Group 24
AIR CONDITIONING
CONTENTS

DATA AND SPECIFICATIONS

COMPRESSOR

Location	Left of Center on Cylinder Block
Type	2 Cylinder "V" Type
Bore	$2\frac{5}{16}$ Inch
Stroke	$1\frac{1}{8}$ Inch
Displacement	9.45 Cubic Inches
Type Valve	Reed Type
Speed (depends on axle ratio and tire size)	Approximately 1250 rpm at 25 mph
Oil Capacity (Refrigerant Oil)	11 Ounces
Clutch	Rotating Coil
Muffler	In Compressor Discharge Line

DATA AND SPECIFICATIONS (Cont'd)

CONDENSER

Location	Front of Radiator

RECEIVER-DRIER-STRAINER

Type	Cylindrical Steel Container
Location	
PS-1, PS-3 and PC-1	Engine Compartment
PC-2, PC-3 and PY-1	In Front of Radiator

REFRIGERANT

Refrigerant	Refrigerant 12
Total Charge	
Front Unit Only	2⅝ to 2⅞ lbs.
Dual Units (all)	3⅝ to 3⅞ lbs.

EVAPORATOR

Location	Dash Panel

BLOWERS

Type	Centrifugal
Location	Dash Panel
Capacity	250 to 265 cubic feet of air per minute at high speed
Current Draw	Approximately 14-17 amps. at 14 Volts

SPECIAL TOOLS

Tool No.	Tool Name	Tool No.	Tool Name	Tool No.	Tool Name
C-590	STUDS	C-3429	SCALE	C-3652	VACUUM PUMP
C-744	LIGHT	C-3478	CUTTER	C-3663	CONDENSER COMB
C-804	TOOL	C-3499	TESTER	C-3704	PSYCHROMETER
SP-2922*	TEST CAP	C-3569	TORCH	C-3707	GAUGE
C-3128	PLIERS	C-3616	RATCHET	C-3740	TESTER
C-3355	GOGGLES	C-3620	SOCKET	C-3741	ADAPTER KIT
C-3358	WRENCH SET	C-3621	SOCKET	C-3787	PULLER
C-3361A	RATCHET	C-3622	EXTENSION	C-3788	TOOL
C-3362	BENDER SET	C-3623	THERMOMETER	C-3807	SLEEVE

SPECIAL TOOLS (Cont'd)

C-3363	WRENCH SET	C-3644*	TEST HOSE
C-3420	ADAPTER	C-3645*	TEST HOSE

*These Numbers for Ordering Service Repair or Replacement Parts for C-3740 Tester

TIGHTENING REFERENCE

	Foot-Pounds	Inch-Pounds
Compressor Bearing Housing Bolt	10-13	
Compressor to Bracket Bolt	50	
Compressor Connecting Rod Screw		52-56
Compressor Cylinder Head Cover Bolt	23-27	
Compressor Cylinder Head Cover (Nameplate) Bolt	20-24	
Compressor Discharge Adapter Bolt	14-18	
Compressor to Engine Bolt	30	
Compressor Oil Pump Cover Bolt	10-13	
Compressor Oil Sump	15-19	
Compressor to Strut Bolt	30	
Compressor Suction Adapter Bolt	10-14	
Magnetic Clutch to Compressor Bolt	20	

FLARE NUT TORQUES

Flare Size	Foot-Pounds	Flare Size	Foot-Pounds
1/4 SAE	12-14	1/2 SAE	30-35
3/8 SAE	20-25	5/8 SAE	55-65

Group 24
AIR-CONDITIONING

Three types of original equipment air conditioning installations are available for the 1960 models. The first option is a combination air conditioning and heating unit. It is a dash-mounted unit, operated by push buttons conveniently located on the instrument panel. A dual installation consisting of the combination front unit and a rear-mounted evaporator assembly is also available. This deluxe installation insures equal distribution of conditioned air to rear-seat as well as front-seat passengers. The third option is a deluxe installation for suburban body styles only. It consists of the combination dash-mounted unit and a special roof-mounted evaporator assembly installed at the rear of the suburban body.

The dash-mounted front unit is the basic factory installed option. The rear unit, mounted in the luggage compartment, and the roof unit for suburbans are not available as single units without the front unit. Since both of these rear unit options operate automatically in conjunction with the front unit, only the front unit will be described in detail.

1. OPERATION

Selection of the degree of air conditioning desired is by means of push buttons conveniently located on the instrument panel. A sliding lever, in the same panel with the push buttons, provides control of the hot water flow through the heater core to regulate the temperature (Refer to Fig. 1). The switch for the electric blower motor control is mounted on the end of the sliding lever. The blower motor has three speeds—low speed with the switch knob pushed in, high speed with the switch knob pulled out and medium speed between these two extremes.

Operation of the doors and damper which direct air flow through the combination heater and air-conditioning unit is by means of vacuum diaphragm units called vacuum actuators. The vacuum source is the engine intake manifold. Vacuum lines connect to each side of the vacuum actuator diaphragm, with the push button serving as a "switch valve" to admit vacuum to one side or the other of the vacuum actuator diaphragm. The diaphragm is connected to the door or damper by a rod and suitable linkage. Movement of the diaphragm, therefore, opens or closes the door or damper.

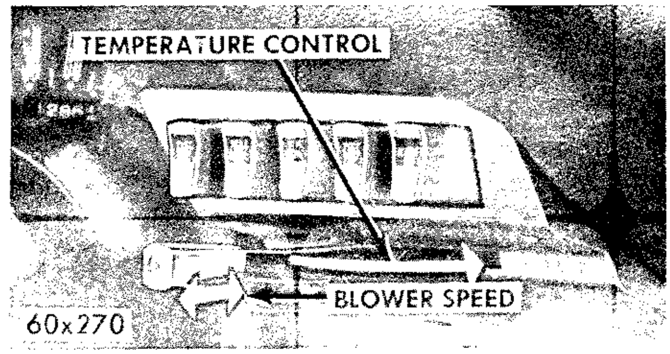

Fig. 1—Air Conditioning Controls

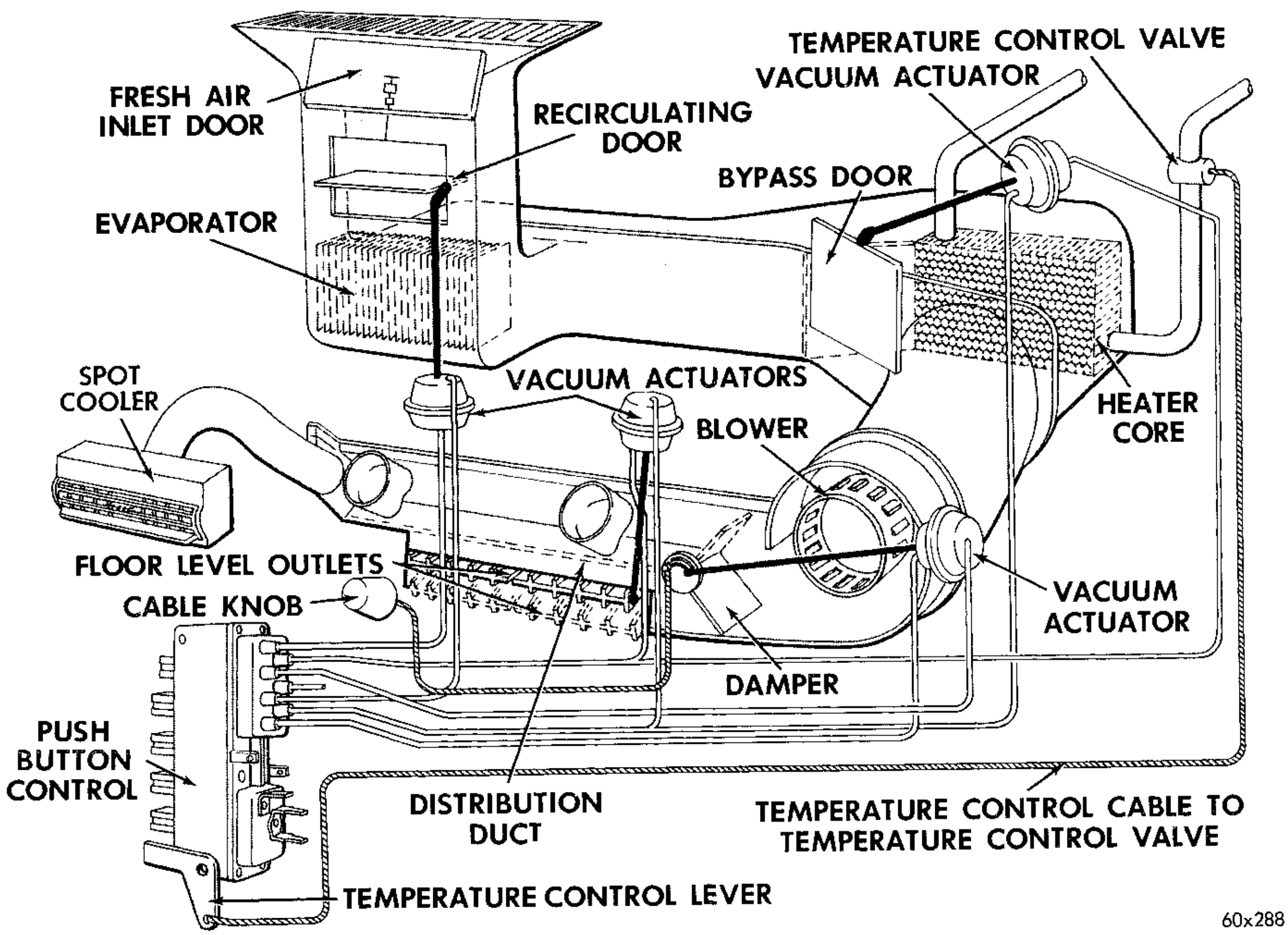

Fig. 2—Air Flow—Typical

The push buttons also control the electrical circuits to the magnetic clutch and to the blower switch. The switch on the end of the temperature control lever controls the blower speed.

2. AIR FLOW

Figure 2 is an air flow schematic illustration of a typical 1960 unit. The fresh air door and the recirculating door are connected by a linkage so that they work in conjunction with each other. They are both operated by one vacuum actuator. When the fresh-air door is fully closed, the recirculating door will be fully open. Conversely, when the fresh-air door is fully open the recirculating door will be fully closed. An adjustment is provided in the linkage connecting these two doors.

The heater bypass door is also controlled by a vacuum actuator. When the bypass door is closed, all air is directed through the heater core. When the bypass door is open, 75% of the air is bypassed around the heater core, and the remaining 25% flows through the heater core. The temperature control valve is mechanically controlled by the temperature control lever adjacent to the push buttons. For heating only, the temperature control valve can be opened to provide full water flow through the heater core. The bypass door will be closed, sending all air through the core. The bypass door linkage can be adjusted.

The distribution duct damper is also operated by a vacuum actuator. Its function is to control the percentage of air directed to the instrument panel outlet grilles and spot cooler, and the percentage of air delivered through the central floor outlet deflector. In the extreme down position it will direct most of the air upward and to the spot cooler, the balance to the central floor outlet. In the extreme up position, the damper directs most of the air to the floor outlet, the balance to the upper outlets and the spot cooler.

Although the exact division of air flow is determined automatically by the push buttons controlling the distribution duct damper vacuum actuator, the driver can override the automatic control. The air distribution control knob provides the means of manually controlling the distribution duct damper.

The central floor outlet deflectors are controlled by a separate vacuum actuator. Position of these deflectors determines the direction of air flow from the floor outlet. Normal deflector position for cooling is up. This directs air upward and toward the rear-seat passengers. Normal deflector position for heating is down. Directing the warm air downward improves warm air circulation and insures maximum passenger comfort. The deflectors can be moved manually to override the automatic control.

The manual controls are provided at the spot cooler outlet. These permit the driver to open and close the grille, and to adjust the direction of the discharged air. The entire grille can be rotated to direct air upward or downward. When the grille is rotated all the way upward, air flow from the spot cooler is shut off. The grille deflectors can be moved

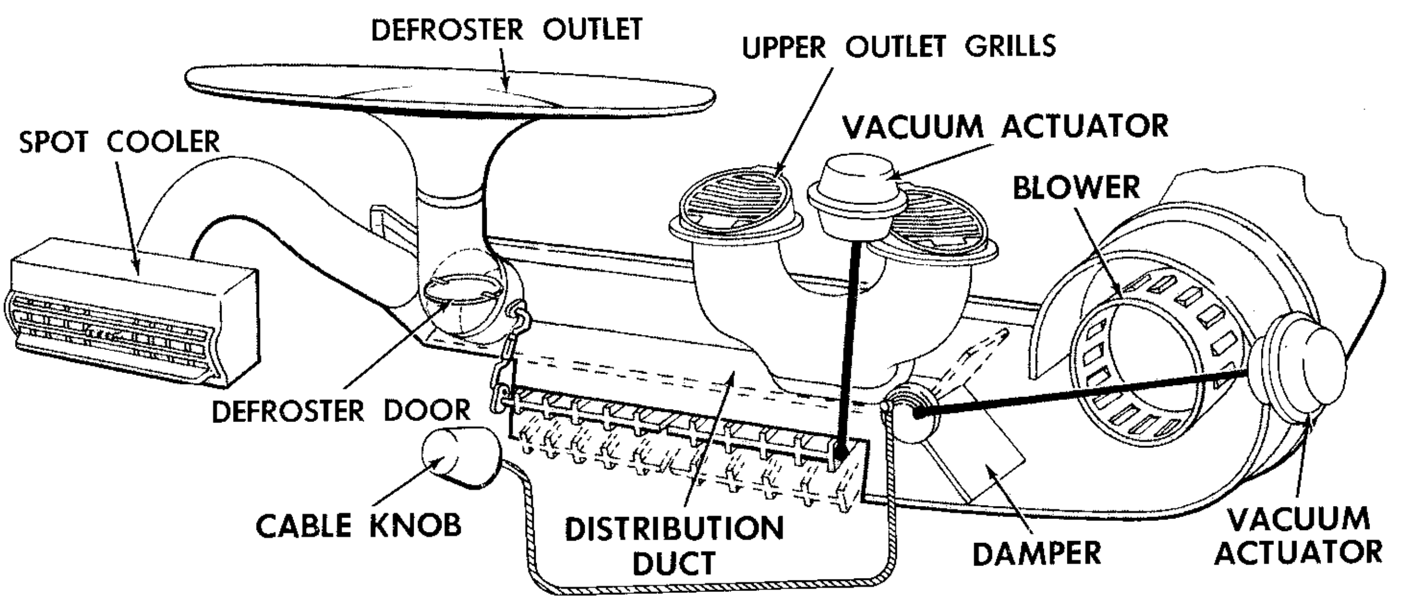

Fig. 3—Air Distribution—DeSoto

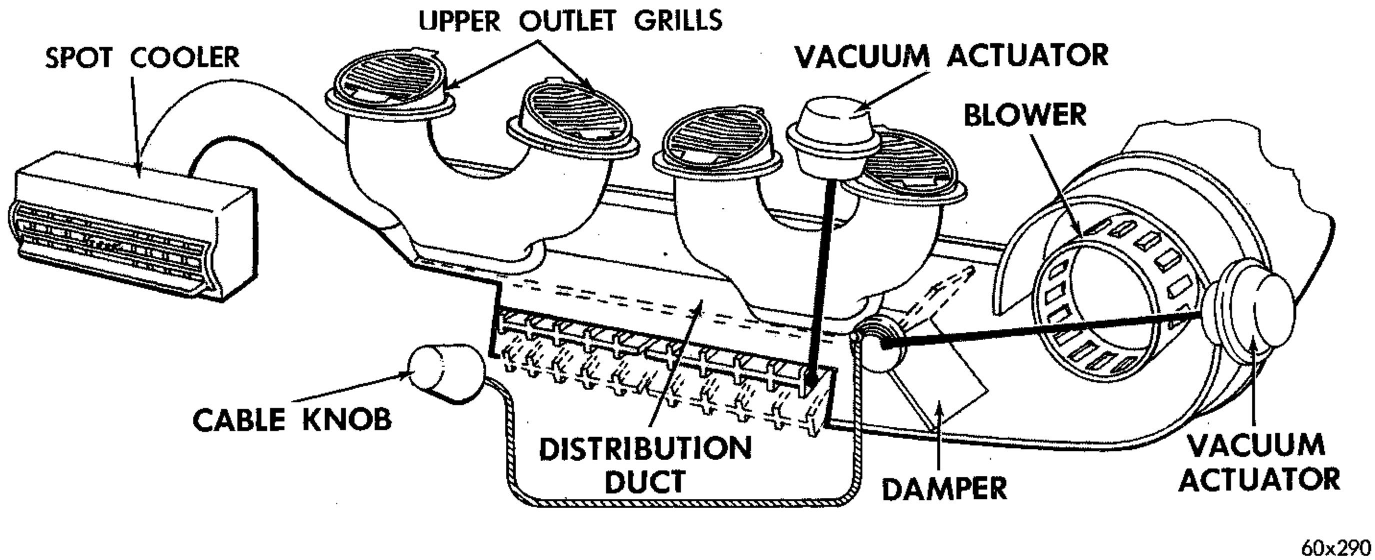

Fig. 4—Air Distribution—Chrysler

to the left or the right to direct air flow to the left or the right.

3. AIR DISTRIBUTION

Figure 3 is an air distribution schematic illustration for DeSoto models. Air flow to the spot cooler at the left and to the instrument panel grilles at the right is directed as controlled by the distribution duct damper. The defroster outlet in the distribution is at the left adjacent to the spot cooler outlet. It is equipped with a door. The defroster outlet door is mechanically linked to a bell crank at the left end of the central deflector. The defroster door should be fully open for defrosting and heating. It should be closed for all other push-button positions. It is operated by the vacuum actuator that controls the central deflector. An adjustment is provided in the defroster outlet door linkage.

The defroster outlet in the distribution duct is connected to a defroster outlet located along the

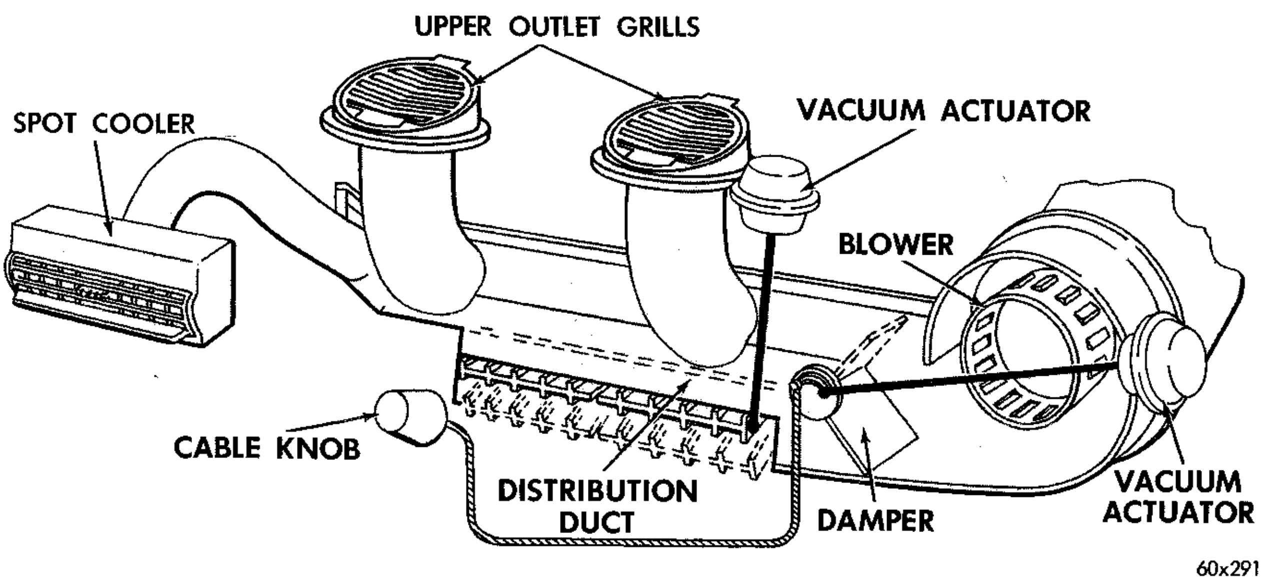

Fig. 5—Air Distribution—Imperial

lower left edge of the windshield. The spot cooler grille should be closed when the "Heat" or "Defrost" button is pushed. All air delivered to the left end of the distribution duct will flow up through the opened defroster door and be delivered to the left side of the windshield. At the same time, the two instrument panel outlet grilles can be adjusted to provide defrosting for the right side of the windshield.

Figure 4 is an air distribution schematic illustration for Chrysler models, and figure 5 for Imperial models. Air distribution is controlled by the distribution duct damper. The position of the distribution duct damper determines the amount of air available at the central floor outlet grille. The remaining air is directed to the instrument panel outlet grilles and to the spot cooler at the left.

The design and location of the instrument panel outlet grilles eliminates the need for any auxiliary defroster outlets. On all Chrysler models, two instrument panel outlet grilles are provided at the left side and two more are provided at the right side. On all Imperial models, a large instrument panel outlet grille is provided at the left and another at the right.

On both Chrysler and Imperial models the instrument panel outlet grilles can be adjusted to direct the air exactly as desired. Grilles are normally directed back toward the passengers for cooling. They are angled forward and toward the sides of the windshield for effective defrosting.

The spot cooler grilles can be adjusted manually to change the direction of air delivered or closed completely. When the spot cooler grilles are closed, all air deflected to the upper part of the distribution duct will be delivered to the instrument panel outlet grilles.

4. AIR FLOW FOR EACH BUTTON POSITION

When testing or adjusting the doors and damper in the distribution system, it is important to know the correct position of each door and damper for each push button position. It is also necessary to know which vacuum hoses are activated for each push-button position. In the paragraphs which follow, air flow is described. The accompanying illustrations also indicate which vacuum actuator hoses are activated for each push-button position.

a. Air Flow—Maximum Cooling (Fig. 6)

If maximum cooling is desired, follow three simple steps after starting the engine:

1. Move the temperature control lever to the "OFF" position in the slot.

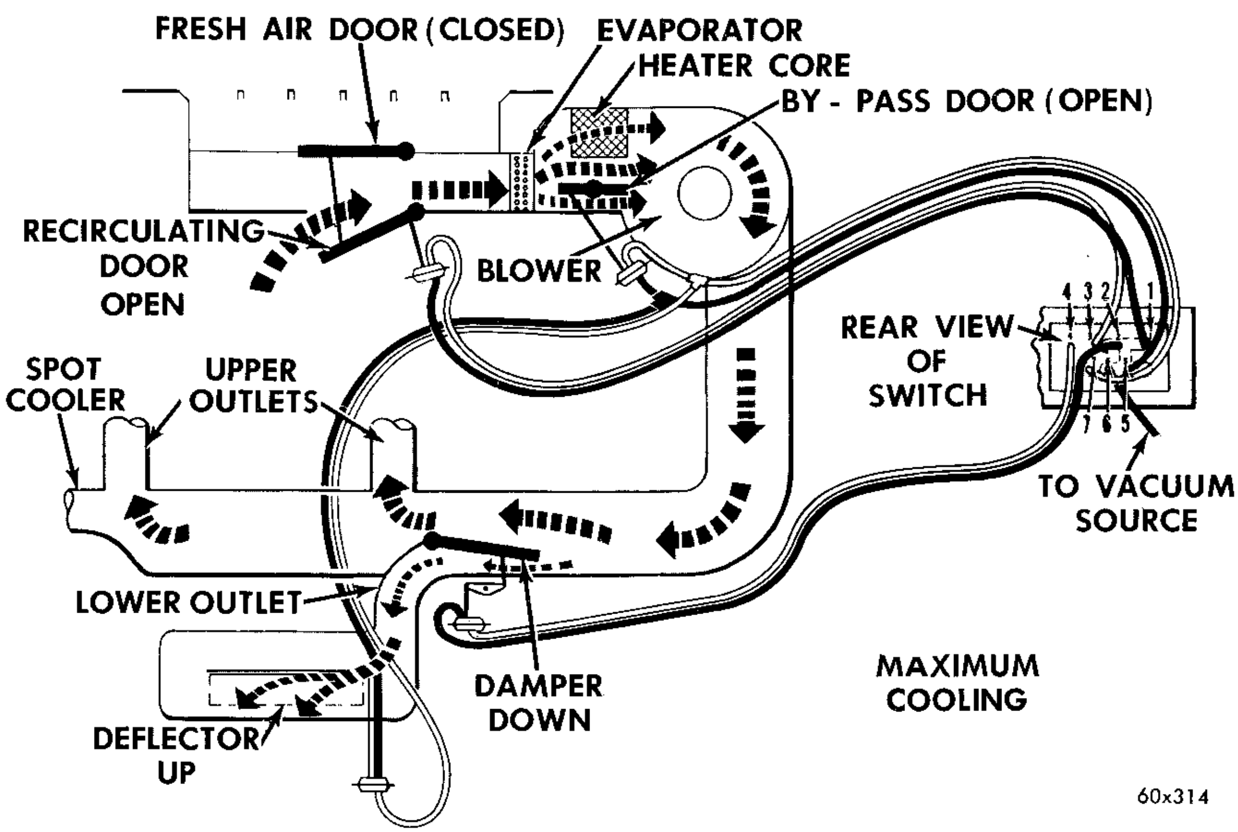

Fig. 6—Air Flow—Maximum Cooling—Chrysler and Imperial

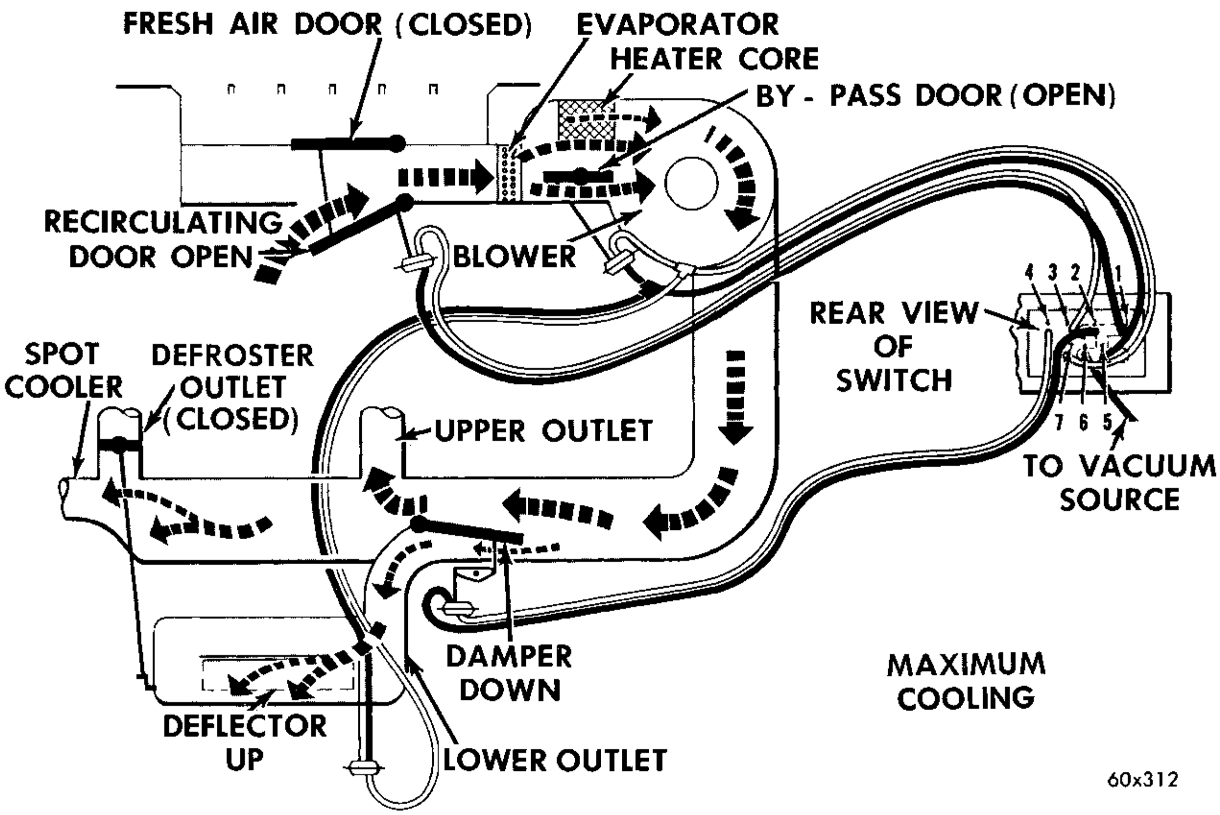

Fig. 7—Air Flow—Maximum Cooling—DeSoto

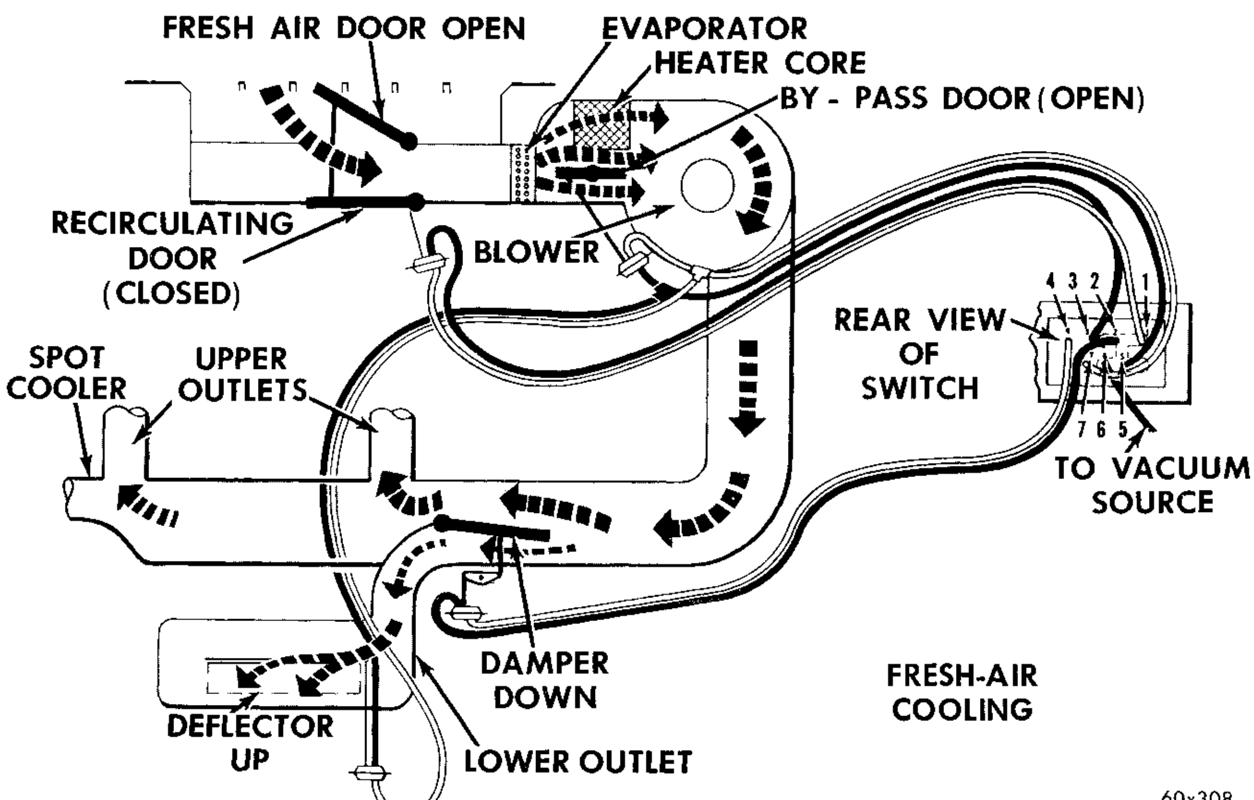

Fig. 8—Air Flow—Fresh Air Cooling—Chrysler and Imperial

2. Push the "Maximum Cooling" button in.

3. Pull the "Blower" switch knob (on the end of the control lever) out for maximum blower speed.

When the unit is operating with this setting, the fresh air door is closed and the recirculating door is open. This means only the air in the interior of the car will be air conditioned, and no fresh air will be drawn in from the outside. The heater bypass door is open so that 75% of the air bypasses the heater core. The temperature control valve is closed so there is no hot water circulating through the heater core.

