch

Malfunctioning wiring.

Immediate LO Blower - Car Start-Up

Possible Causes

Malfunctioned engine thermoswitch.

Warm engine - normal operation.

Temperature of Discharge Air Too Hot or Too Cool

Possible Cause

Misadjusted or disconnected temperature door cable.

Insufficient Heat

Possible Causes

Misadjusted or disconnected temperature door cable.

Malfunctioned water valve.

Malfunctioned engine thermostat.

Low coolant.

No Full A/C or Heater (Only Bi-Level)

Possible Cause

Vacuum lines switched at upper and lower mode door diaphragms.

Partial Air Flow to Windshield in DEF and No Air Flow to Windshield in BI-LEVEL Position

Possible Cause

Vacuum lines to defroster (dual) diaphragm switched. Normal "BI-LEVEL" operation has a delay before door opens.

No Air Flow to Windshield in Either BI-LEVEL or DEF Position

Possible Causes

Either vacuum line to defroster diaphragm disconnected.

Leaking dual diaphragm.

ADJUSTMENT OF CONTROL WIRE ASSEMBLY - A-B-C-E SERIES

1. Assemble control wire to control assembly.
2. Secure temperature wire to temperature control valve.
3. Adjust control cable so that 1/16 to 1/8 inch spring-back is obtained in the "Hot" position.

MAJOR REPAIR

REMOVAL AND INSTALLATION OF INSTRUMENT PANEL CONTROL ASSEMBLY — H SERIES

1. Disconnect the negative battery cable.
2. Remove clock knob and wood grain trim panel. (If equipped).
3. Remove instrument panel cover by removing all attaching screws, glove box and 4 attaching nuts from the inner side of the dash above the glove box opening.
4. Remove the 2 nuts securing the column to the upper bracket guide and lower the column.

> **CAUTION:** *This steering column to dash bracket fastener is an important attaching part in that it could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number, or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.*

5. Remove 1 screw attaching cluster assembly to dash supprt above steering column.
6. Disconnect speedometer cable from speedometer head.
7. Remove screws from cluster assembly and carefully pull forward. (Toward rear of car).
8. Remove 1 screw attaching Bowden cable to control.
9. Disconnect vacuum and electrical connectors.
10. Install in reverse of removal torquing steering column to dash bracket nuts to 15-25 lb. ft. and adjusting control cable so that 1/16 to 1/8 inch spring back is obtained in the "HOT" position.

REMOVAL AND INSTALLATION OF DISTRIBUTOR ASSEMBLY AND HEATER CORE — H SERIES

Removal

1. Disconnect battery ground cable.
2. Remove glove box.
3. Remove right air outlet duct - deflector.
4. Remove instrument bezel.
5. Remove instrument pad.
6. Remove left air outlet duct deflector and feed duct.

7. Lower steering column.
8. Remove instrument panel assembly.
9. Remove control assembly from instrument panel.
10. Remove radio.
11. Remove defroster duct.
12. Remove center (large) distributbon duct.
13. Purge system of refrigerant.
14. Remove heater hoses at core pipes.
15. Clean surface dirt from exterior of VIR assembly and all line connections. Blow any loose dirt away with an air hose.
16. Disconnect compressor inlet line, oil bleed line and condenser outlet line. Cap or plug all open connections.
17. Loosen the evaporator inlet and outlet connections. Remove the VIR mounting clamp screw and remove the clamp from the assembly. Slide the VIR assembly off the evaporator outlet line first and then the evaporator inlet line.
18. Remove and discard all old "O" rings. All line connections and openings should be plugged or sealed to prevent entry of dirt and moisture into the system.
19. Remove heater-distributor case stud to cowl attaching nuts.
20. Remove heater and distributor assembly, disconnecting electrical connectors at control and vacuum plenum and vacuum tank hoses.
21. Separate heater case from distributor assembly.
22. Remove heater core from heater case.

Installation

1. Install heater core to heater case.
2. Assemble heater case to distributor.
3. Install heater and distributor assembly, connecting electrical connectors at control and vacuum plenum and vacuum tank hoses.
4. Install heater-distributor case attaching nuts. When connecting refrigerant lines, be sure to install NEW "O" rings, coated with clean refrigeration oil.
5. Lubricate all VIR assembly connection "O" rings with clean refrigeration oil and install the "O" rings onto the connecting lines. When making all connections use care to prevent nicking the "O" rings and cross threading the connection threads.
6. Remove the plugs from the evaporator inlet and outlet tube openings of the VIR Assembly. Assemble the VIR assembly onto the evaporator inlet tube first and then onto the outlet tube. When the assembly is in proper position install the VIR mounting clamp. Tighten the evaporator inlet connection to 18 ft. lbs. torque and the evaporator outlet connection to 30 ft. lbs. torque.
7. Remove the plug from the liquid bleed line connection opening of the VIR assembly. Connect and tighten the liquid bleed line connection to the VIR assembly to 6 ft. lbs. torque.
8. Remove the plug from the liquid line connection opening in the VIR assembly. Connect and tighten the condenser line connection to the VIR assembly to 12 ft. lbs. torque.
9. Remove the plug from the compressor line connection opening in the VIR assembly. Connect and tighten the compressor line connection at the VIR assembly to 30 ft. lbs. torque.
10. Install heater hoses and check coolant and add as required.
11. Install center duct to vehicle.
12. Install defroster duct, screw and clip to center duct.
13. Install radio.
14. Install instrument panel.
15. Connect steering column.

CAUTION: *This steering column to dash bracket fastener is an important attaching part in that it could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number, or with an equivalent part, if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.*

16. Install left air outlet duct and feed duct.
17. Install instrument pad.
18. Install instrument cluster bezel.
19. Install right air outlet duct.
20. Install glove box.
21. Evacuate, charge and check the system.
22. Connect the battery ground cable.

REMOVAL AND INSTALLATION OF BLOWER MOTOR — H SERIES

1. Disconnect the battery ground cable.
2. Disconnect the blower motor lead wires and cooling tube at the motor.
3. Scribe the blower motor flange to case position.
4. Remove the blower to case attaching screws and remove the blower wheel and motor assembly. Pry the flange gently if the sealer acts as an adhesive.
5. Remove the blower wheel retaining nut and separate the motor and wheel.
6. To install, reverse steps 1-5, lining up the scribe marks on the motor flange and case which were made at removal. Assemble the plastic blower wheel to the motor with the open end of the blower away from the motor. Replace sealer at the motor flange if necessary.

REMOVAL AND INSTALLATION OF BLOWER MOTOR AND/OR IMPELLER — X SERIES

To replace the A/C blower motor and/or impeller, follow the procedure for heater blower motor removal in heater system section of the manual. Disconnect blower motor cooling tube when removing motor.

REMOVAL AND INSTALLATION OF HEATER CORE AND CASE ASSEMBLY — X SERIES

1. Disconnect battery.
2. Drain coolant.
3. Disconnect upper heater hose at core tube and remove accessible heater core and case assembly attaching nuts.
4. Remove right front fender skirt bolts and lower skirt to gain access to lower heater hose clamp.
5. Loosen hose clamp and disconnect lower heater hose from core tube. Remove lower right hand heater core and case assembly attaching nut.
6. Install plugs in heater core tubes to prevent spilling coolant.
7. Remove glove compartment and door.
8. Remove recirculation vacuum diaphragm at right hand kick panel.
9. Remove heater outlet (at bottom of heater case).
10. Remove cold air distributor duct from heater case.
11. Remove heater case extension screws and separate extension from heater case.
12. Disconnect heater cables and electrical connectors from heater case and remove heater core and case assembly.
13. Separate core from case. If replacing case, transfer parts to new case.
14. To replace, reverse removal procedures.

REMOVAL AND INSTALLATION OF PLENUM AIR INLET DOOR DIAPHRAGM — X SERIES

1. Remove windshield wiper arms.
2. Remove cowl vent grille.
3. Remove plenum diaphragm assembly to plenum chamber attaching screws.
4. Disconnect vacuum hose at diaphragm.
5. Position door in closed position and lift assembly from car.
6. Remove diaphragm to bracket and link screws and remove diaphragm.
7. To replace, reverse removal procedures.

REMOVAL AND INSTALLATION OF DEFROSTER DIAPHRAGM - X SERIES

1. Remove heater outlet duct.
2. Remove two retaining screws and actuator link retaining screw.
3. Disconnect vacuum hose and remove diaphragm.
4. To replace, reverse removal procedure.

REMOVAL AND INSTALLATION OF CONTROL CABLES - X SERIES

To replace the A/C heater cables (air, defroster and temperature) refer to Figure 9B-194 for cable routing. Perform steps 1 through 3 of control panel procedure and disconnect cable from control assembly. To disconnect heater case end of the defroster cable it is necessary to remove the heater core and case assembly from the car. Repair cable or construct new cable.

REMOVAL AND INSTALLATION OF INSTRUMENT PANEL CONTROL — X SERIES

1. Disconnect battery.
2. Remove radio.
3. Remove control panel to instrument panel retaining screws and lower control panel slightly from instrument panel.
4. Disconnect vacuum, electrical connections and heater cables from control panel and lower the control from the dash.
5. To replace, reverse removal procedure.

REMOVAL AND INSTALLATION OF UNDERHOOD AMBIENT SWITCH - X SERIES

The underhood ambient switch is located in the evaporator case. The switch can be replaced by disconnecting the wire connector and removing two switch retaining screws.

REMOVAL AND INATALLATION OF A/C AIR DISTRIBUTION DUCTS - X SERIES

Removal and replacement of air distribution components can be performed by referring to Figure 9B-187 for duct and outlet installation.

REMOVAL AND INSTALLATION OF AIR INLET DIAPHRAGM - X SERIES

1. Remove kick panel diaphragm cover.
2. Disconnect vacuum hose at diaphragm.
3. Remove two diaphragm to kick panel attaching screws.
4. Disconnect link and spring at recirc. air door and remove diaphragm and bracket as an assembly.
5. Separate diaphragm from bracket (3 screws).
6. To replace, reverse removal procedure.

REMOVAL AND INSTALLATION OF CONTROL ASSEMBLY - A SERIES

1. Disconnect the negative battery cable.
2. Remove instruments trim plate by pulling rearward and unsnapping from the instrument panel.
3. Pull control out from the instrument panel and disconnect vacuum, electrical connectors and release the Bowden cable and pull down as shown in Figure 9B-164.

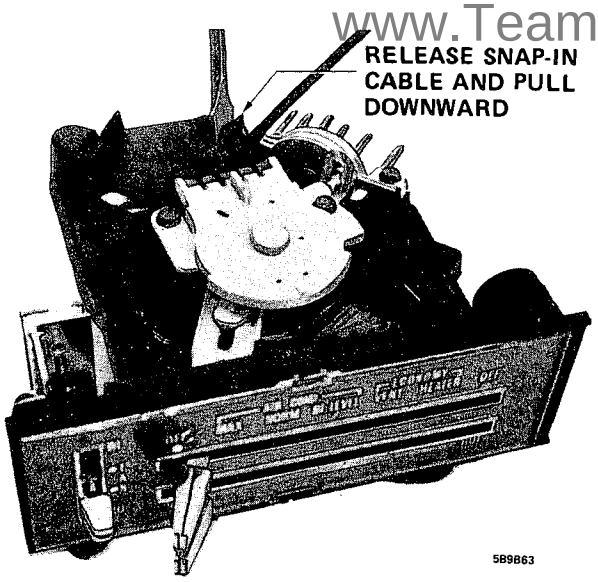


Figure 9B-164 - Releasing Snap-In Bowden Cable - A Series

4. Install in reverse of removal adjusting control cable so that 1/16 to 1/8 inch spring back is obtained in the "HOT" position.

REMOVAL AND INSTALLATION OF BLOWER MOTOR - A SERIES

1. Disconnect blower motor wire.

2. Remove screws securing blower motor to air inlet assembly.

3. Install in reverse of removal.

REMOVAL AND INSTALLATION OF HEATER ASSEMBLY OR HEATER CORE - A SERIES

1. Drain radiator and disconnect heater inlet and outlet water hoses at dash.

2. Disconnect temperature control cable from temperature door guide and vacuum hoses from actuator diaphragms.

3. Remove resistor assembly and reach through opening and remove 1 attaching nut to dash. Remove 1 attaching nut to dash directly over transmission and 2 attaching nuts to upper and lower inboard evaporator case half.

4. From inside the car remove 1 screw in lower righthand corner on passenger side.

5. Remove lower attaching outlet(s) and work assembly rearward until studs clear dash and remove heater assembly.

6. Install heater assembly reverse of removal procedures and seal along mating surfaces between dash and heater assembly.

7. Adjust control cable so that 1/16 to 1/8 inch springback is obtained in the hot position.

REMOVAL AND INSTALLATION OF INSTRUMENT PANEL CONTROL — B-C-E SERIES

If equipped with air cushion restraint system turn ignition switch to "LOCK" position and disconnect the negative battery cable from the battery and tape the end.

1. Disconnect the battery.

2. Remove the left lower instrument panel trim by carefully prying and pulling the trim out.

3. Remove 3 screws from control face.

4. Disconnect vacuum, electrical connectors and Bowden wire.

5. Remove control assembly.

6. To install, reverse removal procedures.

7. Adjust control cable so that 1/16 to 1/8 inch spring back is obtained in the "HOT" position.

REMOVAL AND INSTALLATION OF BLOWER MOTOR - B-C-E SERIES

Removal

1. Disconnect blower motor wire. Remove screws securing blower motor to air inlet assembly.

Installation

Install blower motor assembly in reverse of removal procedures sealing along mating surfaces.

REMOVAL AND INSTALLATION OF HEATER ASSEMBLY OR HEATER CORE - B-C-E SERIES

WARNING: IF CAR IS EQUIPPED WITH AIR CUSHION RESTRAINT SYSTEM, REFER TO THE AIR CUSHION RESTRAINT SYSTEM SERVICE MANUAL FOR REMOVAL PROCEDURES FOR THE PASSENGER AIR CUSHION ASSEMBLY PRIOR TO SERVICING THE HEATER ASSEMBLY AND/OR HEATER CORE OTHERWISE PERSONAL INJURY MAY RESULT.

Removal

1. Drain radiator and disconnect heater inlet and outlet hoses at dash.

2. Disconnect control wires from defroster door and vacuum hose diverter door actuator diaphragm and control cable from temperature door lever.

3. Remove 4 nuts securing heater assembly to dash.

4. Remove screw securing defroster outlet tab to heater assembly.

5. Work heater assembly rearward until studs clear dash and remove heater assembly.

Installation

1. Install heater assembly reverse of removal procedures and seal along mating surfaces between dash and heater assembly.

2. Adjust control cable so that 1/16 to 1/8 inch springback is obtained in the "Hot" position.

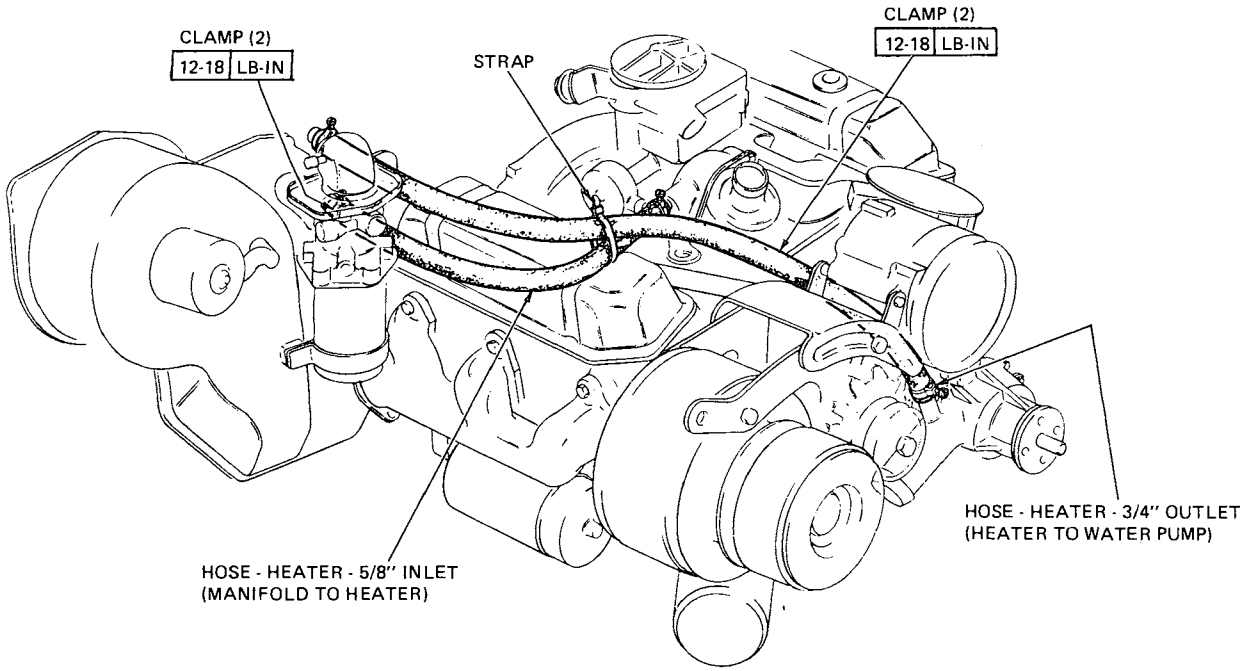


Figure 9B-170 - Heater Hoses (with A/C) V-6 231 Engine - H Series

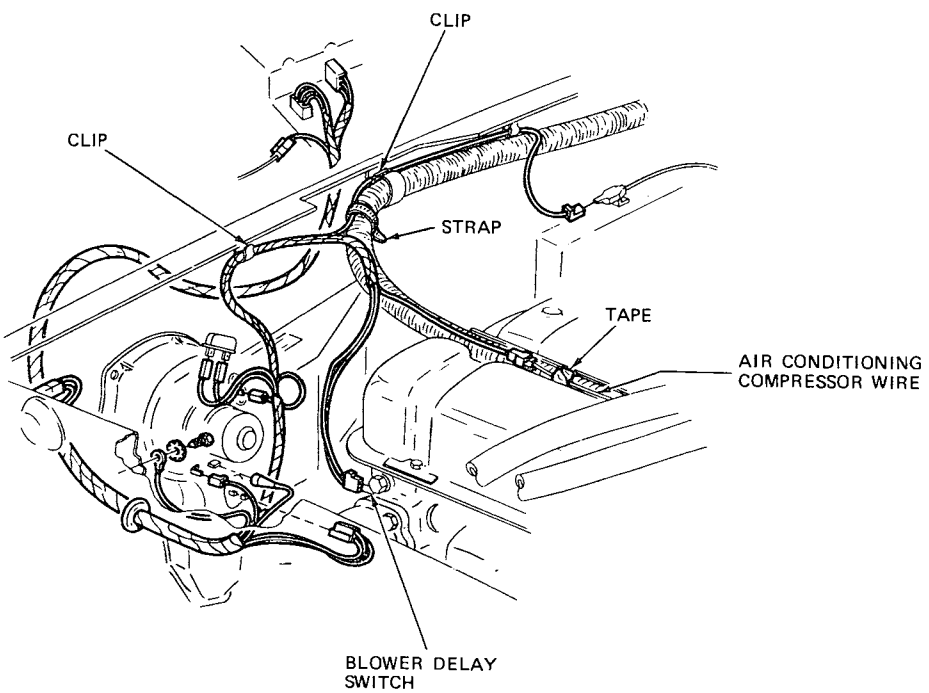


Figure 9B-171 - A/C Blower Motor Wiring - H Series

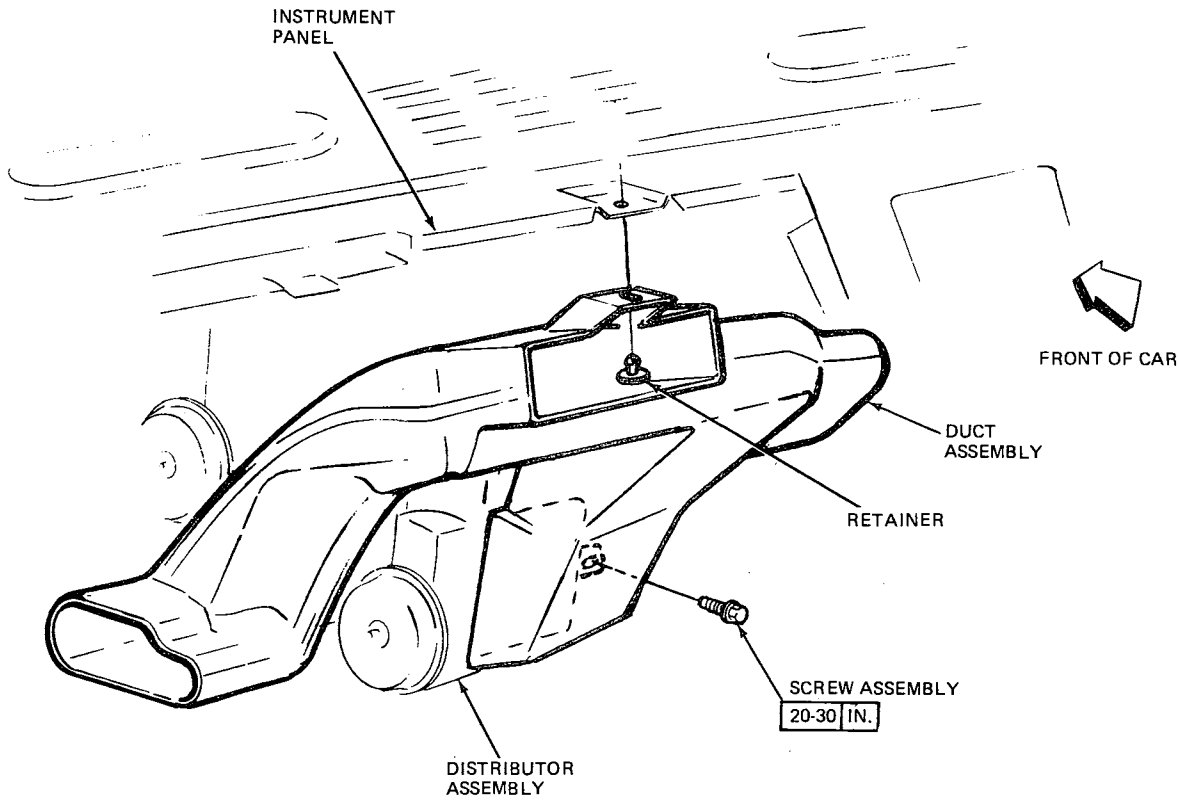


Figure 9B-172 - Air Distributor Duct - H Series

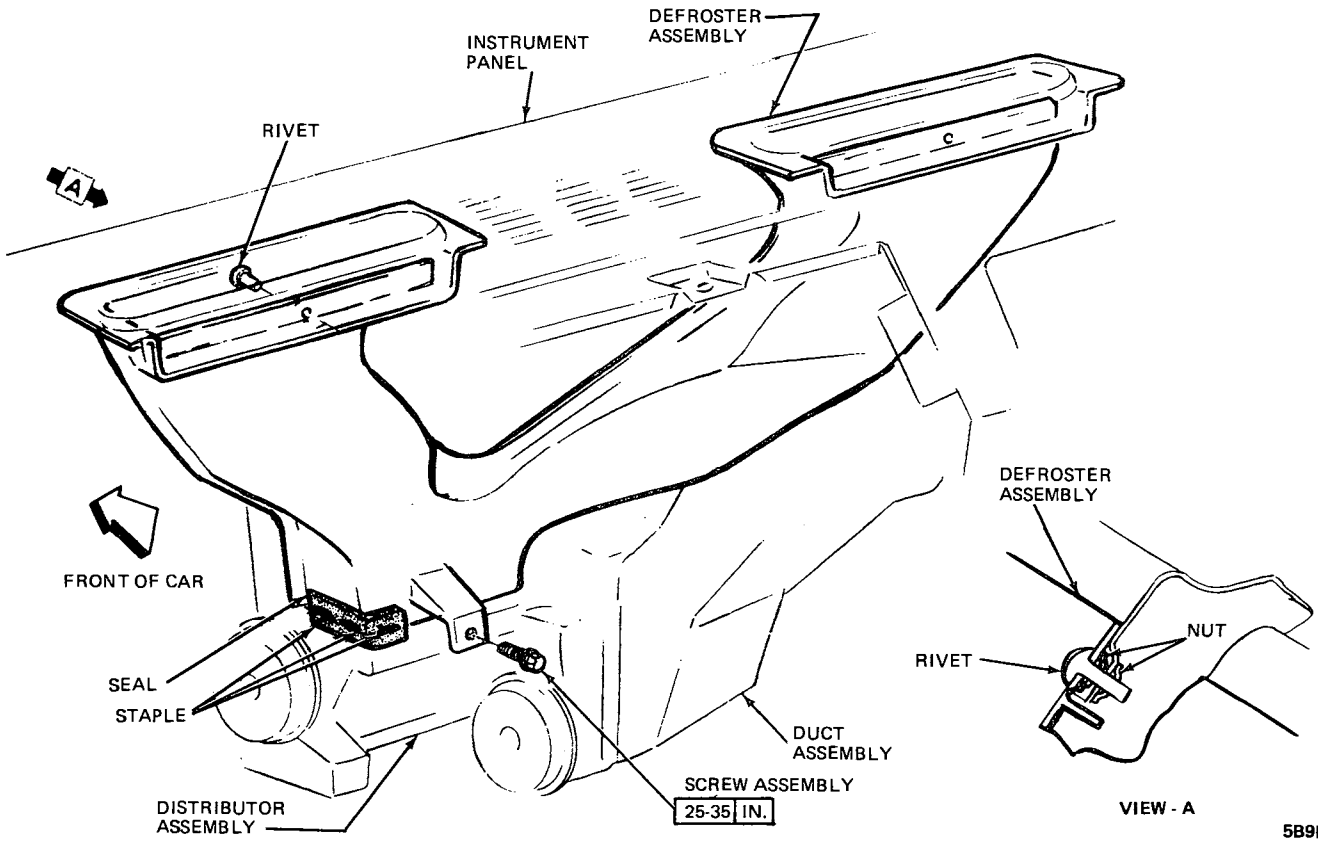


Figure 9B-173 - Defroster Outlet Assembly - H Series

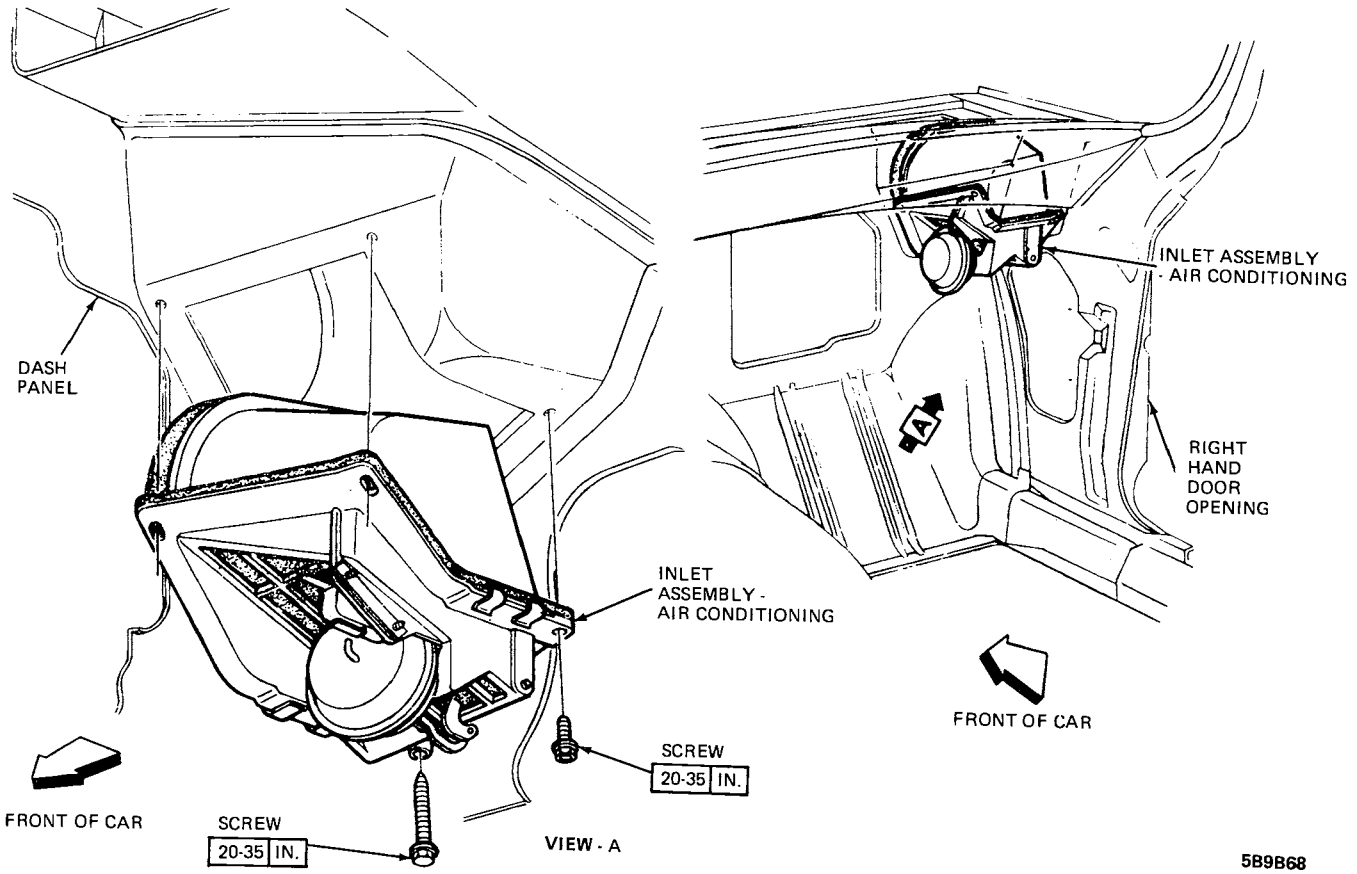


Figure 9B-174 - Plenum Air Inlet System - H Series

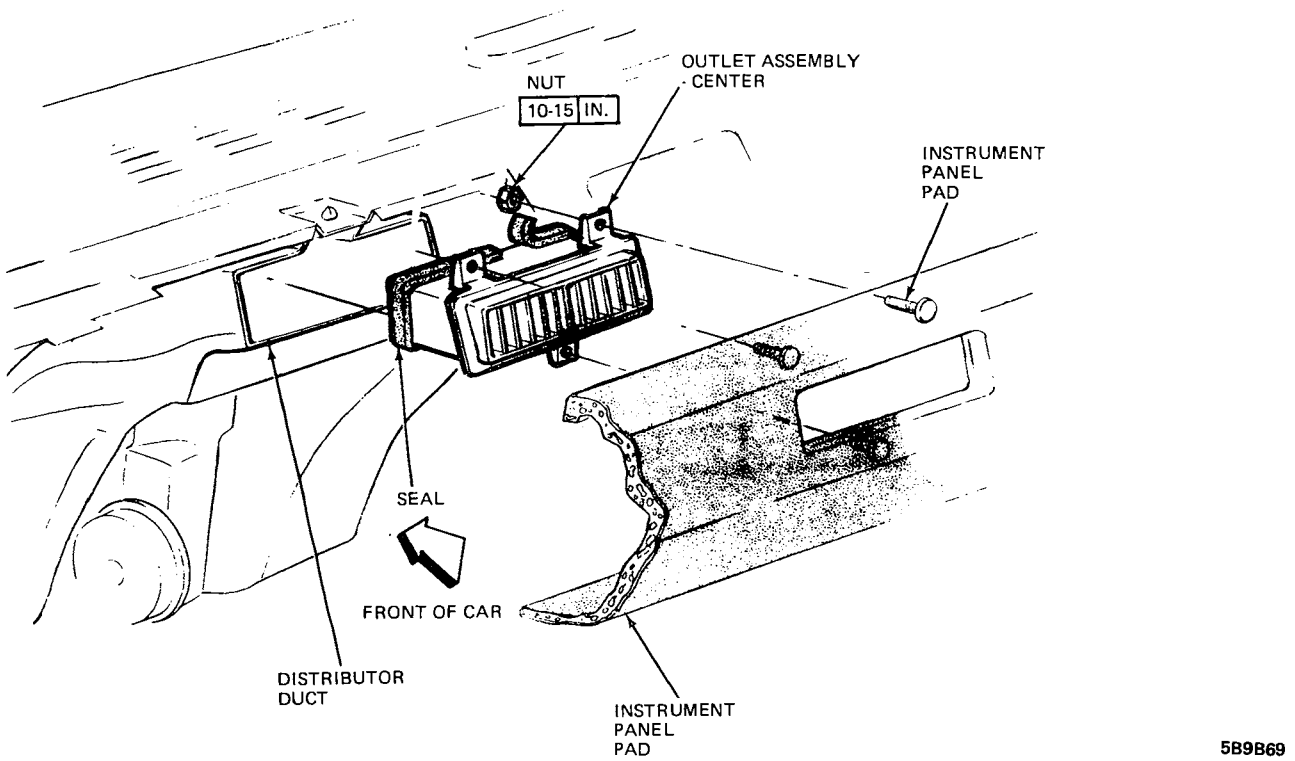


Figure 9B-175 - Center Outlet - Upper - H Series

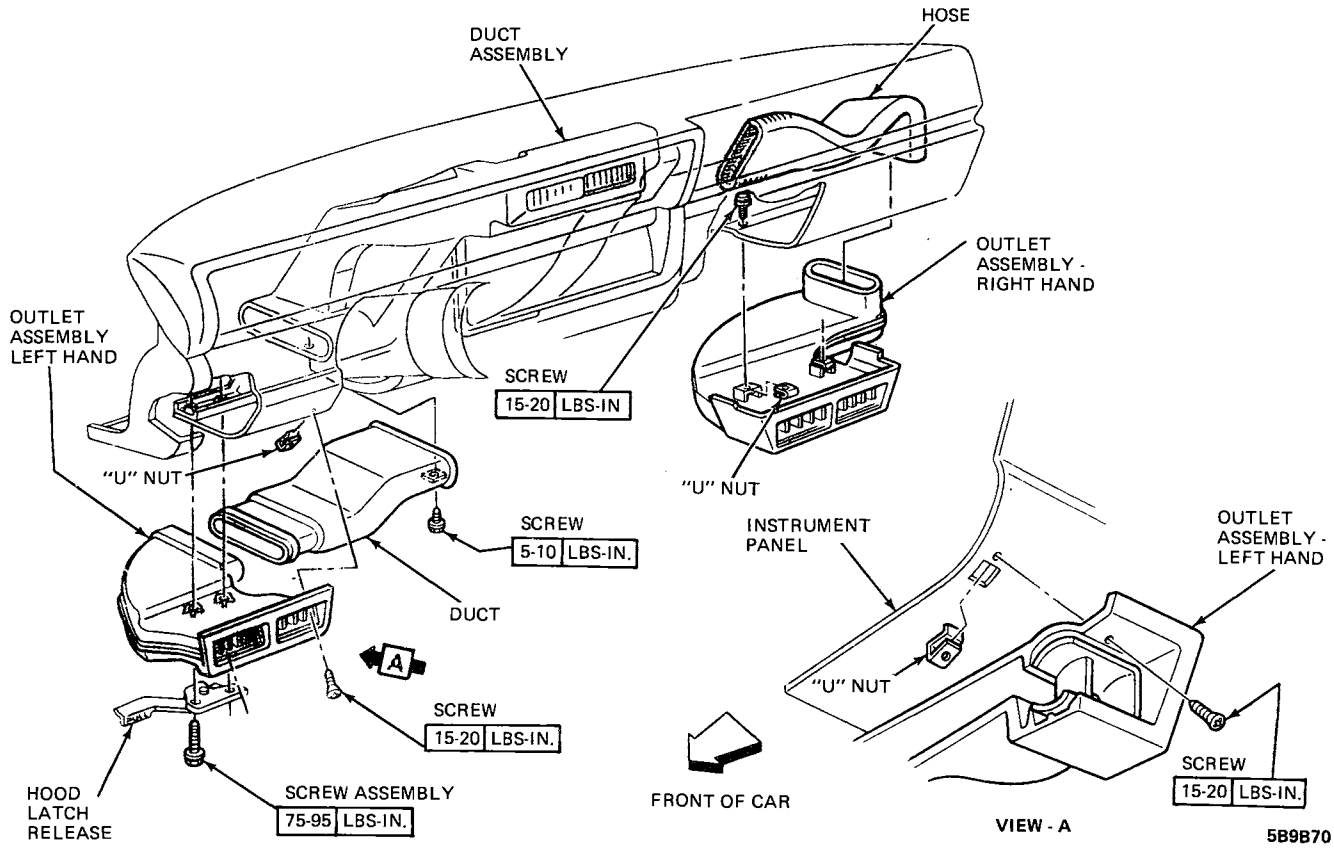


Figure 9B-176 - Lap Coolers - H Series

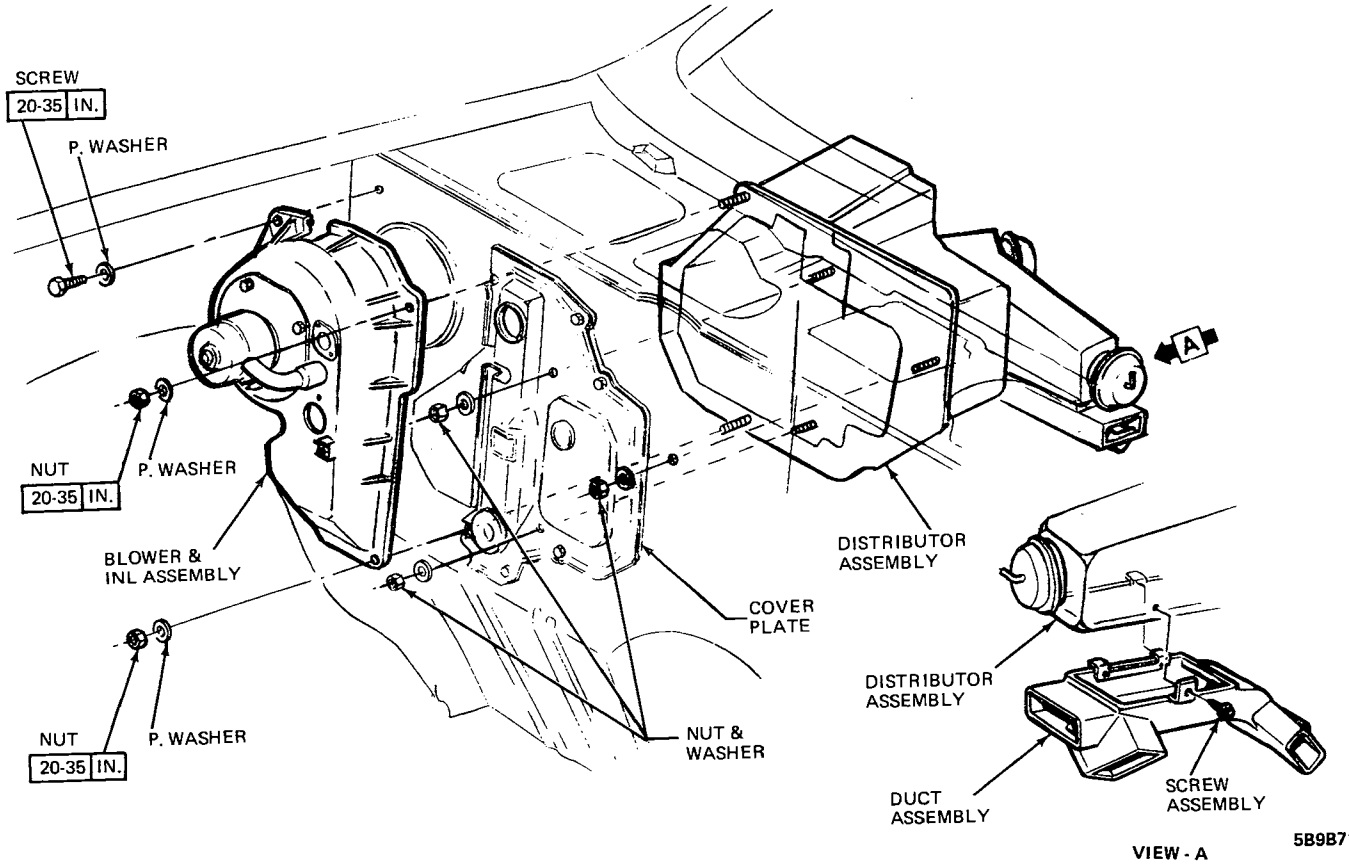


Figure 9B-177 - Blower and Distributor Assembly - H Series

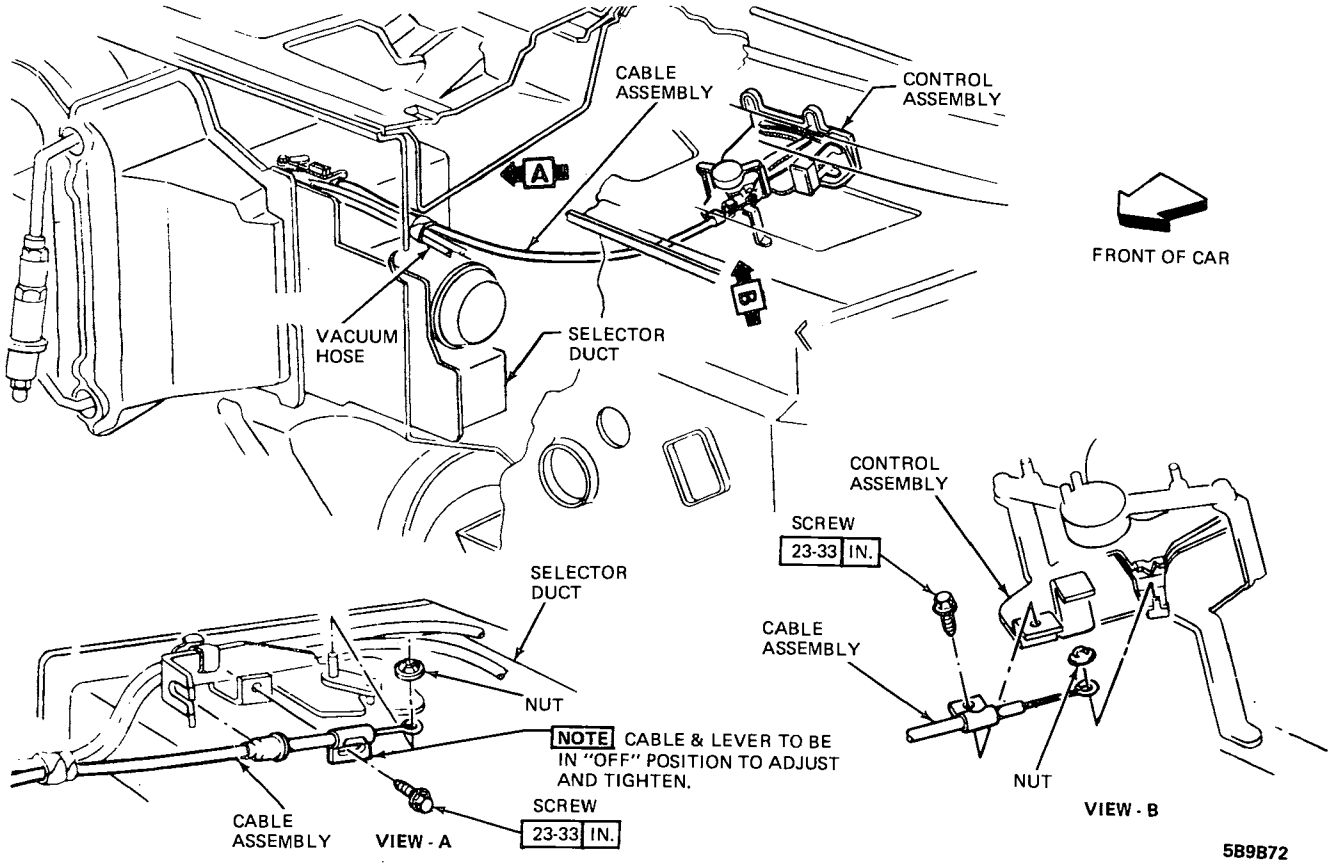


Figure 9B-178 - Control Cable Routing - H Series

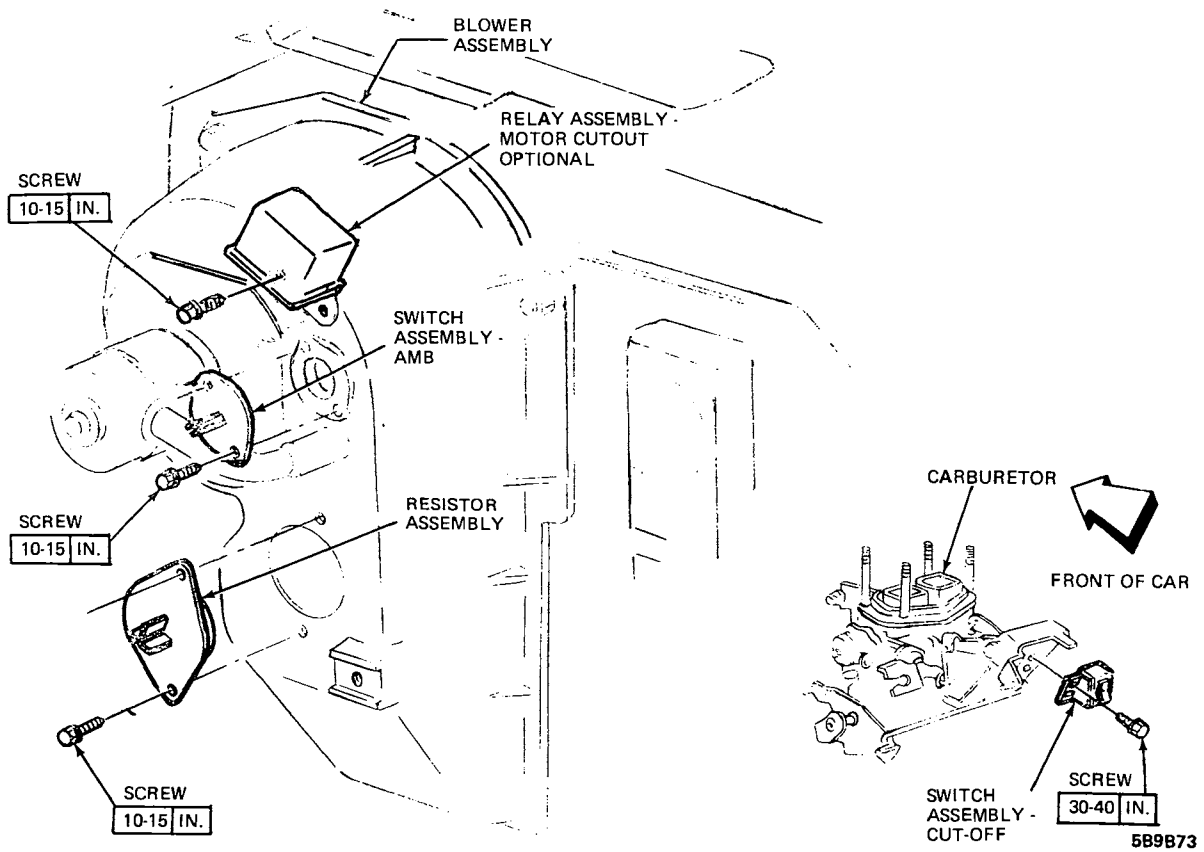


Figure 9B-180 Relay - Switch - Resistor Assembly - H Series

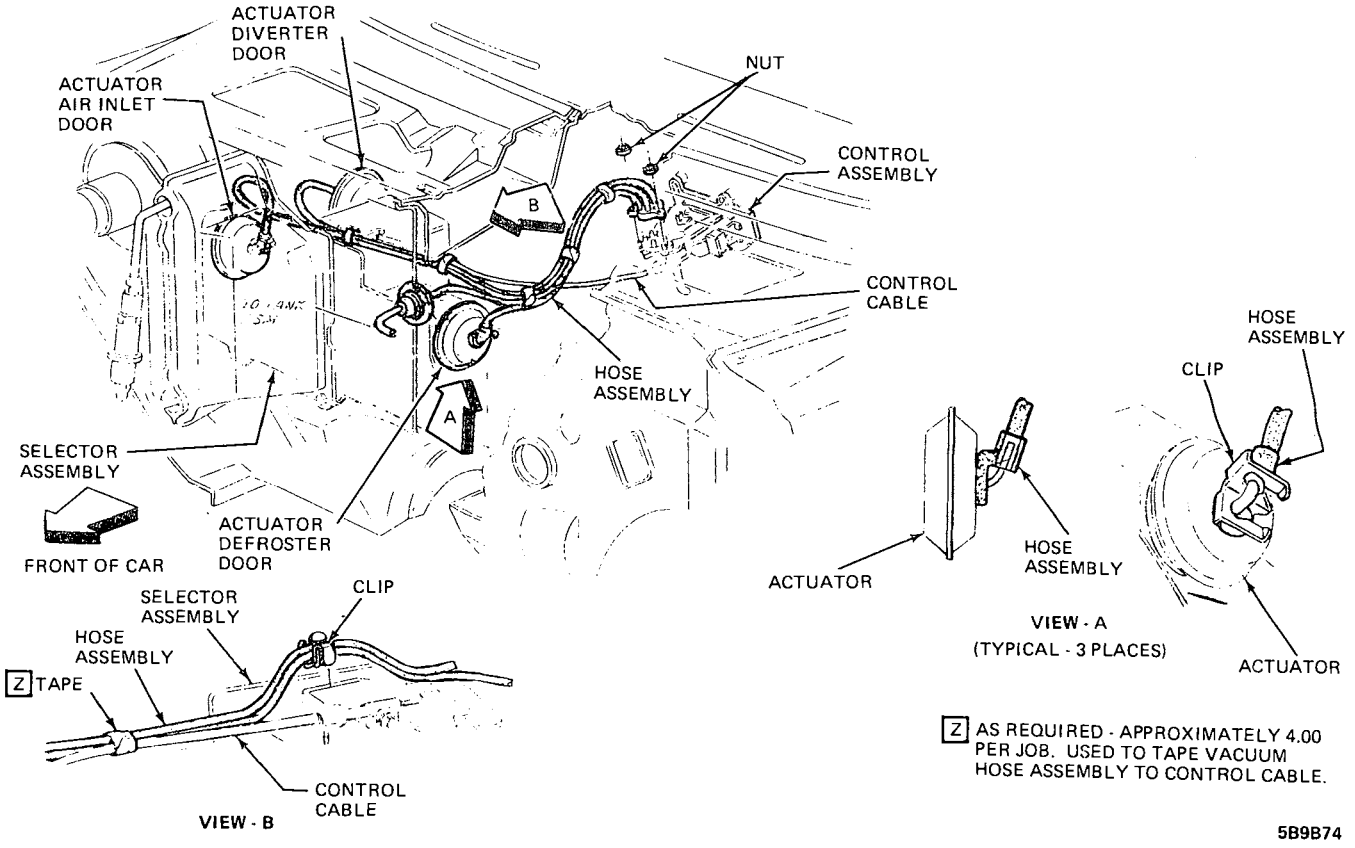


Figure 9B-181 - Instrument Panel Vacuum Hose Assembly - H Series

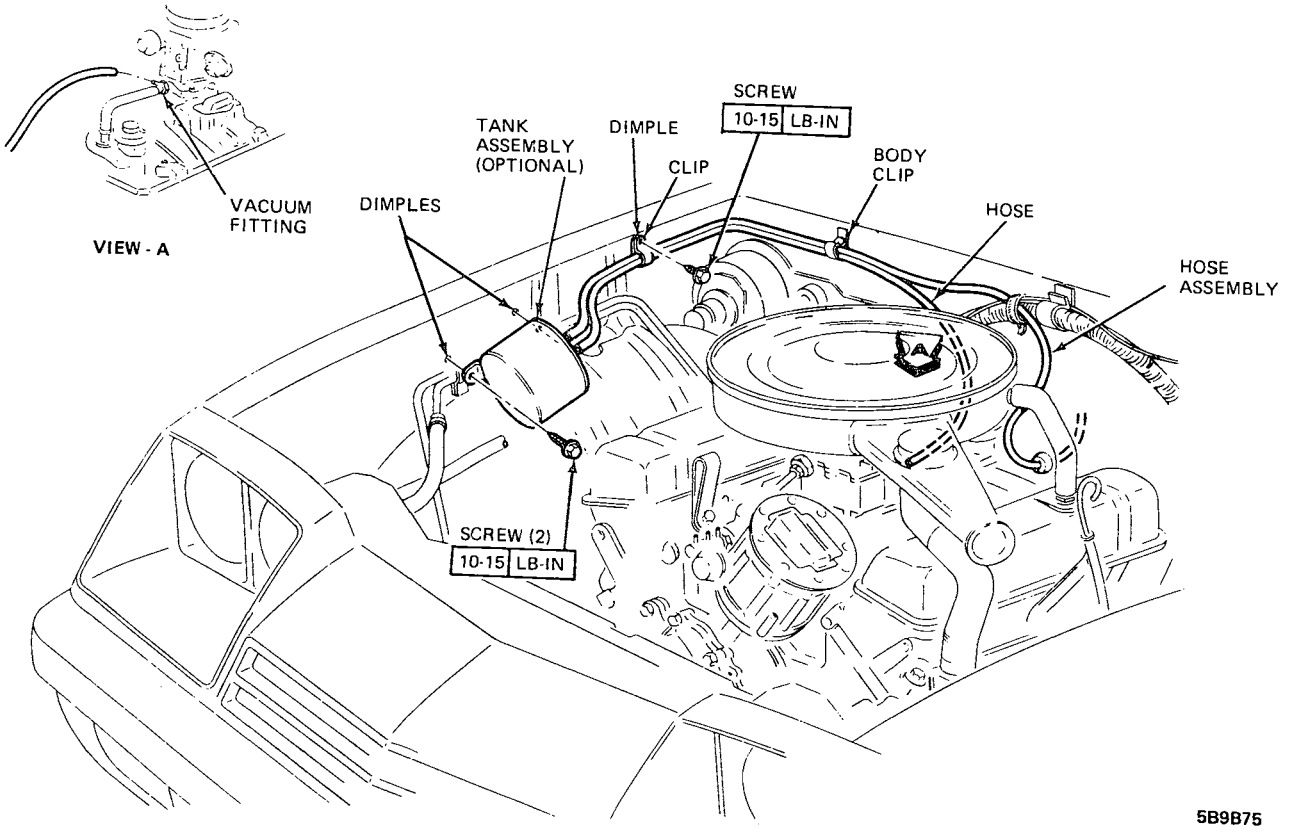


Figure 9B-182 - Engine Compartment Vacuum Hose - H Series

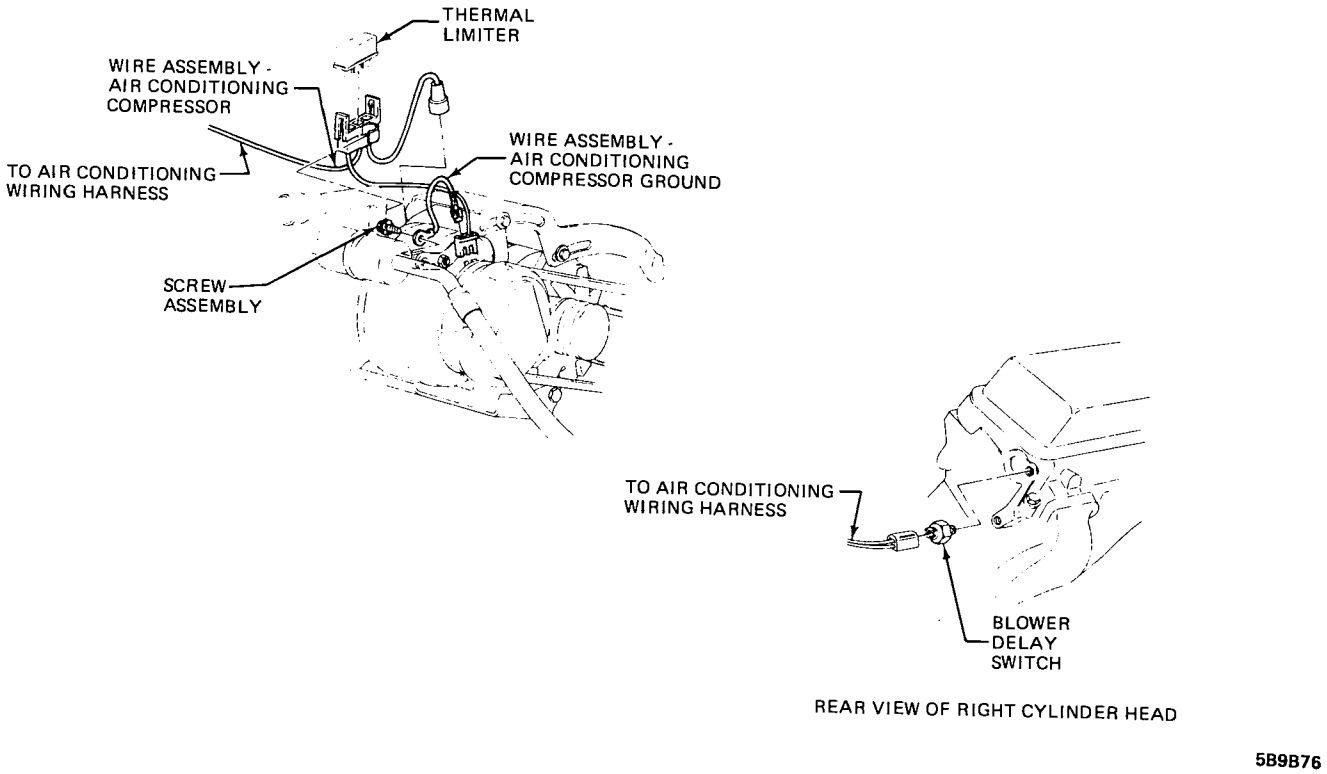


Figure 9B-183 - A/C Compressor Wiring - H series

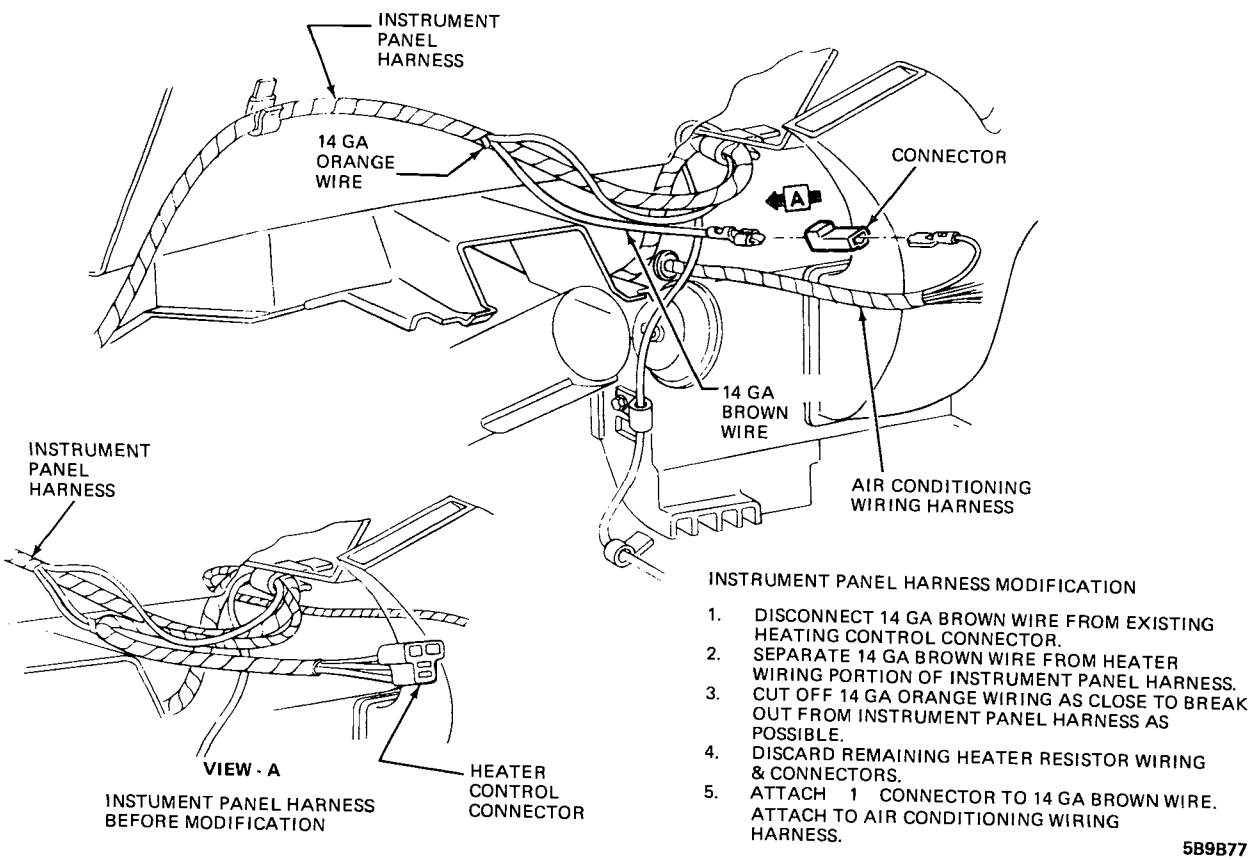


Figure 9B-184 - Instrument Panel Wiring - A/C - H Series

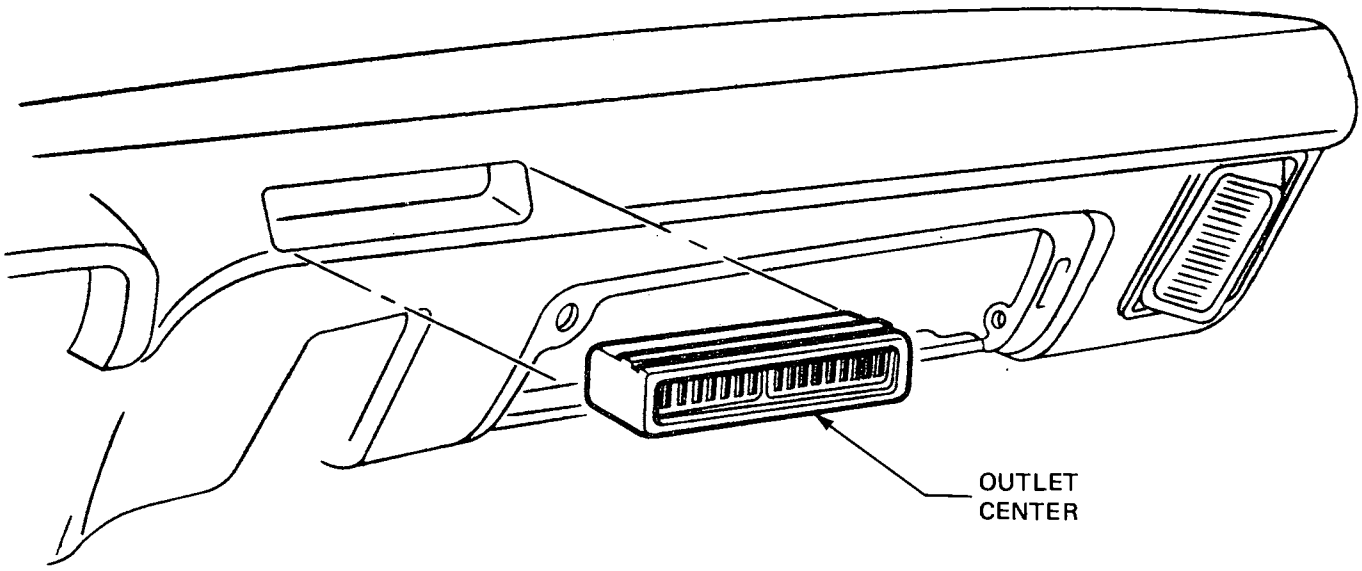


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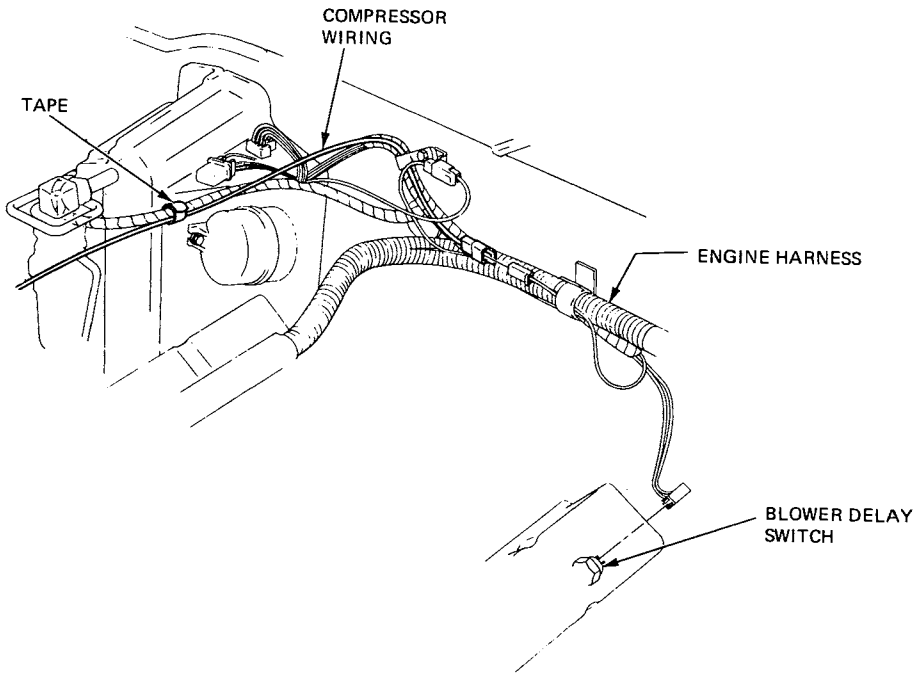
Figure 9B-185 - Center Duct Outlet - X Series



5B9B82

Figure 9B-186 - A/C Blower Motor Wiring - V-6 231 & V-8 350 - X Series

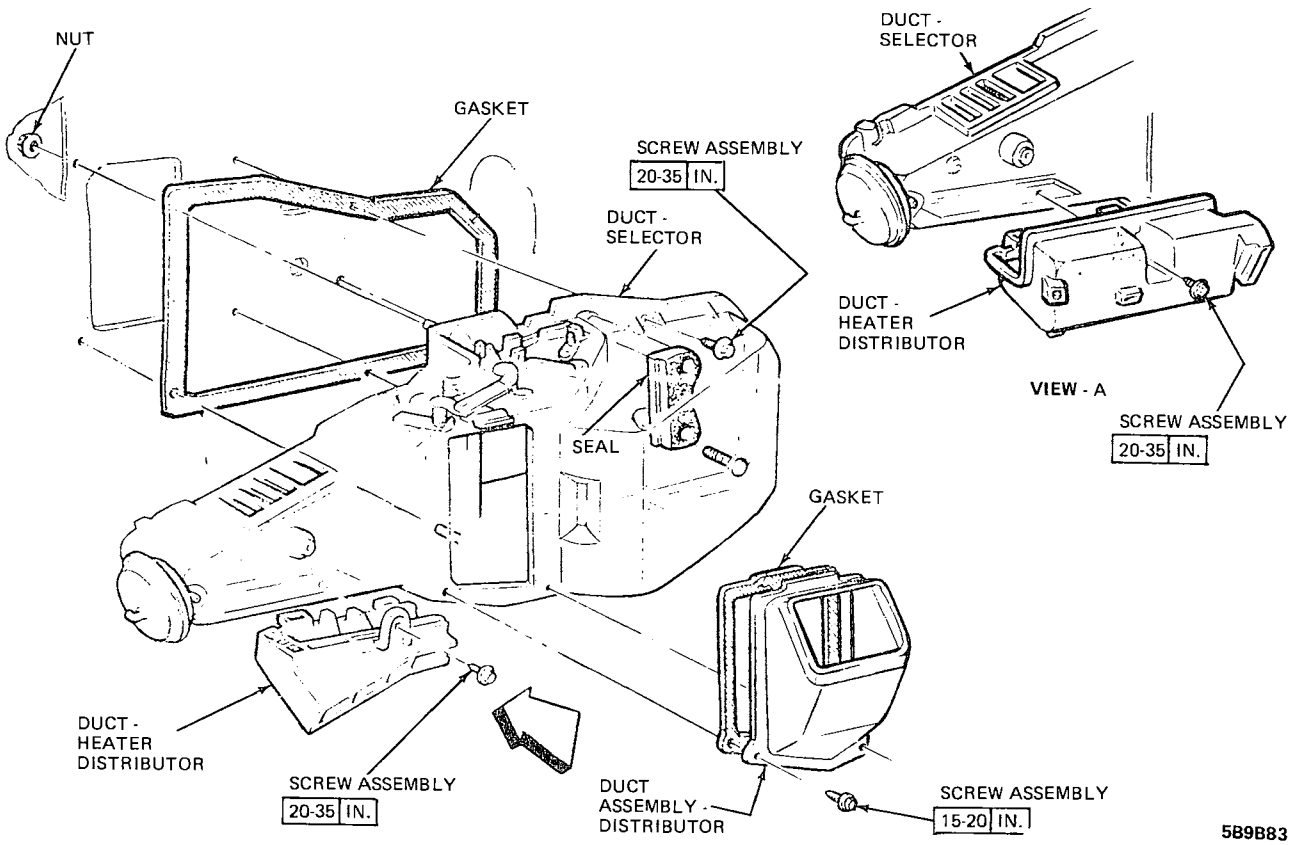


Figure 9B-187 - Selector and Distributor Ducts - X Series

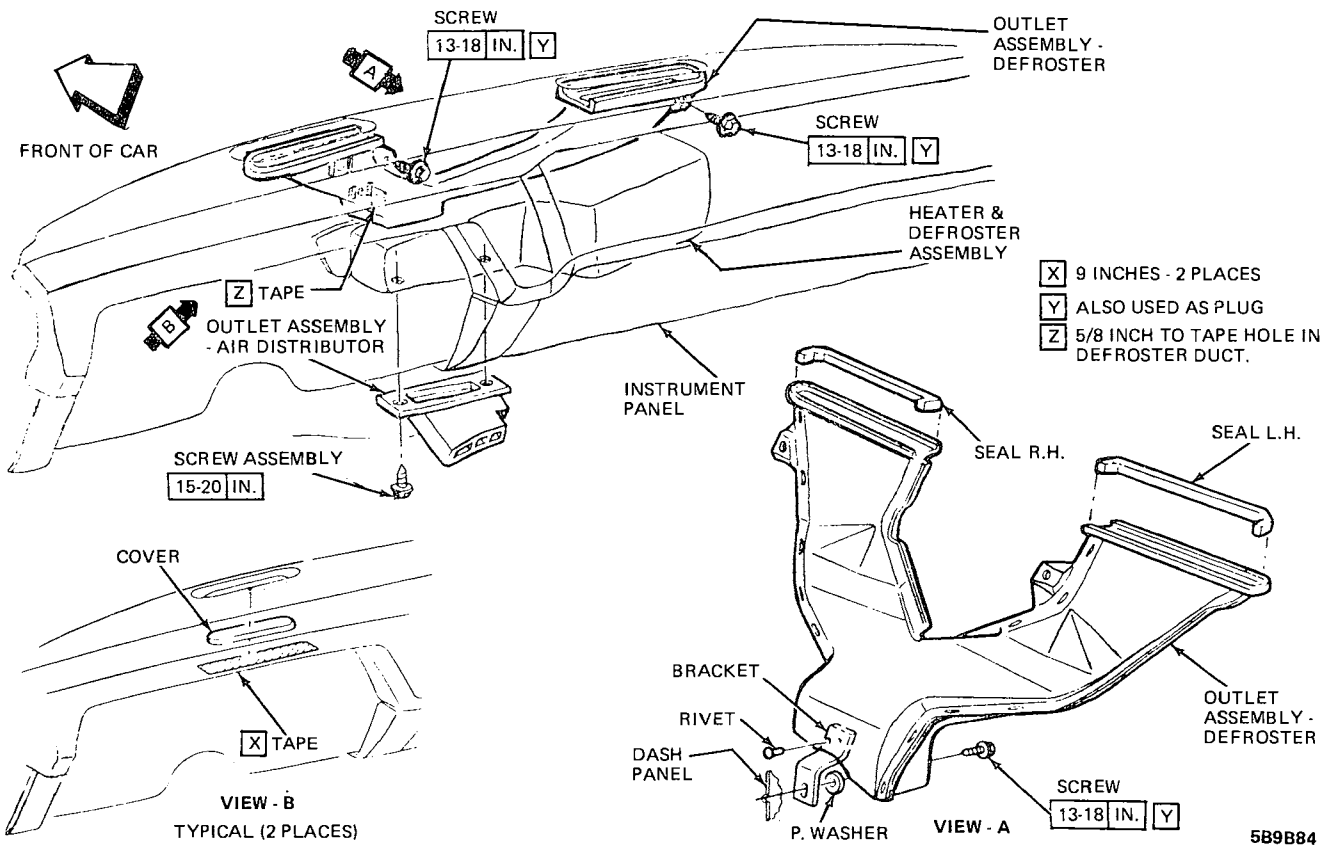


Figure 9B-188 - Heater - Defroster Outlets and Defroster Opening Cover - X Series