If the distribution duct damper is set for normal air distribution, most of the air will be discharged through the instrument panel outlet grilles and through the spot cooler; the remainder through the lower outlet deflector.

On DeSoto models, figure 7, air flow is essentially the same. The defroster outlet door will be closed so that no air will be delivered through the left-hand defroster outlet.

b. Air Flow—Fresh Air Cooling (Fig. 8)

If fresh-air conditioning is desired, push in the "FRESH COOL" button. This opens the fresh-air door and closes the recirculating door. The heater bypass door is open. Approximately 25 per cent of the air passing through the unit is directed through the heater core, and is mixed with the air that is bypassing the heater core. Fresh air is then drawn in, conditioned and discharged through the outlets in the same proportion as for maximum cooling. The temperature of the discharged air can be regulated by moving the temperature control lever. This regulates the temperature control valve which controls water circulation through the heater core.

On DeSoto models, figure 9, air flow is similar. Since the defroster outlet door is closed, no air can be discharged through the defroster outlet at the left side of the windshield.

c. Air Flow—Defrosting (Fig. 10)

When using the system for defrosting, the "DEFROSTER" button is pushed in, and the temperature control lever moved toward the "WARMER" end of the slot. The instrument panel grilles may be rotated as desired. The heater bypass door is closed. With this setting, all the fresh air taken in through the opened fresh air door is directed through the heater core. The larger volume of air is discharged through the instrument panel outlets grilles, as it is needed for the defrosting action. The spot cooler grille should be closed to insure adequate air for defrosting.

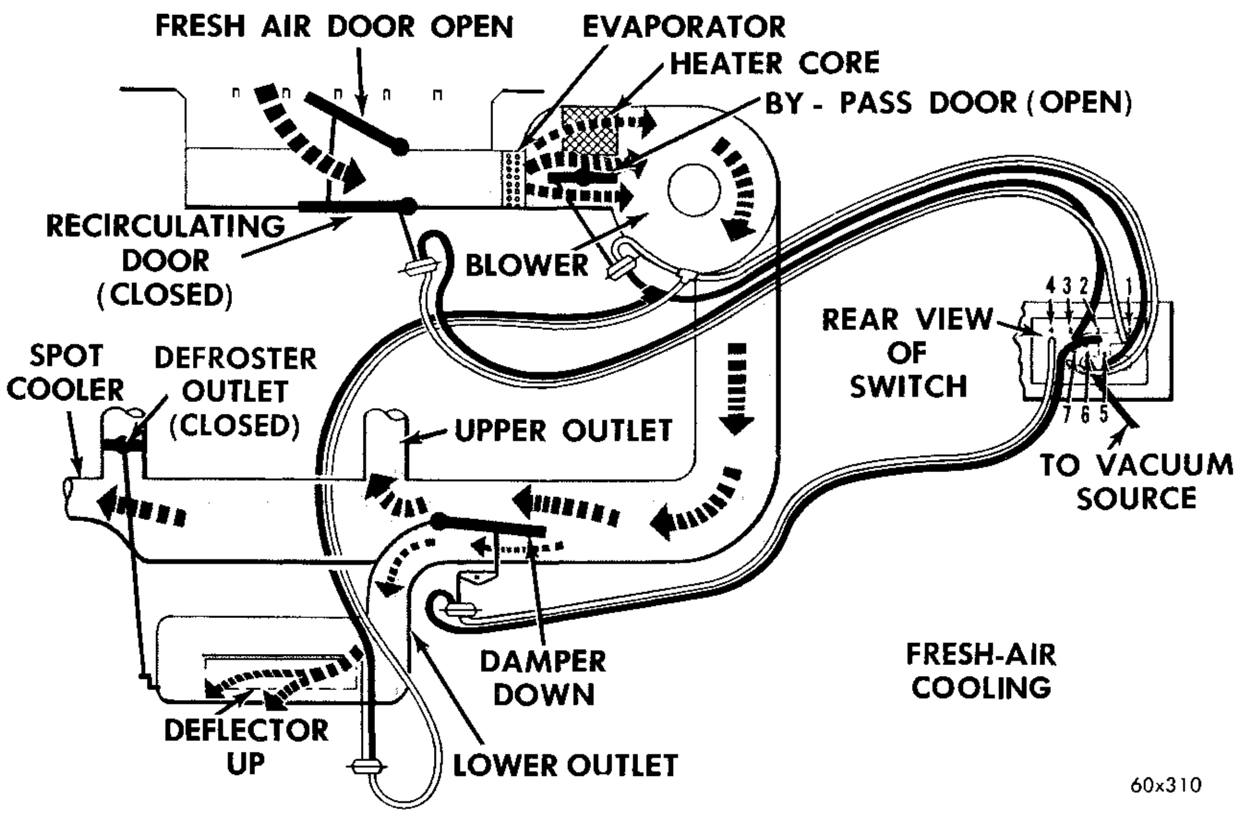

Fig. 9—Air Flow—Fresh Air Cooling—DeSoto

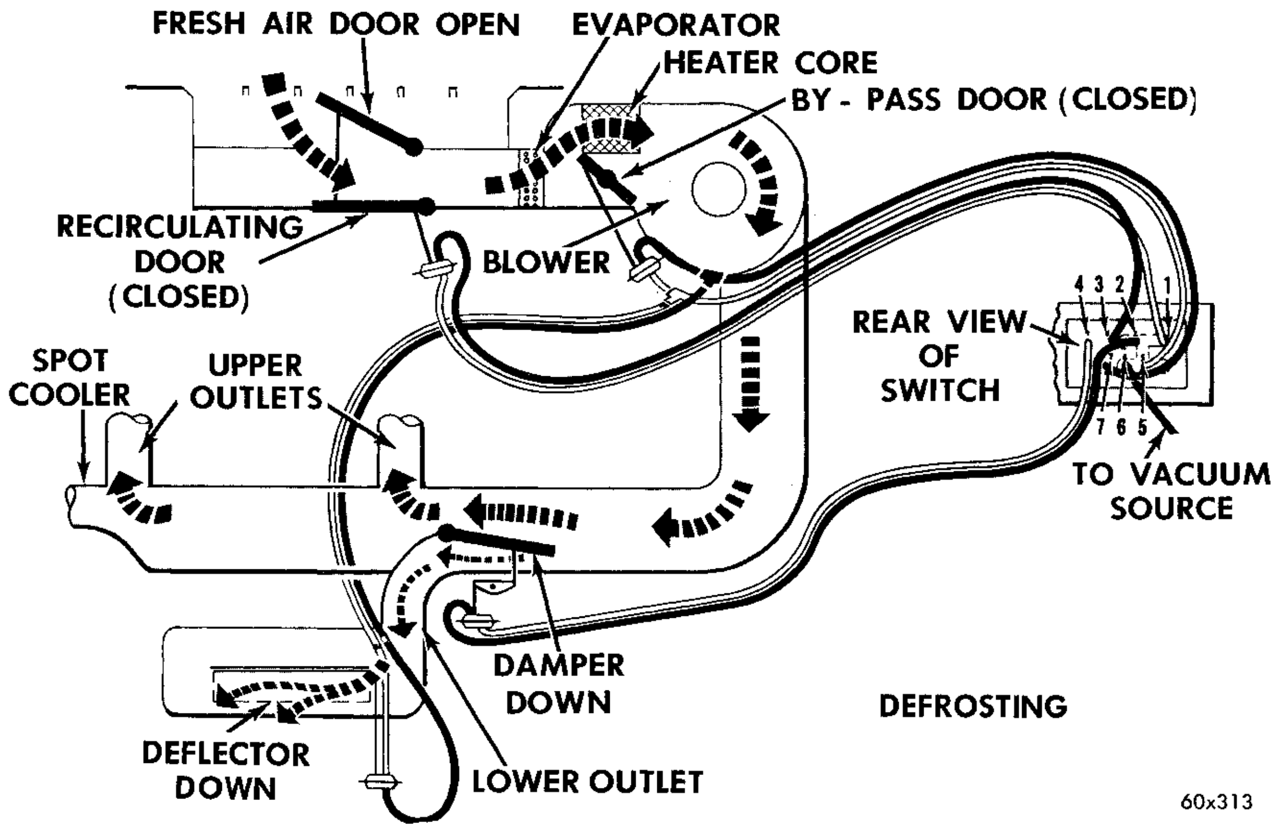

Fig. 10—Air Flow—Defrosting—Chrysler and Imperial

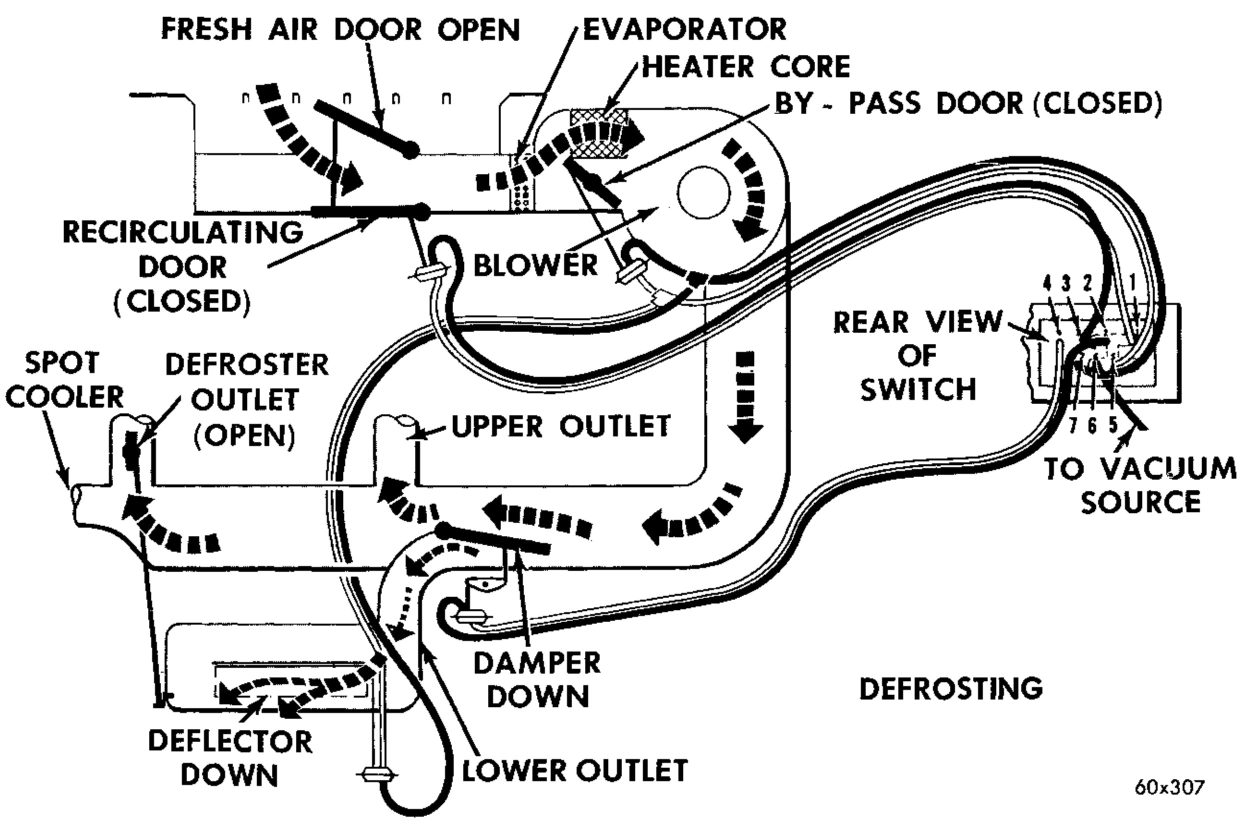

Fig. 11—Air Flow—Defrosting—DeSoto

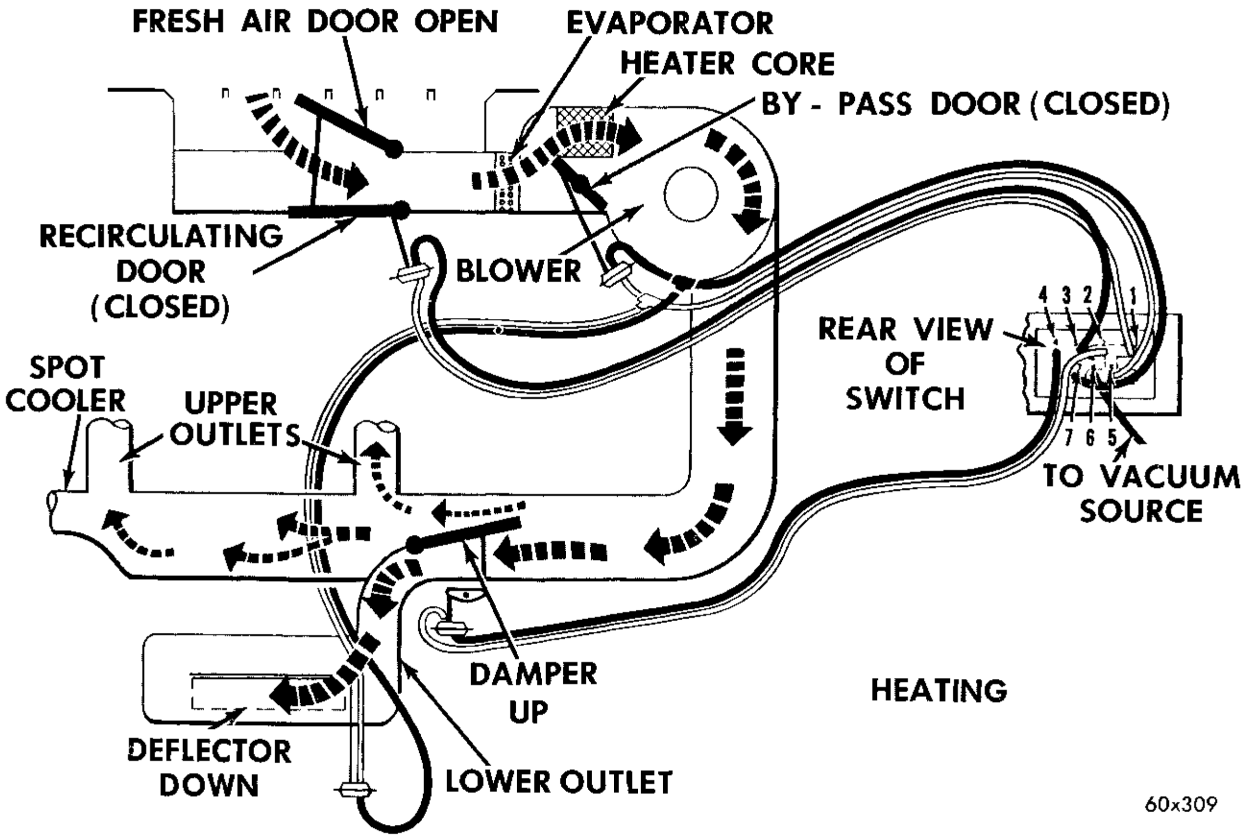

Fig. 12—Air Flow—Heating—Chrysler and Imperial

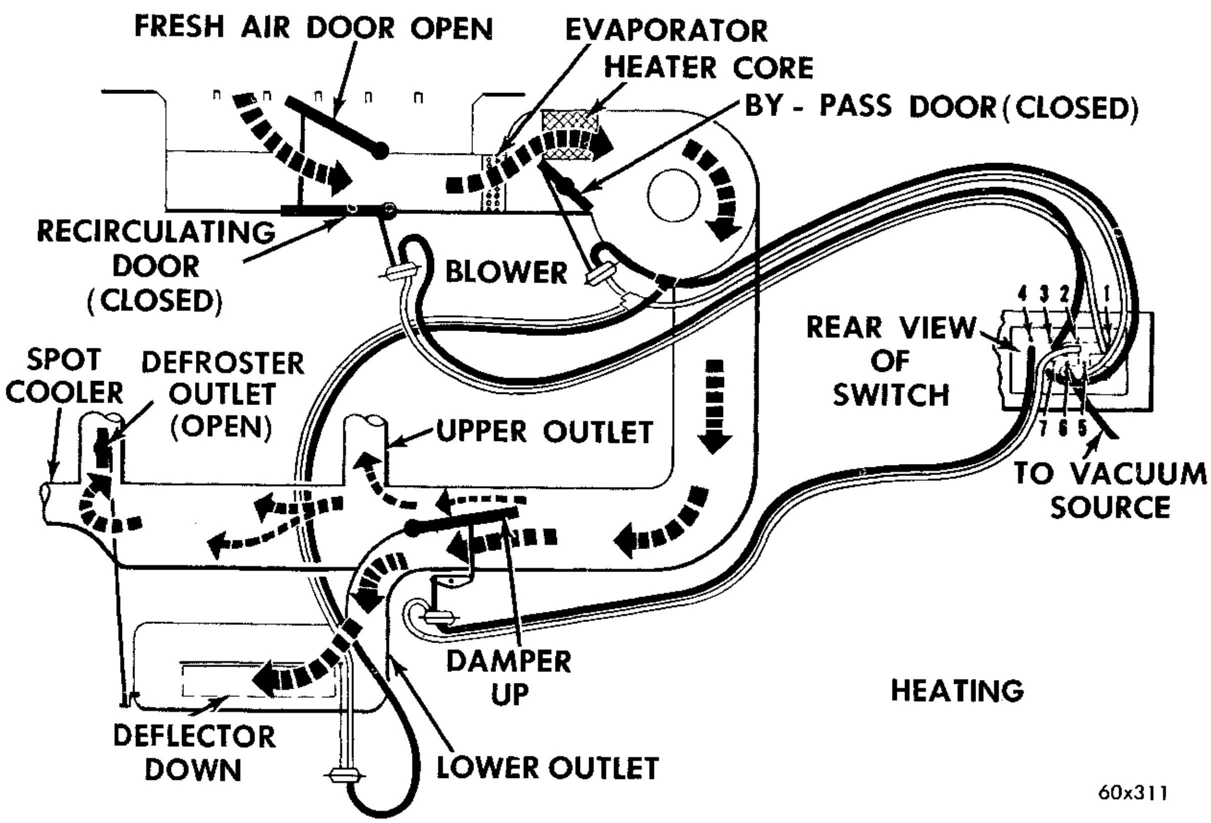

Fig. 13—Air Flow—Heating—DeSoto

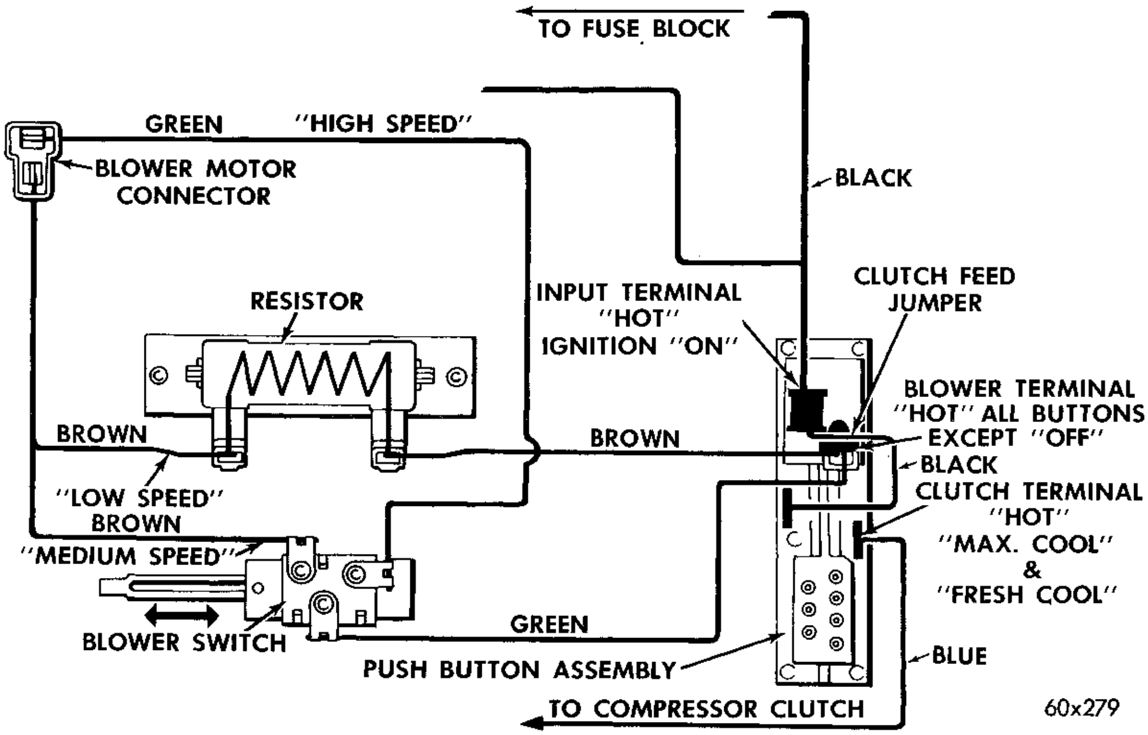

Fig. 14—Electrical Control Circuits—Chrysler and Imperial

On DeSoto models, figure 11, the defroster outlet door is fully open so that maximum air will be delivered to the left-hand defroster outlet provided on this model. The spot cooler grille must be closed so that all air available will be used for defrosting.

d. Air Flow—Heating (Fig. 12)

To operate the unit for heating, the "HEAT" button is pushed in and the temperature control lever moved to the "WARMER" end of the slot. The heater bypass door is closed. All of the air taken in through the fresh-air inlet grille is directed through the heater core. With the temperature control lever moved to the extreme limit of travel toward the "WARMER" end of the slot, the temperature control valve is wide open. Maximum circulation of hot water is directed through the heater core, so air forced through the core receives its highest level of heat absorption. With normal setting, most of the discharge air is directed through the floor level outlet, which provides maximum comfort for the passengers. The spot cooler grille must be closed by the driver to eliminate a hot air blast, and to make maximum use of available heated air for defrosting.

On DeSoto models, figure 13, the defroster outlet door is fully open to provide air to the left-hand defroster outlet. Close the spot cooler grille to make maximum use of available heated air for defrosting.

e. Ventilation

Pushing either the "DEFROST" button or the "HEAT" button, and moving the temperature control lever to "OFF" will set the system for fresh-air ventilation—a desirable setting when temperature conditions are such that neither cooling nor heating is desired. The only difference between the operation of the system with the "DEFROST" button or the "HEAT" button pushed in is the circulation of the discharge air. With the "DEFROST" button in, most of the air is discharged through the instrument panel outlet grilles; with the "HEAT" button in, most of the air is discharged through the floor level outlet.

The driver can adjust the air distribution control to change the position of the distribution duct damper, only when the defrost button is pushed in.

5. ELECTRICAL CONTROLS AND CIRCUITS

On all air-conditioning systems (front-unit type) there are two switches, one for the clutch control circuit and one for the blower motor speed control circuit. The push-button switch assembly controls the clutch circuit. The push-button switch also controls the "feed" circuit to the blower motor speed control switch mounted on the temperature control lever.

a. Push-Button Control

The power "feed" circuit for Chrysler and Imperial models is shown in Figure 14, Figure 15 for De Soto models.

A 20 ampere "in-line" fuse is used on De Soto. No "in-line" fuse is required on Chrysler or Imperial since the power feed connects directly to the "A/C" terminal of the fuse block.

Except for the minor differences outlined above, all front-unit electrical control circuits are alike. Functionally, the blower motor and clutch control circuits for all models are identical.

The clutch circuit is energized ("hot") **only** when the "Maximum Cool", or the "Fresh Cool" push buttons are depressed. The low-speed blower motor circuit and the power "feed" circuit to the blower motor speed control switch are energized ("hot") when any button other than the "off" button, is depressed.

b. Blower Motor Speed Control Switch

The speed control switch and control circuits are the same for all models, and the switch is controlled by moving the temperature control lever in or out. The power "feed" line from the push-button switch to the speed control switch is energized only when the ignition is on and any push button other than "off" is depressed.

The High Speed Blower Circuit, from the speed control switch to the blower motor is energized when the temperature control lever is pulled **all the way out,** the ignition is on and any push button other than "off" is depressed.

The Medium Speed Blower Circuit, from the speed control switch to the blower motor is energized when the temperature control lever is pulled **half way out,** the ignition is on and any push button other than "off" is depressed.

The Low Speed Blower Circuit to the blower motor is direct from the push-button switch, through a fixed line resistor, to the blower motor. This circuit is energized when any push button other than "off" is depressed and the ignition is on.

When the temperature control lever is pushed in all the way, the only energized circuit from the push-button switch to the blower motor is through the low-speed power feed line. The low-speed circuit is also energized when the temperature control lever is moved to medium or high-speed position. Because

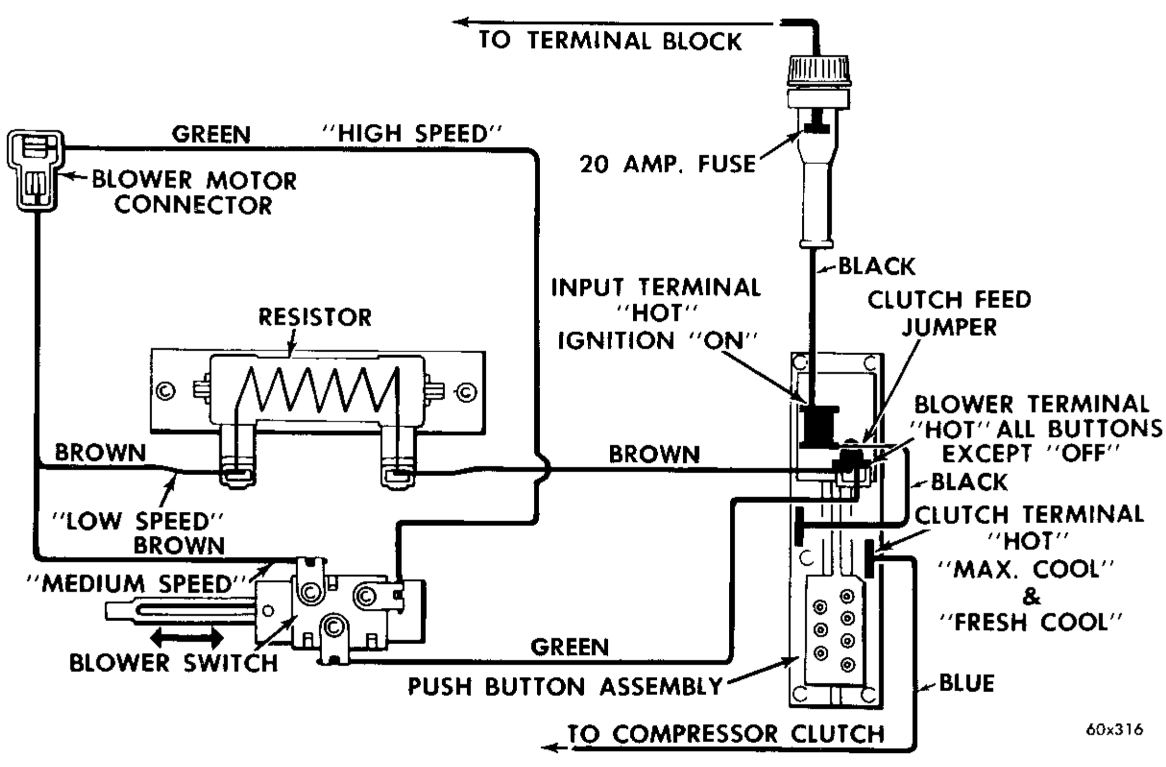

Fig. 15—Electrical Control Circuits—De Soto

of the fixed line resistor in the low-speed circuit, the primary power feed to the blower motor is through the medium or the high-speed circuit, depending on the temperature control lever position.

The circuit arrangement makes it possible to provide three-speed blower operation with a two-speed motor, a two-speed switch and a two-wire terminal connector at the blower motor. The blower motor is grounded at its mounting.

c. Trunk Unit and Roof Unit Controls

The trunk unit and the roof unit evaporators are dependent upon the controls used to operate the front unit. The evaporator of a trunk unit or a roof unit of a dual installation will "cool" only when the "MAXIMUM COOL" or the "FRESH COOL" push button of the front unit control is depressed to energize the magnetic compressor clutch.

The blower circuits of the trunk unit and the roof unit are entirely independent of the front unit. The blower switch used on these rear units of a dual installation, provides low or high blower speed from the two blowers used in rear-end units.

The blowers of the trunk unit are grounded through the evaporator assembly mounting. The blowers of the roof unit are grounded through a ground lead to the roof rail. Otherwise, the blower circuits of all rear units are essentially the same.

Figure 16, Trunk Unit Wiring Diagram, provides the necessary information for tracing the blower switch circuit for all models except Town and Country.

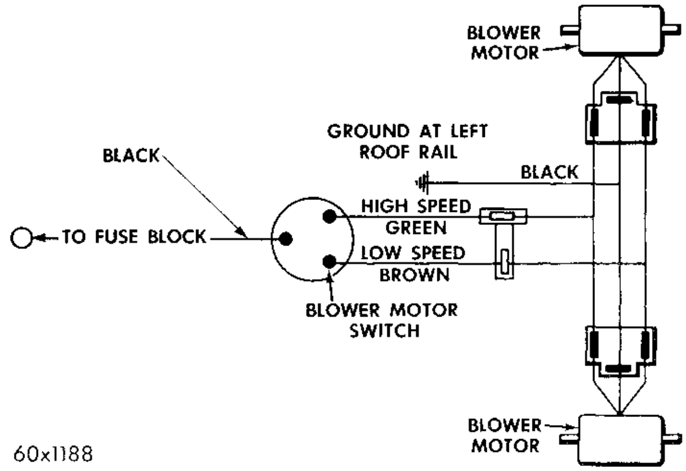

Fig. 17—Roof Unit Wiring Diagram—Chrysler and Imperial

Figure 17, Roof Unit Wiring Diagram, provides the necessary information for tracing the blower circuit on Chrysler models, Town and Country.