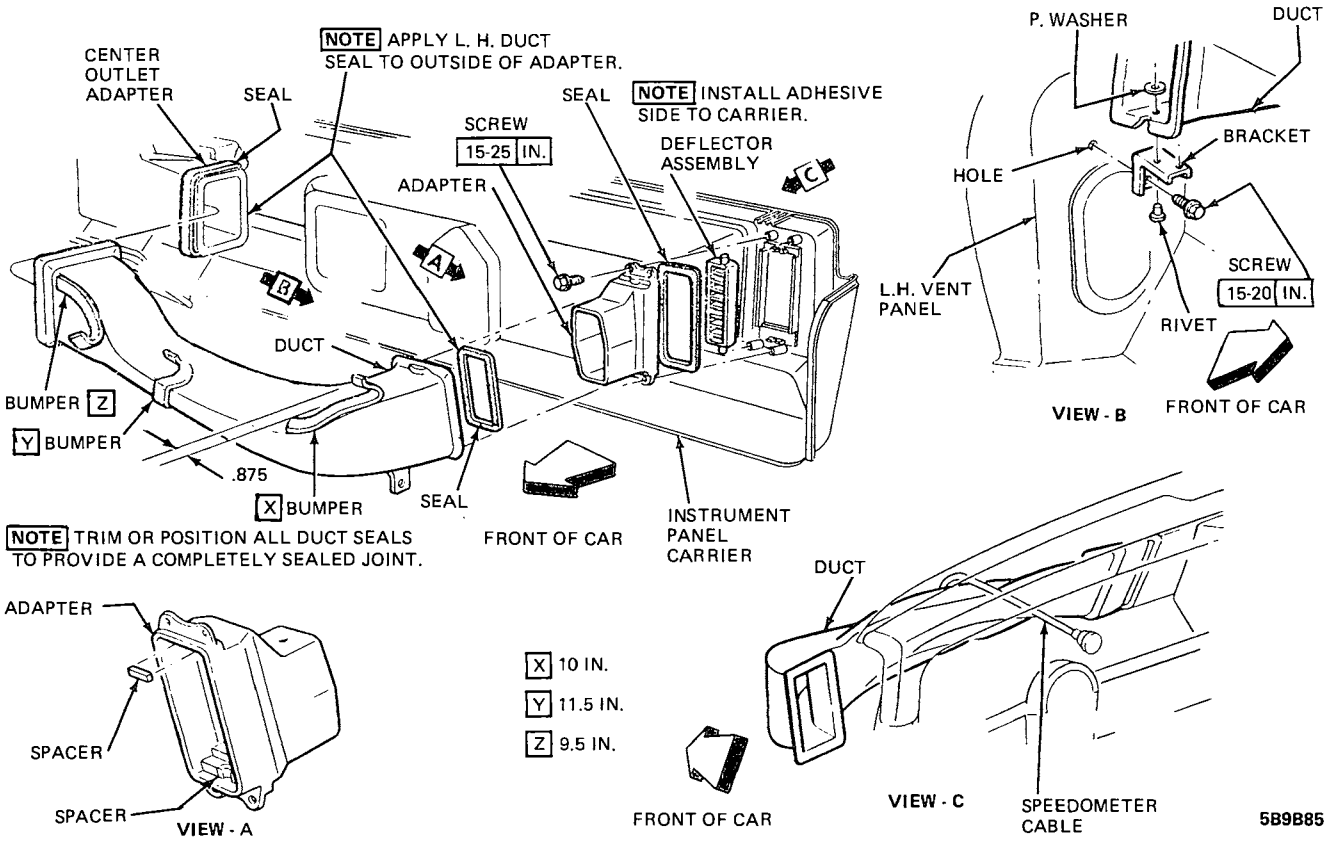


Figure 9B-190 - Side Outlet and Ducts - X Series

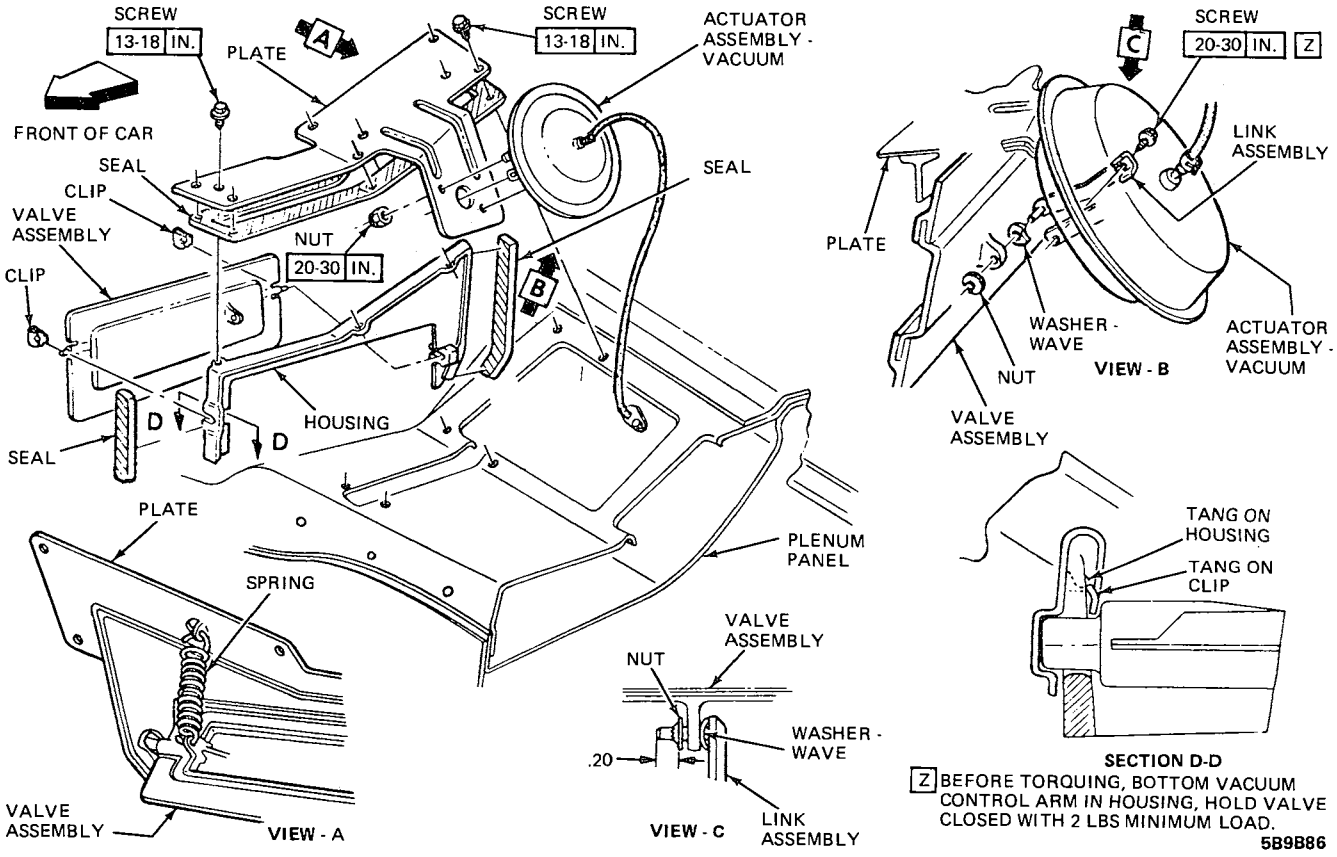


Figure 9B-191 - Plenum Valve - X Series

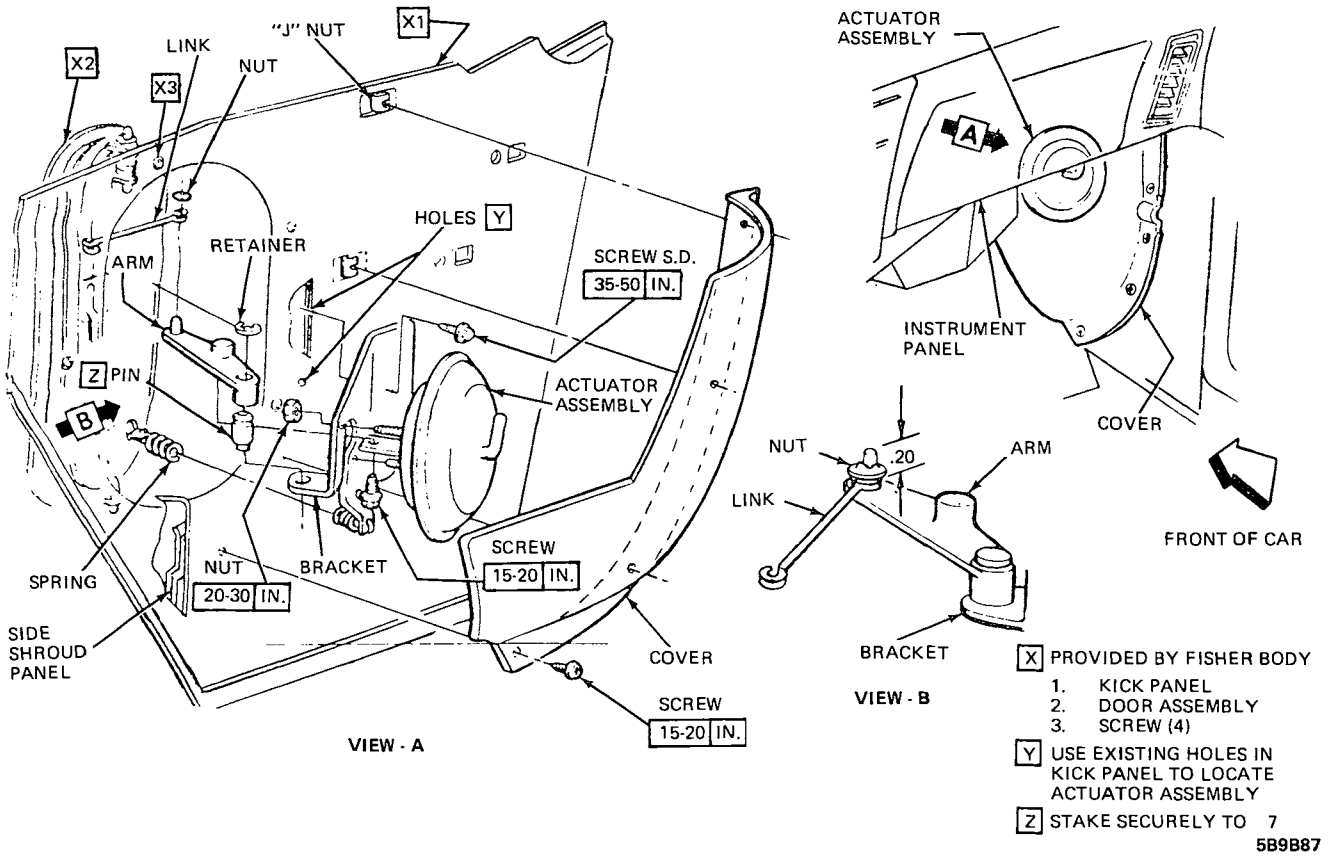


Figure 9B-192 - Side Shroud Control - Kick Panel and Cover - X Series

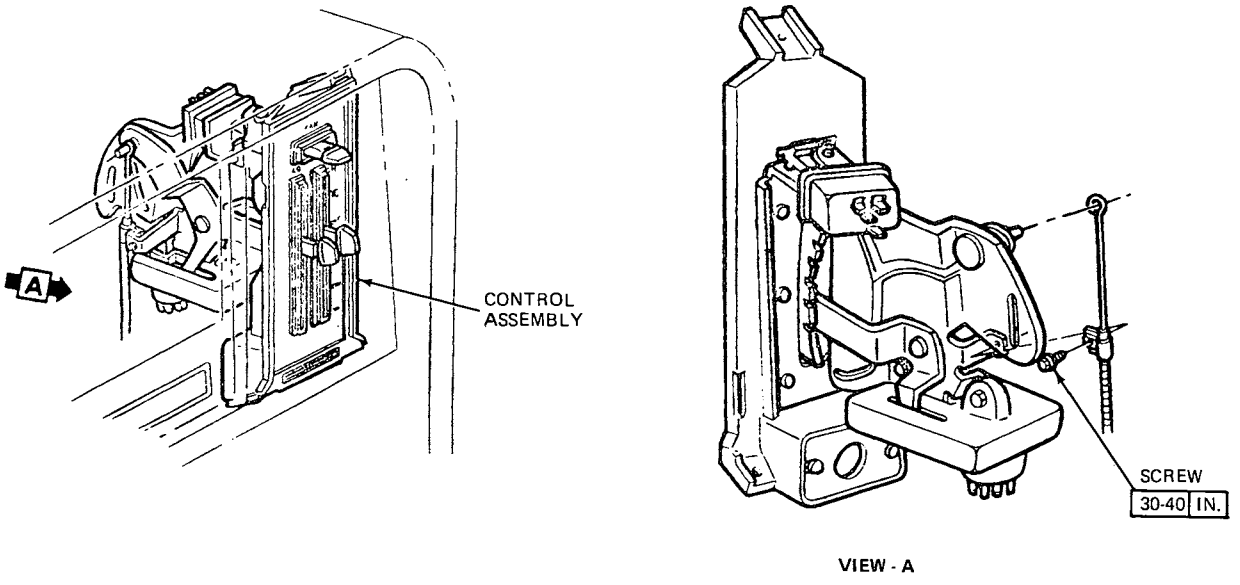


Figure 9B-193 - Instrument Panel Control Assembly - X Series

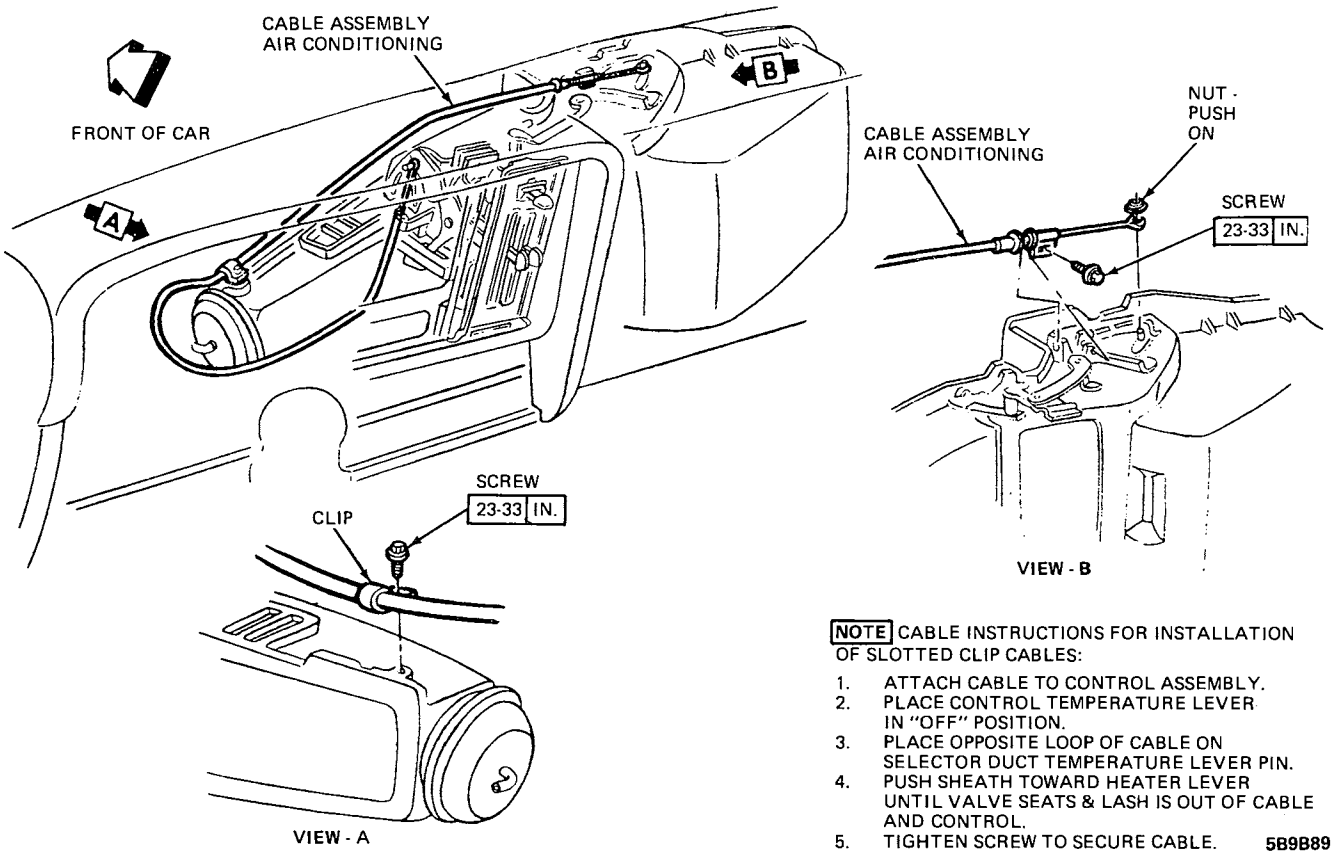


Figure 9B-194 - Control Cable - X Series

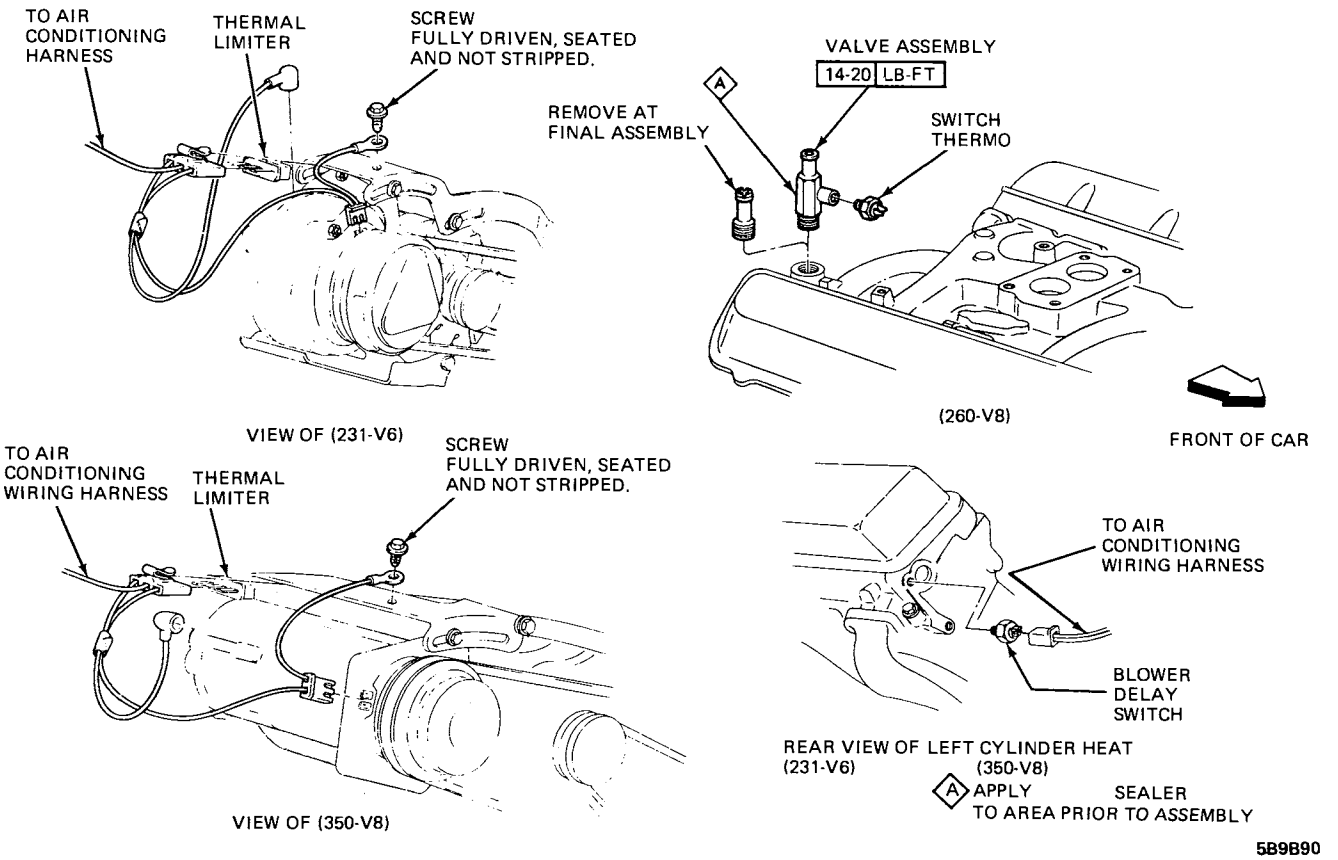


Figure 9B-195 - Relays - Resistor and Switch - X Series

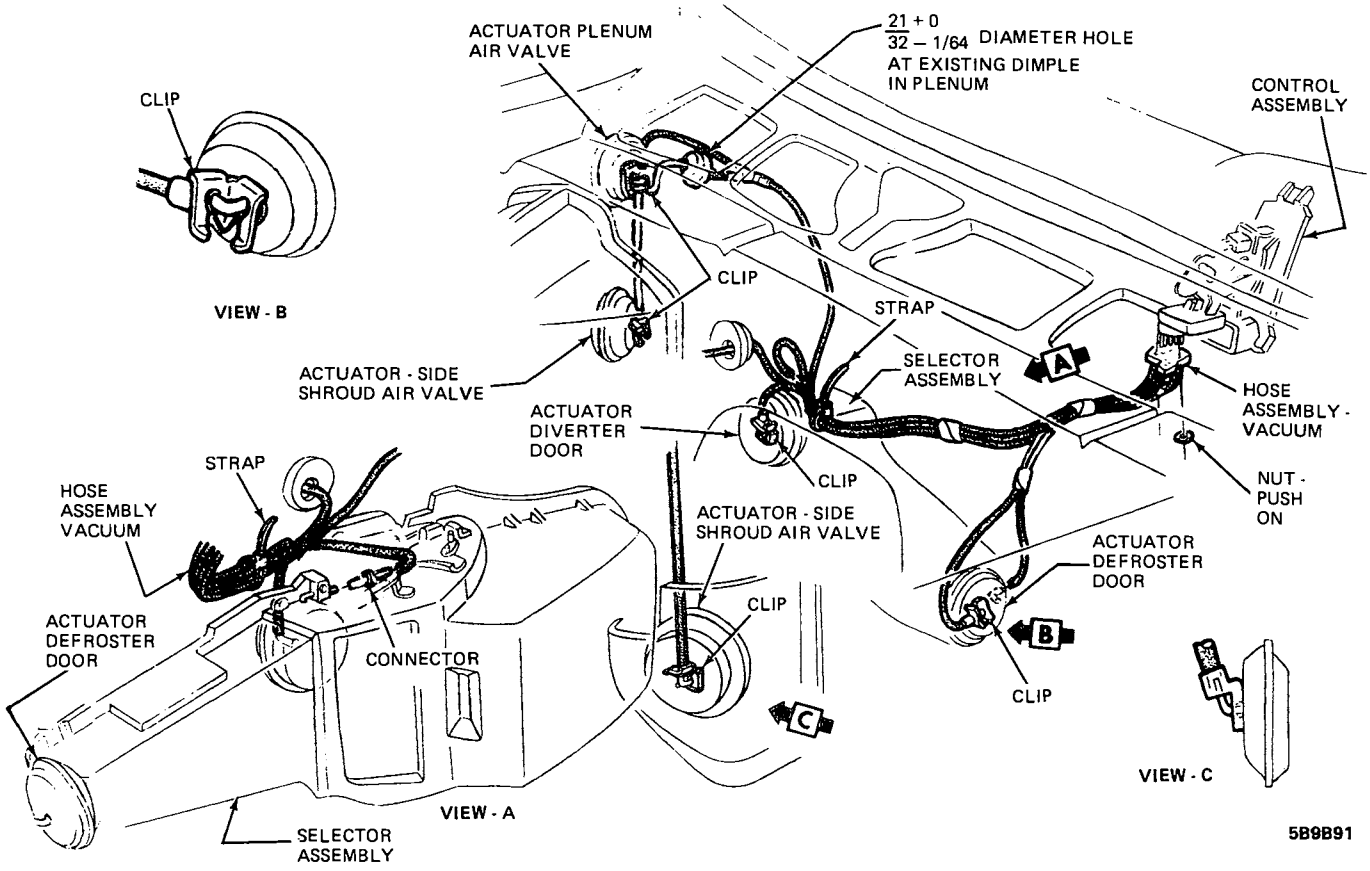


Figure 9B-196 - Instrument Panel Vacuum Routing - X Series

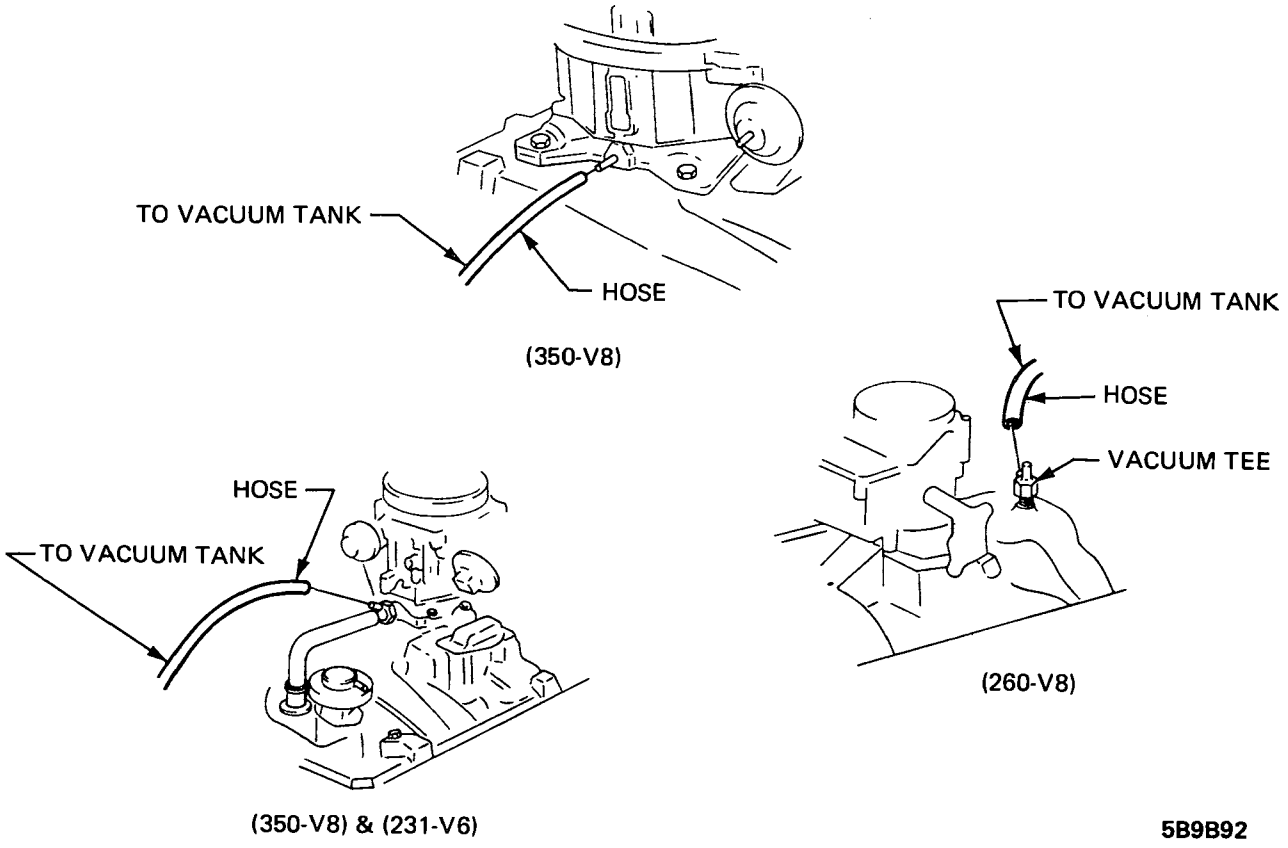


Figure 9B-197 - Vacuum Tank Assembly Hose Attachments - X Series

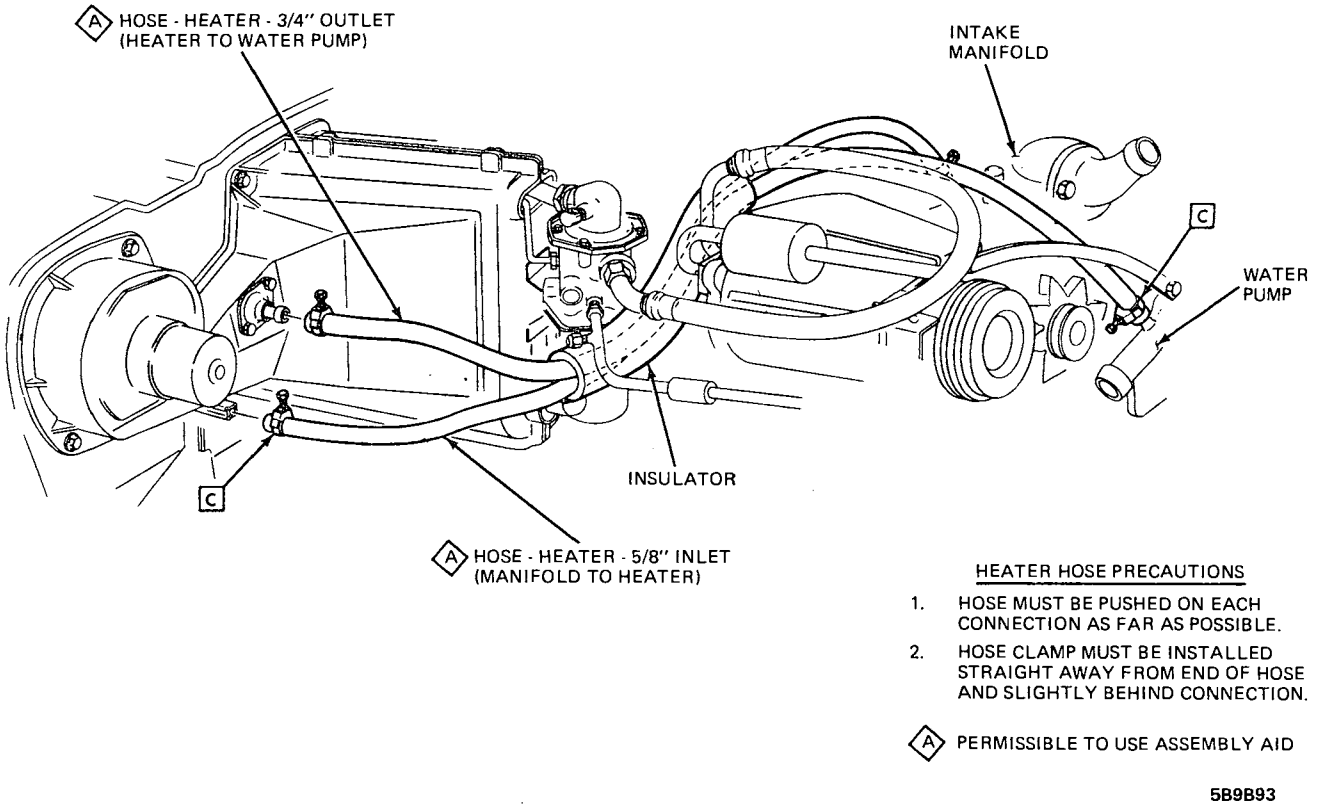


Figure 9B-198 - Heater Hoses - A/C - V-8 350 Engine - X Series

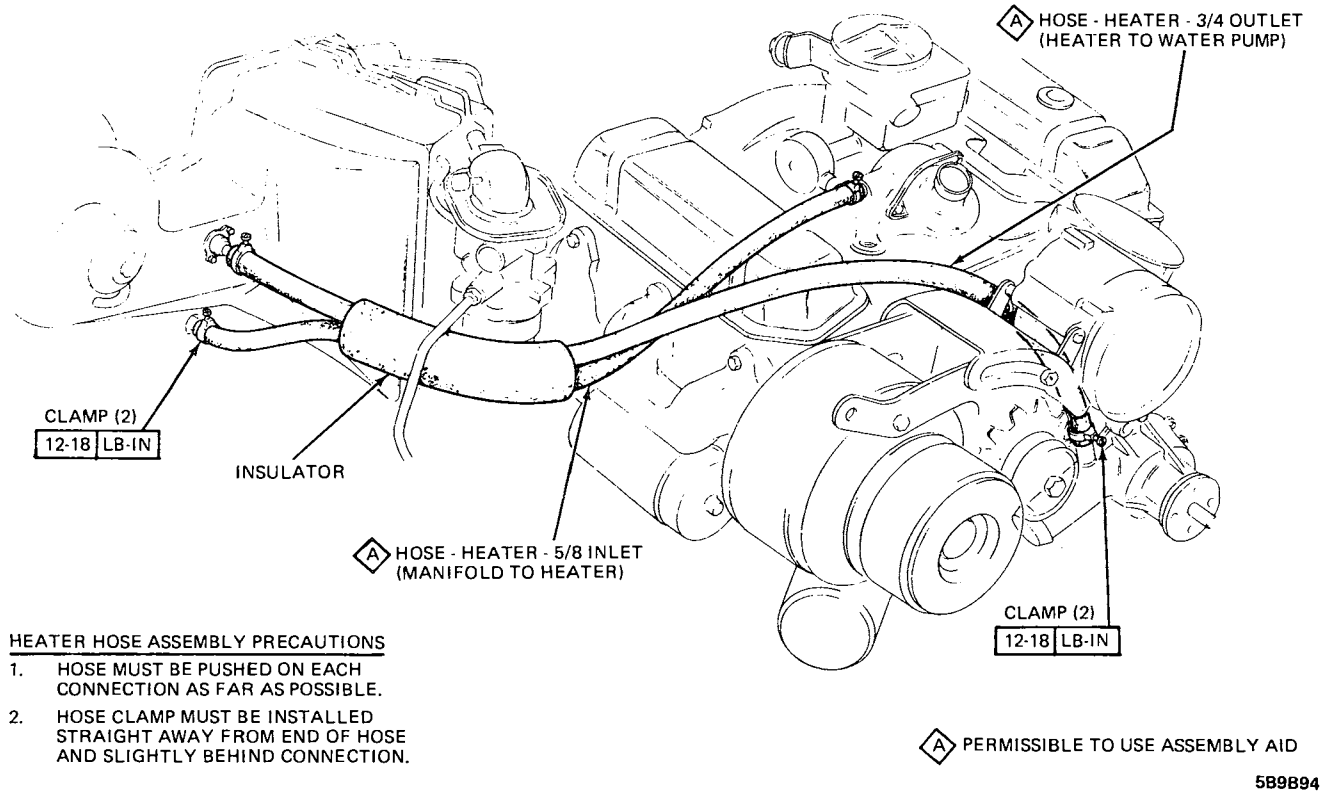


Figure 9B-200 - Heater Hoses- A/C - V-6 231 Engine - X Series

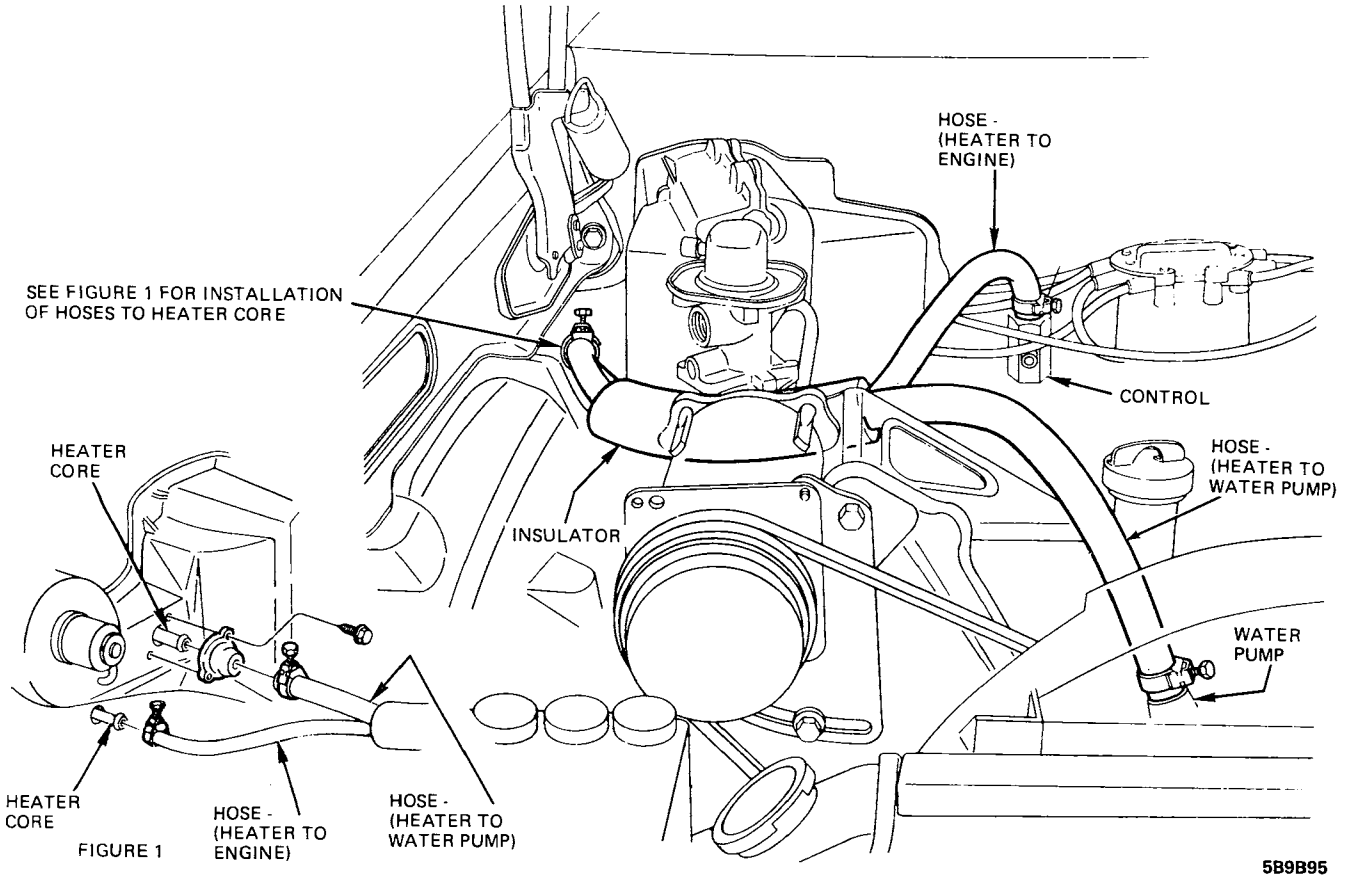


Figure 9B-201 - Heater Hoses - A/C - V-8 260 Engine - X Series

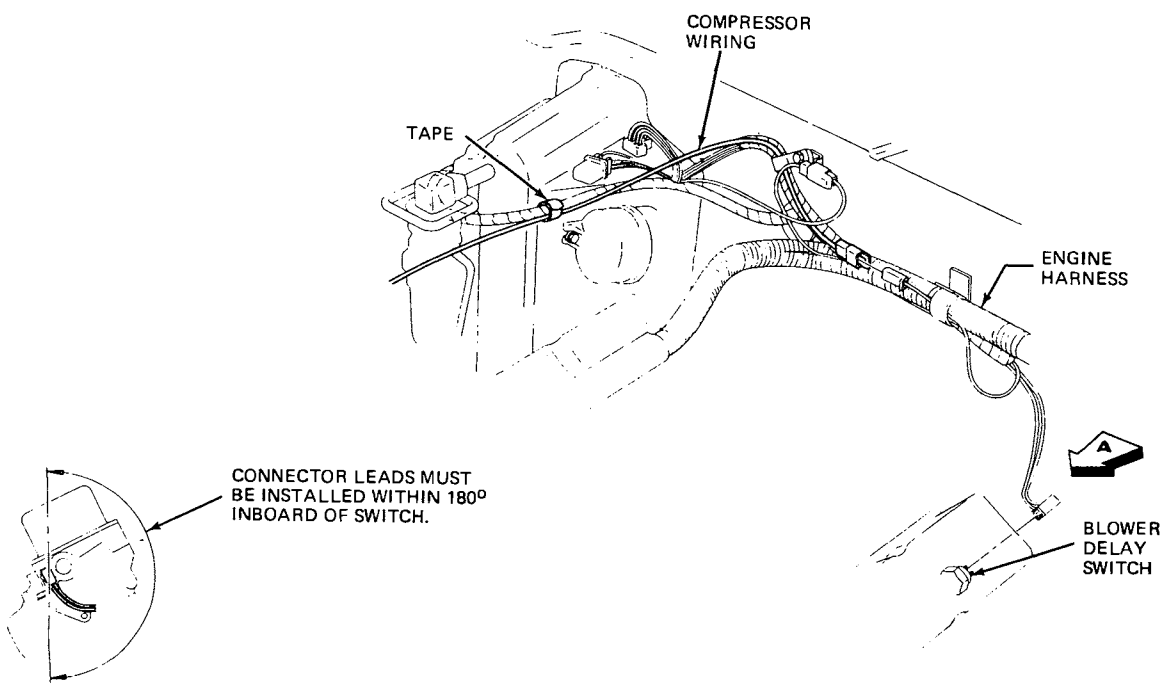


Figure 9B-202 - A/C Blower Motor Wiring - V-6 231 Engine - V-8 350 Engine - X Series

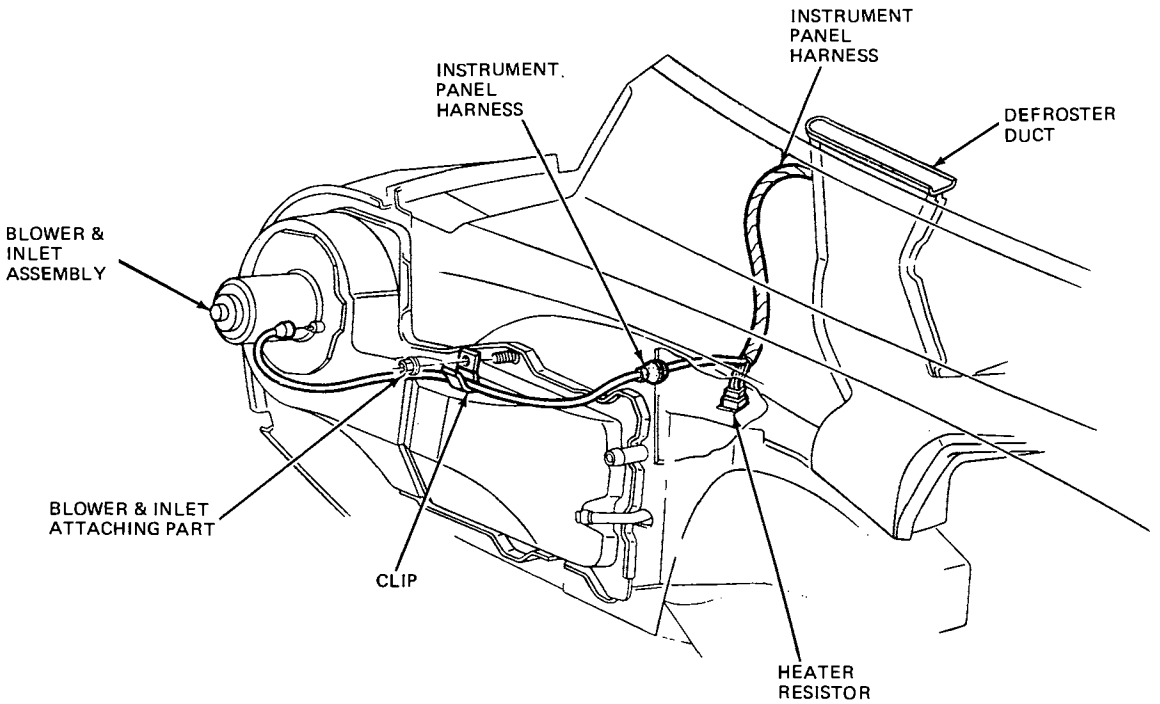


Figure 9B-203 - Instrument Panel Harness to Blower & Inlet Assembly - X Series

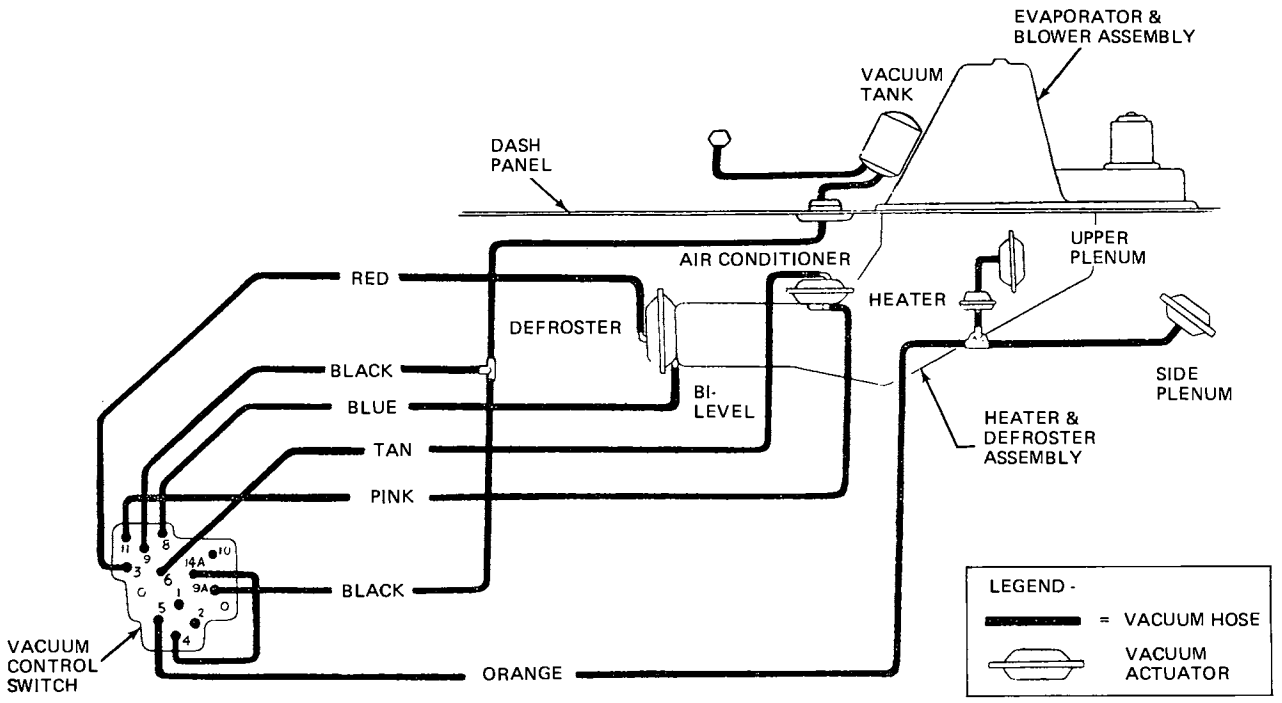


Figure 9B-204 - Vacuum Hose Diagram - Heater - A/C - X Series

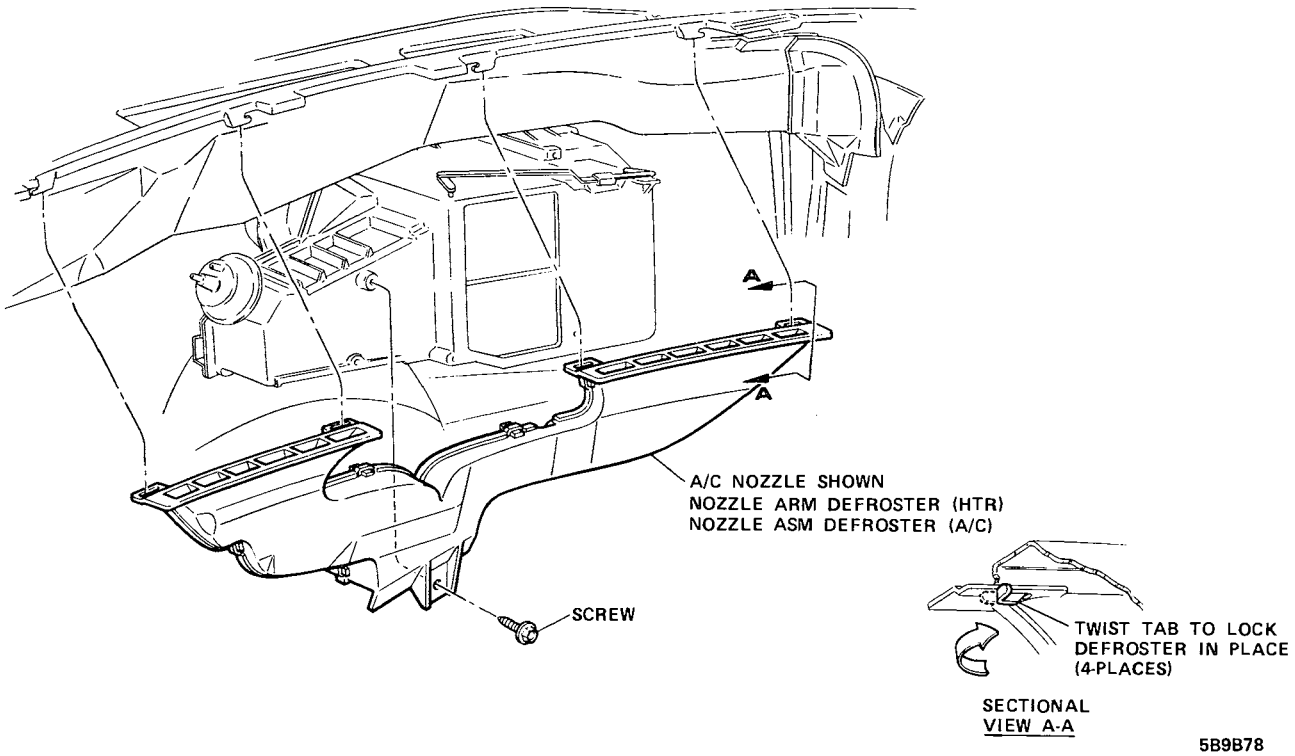
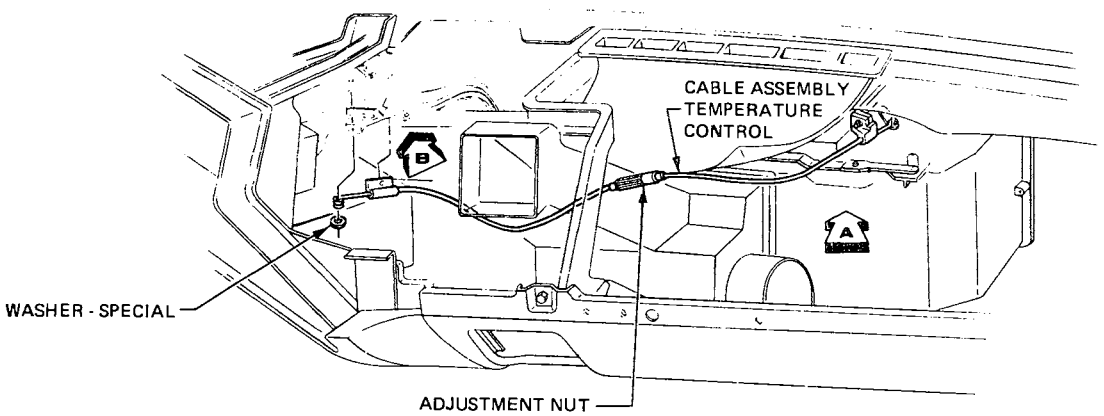
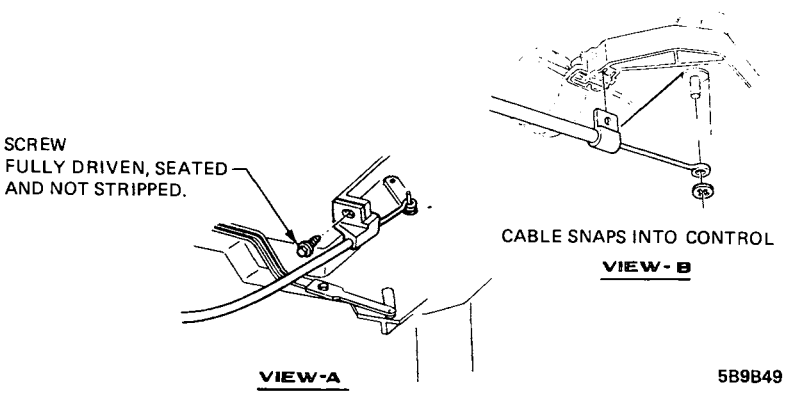


Figure 9B-205 - Outlet - Defroster Nozzle - A Series





CONTROL WIRE ASSEMBLE & ADJUSTMENT

1 — SUB-ASSEMBLE CONTROL WIRE TO AIR CONDITIONING HEATER CONTROL ASSEMBLY.

A. SECURE TEMPERATURE WIRE TO TEMPERATURE CONTROL VALVE (RED)

B. ADJUST CONTROL CABLE SO THAT 1/16" TO 1/8" SPRINGBACK IS OBTAINED IN THE HOT POSITION.

CONTROLS MUST BE 100% INSPECTED FOR CORRECT OPERATION & FREE MOVEMENT.

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Figure 9B-206 - Cable - A/C Control (Manual) - A Series

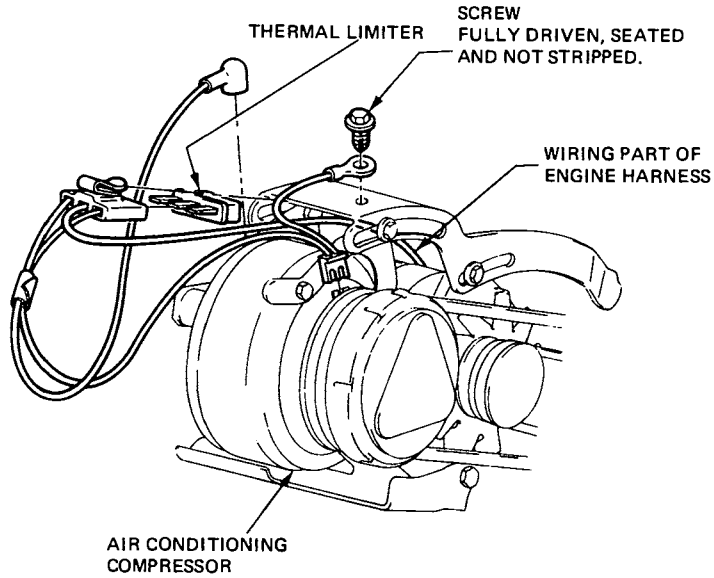


Figure 9B-207 - Thermal Limiter & Wiring - V-6 231 Engine - A Series

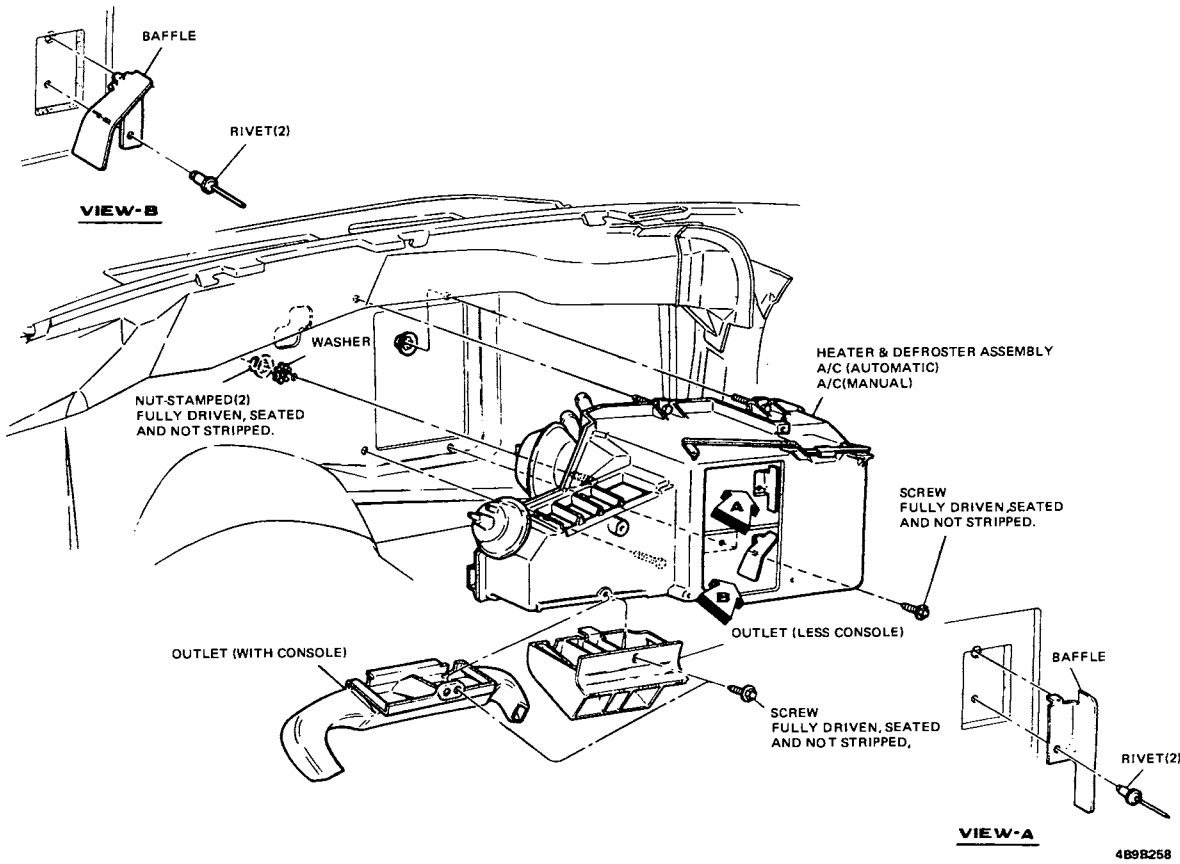


Figure 9B-208 - A/C Heater - Defroster Assembly and Center Outlet - A Series

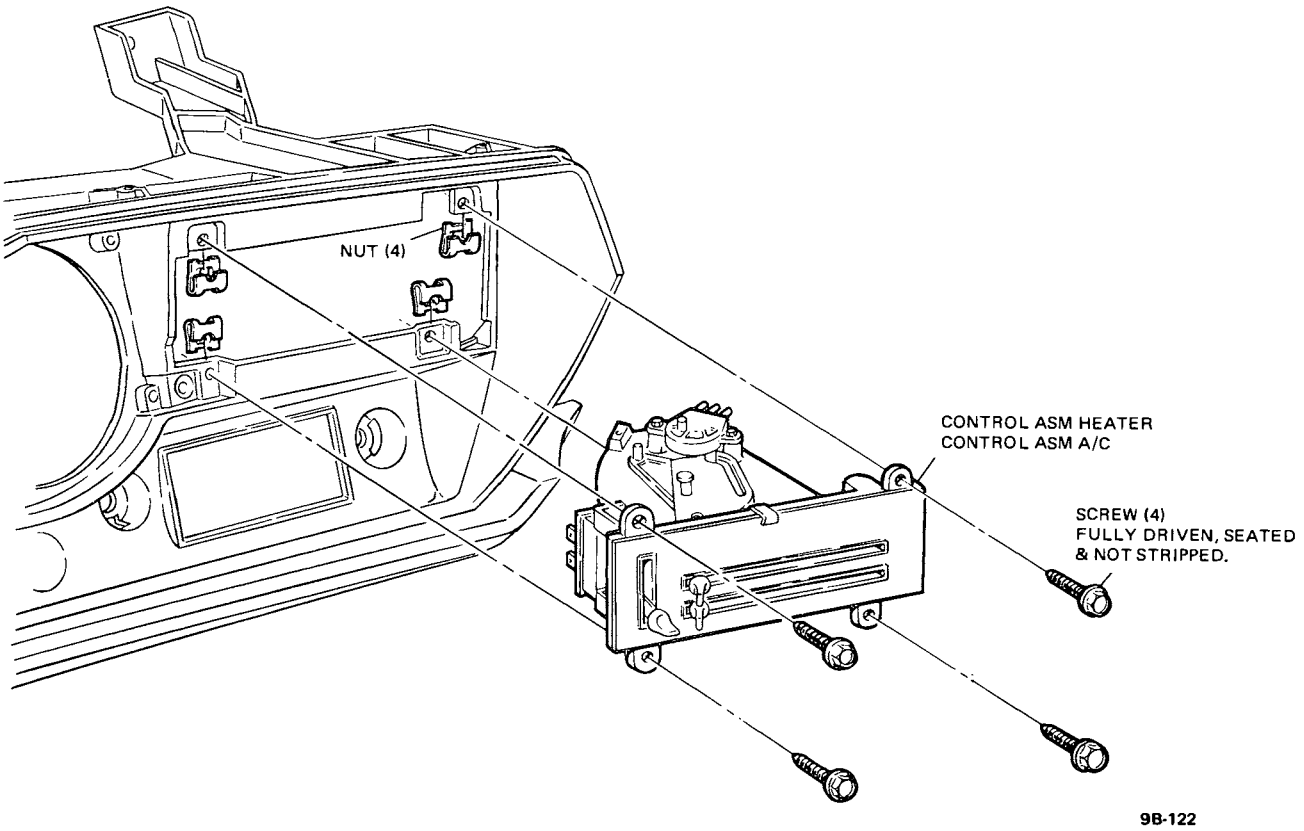


Figure 9B-210 - Heater and A/C to Housing Control Assembly - A Series

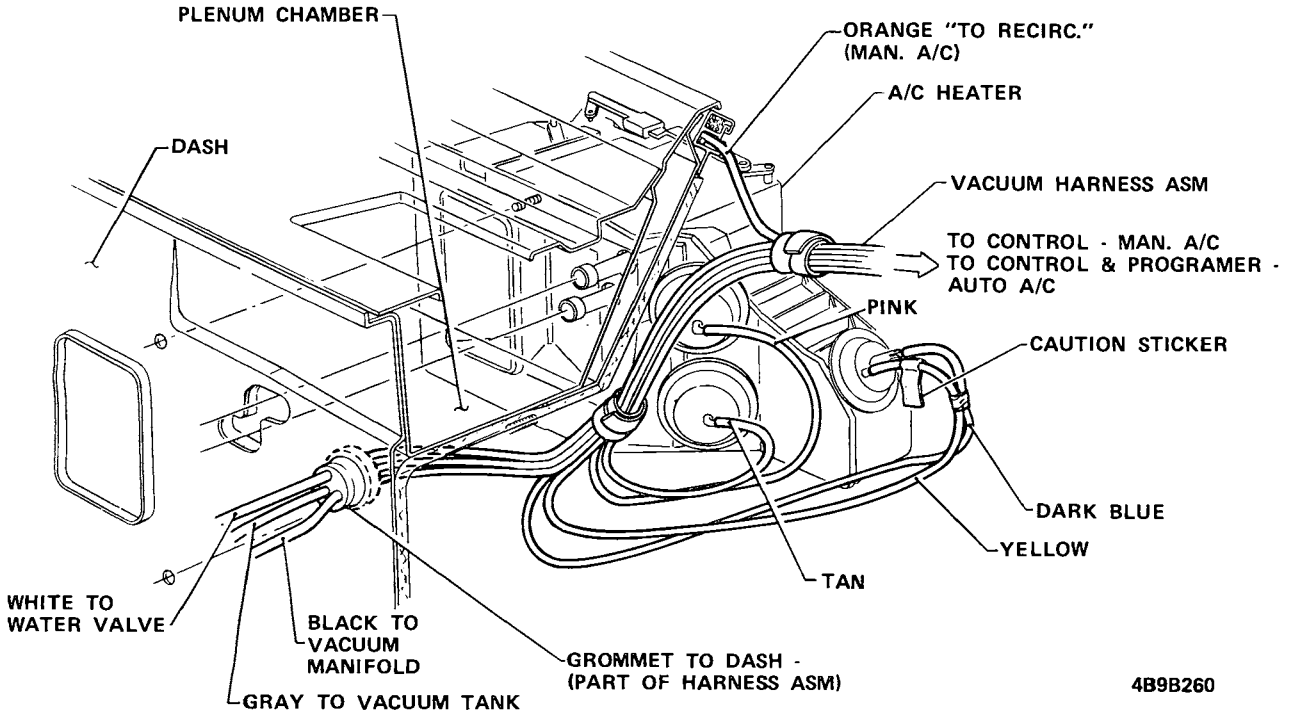


Figure 9B-211 - A/C Vacuum Harness - Passenger Compartment to Heater - A Series

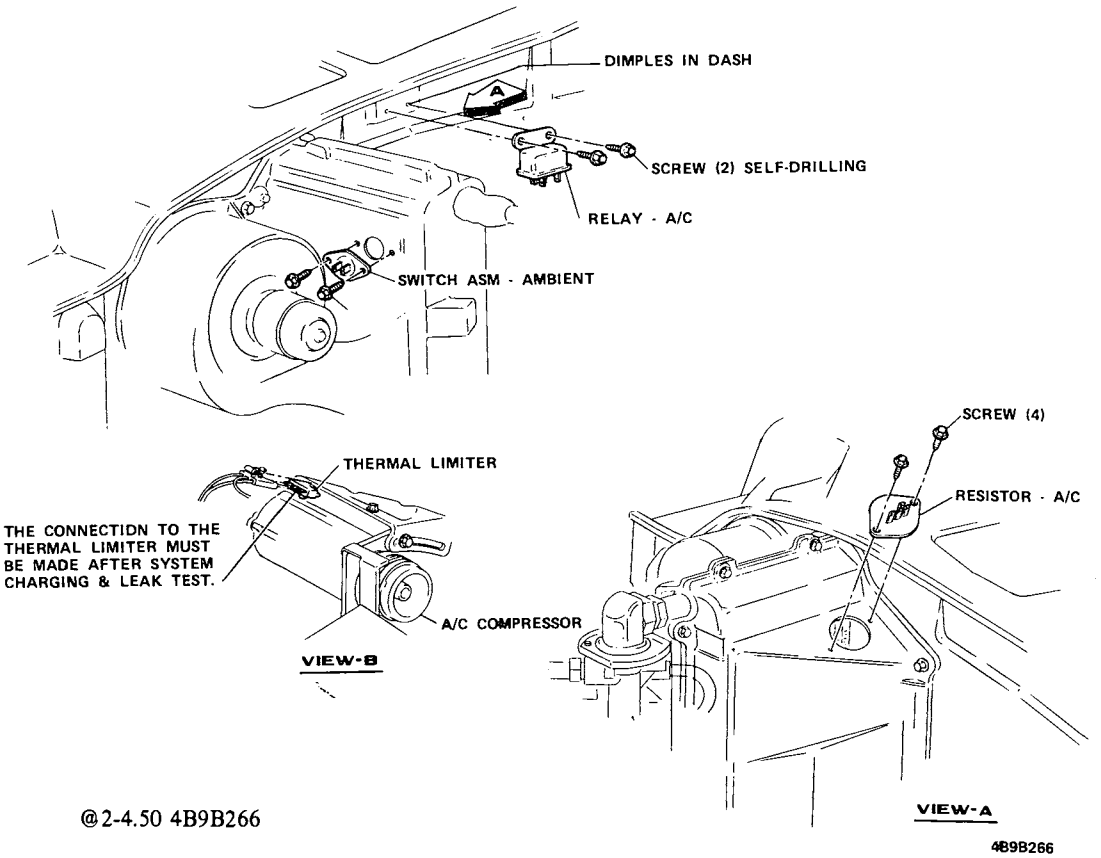


Figure 9B-212 - A/C Ambient Switch - Resistor - Relay and Thermal Limiter - A Series