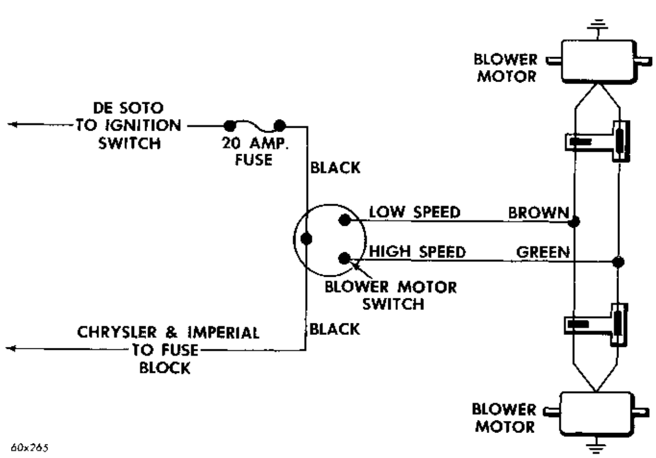

Fig. 16—Trunk Unit Wiring Diagram

6. OPERATING INSTRUCTIONS FOR OWNERS

The purchaser of an air-conditioning equipped car should be instructed on proper operation of the controls at the time of new-car delivery. It should never be assumed that the new owner will study the Owner's Manual or that his experience with the past models provides a complete understanding of the new controls. Customer satisfaction can be increased and complaints minimized by instructing the owner on operation as well as his service responsibilities. The following suggestions cover special operating conditions and preventive service suggestions.

a. Fast Cool-Down

If the car has been sitting in the hot sun, open car windows immediately.

Move the temperature control lever to the extreme opposite position of the "warm" arrow.

Pull out temperature control lever "knob" for high blower speed.

Start engine.

Press the "MAXIMUM COOLING" button.

Start driving car. Car motion and air-conditioning blower action will flush the hot air out of the car.

After one or two minutes of driving, close all car windows.

b. Operation in Traffic

If **extremely slow traffic** is encountered, 10 to 15 miles per hour, additional cooling can be obtained by operating the transmission in the lowest range (No. 1 button).

For **moderate traffic** operation, 20 to 30 miles per hour, operate transmission in intermediate range (No. 2 button).

At **stop lights** and other stops, press transmission ("N") Neutral button and increase engine speed with the foot accelerator.

At **higher speeds,** press transmission ("D") Drive button.

c. Highway and Light Traffic Operation

As soon as the car cools down, and especially at highway speeds, change the air-conditioning buttons from "MAXIMUM COOL" to "FRESH COOL." This will slightly pressurize the car and prevent any unrefrigerated air from seeping into the car. This will remove tobacco odors, etc. When changing air-conditioning buttons from "MAXIMUM COOL" to "FRESH COOL", particularly at highway speeds, momentarily release accelerator pedal, and return it to its former speed position. This momentary release of accelerator pedal will increase engine vacuum causing a fast action in the closing of the recirculating door and opening of the fresh air door.

"Fresh Cool" operation will be the most desirable operating position except for extremely hot or humid weather, or starting with a hot car, as previously outlined.

If less cooling is desired, push in blower switch on temperature control lever for medium or low blower speed.

If still too cool, move the temperature control lever in the direction of the "warm" arrow.

d. Off-Season Operation

During the off-cooling season, suggest to owners that they operate the air-conditioning system for at least a few minutes once a week, with the "FRESH COOL" button in and the temperature control lever in the "warm" position. This will cause the air-conditioning compressor to pump oil to the compressor seal, preventing the seal from drying out and causing loss of refrigerant.

e. Antifreeze Required for Summer Operation

The 1960 Chrysler Corporation Air-Conditioning system requires the engine's cooling system to be protected to +15°F. with a permanent-type antifreeze for summer operation. This is to prevent freezing of the coolant in the heater core.

In the springtime, after the winter's operation with the cooling system protected with permanent-type antifreeze for the temperatures of the area, it is suggested the system be drained and flushed out with water. When draining, flushing and refilling, have the temperature control lever in the extreme hot position so the heater core is drained, flushed and refilled. Install a gallon of permanent-type antifreeze in the system, and add enough water to fill the system.

Do not re-use the old antifreeze.

The permanent antifreeze does not lose its antifreeze qualities during the winter season operation, but the chemical inhibitors for rust and corrosion prevention are weakened and finally exhausted by extended use.

Do not add new inhibitor to used antifreeze in hope of re-vitalizing the used antifreeze.

The chemical inhibitors come in various chemical compositions, some are compatible, some neutralize each other, and some form violent reactions to each other causing foaming and other undesirable reactions.

Play it safe and use new permanent-type antifreeze.

f. Bug Screens

Bug screens should not be installed on cars equipped with air conditioning. A bug screen installed in front of the condenser will reduce air flow and affect air-conditioning performance. Under severe heat conditions a bug screen may cause the engine to overheat.

7. FUNCTIONAL DESCRIPTION OF THE 1960 REFRIGERATION SYSTEM

The following functional description of the refrigeration part of the air-conditioning system is intended to familiarize the service technician with general arrangement and function of the components of the 1960 system. At first glance the new system looks very much like the system used on previous models. However, a closer look at each of the units of the new system will show that a number of improvements have been incorporated in the 1960 system. Figure 18 is a schematic arrangement of the refrigeration components used in the new system.

The new system does not cycle on the clutch. This eliminates the need for a Thermal Switch. A new unit called an Evaporator Pressure Regulator Valve replaces the thermal switch. This new control valve is located at the suction side of the compressor. Both the suction and the discharge service valve have been replaced by new-type service ports for connecting the compressor to trouble shooting pressure gauges.

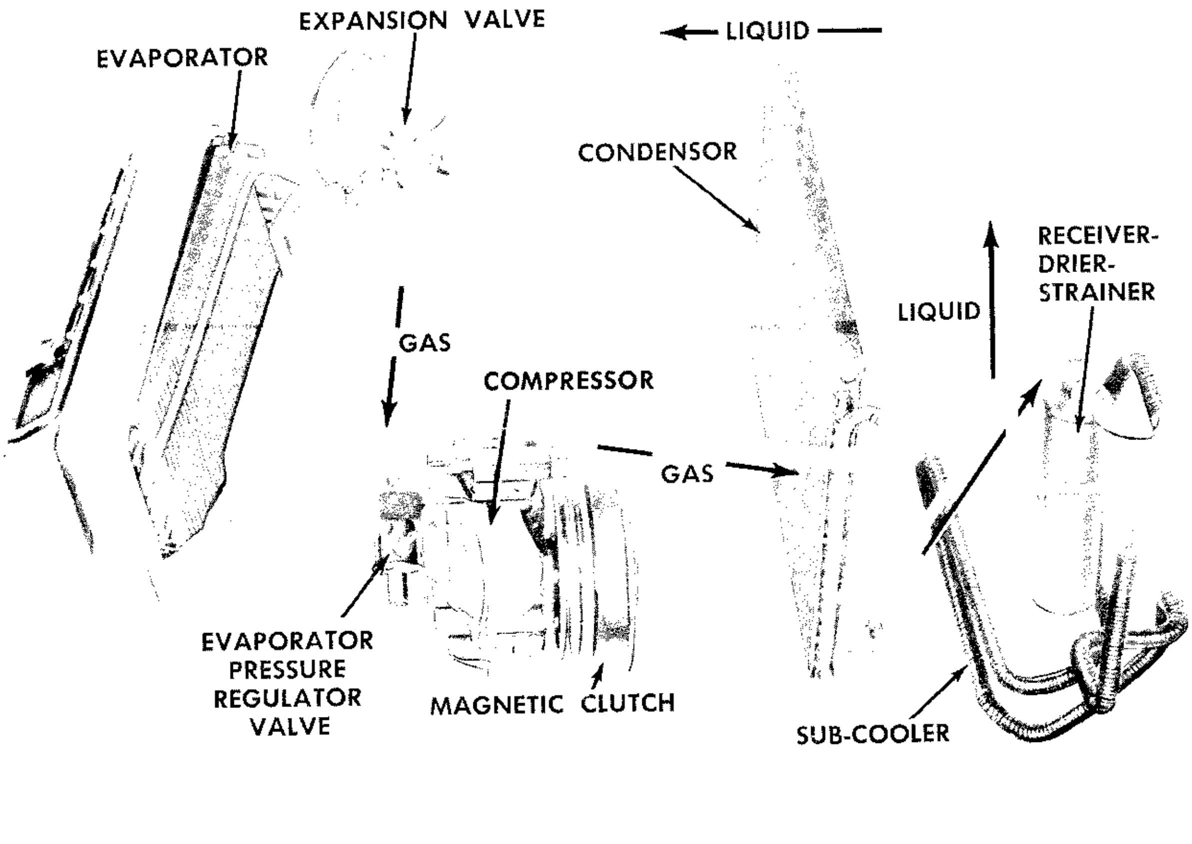

Fig. 18—Refrigeration System Components

These changes have a definite bearing on testing and diagnosis procedures required in servicing the system. A complete understanding of the over-all operation of the new system will help you use the new test procedures to isolate and correct malfunctions.

Again refer to Figure 18. The **Compressor** pulls heat-laden refrigerant from the **Evaporator.** It compresses the refrigerant and sends it to the **Condenser** in the form of super-heated vapor. Since the high-pressure vapor delivered to the condenser is much hotter than the warmest summer day, it quickly gives up its heat to the outside air flowing through the condenser fins.

As soon as the refrigerant vapor gives up its latent heat of vaporization, it changes back to a liquid. The condensed refrigerant is filtered, dried and temporarily stored in the Receiver - Driver - Strainer until it is needed by the **Evaporator.**

On some installations, the relatively hot liquid refrigerant leaving the receiver-drier-strainer passes through a special **Sub-Cooler** on its way to tne evaporator. The sub-cooler gets rid of some of the heat remaining in the liquid refrigerant.

The liquid refrigerant is metered into the Evaporator by the **Expansion** Valve. It controls the flow of refrigerant so that the evaporator coils are never starved nor flooded. This flow control valve is necessary to insure complete and continuous vaporization inside the coils no matter what the operating conditions may be. The air to be conditioned and delivered to the car interior flows between the coils and fins of the **Evaporator.** The liquid refrigerant flowing through the evaporator coils absorbs heat from the flowing air. The heat absorbed by the refrigerant causes it to boil and change into a vapor. In the process, the evaporator coils get very cold.

If the evaporator temperature were allowed to go too low, moisture condensed from the air would freeze on the coils. The evaporator would soon "ice up" and restrict air flow. In the past you have worked on systems having a thermal switch which disengaged the compressor clutch to prevent this icing condition. In this new system, evaporator temperature is controlled by suction pressure signals rather than evaporator coil temperature signals.

As the temperature of the evaporator gets lower, the pressure of the vapor leaving the evaporator also gets lower. The new **Evaporator Pressure Regulator Valve,** located at the suction side of the compressor, is designed to restrict the flow of refrigerant vapor to the compressor before the suction pressure drops down too low. As soon as the inlet to the compressor is restricted, the compressor load is greatly reduced.

As soon as the evaporator temperature increases a few degrees, the suction pressure also increases. The increase in suction pressure opens the Evaporator Pressure Regulator Valve to complete the cycle.

The foregoing is a very general explanation of the refrigeration cycle of the new system. Following is a description of the construction and operation of each of the refrigeration system components.

8. DESCRIPTION AND OPERATION OF REFRIGERATION COMPONENTS

a. The Compressor (Fig. 19)

The compressor is a two-cylinder, reciprocating type designed specifically for the Chrysler Air-Conditioning system. Its over-all dimensions have been held to a minimum and several new features have been

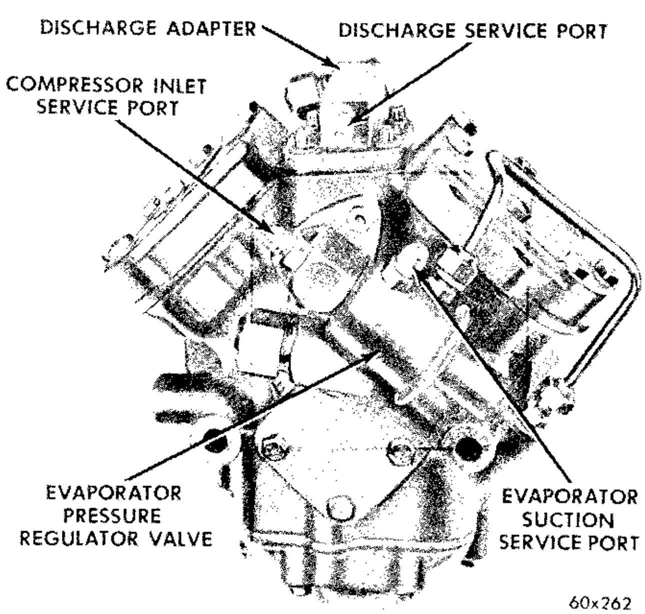

Fig. 19—Compressor Assembly

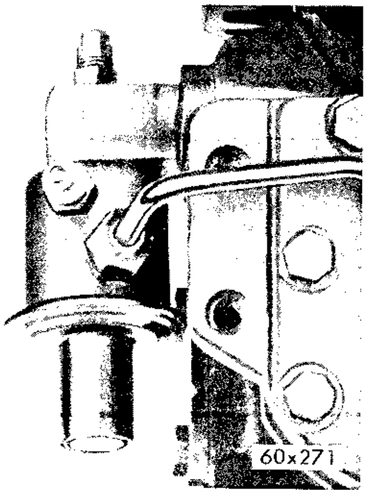

Fig. 20—Evaporator Pressure Regulator

incorporated into its design to insure proper operation under the most difficult operating conditions.

Service parts are available so that the compressor can be repaired in the field. Detailed instructions for servicing the compressor, are contained in Paragraph 22. A complete procedure for testing compressor capacity (output) will be found in Paragraph 15.

One of the first things you will notice on the compressor is the absence of conventional service valves. These have been replaced by service ports equipped with valves. They provide the means of connecting the system to test gauges, a vacuum pump or a supply of refrigerant when charging the system. The service port valves are similar in principle to a conventional tire valve. They prevent refrigerant from leaking out of the system. The service port valves are opened by installing a special adapter.

A single discharge port is provided in the adapter located on the discharge side of the compressor. Two service ports are provided at the suction side of the compressor. Both are incorporated in the new Evaporator Pressure Regulator Valve Assembly. One of these is the Suction Service Port; the other is the Compressor Inlet Service Port. The internal passages connecting to these valves are described and explained below.

One basic compressor assembly serves for all original equipment installations. Both the Compressor Discharge Adapter and the Evaporator Pressure Regulator Valve are supplied as left or right-hand assemblies. By selecting the proper EPR Valve and Discharge Adapter, a basic compressor assembly can

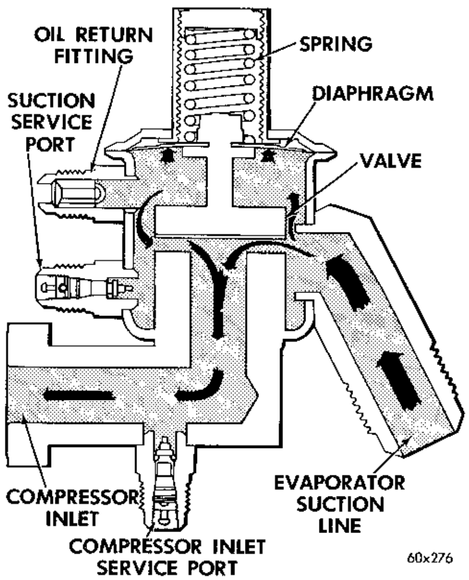

Fig. 21—EPR Valve—Open

be readily adapted for the left-side or right-side mounting.

b. The Evaporator Pressure Regulator Valve

The Evaporator Pressure Regulator (EPR) Valve (Fig. 20) is calibrated to provide maximum cooling and should not be adjusted. Refer to the "EPR Test" in Paragraph 14.

The "EPR" valve is mounted on the suction side of the compressor. In simplest terms, it is a pressure-regulating valve inserted between the evaporator and th compressor inlet.

Its primary function is to always maintain the pressure in the evaporator at a high enough level to insure that condensed moisture will not freeze on the evaptorator tubes and fins. In performing this primary function, the EPR valve eliminates cycling on the clutch. In other words, it modulates evaporator pressure without physically stopping compressor operation.

A working knowledge of the internal operation of the EPR valve will assist you in understanding and performing the tests outlined in Paragraph 14.

c. EPR Valve Open

Figure 21 is a schematic representation of vapor flow when the valve is open. Refrigerant vapor from the evaporator suction line fills the cavity below the diaphragm. A vapor pressure of 22 to 31 psi exerted on the diaphragm will overcome the pressure exerted by the spring above the diaphragm. Thus, the pressure of the vapor leaving the evaporator lifts the valve off its seat. The open valve allows vapor to enter the compressor inlet. The compressor performs its normal pressurizing function.

The Compressor Inlet Service Port, located on the compressor side of the valve, is subjected to suction line vapor pressure when the valve is open.

The Evaporator Suction Service Port, located at the valve, is always subjected to evaporator suction line pressure regardless of valve position.

The Oil Return Fitting provides a small passage from the suction line to the compressor crankcase at all times. It allows a very small amount of vapor to enter the crankcase regardless of whether the EPR Valve is open or closed. The function of the oil return passage is of importance **only** when the valve approaches a closed position.

d. EPR Valve Closed

Figure 22 is a schematic representation of vapor flow when the valve is closed. In operation, the valve never remains fully closed. It moves toward the closed position as evaporator pressure approaches 22 to 31 psi. This occurs when evaporator heat load is reduced, and there is a resultant reduction in evaporator temperature. The instant evaporator

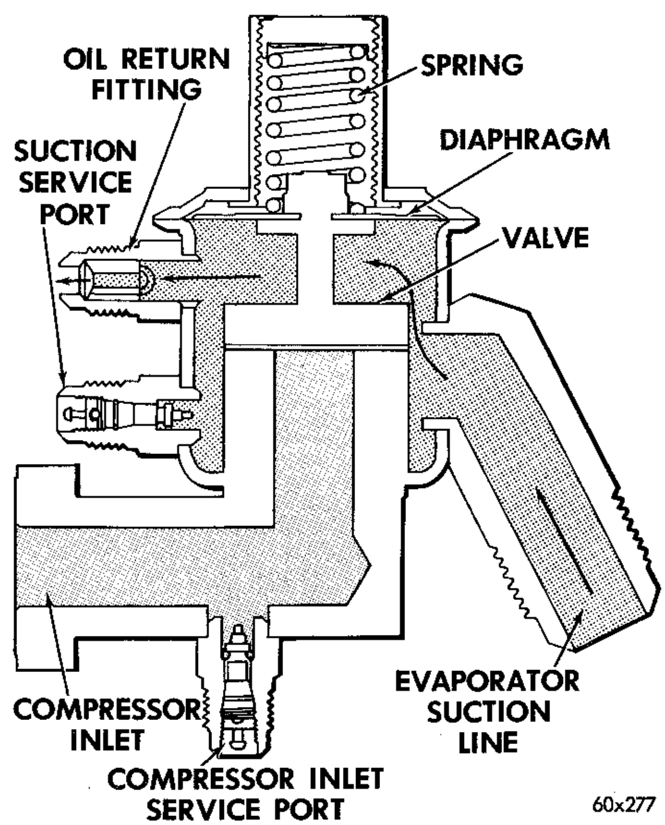

Fig. 22—EPR Valve—Closed

temperature increases, evaporator pressure also increases. This increases vapor pressure on the diaphragm which tends to open the valve. Under a relatively light heat load at the evaporator, the "EPR" Valve alternately moves toward the closed, and then toward the open position, resulting in a modulating action.

The Compressor Inlet Service Port is momentarily isolated from the suction line vapor pressure whenever the valve closes. It is then subjected to compressor inlet pressure **only.**

The Evaporator Suction Service Port is subjected to suction line pressure because it is located at the valve inlet side.

The Oil Return Fitting provides a passage between the suction line and the compressor crankcase. This allows refrigerant oil, carried by the refrigerant vapor, to return to the compressor crankcase. The oil return passage is so small compared to the suction line from the evaporator that the amount of vapor entering the compressor through the oil line is negligible.

The check valve incorporated in the oil line fitting of the EPR Valve, prevents reverse flow from the compressor crankcase.

e. The Magnetic Clutch

When either the "Maximum Cooling" or the "FRESH COOLING" button is pushed, the electrical circuit to the magnetic clutch is completed. The magnetic clutch field is energized, engaging the clutch and driving the compressor. The circuit to the clutch is interrupted when the "OFF", "HEAT" or "DEFROST" is pushed. The clutch is not used to control the refrigeration cycle. Whether or not the clutch is energized is dependent entirely on which of the push buttons is depressed, as explained above.

The clutch has the electromagnet incorporated in the pulley assembly. The electrical circuit to the electromagnet is through collector rings and brushes. Complete instructions for servicing the clutch are contained in Paragraph 29.

f. The Condenser

The condenser is constructed of tubing and fins. The tubing is made of soft annealed copper. It is hydraulically expanded into the aluminum fins. This insures good thermal contact between the fins and tubing. Both copper and aluminum are excellent conductors of heat.

When the car is standing still with engine running, or when the car is moving forward slowly,

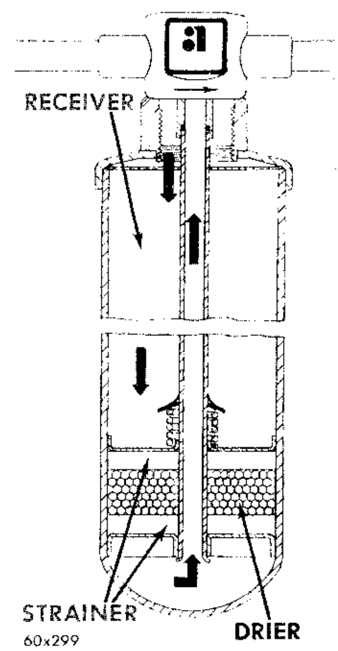

Fig. 23—Receiver-Drier-Strainer

the fan action draws air through the condenser to accelerate heat dissipation. The only function of the condenser is to get rid of the heat in the hot, compressed refrigerant vapor received from the compressor. In giving up its heat, the refrigerant vapor condenses back into liquid refrigerant.

g. Receiver—Drier—Strainer

Liquid refrigerant from the condenser is received and stored temporarily in the Receiver – Drier – Strainer unless full supply is demanded by the system. Figure 23 illustrates refrigerant flow through the unit, as well as the location of the strainers and the drier.

Filter packs above and below the drier strain out any foreign particles. The special drying agent has the ability to attract and hold moisture trapped in the liquid refrigerant.

A drier containing excessive moisture may be capable of holding its moisture on a cool or moderately warm day. However, a drier saturated with the same amount of moisture can release moisture on a hot day. If this happens, the released moisture can freeze at the expansion valve, resulting in erratic operation or a no-cooling condition. Since all 1960 models are equipped with a sight glass having a "dry-eye" moisture indicator, the presence of moisture is readily detected.

Do not attempt to "Bake" moisture out of a moisture-saturated receiver–drier–strainer, replace it. Refrigerant oil on the surface of the drying agent

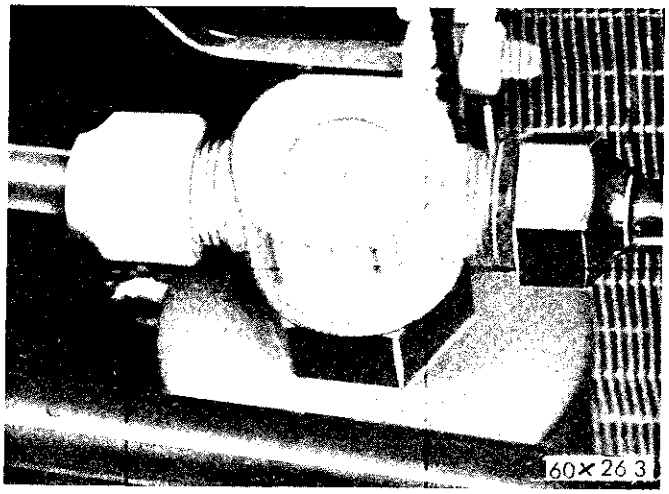

Fig. 24—Sight Glass and Dry Eye

will carbonize into a protective covering that will completely destroy the effectiveness of the drier.

h. The Sight Glass and Dry-Eye

The combination "Dry-Eye" and sight glass (Figure 24) serves three functions. First, it provides the means of attaching the Receiver–Drier–Strainer. It is installed in the liquid line leading from the **Condenser.** Since the passages designed into this unit determine the direction of flow through the Receiver–Drier–Strainer, it must always be installed so that the arrow points in the direction of refrigerant flow . . . away from the condenser, toward the evaporator.

Second, the sight glass provides the means of observing refrigerant leaving the condenser. Under normal operating conditions, a fully charged system will deliver a solid stream of liquid refrigerant to the liquid line leading to the evaporator. Generally speaking, foam at the sight glass means that the system is low on refrigerant. Complete instructions for testing refrigerant level are included in Paragraph 10-F.

Third, the "Dry-Eye" part of the unit is a moisture-sensing element. Excessive moisture will turn the dry element pink. A blue element means that there is no moisture in the liquid going to the evaporator.

i. The Sub-Cooler

The sub-cooler is a continuous tube having fins. Its function is to increase heat dissipation. When a sub-cooler is used, it is connected in series between the Receiver–Drier–Strainer outlet and the refrigerant liquid line to expansion valve at the evaporator. The function of the sub-cooler is to cool the liquid refrigerant flowing to the evaporator.

The tubing used in the sub-cooler is steel. The tubing is solder-bonded to the aluminum fins to insure good thermal contact between the two metals.

j. The Expansion Valve

There are three forces which control the operation of this valve and, combined, they cause the valve to function much like the carburetor on a car–metering the exact amount of liquid as required, neither flooding nor starving the evaporator. (Either flooding or starving the evaporator results in inadequate cooling of the vehicle.)

The three forces that control this valve are:

1. Suction manifold temperature (opens valve through thermal bulb pressure).

2. Suction manifold pressure (closed valve).

3. Super heat spring (closes valve).

The expansion valve (Fig. 25) has a metal diaphragm in the top section of the valve. This diaphragm contacts the valve cup actuating pins, which are in contact with the valve cup. The movement of the valve cup, up or down, controls the flow of the liquid refrigerant.

A capillary tube is connected to the section above the diaphragm. The other end of the capillary tube is a thermal bulb that fits into a well on the suction manifold. The thermal bulb senses the temperature of the suction manifold refrigerant gas.

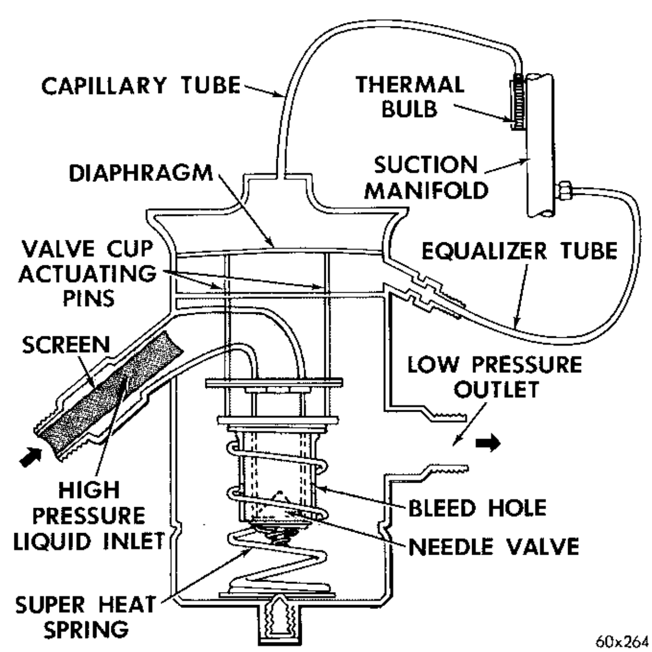

Fig. 25—Expansion Valve Schematic

The area above the diaphragm, including the capillary tube and thermal bulb, forms a sealed section and is filled with liquid and vapor Refrigerant 12. This sealed section will have a **pressure** in relation to the suction manifold's **temperature.** As the suction manifold's temperature increases, the pressure on the valve's diaphragm increases; as suction manifold's temperature decreases, the pressure on the valve's diaphragm decreases.

A tube is connected to the section below the diaphragm. The other end of the tube is connected to the suction manifold pressure. This tube is referred to as the **equalizer tube.** The suction manifold pressure on the underside of the diaphragm acts as a counteracting or equalizing force against the thermal bulb's pressure.

The nonadjustable super heat spring acts in conjunction with suction pressure to close the valve cup. The super heat spring tension is the deciding factor in closing the valve cup when the suction pressure and the thermal bulb pressure are near equal.

The following example will illustrate the operation of an expansion valve. Suppose a car has been driven with air-conditioning system operating, and is then brought to the curb or parking lot and the engine is turned off. At this time, the discharge pressure into the expansion valve will be quite high (180-250 psi), suction pressure will be low (25-35 psi) and, because of previous operation of the system, the evaporator and suction manifold will be cool.

As the evaporator and suction manifold warms up, the thermal bulb pressure increases, opening the valve cup. This allows a slight trickle of refrigerant to enter the evaporator coils which, in turn, increases manifold pressure to the underside of the valve diaphragm. The manifold pressure and thermal bulb pressure increases to Temperature-Pressure Relation, or near the same pressure. The super heat spring is then the deciding force controlling the operation of the expansion valve. The super heat spring keeps the valve cup closed, preventing liquid from passing through the expansion valve to the evaporator.

When the engine and air conditioning are started, the compressor starts pumping refrigerant gas from the warm evaporator out through the suction manifold with the expansion valve closed. This lowers the pressure in the warm suction manifold which, in turn, lowers the pressure to the underside of the expansion valve diaphragm.

The thermal bulb's pressure forces the diaphragm down, forcing the valve cup actuating pins to move the valve cup (against the super heat spring tension) off its seat, allowing liquid refrigerant to pass from the high-pressure side of the valve to the low-pressure side.

When the pressure is lowered on Refrigerant 12, it tends to change its state–from a liquid to a gas. In order to do this it must absorb heat when the hot liquid refrigerant flows by the valve cup's needle valve into the low-pressure area. A small amount of the liquid flashes into a gas, absorbing the heat from the liquid refrigerant, bringing the liquid's temperature down to the Temperature-Pressure Relation.

The refrigerant liquid continues to flow through the evaporator coils, absorbing heat from the coils. It also absorbs heat from the air passing over the coils, and the liquid refrigerant changes to a gas. This process continues the entire length of the evaporator coils until, shortly before it reaches the suction manifold, all the liquid has changed to a gas.

Just as a car's driver must constantly move the accelerator for various road speeds and loads, there is a similar constant throttling action taking place in the expansion valve to maintain the proper amount of refrigerant flow for all compressor speeds and heat loads. This is done automatically by three forces – suction manifold temperature, suction manifold pressure, and super heat spring.

The expansion valve is located outside the evaporator housing on the left side of the engine compartment. (Refer to Fig. 26.)

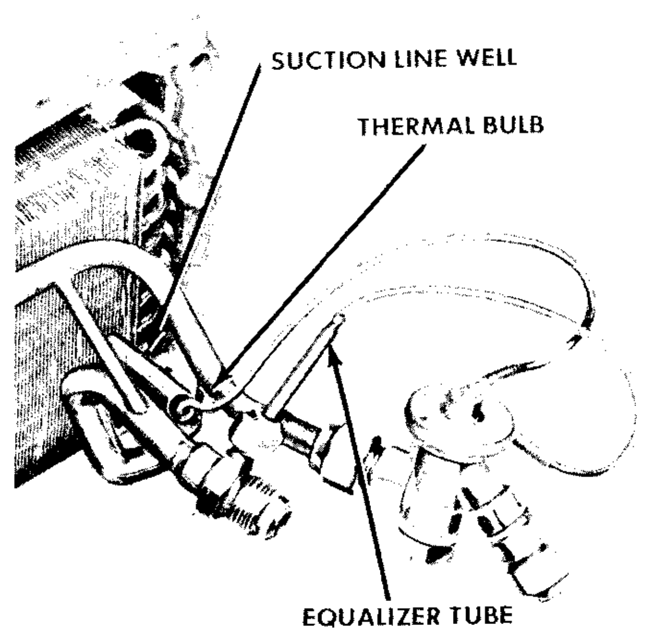

Fig. 26—Expansion Valve Location

The thermal bulb is located in a suction line well **inside** the evaporator housing. When checking to make sure the thermal bulb is making good thermal contact with the well attached to the suction line, it is necessary to remove the grommet retainer and grommet used to seal the opening in the evaporator housing. Detailed Expansion Valve test procedures are given in Paragraph 16, and detailed replacement instructions are given in Paragraph 30.

k. The Evaporator

The function of the evaporator is to absorb heat and condense moisture from the air flowing to the car interior. The basic evaporator core is enclosed in a special cast housing. The purpose of this housing is to direct air flow through the core for maximum transfer of heat and humidity to the core. The evaporator core assembly in its cast housing is, in turn, attached to the "Engine Side" evaporator housing, forming a completely sealed evaporator assembly. (Refer to Fig. 27.)