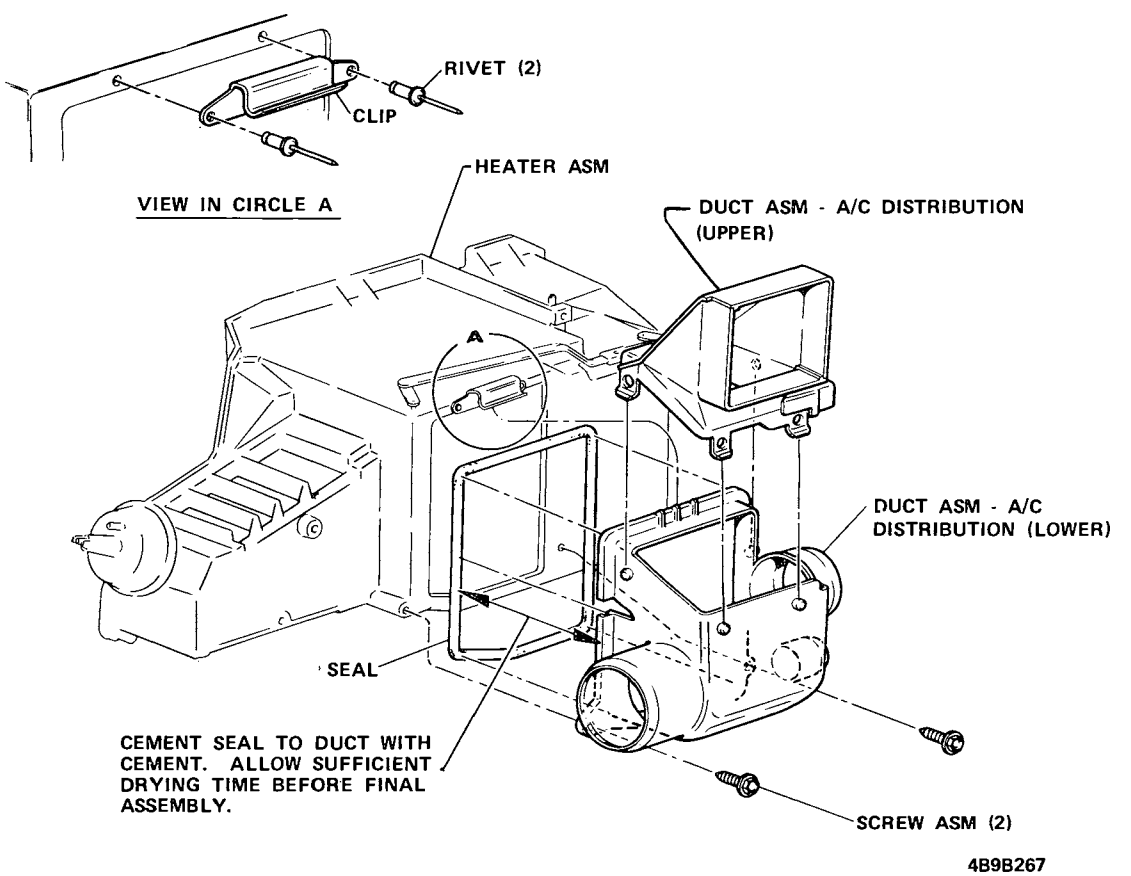


Figure 9B-213 - A/C Distributor Duct - Upper and Lower - To Heater - A Series

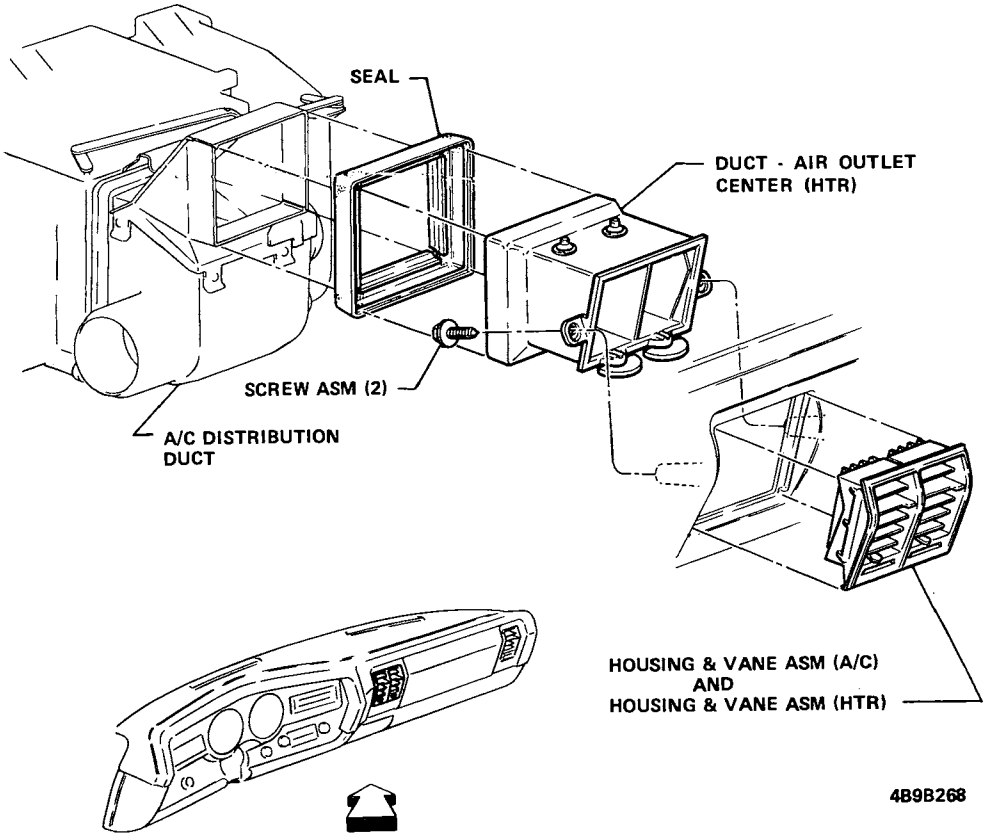


Figure 9B-214 - Center Outlet - A Series

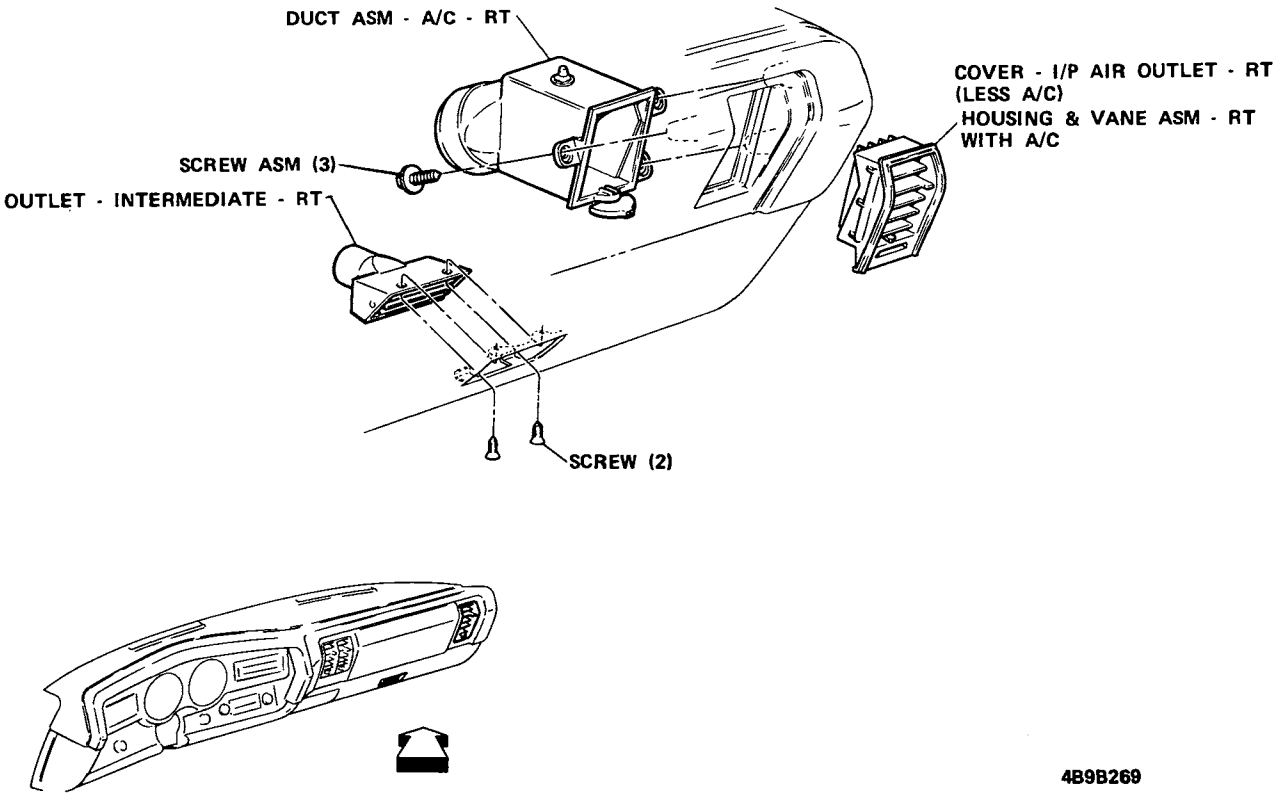


Figure 9B-215 - A/C Outlet - Right and Intermediate Outlet - Right - A Series

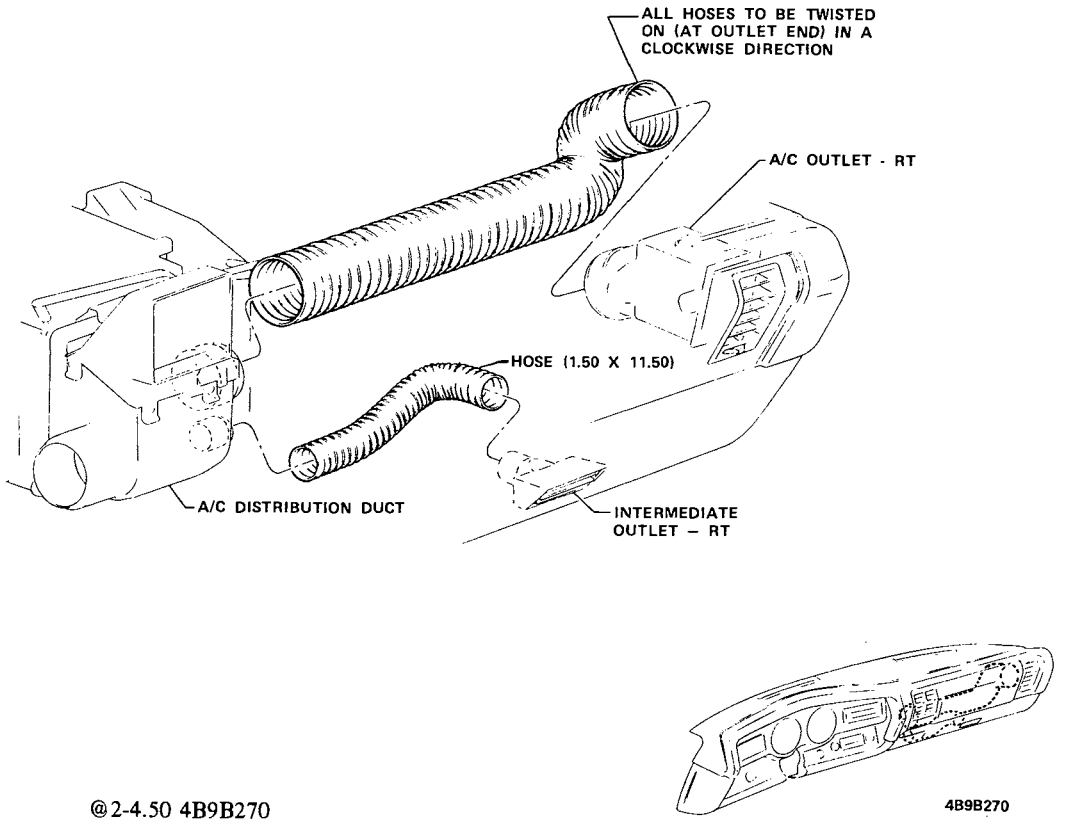


Figure 9B-216 - Hose - A/C Outlets - Right - A Series

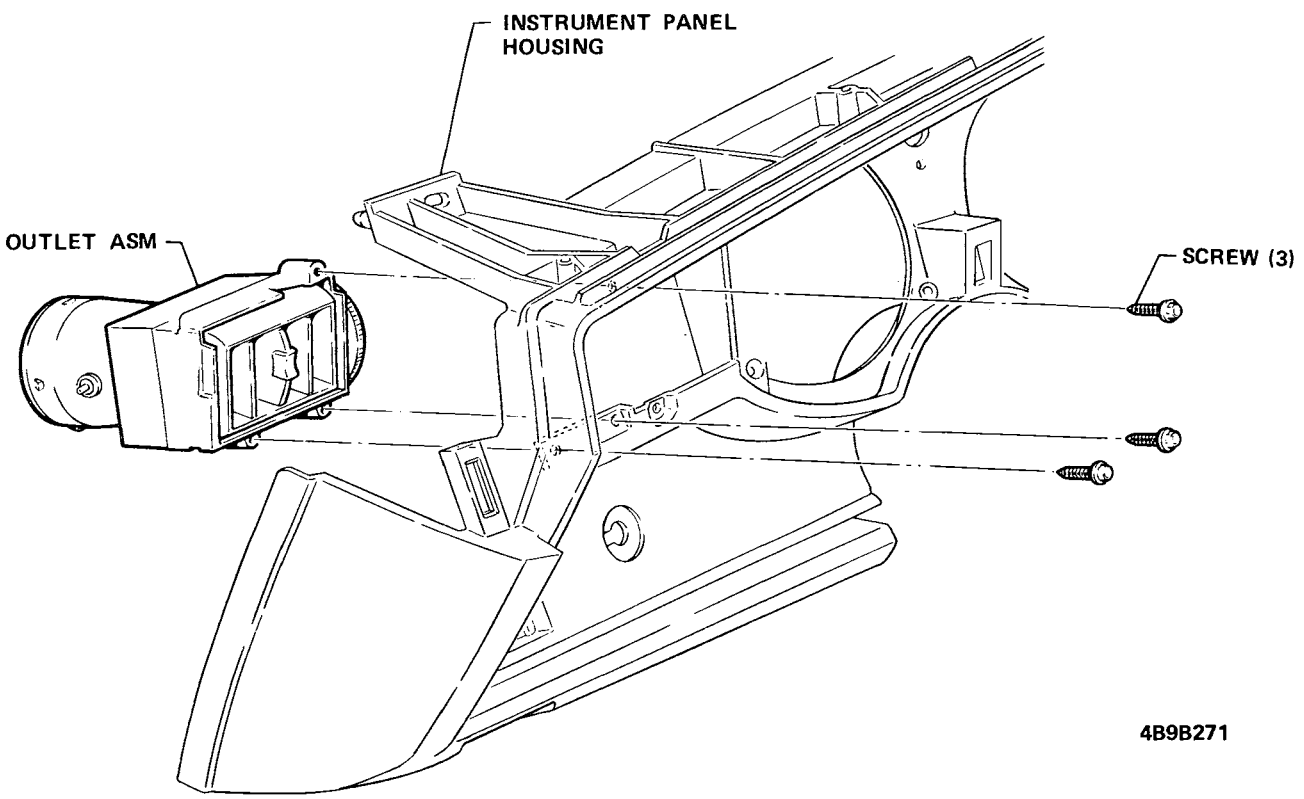


Figure 9B-217 - A/C Outlet - Left to Instrument Housing - A Series

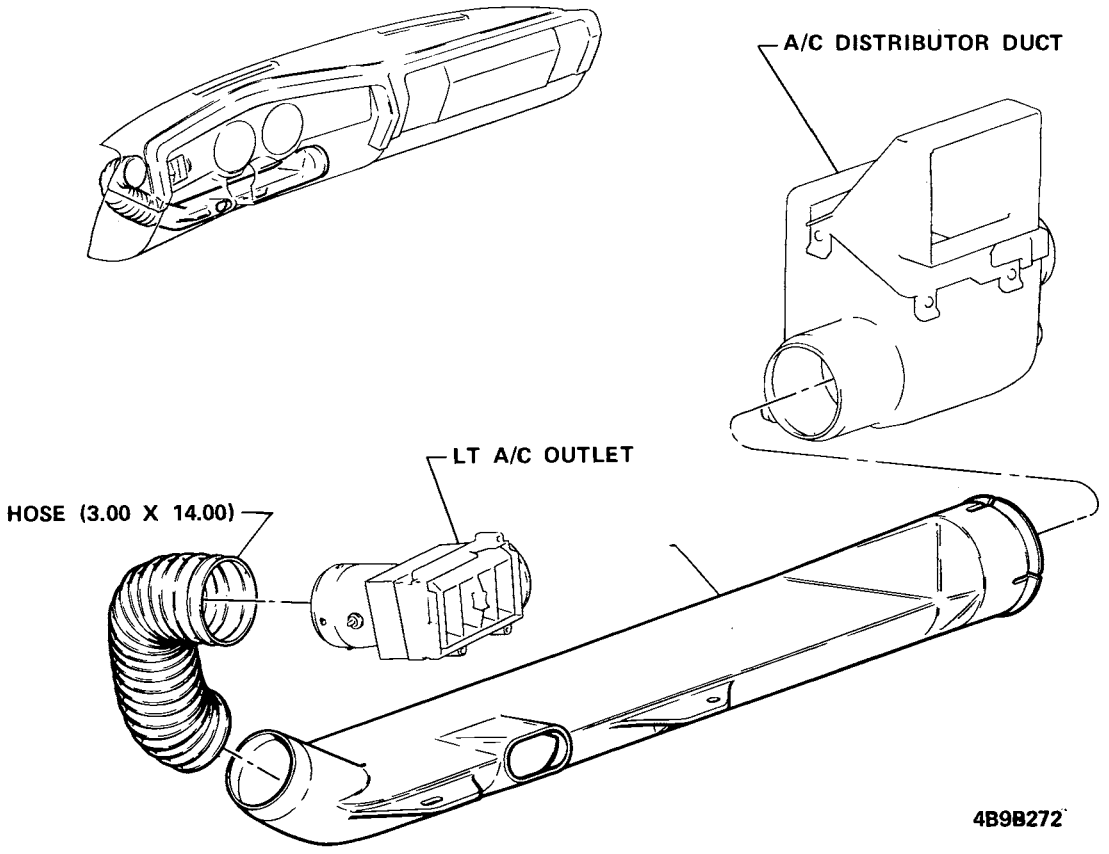


Figure 9B-218 - A/C Intermediate Duct and Left Outlet Hose - A Series

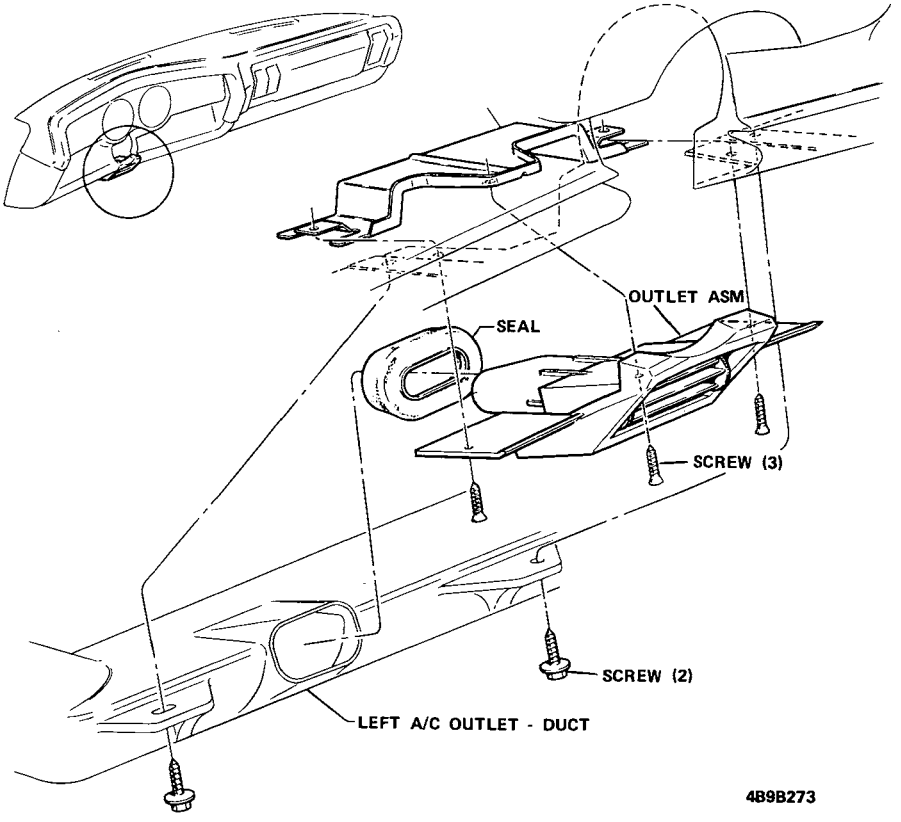


Figure 9B-220 - A/C Outlet - Intermediate - Left - A Series

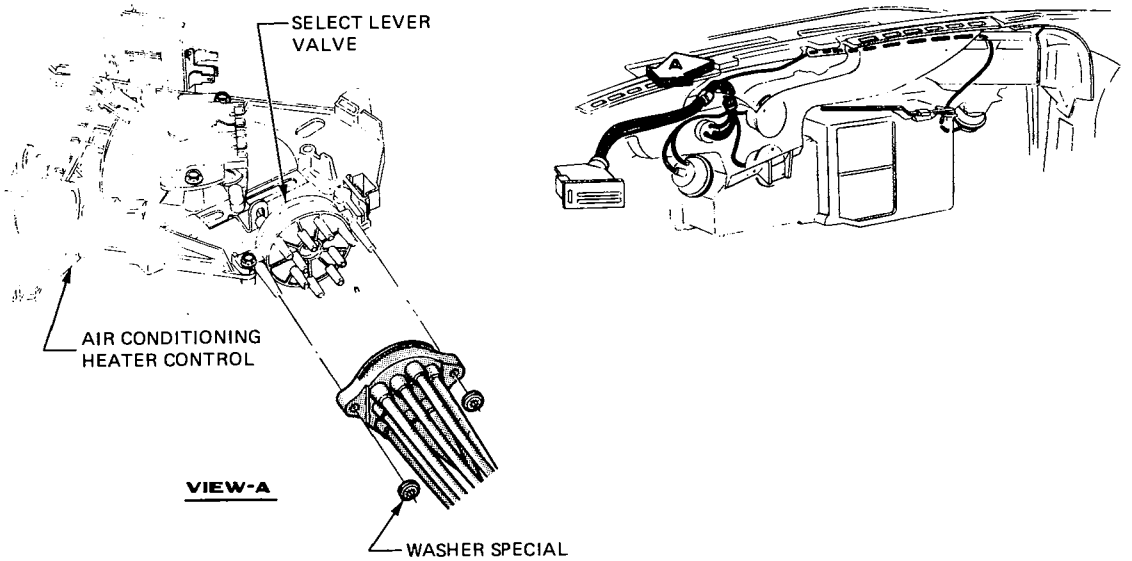


Figure 9B-221 - Vacuum Harness - A/C Passenger Compartment to Control (Manual) - A Series

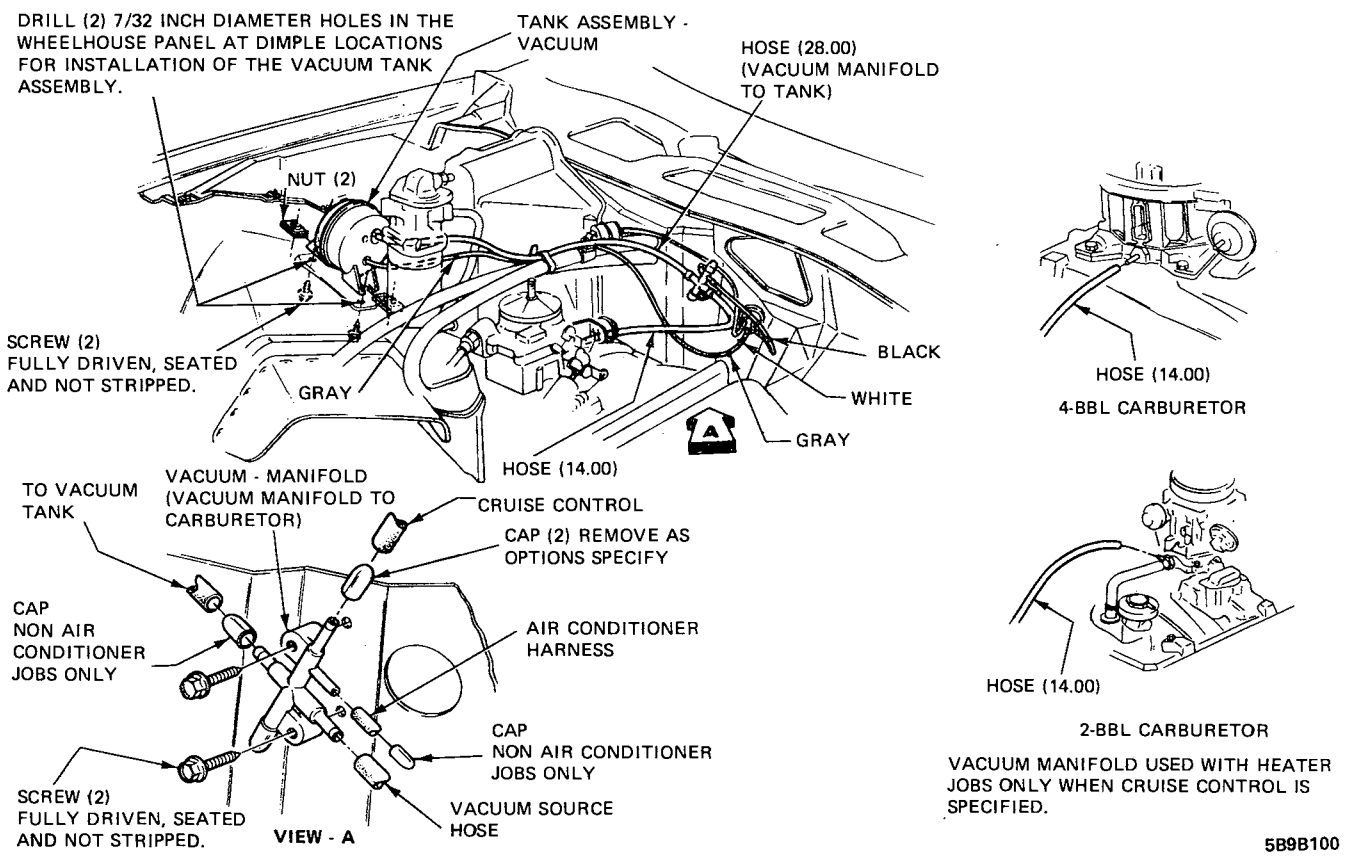


Figure 9B-222 - Vacuum Harness - A/C - Engine Compartment - A Series

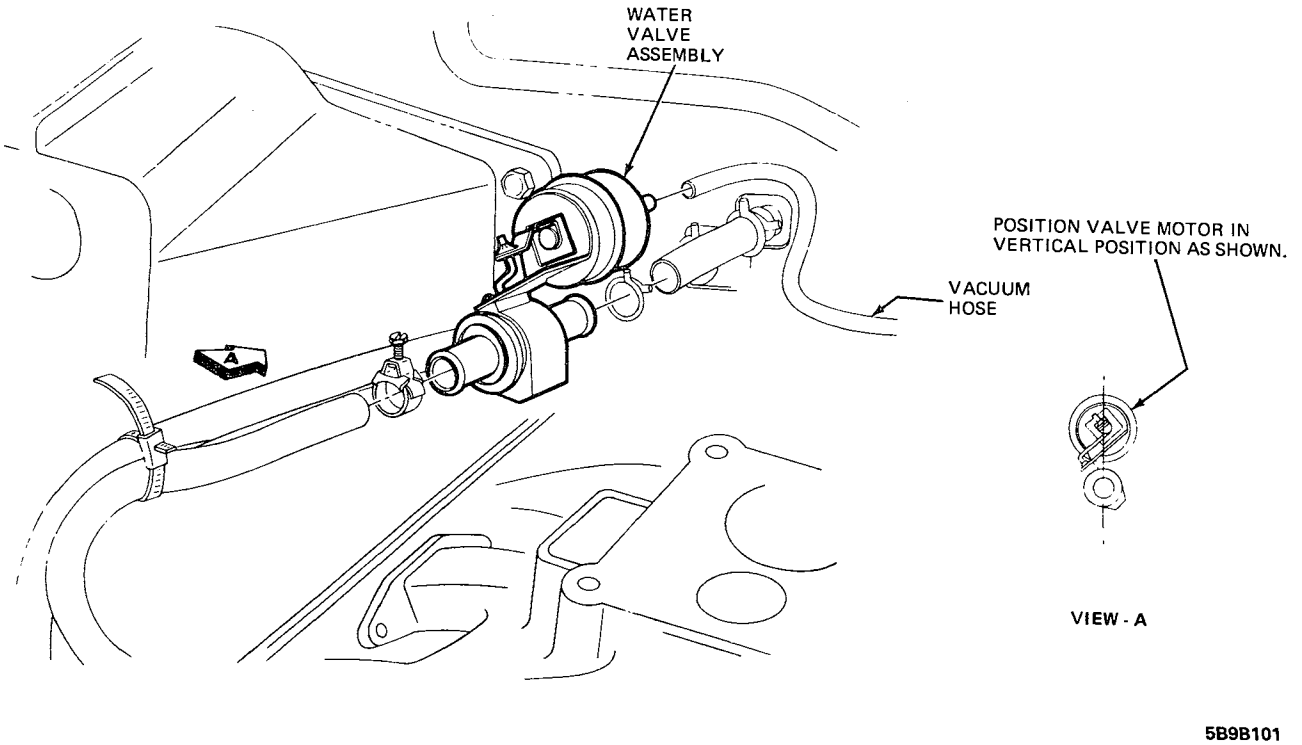


Figure 9B-223 - A/C Water Valve - A Series

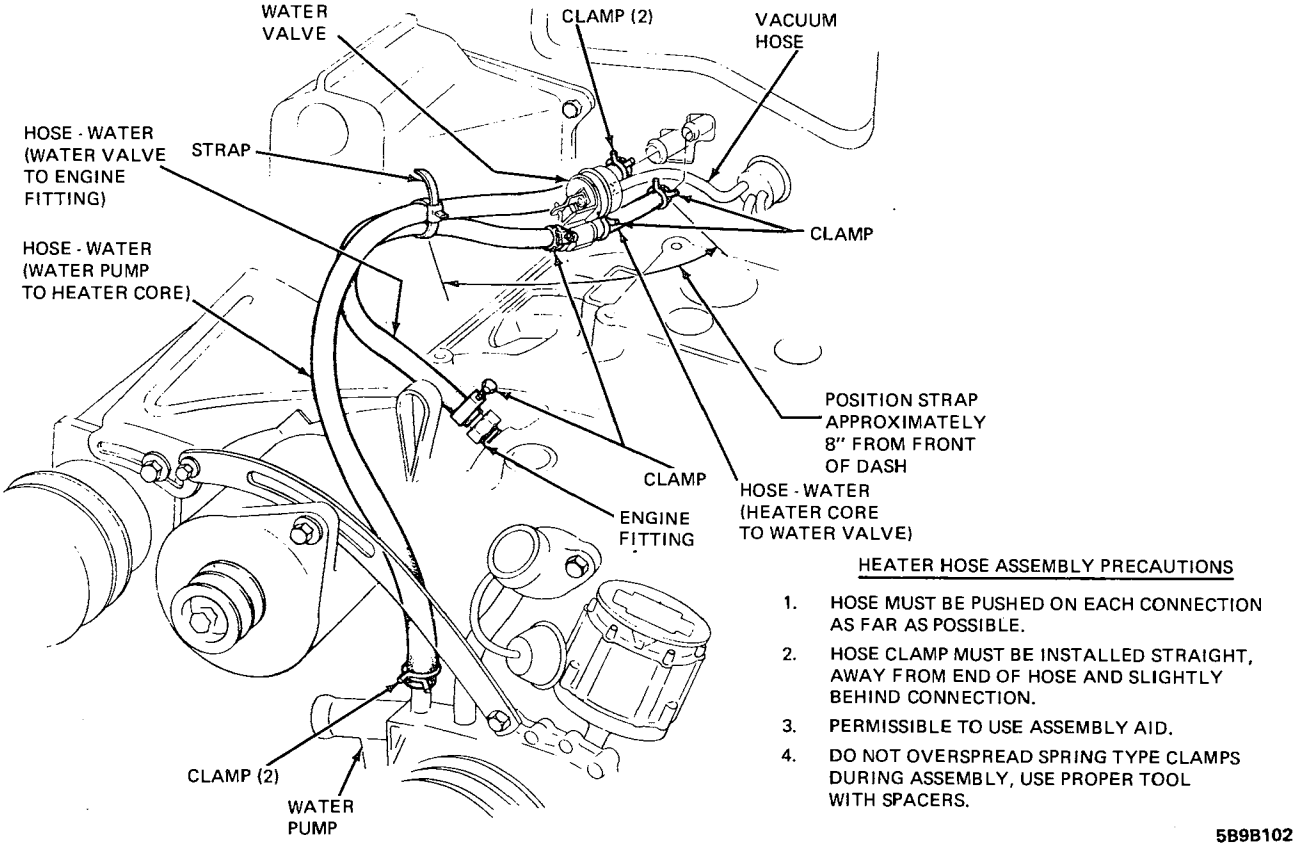
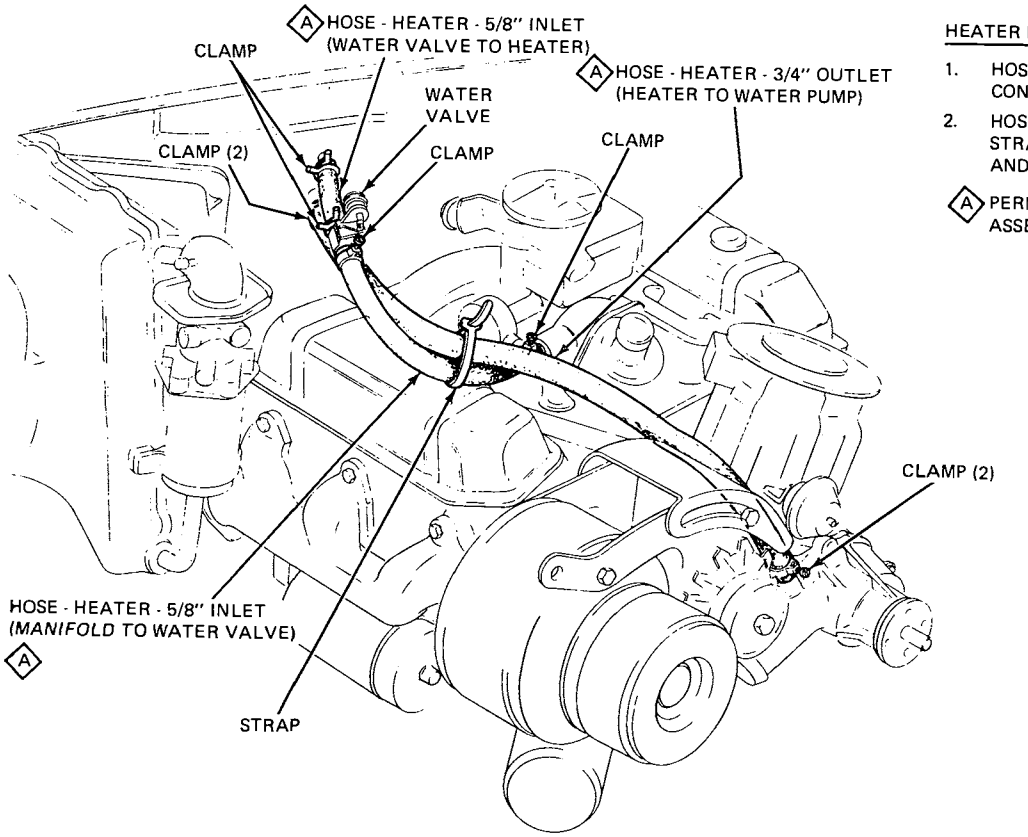


Figure 9B-224 - Heater Hoses - A/C - V-8 350-455 Engines - A Series



HEATER HOSE ASSEMBLY PRECAUTIONS

1. HOSE MUST BE PUSHED ON EACH CONNECTION AS FAR AS POSSIBLE.
2. HOSE CLAMP MUST BE INSTALLED STRAIGHT AWAY FROM END OF HOSE AND SLIGHTLY BEHIND CONNECTION.

A PERMISSIBLE TO USE ASSEMBLY AID

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Figure 9B-225 - Heater Hoses - A/C - V-6 231 Engine - A Series

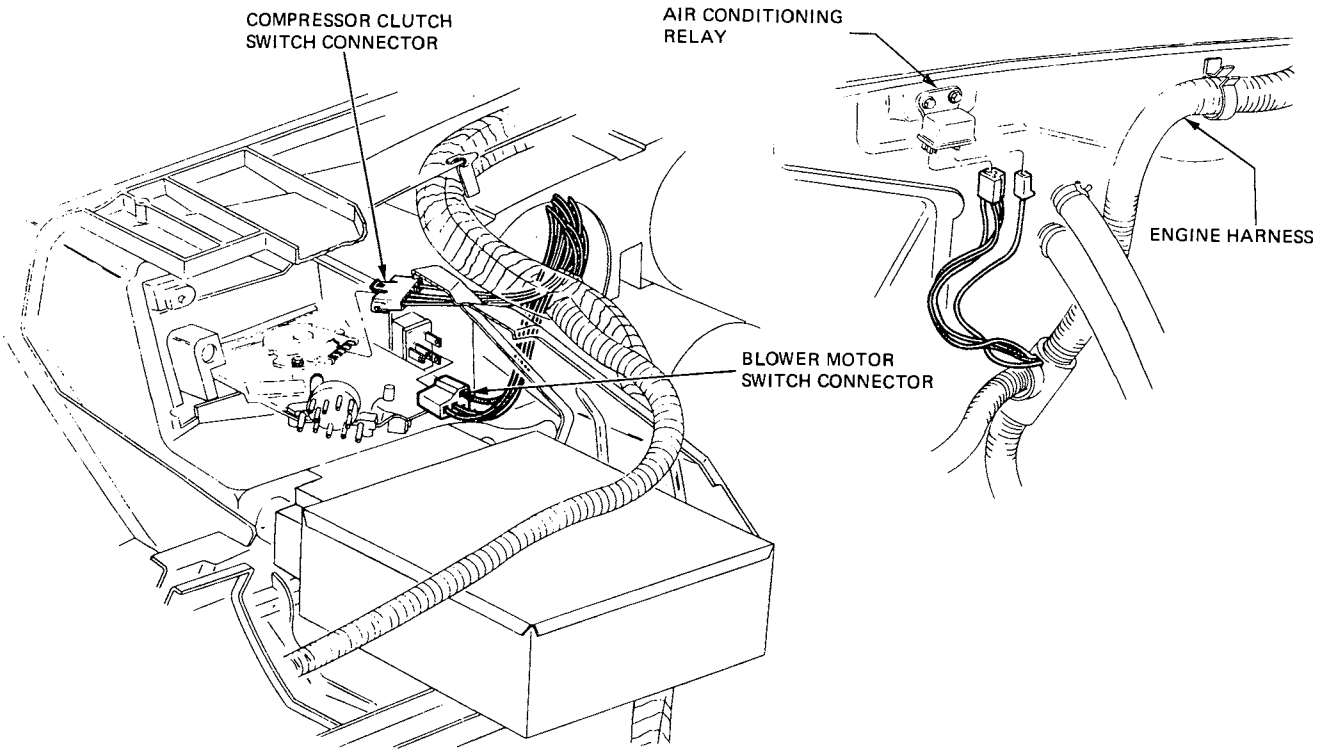

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Figure 9B-226 Wiring - A/C Controls & Relay - Manual - A Series

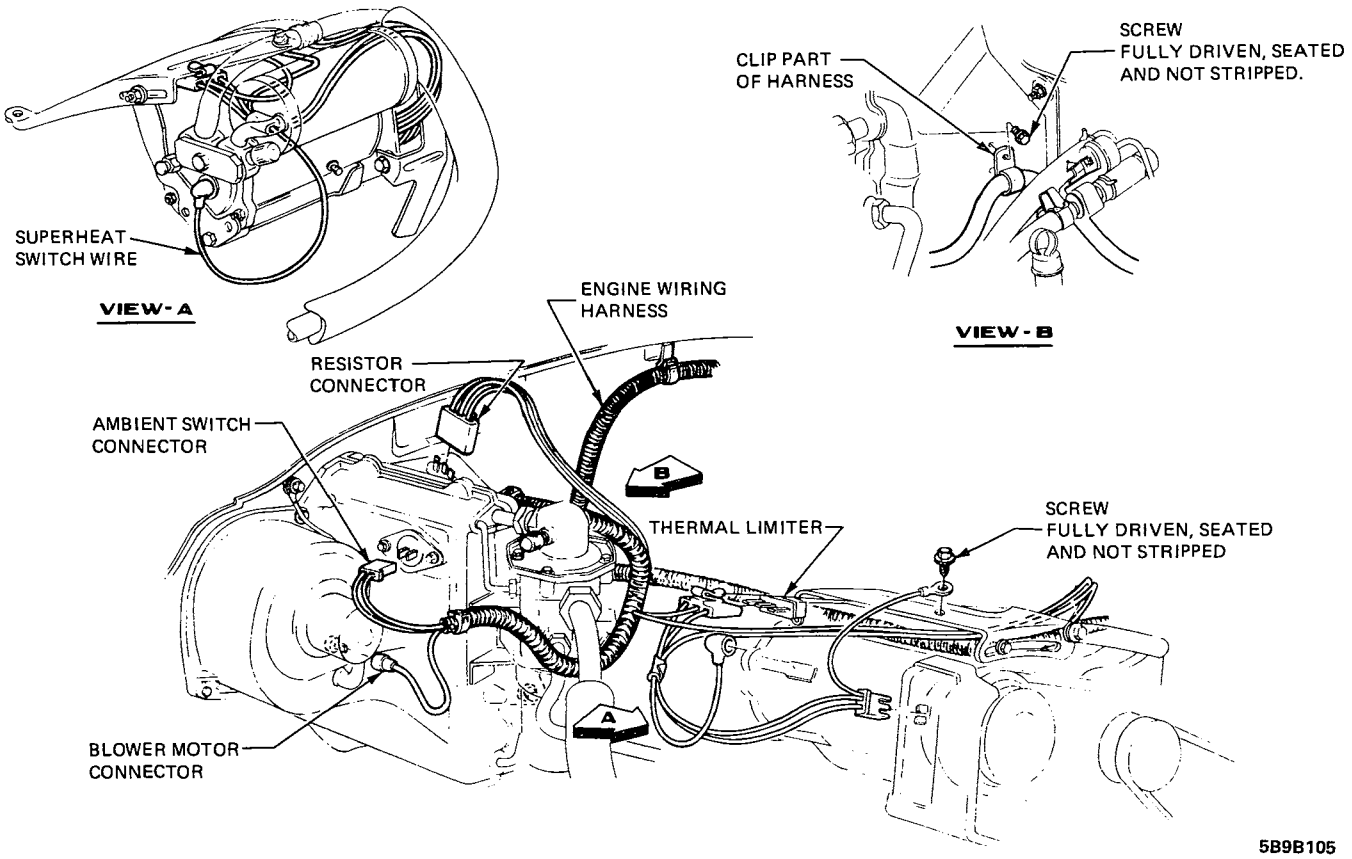


Figure 9B-227 - Wiring - Manual A/C Blower Motor & Compressor - A Series

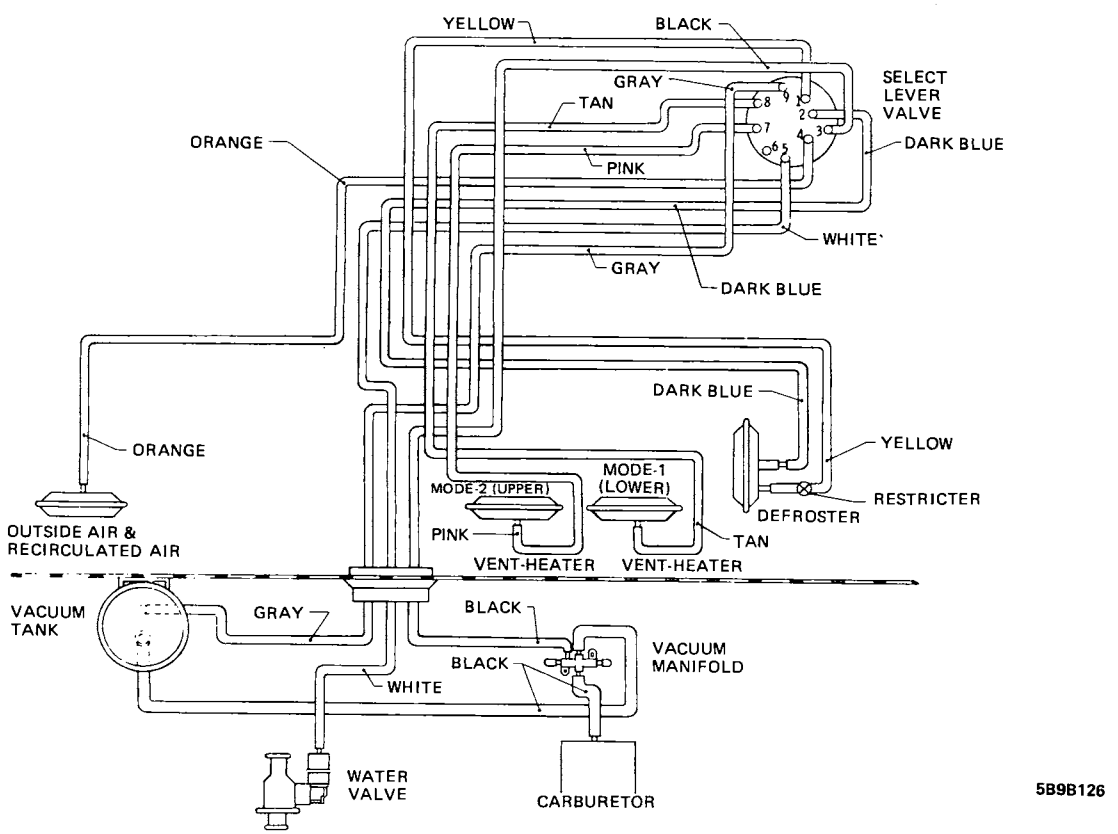


Figure 9B-228 - Vacuum Hose Schematic - A/C Manual - A Series

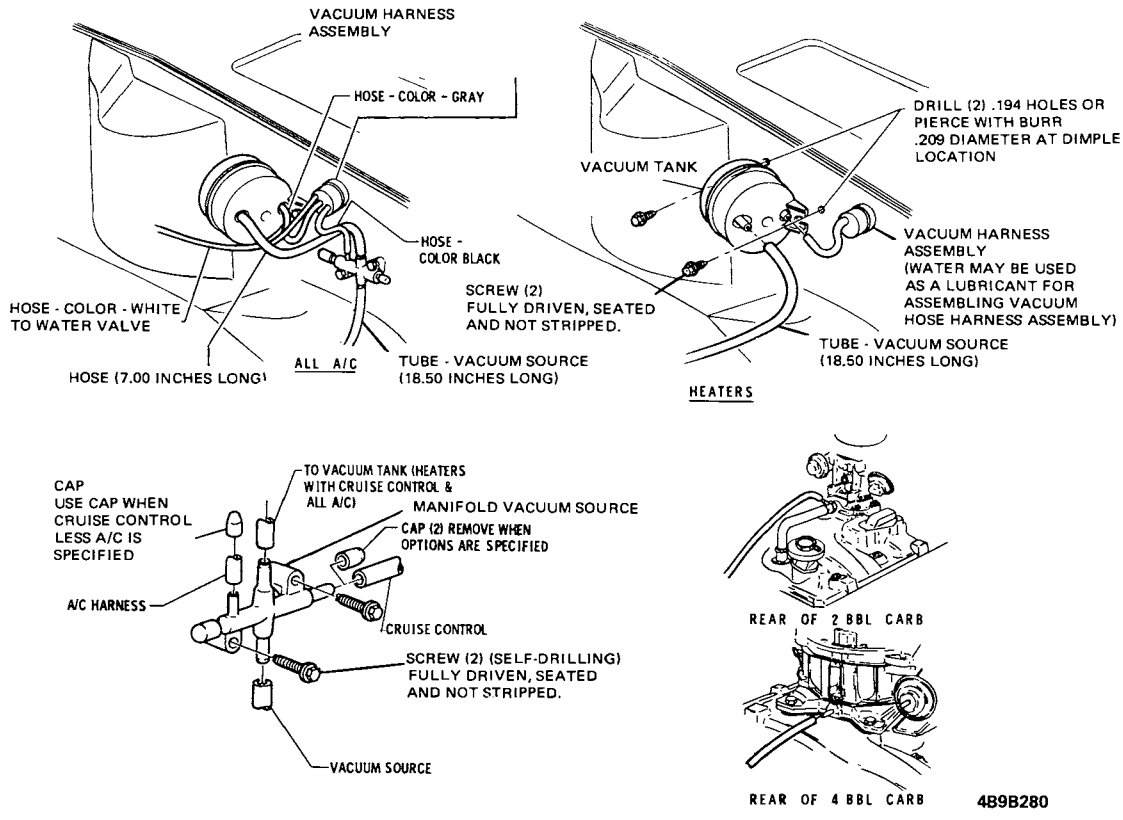


Figure 9B-230 - A/C and Heater Vacuum Harness to Vacuum Tank and Manifold - B-C-E Series

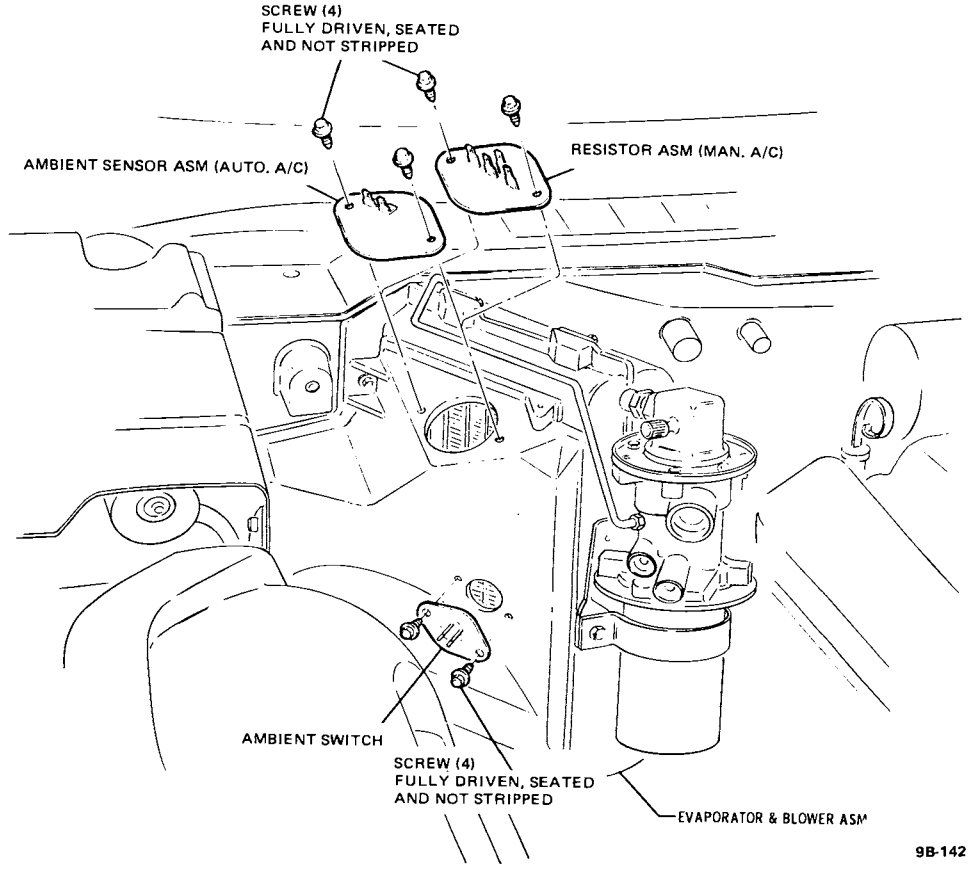


Figure 9B-231 - A/C Ambient Sensor Switch and Resistor - B-C-E Series

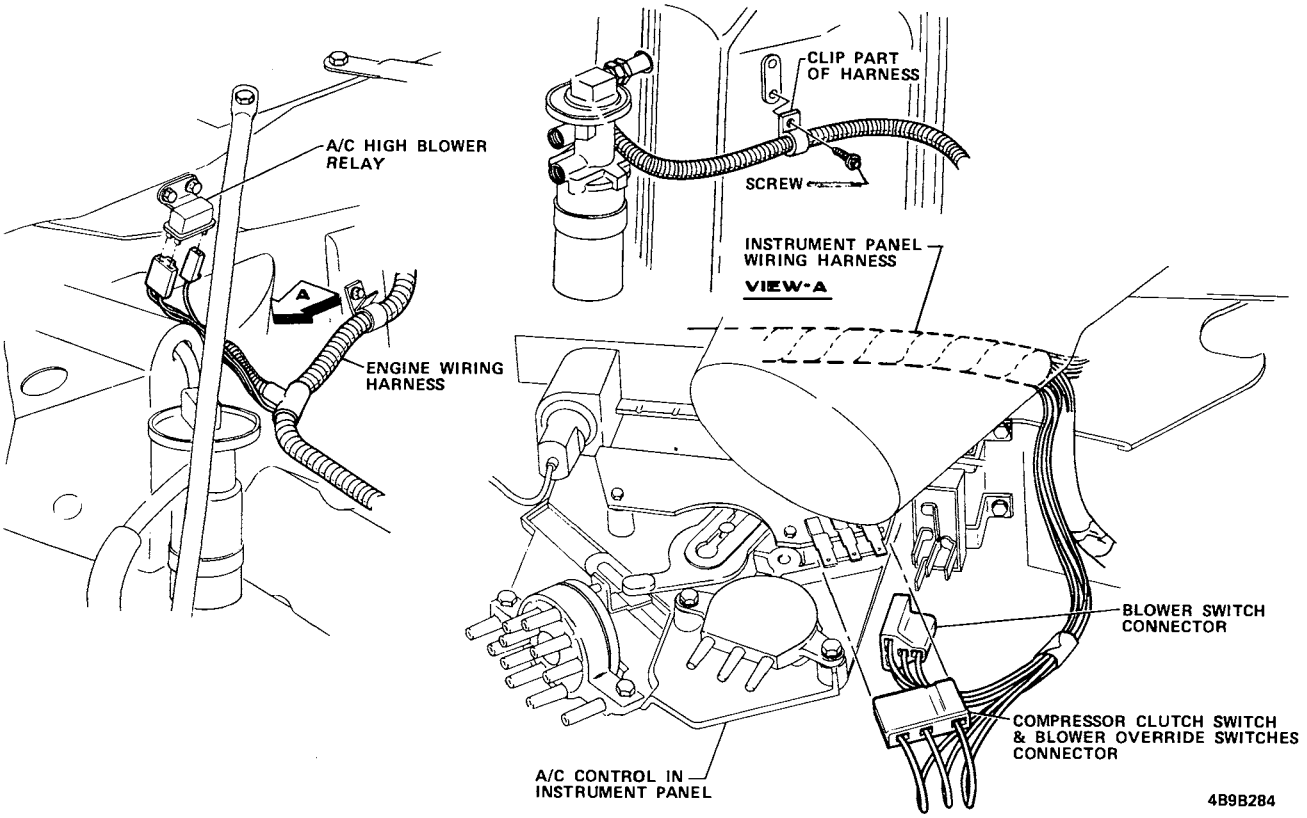


Figure 9B-232 - A/C Wiring - Control and Relays - B-C-E Series

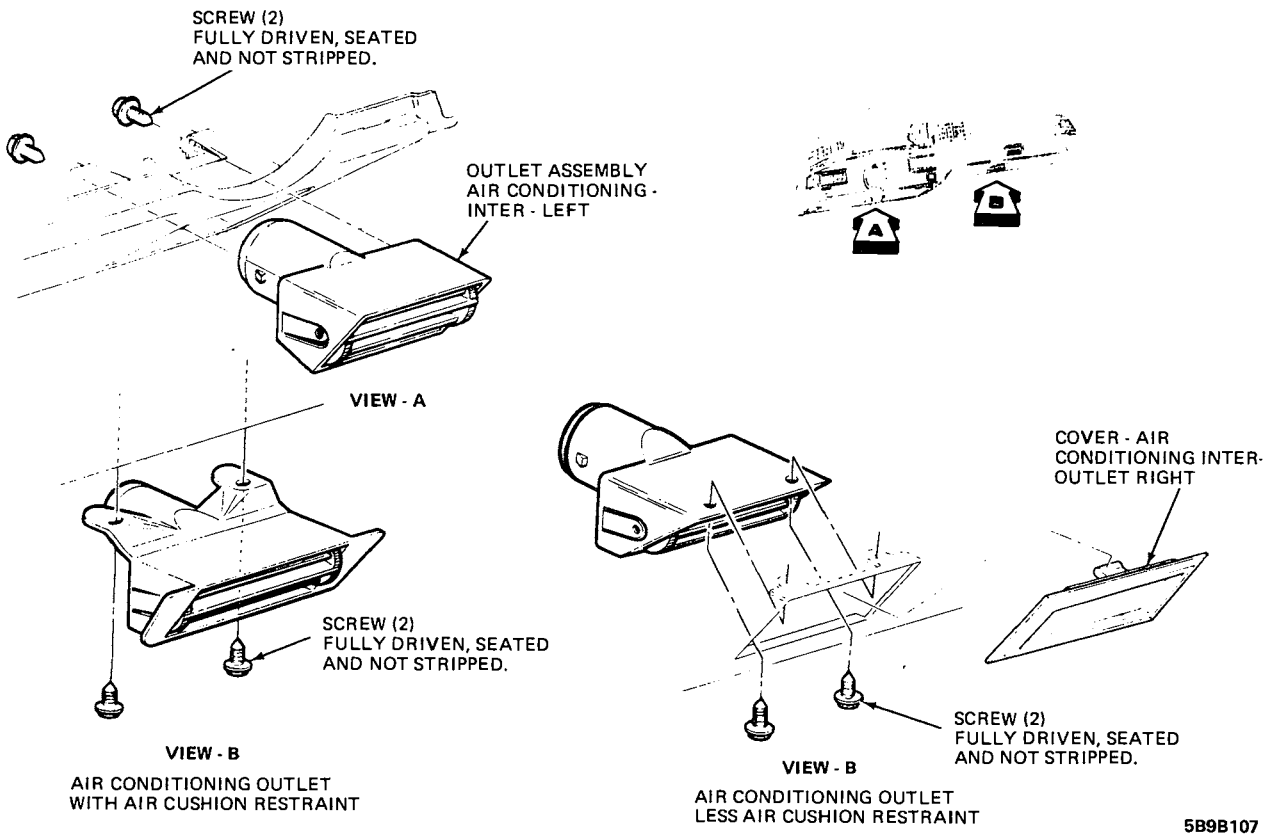


Figure 9B-233 - A/C Intermediate Outlets - Right & Left - B-C-E Series

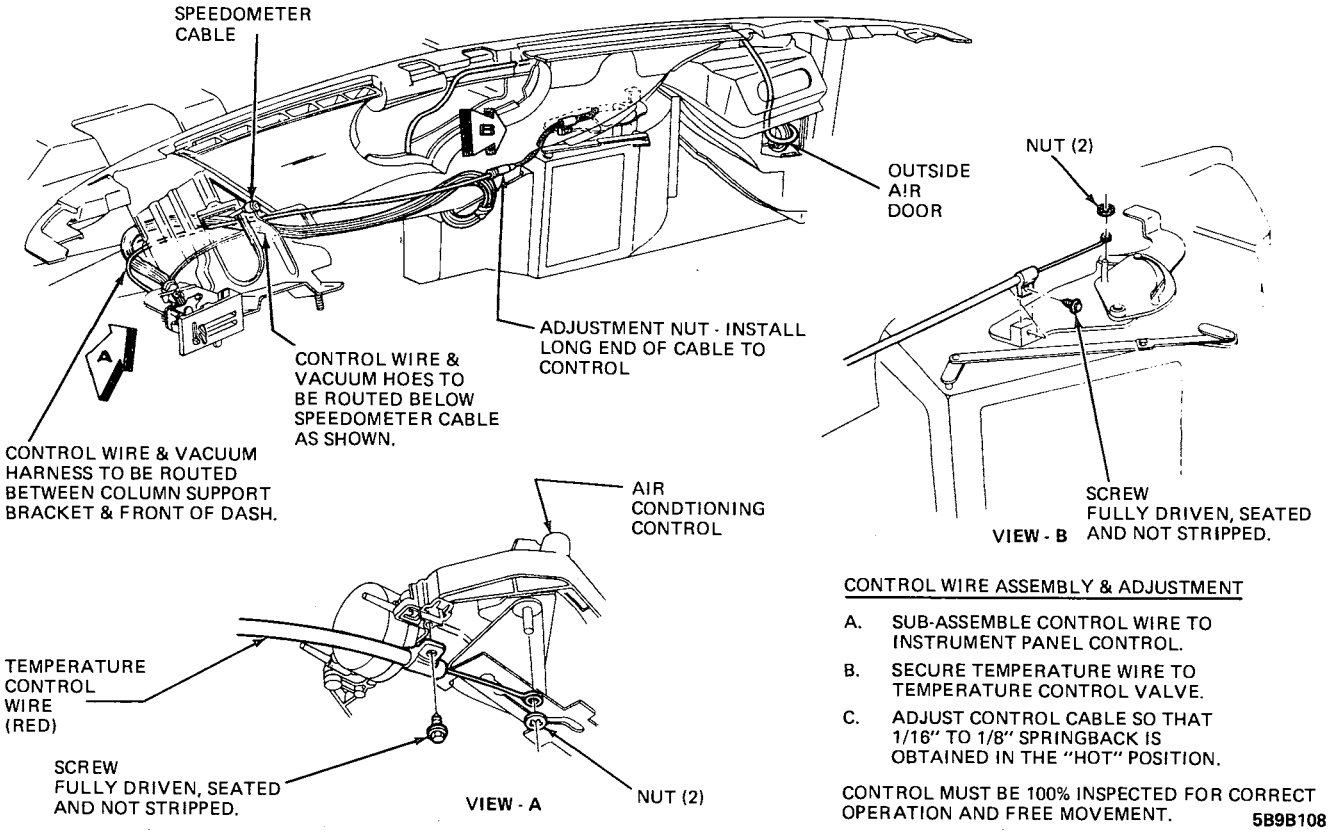


Figure 9B-234 - Control Cables - Vacuum Harness Routing - Manual A/C - B-C-E Series

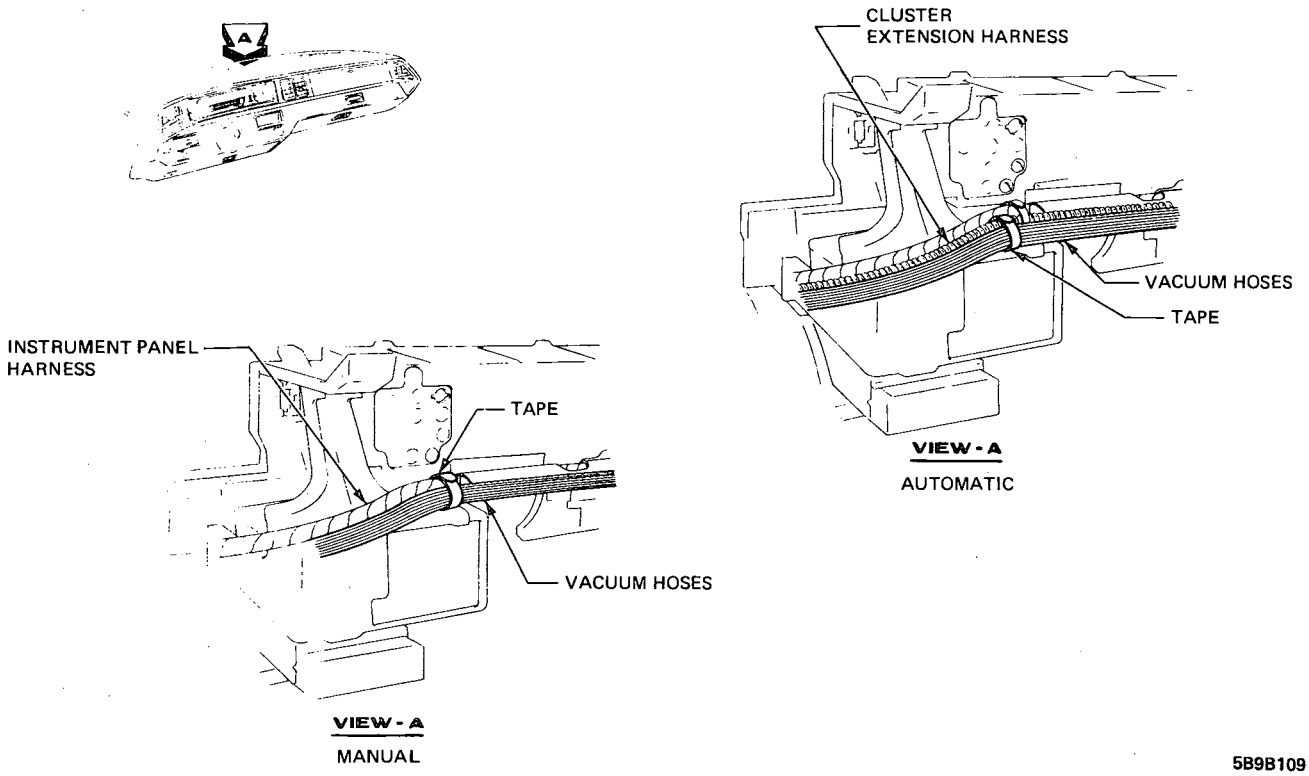


Figure 9B-235 - Vacuum Harness Routing - A/C - B-C-E Series

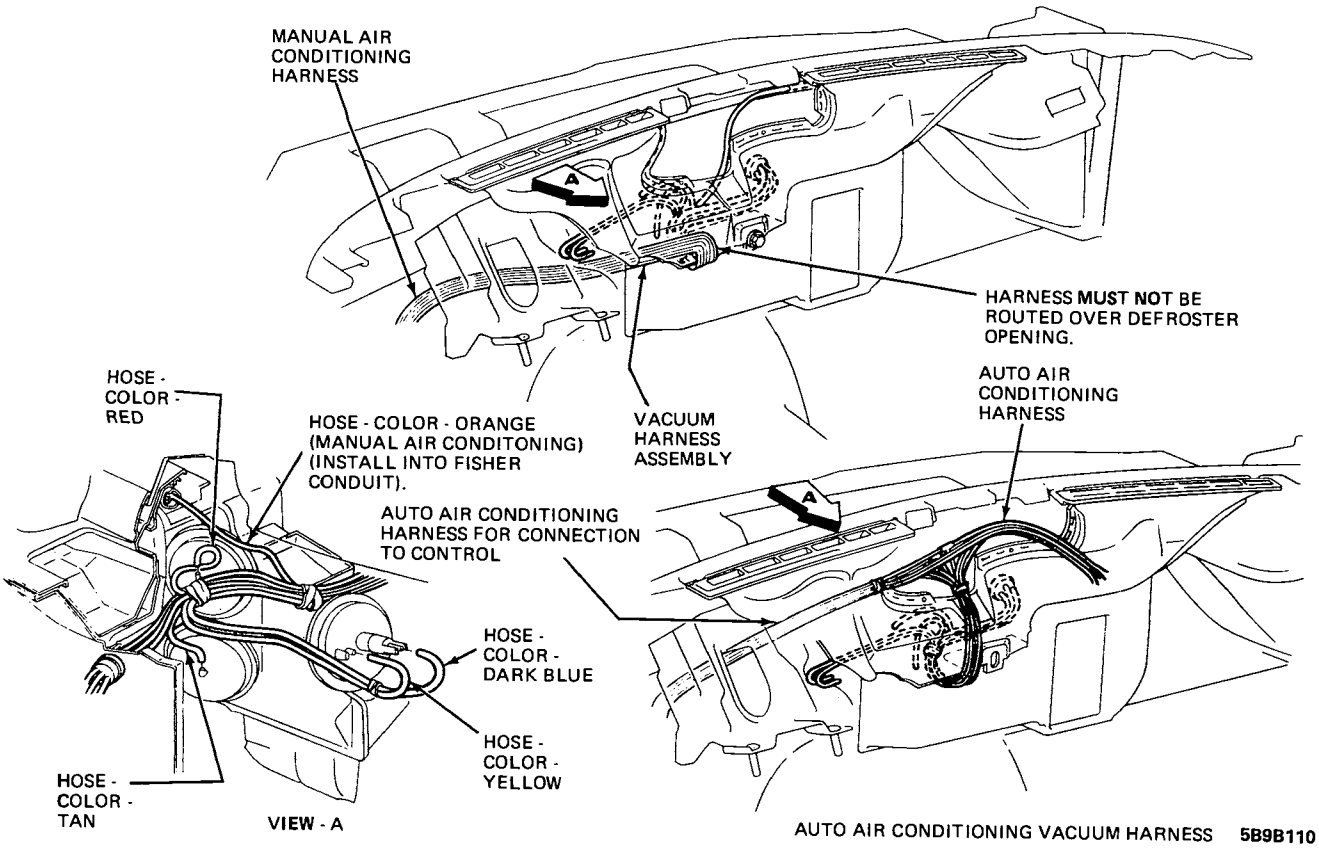


Figure 9B-236 - Vacuum Harness at Heater Case - A/C - B-C-E Series

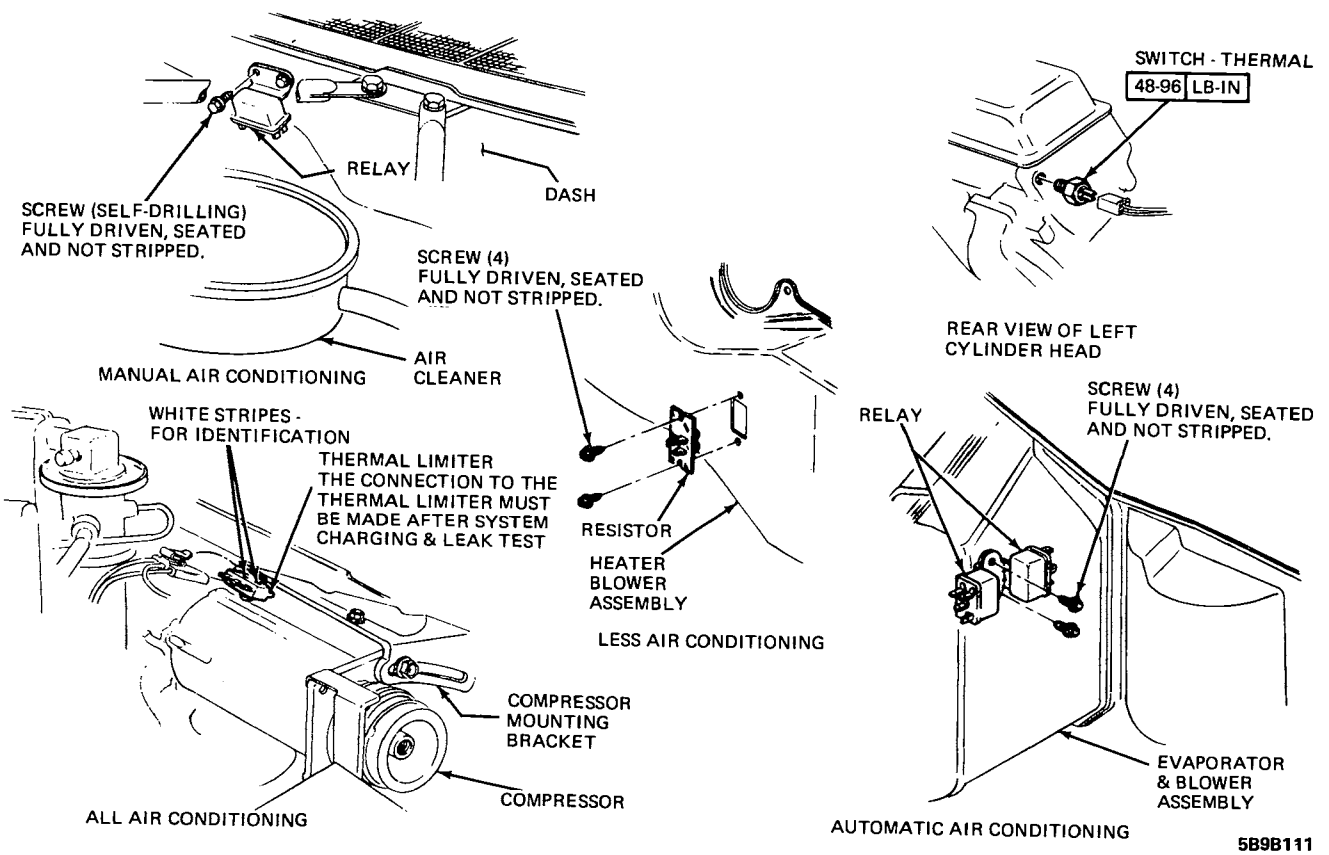


Figure 9B-237 - A/C Relays - Thermal Limiter - Switch and Heater Resistor - B-C-E Series

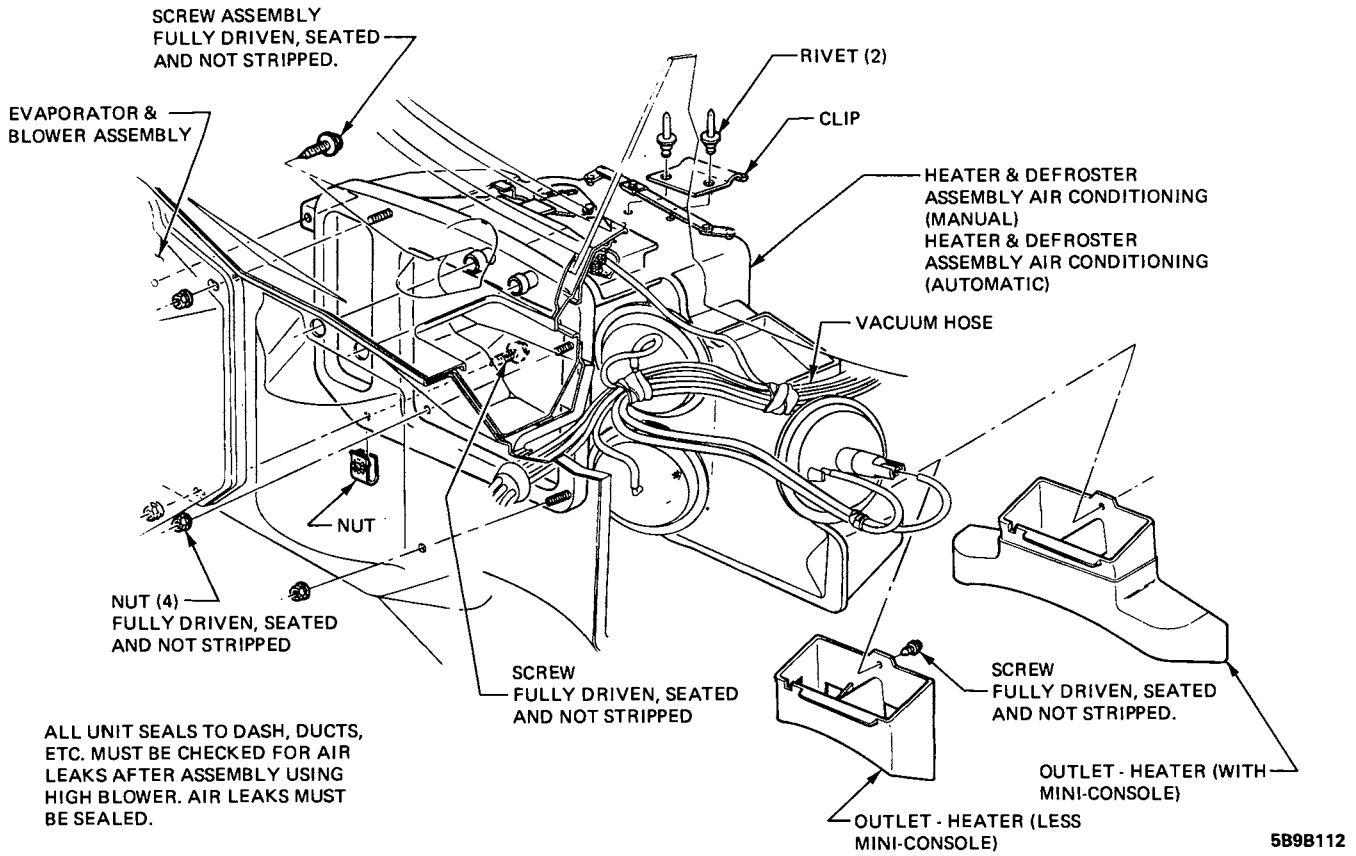


Figure 9B-238 - Heater and Defroster Assembly - A/C - B-C-E Series

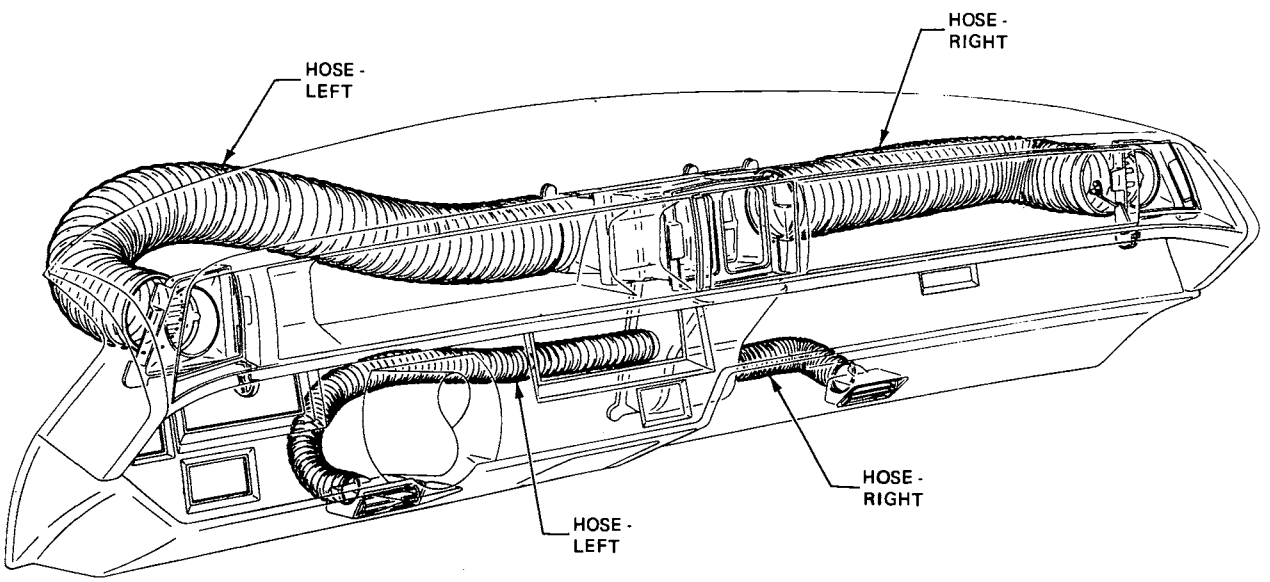


Figure 9B-240 - A/C Outlets and Hose - B-C-E Series

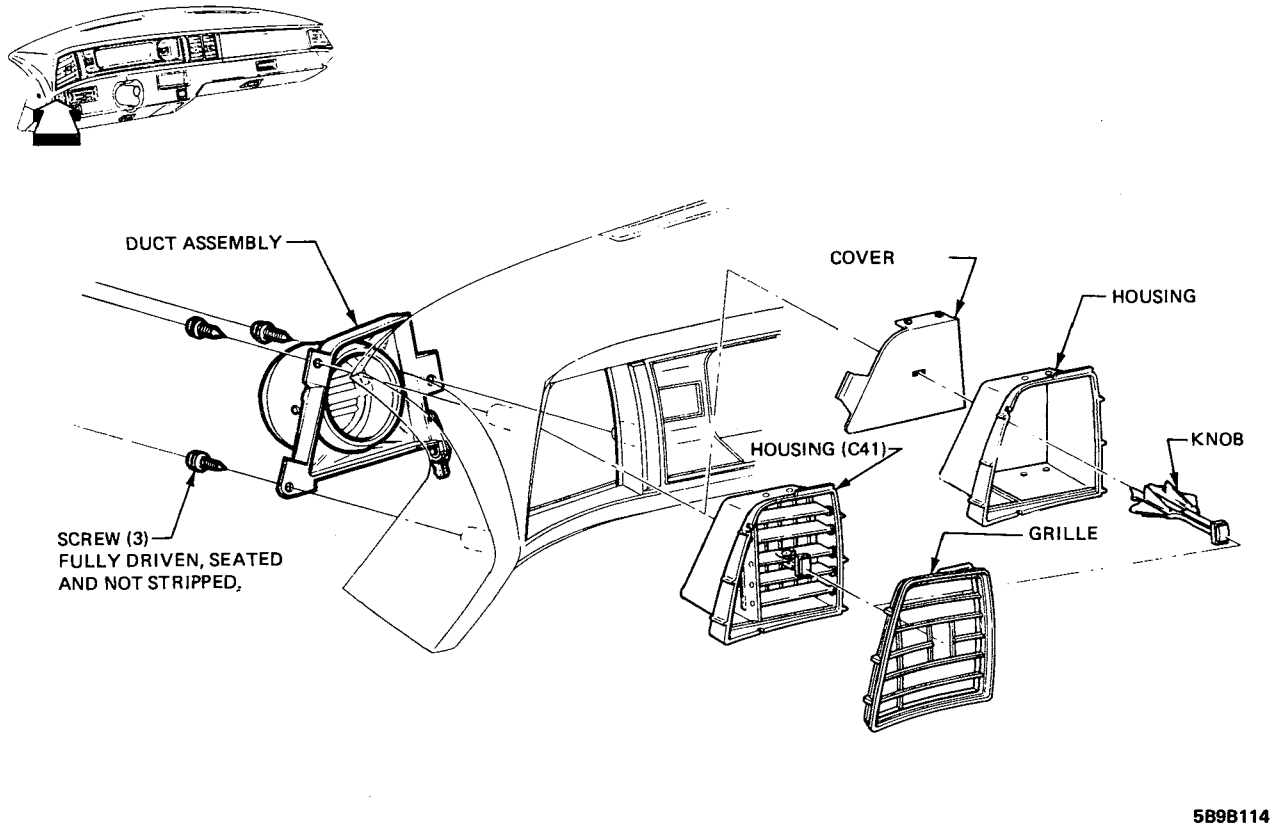


Figure 9B-241 - Heater and A/C Outlet - Left - To IP Cover - B-C-E Series

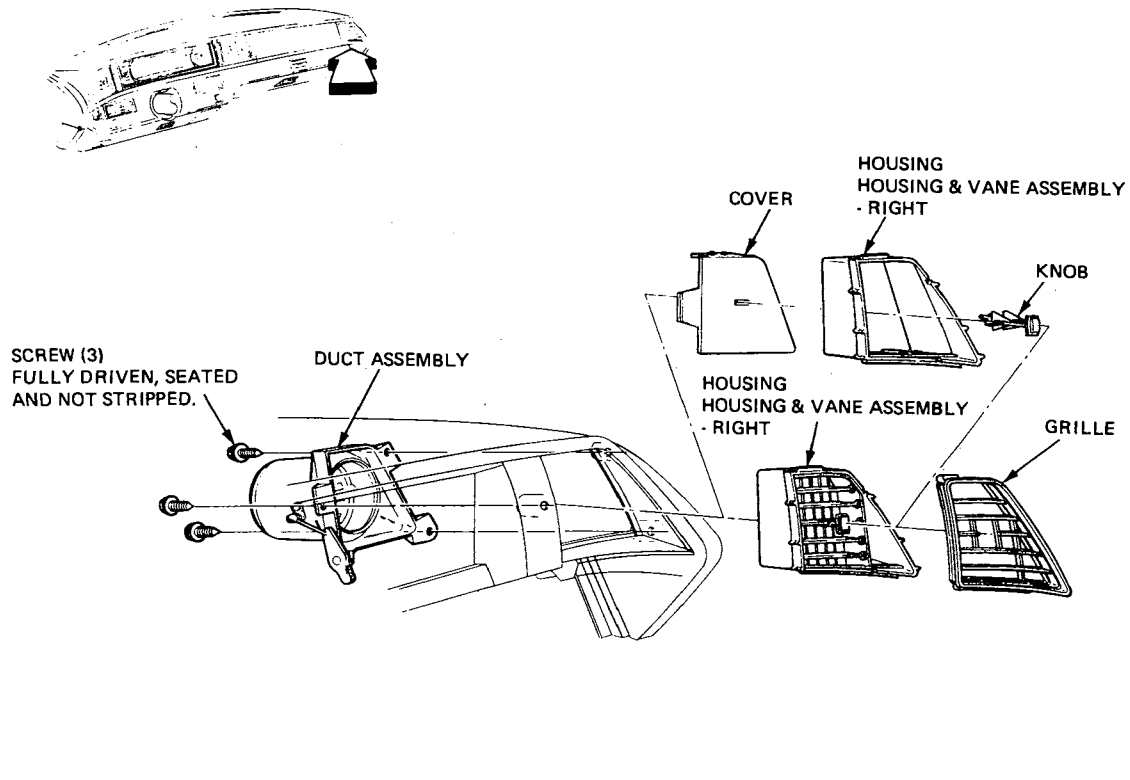


Figure 9B-242 - Heater and A/C Outlet - Right - To Instrument Cover - B-C-E Series

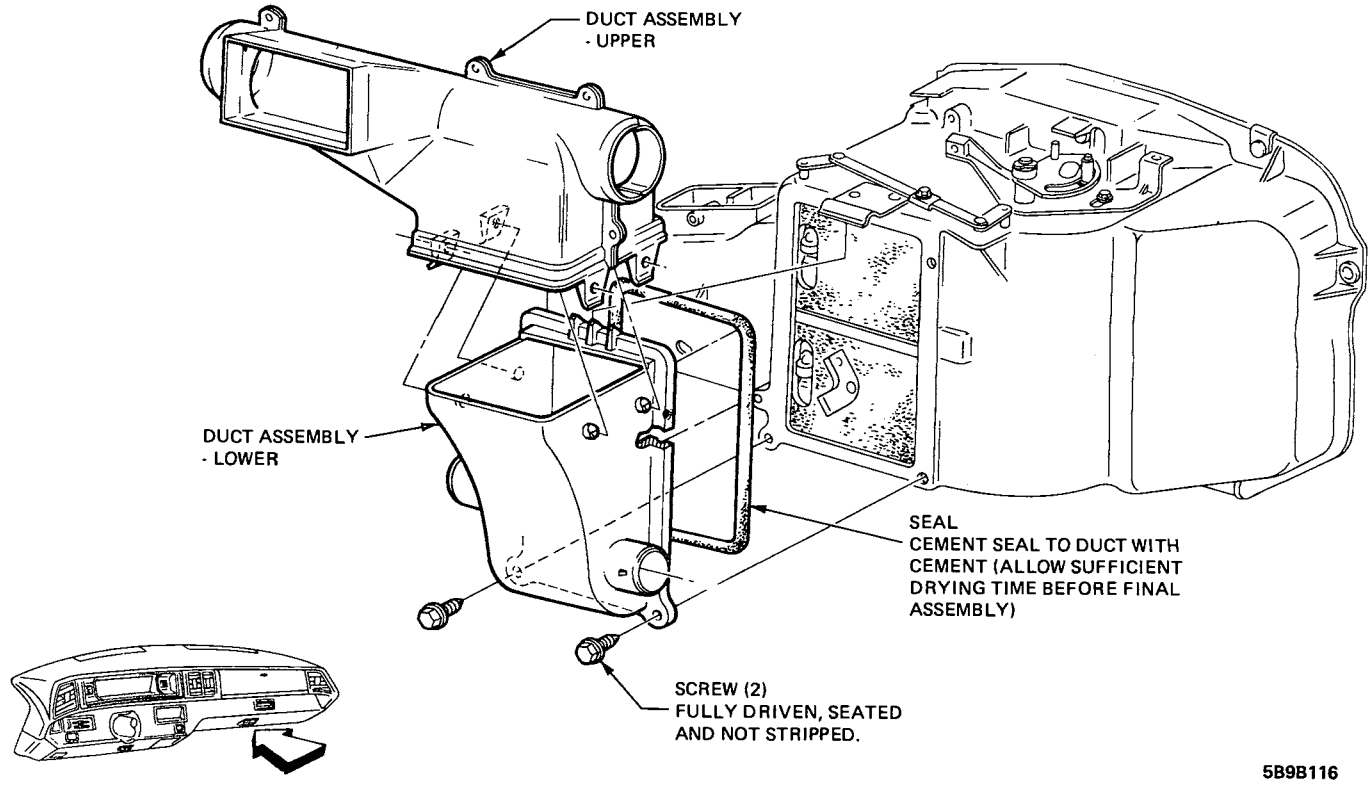


Figure 9B-243 - A/C Distributor Duct Assembly - Upper & Lower - B-C-E Series

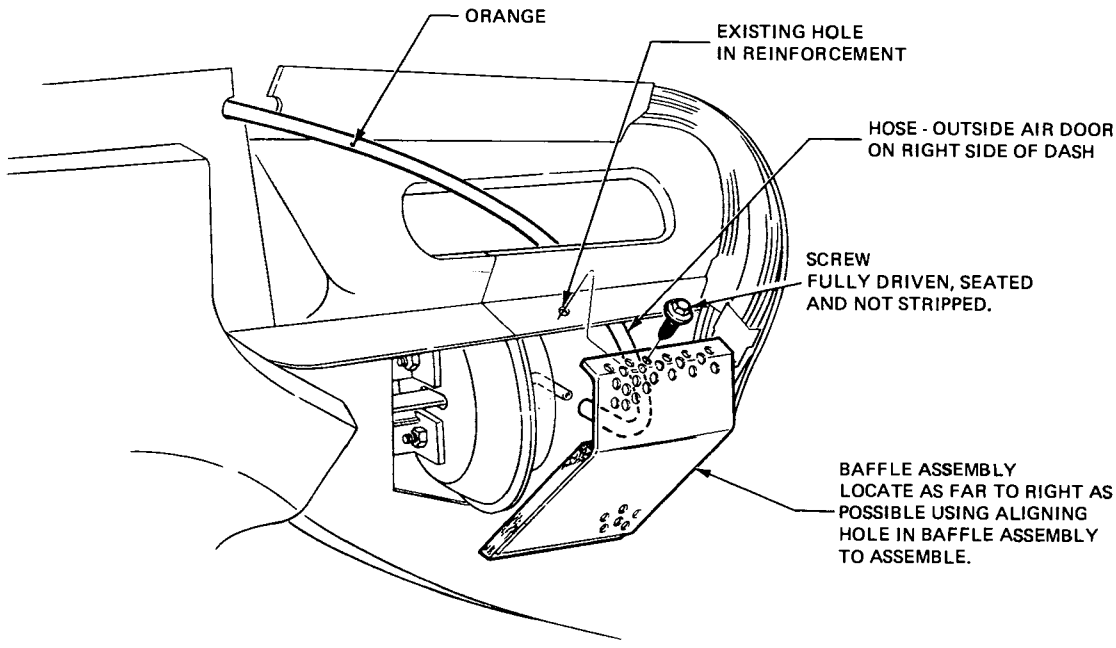


Figure 9B-244 - A/C - Recirc. Air Baffle Assembly - Less Air Cushion Restraint - B-C-E Series