The evaporator core is also constructed of annealed copper tubing, hydraulically expanded into aluminum fins to insure good thermal contact. There are ten separate systems of tubing. Each system is fed by a separate line from the expansion valve distributor. Each system of tubing doubles back five times before it reaches the suction manifold. This design promotes uniform distribution of the refrigerant metered through the evaporator, resulting in maximum efficiency.

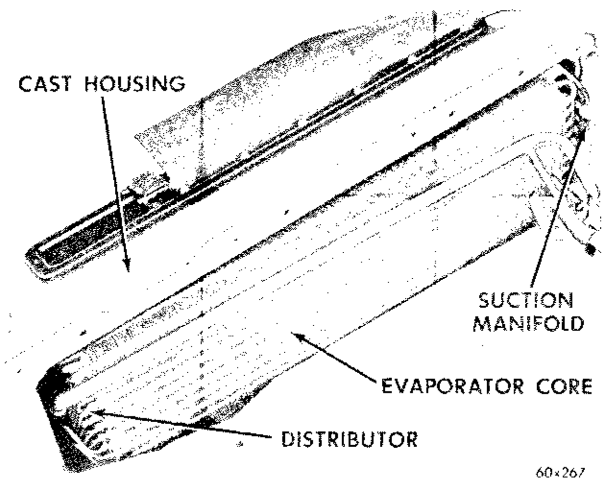

Fig. 27—Evaporator Core Assembly

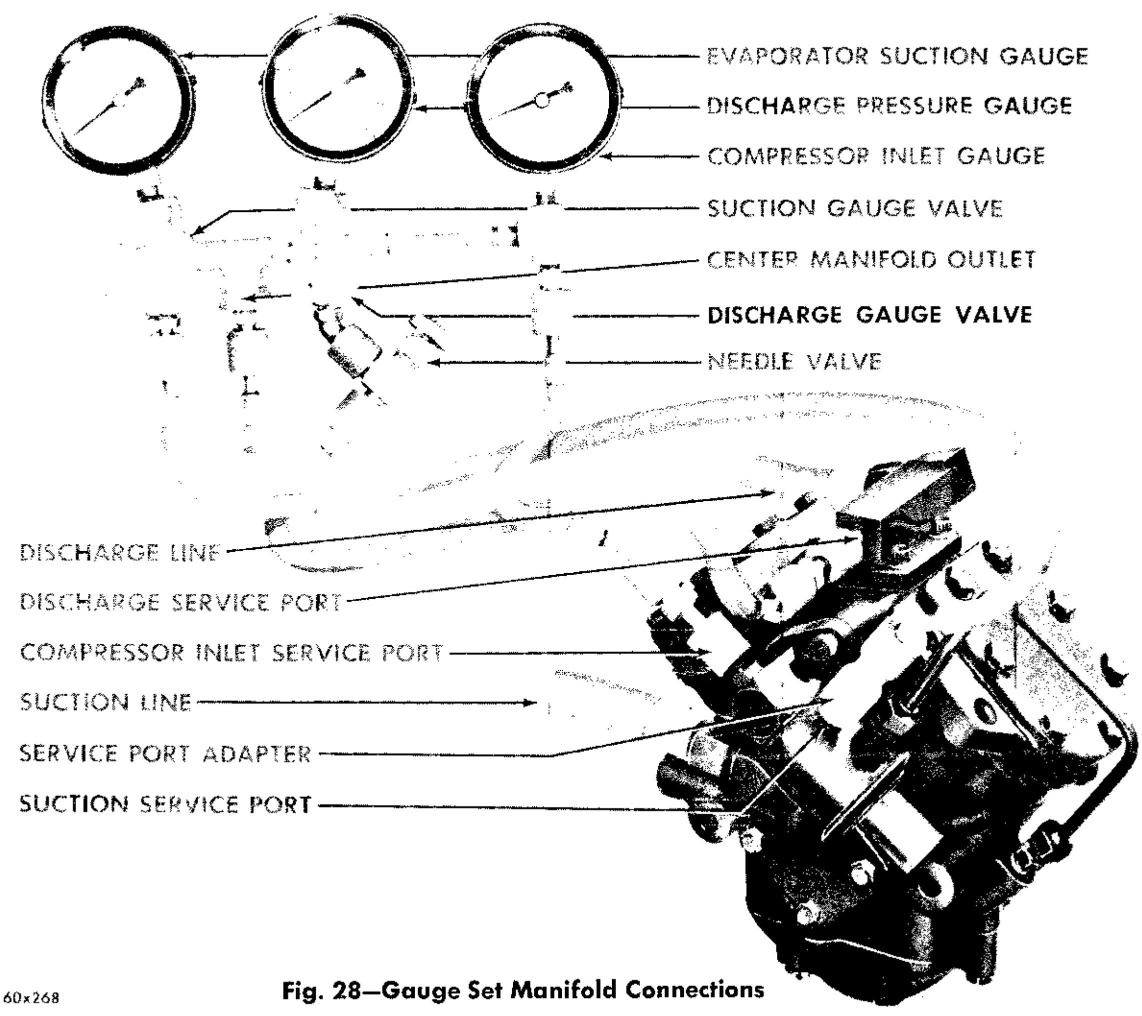

Fig. 28—Gauge Set Manifold Connections

INSPECTION, TEST PROCEDURE AND DIAGNOSIS

9. THE GAUGE SET MANIFOLD

The Gauge Set Manifold is an indispensable test and diagnosis instrument. The new gauge set manifold (Tool C-3740) has two compound suction gauges and one discharge pressure gauge. Two accurately calibrated suction pressure gauges are required for the evaporator pressure regulator valve test. A modification kit (Tool C-3741) contains all of the parts necessary to convert the previous gauge set manifold (Tool C-3627) for testing the 1960 Air-Conditioning System. (Refer to Fig. 28.)

Evaporator Suction Gauge at the left side of the manifold is calibrated to register 0 to 30 inches of vacuum and 0 to 150 psi. This gauge is connected to the suction service port of the compressor. A special service port adapter, supplied with the gauge set, provides the means of connecting the gauge set manifold hose to the service port. When the adapter is installed at the port and tightened, the stem of the valve in the service port is depressed, opening the service port valve.

Discharge Pressure Gauge at the center of the manifold is calibrated to register 0 to 300 psi. For all tests this gauge is connected to the discharge service port of the compressor. A service port adapter is used to make this connection. The needle valve, located below the discharge pressure gauge, is used to damp out gauge needle oscillations so that accurate readings can be obtained.

Compressor Inlet Gauge is mounted at the right side of the manifold. This mounting is for convenience only. There are no passages between this gauge and the gauge manifold. The compressor inlet gauge is calibrated to register 0 to 30″ of vacuum and 0 to 150 psi. This gauge and the evaporator suction gauge must be accurately calibrated so that the needles of both gauges are exactly at 0″ before making tests. The compressor inlet gauge is connected to the compressor inlet service port by a special service port adapter.

Center Manifold Outlet provides the necessary connection for a long service hose used when discharging the system, using a vacuum pump to "pull a vacuum" before charging the system, and for connecting the system to a supply of refrigerant when charging the system. When performing the Compressor Capacity Test, Paragraph 15, the hose is removed and a special test cap is installed in its place.

Manifold Gauge Valves should be closed when connecting the gauge set manifold to the service ports of the compressor. The suction gauge valve at the left is opened to provide a passage between the suction gauge and the center manifold outlet. The discharge gauge valve at the right is opened to provide a passage between the discharge pressure gauge and the center manifold outlet.

Detailed instructions for proper use of the gauge set manifold are contained in the test covering each test and service operation employing these gauges.

10. PRELIMINARY TEST, INSPECTIONS AND ADJUSTMENTS

Satisfactory performance of the combined air-conditioning and heating system is dependent upon proper operation and adjustment of all operating controls, as well as proper functioning of all refrigeration system units. The inspections, tests and adjustments should be used to locate the cause of a malfunction. The inspections and tests in this manual have been arranged in a logical sequence that has proved to be the surest and shortest route to accurate diagnosis. It is recommended that they be followed to the letter, and performed in the order in which they are presented.

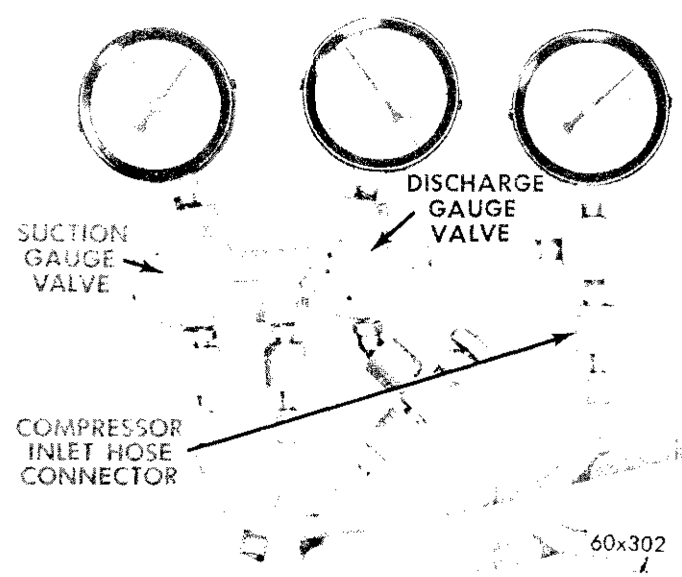

Fig. 29—Purge Gauge Hoses

a. Test System Pressure (Engine not Running)

Install the gauge set manifold. For identification of test hose connections at service port see Figure 28. After tightening all three service port adapters, make sure that the needle valve located below the discharge pressure gauge is open. Purge air from the gauge hoses (Fig. 29) as follows:

1. Open the suction gauge valve momentarily, then close it.

2. Open the discharge gauge valve momentarily, then close it.

3. Loosen the compressor inlet suction hose connection at the manifold momentarily, then tighten it.

If the car has been parked and the system not operating, gauge pressure should be normal for temperature of the system. Refer to the Temperature-Pressure Relationship Chart.

If no pressure is indicated on the gauges it means that the system is empty, due to a leak. It will be necessary to evacuate, charge with a sweep-test charge, locate and correct the leak, purge the test charge, replace the drier, vacuum the system and charge the system with the proper amount of Refrigerant 12.

If pressures are normal, proceed with the next test and adjustment.

TEMPERATURE-PRESSURE RELATIONSHIP CHART

(FOR REFRIGERANT 12)

Temp. F.	Pressure PSI	Temp. F.	Pressure PSI	Temp. F.	Pressure PSI	Temp. F.	Pressure PSI	Temp. F.	Pressure PSI
0	9.1	35	32.5	60	57.7	85	91.7	110	136.0
2	10.1	36	33.4	61	58.9	86	93.2	111	138.0
4	11.2	37	34.3	62	60.0	87	94.8	112	140.1
6	12.3	38	35.1	63	61.3	88	96.4	113	142.1
8	13.4	39	36.0	64	62.5	89	98.0	114	144.2
10	14.6	40	36.9	65	63.7	90	99.6	115	146.3
12	15.8	41	37.9	66	64.9	91	101.3	116	148.4
14	17.1	42	38.8	67	66.2	92	103.0	117	151.2
16	18.3	43	39.7	68	67.5	93	104.6	118	152.7
18	19.7	44	40.7	69	68.8	94	106.3	119	154.9
20	21.0	45	41.7	70	70.1	95	108.1	120	157.1
21	21.7	46	42.6	71	71.4	96	109.8	121	159.3
22	22.4	47	43.6	72	72.8	97	111.5	122	161.5
23	23.1	48	44.6	73	74.2	98	113.3	123	163.8
24	23.8	49	45.6	74	75.5	99	115.1	124	166.1
25	24.6	50	46.6	75	76.9	100	116.9	125	168.4
26	25.3	51	47.8	76	78.3	101	118.8	126	170.7
27	26.1	52	48.7	77	79.2	102	120.6	127	173.1
28	26.8	53	49.8	78	81.1	103	122.4	128	175.4
29	27.6	54	50.9	79	82.5	104	124.3	129	177.8
30	28.4	55	52.0	80	84.0	105	126.2	130	182.2
31	29.2	56	53.1	81	85.5	106	128.1	131	182.6
32	30.0	57	55.4	82	87.0	107	130.0	132	185.1
33	30.9	58	56.6	83	88.5	108	132.1	133	187.6
34	31.7	59	57.1	84	90.1	109	135.1	134	190.1

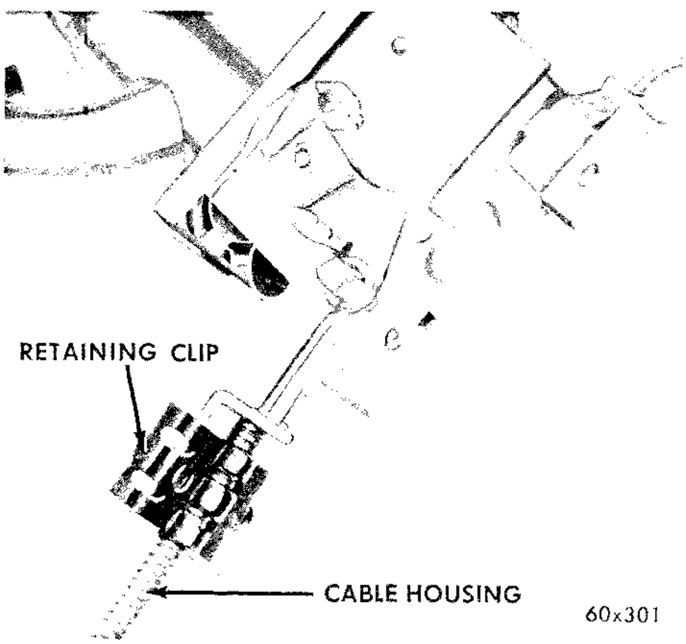

Fig. 30—Temperature Control Valve Closed

b. Water Temperature Control Valve Adjustment

Move the temperature control lever on instrument panel to the extreme "WARM" position, and then back to the "OFF" position. At the same time, check control cable action and the movement of the water temperature control valve lever. The valve should be moved to the wide-open position and back to the fully closed position. Figure 30 shows the valve in the fully **closed** position. The water valve is pushed to open and pulled to close.

If the temperature control valve does not close completely, reposition the control cable housing in the retaining clip so that the valve does close completely.

c. Test the Operation of All Controls

Operating controls must be tested as described in the following sequence:

1. Remove the radiator cap.
2. Open the car windows.
3. Move the temperature control lever to the "OFF" position.
4. Start the engine and adjust engine speed to 1250 RPM. Use a reliable tachometer.
5. Push the "FRESH COOL" button in.
6. Test blower operation at all three speed positions. If blower does not operate correctly, refer to "ELECTRICAL CONTROLS AND CIRCUITS", Paragraph 5. Leave the blower "High" position.
7. The compressor clutch should be engaged, the compressor operating, and the air-conditioning system in operation. If the clutch does not engage, test the circuit. (Refer to "ELECTRICAL CONTROLS AND CIRCUITS", Paragraph 5.)

Test the water valve by momentarily disconnecting the heater outlet hose at the upper side of the heater housing. (Fig. 31.) A slight spillage of water when the hose is removed is normal. (The radiator cap was removed at the start of this test to minimize pressure in the car's cooling system.) A continuous flow of water indicates that the valve is not closing properly. This may be caused by an improperly adjusted control cable or a faulty valve. Readjust the

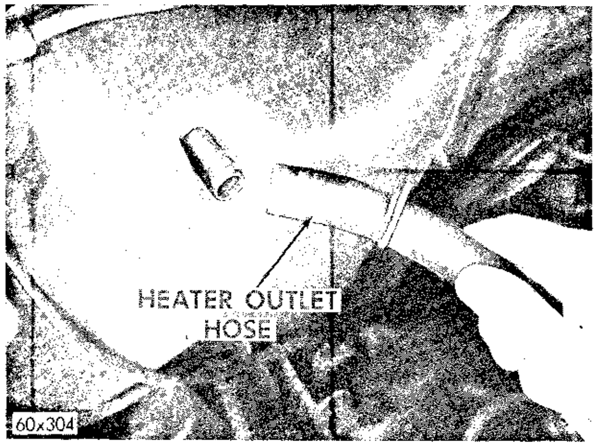

Fig. 31—Water Valve Test

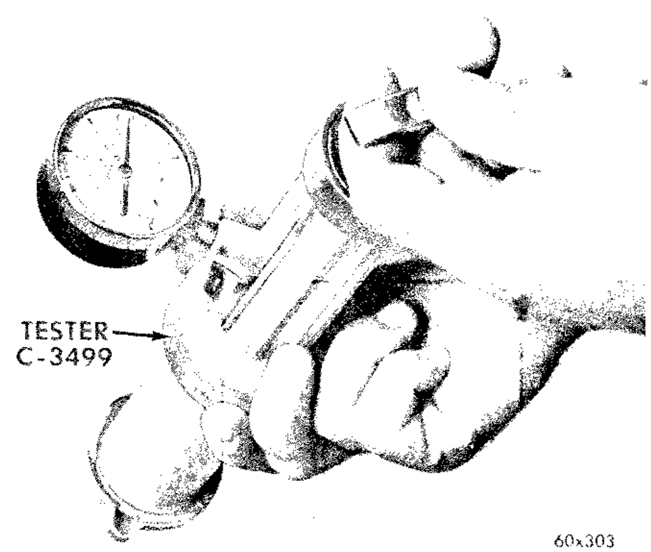

Fig. 32—Radiator Cap Tester

control cable or replace the valve, as necessary, and retest.

d. Test the Radiator Cap

It is an absolute necessity for the 1960 air-conditioned car to be equipped with a radiator cap having a holding pressure of 15 to 16 psi, for hot weather operation.

A radiator pressure cap testing below these specifications will permit loss of coolant during a hard pull on a hot day, or in slow moving traffic, or when the engine is stopped after a fast run on a hot day.

Test the radiator pressure cap, using Tool C-3499 (Fig. 32). Before assembling the adapter and radiator pressure cap to the pump, dip the radiator cap and both ends of the adapter into clean water to assure a tight seal.

Hold the assembled tester in a vertical position with the radiator cap downward, as shown. Stroke the tester pump plunger until the gauge indicates the pressure cap is relieving pressure. It must relieve pressure between 15 to 16 psi. If within these specifications, reinstall on radiator.

NOTE: These test specifications are for caps tested at average altitudes. In high altitudes, the test specifications are lowered about one (1) psi for each 2,000 feet above sea level.

If the car's radiator cap does not test within these specifications, replace with a cap which does.

e. Inspect Condenser and Sub-Cooler

Inspect condenser and sub-cooler fins for obstructions for foreign matter. Clean if necessary.

Any obstructions to the free flow of air across the condenser and/or sub-cooler will decrease heat dissipation from condenser, decrease the efficiency of the condenser and, in turn, decrease the evaporator's efficiency. These conditions result in increasing the discharge pressure and horsepower load on the engine. The use of a bug screen is not recommended as it, too, will decrease the free flow of air.

Check condenser and sub-cooler for bent or damaged fins.

Bent fins on the condenser and/or sub-cooler deflect air flow across the bent portions, decreasing the condenser area. By careful use of the condenser comb, Tool C-3663 (Fig. 33), the fins can be straightened to their original shape and efficiency. Be sure the fan shroud is properly positioned.

f. Refrigerant Level and Moisture

If the system is a dual system, both units must be operated simultaneously at high blower speed when this test is made, and when adding to the charge.

The arrow on the sight glass (Fig. 24) must point in the direction of refrigerant flow—toward the line leading to the evaporator. If the arrow is reversed, the system must be purged, sight glass reversed and the system recharged, following the complete procedure for correcting a "wet" system.

Block air flow across the condenser as required to raise the discharge pressure to 225 to 250 psi, and check the sight glass for foam. There should be no foam. If sight glass is clear, remove air restriction from the condenser and allow the discharge pressure to return to normal.

If foam shows in the sight glass when the discharge pressure is 225 to 250 psi, it indicates the system is low on refrigerant. The proper amount of refrigerant required to complete a full charge may be added to the system as follows: Maintaining the discharge pressure at 225 to 250 psi, add refrigerant gas through the suction side of the system until foam is cleared from sight glass, then add exactly one-half (½) pound.

Check "dry-eye" element for color. It should be blue. If the dry-eye is "pink" or "orchid" color, it indicates the system is wet. Then it will be necessary to purge the refrigerant from the system, replace the receiver-drier and recharge.

g. Test Push Button Operation

Reduce engine speed to normal idle. With the engine operating at idle speed, the vacuum will be high and

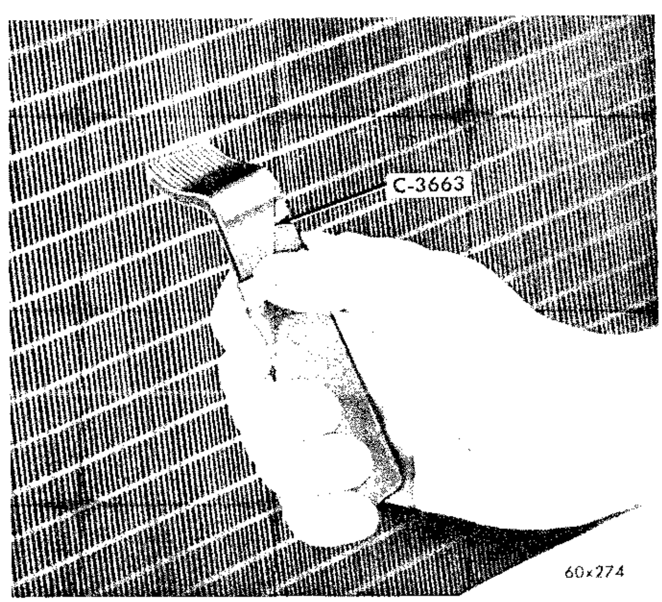

Fig. 33—Condenser Comb

PUSH BUTTON CONTROL CHART

BUTTON	OFF	MAX. COOL	FRESH COOL	DEFROST	HEAT
FRESH AIR DOOR	CLOSED	CLOSED	OPEN	OPEN	OPEN
RECIRCULATING DOOR	OPEN	OPEN	CLOSED	CLOSED	CLOSED
BYPASS DOOR	OPEN	OPEN	OPEN	CLOSED	CLOSED
DEFLECTOR	UP	UP	UP	DOWN	DOWN
DEFROSTER DOOR*	CLOSED	CLOSED	CLOSED	OPEN	OPEN
DAMPER	DOWN	DOWN	DOWN	DOWN	UP
BLOWER SPEED	OFF	HI-MED. LOW	HI-MED. LOW	HI-MED. LOW	HI-MED. LOW
COMPRESSOR CLUTCH	OFF	ON	ON	OFF	OFF

*De Soto Only

the vacuum actuators should operate quickly. If actuator operation is slow, check the source hose connection at the engine manifold. Push each button to test the over-all operation of the electrical and vacuum controls. The Push Button Control Chart summarizes the actions that should take place when each button is pushed. If the action is not correct, refer to hose connection illustrations in "AIR FLOW FOR EACH BUTTON", Paragraph 4.

If all controls operate in the proper sequence but action of dampers and doors is slow or incomplete, inspect for mechanical misalignment, binding or improper linkage adjustment as outlined below.

Heater Bypass Door Adjustment. Press the "DEFROST" or "HEAT" button. The bypass door should be fully closed and the vacuum actuator should move the over-center lever into a straight line with the pivot screw. To adjust the over-center linkage, loosen the pivot lever screw (Fig. 34). Slide the pivot and screw in its slot as you push the actuator rod rearward to close the bypass door completely. Hold the actuator rod and tighten the pivot screw to maintain this adjustment.

Recirculation and Fresh Air Door Linkages. Inspect and correct any binding of the recirculating door over-center lever, hinges and fresh air door connecting rod. To adjust the fresh air door connecting rod, remove the cowl inlet grille, and push the "FRESH COOL" button in. The fresh air door will

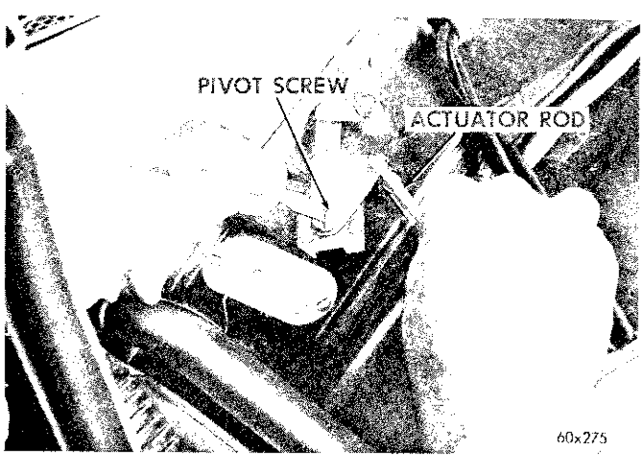

Fig. 34—Heater By-Pass Door Adjustment

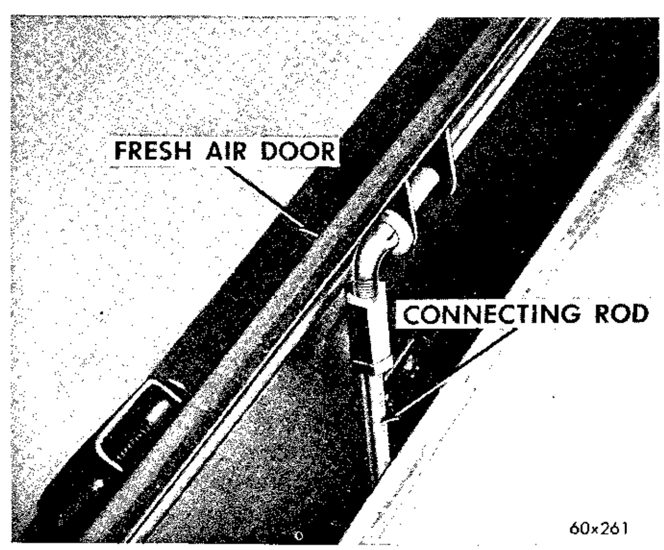

Fig. 35—Fresh Air Door Connecting Rod

open, and the connecting rod (Fig. 35) is then readily accessible.

The connecting rod is provided with a turnbuckle nut and lock nut. The length of the rod can be adjusted by using two $\frac{7}{16}$ inch open-end wrenches. The fresh air door should be adjusted to give the **minimum** possible opening when the recirculating door is completely closed. Push in the "MAXIMUM COOL" button and inspect to see that the fresh air door moves to its fully closed position.

Defroster Outlet Door Linkage. On De Soto, a turnbuckle adjustment is provided in the linkage between the floor outlet deflector and the defroster outlet door (Fig. 36). Push the "OFF" button. The floor outlet deflector will be moved into the "up" position by its actuator. The bell crank at the left end of the deflector will move defroster door to the closed position. If the defroster door does not close fully, disconnect the link at the door bell crank. Hold the defroster door fully closed and adjust the turnbuckle until the link will slip into the hole in the defroster door bell crank. Reconnect the link.

h. Complete Vacuum Control System Test

The test of push-button operation determines whether or not the vacuum and electrical circuits are properly connected and the controls are functioning properly. However, it is possible that a vacuum control system that operates perfectly at the high vacuum provided at engine idle speed may not function properly at high engine speeds. Before starting this test, stop the engine. Make certain that the vacuum source hose at the engine intake manifold is tight on its connector.

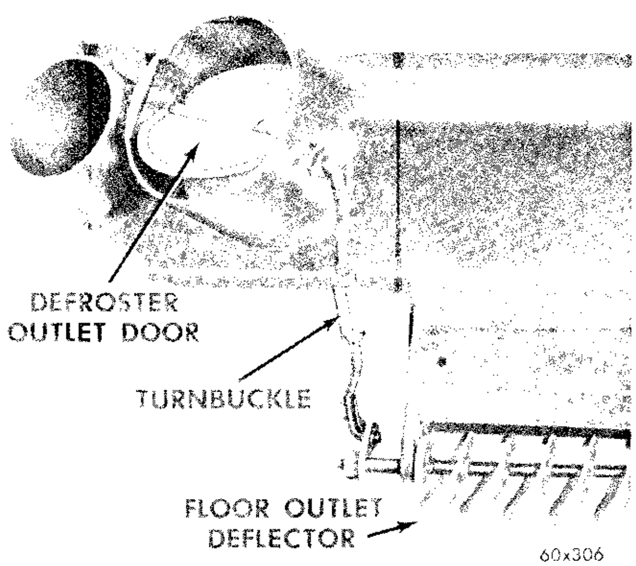

Fig. 36—Defroster Outlet Door Linkage

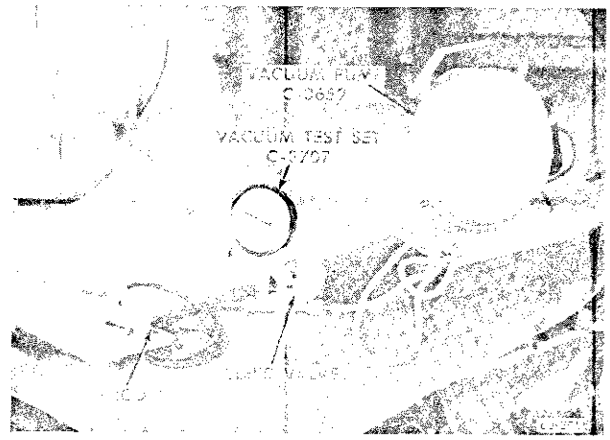

Fig. 37—Adjust Vacuum Test Bleed Valve

Start vacuum pump (Tool C-3652) and connect to vacuum test set (Tool C-3707). Adjust the bleed valve on the test set to obtain exactly 8 inches of vacuum, with a finger blocking the prod on the end of the test hose (Fig. 37).

It is absolutely essential that the bleed valve be adjusted so the vacuum gauge pointer will return to exactly 8 inches when the prod is covered by a finger. Otherwise a false reading will be obtained when the control circuit is tested.

CAUTION

Alternately release and reblock the hose prod several times. Make sure the bleed valve is adjusted so the vacuum gauge pointer returns to exactly 8 inches of vacuum when the prod is covered with a finger.

Disconnect the engine vacuum source hose (Fig. 38) at the plastic junction connector under the in-

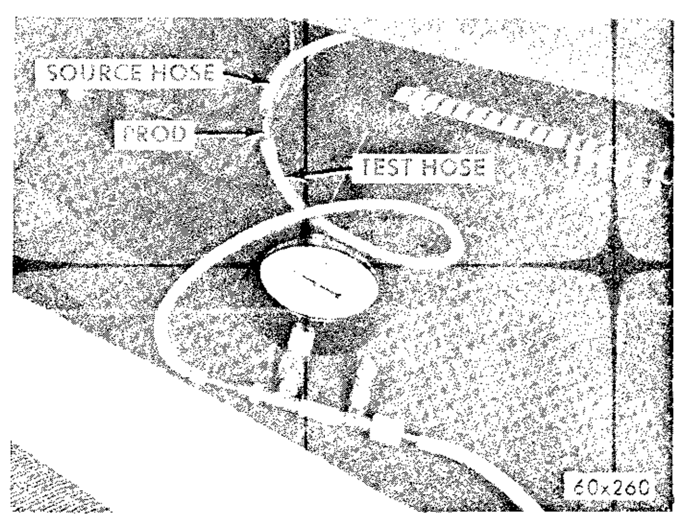

Fig. 38—Push Button Vacuum Test

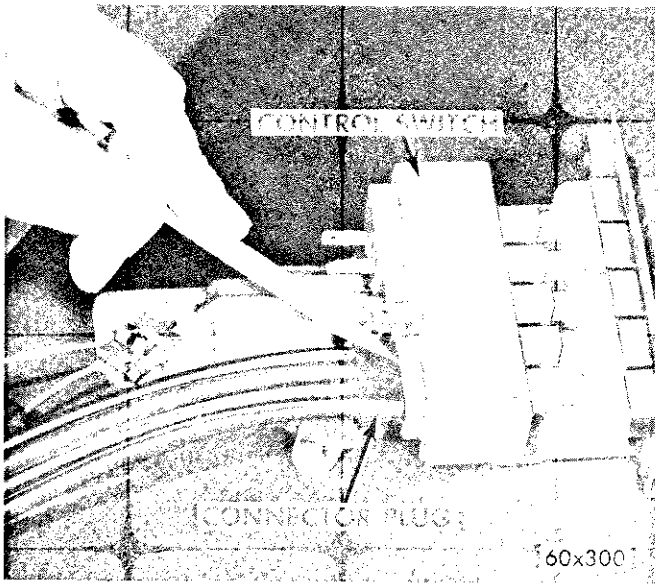

Fig. 39—Connector Plug Installed

strument panel, and insert the vacuum tester hose prod into the source hose leading to the control switch.

Start the test by pushing the "H" or heat button. The vacuum tester gauge needle will drop until the actuator has operated, and then will return to 8 inches. Note how much the vacuum drops below 8 inches. Continue to push buttons; "OFF", "MAX. COOL", "FRESH COOL", "DEFROST" and "HEAT" allowing time for actuators to operate after each button is pushed, and note the vacuum drop below 8 inches after each operation. The maximum allowable vacuum drop below 8 inches after each operation is ¾ inch.

If the vacuum drop is more than ¾ inch, first recheck the tester for reading exactly 8 inches. If correct, inspect the fit of the 7-hole hose connector plug on the control switch (Fig. 39). This plug must be positioned all the way on the 7 prods on the control switch.

CAUTION

Do not use lubricant on the switch prods or in the holes in the plug, as lubricant will ruin the vacuum valve in the switch. If it is impossible to properly position the connector plug all the way on the switch prods, put a drop or two of clean water in the holes of the connector plug. This will allow the plug to slide completely on switch prods.

Retest: If vacuum drop is now within limits, proceed with over-all performance test. If vacuum drop is still in excess of ¾ inch, remove connector plug from switch. Insert the vacuum test prod alternately in each of the connector holes except the source hose

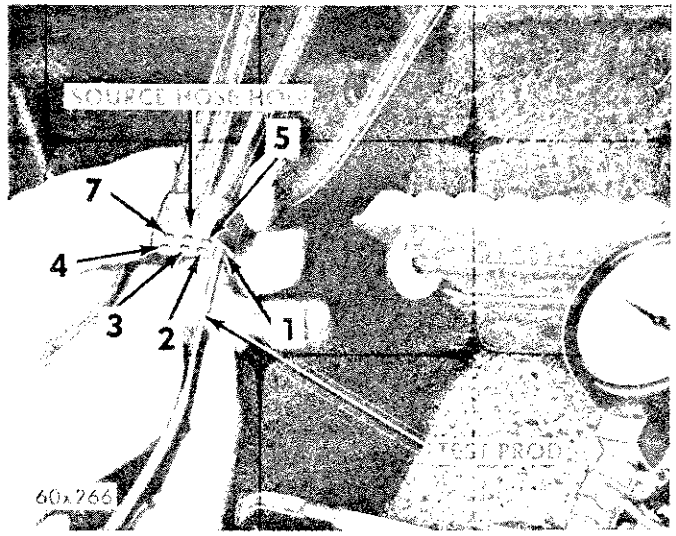

Fig. 40—Vacuum Tube Assembly Test

connector hole (Fig. 40). Note the amount of vacuum drop **below** 8 inches after each actuator has operated. If vacuum test gauge comes back to 8 inches at each of the 6 holes, the hoses and actuators aren't leaking. The control switch is faulty and must be replaced. If excessive vacuum drop shows up at one or more holes in the connector block, isolate the faulty hose or actuator.

If the vacuum drop occurs at number 5 or 7 holes, first check the tee connectors under the instrument panel that tie numbers 5 and 7 hoses to the bypass door and deflector hoses. If tee connections are all right, inspect the hose connections to the actuator involved. Then test whether the actuator or hose is at fault; use the test hose on the actuator involved (Fig. 41).

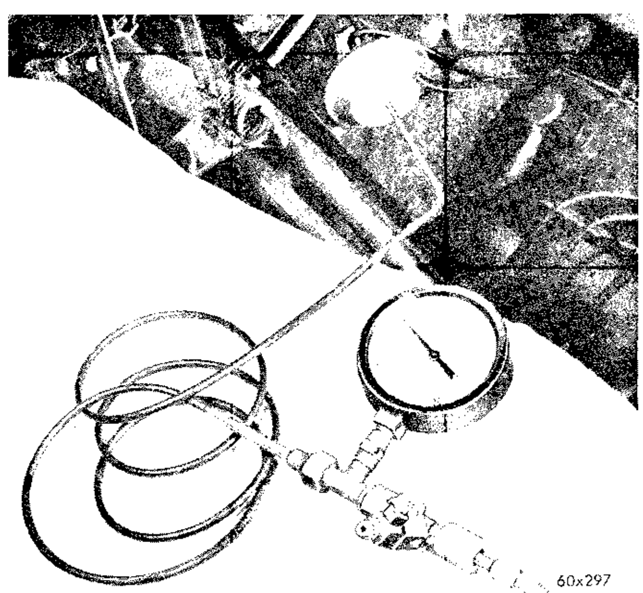

Fig. 41—Vacuum Actuator Test

A leak in a hose may be detected with the leak tester by running fingers along the hose and watching the vacuum gauge reading. A faulty spot may be cut out and hose spliced, using 1/8-inch 00 copper tubing.

A vacuum drop in excess of 3/4 inch below the 8 inches needed in this test would not interfere with the engine operation, other than perhaps to cause a rough idle. It could, however, interfere with the proper operation of the air-conditioning and heating controls at high speeds and during acceleration.

11. THE OVER-ALL PERFORMANCE TEST

Humidity (the amount of moisture in the air) has an important bearing on the temperature of the air delivered to the car's interior. This is true of all air-conditioned systems whether in home, office or car. It is important to understand the effect humidity has on the performance of the system. When humidity is high, the evaporator has to perform a double duty. It must lower the air temperature and the temperature of the moisture carried in the air. Condensing the moisture in the air transfers a great deal of heat energy into the evaporator fins and tubing. This reduces the amount of heat the evaporator can absorb from the air. In other words, high humidity greatly reduces the evaporator's ability to lower the temperature of the air delivered to the car interior.

Evaporator capacity used to reduce the amount of moisture in the air is not wasted. Wringing some of the moisture out of the air entering the car adds materially to the comfort of the passengers. However, an owner may expect too much from his air-conditioning system on humid days. A performance test is the best way to determine whether or not the system is performing up to standard. This test also provides valuable clues to the possible cause of trouble.

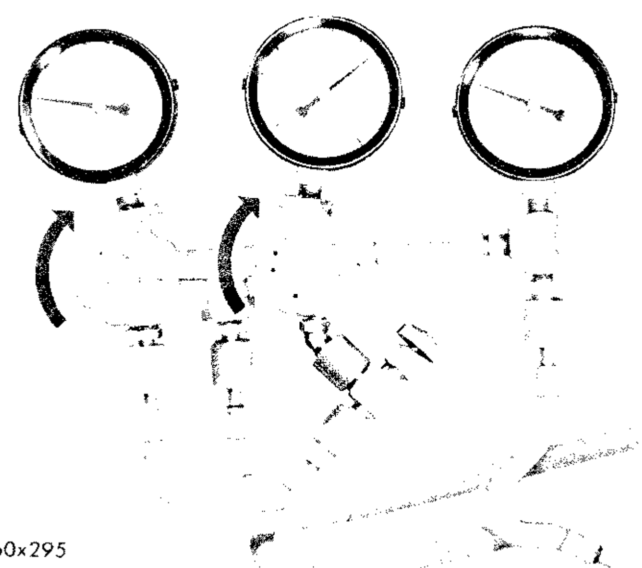

Fig. 42—Gauge Set Manifold Installed

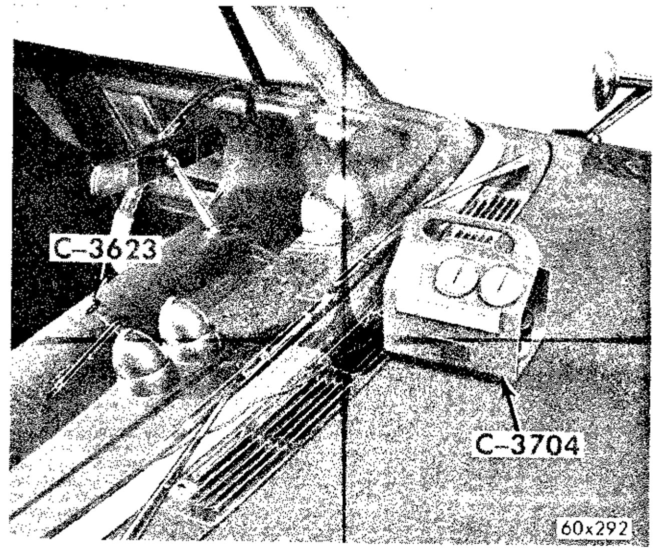

Fig. 43—Psychrometer and Thermometer

The preliminary tests and inspections outlined earlier should be made before the over-all performance test. The Gauge Set Manifold (Fig. 42) should be connected according to instructions covered in "Gauge Set Manifold Connections", Paragraph 9.

a. Performance Test Preparations

AIR TEMPERATURE IN TEST ROOM MUST BE 75° F., MINIMUM FOR THIS TEST. Open car windows. Move the temperature control lever to "OFF" position. Turn the air distribution control knob fully clockwise. Open upper outlet grilles to fully extended position and direct air flow toward rear of car. Open the spot cooler grille.

Start the engine, push in "FRESH COOL" button pull blower switch to high position.

NOTE: When testing front unit of a dual system, leave rear or roof unit blower turned off.

Adjust engine speed to 1250 rpm. Arrange the gauge set manifold hoses and tachometer leads to allow the hood to be lowered, and close the hood.

Place motor-driven psychrometer (Tool C-3704) near the air inlet grille as shown in Fig. 43. The 12-volt motorized psychrometer shown is recommended because it is usually accurate, and is easy to use. Distilled water should be used with this meter to prevent drying out and hardening the wet sock. Place thermometer (Tool C-3623) in right-hand instrument panel outlet grille.

Operate the air-conditioning system until a stabilized condition on the gauges and thermometers has been established. One of the most important factors in making the over-all performance test is that the engine must be operated at 1250 rpm for a sufficient time to build up to operating temperatures and allow all the under-hood components of the system to be subjected to the under-hood operating temperature for a period of time.

Partially close the needle valve, located below the discharge pressure gauge, to minimize oscillation of the discharge gauge pointer. Do not close the needle valve completely since this would prevent the discharge pressure gauge from registering discharge pressures.

Read the discharge pressure on the gauge. This test should be performed with the discharge pressure from 190 to 210 psi. The 190 to 210 pound pressure is for test purposes only. These pressures change according to the ambient temperatures, humidity and the efficiency of the entire system.

Take the necessary steps to bring and maintain the discharge pressure within these limits.

To increase the discharge pressure, restrict the air flow across the condenser using cardboard, paper, etc. In high ambient temperatures and high humidity areas, it may be necessary to put an electric fan in front of the condenser in order to keep the pressure down to these limits.

b. Determination of System Performance

Observe and record both the "Inlet Dry Bulb Temperature" and "Inlet Wet Bulb Temperature" as registered on the psychrometer.

Observe and record the "Discharge Air Temperature" registered by the thermometer at the right-hand grille outlet.

From the appropriate Front Unit Performance Temperature Chart for car and type installation being tested, Pages 34 through 41, determine the maximum allowable discharge air temperature for the prevailing "Dry" and "Wet" bulb temperatures recorded. If the car's discharge air temperature is at or below the temperature given on the Performance Chart, the air conditioning is delivering its rated cooling capacity. However, to assure trouble-free operation, continue with the "Evaporator Pressure Regulator Test", Paragraph 13. If the EPR valve has been tampered with, it may have been adjusted so low that evaporator temperature will produce "icing" of the fins and coils.

If the discharge air temperature at the instrument panel outlet grilles is above the maximum allowable on the Performance Chart, perform the following operations in the order indicated until proper performance is obtained.

1. "THE EVAPORATOR PRESSURE REGULATOR TEST" (Paragraph 14).

2. "THE COMPRESSOR CAPACITY TEST" (Paragraph 15).

3. "THE EXPANSION VALVE TEST" (Paragraph 16).

12. TRUNK UNIT PERFORMANCE TEST

The method used to test the trunk unit of a dual installation is essentially the same as for a front unit. The front unit should be tested before testing the trunk unit. When testing the trunk unit of a dual system, turn the front unit off by pushing the "OFF" button. Next, connect a jumper from the positive terminal of the battery to the compressor so that the refrigeration part of the entire system can be operated without air-flow through the front unit.

a. Test Preparations

Open the car windows, adjust engine speed to 1250 rpm and close the car hood. Turn the trunk unit blower motor switch to high-speed position.

Place the motor-driven psychrometer (Tool C-3704) near the rear unit air inlet grille and a thermometer (Tool C-3623) in the right-hand air outlet grille, as shown in Fig. 44.

Operate air-conditioning system until a stabilized condition on the gauges and thermometers has been established. One of the most important factors in making the over-all performance test is that the engine must be operated at 1250 rpm for a sufficient

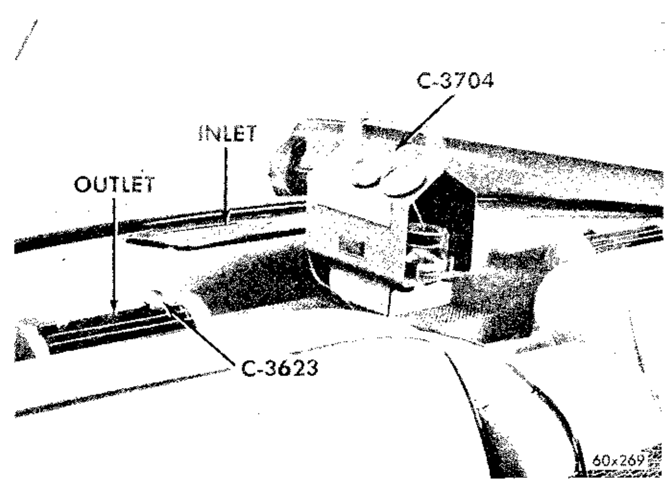

Fig. 44—Trunk Unit Performance Test

1960 AIR CONDITIONING PERFORMANCE CHART

DRY BULB TEMP.	WET BULB AIR TEMPERATURE																																						
	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
75	49	49	49	49	49	49	49	49	50	50	50	50	51	52	52	53	54	55	56	56	56	57	58																
76	49	49	49	49	49	49	50	50	50	50	50	51	51	52	52	53	54	55	56	56	57	57	58	58															
77	49	49	49	49	50	50	50	50	50	50	51	51	51	52	52	53	54	55	56	56	57	58	58	58	60														
78	49	49	50	50	50	50	50	50	51	51	51	51	52	52	53	53	54	55	56	56	57	58	59	59	60	61													
79	50	50	50	50	50	50	50	51	51	51	51	51	52	52	53	53	54	55	56	56	57	58	59	59	60	61	62												
80	50	50	50	50	50	51	51	51	51	51	51	51	52	52	53	53	54	55	56	56	57	58	59	60	60	61	62	63											
81	50	50	50	51	51	51	51	51	51	51	52	52	52	53	53	54	54	55	56	56	57	58	59	60	61	62	63	64	64										
82	51	51	51	51	51	51	51	51	52	52	52	52	53	53	54	54	55	55	56	57	57	58	59	60	61	62	63	64	65	65									
83	51	51	51	52	52	52	52	52	52	52	53	53	53	54	54	55	55	56	56	57	58	59	59	60	61	62	63	64	65	66	67								
84	52	52	52	52	52	52	53	53	53	53	53	53	54	54	54	55	55	56	57	57	58	59	60	60	61	62	63	64	65	66	67	68							
85	52	52	52	52	53	53	53	53	53	53	53	54	54	54	55	55	56	56	57	58	58	59	60	61	61	62	63	64	65	66	67	68	69						
86	53	53	53	53	53	53	53	53	54	54	54	54	54	54	55	55	56	56	57	58	58	59	60	61	62	62	63	64	65	66	67	68	69	69					
87	53	53	53	53	54	54	54	54	54	54	55	55	55	55	55	56	56	57	57	58	59	59	60	61	62	63	64	64	65	66	67	68	69	69	70				
88	54	54	54	54	54	54	55	55	55	55	55	55	55	55	56	56	56	57	58	58	59	60	60	61	62	63	64	65	65	66	67	68	69	69	70	71			
89	55	55	55	55	55	55	55	55	55	55	56	56	56	56	56	56	57	57	58	58	59	60	61	61	62	63	64	65	65	66	67	68	69	69	70	71	72		
90				55	55	55	55	56	56	56	56	56	56	56	56	57	57	57	58	59	59	60	61	62	62	63	64	65	66	66	67	68	69	70	70	71	72	73	
91					56	56	56	56	56	56	56	56	56	56	57	57	57	58	58	59	59	60	61	62	62	63	64	65	66	67	67	68	69	70	71	71	72	73	74
92					56	56	56	56	57	57	57	57	57	57	57	57	58	58	59	59	60	60	61	62	63	63	64	65	66	67	67	68	69	70	71	71	72	73	74
93						57	57	57	57	57	57	57	57	57	58	58	58	59	59	60	60	61	62	62	63	64	64	65	66	67	67	68	69	70	71	71	72	73	74
94						58	58	58	58	58	58	58	58	58	58	58	58	59	59	60	61	61	62	62	63	64	64	65	66	67	67	68	69	70	71	71	72	73	74
95						58	58	58	58	58	58	58	58	58	58	59	59	59	60	60	61	61	62	63	63	64	64	65	66	67	67	68	69	70	71	71	72	73	74
96						59	59	59	59	59	59	59	59	59	59	59	59	60	60	60	61	62	62	63	63	64	65	65	66	67	68	68	69	70	71	72	72	73	74
97						59	59	59	59	59	59	59	59	60	60	60	60	61	61	61	62	62	63	63	64	64	65	66	66	67	68	69	69	70	71	72	73	73	74
98							60	60	60	60	60	60	60	60	60	60	61	61	62	62	62	63	63	64	64	65	65	66	67	68	68	69	70	70	71	72	73	73	74
99							61	61	61	61	61	61	61	61	61	61	61	62	62	62	63	63	64	64	64	65	66	66	67	68	68	69	70	71	71	72	73	73	74
100							61	61	61	61	61	61	61	61	61	62	62	62	62	63	63	63	64	64	64	65	66	66	67	68	68	69	70	71	71	72	73	73	74
101															62	62	62	62	63	63	63	64	64	64	65	65	66	67	67	68	69	69	70	71	72	72	73	74	75
102															62	62	63	63	63	63	63	64	64	65	65	66	66	67	67	68	69	70	70	71	72	72	73	74	75
103															63	63	63	63	63	64	64	64	65	65	65	66	66	67	68	68	69	70	71	71	72	73	74	75	75
104															63	63	63	63	64	64	64	64	65	65	66	66	67	67	68	68	69	70	71	71	72	73	74	75	76
105															63	63	63	64	64	64	64	65	65	65	66	66	67	67	68	68	69	70	71	71	72	73	74	75	76
106															64	64	64	64	64	64	65	65	65	66	66	66	67	67	68	69	69	70	71	72	72	73	74	75	76
107															64	65	65	65	65	65	65	65	66	66	66	67	67	68	68	69	70	70	71	72	73	73	74	75	76
108															65	65	65	65	65	65	66	66	66	66	67	67	68	68	69	69	70	70	71	72	73	74	75	76	77
109															65	65	65	66	66	66	66	66	66	67	67	67	68	68	69	69	70	71	71	72	73	74	75	76	77
110															66	66	66	66	66	66	66	66	66	67	67	67	68	68	69	69	70	71	71	72	73	74	75	76	77

MAXIMUM DISCHARGE AIR TEMPERATURE

60x280 A

Performance Temperature Chart—Front Unit Only (DeSoto and Chrysler Windsor)

1960 AIR CONDITIONING PERFORMANCE CHART

DRY BULB TEMP.	WET BULB AIR TEMPERATURE																																						
	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
75	51	51	51	51	51	51	51	51	52	52	52	52	53	54	54	55	56	56	57	58	59	59	60																
76	51	51	51	51	51	51	52	52	52	52	52	53	53	54	54	55	56	56	57	58	59	59	60	60															
77	51	51	51	51	52	52	52	52	52	52	53	53	53	54	54	55	56	56	57	58	59	60	60	60	62														
78	51	51	52	52	52	52	52	52	53	53	53	53	54	54	55	55	56	57	57	58	59	60	60	61	62	63													
79	52	52	52	52	52	52	52	53	53	53	53	53	54	54	55	55	56	57	57	58	59	60	61	61	62	63	64												
80	52	52	52	52	52	53	53	53	53	53	53	53	54	54	55	55	56	57	57	58	59	60	61	62	62	63	64	65											
81	52	52	52	53	53	53	53	53	53	53	54	54	54	55	55	56	56	57	58	58	59	60	61	62	63	64	65	66	66										
82	53	53	53	53	53	53	53	53	54	54	54	54	55	55	56	56	57	57	58	59	59	60	61	62	63	64	65	66	67	67									
83	53	53	53	54	54	54	54	54	54	54	55	55	55	56	56	57	57	58	58	59	60	61	61	62	63	64	65	66	67	68	69								
84	54	54	54	54	54	54	55	55	55	55	55	55	56	56	56	57	57	58	59	59	60	61	62	62	63	64	65	66	67	68	69	70							
85	54	54	54	54	55	55	55	55	55	55	55	56	56	56	57	57	58	58	59	60	60	61	62	63	63	64	65	66	67	68	69	70	71						
86	55	55	55	55	55	55	55	55	56	56	56	56	56	56	57	57	58	58	59	60	60	61	62	63	64	64	65	66	67	68	69	70	71	71					
87	55	55	55	55	56	56	56	56	56	56	57	57	57	57	57	58	58	59	59	60	61	61	62	63	64	65	66	66	67	68	69	70	71	71	72				
88	56	56	56	56	56	56	57	57	57	57	57	57	57	57	58	58	58	59	60	60	61	62	62	63	64	65	66	67	67	68	69	70	71	71	72	73			
89	57	57	57	57	57	57	57	57	57	57	58	58	58	58	58	58	59	59	60	60	61	62	63	63	64	65	66	67	67	68	69	70	71	71	72	73	74		
90				57	57	57	57	58	58	58	58	58	58	58	58	59	59	59	60	61	61	62	63	64	64	65	66	67	68	68	69	70	71	72	72	73	74	75	
91					58	58	58	58	58	58	58	58	59	59	59	59	59	60	60	61	61	62	63	64	64	65	66	67	68	69	69	70	71	72	73	73	74	75	76
92					58	58	58	58	59	59	59	59	59	59	59	59	60	60	61	61	62	62	63	64	65	65	66	67	68	69	69	70	71	72	73	73	74	75	76
93						59	59	59	59	59	59	59	59	59	60	60	60	61	61	62	62	63	64	64	65	66	66	67	68	69	69	70	71	72	73	73	74	75	76
94						60	60	60	60	60	60	60	60	60	60	60	60	61	61	62	63	63	64	64	65	66	66	67	68	69	69	70	71	72	73	73	74	75	76
95						60	60	60	60	60	60	60	60	60	60	61	61	61	62	62	63	63	64	65	65	66	66	67	68	69	69	70	71	72	73	73	74	75	76
96						61	61	61	61	61	61	61	61	61	61	61	61	62	62	62	63	64	64	65	65	66	67	67	68	69	70	70	71	72	73	74	74	75	76
97						61	61	61	61	61	61	61	61	62	62	62	62	63	63	63	64	64	65	65	66	66	67	68	68	69	70	71	71	72	73	74	75	75	76
98							62	62	62	62	62	62	62	62	62	62	63	63	64	64	64	65	65	66	66	67	67	68	69	70	70	71	72	72	73	74	75	75	76
99							63	63	63	63	63	63	63	63	63	63	63	64	64	64	65	65	66	66	66	67	68	68	69	70	70	71	72	73	73	74	75	75	76
100							63	63	63	63	63	63	63	63	63	64	64	64	64	65	65	65	66	66	66	67	68	68	69	70	70	71	72	73	73	74	75	75	76
101															64	64	64	64	65	65	65	66	66	66	67	67	68	69	69	70	71	71	72	73	74	74	75	76	77
102															64	64	65	65	65	65	65	66	66	67	67	68	68	69	69	70	71	72	72	73	74	74	75	76	77
103															65	65	65	65	65	66	66	66	67	67	67	68	68	69	70	70	71	72	73	73	74	75	76	77	77
104															65	65	65	65	66	66	66	66	67	67	68	68	69	69	70	70	71	72	73	73	74	75	76	77	78
105															65	65	65	66	66	66	66	67	67	67	68	68	69	69	70	70	71	72	73	73	74	75	76	77	78
106															66	66	66	66	66	66	67	67	67	68	68	68	69	69	70	71	71	72	73	74	74	75	76	77	78
107															66	67	67	67	67	67	67	67	68	68	68	69	69	70	70	71	72	72	73	74	75	75	76	77	78
108															67	67	67	67	67	67	68	68	68	68	69	69	70	70	71	71	72	72	73	74	75	76	77	78	79
109															67	67	67	68	68	68	68	68	68	69	69	69	70	70	71	71	72	73	73	74	75	76	77	78	79
110															68	68	68	68	68	68	68	68	68	69	69	69	70	70	71	71	72	73	73	74	75	76	77	78	79

MAXIMUM DISCHARGE AIR TEMPERATURE

60x281 A

Performance Temperature Chart—Front Unit of Dual System (DeSoto and Chrysler Windsor)

1960 AIR CONDITIONING PERFORMANCE CHART

DRY BULB TEMP.	WET BULB AIR TEMPERATURE																																						
	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
75	48	48	48	48	48	48	48	48	49	49	49	50	50	51	51	52	53	53	54	55	55	56	57																
76	48	48	48	48	48	48	49	49	49	49	49	50	50	51	51	52	53	53	54	55	56	56	57	57															
77	48	48	48	48	49	49	49	49	49	49	50	50	50	51	51	52	53	53	54	55	56	57	57	57	59														
78	48	48	49	49	49	49	49	49	50	50	50	50	51	51	52	52	53	54	54	55	56	57	57	58	59	60													
79	49	49	49	49	49	49	49	50	50	50	50	50	51	51	52	52	53	54	54	55	56	57	58	58	59	60	61												
80	49	49	49	49	49	50	50	50	50	50	50	50	51	51	52	52	53	54	54	55	56	57	58	59	59	60	61	62											
81	49	49	49	50	50	50	50	50	50	50	51	51	51	52	52	53	53	54	55	55	56	57	58	59	60	61	62	63	63										
82	50	50	50	50	50	50	50	50	51	51	51	51	52	52	53	53	54	54	55	56	56	57	58	59	60	61	62	63	64	64									
83	50	50	50	51	51	51	51	51	51	51	52	52	52	53	53	54	54	55	55	56	57	58	58	59	60	61	62	63	64	65	66								
84	51	51	51	51	51	51	52	52	52	52	52	52	53	53	53	54	54	55	56	56	57	58	59	59	60	61	62	63	64	65	66	67							
85	51	51	51	51	52	52	52	52	52	52	52	53	53	53	54	54	55	55	56	57	57	58	59	60	60	61	62	63	64	65	66	67	68						
86	52	52	52	52	52	52	52	52	53	53	53	53	53	53	54	54	55	55	56	57	57	58	59	60	61	61	62	63	64	65	66	67	68	68					
87	52	52	52	52	53	53	53	53	53	53	54	54	54	54	54	55	55	56	56	57	58	58	59	60	61	62	63	63	64	65	66	67	68	68	69				
88	53	53	53	53	53	54	54	54	54	54	54	54	54	54	55	55	55	56	57	57	58	59	59	60	61	62	63	64	64	65	66	67	68	68	69	70			
89	54	54	54	54	54	54	54	54	54	54	55	55	55	55	55	55	56	56	57	57	58	59	60	60	61	62	63	64	64	65	66	67	68	68	69	70	71		
90				54	54	54	54	55	55	55	55	55	55	55	55	56	56	56	57	58	58	59	60	61	61	62	63	64	65	65	66	67	68	69	69	70	71	72	
91					55	55	55	55	55	55	55	55	55	55	56	56	56	57	57	58	58	59	60	61	61	62	63	64	65	66	66	67	68	69	70	70	71	72	73
92					55	55	55	55	56	56	56	56	56	56	56	56	57	57	58	58	59	59	60	61	62	62	63	64	65	66	66	67	68	69	70	70	71	72	73
93						56	56	56	56	56	56	56	56	56	57	57	57	58	58	59	59	60	61	61	62	63	63	64	65	66	66	67	68	69	70	70	71	72	73
94						57	57	57	57	57	57	57	57	57	57	57	57	58	58	59	60	60	61	61	62	63	63	64	65	66	66	67	68	69	70	70	71	72	73
95						57	57	57	57	57	57	57	57	57	57	58	58	58	59	59	60	60	61	62	62	63	63	64	65	66	66	67	68	69	70	70	71	72	73
96						58	58	58	58	58	58	58	58	58	58	58	58	59	59	59	60	61	61	62	62	63	64	64	65	66	67	67	68	69	70	71	71	72	73
97						58	58	58	58	58	58	58	58	59	59	59	59	60	60	60	61	61	62	62	63	63	64	65	65	66	67	68	68	69	70	71	72	72	73
98							59	59	59	59	59	59	59	59	59	59	60	60	61	61	61	62	62	63	63	64	64	65	66	67	67	68	69	69	70	71	72	72	73
99							60	60	60	60	60	60	60	60	60	60	60	61	61	61	62	62	63	63	63	64	65	65	66	67	67	68	69	70	70	71	72	72	73
100							60	60	60	60	60	60	60	60	60	61	61	61	61	62	62	62	63	63	63	64	65	65	66	67	67	68	69	70	70	71	72	72	73
101															61	61	61	61	62	62	62	63	63	63	64	64	65	66	66	67	68	68	69	70	71	71	72	73	74
102															61	61	62	62	62	62	62	63	63	64	64	65	65	66	66	67	68	69	69	70	71	71	72	73	74
103															62	62	62	62	62	63	63	63	64	64	64	65	65	66	67	67	68	69	70	70	71	72	73	74	74
104															62	62	62	62	63	63	63	63	64	64	65	65	66	66	67	67	68	69	70	70	71	72	73	74	75
105															62	62	62	63	63	63	63	64	64	64	65	65	66	66	67	67	68	69	70	70	71	72	73	74	75
106															63	63	63	63	63	63	64	64	64	65	65	65	66	66	67	68	68	69	70	71	71	72	73	74	75
107															63	64	64	64	64	64	64	64	65	65	65	66	66	67	67	68	69	69	70	71	72	72	73	74	75
108															64	64	64	64	64	64	65	65	65	65	66	66	67	67	68	68	69	69	70	71	72	73	74	75	76
109															64	64	64	65	65	65	65	65	65	66	66	66	67	67	68	68	69	70	70	71	72	73	74	75	76
110				60x282 A											65	65	65	65	65	65	65	65	65	66	66	66	67	67	68	68	69	70	70	71	72	73	74	75	76