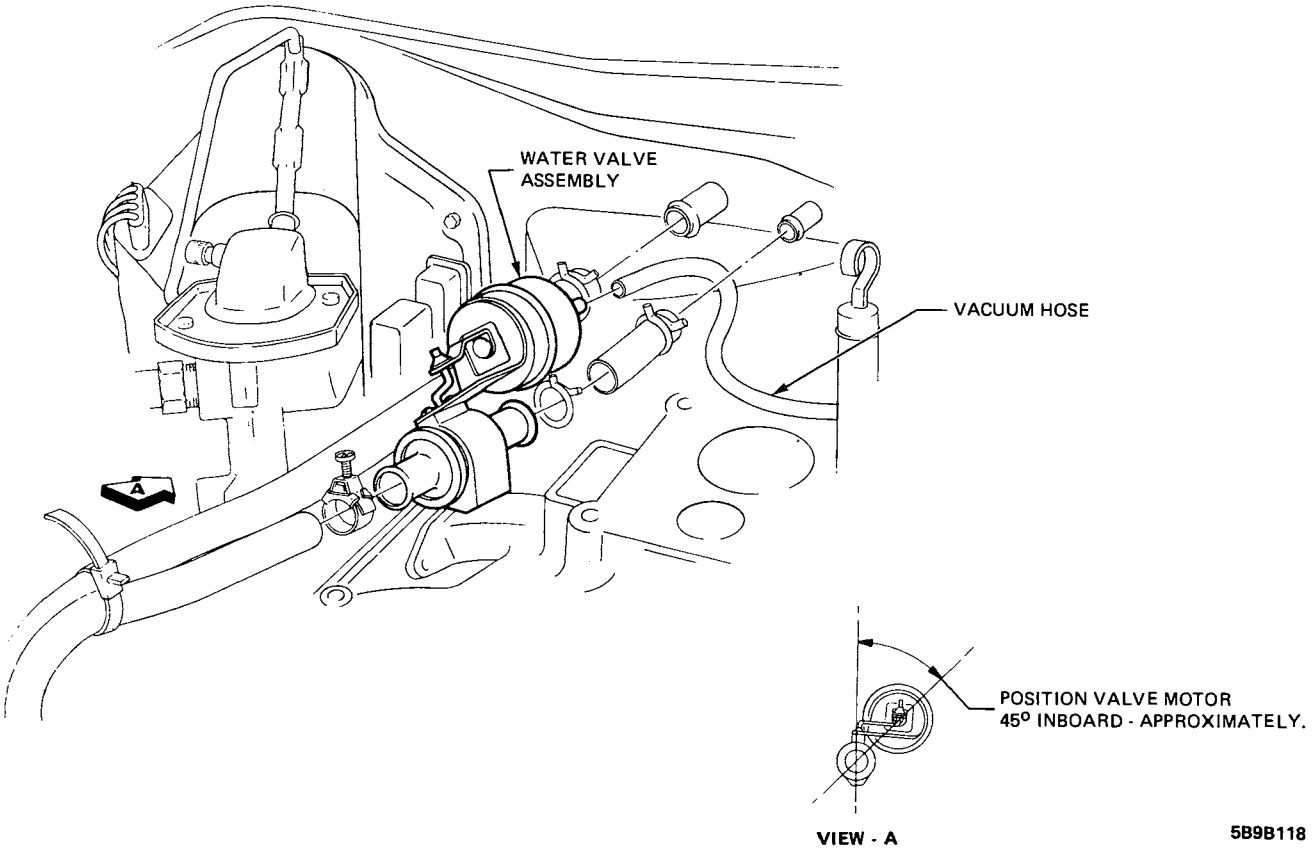


Figure 9B-245 - A/C Water Valve - B-C-E Series

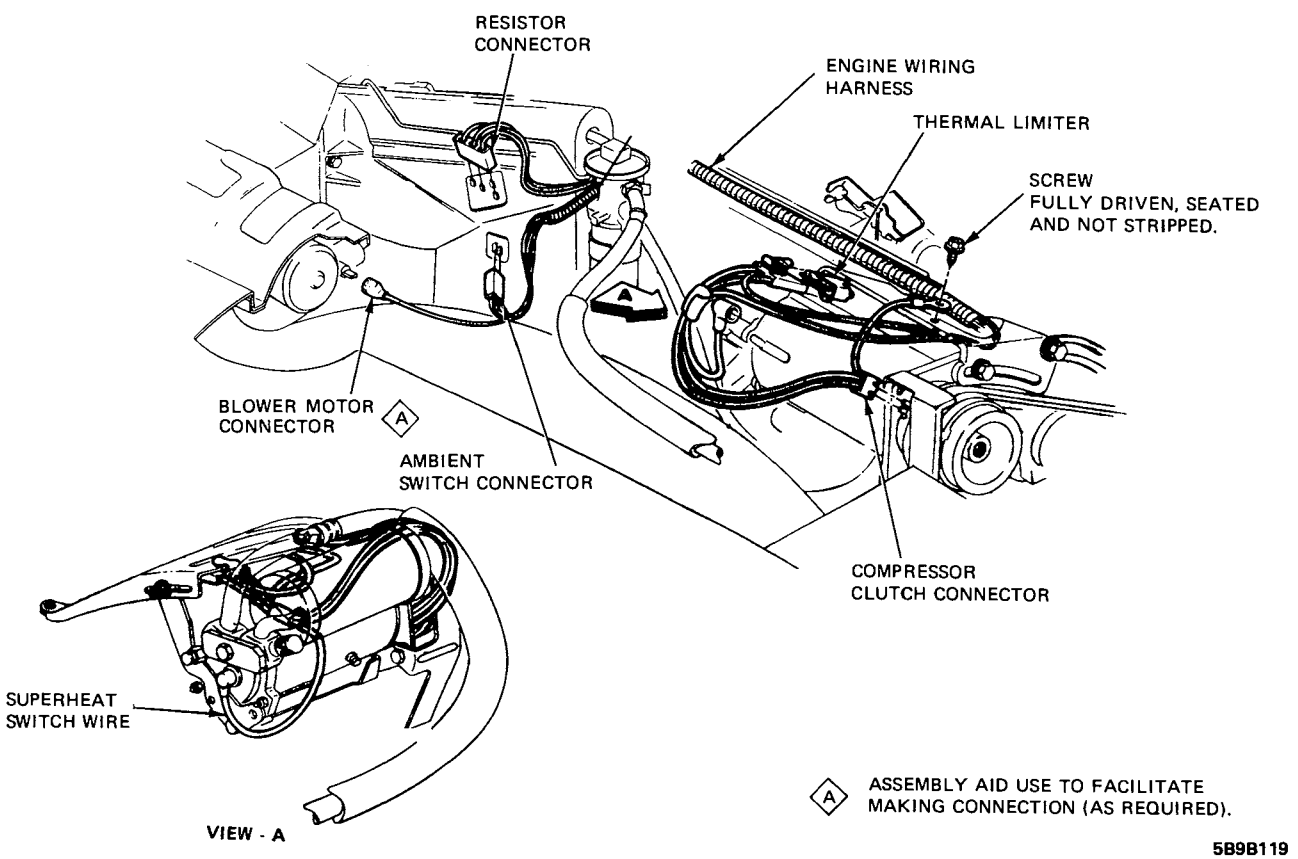


Figure 9B-246 - Blower Motor Compressor Wiring - A/C Manual - B-C-E Series

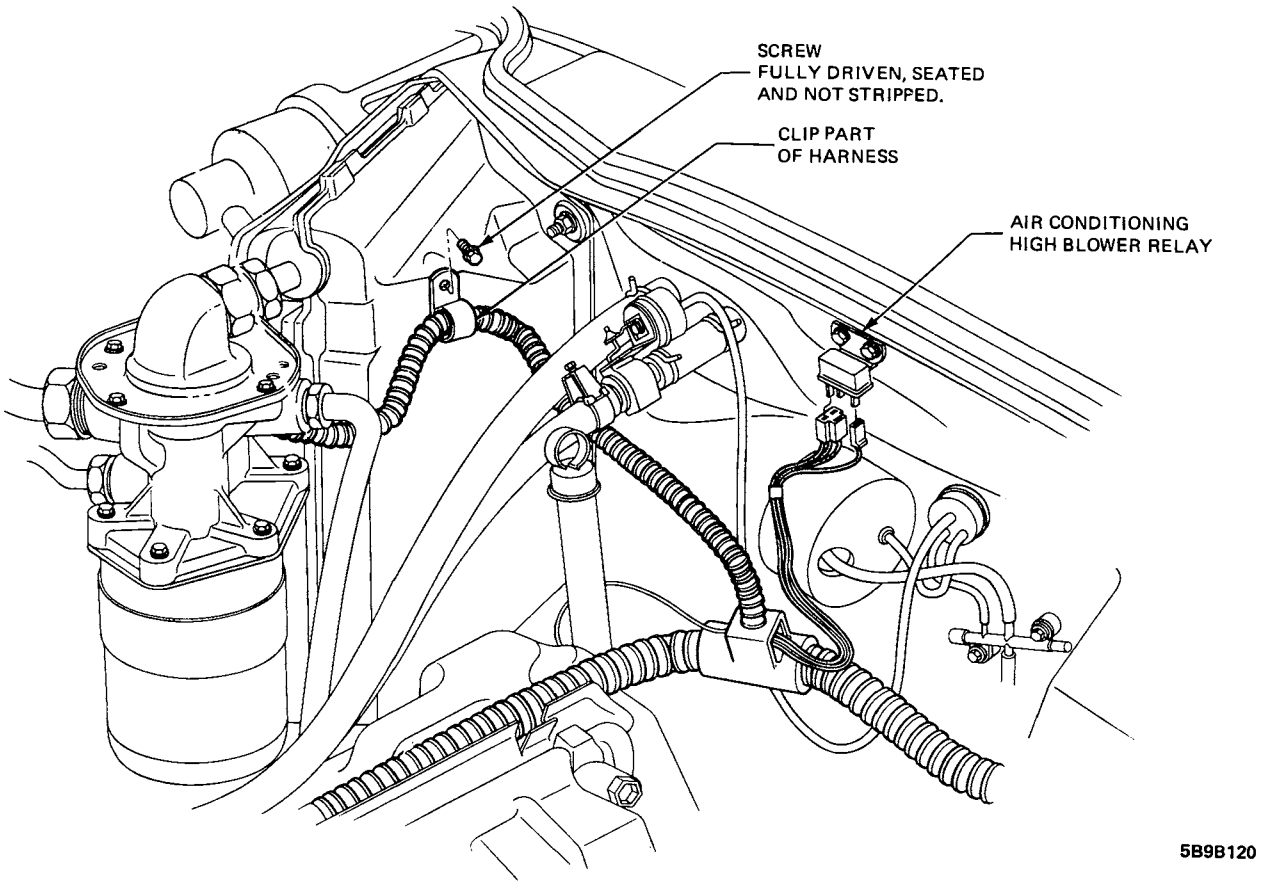


Figure 9B-247 - Wiring - A/C Relay - Manual - B-C-E Series

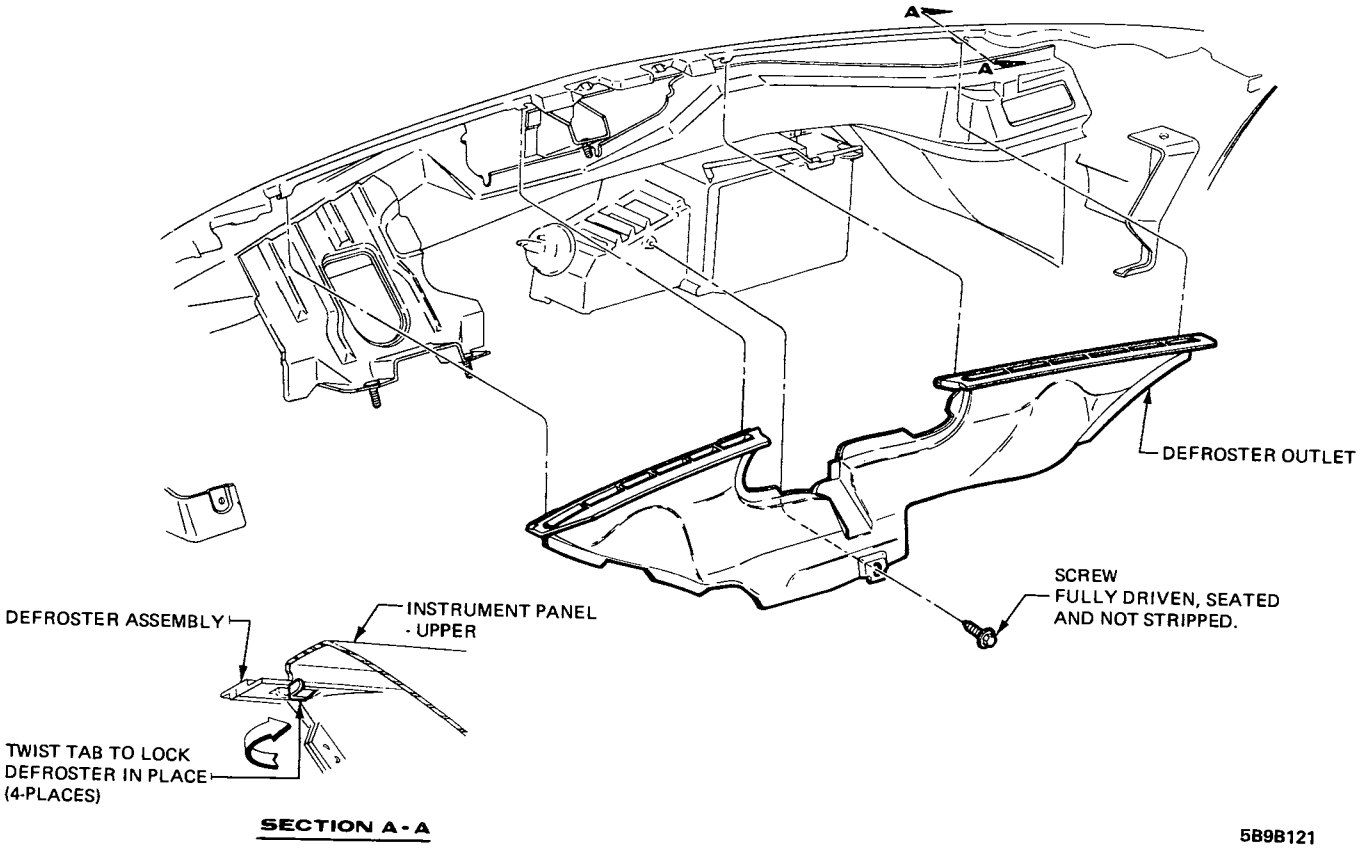


Figure 9B-248 - Defroster Outlet - A/C & Heater - B-C-E Series

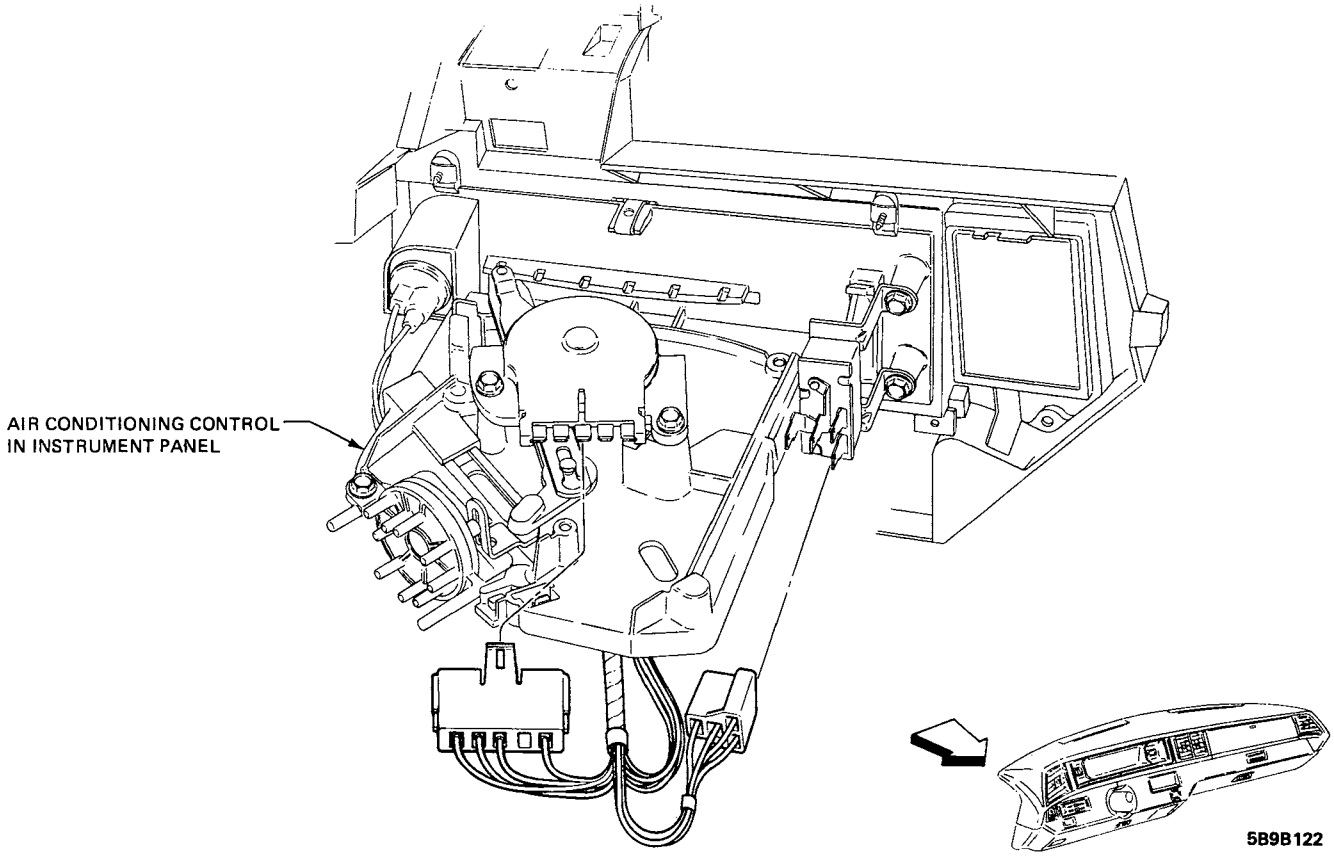


Figure 9B-250 - Wiring - A/C Manual Control - B-C-E Series

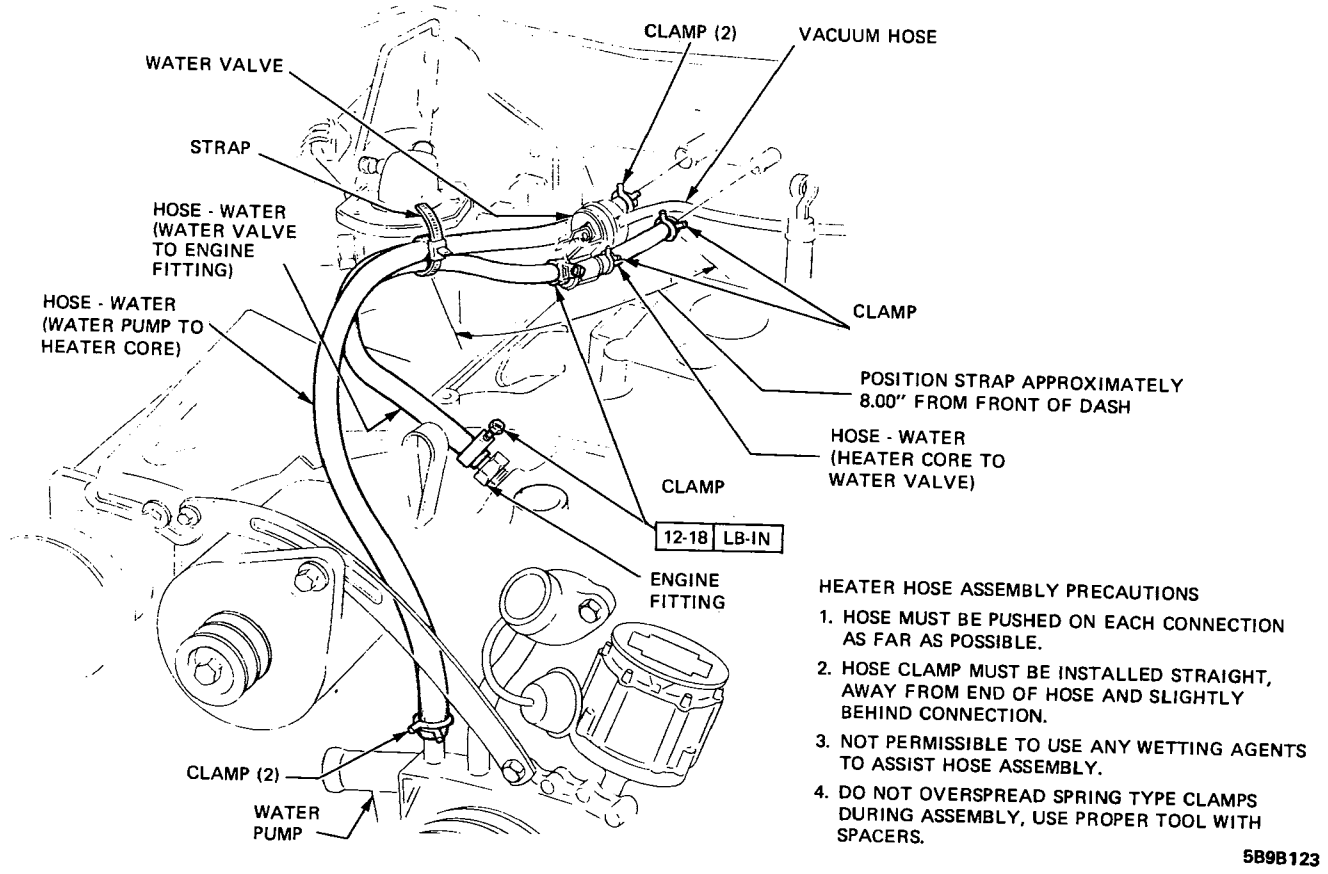


Figure 9B-251 - Heater Hoses - A/C - B-C-E Series

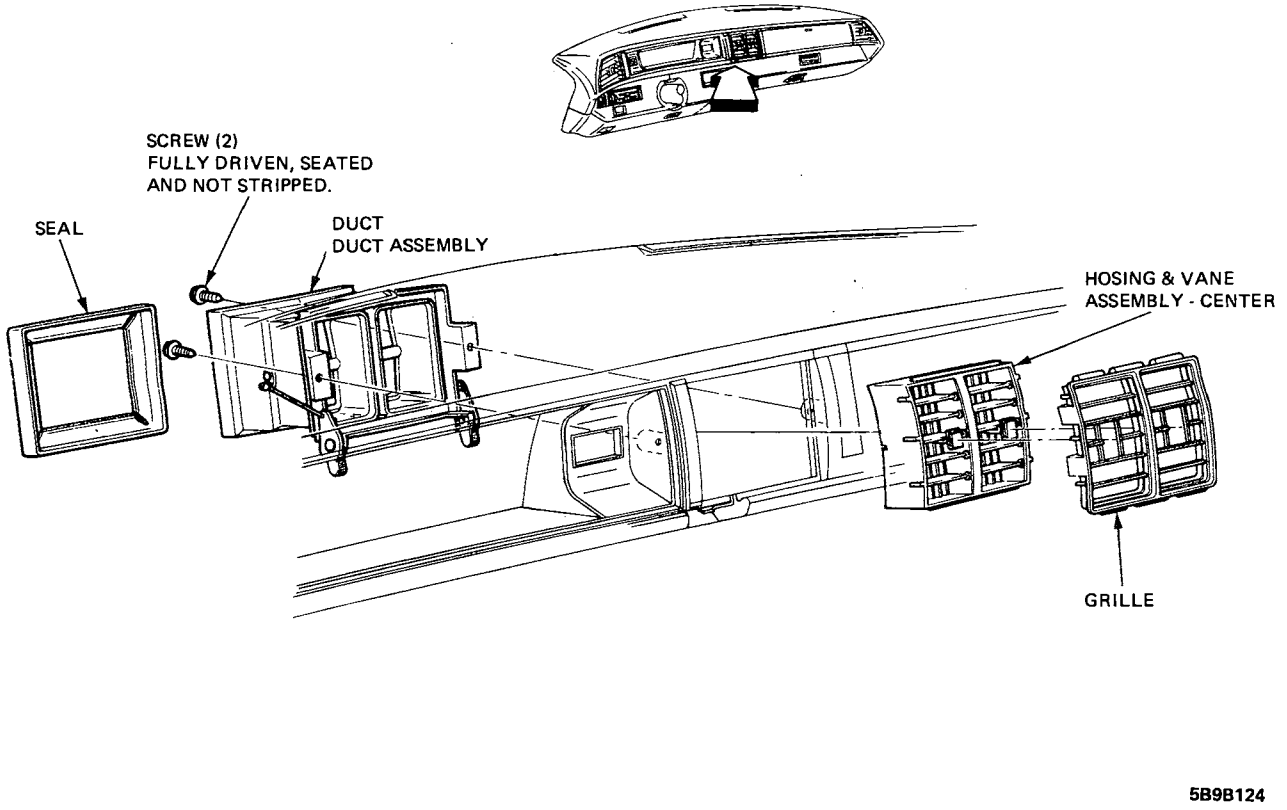


Figure 9B-252 - Heater & A/C Outlet Center to Instrument Panel Cover - B-C-E Series

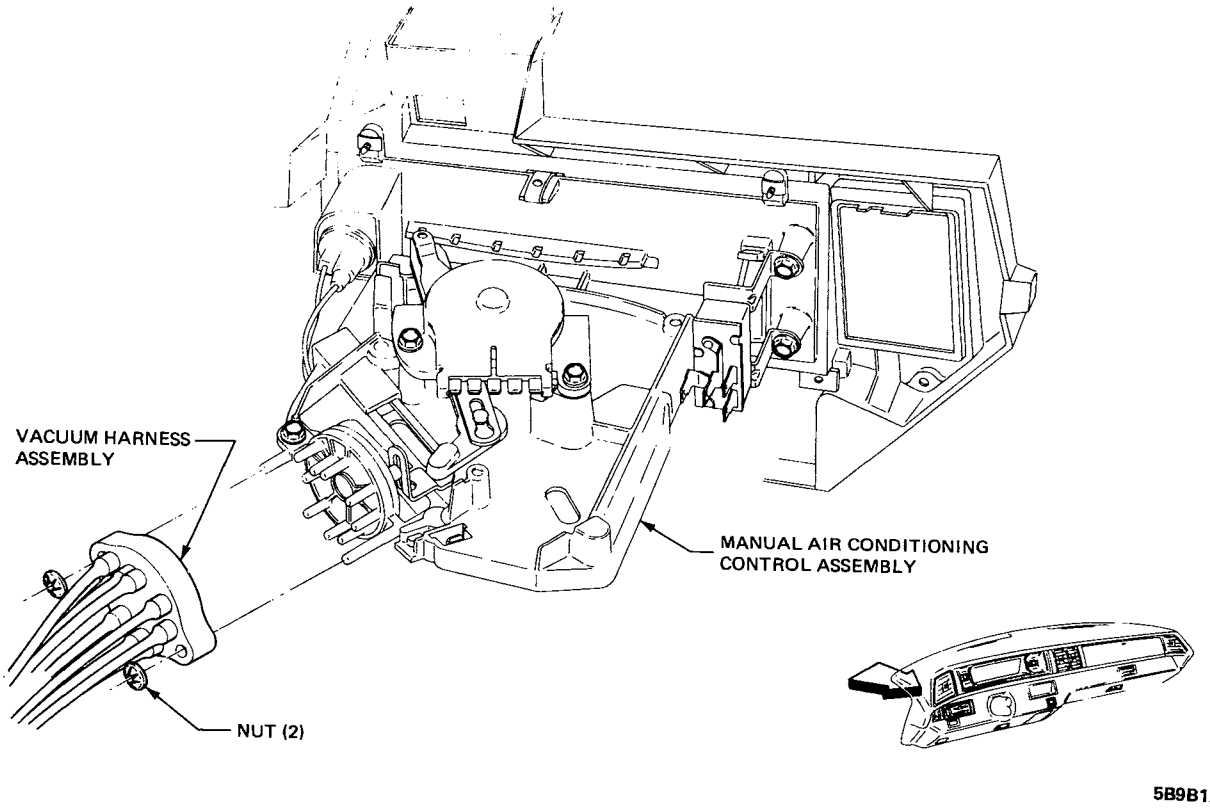


Figure 9B-253 - Vacuum Harness - At Control - Manual A/C - B-C-E Series

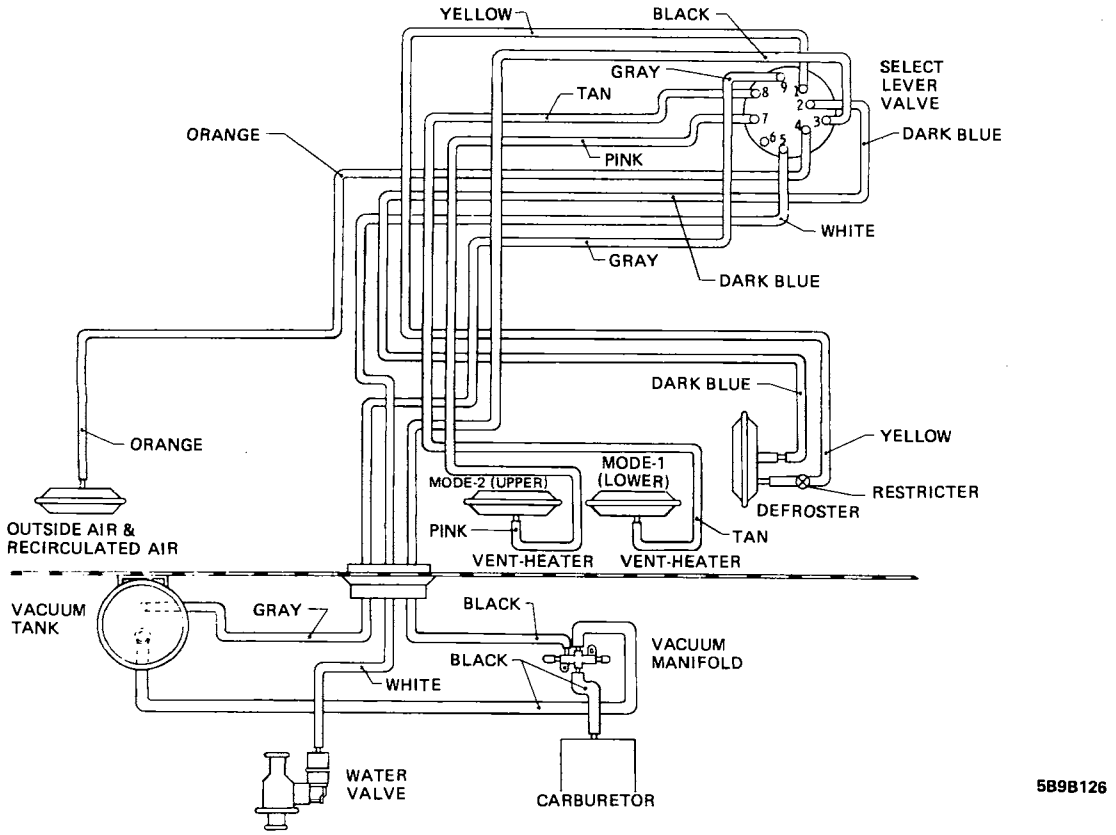


Figure 9B-254 - Vacuum Hose Schematic - A/C - Manual - B-C-E Series

AUTOMATIC CLIMATE CONTROL - HEATER - AIR CONDITIONER SYSTEM

A-B-C-E SERIES

WARNING: IF EQUIPPED WITH AIR CUSHION RESTRAINT SYSTEM, DO NOT ATTEMPT ANY ADJUSTMENT, REPAIR OR REMOVAL OF ANY PORTION OF THE AIR CONDITIONING SYSTEM WHICH WOULD REQUIRE REMOVAL OR DISCONNECTING OF ANY COMPONENT OF THE AIR CUSHION RESTRAINT SYSTEM UNTIL THE DISCONNECTION PROCEDURE IS COMPLETED. THIS PROCEDURE MUST BE FOLLOWED TO PREVENT ACCIDENTAL DEPLOYMENT OF THE SYSTEM WHICH COULD RESULT IN PERSONAL INJURY AND/OR DAMAGE TO THE SYSTEM'S COMPONENTS.

A.C.R.S. DISCONNECTION PROCEDURE

1. Turn ignition switch to "LOCK" position. Disconnect the negative battery cable from the battery and tape end.

CONTENTS

DESCRIPTION AND OPERATION

GENERAL THEORY OF SYSTEM OPERATION AND COMPONENTS

A.C.C. is designed to automatically control the heating and air conditioning components in the automobile so that a constant interior temperature is maintained, regardless of varying ambient conditions. The Automatic Climate Control system is beneficial in both summer and winter. In hot weather, it will cool the car rapidly to the pre-set comfort level and then modulate cooling to whatever degree is required to maintain constant comfort. In mild weather, the interior of the vehicle remains comfortable

without having to reset the controls. In cold weather, the system will heat the car quickly to the desired temperature, then level out to maintain the pre-set comfort level desired by the passengers.

The existing heater and air conditioning components provide a series system so that the primary control function is to position an air mix door and a mode door in order to release properly-heated or cooled air from the proper duct outlets.

Programmer

1975 automatic climate control equipped cars have a revised design ATC Programmer. The new programmer, designated MKII, is revised in the electrical-to-vacuum transducer mechanism. Previous systems used a "force balancing" valve which provided either vacuum, vent or closed operation with no flow at the controlled (or balance) point. The MK II programmer is based on the "bleed" principle, identical in concept to the temperature sensor in the thermac air cleaner or the servo in the cruise master system.

The higher efficiency of this type of valve results in a simpler amplifier circuit as well as a more compact transducer.

The revised components in the programmer, are as follows:

a. Transducer

b. Amplifier

c. Restrictor

d. Vacuum level valve

e. Vacuum hoses

The operation of the MK II programmer differs from previous programmers in the following manner: The early transducer is fed manifold vacuum and modulates that vacuum to provide a signal to the power diaphragm proportional to the electrical signal to the transducer coil. The signal vacuum is passed through the vacuum relay which acts as a locking device during periods of low engine vacuum or car shutdown. With the MK II programmer, supply vacuum is metered through a .016" dia. hole in the vacuum relay and the transducer provides a variable vent action which regulates the vacuum signal to the power diaphragm. Because the transducer has high vent flow capacity, a porous metal restriction is provided in the power diaphragm vacuum feed line to maintain the position of the programmer output until the vacuum relay can lock at car shutdown. The power diaphragm incorporates a vacuum level valve which is actuated by the diaphragm plate at the maximum heat end of travel to limit the power diaphragm vacuum level to approximately 6.0 in. hg. This limits the programmer vacuum level preventing the possibility of locking in maximum heater under certain low engine vacuum conditions.

Transducer

The transducer is a throttling device, with a vacuum level set by balancing an air force against a ball with a magnetic attraction between the armature and pole piece. The low operating force and efficient structure of the MK II transducer results in substantially lower electrical power requirements to drive the system.

Amplifier

The amplifier is similar in construction to previous amplifiers, however the MK II amplifier uses a smaller output transistor and eliminates the clip and insulator arrangement of providing heat transfer. Further, the small transducer is a part of the amplifier assembly, reducing wires and connections.

Restrictor

The transducer operates the reverse of the previous transducer and has high vent flow capacity. In order to prevent the loss of position during stop/restart operations, it is necessary to add a restrictor between the vacuum relay and motor. This is a sintered plug-in hose type.

Vacuum Level Valve

Because the transducer is not adjustable for maximum level, it is necessary to limit the maximum applied vacuum by other methods. The vacuum level valve is used to release the programmer from the maximum heat position at any manifold level above 6.0 inches.

Vacuum Hoses

The vacuum hoses are revised to include the restrictor installation and accommodate the routing required by the new design.

There are two important service differences required by the MK II programmer. First, because of the slight difference in performance (Programmer moves toward A/C not heat, when system is shut off or disconnected at the programmer) of the MK II programmer, a new diagnosis card (J-23678-50) for use with the J-23678 ATC tester is required. The new card will be clearly marked for use with the MK II programmer.

The second difference is a new procedure for adjusting the air mix door link. The change in the procedure involves disconnecting the ambient sensor electrical connector rather than the programmer electrical connector as in previous years.

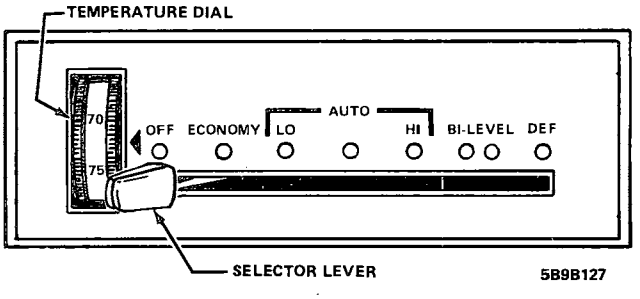


Figure 9B-260 - Automatic Climate Control - Dash Control - A Series

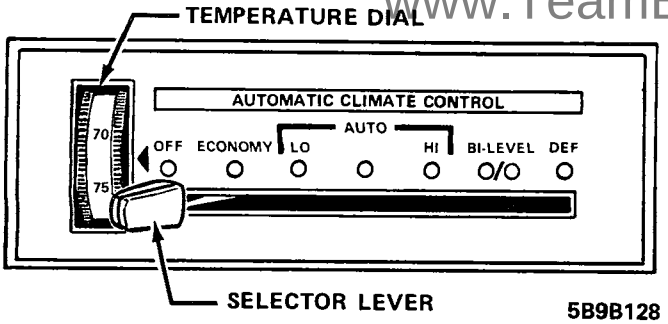


Figure 9B-261 - Automatic Climate Control - Dash Control - B-C-E Series

BASIC SYSTEM OPERATION

Economy Position

In this mode the compressor will be off. The blower speeds will alternate automatically from HI to LO as necessary to maintain the temperature dial setting. Heated or unheated air may come from the heater and/or air conditioning outlets depending on the temperature dial setting and/or outside temperature. In-coming air cannot be cooled lower than outside air temperature in this selector lever position.

DIAGNOSIS

HOW TO ISOLATE THE PROBLEM

To diagnose an air conditioner problem in the shortest time and with the least effort, it is essential to follow a logical service procedure. Time spent in conducting a system functional performance test and analyzing the defect in order to isolate it to a specific control function area will be repaid in reduced repair time. A recommended diagnosis procedure follows:

STEP 1 - Attempt to get an accurate, detailed description of the owner's complaint in writing on the repair order. "A/C inop." or "erratic operation" do not provide much information to the repairman.

STEP 2 - To confirm the system defect, make a brief check of system operation by sitting in the car and operating the controls, with the engine warmed up and running at 1000 RPM or higher, in the following sequence:

70 to 80 Degrees F. Inside Temperature.

AUTOMATIC TEMPERATURE CONTROL FUNCTIONAL TEST

Control Setting	System Should Operate As Follows:
"DEFROSTER" DIAL @ 85	Air should be delivered out of defroster outlets at a fixed high blower speed. Some floor bleed out heater.
"BI-LEVEL" DIAL @ 75	Air should be delivered from both the A/C and heater outlets at a reduced blower speed. Only a small portion of air will come out the defroster outlet.
"HI" DIAL @ 65	Air should be delivered out the A/C outlets at a fixed high blower speed and cool to cold temperature. The re-circulating air door may open (blower noise increases). Door movement will be slow because of vacuum delay plug.
"AUTO" DIAL @ 65	After 45 seconds the A/C discharge air should drop to 50 degrees F. or lower (may be slightly higher in 90 degrees F. or above ambients). Recirc. air door should close (noise level will drop).
"AUTO" DIAL @ 85	Blower speeds should drop (Hi - M3 - M2 - M1 - etc.) and discharge air temperature should increase. Depending on the temperature in the work area, the air delivery mode should change from the A/C outlets to the heater outlets.
"LO" DIAL @ 85	Air should be delivered at a fixed low blower speed.

Control Setting	System Should Operate As Follows:
"ECONOMY" DIAL @ 85	Air should be discharged from the A/C and heater outlets at a fixed low blower speed. The A/C compressor should not operate.
"OFF" DIAL @ 65	Air should be discharged out the heater outlet at a fixed low blower speed. No A/C compressor operation.

During the preceding tests, be sure to note the following:

a. Check to assure that air delivery is not coming from both the A/C and heater outlets when only one mode is indicated. A split air delivery is indicative of a vacuum leak or a tight door.

b. Note whether program events (air delivery mode change, blower speed change, recirc. air, etc.) occur without change in discharge air temperature. This would indicate a programmer is operating without moving the temperature air door. Check the air mix door link to programmer connection.

c. Failure of a specific vacuum-operated door function could indicate a vacuum disconnect of the vacuum diaphragm at that door. See illustrations for locations of the different function doors.

STEP 3 - Perform the easiest checks first! A simple, visual inspection of the easily accessible underhood and instrument panel electrical and vacuum connections will, in many instances, reveal the defect on the spot.

STEP 4 - Based on information gained during the functional test performed in Step 2, try to relate the problem to one of the following areas:

1. Temperature Control Problems
2. Blower Control Problems
3. Auxiliary Vacuum Problems
4. Refrigeration System Problems

Once a problem has been isolated to one of the areas listed above, refer to that diagnosis section on the following pages. Diagnosis charts and Control Circuit illustrations are provided. It is of special importance to be familiar with the general description of the major sections of the system as presented in the Theory of Operation section.

STEP 5 - After the problem has been properly diagnosed and the repair made, it is important to run through the brief check listed in Step 2 in order to assure that the system is now performing correctly.

TEMPERATURE CONTROL PROBLEM DIAGNOSIS

The primary function of the temperature control circuit is to determine the correct temperature of the air to be discharged into the passenger compartment and to set the air mix door position to accomplish that function. The signal used for this purpose (vacuum to position the programmer vacuum motor) is also used in the blower speed control circuit and the auxiliary vacuum function circuit. Those uses may be disregarded when dealing with problems which relate only to the temperature control circuit.

Examples of temperature control problems are: (1) "system operates at maximum air conditioning (no heat) or only at maximum heating (no air conditioning)," (2) "temperature dial does not provide comfort," and (3) "poor heating or poor cooling." Blower cycling and mode cycling are also caused by a malfunction in the temperature control circuit.

It is important to separate temperature control circuit problems from refrigeration or heater problems. If the complaint is "poor" or "no" heating or cooling and the programmer moves to both extremes of travel with the air mix door and program functions known to follow, the problem probably lies in the refrigerant or heater water systems.

Many temperature control problems result from poor electrical or vacuum line connections. The following relationships may aid diagnosis.

A disconnected sensor or temperature dial interrupts the electrical signal and drives the programmer to maximum heating.

A poor sensor connection adds resistance to the sensor string, driving the system hotter.

An open amplifier power feed eliminates the output signal and drives the programmer to maximum A/C.

A disconnected vacuum hose supplying the vacuum checking relay actuating nipple will lock the vacuum motor in an intermediate position.

A disconnected vacuum hose in the transducer-programmer vacuum motor line will drive the system to maximum cooling.

A leak in the auxiliary vacuum circuit may reduce the transducer vacuum supply level below control requirements, causing an "off-calibration" or "poor heating" type of complaint.

A loss of supply vacuum usually results in cold air flow on the floor.

Diagnosis of most of the problems encountered in the temperature control circuit will be greatly aided by use of tester, J-23678. Information on how to use the A.T.C. Tester appears at the end of this section. (Instructions also accompany the tester.)

Specific problems and probable causes are as follows:

System Operates Only at Maximum Air Conditioning

This can be a vacuum or electrical problem. The problem can be separated into problems of erroneous signal external to the programmer or internal programmer malfunctions. With the system operating, disconnect the programmer electrical connector and observe the programmer movement through the slot at the bottom of the programmer cover. If the programmer remains in the maximum air conditioner position, remove the multiple vacuum connector and check for supply vacuum at the black hose. If no (or low) vacuum supply, check for leaks or disconnects in vacuum hose assembly. If vacuum supply is okay, check voltage to programmer, if okay, programmer is malfunctioning. Remove programmer cover and inspect for obvious disconnects. If no programmer malfunction is obvious, use tester J-23678 to analyze and correct problem.

Other external causes of this symptom are:

1. Shorted in-car sensor or ambient sensor.
2. Shorted or miscalibrated temperature dial.
3. A short in the sensor circuit of the wiring harness.

System Operates Only At Maximum Heating

This is usually an electrical problem. Problems outside of the programmer can generally be separated from internal programmer malfunctions. To do this, set the temperature dial to 65 degrees and the control lever to the "Economy" position with the system operating. Observe the programmer through the slot located in the lower half of the programmer cover to see if the programmer now moves to the maximum air conditioning position. If the programmer does move, the problem is in one of the following areas:

1. Disconnected or malfunctioned in-car sensor.
2. Disconnected or malfunctioned ambient sensor.
3. Open circuit or backed-out terminal in the wiring harness sensor string circuit.
4. Disconnected or backed-out terminal in the three-way connector located under the instrument panel on the R.H. side of the car near the programmer.

If the programmer did not move when the control was put to "Economy," the problem lies in one of the following areas:

1. Disconnected or malfunctioned temperature dial.
2. Disconnected or open in ground circuit (black wire) between control head and programmer.
3. Malfunction within programmer assembly.

Use Tester, J-23678, and Adapter Harness, J-24774-75, to analyze and correct the preceding problems.

System Fluctuates Blower Speeds and/or Mode Shifts During Acceleration

1. Malfunctioned vacuum checking relay (inside programmer).
2. Leaking programmer vacuum motor.

It is possible to distinguish between the two above items. With the system operating and programmer cover removed, reinstall the vacuum and electrical connectors and perform the following steps:

a. Remove the ambient sensor connector to force the programmer to maximum heating (full vacuum).

b. Remove the vacuum hose assembly connector. The programmer should remain in the maximum heat position. If it does not, repeat Step a, and then pinch the programmer vacuum motor supply hose with a pair of needle-nose pliers. If the programmer still moves, the vacuum motor is leaking. If the programmer does not move, the checking relay has malfunctioned.

c. If the original complaint was mode shifts without blower change, the check valve portion of the checking relay has probably malfunctioned.

Dial Setting Does Not Provide Comfort

The best approach to solving problems of the "off calibration" variety is to use Tester, J-23678, to check and reset calibration on all of the following parts:

1. The temperature dial.
2. The feedback potentiometer in the programmer.
3. The temperature door link adjustment.
4. The sensor string.

Check to assure that in-car sensor aspirator hose is attached at both the in-car sensor and the aspirator and is not kinked in routing.

Refer to the instruction sheet included with the Tester or the section on System Adjustments for procedures on checking and calibrating the preceding items.

Blower Cycling and Mode Cycling

Some system cycling may also occur and is normal if the temperature dial is moved in large increments. Instruct owner of this and explain system operation. Listen for blower speed changes or watch for other erratic movements. Also use Tester.

Insufficient Heating or Cooling

This problem may be caused by a control system malfunction or by the refrigerant or heater systems. Determine first which area to pursue:

1. Check for compressor clutch actuation (no cooling). If not operating, refer to diagnosis of low refrigerant detection system.
2. Check for clear sight glass and cold suction line (no cooling).
3. Check engine coolant level (no heating).
4. Check temperature of heater hoses by feel (with engine hot) to see if hot water is entering the heater core (no heating).
5. Check for proper air flow at the "Auto" and "Hi" lever

settings. (Improper air flow may be a blower relay problem, a blocked air passage, or a disconnected air hose.)

6. Check calibration of control head temperature dial.

7. Check calibration of programmer "feedback" potentiometer.

If a refrigeration problem exists, refer to the refrigeration diagnosis section. If the problem appears to be caused by the temperature control system, locate problem area using Tester, J-23678, or as specified elsewhere in this section. Also check air mix door link adjustments.

Blower Speeds and Mode Shift Occurs Without Temperature Change

Check connection of air mix door link to programmer shaft and to air door crankarm.

Blower Control Circuit Problem Diagnosis

Blower control can be divided into two separate categories, blower turn-on and blower speed control. Blower turn-on is accomplished when a ground path is completed for either the "Lo" relay coil or the "Auto" relay coil. Relay coil grounds are completed by (a) the thermoswitch which provides delay for heater water warm-up in winter operation, (b) the in-car switch which provides immediate turn-on in summer operation, or (c) manual override in the "Defrost" settings. Blower speed control is accomplished by actuating only the low blower relay in the "Off," "Economy," and "Lo" positions, by selective use of the resistors on the blower circuit board in the "Auto" and "Bi-Level" lever settings, or by a high blower override circuit in the "Hi" and "Defrost" lever positions. It should be noted that the system air doors are always positioned to allow delivery of air into the passenger compartment. Particulars of the blower control circuit are explained in more detail in the Theory of Operation section. Problem descriptions and probable causes are listed in the following diagnosis chart:

System Operates Only At Low Blower

1. Electrical disconnect at "Auto" blower relay.

2. Malfunctioned "Auto" blower relay.

3. Backed-out terminal or poor connection at six-way connector (located near programmer), at programmer, or at control head. Trace "Auto" blower circuit using electrical wiring diagram.

4. Open in "Auto" blower circuit wiring.

No Blower Operation In Any Lever Setting

1. Electrical disconnect at blower motor or at radio capacitor in series with blower feed.

2. Blown or malfunctioned 15 amp. A/C-heater fuse.

3. Stalled blower motor.

4. Open circuit in wiring harness to blower motor.

5. Disconnect at six-way connector (near programmer).

6. Blown in-line fuse from alternator.

No Blower In Off, or Lo Settings

1. Disconnect at low blower relay.

2. Malfunctioned low blower relay.

3. Open low speed resistor on programmer.

4. Backed-out terminal or poor connection at six-way connector (located near programmer) or at programmer. Trace low blower circuit.

5. Open in low blower circuit wiring.

Operates Only At Low Blower Except In "Hi" and "Defrost"

1. Malfunction in programmer wiper contact or board.

2. Backed-out terminal or disconnect at programmer electrical connector.

3. Open in programmer internal wiring.

Blower Operation Only In "Hi" or "Defrost"

Electrical disconnect at programmer (system will also operate only at maximum A/C).

Blower Speed Varies In "Hi" and "Defrost"

1. Malfunctioned wipers or circuit board in control head circuit board switch.

2. Open in control head wiring harness.

3. Open in by-pass circuit in wiring harness.

Blower Operates With Ignition Off

Malfunctioned low blower relay or auto relay (closed contacts).

Blower Speeds Skipped In "Auto" and "Economy" Settings

Open resistor on programmer blower circuit board.

No Heater Turn-On In Cold Weather Except In "Defrost"

1. Electrical disconnect at thermoswitch (located at rear of R.H. cylinder head).

2. Malfunctioned (will not close). Check by grounding switch feed wire.

3. If problem persists, refer to electrical circuit diagrams for wiring discontinuity.

If problem does not occur in garage, it is probable that the system is turned on by the in-car sensor. Disconnect control head electrical connector to disarm the in-car switch. If the blower turns off (with the engine warmed up), ground the thermoswitch feed wire. If the blower now turns on (in low blower speed), the thermoswitch has probably malfunctioned.

Immediate Heater Turn-On In Cold Weather

1. Malfunctioned (closed) thermoswitch (remove and check cold).

2. Malfunctioned (closed) in-car switch.

3. If problem persists, refer to electrical circuit diagram, and trace wiring continuity.

A/C Delayed In Hot Weather Until Engine Warms Up (Unless Control Lever Is In "Defrost")

If problem persists, check wiring continuity in the in-car switch circuit.

AUXILIARY VACUUM PROBLEM DIAGNOSIS

Auxiliary vacuum functions are defined as those vacuum circuits in the automatic temperature control system which do not affect the temperature of discharged air. Specifically that would include all vacuum functions except the programmer vacuum motor. Included in this section is one auxiliary electrical circuit, the compressor actuation circuit. A list of the auxiliary circuits is as follows:

1. Upper mode door vacuum circuit.
2. Lower mode door vacuum circuit.
3. Defroster bleed vacuum circuit.
4. Defroster door vacuum circuit.
5. Recirc. door vacuum circuit.
6. Heater water valve vacuum circuit.
7. Compressor electrical circuit.

Because of the relative simplicity of each of the auxiliary vacuum circuits, the best diagnostic aid will be a clear understanding of the type of problem or complaint which would result from a malfunction in any of the individual circuits. Once the problem has been isolated to a specific circuit, diagnosis will generally consist of checking vacuum connections at one or two points. The following chart presents the types of problems most likely to be encountered in each of the auxiliary circuits. For more complex problems, a procedure to completely qualify the vacuum system is presented in the last block of the diagnosis chart.

It should be noted that because of the inter-relationship of the vacuum circuits, a leak in one circuit may reduce the vacuum supply to another circuit sufficiently to cause a malfunction of the second circuit. For example, a water valve hose disconnected may prevent the mode doors from moving full travel, causing a split mode condition.