MAXIMUM DISCHARGE AIR TEMPERATURE

Performance Temperature Chart—Front Unit Only (Saratoga, New Yorker, Imperial)

1960 AIR CONDITIONING PERFORMANCE CHART

DRY BULB TEMP	WET BULB AIR TEMPERATURE																																						
	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
75	50	50	50	50	50	50	50	50	51	51	51	52	52	53	53	54	55	55	56	57	57	58	59																
76	50	50	50	50	50	50	51	51	51	51	51	52	52	53	53	54	55	55	56	57	58	58	59	59															
77	50	50	50	50	51	51	51	51	51	51	52	52	52	53	53	54	55	55	56	57	58	59	59	59	61														
78	50	50	51	51	51	51	51	51	52	52	52	52	53	53	54	54	55	56	56	57	58	59	59	60	61	62													
79	51	51	51	51	51	51	51	52	52	52	52	52	53	53	54	54	55	56	56	57	58	59	60	60	61	62	63												
80	51	51	51	51	51	52	52	52	52	52	52	52	53	53	54	54	55	56	56	57	58	59	60	61	61	62	63	64											
81	51	51	51	52	52	52	52	52	52	52	53	53	53	54	54	55	55	56	57	57	58	59	60	61	62	63	64	65	65										
82	52	52	52	52	52	52	52	52	53	53	53	53	54	54	55	55	56	56	57	58	58	59	60	61	62	63	64	65	66	66									
83	52	52	52	53	53	53	53	53	53	53	54	54	54	55	55	56	56	57	57	58	59	60	60	61	62	63	64	65	66	67	68								
84	53	53	53	53	53	53	54	54	54	54	54	54	55	55	55	56	56	57	58	58	59	60	61	61	62	63	64	65	66	67	68	69							
85	53	53	53	53	54	54	54	54	54	54	54	55	55	55	56	56	57	57	58	59	59	60	61	62	62	63	64	65	66	67	68	69	70						
86	54	54	54	54	54	54	54	54	55	55	55	55	55	55	56	56	57	57	58	59	59	60	61	62	63	63	64	65	66	67	68	69	70	70					
87	54	54	54	54	55	55	55	55	55	55	56	56	56	56	56	57	57	58	58	59	60	60	61	62	63	64	65	65	66	67	68	69	70	70	71				
88	55	55	55	55	55	56	56	56	56	56	56	56	56	56	57	57	57	58	59	59	60	61	61	62	63	64	65	66	66	67	68	69	70	70	71	72			
89	56	56	56	56	56	56	56	56	56	56	57	57	57	57	57	57	58	58	59	59	60	61	62	62	63	64	65	66	66	67	68	69	70	70	71	72	73		
90				56	56	56	56	57	57	57	57	57	57	57	57	58	58	58	59	60	60	61	62	63	63	64	65	66	67	67	68	69	70	71	71	72	73	74	
91					57	57	57	57	57	57	57	57	57	57	58	58	58	59	59	60	60	61	62	63	63	64	65	66	67	68	68	69	70	71	72	72	73	74	75
92					57	57	57	57	58	58	58	58	58	58	58	58	59	59	60	60	61	61	62	63	64	64	65	66	67	68	68	69	70	71	72	72	73	74	75
93						58	58	58	58	58	58	58	58	58	59	59	59	60	60	61	61	62	63	63	64	65	65	66	67	68	68	69	70	71	72	72	73	74	75
94						59	59	59	59	59	59	59	59	59	59	59	59	60	60	61	62	62	63	63	64	65	65	66	67	68	68	69	70	71	72	72	73	74	75
95						59	59	59	59	59	59	59	59	59	59	60	60	60	61	61	62	62	63	64	64	65	65	66	67	68	68	69	70	71	72	72	73	74	75
96						60	60	60	60	60	60	60	60	60	60	60	60	61	61	61	62	63	63	64	64	65	66	66	67	68	69	69	70	71	72	73	73	74	75
97						60	60	60	60	60	60	60	60	61	61	61	61	62	62	62	63	63	64	64	65	65	66	67	67	68	69	70	70	71	72	73	74	74	75
98							61	61	61	61	61	61	61	61	61	61	62	62	63	63	63	64	64	65	65	66	66	67	68	69	69	70	71	71	72	73	74	74	75
99							62	62	62	62	62	62	62	62	62	62	62	63	63	63	64	64	65	65	65	66	67	67	68	69	69	70	71	72	72	73	74	74	75
100							62	62	62	62	62	62	62	62	62	63	63	63	63	64	64	64	65	65	65	66	67	67	68	69	69	70	71	72	72	73	74	74	75
101															63	63	63	63	64	64	64	65	65	65	66	66	67	68	68	69	70	70	71	72	73	73	74	75	76
102															63	63	64	64	64	64	64	65	65	66	66	67	67	68	68	69	70	71	71	72	73	73	74	75	76
103															64	64	64	64	64	65	65	65	66	66	66	67	67	68	69	69	70	71	72	72	73	74	75	76	76
104															64	64	64	64	65	65	65	65	66	66	67	67	68	68	69	69	70	71	72	72	73	74	75	76	77
105															64	64	64	65	65	65	65	66	66	66	67	67	68	68	69	69	70	71	72	72	73	74	75	76	77
106															65	65	65	65	65	65	66	66	66	67	67	67	68	68	69	70	70	71	72	73	73	74	75	76	77
107															65	66	66	66	66	66	66	66	67	67	67	68	68	69	69	70	71	71	72	73	74	74	75	76	77
108															66	66	66	66	66	66	67	67	67	67	68	68	69	69	70	70	71	71	72	73	74	75	76	77	78
109															66	66	66	67	67	67	67	67	67	68	68	68	69	69	70	70	71	72	72	73	74	75	76	77	78
110															67	67	67	67	67	67	67	67	67	68	68	68	69	69	70	70	71	72	72	73	74	75	76	77	78

MAXIMUM DISCHARGE AIR TEMPERATURE

60x283 A

Performance Temperature Chart—Front Unit of Dual System (Saratoga, New Yorker, Imperial)

1960 AIR CONDITIONING PERFORMANCE CHART

DRY BULB TEMP.	WET BULB AIR TEMPERATURE																																						
	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
75	46	46	46	46	46	46	46	46	47	47	47	47	48	49	49	50	51	51	52	53	53	54	55																
76	46	46	46	46	46	46	47	47	47	47	47	48	48	49	49	50	51	51	52	53	54	54	55	55															
77	46	46	46	46	47	47	47	47	47	47	48	48	48	49	49	50	51	51	52	53	54	55	55	55	57														
78	46	46	47	47	47	47	47	47	48	48	48	48	49	49	50	50	51	52	52	53	54	55	55	56	57	58													
79	47	47	47	47	47	47	47	48	48	48	48	48	49	49	50	50	51	52	52	53	54	55	56	56	57	58	59												
80	47	47	47	47	47	48	48	48	48	48	48	48	49	49	50	50	51	52	52	53	54	55	56	57	57	58	59	60											
81	47	47	47	48	48	48	48	48	48	48	49	49	49	50	50	51	51	52	53	53	54	55	56	57	58	59	60	61	61										
82	48	48	48	48	48	48	48	48	49	49	49	49	50	50	51	51	52	52	53	54	54	55	56	57	58	59	60	61	62	62									
83	48	48	48	49	49	49	49	49	49	49	50	50	50	51	51	52	52	53	53	54	55	56	56	57	58	59	60	61	62	63	64								
84	49	49	49	49	49	49	50	50	50	50	50	50	51	51	51	52	52	53	54	54	55	56	57	57	58	59	60	61	62	63	64	65							
85	49	49	49	49	50	50	50	50	50	50	50	51	51	51	52	52	53	53	54	55	55	56	57	58	58	59	60	61	62	63	64	65	66						
86	50	50	50	50	50	50	50	50	51	51	51	51	51	51	52	52	53	53	54	55	55	56	57	58	59	59	60	61	62	63	64	65	66	66					
87	50	50	50	50	51	51	51	51	51	51	52	52	52	52	52	53	53	54	54	55	56	56	57	58	59	60	61	61	62	63	64	65	66	66	67				
88	51	51	51	51	51	51	52	52	52	52	52	52	52	52	53	53	53	54	55	55	56	57	57	58	59	60	61	62	62	63	64	65	66	66	67	68			
89	52	52	52	52	52	52	52	52	52	52	53	53	53	53	53	53	54	54	55	55	56	57	58	58	59	60	61	62	62	63	64	65	66	66	67	68	69		
90				52	52	52	52	53	53	53	53	53	53	53	53	54	54	54	55	56	56	57	58	59	59	60	61	62	63	63	64	65	66	67	67	68	69	70	
91					53	53	53	53	53	53	53	53	53	53	54	54	54	55	55	56	56	57	58	59	59	60	61	62	63	64	64	65	66	67	68	68	69	70	71
92					53	53	53	53	54	54	54	54	54	54	54	54	55	55	56	56	57	57	58	59	59	60	61	62	63	64	64	65	66	67	68	68	69	70	71
93						54	54	54	54	54	54	54	54	54	55	55	55	56	56	57	57	58	59	59	60	61	61	62	63	64	64	65	66	67	68	68	69	70	71
94						55	55	55	55	55	55	55	55	55	55	55	55	56	56	57	58	58	59	59	60	61	61	62	63	64	64	65	66	67	68	68	69	70	71
95						55	55	55	55	55	55	55	55	55	55	56	56	56	57	57	58	58	59	60	60	61	61	62	63	64	64	65	66	67	68	68	69	70	71
96						56	56	56	56	56	56	56	56	56	56	56	56	57	57	57	58	59	59	60	60	61	62	62	63	64	65	65	66	67	68	69	69	70	71
97						56	56	56	56	56	56	56	56	57	57	57	57	58	58	58	59	59	60	60	61	61	62	63	63	64	65	66	66	67	68	69	70	70	71
98							57	57	57	57	57	57	57	57	57	57	58	58	59	59	59	60	60	61	61	62	62	63	64	65	65	66	67	67	68	69	70	70	71
99							58	58	58	58	58	58	58	58	58	58	58	59	59	59	60	60	61	61	61	62	63	63	64	65	65	66	67	68	68	69	70	70	71
100							58	58	58	58	58	58	58	58	58	59	59	59	59	60	60	60	61	61	61	62	63	63	64	65	65	66	67	68	68	69	70	70	71
101															59	59	59	59	60	60	60	61	61	61	62	62	63	64	64	65	66	66	67	68	69	69	70	71	72
102															59	59	60	60	60	60	60	61	61	62	62	63	63	64	64	65	66	67	67	68	69	69	70	71	72
103															60	60	60	60	60	61	61	61	62	62	62	63	63	64	64	65	66	67	68	68	69	70	71	72	72
104															60	60	60	60	61	61	61	61	62	62	63	63	64	64	65	65	66	67	68	68	69	70	71	72	73
105															60	60	60	61	61	61	61	62	62	62	63	63	64	64	65	66	66	67	68	68	69	70	71	72	73
106															61	61	61	61	61	61	62	62	62	63	63	63	64	64	65	66	66	67	68	69	69	70	71	72	73
107															61	62	62	62	62	62	62	62	63	63	63	64	64	65	65	66	67	67	68	69	70	70	71	72	73
108															62	62	62	62	62	62	63	63	63	63	64	64	65	65	66	66	67	67	68	69	70	71	72	73	74
109															62	62	62	63	63	63	63	63	63	64	64	64	65	65	66	66	67	68	68	69	70	71	72	73	74
110															63	63	63	63	63	63	63	63	63	64	64	64	65	65	66	66	67	68	68	69	70	71	72	73	74

MAXIMUM DISCHARGE AIR TEMPERATURE

60x284 A

Performance Temperature Chart—Trunk Unit of Dual System (DeSoto and Chrysler Windsor)

1960 AIR CONDITIONING PERFORMANCE CHART

DRY BULB TEMP.	WET BULB AIR TEMPERATURE																																						
	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
75	45	45	45	45	45	45	45	45	46	46	46	46	47	48	48	49	50	50	51	52	52	53	54																
76	45	45	45	45	45	45	46	46	46	46	46	47	47	48	48	49	50	50	51	52	53	53	54	54															
77	45	45	45	45	46	46	46	46	46	46	47	47	47	48	48	49	50	50	51	52	53	54	54	54	56														
78	45	45	46	46	46	46	46	46	47	47	47	47	48	48	49	49	50	51	51	52	53	54	54	55	56	57													
79	46	46	46	46	46	46	46	47	47	47	47	47	48	48	49	49	50	51	51	52	53	54	55	55	56	57	58												
80	46	46	46	46	46	47	47	47	47	47	47	47	48	48	49	49	50	51	51	52	53	54	55	56	56	57	58	59											
81	46	46	46	47	47	47	47	47	47	47	48	48	48	49	49	50	50	51	52	52	53	54	55	56	57	58	59	60	60										
82	47	47	47	47	47	47	47	47	48	48	48	48	49	49	50	50	51	51	52	53	53	54	55	56	57	58	59	60	61	61									
83	47	47	47	48	48	48	48	48	48	48	49	49	49	50	50	51	51	52	52	53	54	55	55	56	57	58	59	60	61	62	63								
84	48	48	48	48	48	48	49	49	49	49	49	49	50	50	50	51	51	52	53	53	54	55	56	56	57	58	59	60	61	62	63	64							
85	48	48	48	48	49	49	49	49	49	49	49	50	50	50	51	51	52	52	53	54	54	55	56	57	57	58	59	60	61	62	63	64	65						
86	49	49	49	49	49	49	49	49	50	50	50	50	50	50	51	51	52	52	53	54	54	55	56	57	58	58	59	60	61	62	63	64	65	65					
87	49	49	49	49	50	50	50	50	50	50	51	51	51	51	51	52	52	53	53	54	55	55	56	57	58	59	60	60	61	62	63	64	65	65	66				
88	50	50	50	50	50	51	51	51	51	51	51	51	51	51	52	52	52	53	54	54	55	56	56	57	58	59	60	61	61	62	63	64	65	65	66	67			
89	51	51	51	51	51	51	51	51	51	51	52	52	52	52	52	52	53	53	54	54	55	56	57	57	58	59	60	61	61	62	63	64	65	65	66	67	68		
90				51	51	51	51	52	52	52	52	52	52	52	52	53	53	53	54	55	55	56	57	58	58	59	60	61	62	62	63	64	65	66	66	67	68	69	
91					52	52	52	52	52	52	52	52	52	52	53	53	53	54	54	55	55	56	57	58	58	59	60	61	62	63	63	64	65	66	67	67	68	69	70
92					52	52	52	52	53	53	53	53	53	53	53	53	54	54	55	55	56	56	57	58	59	59	60	61	62	63	63	64	65	66	67	67	68	69	70
93						53	53	53	53	53	53	53	53	53	54	54	54	55	55	56	56	57	58	58	59	60	60	61	62	63	63	64	65	66	67	67	68	69	70
94						54	54	54	54	54	54	54	54	54	54	54	54	55	55	56	57	57	58	58	59	60	60	61	62	63	63	64	65	66	67	67	68	69	70
95						54	54	54	54	54	54	54	54	54	54	55	55	55	56	56	57	57	58	59	59	60	60	61	62	63	63	64	65	66	67	67	68	69	70
96						55	55	55	55	55	55	55	55	55	55	55	55	56	56	56	57	58	58	59	59	60	61	61	62	63	64	64	65	66	67	68	68	69	70
97						55	55	55	55	55	55	55	55	56	56	56	56	57	57	57	58	58	59	59	60	60	61	62	62	63	64	65	65	66	67	68	69	69	70
98							56	56	56	56	56	56	56	56	56	56	57	57	58	58	58	59	59	60	60	61	61	62	63	64	64	65	66	66	67	68	69	69	70
99							57	57	57	57	57	57	57	57	57	57	57	58	58	58	59	59	60	60	60	61	62	62	63	64	64	65	66	67	67	68	69	69	70
100							57	57	57	57	57	57	57	57	57	58	58	58	58	59	59	59	60	60	60	61	62	62	63	64	64	65	66	67	67	68	69	69	70
101															58	58	58	58	59	59	59	60	60	60	61	61	62	63	63	64	65	65	66	67	68	68	69	70	71
102															58	58	59	59	59	59	59	60	60	61	61	62	62	63	63	64	65	66	66	67	68	68	69	70	71
103															59	59	59	59	59	60	60	60	61	61	61	62	62	63	64	64	65	66	67	67	68	69	70	71	71
104															59	59	59	59	60	60	60	60	61	61	62	62	63	63	64	64	65	66	67	67	68	69	70	71	72
105															59	59	59	60	60	60	60	61	61	61	62	62	63	63	64	64	65	66	67	67	68	69	70	71	72
106															60	60	60	60	60	60	61	61	61	62	62	62	63	63	64	65	65	66	67	68	68	69	70	71	72
107															60	61	61	61	61	61	61	61	62	62	62	63	63	64	64	65	66	66	67	68	69	69	70	71	72
108															61	61	61	61	61	61	62	62	62	62	63	63	64	64	65	65	66	66	67	68	69	70	71	72	73
109															61	61	61	62	62	62	62	62	62	63	63	63	64	64	65	65	66	67	67	68	69	70	71	72	73
110															62	62	62	62	62	62	62	62	62	63	63	63	64	64	65	65	66	67	67	68	69	70	71	72	73

MAXIMUM DISCHARGE AIR TEMPERATURE

60x285 A

Performance Temperature Chart—Trunk Unit of Dual System (Saratoga, New Yorker, Imperial)

1960 AIR CONDITIONING PERFORMANCE CHART

DRY BULB TEMP.	WET BULB AIR TEMPERATURE																																						
	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
75	54	54	54	54	54	54	54	54	55	55	55	56	56	57	57	58	59	59	60	61	61	62	63																
76	54	54	54	54	54	54	55	55	55	55	55	56	56	57	57	58	59	59	60	61	62	62	63	63															
77	54	54	54	54	55	55	55	55	55	55	56	56	56	57	57	58	59	59	60	61	62	63	63	63	65														
78	54	54	55	55	55	55	55	55	56	56	56	56	57	57	58	58	59	60	60	61	62	63	63	64	65	66													
79	55	55	55	55	55	55	55	56	56	56	56	56	57	57	58	58	59	60	60	61	62	63	64	64	65	66	67												
80	55	55	55	55	55	56	56	56	56	56	56	56	57	57	58	58	59	60	60	61	62	63	64	65	65	66	67	68											
81	55	55	55	56	56	56	56	56	56	56	57	57	57	58	58	59	59	60	61	61	62	63	64	65	66	67	68	69	69										
82	56	56	56	56	56	56	56	56	57	57	57	57	58	58	59	59	60	60	61	62	62	63	64	65	66	67	68	69	70	70									
83	56	56	56	57	57	57	57	57	57	57	58	58	58	59	59	60	60	61	61	62	63	64	64	65	66	67	68	69	70	71	72								
84	57	57	57	57	57	57	58	58	58	58	58	58	59	59	59	60	60	61	62	62	63	64	65	65	66	67	68	69	70	71	72	73							
85	57	57	57	57	58	58	58	58	58	58	58	59	59	59	60	60	61	61	62	63	63	64	65	66	66	67	68	69	70	71	72	73	74						
86	58	58	58	58	58	58	58	58	59	59	59	59	59	59	60	60	61	61	62	63	63	64	65	66	67	67	68	69	70	71	72	73	74	74					
87	58	58	58	58	59	59	59	59	59	59	60	60	60	60	60	61	61	62	62	63	64	64	65	66	67	68	69	69	70	71	72	73	74	74	75				
88	59	59	59	59	59	59	60	60	60	60	60	60	60	60	61	61	61	62	63	63	64	65	65	66	67	68	69	70	70	71	72	73	74	74	75	76			
89	60	60	60	60	60	60	60	60	60	60	61	61	61	61	61	61	62	62	63	63	64	65	66	66	67	68	69	70	70	71	72	73	74	74	75	76	77		
90				60	60	60	60	61	61	61	61	61	61	61	61	62	62	62	63	64	64	65	66	67	67	68	69	70	71	71	72	73	74	75	75	76	77	78	
91					61	61	61	61	61	61	61	61	61	61	62	62	62	63	63	64	64	65	66	67	67	68	69	70	71	72	72	73	74	75	76	76	77	78	79
92					61	61	61	61	62	62	62	62	62	62	62	62	63	63	64	64	65	65	66	67	68	68	69	70	71	72	72	73	74	75	76	76	77	78	79
93						62	62	62	62	62	62	62	62	62	63	63	63	64	64	65	65	66	67	67	68	69	69	70	71	72	72	73	74	75	76	76	77	78	79
94						63	63	63	63	63	63	63	63	63	63	63	63	64	64	65	66	66	67	67	68	69	69	70	71	72	72	73	74	75	76	76	77	78	79
95						63	63	63	63	63	63	63	63	63	63	64	64	64	65	65	66	66	67	68	68	69	69	70	71	72	72	73	74	75	76	76	77	78	79
96						64	64	64	64	64	64	64	64	64	64	64	64	65	65	65	66	67	67	68	68	69	70	70	71	72	73	73	74	75	76	77	77	78	79
97						64	64	64	64	64	64	64	64	65	65	65	65	66	66	66	67	67	68	68	69	69	70	71	71	72	73	74	74	75	76	77	78	78	79
98							65	65	65	65	65	65	65	65	65	65	66	66	67	67	67	68	68	69	69	70	70	71	72	73	73	74	75	75	76	77	78	78	79
99							66	66	66	66	66	66	66	66	66	66	66	67	67	67	68	68	69	69	69	70	71	71	72	73	73	74	75	76	76	77	78	78	79
100							66	66	66	66	66	66	66	66	66	67	67	67	67	68	68	68	69	69	69	70	71	71	72	73	73	74	75	76	76	77	78	78	79
101															67	67	67	67	68	68	68	69	69	69	70	70	71	72	72	73	74	74	75	76	77	77	78	79	80
102															67	67	68	68	68	68	68	69	69	70	70	71	71	72	72	73	74	75	75	76	77	77	78	79	80
103															68	68	68	68	68	69	69	69	70	70	70	71	71	72	73	73	74	75	76	76	77	78	79	80	80
104															68	68	68	68	69	69	69	69	70	70	71	71	72	72	73	73	74	75	76	76	77	78	79	80	81
105															68	68	68	69	69	69	69	70	70	70	71	71	72	72	73	73	74	75	76	76	77	78	79	80	81
106															69	69	69	69	69	69	70	70	70	71	71	71	72	72	73	74	74	75	76	77	77	78	79	80	81
107															69	70	70	70	70	70	70	70	71	71	71	72	72	73	73	74	75	75	76	77	78	78	79	80	81
108															70	70	70	70	70	70	71	71	71	71	72	72	73	73	74	74	75	75	76	77	78	79	80	81	82
109															70	70	70	71	71	71	71	71	71	72	72	72	73	73	74	74	75	76	76	77	78	79	80	81	82
110															71	71	71	71	71	71	71	71	71	72	72	72	73	73	74	74	75	76	76	77	78	79	80	81	82

MAXIMUM DISCHARGE AIR TEMPERATURE

60x286 A

Performance Temperature Chart—Roof Unit of Dual System (Chrysler Windsor)

1960 AIR CONDITIONING PERFORMANCE CHART

DRY BULB TEMP.	WET BULB AIR TEMPERATURE																																						
	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
75	53	53	53	53	53	53	53	53	54	54	54	54	55	56	56	57	58	58	59	60	60	61	62																
76	53	53	53	53	53	53	54	54	54	54	54	55	55	56	56	57	58	58	59	60	61	61	62	62															
77	53	53	53	53	54	54	54	54	54	54	55	55	55	56	56	57	58	58	59	60	61	62	62	62	64														
78	53	53	54	54	54	54	54	54	55	55	55	55	56	56	57	57	58	59	59	60	61	62	62	63	64	65													
79	54	54	54	54	54	54	54	55	55	55	55	55	56	56	57	57	58	59	59	60	61	62	63	63	64	65	66												
80	54	54	54	54	54	55	55	55	55	55	55	55	56	56	57	57	58	59	59	60	61	62	63	63	64	65	66	67											
81	54	54	54	55	55	55	55	55	55	55	56	56	56	57	57	58	58	59	60	60	61	62	63	64	65	66	67	68	68										
82	55	55	55	55	55	55	55	55	56	56	56	56	57	57	58	58	59	59	60	61	61	62	63	64	65	66	67	68	69	69									
83	55	55	55	56	56	56	56	56	56	56	57	57	57	58	58	59	59	60	60	61	62	63	63	64	65	66	67	68	69	70	71								
84	56	56	56	56	56	56	57	57	57	57	57	57	58	58	58	59	59	60	61	61	62	63	64	64	65	66	67	68	69	70	71	72							
85	56	56	56	56	57	57	57	57	57	57	57	58	58	58	59	59	60	60	61	62	62	63	64	65	65	66	67	68	69	70	71	72	73						
86	57	57	57	57	57	57	57	57	58	58	58	58	58	58	59	59	60	60	61	62	62	63	64	65	65	66	67	68	69	70	71	72	73	73					
87	57	57	57	57	58	58	58	58	58	58	59	59	59	59	59	60	60	61	61	62	63	63	64	65	66	67	68	68	69	70	71	72	73	73	74				
88	58	58	58	58	58	58	59	59	59	59	59	59	59	59	60	60	60	61	62	62	63	63	64	65	66	67	68	68	69	70	71	72	73	73	74	75			
89	59	59	59	59	59	59	59	59	59	59	60	60	60	60	60	60	61	61	62	62	63	64	65	65	66	67	68	69	69	70	71	72	73	73	74	75	76		
90				59	59	59	59	60	60	60	60	60	60	60	60	61	61	61	62	63	63	64	65	66	66	67	68	69	70	70	71	72	73	74	74	75	76	77	
91					60	60	60	60	60	60	60	60	60	60	61	61	61	62	62	63	63	64	65	66	66	67	68	69	70	71	71	72	73	74	75	75	76	77	78
92					60	60	60	60	61	61	61	61	61	61	61	61	62	62	63	63	64	64	65	66	66	67	68	69	70	71	71	72	73	74	75	75	76	77	78
93						61	61	61	61	61	61	61	61	61	62	62	62	63	63	64	64	65	66	66	67	68	68	69	70	71	71	72	73	74	75	75	76	77	78
94						62	62	62	62	62	62	62	62	62	62	62	62	63	63	64	65	65	66	66	67	68	68	69	70	71	71	72	73	74	75	75	76	77	78
95						62	62	62	62	62	62	62	62	62	62	63	63	63	64	64	65	65	66	67	67	68	68	69	70	71	71	72	73	74	75	75	76	77	78
96						63	63	63	63	63	63	63	63	63	63	63	63	64	64	64	65	66	66	67	67	68	69	69	70	71	72	72	73	74	75	76	76	77	78
97						63	63	63	63	63	63	63	63	64	64	64	64	65	65	65	66	66	67	67	68	68	69	70	70	71	72	73	73	74	75	76	77	77	78
98							64	64	64	64	64	64	64	64	64	64	65	65	66	66	66	67	67	68	68	69	69	70	71	72	72	73	74	74	75	76	77	77	78
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100							65	65	65	65	65	65	65	65	65	66	66	66	66	67	67	67	68	68	68	69	70	70	71	72	72	73	74	75	75	76	77	77	78
101															66	66	66	66	67	67	67	68	68	68	69	69	70	71	71	72	73	73	74	75	76	76	77	78	79
102															66	66	67	67	67	67	67	68	68	69	69	70	70	71	71	72	73	74	74	75	76	76	77	78	79
103															67	67	67	67	67	68	68	68	69	69	69	70	70	71	71	72	73	74	75	75	76	77	78	79	79
104															67	67	67	67	68	68	68	68	69	69	70	70	71	71	72	72	73	74	75	75	76	77	78	79	80
105															67	67	67	68	68	68	68	69	69	69	70	70	71	71	72	73	73	74	75	75	76	77	78	79	80
106															68	68	68	68	68	68	69	69	69	70	70	70	71	71	72	73	73	74	75	76	76	77	78	79	80
107															68	69	69	69	69	69	69	69	70	70	70	71	71	72	72	73	74	74	75	76	77	77	78	79	80
108															69	69	69	69	69	69	70	70	70	70	71	71	72	72	73	73	74	74	75	76	77	78	79	80	81
109															69	69	69	70	70	70	70	70	70	71	71	71	72	72	73	73	74	75	75	76	77	78	79	80	81
110															70	70	70	70	70	70	70	70	70	71	71	71	72	72	73	73	74	75	75	76	77	78	79	80	81

MAXIMUM DISCHARGE AIR TEMPERATURE

60x287 A

Performance Temperature Chart—Roof Unit of Dual System (Saratoga, New Yorker, Imperial)

time to build up to operating temperatures and allow all the under-hood components of the system to be subjected to the under-hood operating temperatures for a period of time.

Paritally close the needle valve, located below the discharge pressure gauge, to minimize oscillation of the discharge gauge pointer. Do not close the needle valve completely since this would prevent the discharge pressure gauge from registering discharge pressure.

Read the discharge pressure on the gauge. This test should be performed with the discharge pressure from 190 to 210 psi. The 190 to 210 pound-pressure is for test purposes only. These pressures change according to the ambient temperature, humidity and the efficiency of the entire system.

Take the necessary steps to bring and maintain the discharge pressure within these limits.

To increase the discharge pressure, restrict the air flow across the condenser using cardboard, paper, etc. In high ambient temperatures and high humidity areas it may be necessary to put an electric fan in front of the condenser in order to keep the pressure down to these limits.

b. Determination of Trunk Unit Performance

Observe and record both the "Inlet Dry Bulb Temperature" and "Inlet Wet Bulb Temperature" as registered on the psychrometer.

Observe and record the "Discharge Air Temperature" registered by the thermometer at the right-hand grille outlet.

From the appropriate Trunk Unit Performance Temperature Chart for car and type installation being tested, Pages 34 through 41, determine the maximum allowable discharge air temperature for prevailing "Dry" and "Wet" bulb temperatures. If the car's discharge air temperature is at or below the temperature given on the performance chart, the trunk unit is delivering its rated cooling capacity.