Upper and Lower Mode Door Actuation Problems

The most likely malfunctions would be "no air conditioner operation" and "split mode operation." Vacuum is required to get air conditioner mode. Check the hose connections at the mode door upper and lower vacuum actuators. Split modes may occur because of malfunctions in either the upper or lower door circuit, or because of leaks in other auxiliary vacuum circuits. It is recommended that the external circuit test procedure listed later be used to isolate mode door vacuum problems.

Defroster Bleed Problems

Actuation of the side (bleed) port of the defroster diaphragm is delayed by a porous flow plug inserted in the yellow-coded vacuum hose. Complaints relating to defroster bleed operation will generally be of two types:

1. "No defroster bleed." Check hose connection at defroster bleed nipple of defroster vacuum actuator. If connections are satisfactory, porous plug is probably too restrictive. Replace plug. (Before installing new plug, check for vacuum in yellow line; and apply hose to nipple, without the plug, to check bleed door operation.)

2. "Rapid fogging of windshield when heater turns on." Either there is no porous flow plug or installation of the plug is incorrect.

Defroster Door Actuation Problems

The most common problem to be expected in this circuit would be "no air out of defroster outlets in "DEFROST" setting." Vacuum to the defroster actuator is required for defroster operation.

1. Check hose connection (blue) at defroster actuator.
2. Check for vacuum at the control head purple hose.
3. If system stays in A/C mode at "DEFROST," check vacuum circuit to determine why mode override did not occur.

If problem persists, see vacuum circuit test following.

Recirculating Air Door Actuation Problems

The most likely problem to be encountered will be "no recirc. air in "Hi" lever setting." Vacuum is required to obtain recirc. air. Check hose connection at recirc. air door. Remove vacuum delay plug to check for adequate vacuum at "Hi" setting and 65 degree dial. If vacuum is available but door won't move after approximately three minutes with plug in circuit, replace plug.

Heater Water Valve Control Problems

The water valve is normally open requiring vacuum to close off water flow. It would be very difficult for a customer to recognize a problem in the water valve circuit by "no heater water shut-off"; however, a leak in that circuit may manifest itself by reduced vacuum levels available in other vacuum functions. The most likely such complaint would be a split mode delivery. Use the auxiliary vacuum circuit test procedure presented following to isolate vacuum problems.

Auxiliary Vacuum Circuit Check Valve Problems

The check valve for the auxiliary vacuum circuit is located in the programmer checking relay assembly. A malfunction of this check valve will probably result in complaints of loss of a specific function (such as "A/C shuts off") during accelerations or mountain climbing. The check valve may be checked with the system operating by disconnecting and plugging the black hose feeding the programmer checking relay. The vacuum functions (a vacuum gauge in the purple hose or the system in A/C mode) should hold. If they do not hold, reinstall the black hose; and pinch the purple hose. If the functions now hold, the check valve is bad. If the functions continue to leak down, there is a circuit leak further upstream. Use the auxiliary vacuum circuit test following to locate the leak.

Compressor Electrical Problems

Malfunctions in the compressor electrical circuit would result in complaints of "no cooling," or "insufficient cooling." Perform the following checks:

1. Blown thermal fuse or disconnect at thermal fuse.

2. Blown 15 amp fuse in fuse block.

3. Electrical disconnect at compressor clutch coil or clutch coil ground.

4. Electrical disconnect at compressor ambient switch. (Also disconnects ambient sensor which will bias the programmer to maximum heat.)

5. Electrical disconnect at the three-way electrical connector inside the car, to the right of the programmer.

6. Backed-out terminal or misconnect at the control head electrical connector.

7. Malfunctioned compressor ambient switch.

8. Open in wiring harness.

Auxiliary Vacuum Circuit Test Procedure

Remove car vacuum harness plug from programmer valve, which should direct all airflow to floor except for defroster bleed air. Connect tee with short hose and union to J-23678 tester vacuum gauge hose as shown in the following figure, inserting tee in Port No. 2 of harness plug and probing each of the other ports in turn. Make sure that control head lever is set as specified for each step, and cover up probe on Ports 3 and 9 when called for, to seal off other circuit branches. For each step, full vacuum should be read after actuator-travel is completed.

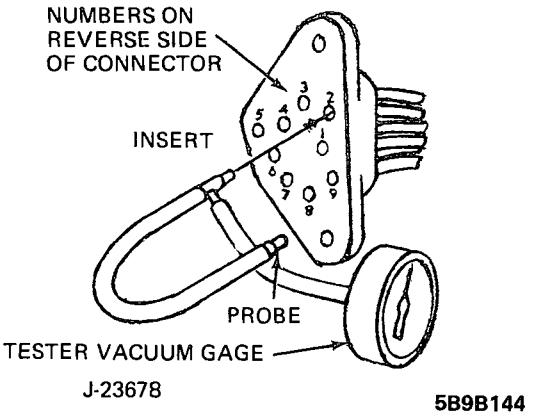


Figure 9B-262 - Connecting Vacuum Gauge

A low vacuum reading in any step indicates a leak in control head valve or in the hoses and components listed in that step. If some function is missing, even though full vacuum is available, reconnect harness plug to programmer and check vacuum at extreme end of hoses involved, to distinguish between a pinched hose and a mechanical bind in actuator or door.

REFRIGERATION PROBLEM DIAGNOSIS

The sole function of the refrigeration system is to maintain the evaporator core cooling surfaces at 32 degrees F. when refrigeration is required. A properly-operating refrigeration system will do this, if engine speed is sufficient and the heat load on the system is not excessive. A refrigeration problem exists when there is a malfunction in one of the refrigeration components or in the overall system which interferes with this function. In most cases, the malfunction will result in higher-than-normal core temperature and loss of effective cooling; in a few specific cases the core will operate at a temperature lower than 32 degrees F. and condensate in the core will freeze and block air-flow, again causing a loss of cooling.

It is important to separate refrigeration problems from temperature control problems. This can be done simply during the brief lever setting check prescribed at the beginning of the diagnosis section. Proceed as follows:

1. Set lever at OFF-ECONOMY-LO-AUTO-HI-BI-LEVEL-DEFROST and check for proper system operation, as described earlier.

2. If system operates properly, return lever to AUTO and set dial at 65 degrees.

3. Install thermometer in center air conditioner outlet. Wait approximately one minute. Thermometer should read 40 to 50 degrees unless temperature or humidity of test area are excessively high.

4. If the discharge temperature is significantly higher than 50 degrees, disconnect vacuum hose assembly attached to the programmer. Check to assure that the air-mix door link arm is pivoted fully to the "Max" A/C position.

5. If the discharge air temperature drops to 50 degrees or below as a result of disconnecting the hoses, the problem belongs in the Temperature Control category.

6. If the temperature does not change and is still significantly higher than 50 degrees, a refrigeration problem exists.

Many refrigeration problems can be readily diagnosed without connecting the refrigeration gauge set or perform-

Control Lever	Probe Port	Hose Color	Cover Up	Other Hoses in Circuit	Action Expected
Bi-Level	None	None	Probe	Yellow	Defroster door moves to "bleed" position
Bi-Level	1	White	None	None	Hot water valve closes – Check air in "max. heat"
Bi-Level	3	Red	Port 9	Purple, Tan	Lower mode door moves to A/C position
Bi-Level	4	Orange	None	None	Recirc. door opens – 1-2 min. delay
Lo	5	Chartreuse	Port 9	Purple	Checks control head vacuum leakage
Lo	6 or 8	Green	None	None	Upper mode door moves to A/C position
Hi	7	Dark Brown	None	Tan	Lower mode door moves to A/C position
DEFROST	9	Purple	Port 3	Red, Dk. Blue	Defroster door moves to full "DEFROST" position.

ing the more extensive Cooling Capacity Performance Test listed in the standard service procedures.

USE OF THE A.T.C. TESTER - J-23678

The A.T.C. Tester, J-23678, is designed for on-car diagnosis of control problems utilizing car electrical and vacuum supplies. The Tester will not only locate the problem area but will also isolate the individual malfunctioning component.

How The Tester Functions

The Tester is inserted into the control system electrical and vacuum circuits at the programmer connections. The Tester is made up of the following four basic sections:

1. Manual Drive Control - A variable rheostat which replaces the sensor string when the "Automatic-Manual" rocker switch is in the "Manual" position. The rheostat can be varied to cause programmer movement, to analyze programmer operation, to adjust the feedback potentiometer, or to distinguish a sensor string malfunction from a programmer malfunction.

2. Voltmeter - Used to check programmer and blower voltages at connector terminals. A "probe and clip" position is also included to allow voltage readings elsewhere in the system.

3. Temperature Dial Calibrator - The temperature dial setting (resistance) is checked by comparison to a master resistor in the Tester. Allows dial adjustment.

4. Vacuum Gauge - Used to check vacuum anywhere in the system.

ALWAYS START DIAGNOSIS WITH BRIEF FUNCTIONAL TEST OF SYSTEM.

TEST PROCEDURE

System Functional Test - Always Start Diagnosis With This Test

Programmer Functional Test

1. Connect tester electrical harness to programmer and car harness to tester. Use harness adapters No. J-24774 and J-24774-75.

2. Operate car at idle - approx. 1000 RPM.

3. Set control head lever at auto.

4. Turn temp. dial calibration switch off.

5. Place manual-automatic switch in manual position.

(NOTE: This substitutes variable resistor for sensor string - at all control head settings.)

6. Place the manual control at max. heat and then rotate slowly counter-clockwise. The vacuum motor mechanism which can be seen through the slot in the programmer cover should start moving at 175 ohms. Rotating the knob to max. cold should move the programmer to its full A/C position. Check air mix door for full travel and no obstructions. If the programmer operates in this manner, the components governing programmer movement - amplifier, transducer, and vacuum motor - are OK, proceed to sensor string test.

7. If the programmer moves but the movement does not start at 175 ohms, adjust feedback pot per procedure.

8. If the programmer does not move, check as follows for supply voltage and supply vacuum:

a. Place voltmeter switch in 2 position. Battery voltage should appear on meter. No voltage indicates lack of ground on term. 1 or battery supply to term. 2 of programmer.

b. Plug tester's dummy vac. plug on programmer valve. Connect dummy hose to vac. supply (port 2 hose in car vacuum harness). Make sure vac. is present (11 in. hg. or more). Programmer now has vac. supply with no car vac. system components connected. If programmer functions using manual control, troubleshoot car vac. system. If

Set Control At:		System Should Operate As Follows (Engine Running - 70 Degrees - 80 Degrees Inside)
DEF.	85 Deg.	Fixed high blower - most of air delivered from defroster outlets – some air from heater outlet – instant blower turn-on.
BI-LEVEL	75 Deg.	Lower blower speed – cooler air from both A/C and htr. outlets – only very small amount of air out defroster.
HI	65 Deg.	Fixed high blower – cold air from A/C outlets – recirc. should occur (will take approx. 3 min. on some cars because of restrictor in hose)
AUTO.	65 Deg.	No recirc. – door will take approx. 5 min. on some cars before outside air enters.
AUTO.	85 Deg.	Blower speed should drop then increase – air should change from A/C to bi-level to htr.
LO	85 Deg.	Blower should drop to fixed low speed.
ECON.	85 Deg.	No compressor operation. Otherwise same as auto.
OFF	85 Deg.	Fixed low blower – warm air out heater outlets – no air out A/C or defroster ducts – no compressor operation.

programmer does not function, malfunction is in programmer.

Sensor String Test (Must Pass Programmer Functional Test First)

1. Set control lever at auto. and temperature dial at 75.
2. Place temp. dial calibration switch at off.
3. Place manual-automatic switch at automatic position.
4. Observe position of vacuum motor mechanism through slot in programmer cover.
5. Switch to manual and adjust manual control for same mechanism position.
6. When manual control is properly adjusted, moving manual-automatic switch back and forth will not move vacuum motor.
7. Read manual control. This indicates the resistance of the sensors and the temperature dial combined and should be 120 to 150 ohms at 70 to 75 room temp.
8. If reading is not 120 to 150 ohms, perform the temperature dial calibration test to check out the temp. dial. If temp. dial checks OK, the in-car or ambient sensor or connecting wiring has malfunctioned.

Temperature Dial Calibration (Control Lever In Econ.)

1. Place control lever at econ.
2. Place manual-automatic switch in manual position.
3. Place calibration switch in cal. position.
4. Disconnect in-car sensor connector, and plug connector into mating connector on tester harness adapter. (Ground both sensor wires.)
5. Read voltmeter.
6. Press pushbutton and adjust temp. dial on control head to get same voltmeter reading as preceding.
7. Temp. dial should read as indicated on tester panel near pushbutton. If it does not, slip temp. dial clutch to correct. If same voltmeter reading cannot be obtained, the temp. dial has malfunctioned.

Blower Circuit Tests

1. Place calibration switch in off position.
2. Place manual-automatic switch in manual position.
3. Set control lever at Lo. Using voltmeter knob, there should be battery voltage at 7 and approx. half battery voltage at 6. If there is no voltage at 7, there is a malfunction in the Lo relay circuit. If there is voltage at 7 but no voltage at 6, the programmer has malfunctioned.
4. Set control lever at auto. There should be battery voltage at 8 and the voltage at 6 should stairstep down and then back up as the manual control is rotated from max. heat to max. cold. If there is no voltage at 8, there is a malfunction in the auto. relay circuit. If the voltage at 6 does not change as described, the programmer malfunctioned. A good connection between 6 and the blower motor is assumed. If the blower wire is disconnected, only battery voltage will appear at 6.

Diagnosing Malfunctions In Programmer

The following tests should be performed to determine a malfunctioned internal part. Tests should be made in the numbered sequence.

Test 1 - Programmer Vacuum Circuit

Turn temp. dial calibration switch off. Place manual-automatic switch in manual position. Manual control - max. heat. If programmer moves to max. heat position, skip to Test 2. Otherwise, perform following test:

1. Remove programmer cover. Install dummy vacuum plug with vacuum gauge teed-in to port 2 of car harness plug.
2. If vacuum drops below supply vacuum found in programmer functional test, use long-nose pliers to pinch the two black hoses leading from side of rotary valve. If vacuum reading improves, check programmer hoses for leaks,then go to Test 2.
3. If reading does not improve, leak is in rotary valve.

Test 2 - Vacuum Motor and Checking Relay

1. Leave tester set as in Test 1 preceding. Programmer should go to full heat.
2. Disconnect vacuum dummy plug or car vacuum harness from programmer. Vacuum checking relay should hold vacuum motor in full heat. If mechanism moves, vacuum motor or checking relay is leaking. Apply raw vacuum to vacuum motor then pinch hose at motor to see if leak is in motor. A good motor holds position.

Test 3 - Amplifier and Transducer

1. Connect tester harness to system. Place manual-automatic switch in manual and temp. dial calibration switch in off position.
2. Remove small transducer vacuum hose and connect tester vacuum gauge to hose. 11 in. hg. or more vac. should be present on small transducer supply hose. Delay in obtaining 11 in. hg. or more may be due to a plugged restrictor located in the small transducer hose. Re-install hose on transducer.
3. Remove large vacuum hose from transducer. Connect tester vacuum gauge to large port on transducer.
4. By rotating the manual control, vacuum readings of 1 to 11 in. hg. should be obtainable. Any value from 1 to 11 in. hg. can be obtained by careful adjustment of the manual control if the amplifier-transducer is functional.

Test 4 - Feedback Potentiometer Adjustment

1. Using screwdriver, slip feedback pot shaft counterclockwise with respect to gear. Programmer should move to full heat.
2. Place manual-automatic switch in manual position. Rotate manual control to max. heat.
3. Move manual control to 175.

4. Slip feedback pot shaft slowly clockwise looking for signs of vacuum motor mechanism movement.

5. Check adjustment with manual control. Travel should start when 175 is reached as knob is turned counter-clockwise from max. heat.

6. If feedback pot cannot be adjusted. Replace amplifier-transducer assembly.

Blower Switch Bench Test - (Using J-23713 Bench Test Harness)

1. Place voltmeter knob at 6.

2. With manual-automatic switch in manual, rotate manual control back and forth. Voltage should drop then increase in steps. Steps will be smaller than those seen in car.

Programmer Moves But Vacuum Operated Door(s) Malfunction

If one of the doors does not operate, malfunction could be caused by plugged or pinched harness or plugged valve on programmer to check programmer valve. Cut off sealed hose on dummy plug for circuit malfunctioning and connect the vacuum gauge to the plug. Plug the dummy plug on the programmer vacuum valve. Connect dummy hose to vacuum supply hose (port 2) in car vacuum harness. Monitor vacuum while operating programmer with manual control. When completed, seal dummy plug hose with rivet. Do not use a screw.

Temperature Door Check and Adjustment

A mis-adjusted temperature door link may not allow the programmer to travel fully to max. heat or to max. cold and could result in poor heating or poor cooling complaints. To check adjustment, attach tester electrical harness between programmer and car harness. Put manual-automatic switch in manual and control lever in auto. Put voltmeter knob in 6. Rotate manual control from max. heat to max. cold. High blower (battery voltage) should be obtained in both extremes. With control lever in high, recirc. operation should be obtained at max. cold (3 min. delay on some cars) with these conditions met. temperature door adjustment is correct. To readjust:

1. Start engine and put control lever in def.

2. Loosen screw on programmer shaft.

3. Place manual-automatic switch in manual, manual control at max. heat. Programmer should go to full heat.

4. Move temperature door to full heat position by pushing door link away from programmer. The blower air will hold door.

5. Tighten screw and re-check as preceding.

MAINTENANCE AND ADJUSTMENTS

ADJUSTMENT OF AUTOMATIC CLIMATE CONTROL PROGRAMMER, LINK ASSEMBLY AND TEMPERATURE DOOR - A-B-C-E SERIES

1. Loosen the hex screw of the door link at the output shaft of the programmer.

2. Place the control head selector lever in the "DEF" position.

3. Remove the electrical connector from the ambient sensor. This results in the proper position of the output shaft of the programmer (full heat position).

4. Check to make sure that the air mix door is in the full heat position. The blower air flow will now hold the mix door in the proper position.

5. Without disturbing the door link or the output shaft position, tighten the hex screw on the door link.

6. To check the Mix Door Link Adjustment, proceed as follows.

a. Connect Tester J-23678 into the wiring harness and the programmer using Harness Adapter J-24774 and J-24774-75. Place the control head in "AUTO". Place the "MANUAL-AUTOMATIC" switch in the "MANUAL" position. Using the "MANUAL CONTROL", swing the programmer to "Max. Heat" then to "Max. Cold". Hi blower should be obtained in both positions.

b. Check for recirculation operation. Operate the system with the "MANUAL CONTROL" on "150" for 5 minutes so the restricted vacuum line can move the outside air door to the outside air position. With the control head in "HI", move the "MANUAL CONTROL" to "Max. Cold". With all the car doors and windows closed, the blower noise level should increase when recirculation occurs (approximately 3 minute delay due to the restrictor).

TEMPERATURE DIAL CALIBRATION - A-B-C-E SERIES

Be sure to allow sufficient time for car engine to warm up and A.C.C. system to turn-on before attempting calibration.

1. Connect A.C.C. Tester J-23678 into the A.C.C. wiring harness and the programmer.

2. Place control panel selector lever in "VENT".

3. Place manual-automatic switch on the tester in the manual position.

4. Place the temperature dial calibrator switch on the tester in the "CAL" position.

5. Note the voltmeter reading on tester.

6. Press "Compare" button and note voltmeter reading.

7. With the "Compare" button pressed in, rotate the temperature dial on the control panel until the voltmeter reading is the same as it was in Step 5 (button not pressed in).

8. The control panel temperature dial should be set at the temperature dial setting on the tester panel ("75"). If it does not, use Tool J-21530 to hold the gear on the left side of the temperature dial and slip the dial to the correct setting. If the temperature dial cannot be calibrated using this procedure, it has malfunctioned.

FEEDBACK POT ADJUSTMENT

1. Remove the plastic cover from the programmer while it is still mounted in the car.

2. Connect the Tester J-23678 into the wiring harness and the programmer using Harness Adapter J-24774.

3. Place the control head selector lever in the "AUTO" position.

4. Place the "MANUAL-AUTOMATIC" switch on the tester in the "MANUAL" position.

5. Place the "TEMPERATURE DIAL CALIBRATOR" switch of the tester in the "OFF" position.

6. Rotate the "MANUAL CONTROL" knob on the tester to the "Max. Heat" position. The programmer should move to the full heat position.

7. Rotate the "MANUAL CONTROL" knob to 180 and STOP. DO NOT OVER-TRAVEL!

8. Using a blade type screwdriver, slip the shaft of the feedback potentiometer fully counterclockwise to its stop. The vacuum motor mechanism will be "in" the vacuum motor indicating full heat operation.

9. Using the screwdriver, very slowly slip the feedback potentiometer clockwise until the first movement of the vacuum motor mechanism can be seen. Stop the adjustment when the movement first occurs. (Do not watch the programmer output shaft.)

10. To check the adjustment, rotate the "MANUAL CONTROL" knob to the "Max. Heat" position. Then slowly rotate the "MANUAL CONTROL" knob counterclockwise and the vacuum motor mechanism should first start to move when the "MANUAL CONTROL" knob is exactly at 180 ± 1. Touch up the feedback potentiometer adjustment in the programmer so that the mechanism movement occurs exactly 180. If this adjustment cannot be made, the programmer has malfunctioned.

MAJOR REPAIR

REMOVAL AND INSTALLATION OF INSTRUMENT PANEL CONTROL ASSEMBLY – A SERIES

1. Disconnect battery.

2. Remove trim plate by pulling rearward and unsnapping from instrument panel.

3. Pull control out from the instrument panel and disconnect vacuum and electrical connectors.

4. Remove control assembly.

5. Install control assembly reverse of removal procedure.

REMOVAL AND INSTALLATION OF IN-CAR SENSOR – A SERIES

1. Open glove box door.

2. Reach up through opening in glove box and grasp sensor body and twist 1/4 turn clockwise and pull down through opening.

REMOVAL AND INSTALLATION OF BLOWER MOTOR – A SERIES

1. Disconnect blower motor wire.

2. Remove screws securing blower motor to air inlet assembly.

3. Install in reverse of removal.

REMOVAL AND INSTALLATION OF INSTRUMENT PANEL CONTROL – B-C-E SERIES

If equipped with air cushion restraint system turn ignition switch to "LOCK" position and disconnect the negative battery cable from the battery and tape the end.

1. Disconnect the battery.

2. Remove the left lower instrument panel trim by carefully prying and pulling the trim out.

3. Remove 3 screws from the control face.

4. Pull control out from the instrument panel and disconnect vacuum and electrical connectors.

5. Install control assembly in reverse of removal procedures.

REMOVAL AND INSTALLATION OF BLOWER MOTOR B-C-E SERIES

Removal

1. Disconnect blower motor wire.

2. Remove screws securing blower motor to air inlet assembly.

Installation

Install blower motor reverse of removal procedure.

REMOVAL AND INSTALLATION OF HEATER ASSEMBLY OR HEATER CORE B-C-E SERIES

WARNING: IF CAR IS EQUIPPED WITH AIR CUSHION RESTRAINT SYSTEM, REFER TO "AIR CUSHION RESTRAINT SYSTEM" SERVICE MANUAL TO REMOVE THE PASSENGER AIR CUSHION OTHERWISE PERSONAL INJURY MAY RESULT.

Removal

1. Drain radiator and disconnect heater inlet and outlet hoses at dash.

2. Disconnect control wires from defroster door and vacuum hose diverter door actuator diaphragm and control cable from temperature door lever.

3. Remove 4 nuts securing heater assembly to dash.

4. Remove screw securing defroster outlet tab to heater assembly.

5. Work heater assembly rearward until studs clear dash and remove heater assembly.

Installation

Install heater assembly reverse of removal procedures and seal along mating surfaces between dash and heater assembly.

REMOVAL AND INSTALLATION OF IN-CAR SENSOR - B-C-E SERIES

1. Open glove box door.

2. Through opening in glove box, remove 2 retaining screws on in-car sensor.

3. Disconnect wire connector from sensor.

4. Disconnect aspirator hose from sensor.

5. To install reverse removal procedures.

REMOVAL AND INSTALLATION OF PROGRAMMER - A-B-C-E SERIES

Removal

1. Remove glove box.

2. Loosen adjustment screw on link assembly.

3. Remove vacuum and electrical connections.

4. Remove screws from programmer and remove programmer.

Installation

1. To replace, install programmer onto the heater defroster assembly.

2. Install the link assembly onto the output shaft leaving the hex screw loose.

3. Place the control head selector lever in the "DEF" position and install the vacuum harness assembly.

4. Check to make sure that the air mix door is in the full heat position. The blower air flow will hold the mix door in the proper position.

5. Without disturbing the door link or the output shaft position, tighten the hex screw on the door link.

6. Connect ATC tester J-23678 into the wiring harness and the programmer. With the "Manual-Automatic" switch in the "Manual" position, rotate the "Manual Control Knob" from maximum heat to maximum cold and check for full travel of the air mix door and the programmer.

7. Install the electrical connector.

REMOVAL AND INSTALLATION OF PROGRAMMER COMPONENTS - A-B-C-E SERIES

Amplifier - Transducer Removal

1. Remove programmer.

2. Remove programmer cover.

3. Remove vacuum hoses from transducer.

4. Remove two screws securing electrical connector to housing and remove connector from position over amplifier contacts.

5. Remove two screws securing potentiometer and amplifier to housing and remove amplifier-transducer assembly.

Installation

1. Position amplifier-transducer to housing and secure with two screws at potentiometer.

2. Position electrical connector over amplifier terminals and secure connector with two screws.

3. Connect vacuum hoses to transducer.

4. Install programmer.

5. Calibrate feedback pot.

6. Install programmer cover.

Checking Relay Removal

1. Remove programmer.

2. Remove programmer cover.

3. Remove four hoses from relay and remove relay.

Installation

1. Position checking relay in programmer with ports #2 towards vacuum motor.

2. Make the following vacuum hose connections:

a. White hose from transducer wraps around vacuum motor and connects to port #2. If this vacuum hose is replaced, the replacement hose must be at least 15" long).

b. Yellow hose from vacuum motor connects to remaining port (#1) on vacuum motor side of relay.

c. Purple hose from "Purp" port of vacuum valve connects to center port on amplifier side of relay.

d. Remaining black hose from center port of vacuum valve connects to outside port on amplifier side of relay.

3. Install programmer cover.

4. Install programmer.

Vacuum Motor Removal

1. Remove programmer.

2. Remove programmer cover.

3. Remove two screw/studs securing vacuum valve and swing valve out of way with hoses still attached.

4. Remove vacuum valve actuating link.

5. Remove spring from over blower contact assembly.

6. Remove spring and clip from end of vacuum motor operating link.

7. Remove three output shaft retaining screws and retainers. Disconnect output shaft from vacuum motor mechanism.

8. Disengage bushing from vacuum motor to output shaft pin and from vacuum motor to blower contact mechanism.

9. Remove two screws securing vacuum motor to housing.

10. Remove yellow vacuum hose between checking relay and vacuum motor.

11. Remove vacuum motor.

12. Blower contact may be removed. However, be sure to handle assembly carefully as detent balls may fall out. If blower contact is not being replaced, mark a tooth on the feedback pot and a corresponding notch on the blower switch gear).

Installation

During assembly of vacuum motor apply lubriplate or equivalent on all sliding surfaces.

1. If blower contact assembly was removed, position assembly to circuit board. Check for presence of ball in casing pivot hole. Use care to be sure that the two balls do not fall out of blower contact assembly.

2. Align marks on feedback pot and blower contact gear if parts are being reused.

3. With white vacuum hose in position, install vacuum motor to housing. Engage output shaft to blower contact assembly and secure vacuum motor with two screws.

4. Engage output shaft pin in slot of vacuum motor mechanism and vacuum motor mechanism pin in slot of output shaft, being certain vacuum motor mechanism is above retaining post.

5. Install two output shaft retainers and secure with three screws being certain that lower retainer falls into undercut of output shaft.

6. Position spring over circuit board and position drive arm over pins on vacuum motor mechanism and circuit board.

7. Position vacuum valve to housing and secure with two screw/studs.

8. Connect yellow vacuum hose from checking relay to vacuum motor.

9. Hook spring over hook in vacuum motor mechanism and stretch spring so that clip may be installed on opposite end.

10. Install programmer cover.

11. Install programmer.

Blower Circuit Board Removal

1. Remove programmer.

2. Remove programmer cover.

3. Remove vacuum motor as described in Part c. preceding.

4. Remove three screws securing circuit board to housing.

5. Remove two screws securing electrical connector to housing on amplifier.

6. Remove circuit board and electrical connector as an assembly.

Installation

1. Position circuit board to programmer and connector over pins on amplifier. Secure circuit board with three screws (short screw closest to amplifier) and connector with two screws.

2. Install vacuum motor.

3. Install programmer cover.

4. Install programmer.

Vacuum Valve Removal

1. Remove programmer.

2. Remove programmer cover.

3. Remove three vacuum hoses from vacuum valve.

4. Remove two screw/studs securing vacuum valve to housing and remove valve.

Installation

1. With vacuum valve spring in place, position vacuum valve to housing with pins on bottom engaged in drive arm and drive arm engaged in pins on vacuum motor mechanism and blower contact.

2. Secure vacuum valve with two screw/studs.

3. Make the following vacuum hose connections:

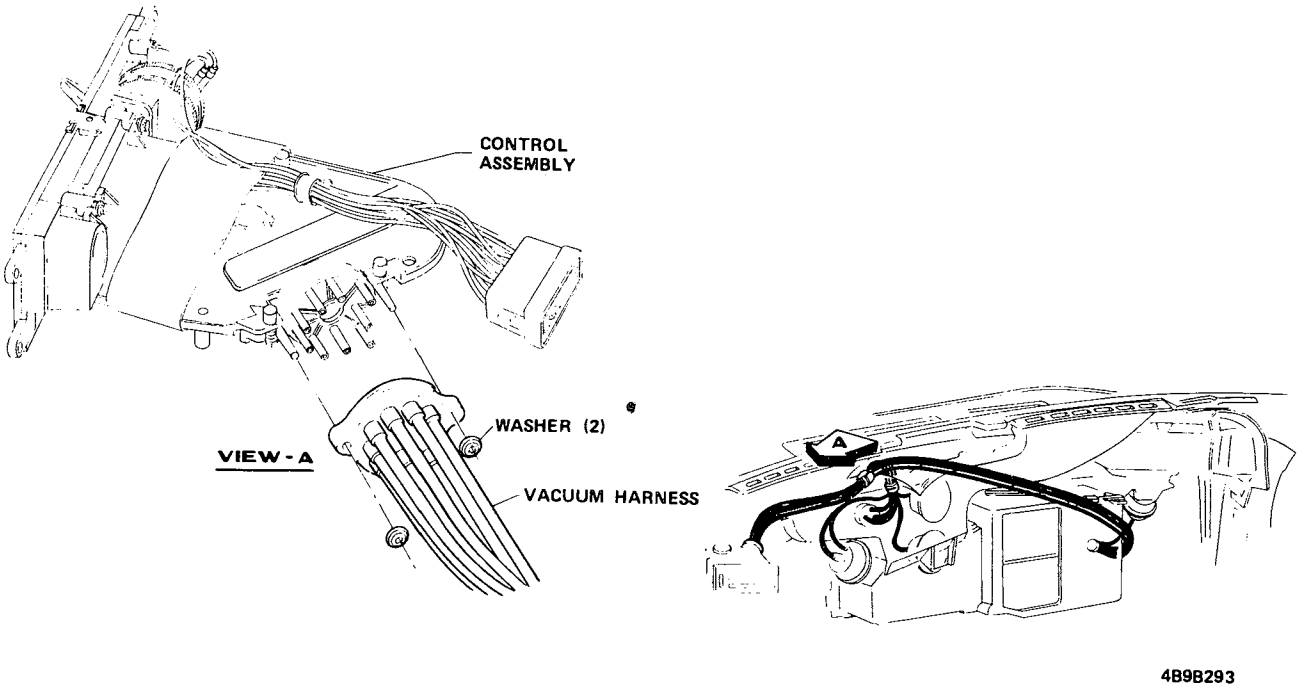
a. Purple hose from checking relay connects to port marked "Purp".

b. Black hose from checking relay connects to center port of vacuum valve.

c. Small black hose from transducer connects to remaining port of vacuum valve. Do not replace this hose with hose from 1971-1974 programmer as system will lock in full heat due to absence of porous plug.)

4. Install programmer cover.

5. Install programmer.



@2-4.50 4B9B293

Figure 9B-270 - Vacuum Harness to Control - Automatic A/C - A Series

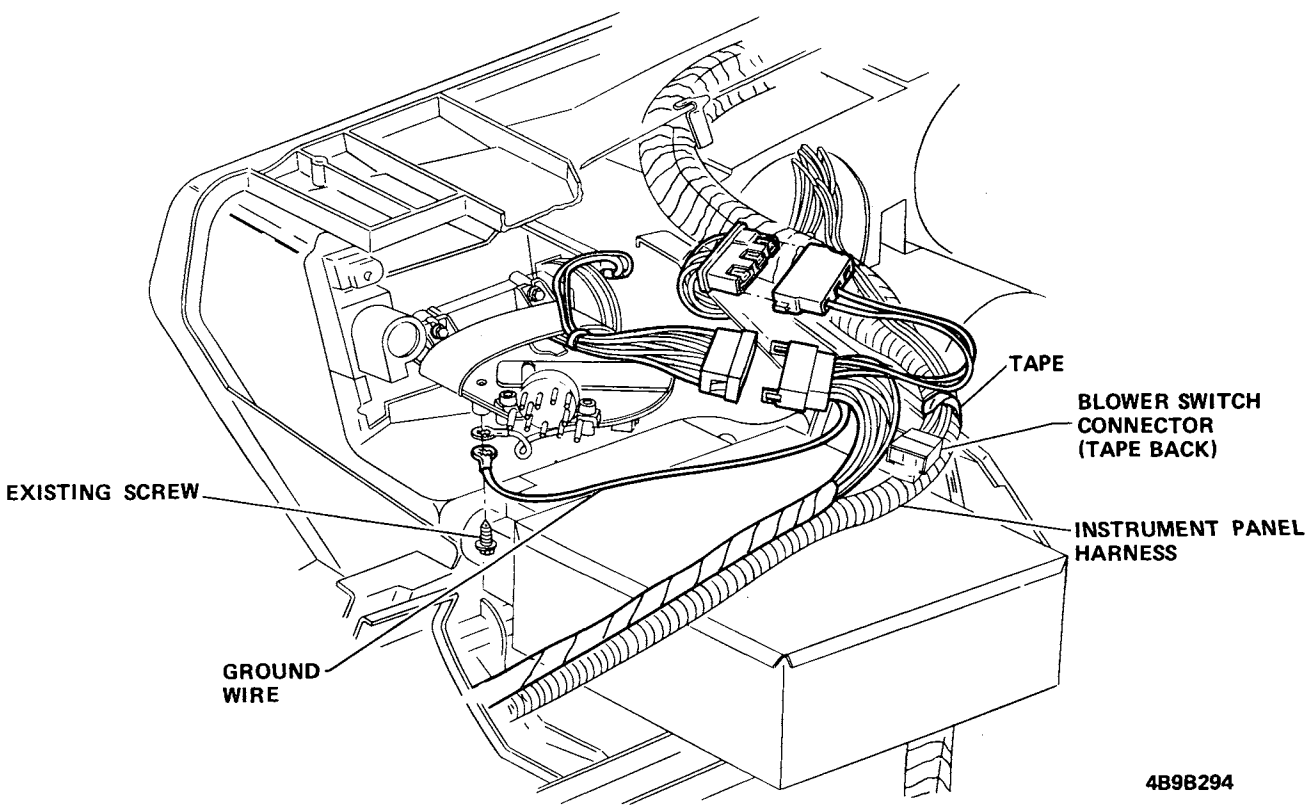


Figure 9B-271 - In-Car Sensor and Aspirator - Automatic A/C - A Series

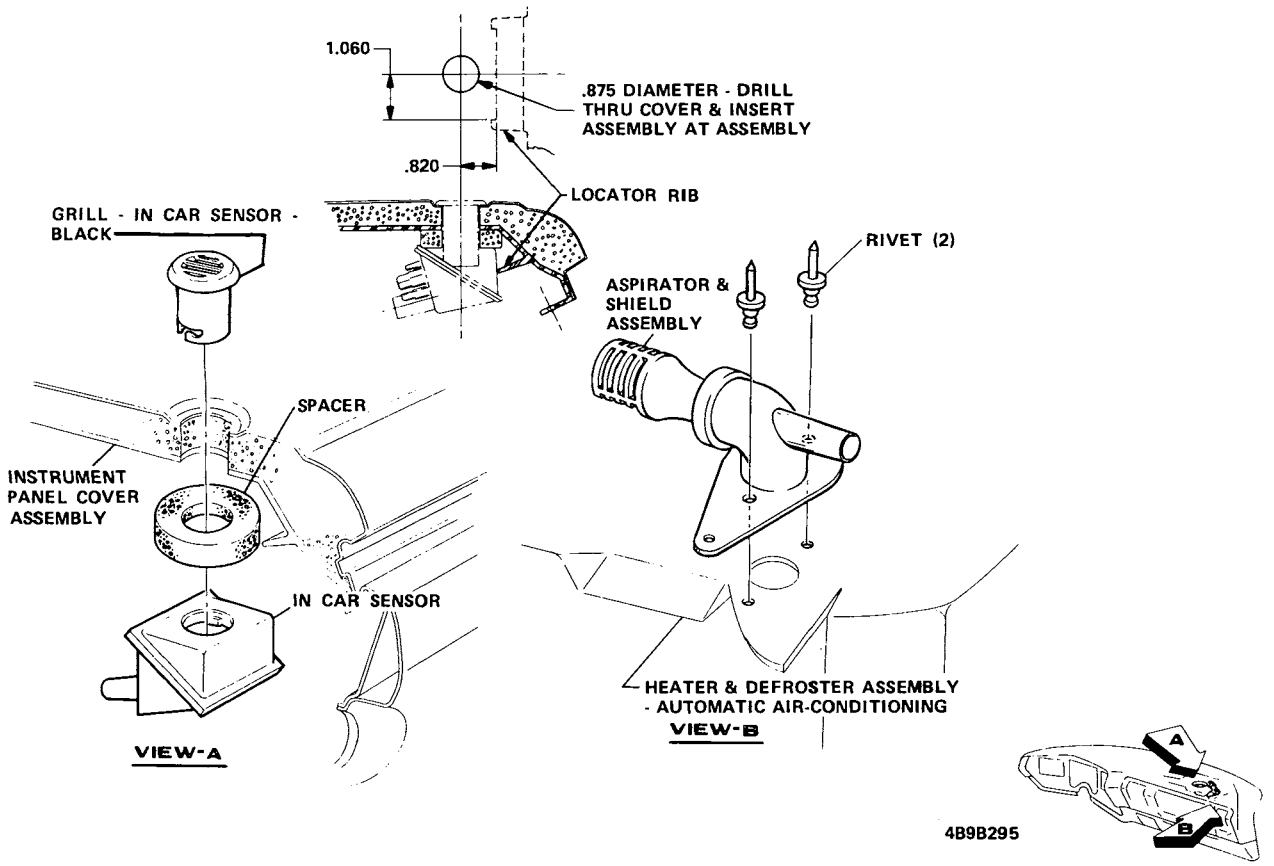


Figure 9B-272 - A/C Programmer - Automatic - A Series

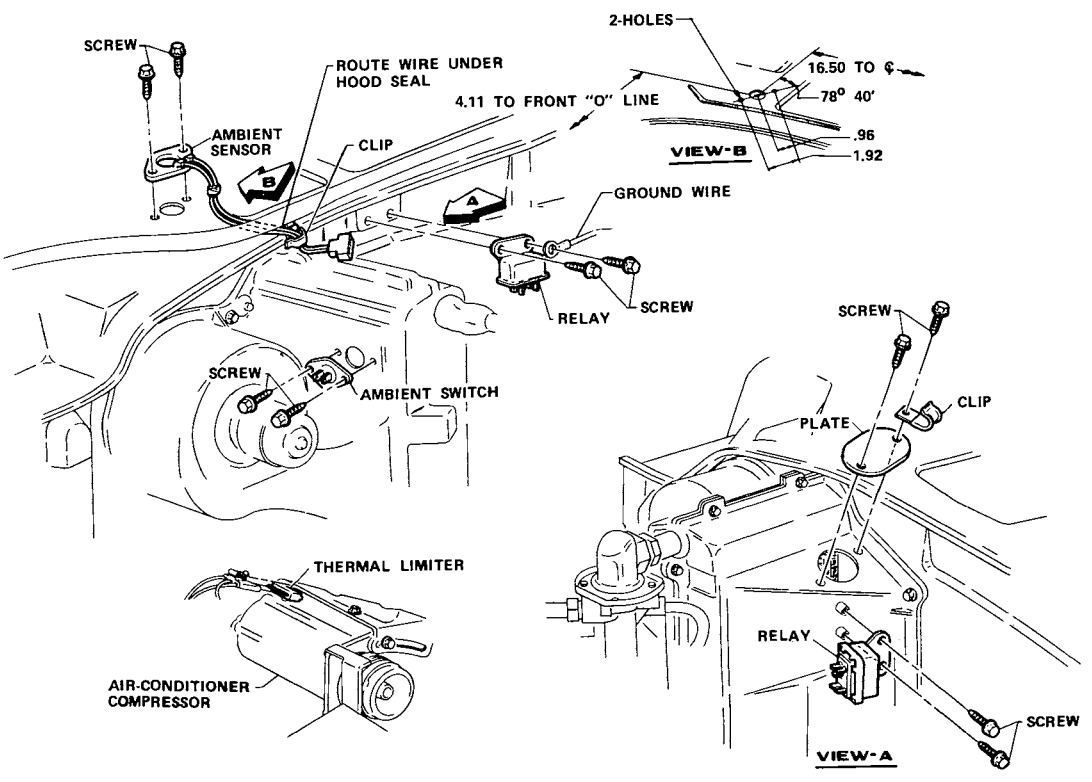


Figure 9B-273 - Ambient Switch - Sensor Relays - Thermal Limiter - Automatic A/C - A Series

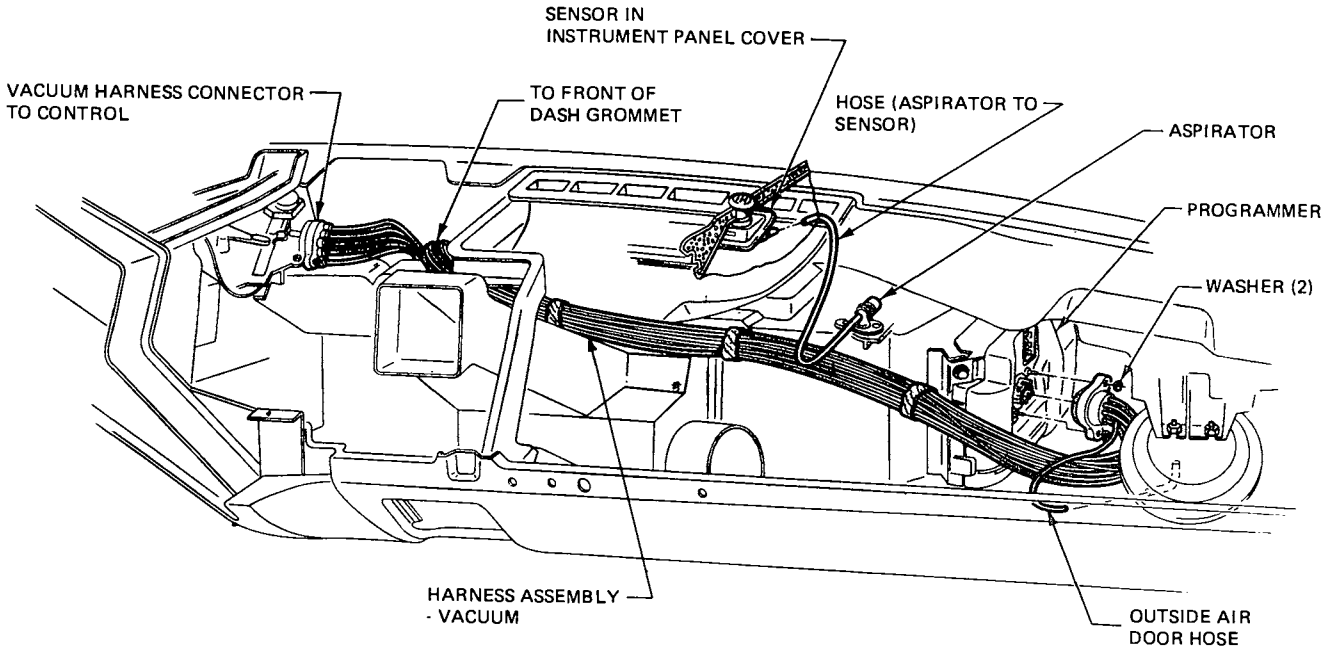


Figure 9B-274 - Vacuum Harness - Passenger Compartment - Automatic A/C - A Series

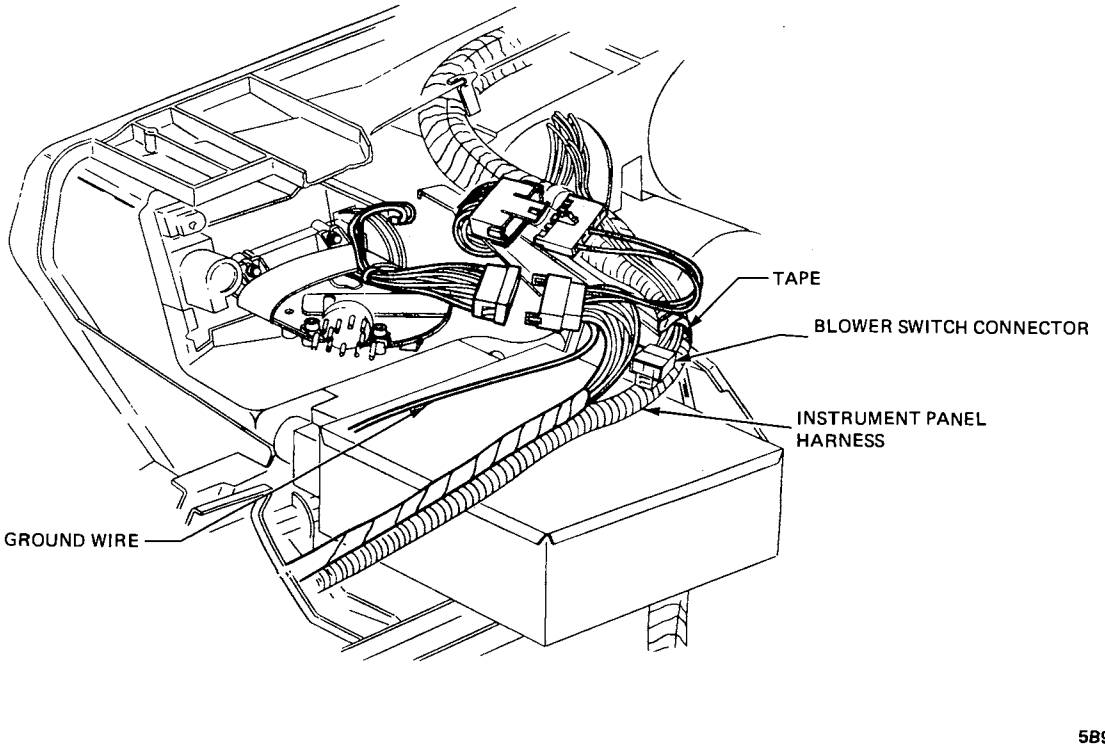


Figure 9B-275 - Wiring - Automatic A/C - Instrument Panel Control - A Series

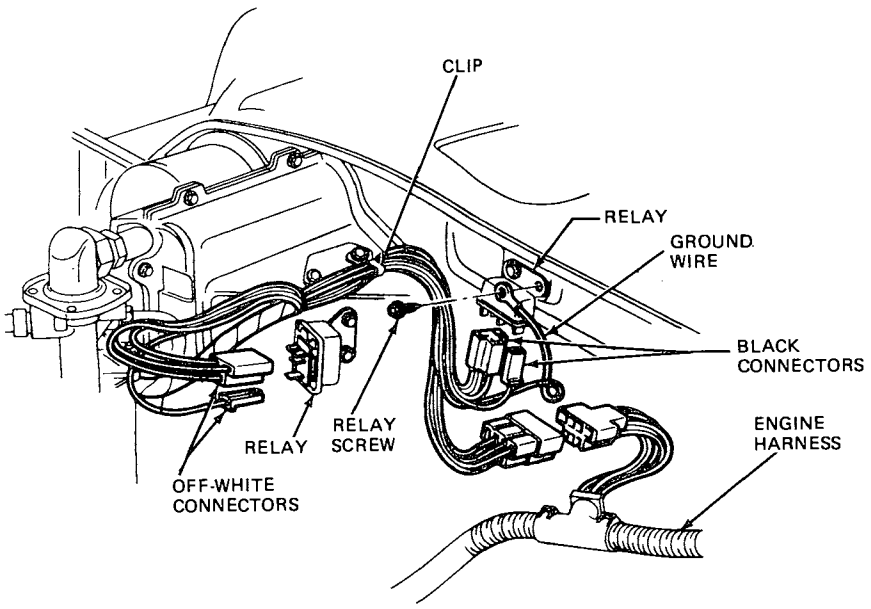


Figure 9B-276 - Wiring - Automatic A/C - Relays - A Series

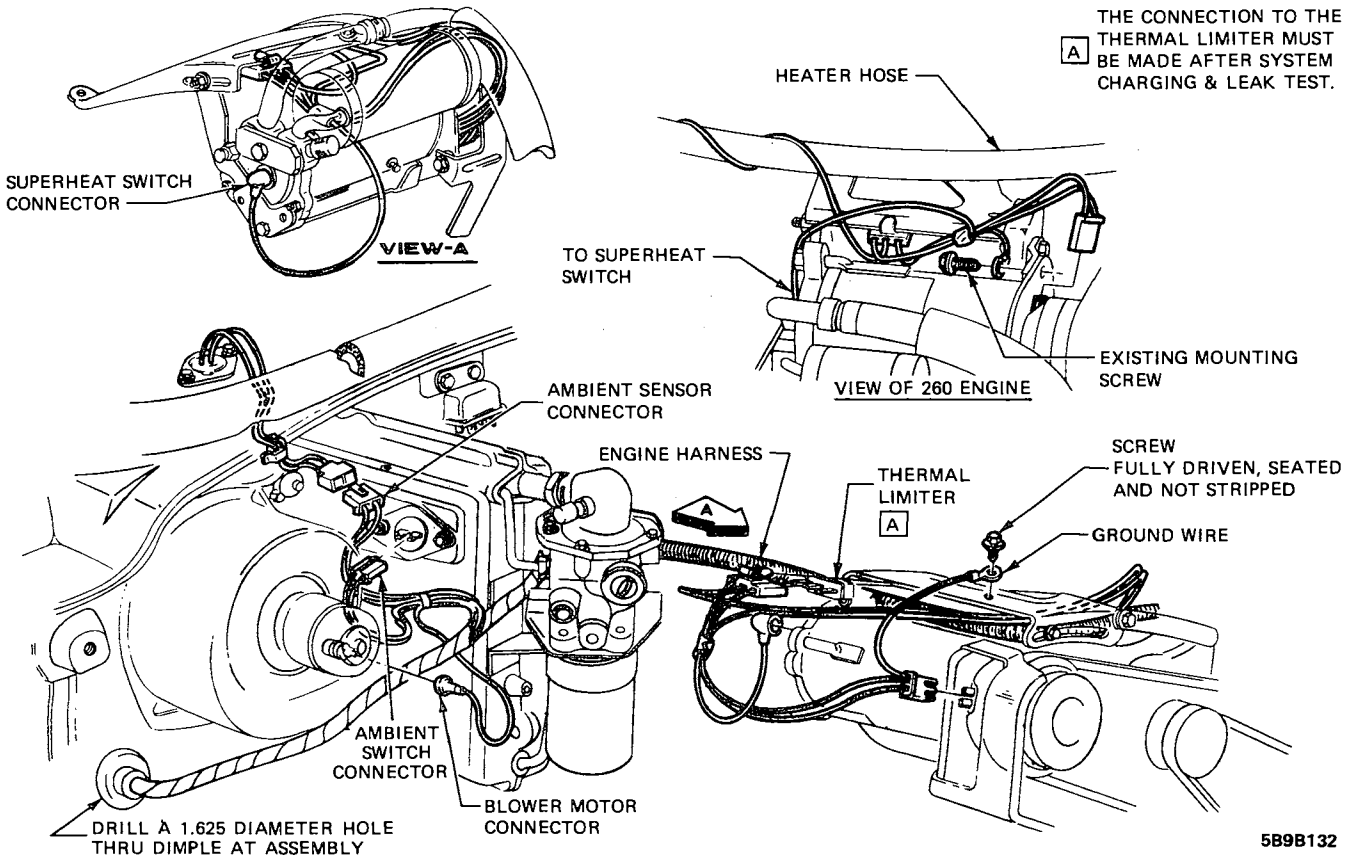


Figure 9B-277 - Wiring - Automatic A/C Blower Motor and Ambient Switch - A Series

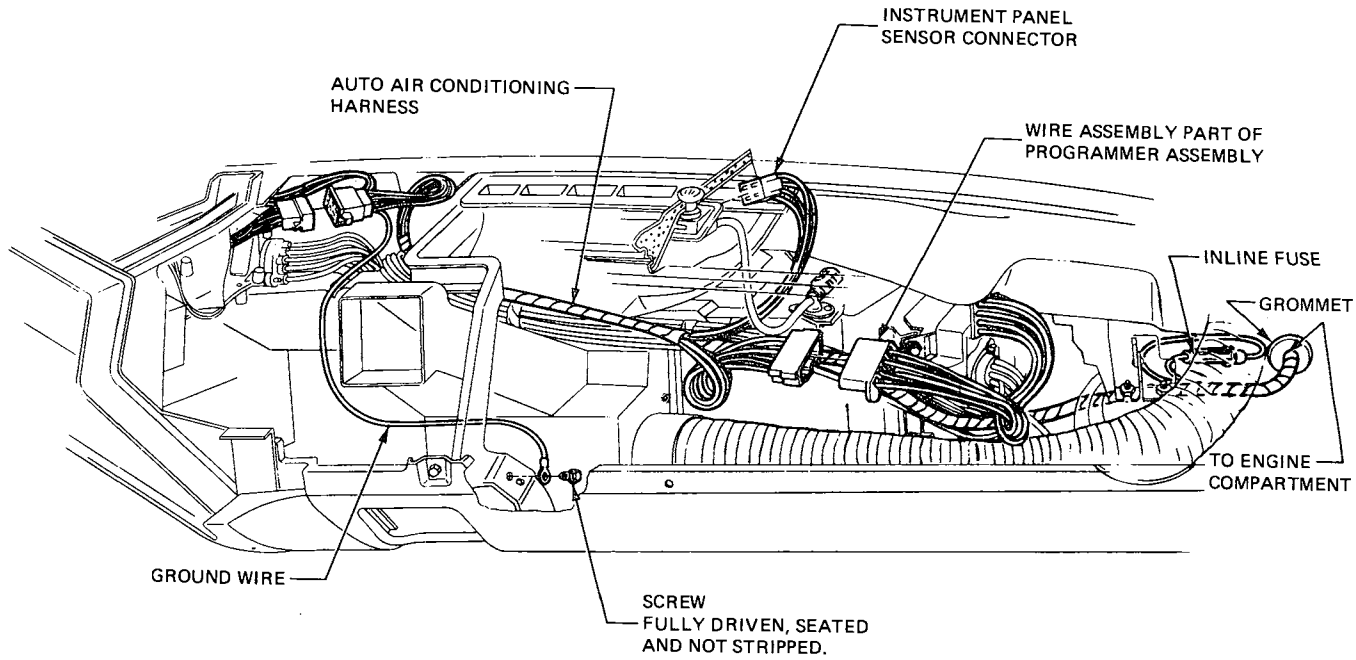


Figure 9B-278 - Wiring - Automatic A/C Programmer and Thermo Sensor - A Series

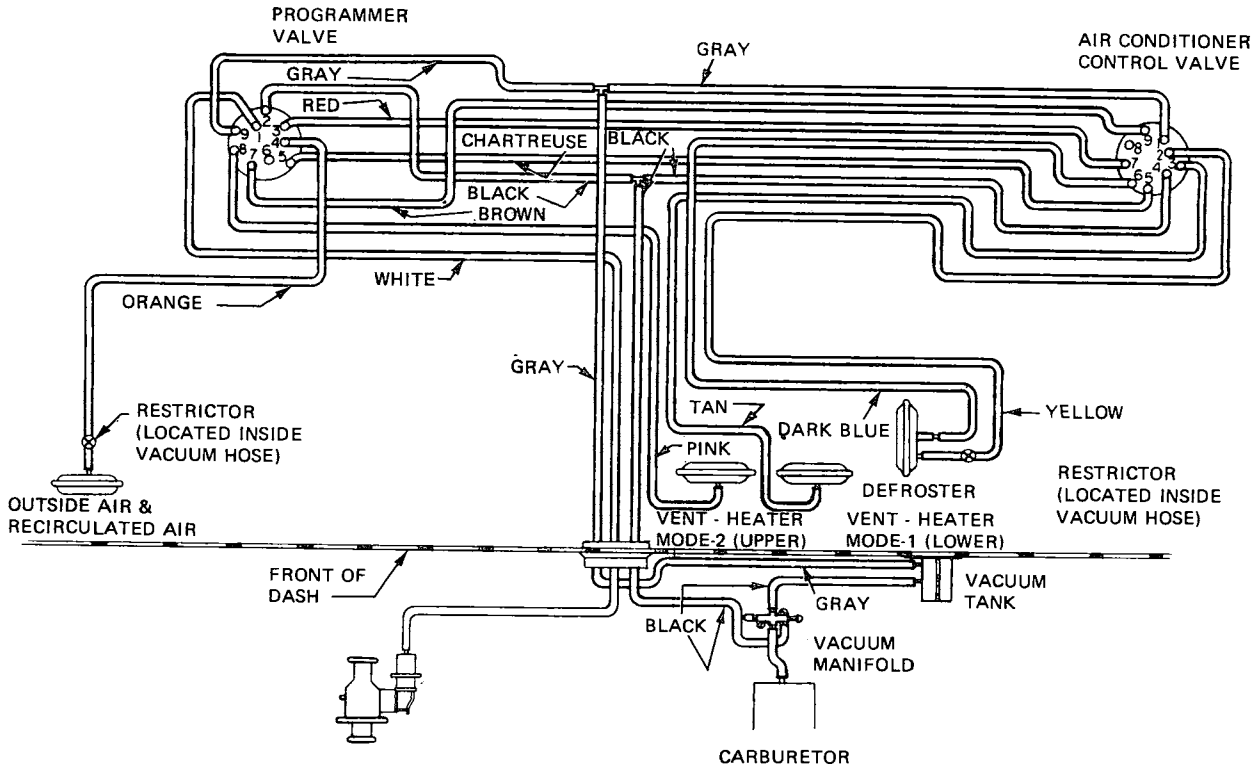


Figure 9B-280 - Automatic A/C Vacuum Hose Schematic - A Series

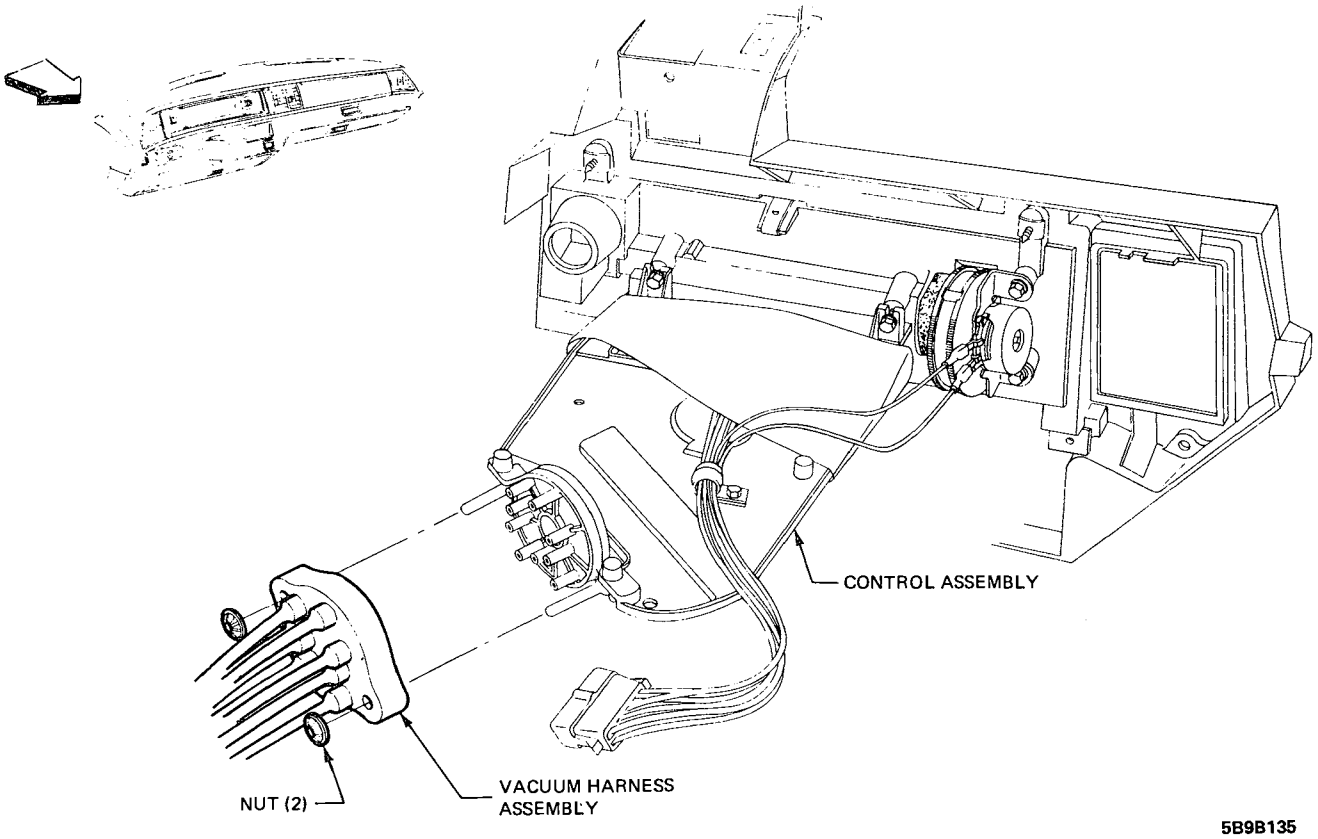


Figure 9B-281 - Vacuum Harness - At Control - Automatic A/C - B-C-E Series

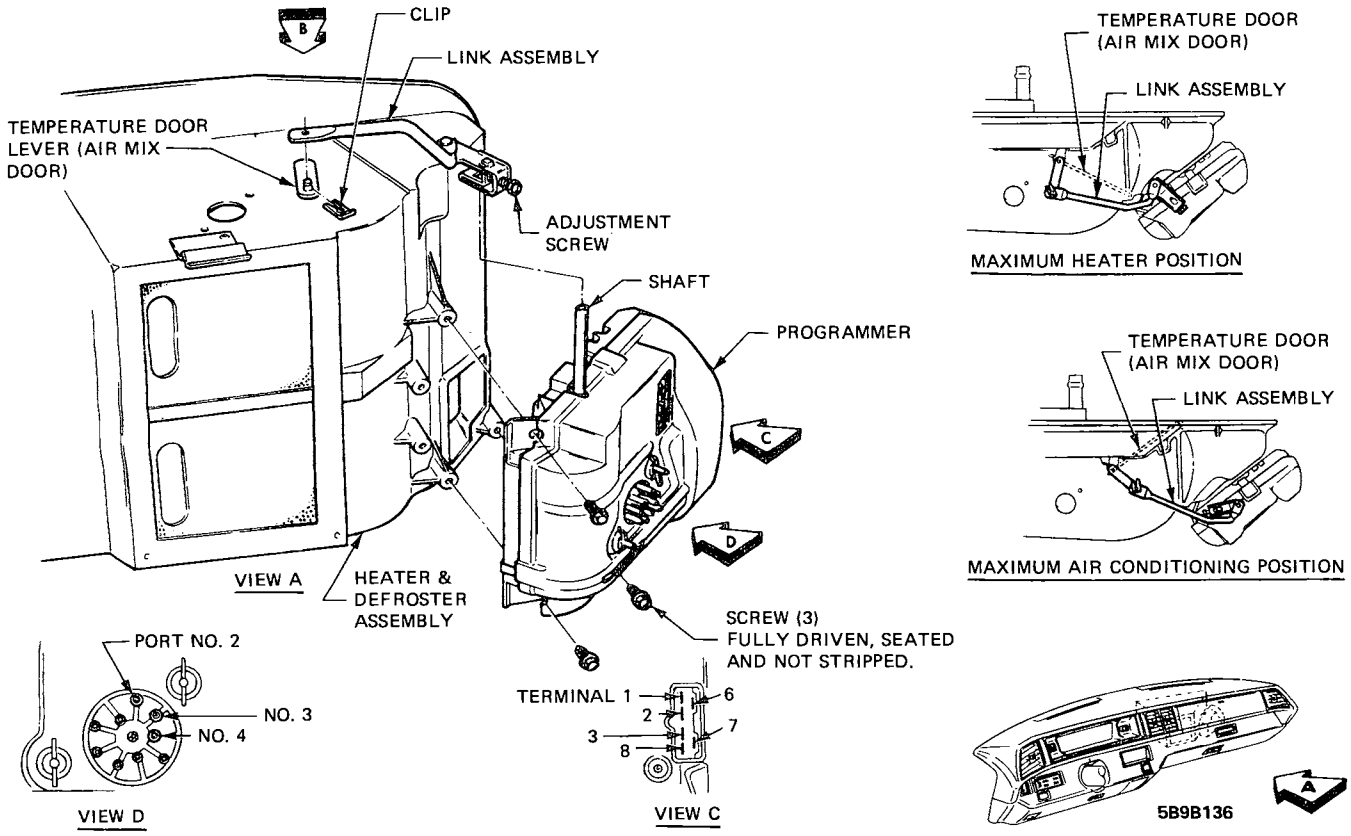


Figure 9B-282 - Automatic A/C - B-C-E Series

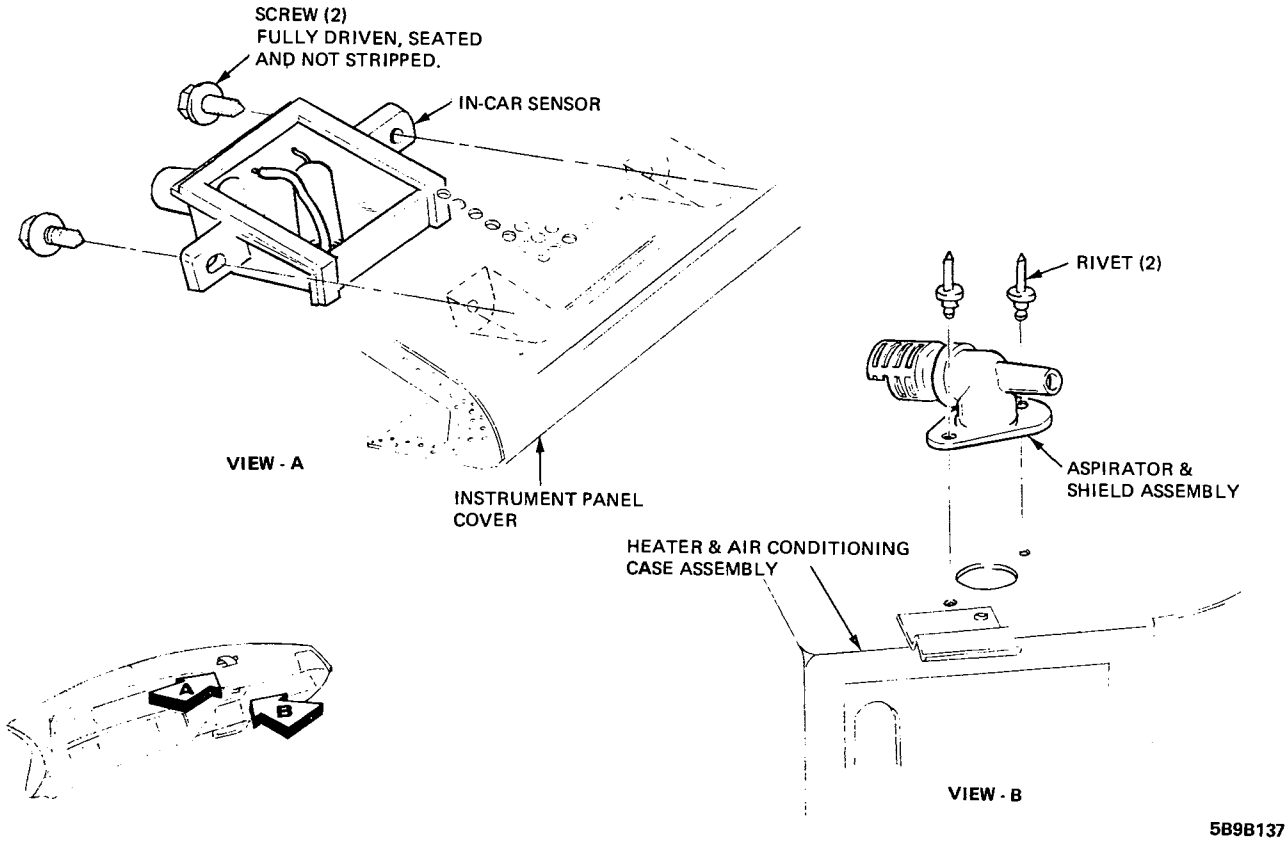


Figure 9B-283 - Aspirator and In-Car Sensor - Automatic A/C - B-C-E Series

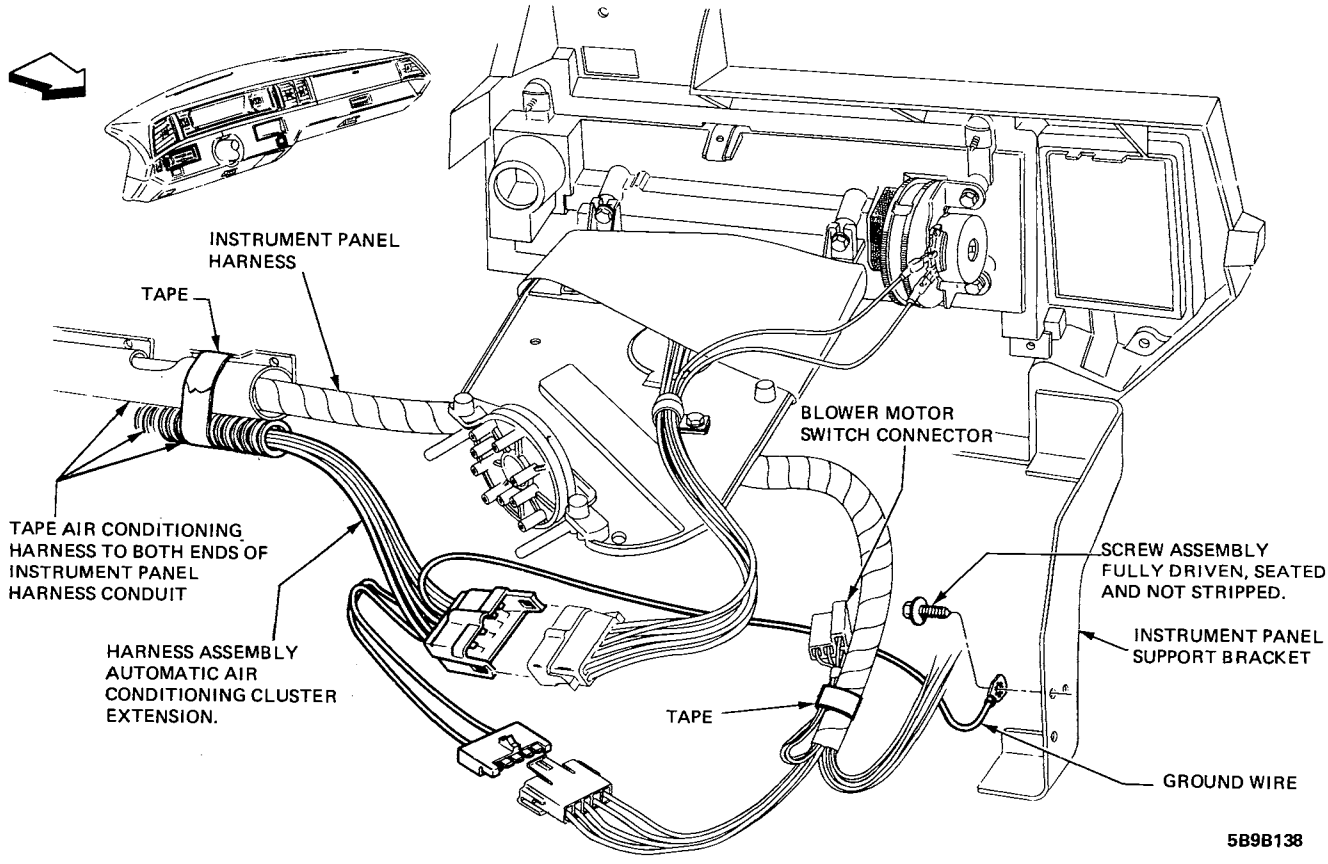


Figure 9B-284 - Wiring - Automatic A/C - At Control - B-C-E Series

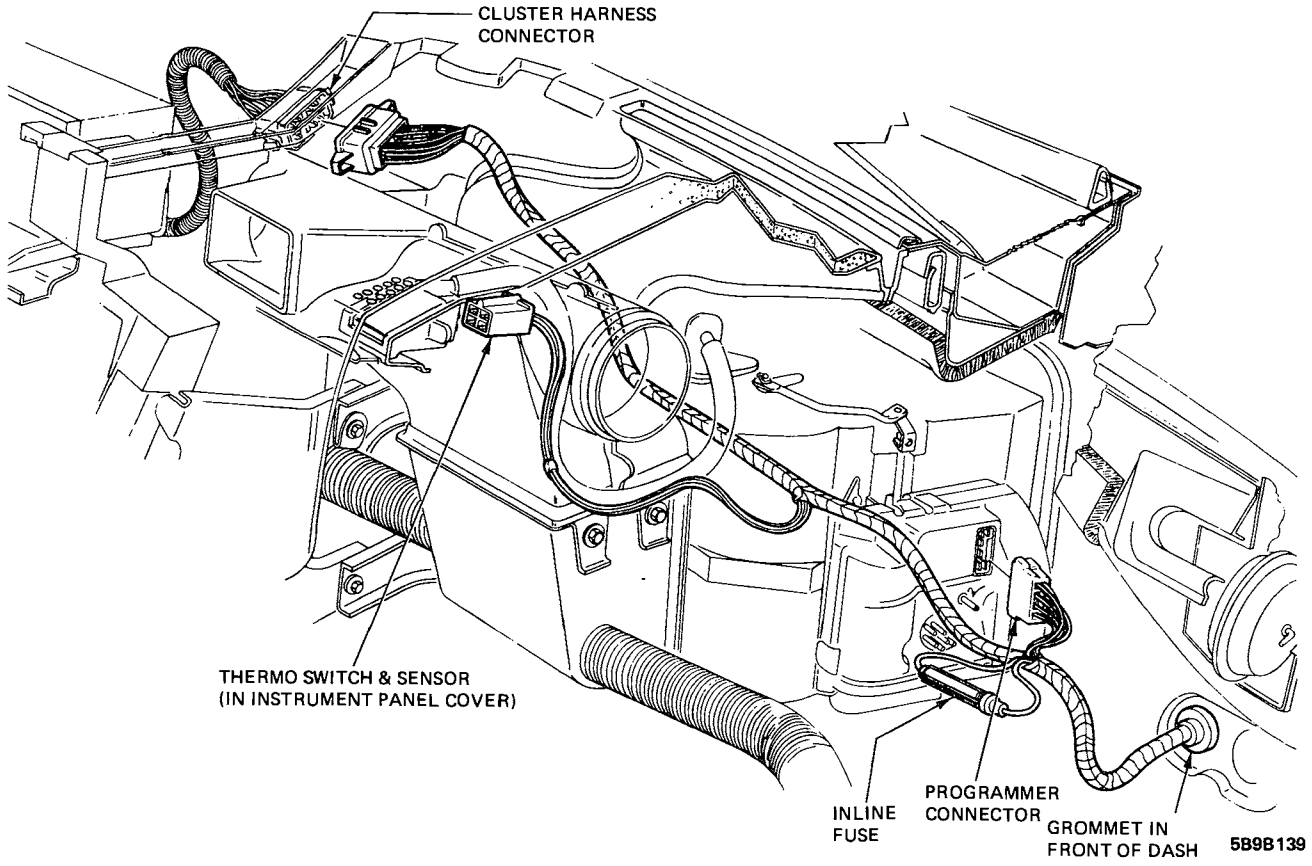


Figure 9B-285 - Wiring - Automatic A/C Programmer and Thermo Sensor - B-C-E Series

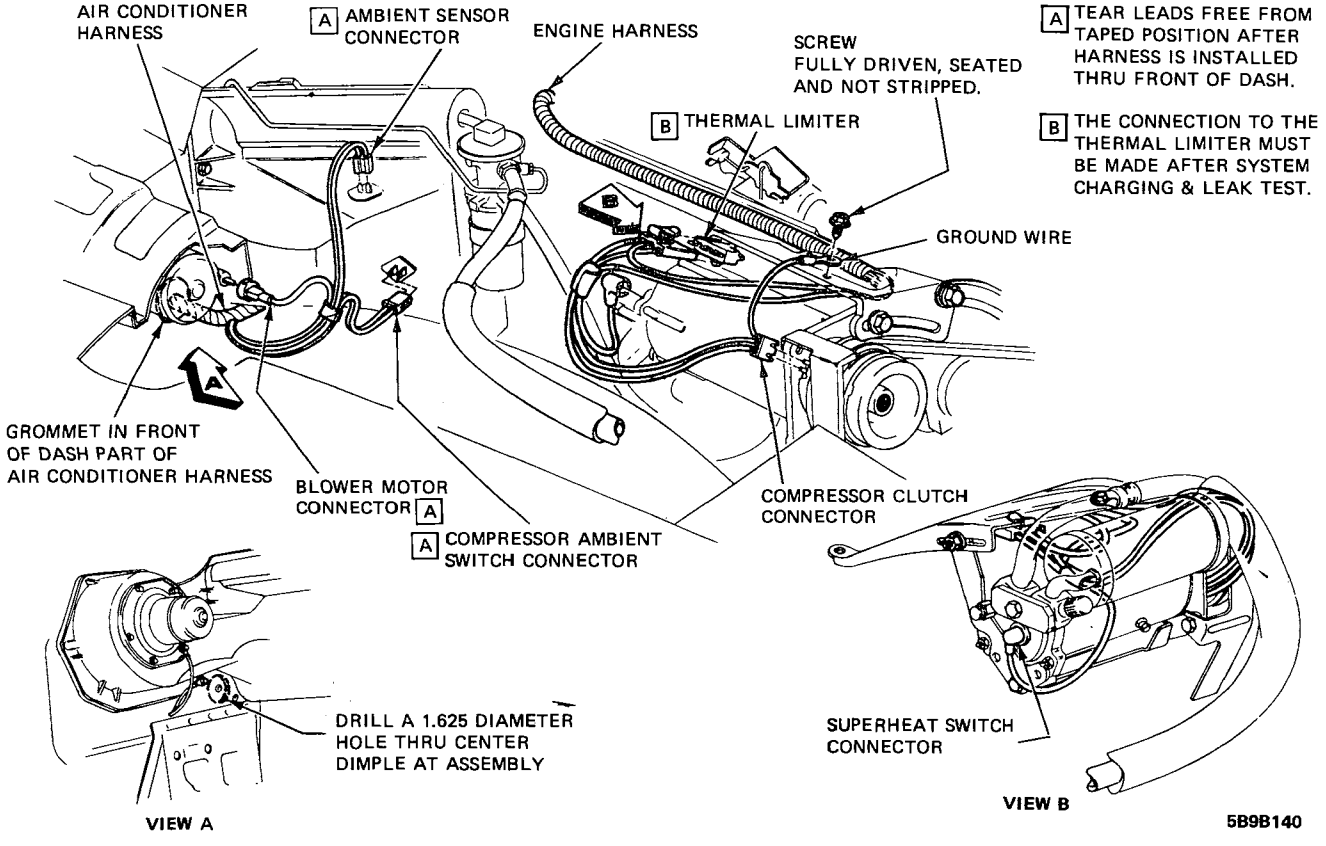


Figure 9B-286 - Wiring - Automatic A/C Blower Motor Compressor - B-C-E Series

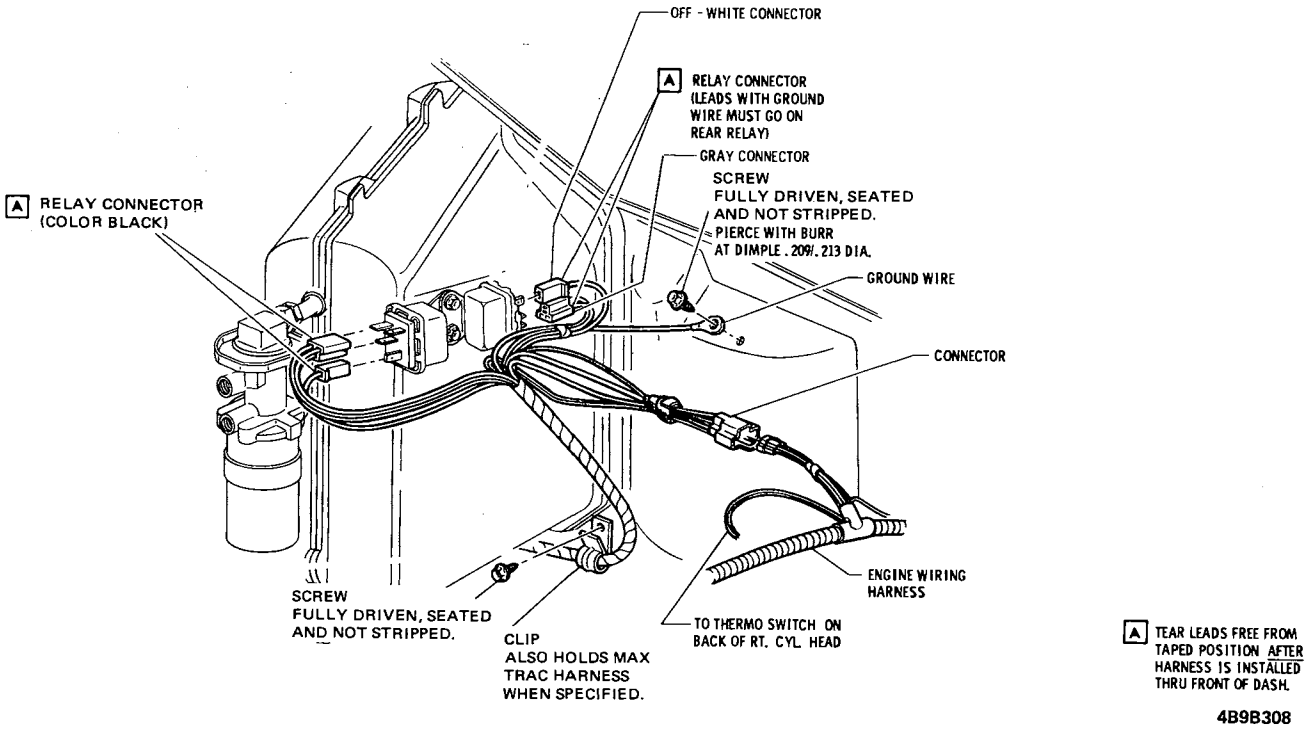


Figure 9B-287 - Automatic A/C Relays Wiring - B-C-E Series

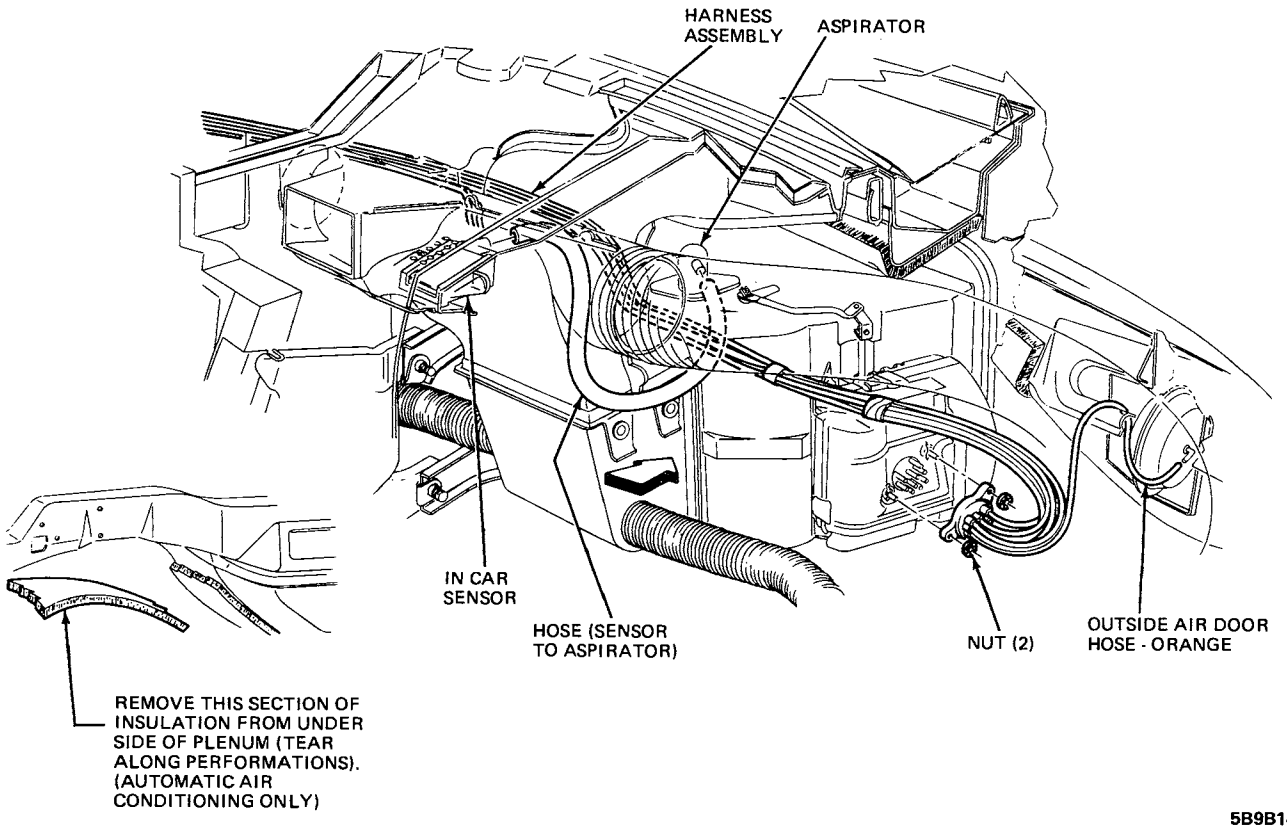


Figure 9B-288 - Vacuum Harness Automatic A/C - Passenger Compartment - B-C-E Series

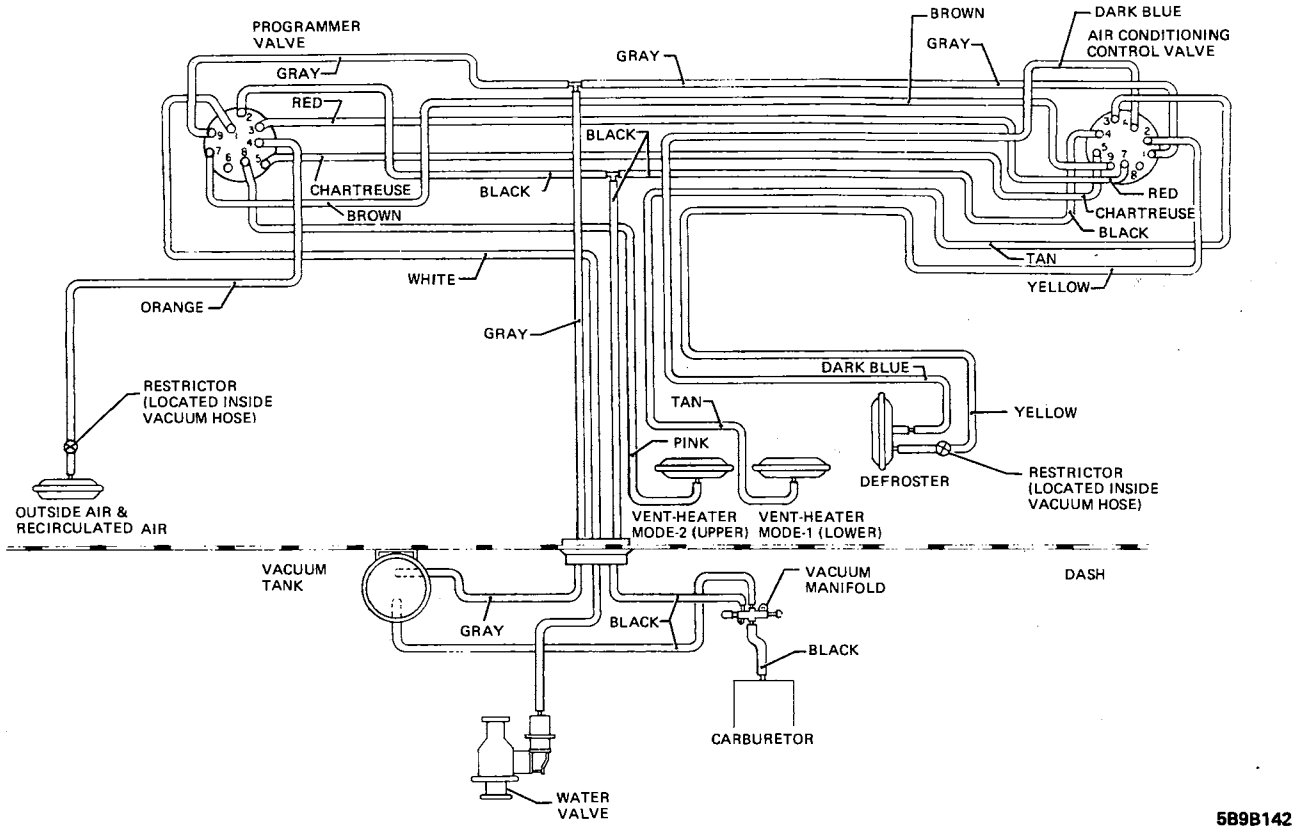
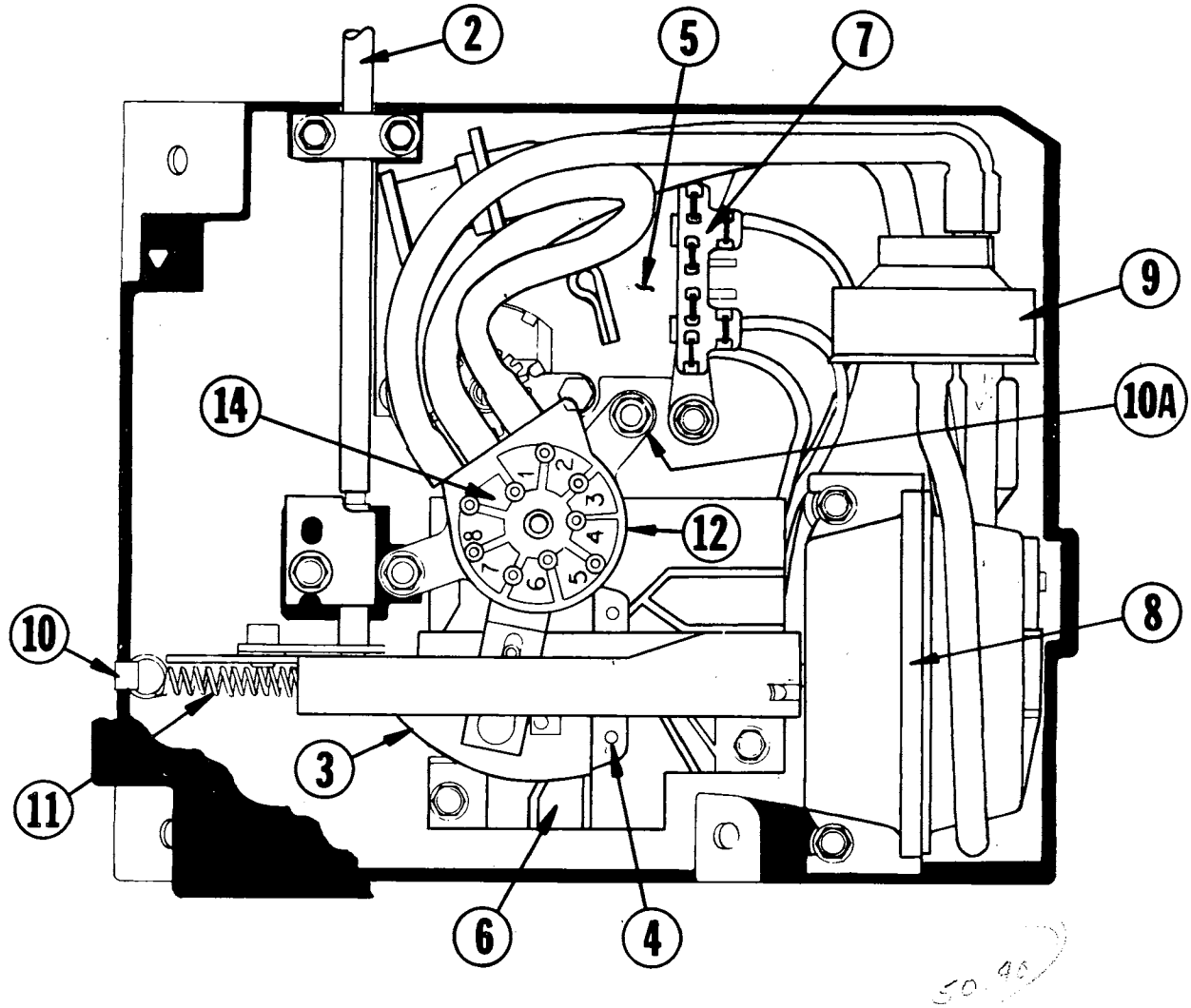


Figure 9B-290 - Automatic A/C Vacuum Schematic - B-C-E Series



ILLUS. NO.	DESCRIPTION
2	MIX DOOR OPERATING ARM ASSEMBLY
3	FEEDBACK POTENTIOMETER ARM MECHANISM
4	WIPER CONTACTS ARM ASSEMBLY
5	CIRCUIT BOARD ASSEMBLY
6	RESISTOR, BLOWER, CIRCUIT BOARD ASSEMBLY
7	6-PIN CONNECTOR
8	VACUUM MOTOR ASSEMBLY
9	CHECKING RELAY
10	POWER SPRING RETAINER
10A	VALVE RETAINER STUD
11	POWER SPRING
14	VACUUM VALVE ASSEMBLY

5B9B143

Figure 9B-291 - Delco Electronics Automatic A/C Programmer - A-B-C-E Series