If the discharge air temperature at the outlet grille is above the maximum allowable on the Performance Chart, test the trunk unit expansion valve.

13. ROOF UNIT PERFORMANCE TEST

The method used to test the roof unit of a dual installation is essentially the same as for a front unit. The front unit should be tested before testing the roof unit. When testing the roof unit of a dual system, turn the front unit off by pushing the "OFF" button. Connect a jumper from the positive terminal of the battery to the compressor so that the refrig-

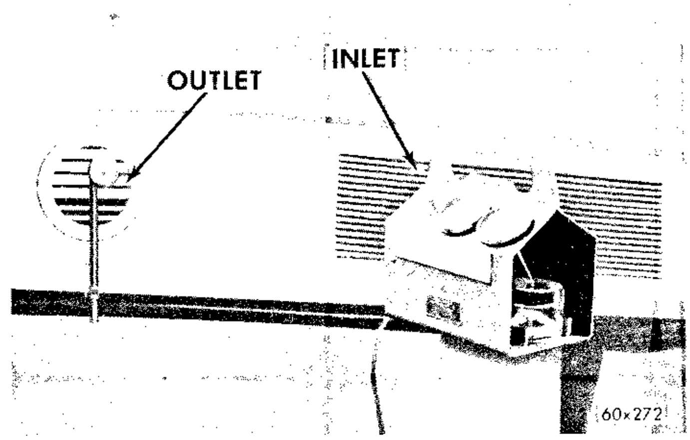

Fig. 45—Roof Unit Performance Test

eration part of the entire system can be operated without air-flow through the front unit.

a. Test Preparation

Open the car windows, adjust engine speed to 1250 rpm and close the car hood. Turn the roof unit blower motor switch to high-speed position.

Place the motor-driven psychrometer (Tool C-3704) near the roof unit air inlet grille and a thermometer (Tool C-3623) in the right-hand air outlet grille, as shown in Fig. 45.

Operate air-conditioning system until a stabilized condition on the gauges and thermometers has been established. One of the most important factors in making the over-all performance test is that the engine must be operated at 1250 rpm for a sufficient time to build up to operating temperatures and allow all the under-hood components of the system to be subjected to the under-hood operating temperatures for a period of time.

Partially close the needle valve, located below the discharge pressure gauge, to minimize oscillation of the discharge gauge pointer. Do not close the needle valve completely since this would prevent the discharge pressure gauge from registering discharge pressure.

Read the discharge pressure on the gauge. This test should be performed with the discharge pressure from 190 to 210 psi. The 190 to 210 pound-pressure is for test purposes only. These pressures change according to the ambient temperature, humidity and the efficiency of the entire system.

Take the necessary steps to bring and maintain the discharge pressure within these limits.

To increase the discharge pressure, restrict the air flow across the condenser using cardboard, paper, etc. In high ambient temperatures and high humidity areas, it may be necessary to put an electric fan in front of the condenser in order to keep the pressure down to these limits.

b. Determination of Roof Unit Performance

Observe and record both the "Inlet Dry Bulb Temperature" and "Inlet Wet Bulb Temperature" as registered on the psychrometer.

Observe and record the "Discharge Air Temperature" registered by the thermometer at the right-hand grille outlet.

From the appropriate Roof Unit Performance Temperature Chart for car and type installation being tested, Pages 34 through 41, determine the maximum allowable discharge air temperature for prevailing "Dry" and Wet bulb temperature. If the discharge air temperature is at or below the temperature given on the Performance Chart, the roof unit is delivering its rated cooling capacity.

If the discharge air temperature at the outlet grille is above the maximum allowable on the Performance Chart, test the roof unit expansion valve.

14. THE EVAPORATOR PRESSURE REGULATOR VALVE TEST

The EPR Valve is calibrated to produce the maximum "cooling" possible without causing frost or ice on the evaporator fins and tubing. If for any reason the factory calibration has been disturbed, the EPR valve may restrict the flow of refrigerant at an evaporator pressure which is either too high for maximum performance or too low to prevent coil freeze up.

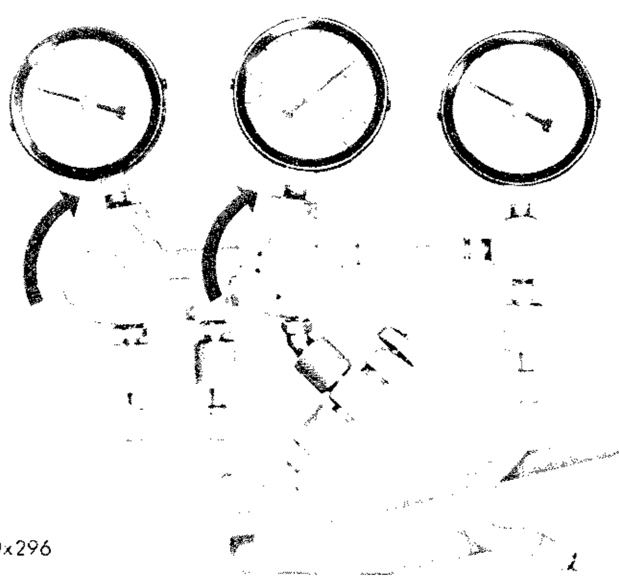

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Fig. 46—Pressure, EPR Valve Open

The evaporator pressure regulator test determines whether or not the valve is functioning properly. It is suggested that you review the functional description of the EPR valve as outlined in Paragraph 8-B, C, and D before proceeding with this test.

EPR Valve Test Conditions

Normally, this test is performed after completion of the Over-All Performance Test. The gauge set manifold will be connected as illustrated in Figure 28.

Adjust engine speed to 1250 rpm. **Close the hood for this test.** Close the car windows and turn the blower on "HIGH." Push the "FRESH COOL" button.

The heat load on the evaporator will soon call for continuous operation of the refrigeration system. The "EPR" valve will open and the pressure at both the suction port and the compressor inlet service port will be approximately the same. It is normal for the Compressor Inlet pressure to be slightly lower than the evaporator suction pressure.

Observe the evaporator suction gauge and the compressor inlet gauge. Both should register 31 psi (Fig. 46), or slightly higher. This indicates that the EPR valve is open. The next step is to determine the minimum evaporator suction pressure maintained in the suction line by the EPR valve. EPR valve action can be accelerated by reducing the heat load on the evaporator. This is accomplished by pushing the blower control switch to the "LOW SPEED" position, thus reducing the volume of air passing through the evaporator. Push the "MAXIMUM COOL" button. Immediately, the evaporator will start to get colder.

As soon as the blower switch is changed to low speed, and the "MAXIMUM COOL" button is pushed, it is necessary to watch both suction gauges for the following reactions:

1. Pressure registered at the evaporator suction gauge will become progressively lower.

2. At the same time, the compressor inlet gauge will start to fluctuate. This fluctuation is caused by the alternate opening and closing of the "EPR" valve. It indicates that suction pressure is reduced to the point where it just about balances the internal spring pressure on the diaphragm. The EPR valve is actually operating as a modulating valve.

3. When fluctuation at the compressor inlet gauge stops and the pressure registered drops steadily, the "EPR" valve is maintaining minimum suction line pressure. Allow pressure registered at the compres-

sor inlet gauge to drop to 15 psi or lower, then read the evaporator suction gauge. (Refer to Fig. 47.)

NOTE: If, and only if, the compressor inlet pressure will not pull down to 15 psi, increase engine speed to approximately 2000 rpm.

4. Suction gauge pressure should be 22 to 31 psi. This indicates that the suction pressure maintained by the "EPR" valve is correct. Again, determine the pressure at which the valve is fully open.

5. Turn the blower on high and push the "FRESH COOL" button to increase the heat load on the evaporator. This will increase suction pressure, causing the "EPR" valve to open fully.

6. Watch both the evaporator suction and the compressor inlet pressure gauge. The pressure registered at the compressor inlet gauge will increase quite rapidly. Both suction gauges should again stabilize at a pressure of 31 psi or slightly higher within a few minutes.

If the minimum suction pressure registered (Step 4, above) is 22 to 31 psi and the suction pressure registered with the valve fully open (Step 6 above) is 31 psi or slightly higher, the EPR valve is functioning normally. A system which passes both the Over-All Performance Test and the "EPR" Valve Test requires no further tests.

Suction Pressure Above 31 psi. If the minimum suction pressure is higher than 31 psi (Step 4, above), the evaporator will not get as cold as it should for maximum performance. It will be necessary to replace the EPR valve, repeat the EPR Valve Test and the Performance Test.

Suction Pressure Below 22 psi. If suction pressure goes below 22 psi (Step 4, above), the evaporator is too cold. The correction is to replace "EPR" valve and repeat the "EPR" Valve Test.

If the system failed to pass the Over-All Performance Test but passed the "EPR" Valve Test, proceed with the Compressor Capacity Test.

15. THE COMPRESSOR CAPACITY TEST

The Over-All Performance Test and the Evaporator Pressure Regulator Valve Test should be performed before testing compressor capacity. These tests are made with the system fully charged with refrigerant. It is necessary to discharge the system before making the Compressor Capacity Test. It is also necessary to discharge the system in order to perform the Expansion Valve Test. It is recommended that tests be made in the order in which they are pre-

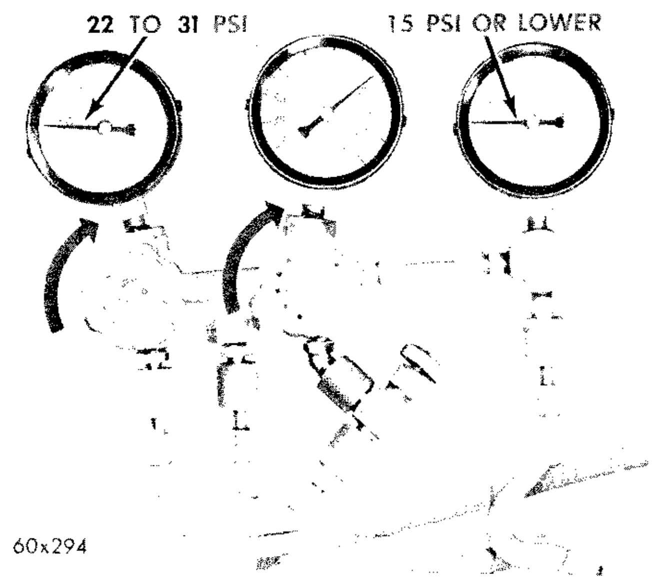

Fig. 47—EPR Valve Test Pressures

sented in this manual. Experience has proven this to be the surest and quickest way to locate and correct the cause of unsatisfactory performance.

If the Compressor Capacity Test is performed immediately after completing the Evaporator Pressure Regulator Valve Test, the compressor will be up to operating temperature and most of the refrigerant oil will have been returned to the compressor crankcase.

If the system has been standing any length of time, it will be necessary to perform the following operations before starting the Compressor Capacity Test:

1. Attach the gauge set manifold.

2. Start the engine and adjust speed to 1250 rpm.

3. Pull blower switch to "HIGH" position, move temperature control to "OFF" and push "FRESH COOL" button.

4. Allow air-conditioning system to operate at full capacity for at least 15 minutes. This will cause most of the compressor oil in the system to be returned to the compressor crankcase.

It will also insure that the compressor is up to operating temperature, which is very important when making this test.

a. Discharge the System

When making the Compressor Capacity Test the compressor must be disconnected from the rest of the system. That means the system must be discharged.

1. Lead the manifold discharge hose into an exhaust ventilation system or to the outside of the building so the service area will not be filled with refrigerant vapor.

2. Fully open the manifold needle valve.

3. Open the discharge (right-hand) gauge valve a small amount. This will allow the refrigerant vapor to discharge **slowly.**

CAUTION

Do not open the valve fully and allow the system to discharge rapidly, since this would sweep some of the refrigerant oil out with the refrigerant.

4. Allow system to discharge until discharge pressure gauge registers zero.

5. Open the suction (left-hand) gauge valve to release any vapor trapped at the suction side.

b. Test Preparation and Connections

After the system is completely discharged, isolate the compressor and connect the gauge set manifold as follows:

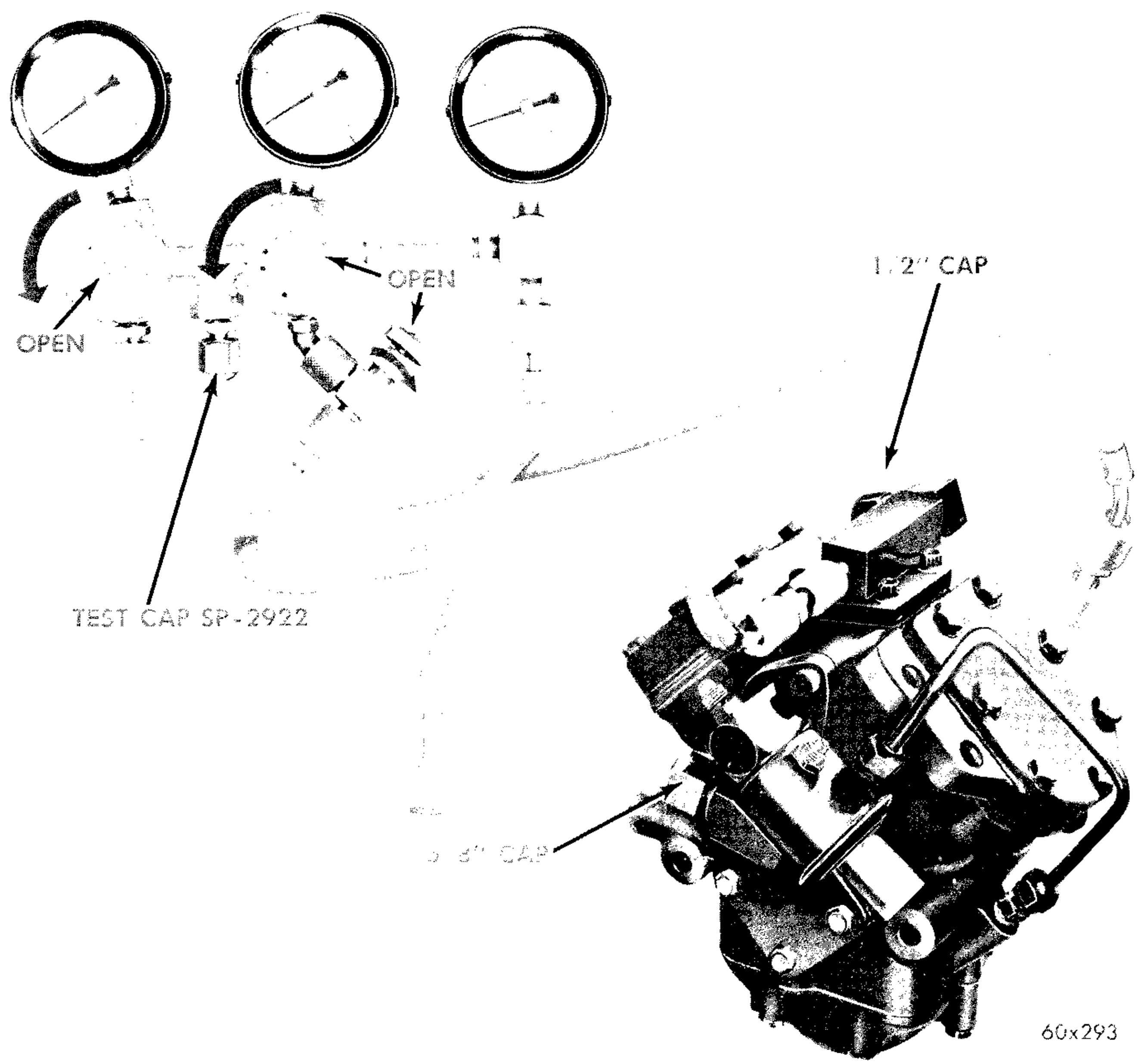

Fig. 48—Compressor Test Connections

1. Disconnect the discharge (muffler) line from the compressor discharge adapter. Cap the discharge adapter outlet with a ½″ flare fitting cap. Seal the muffler line.

2. Disconnect the evaporator suction line (hose) from the "EPR" valve. Use a ⅝″ flare fitting cap to close off the suction line fitting of the EPR valve. Seal the suction line.

The compressor is now isolated from the system and sealed at both the suction and the discharge sides. Refer to Figure 48, and make the following gauge set manifold connections:

3. Disconnect the test hose and adapter from the compressor inlet port.

4. Remove the valve body from the compressor inlet port. Tire valve stem Tool C-3788 can be used for this purpose.

5. Disconnect the test hose and adapter from the suction service port of the "EPR" valve.

6. Install test cap (SP-2922) at the center manifold outlet.

NOTE: Be sure the test cap is perfectly clean. Particles adhering to the cap or the metering orifice can restrict flow and cause false readings. Never use a wire or probe of any kind to clean the cap. Wash it with clean solvent and blow dry with compressed air.

7. Make sure both the left and right gauge valves are open. The compressor can now be operated as an air pump. Air will be drawn in through the compressor inlet port, compressed and delivered (through the test hose attached to the discharge port) to the gauge set manifold. Compressor capacity is determined by noting the pressure registered at the discharge gauge when the compressor is driven at an engine speed of **exactly** 500 rpm. **THE TACHOMETER USED MUST BE ACCURATE.** Compressor capacity test results are dependent upon controlling engine speed at **exactly** 500 rpm.

c. Test Pressures and Results

1. Start the engine and adjust speed to exactly 500 rpm.

2. Slowly close the left-hand gauge valve. Refer to Figure 49. All air delivered by the compressor will now be discharged through the metering orifice in the test cap. Pressure registered at the discharge gauge should build up to at least 190 psi.

3. The load on the compressor may affect engine speed. If necessary, readjust engine speed to **exactly** 500 rpm. Discharge pressure should build up to a minimum of 190 psi.

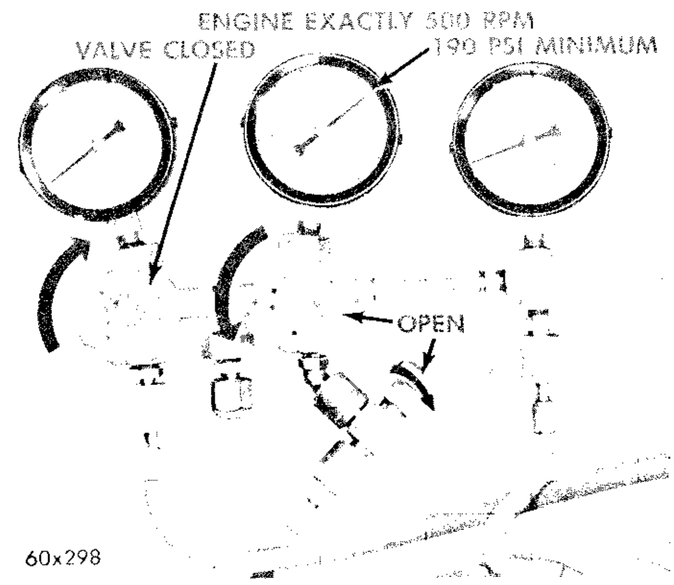

Fig. 49—Compressor Test Pressures

4. Open the left-hand gauge valve momentarily to allow pressure to drop. Then close the valve to make sure pressure again builds up to a minimum of 190 psi with the engine operating at 500 rpm.

CAUTION

To prevent possible compressor damage from excessive heat, do not operate compressor more than a total of five minutes.

If the compressor does not develop a minimum of 190 psi at 500 engine rpm, both compressor valve plate assemblies and gaskets must be replaced. (See "Compressor Service Instructions," Paragraphs 22 and 23.) After repair, the compressor capacity must be tested before charging the system and repeating the Over-All Performance Test.

A compressor that consistently builds up to a minimum of 190 psi at **exactly** 500 engine rpm is delivering rated capacity. Reconnect the evaporator suction line to the EPR valve, and the discharge line (muffler) to the compressor discharge adapter. When connecting these lines use a new gasket, and lubricate both male and female threads and the turning surface of the female flare nut with **refrigerant oil.** Proceed with the Expansion Valve Test.

16. THE EXPANSION VALVE TEST

The following procedure permits testing the expansion valve without removing it from the system. This test is made with the system completely discharged.

When testing the expansion valves on dual installations (front and rear units) **each expansion valve**

must be tested separately. To test the expansion valve of the front unit, disconnect and cap the liquid and suction lines leading to the rear unit evaporator and expansion valve. To test the expansion valve of the rear unit, disconnect and cap the liquid and suction lines leading to the front unit evaporator and expansion valve. IT IS ABSOLUTELY NECESSARY FOR THE COMPRESSOR TO PASS THE COMPRESSOR CAPACITY TEST **BEFORE** TESTING THE EXPANSION VALVE IN ITS INSTALLED POSITION.

A compressor which does not pass the compressor capacity test may have leaking reed valves or a fractured head gasket. Such a leak would allow refrigerant gas, used in the expansion valve test, to leak from the discharge side of the compressor back into the suction side of the compressor. An internal leak between the discharge and suction side of the compressor will upset the expansion valve test results.

a. Test Preparations and Connections

1. Close both the left and right gauge set manifold valves. Open the manifold needle valve.

2. Install a 1/4″ connector and a 1/4″ tee fitting at the left side of the gauge manifold. Install the test cap (Tool SP-2922) on the tee fitting, and connect the test hose to the lower end of the tee fitting.

3. Connect the other end of the suction test hose to the suction service port, using the special adapter to keep the suction service valve open.

4. Connect the discharge test hose to the discharge service port, using a special adapter to hold this service valve open.

5. Connect one end of the long test hose to the center of the gauge manifold, and the other end to the refrigerant dispensing manifold.

6. Close two of the dispensing manifold valves (turn clockwise). Open the remaining dispensing manifold valve (fully counterclockwise). Remove protective cap from opened valve.

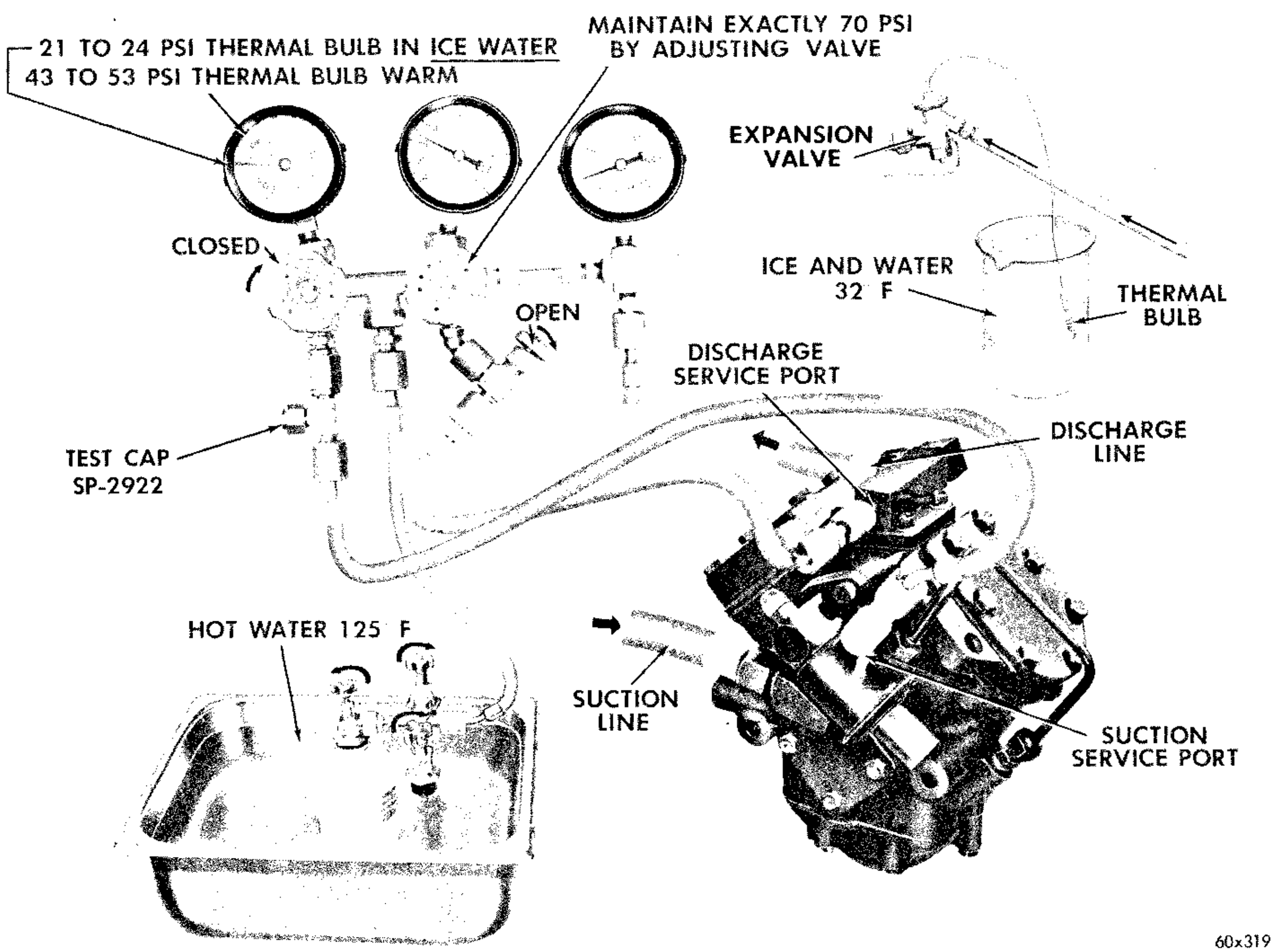

Fig. 50—Expansion Valve Test

7. Screw a refrigerant can to the opened manifold valve, and tighten 6 to 8 foot-pounds maximum. Tighten the manifold locking nut against the shoulder of the can, again using 6 to 8 foot-pounds maximum to insure a good seal.

8. Turn the manifold valve (above the refrigerant can) **completely clockwise** to puncture the can. This also closes the valve and seals the refrigerant in the can.

This completes all test connections necessary for the expansion valve test. Check the test set-up against those illustrated in Fig. 50.

Then, proceed with the following preparation steps:

9. Remove the grommet retainer and grommet, located behind the expansion valve, from the evaporator housing.

10. Remove the expansion valve thermal bulb from its well inside the evaporator housing.

11. Prepare a large pan of water heated to 125 degrees F. and place the refrigerant can upright in the water. Use enough water to provide the heat necessary to insure ample refrigerant pressure throughout this test.

12. Prepare a container of ice and water to provide a known temperature of 32 degrees F. This will be used to test the expansion valve in its "minimum flow" position.

NOTE: Under extreme conditions of high heat and humidity the temperature of the ice and water may not be reduced to 32 degrees F. Use a thermometer to test the actual temperature. If it is necessary to lower the temperature of the ice and water, add small quantities of salt while stirring until the desired temperature of 32 degrees F. is obtained.

b. Maximum Flow Test—Thermal Bulb Warm

1. Warm the thermal bulb by holding it in your hand. This will produce the same effect as a warm evaporator . . . it will open the expansion valve for maximum flow.

2. Open the **refrigerant manifold valve** (fully counterclockwise) to allow refrigerant vapor to flow to the gauge set manifold.

3. Adjust the right-hand gauge set manifold valve to maintain **exactly** 70 psi on the discharge gauge.

4. The suction gauge should register 43 to 53 psi when pressure registered at the discharge gauge is maintained at **exactly** 70 psi. An expansion valve that passes this test is performing up to specifications for maximum flow. Next, test for "minimum flow".

c. Minimum Flow Test—Thermal Bulb at 32° F.

1. Close the right gauge valve to reduce pressure on the expansion valve. This will accelerate movement of the valve toward the "minimum flow" position.

2. Insert the thermal bulb in the container of ice and water. Use sufficient ice to insure a water temperature of 32° F. This will cause the expansion valve to move to the "minimum flow" position.

3. Adjust the right gauge valve to maintain exactly 70 psi as registered at the discharge pressure gauge.

4. The suction gauge should register 21 to 24 psi when discharge pressure is maintained at **exactly** 70 psi.

d. Test Results and Corrections

If the expansion valve does not pass these tests, it must be replaced. For detailed instructions on expansion valve replacement, refer to Paragraph 30.

An expansion valve which passes the above tests has the proper super heat setting, the proper pressure limit calibration, the correct rated capacity and has not lost its thermal bulb charge. Therefore, it will give satisfactory performance.

Since the system is without refrigerant, it is good

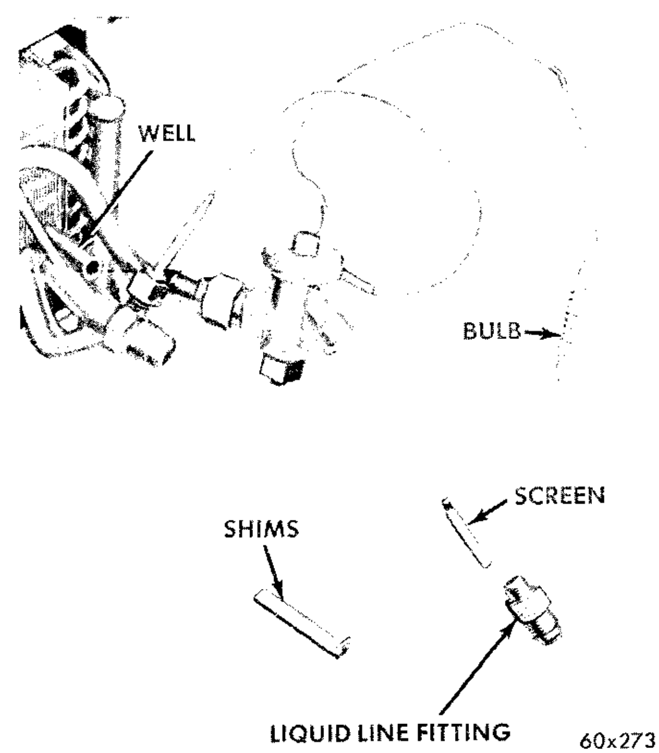

Fig. 51—Expansion Valve Details

practice to remove the expansion valve inlet screen, clean it if necessary and reinstall it before charging the system. (Refer to Fig. 51.) Clean the thermal bulb, the thermal bulb well and the brass thermal bulb wedging strips. Wedge the bulb into its well so that the brass strips wedge the bulb against the suction line. The fit must be mechanically tight and all surfaces clean to insure good thermal contact.

Install the rubber grommet and the grommet retainer at the evaporator housing. To put the system into operation it will be necessary to sweep, test for leaks, vacuum and recharge the system.

GENERAL SERVICE INSTRUCTIONS

17. SAFETY PRECAUTIONS

The refrigerant used in all 1960 air-conditioning installations is Refrigerant 12. It is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of 21.7 degrees F. below zero, it will be a vapor at all normal temperatures and pressures. The vapor is heavier than air, non-flammable and nonexplosive. It is nonpoisonous except when it is in direct contact with open flame. It is noncorrosive except when combined with water. It is a safe refrigerant. The following precautions, however, must be observed when handling Refrigerant 12.

CAUTION

Wear safety goggles when servicing the refrigeration system.

Refrigerant 12 evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes.

Always wear safety goggles (Tool C-3355) when servicing the refrigeration part of the air-conditioning system. Keep a bottle of sterile mineral oil and a weak solution of boric acid handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. Refrigerant 12 is rapidly absorbed by the oil. Next, wash the eyes with the weak solution of boric acid. Call your doctor immediately even though irritation has ceased after first aid treatment.

CAUTION

Do not heat Refrigerant 12 above 125 degrees F.

In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant. A bucket or large pan of hot water not over 125 degrees F. is all the heat required for this purpose. Do not heat the refrigerant container with a blow torch or any other means that would raise temperature and pressure above this temperature. Do not weld or steam clean on or near the system components or refrigerant lines.

CAUTION

Keep Refrigerant 12 containers upright when charging the system.

When metering Refrigerant 12 into the refrigeration system, keep the supply tank or cans in an upright position. If the refrigerant container is on its side or upside down, liquid refrigerant will enter the system and damage the compressor.

CAUTION

Always work in a well-ventilated room.

Always maintain good ventilation in the working area. Always discharge the refrigerant into the service bay exhaust system or outside the building. Large quantities of refrigerant vapor in a small, poorly ventilated room can displace the air and cause suffocation.

Although Refrigerant 12 vapor is normally nonpoisonous, it can be changed into a very poisonous gas if allowed to come in contact with an open flame. Do not discharge large quantities of refrigerant in an area having an open flame. A poisonous gas is produced when using the flame-type leak detector. Avoid inhaling the fumes from the leak detector.

CAUTION

Do not allow liquid refrigerant to touch bright metal.

Refrigerant will tarnish bright metal and chrome surfaces. Avoid splashing refrigerant on any surface. Refrigerant in combination with moisture is very corrosive and can cause great damage to all metal surfaces.

18. HANDLING TUBING AND FITTINGS

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system. High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The following precautions must be observed:

The system must be completely discharged before opening any fitting or connection in the refrigeration system. Open fittings with caution even after system has been discharged. If any pressure is noticed as a fitting is loosened, allow trapped pressure to bleed off very slowly. Use a suitable tube bender (Tool C-3362) when bending the refrigerant lines to avoid kinking. Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing.

A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose. Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so that they are at least 3 inches from the exhaust manifold. It is good practice to inspect all flexible hose lines at least once a year to make sure they are in good condition and properly routed.

Always use **new** copper gaskets. When reconnecting lines, apply a liberal coating of **refrigerant oil** (Fig. 52) to the threads of both parts, particularly to the flare surfaces of the tube and the nut. This will allow the flare fittings to seat squarely and provide proper tightening.

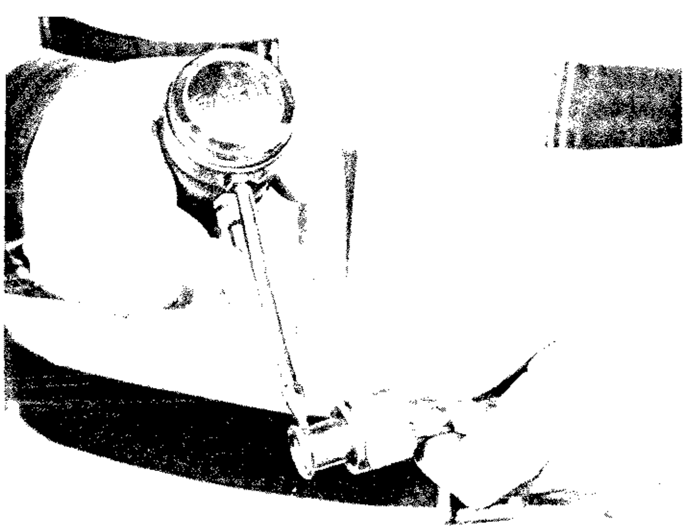

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Fig. 52—Lubricate with Refrigerant Oil

The use of proper wrenches (Tools C-3358 and C-3363) when making connections is very important. Improper wrenches or improper use of wrenches can damage the fittings. Always use two wrenches when loosening or tightening flare tube fittings to prevent distorting of lines and components. When connecting the flexible hose lines, the swaged fitting, the flare nut and the flare coupling should be held to prevent rotation of the swaged fitting and possible damage to the seat.

The internal parts of the refrigeration system will remain in a state of chemical stability as long as pure-moisture-free Refrigerant 12 and refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability and cause operational troubles or even serious damage if present in more than minute quantities.

When it is necessary to open the refrigeration system, have everything you will need to service the system ready so that the system will not be left open any longer than necessary. Cap or plug all lines and fittings as soon as they are opened to prevent the entrance of dirt and moisture. All lines and components in parts stock should be capped or sealed until they are ready to be used.

All tools, including the refrigerant dispensing manifold, the gauge set manifold and test hoses should be kept clean and dry.

The special refrigeration oil supplied for the system is as clean and dry as it is possible to make it. **Only refrigeration oil** should be used in the system or on the fittings and lines. The oil container should be kept tightly capped until it is ready for use, and then tightly capped after use to prevent entrance of dirt and moisture. Refrigerant oil will quickly absorb any moisture with which it comes in contact.

19. COMPRESSOR DRIVE BELT ADJUSTMENT

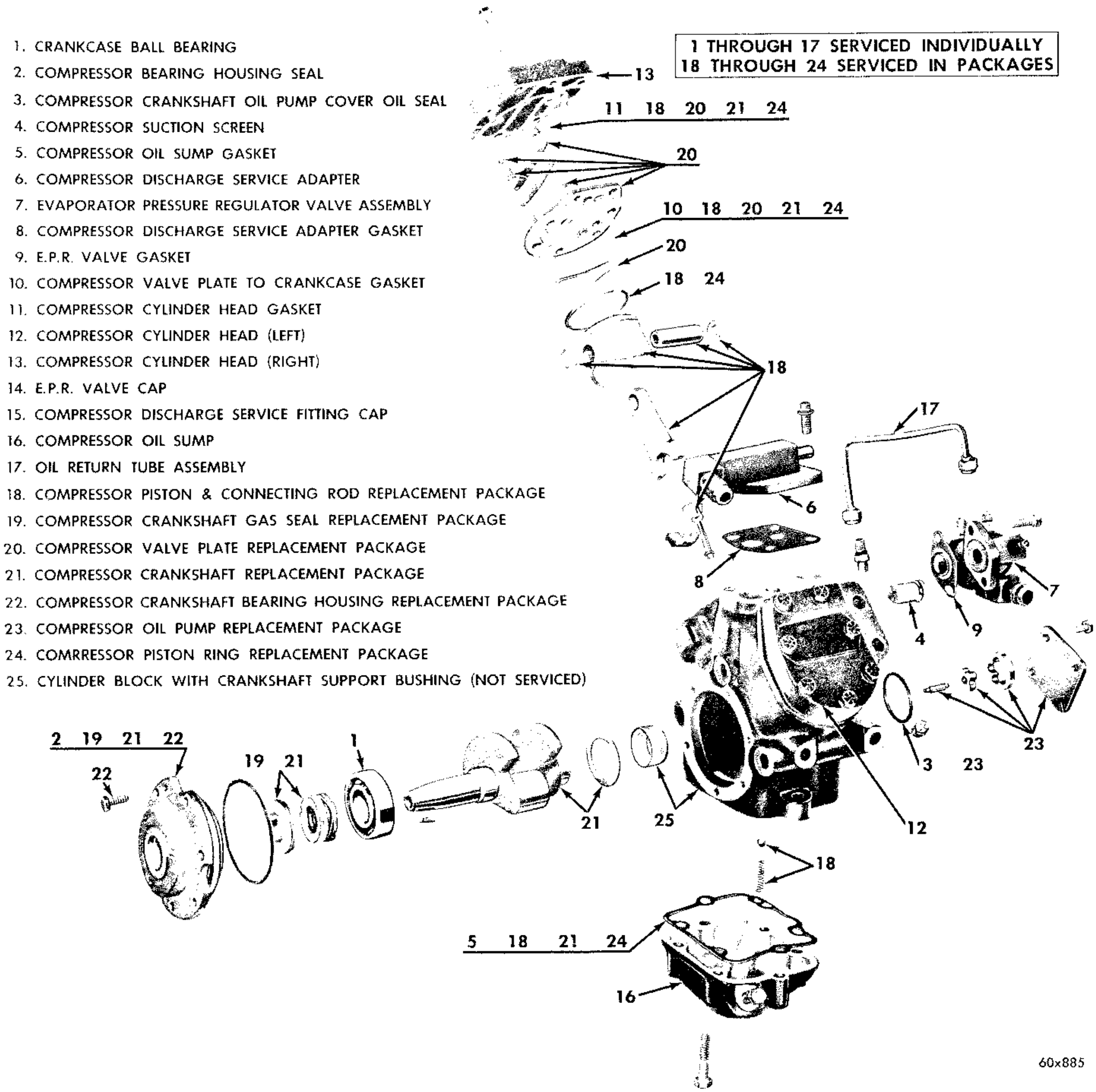
Satisfactory performance of the air-conditioning system is dependent upon drive belt condition and tension. If the proper tensions are not maintained, belt slippage will greatly reduce air-conditioning performance and drive belt life. To avoid such adverse effects, the following service procedure should be followed:

(1) Any belt that has operated for a minimum of a half-hour is considered to be an "in use" belt. Adjust air-conditioning drive belts at the time of new-car preparation. If the torque method is used, tension should be 40 foot-pounds for models equipped with

the 318 cubic-inch engine; 35 foot-pounds for all other V-8 engines. If the deflection method is used, deflection should be 1/4 inch at the mid-point under a 5-pound load for the 318 cubic-inch engine, and 3/8 inch for all other V-8 engines.

(2) Measure the drive belt tension at regular service intervals, using the deflection method, and re-adjust as needed.

(3) On all new-belt installations, new-belt tension specifications should be used when the belt is first installed to obtain proper tension. Thereafter, these replacement belts should be serviced according to the above procedure. Always replace belts in pairs, otherwise the old belt will have insufficient tension and the load will be primarily on the new belt. The torque method of adjusting new belts is preferred. Proper tension for new belts is 65 foot-pounds for all models.



60x885

Fig. 53—Compressor, Disassembled

If the deflection method is used, deflection at the mid-point should be 1/8 inch for De Soto models and Chrysler Windsor; 1/4 inch for other Chrysler and Imperial models.

20. ANTIFREEZE RECOMMENDATIONS

The Air-Conditioning System requires the engine's cooling system to be protected to +15° F. with a permanent type antifreeze for summer operation. This is to prevent freezing of the coolant in the heater core.

In the springtime, after the winter's operation with the cooling system protected with permanent-type antifreeze for the temperatures of the area, it is suggested the system be drained and flushed out with water. When draining, flushing and refilling, have the temperature control lever in the extreme hot position so the heater core is drained, flushed and refilled. Install a gallon of permanent-type antifreeze in the system, and add enough water to fill the system.

Do not re-use the old antifreeze. The permanent antifreeze does not lose its antifreeze qualities during the winter season operation, but the chemical inhibitors for rust and corrosion prevention are weakened and finally exhausted by extended use. Do not add new inhibitor to used antifreeze in hope of re-vitalizing the used antifreeze.

The chemical inhibitors come in various chemical compositions; some are compatible, some neutralize each other, and some form violent reactions to each other causing foaming and other undesirable reactions.

Play it safe and use new permanent-type antifreeze.

Bug Screens

Bug screens should not be installed on cars equipped with air conditioning. A bug screen installed in front of the condenser will reduce air flow and affect air-conditioning performance. Under severe heat conditions a bug scren may cause the engine to overheat.

21. RADIATOR PRESSURE CAP REQUIREMENTS

It is absolutely necessary for the 1960 air-conditioned car to be equipped with a 15 to 16 psi radiator cap. A cap testing below these specifications will result in loss of coolant under severe operating conditions. For detailed instructions on testing the radiator cap, refer to Paragraph 10d.

22. SERVICING THE COMPRESSOR

The compressor is a two-cylinder, reciprocating-type designed specifically for the Chrysler Air-Conditioning System. Service parts are available so that the compressor can be repaired in the field.

Fig. 53 is a disassembled view of the compressor, with a key to the parts serviced individually and in service packages. Nomenclature key numbers 1 through 17 designate parts which are serviced individually. Numbers 18 through 24 designate service packages which include two or more service parts.

For example, key number 11 refers to the compressor cylinder head gasket which is serviced separately. Key number 18 indicates that the compressor cylinder head gasket is also included in the compressor piston and connecting rod replacement package. Note that the cylinder head gasket is also included in service packages described under key numbers 20, 21 and 24.

CAUTION

The refrigerant oil used in the compressor is carried through the entire system by the refrigerant. Some of this oil will be trapped and retained in the system when the refrigerant is discharged for testing or unit replacement. If the compressor is to be removed for repair or replacement, measure the refrigerant oil level in the compressor before the compressor is removed from the car so that the same level can be established when the new or repaired compressor is installed on the car. Too much refrigerant oil in the system can cause abnormal operating pressures and reduce the performance of the entire system.

Complete disassembly and assembly of the compressor must be performed with the compressor removed from the car. However, on some models the valve plate and crankshaft gas seal assemblies can be replaced with the compressor installed on the car.

CAUTION

The system must be completely discharged before attempting to perform any disassembly or repair service to the compressor.

Cleanliness is extremely important. The work area must be clean and free of air-borne dust and dirt. All parts must be thoroughly cleaned and blown dry before reassembly.

Do not use air to dry the crankshaft front main bearing. Wash the bearing in **clean** mineral spirits and shake out all excess cleaning fluid. Saturate the bearing with **clean refrigerant oil** and assemble immediately. Any dirt in the front main bearing assembly will cause noisy operation and possible damage to the bearing.

CAUTION

Before reassembly of any unit, all contact surfaces

must be liberally coated with clean refrigerant oil. Refrigerant oil must be kept in sealed container until ready for use to prevent entrance of moisture and dirt. Never use engine oil as a substitute for refrigerant oil.

23. COMPRESSOR

a. Removal

(1) Discharge the system. (Refer to Paragraph 36).

(2) Measure and record refrigerant oil level so that the oil level of a replacement or repaired compressor can be adjusted to the **exact level registered on the dipstick of the compressor removed from the car.**

(3) Remove the suction line from the evaporator pressure regulator valve, and disconnect the discharge line from the discharge adapter.

CAUTION

Plug or cap all lines as soon as they are disconnected to keep moisture out of the system.

(4) Disconnect magnetic clutch-to-control-unit wire.

(5) Loosen and remove compressor pulley belts.

(6) Remove compressor-to-bracket attaching bolts, and remove compressor.

b. Installation

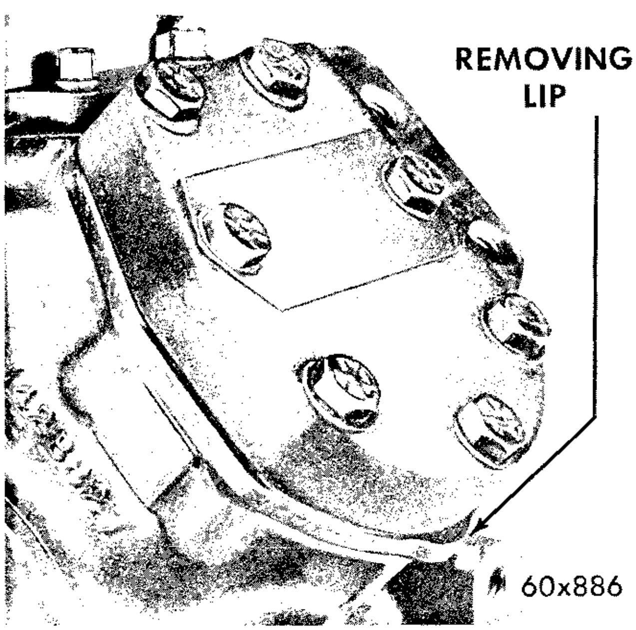


Fig. 54—Valve Plate and Head Removing Lip

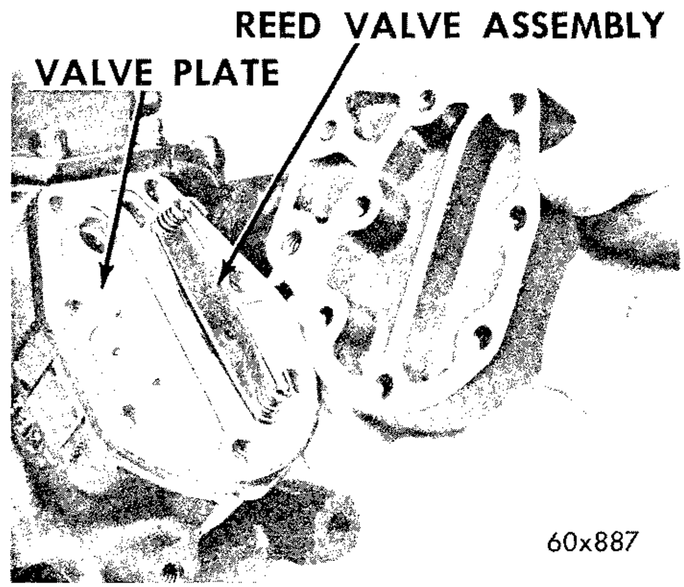


Fig. 55—Valve Plate—Installed Position

CAUTION

When replacing the compressor assembly, the crankshaft should be rotated by hand at least two complete revolutions, to clear oil accumulation from compressor head before the clutch is energized to avoid damaging the compressor reed valves.

(1) Install compressor to bracket, and tighten attaching bolts.

(2) Install compressor pulley belts.

(3) Connect magnetic clutch-to-control-unit wire.

(4) Remove protective caps or plugs, and connect suction line to evaporator pressure regulating valve. Connect discharge line to discharge adapter.

NOTE: After the compressor is installed, it is imperative that the oil level in the compressor be adjusted to the level registered before removing the compressor. If original oil level is not known, adjust level to 2⅝" to 2 13/16" on right-hand mount, and 3" to 3 3/16" on left-center mount.

24. CYLINDER HEAD AND VALVE PLATE ASSEMBLY

a. Removal

(1) Remove the oil return tube from the evaporator pressure regulator valve and compressor.

(2) Remove the cylinder head bolts and the head and valve plate assembly. If the plate does not separate from the head, tap the removing lip on the valve plate lightly with a plastic hammer (see Fig. 54). Do not pry apart.

b. Inspection

After removal of head, plate and gaskets, examine valves. If valves are broken and damage extends to cylinder bores, examine bores to see if they can be repaired by removing light scoring, scuffing or scratches with crocus cloth. After conditioning cylinder bores, clean the surfaces of the cylinder block, valve plate and head thoroughly with mineral spirits.

Use care to remove all shreds of old gasket from plate, block and head surfaces. Clean attaching stud holes in block. If valve plate or cylinder head is damaged, replace, using a complete compressor valve plate replacement package.

c. Installation

(1) The valve plate and cylinder head must be assembled with the reed valve assembly positioned, as shown in Fig. 55.

(2) Dip gaskets in clean refrigerant oil. Using pilot studs as a guide, install valve plate gasket, valve plate, cylinder head gasket and cylinder head, as shown in Fig. 56.

(3) Install attaching bolts. Tighten each bolt alternately and evenly 23-27 foot-pounds torque.

25. PISTON AND CONNECTING ROD

a. Removal

(1) Drain the oil from compressor.

(2) Remove the sump attaching bolts.

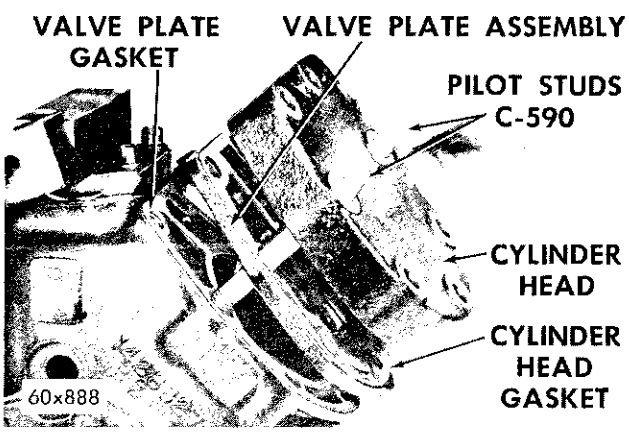


Fig. 56—Installing Valve Plate and Cylinder Head

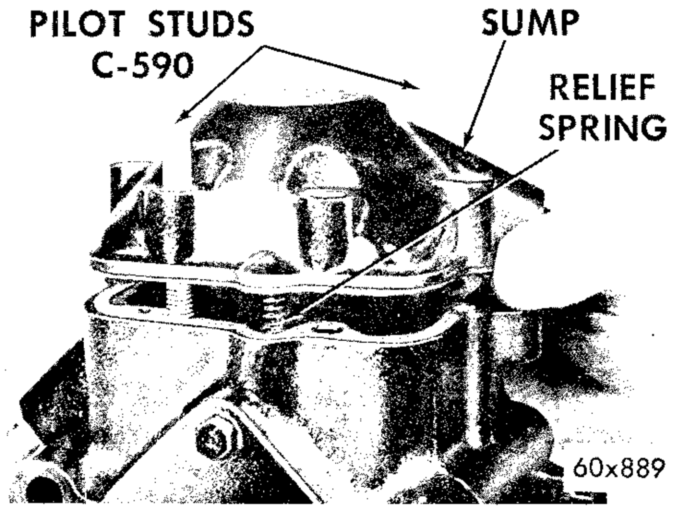


Fig. 57—Installing Sump

(3) Separate the sump from the case by tapping with a plastic hammer being careful not to distort the oil pressure relief spring.

(4) Remove the oil relief spring and (rubber) ball from the crankcase.

(5) Remove cylinder heads and valve plates.

NOTE: Before removing the pistons, rods or rod caps, mark all parts to insure reassembly in original position.

(6) Remove rod caps; remove piston and rod assembly from cylinder.

b. Inspection

Inspect piston and rings for score marks. Inspect rod bearing for pits and for chipping. Replace parts if damaged.

c. Installation

(1) Remove bearing cap and install piston in bore. Use piston ring compressor to prevent ring damage.

(2) Install bearing caps, and tighten screws 52 to 56 inch-pounds torque. Be sure each cap is installed in its original position.

(3) Install valve plates and cylinder heads.

(4) Turn compressor upside down. Install pilot studs, gasket, oil pressure relief ball and spring.

(5) Install sump over pilot studs (Fig. 57), making sure that oil pressure relief spring depresses uniformly as sump is lowered on case.

(6) Tighten sump bolts finger tight to prevent spring misalignment, then tighten 15 to 19 foot-pounds torque.

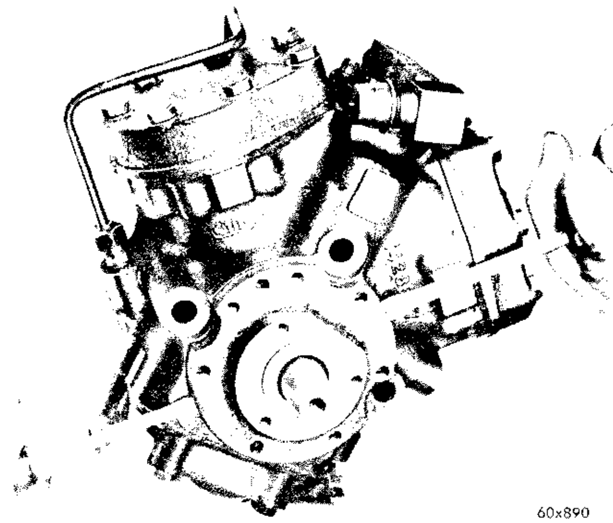


Fig. 58—Crankshaft Bearing Housing Removal

(7) Refill with new refrigerant oil after compressor is installed on car. Do not re-use the oil that was previously drained.

26. CRANKSHAFT BEARING HOUSING AND GAS SEAL

a. Removal

(1) Remove crankshaft housing seal bolts.

(2) Remove bearing housing from case, using two screwdrivers inserted in slots provided to pry housing from case. (See Fig. 58).

(3) Remove the crankshaft bearing housing seal

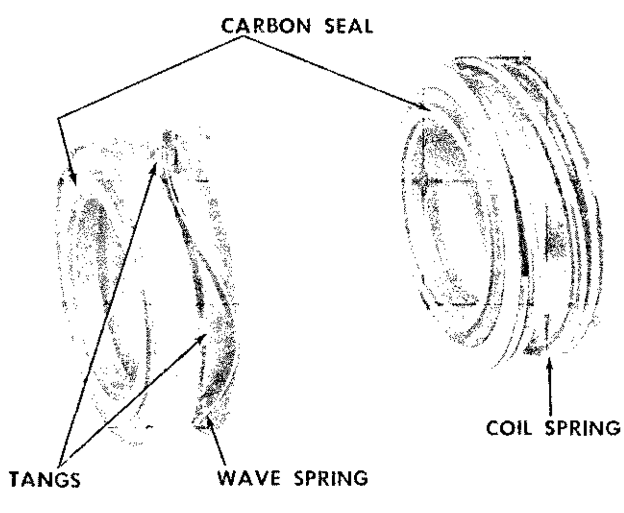


Fig. 59—Gas Seal Identification

Fig. 60—Checking Indexing of Tangs

face plate from the bearing housing. This is part of the gas seal replacement package and must be replaced when the gas seal assembly is replaced.

(4) Remove the gas seal from the crankshaft.

b. Installation

The crankshaft gas seal replacement package consists of the crankshaft gas seal assembly and the crankshaft bearing housing seal face plate. Two types of crankshaft seals are supplied for service, as shown in Fig. 59. If the replacement package contains the cartridge-type seal, follow the entire installation procedure given below. If the replacement package contains the unitized-type seal, steps 1, 2, and 4 will not apply.

(1) Before installing cartridge-type gas seal assembly, check assembly to make sure that tangs index in slots of mating part. This will insure proper spring action. The carbon seal must be assembled, as shown in Fig. 59.

(2) Hold the seal firmly on the outside edge to prevent it from rotating out of the index slots.

(3) Lubricate the crankshaft with refrigerant oil. Slide the seal on the crankshaft with the smooth (carbon seal) surface up, or toward front of the compressor.

(4) When the seal bottoms against the crankshaft bearing, check indexing of tangs again by pressing

down with thumbs to see if it has the proper spring action. (Refer to Fig. 60.)

(5) Lubricate and install the crankshaft bearing housing seal face plate with the smooth (micro-finish) side up. Use a sleeve with the minimum inside diameter of 1$\frac{3}{8}$ inches to avoid damaging the micro-finish sealing surface of the face plate. Tap sleeve lightly until the seal face plate is fully seated in housing.

(6) Install bearing housing oil seal, using plenty of refrigerant oil.

(7) Install housing, making sure that it is in proper alignment with screw holes. The gas seal assembly may be damaged if the bearing housing is rotated after the housing seal contacts the carbon seal.

(8) Install bolts and tighten 10 to 13 foot-pounds torque.

27. CRANKSHAFT AND BALL BEARING

a. Removal

(1) Remove cylinder heads and valve plates.

(2) Remove pistons and connecting rods.

(3) Remove crankshaft bearing housing and gas seal.

NOTE: The pistons and rods must be completely removed before crankshaft removal.

(4) Remove crankshaft and thrust washer from crankcase.

(5) To remove the crankshaft ball bearing, use a small arbor press. Make sure bearing is properly supported before pressing bearing from shaft.

b. Inspection

Clean and inspect all parts. Replace questionable parts as required. If the crankshaft ball bearing is in good condition and clean, protect it against entry of dirt and re-use it. If bearing is serviceable but dirty, or there is evidence of dirt, clean it carefully with mineral spirits and shake dry. Saturate bearing with clean refrigerant oil and assemble immediately. If a new bearing is to be installed, leave it wrapped in its protective package until ready for installation. DO NOT WASH A NEW BEARING ASSEMBLY BEFORE INSTALLATION.

c. Installation

(1) Press crankshaft ball bearing on crankshaft using a sleeve which bears on the inner race **only.**

(2) Install crankshaft, making sure that thrust washer is on rear bearing journal before placing crankshaft in crankcase.

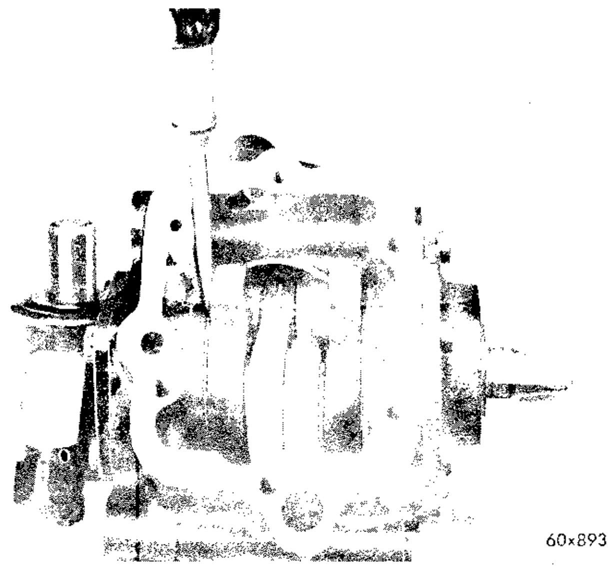


Fig. 61—Checking Crankshaft Axial Movement

(3) Rotate crankshaft to engage oil pump shaft in crankshaft slot.

(4) Install gas seal and crankshaft bearing housing. Use suitable tool, as shown in Fig. 61, to assure free axial movement.

(5) Install pistons and connecting rods.

(6) After pistons and connecting rods are installed, turn crankshaft to check freeness. Shaft should turn without binding.

(7) Install oil sump, valve plates and cylinder heads.

28. OIL PUMP

a. Removal

To remove the oil pump, it is not necessary to drain the refrigerant oil from the crankcase.

(1) Remove the oil pump cover plate and oil seal.

(2) Remove the drive shaft and rotors.

b. Installation

(1) Install oil pump drive shaft by rotating shaft until tang end engages in crankshaft slot.

(2) Install inner rotor on drive shaft, engaging drive.

(3) Install outer rotor, and rotate it until it will slide forward over inner rotor cams. Turn compressor crankshaft with oil pump in this position to determine that rotors do not bind.

(4) Install oil pump cover plate and oil seal.

(5) Tighten bolts 10 to 13 foot-pounds torque.

(6) Rotate crankshaft again to assure free operation.

29. SERVICING THE MAGNETIC CLUTCH

The magnetic clutch (Fig. 62) has the electromagnet incorporated in the pulley assembly, and is identified as the rotating field type. The electrical circuit to the electromagnet is through collector rings and brushes.

a. Testing Electromagnet Current Draw

To test the coil for a short or open circuit, connect an ammeter (0 to 10 amp. scale) in series with a fully charged 12-volt battery and the insulated brush lead. The current draw at 12 volts should be 2.4 to 2.8 amperes.

CAUTION

Do not attempt to remove the electromagnet coil from the pulley. The coil is held in place by a special adhesive material. Once the bond is broken, the coil cannot be reattached.

b. Removal

(1) Loosen and remove the belts.

(2) Remove special locking bolt and washer from compressor crankshaft at front center of clutch.

(3) Insert a 5/8"-18x2 1/8" cap screw into threaded portion of the hub and shoe assembly.

(4) Support clutch with one hand to prevent damaging brushes when removing. Tighten cap screw to pull clutch assembly from compressor crankshaft.

c. Disassembly

(1) Before removing the drive hub snap ring, place a screwdriver in the hub bore to prevent snap ring from flying up. Use Tool C-3301 or equivalent to remove ring.

(2) Insert a 5/8"-18x2 1/2" cap screw in the threaded portion of the hub from the slip ring side of the clutch and remove hub and shoe assembly by tapping against the cap screw with a hammer.

(3) Remove both bearing snap rings from field assembly.

(4) Place the field assembly with the coil side on an arbor press. Place Tool C-3807 against the bearing and press bearing out of field assembly.

NOTE: It is strongly recommended that a new bearing be installed every time the magnetic clutch is disassembled.

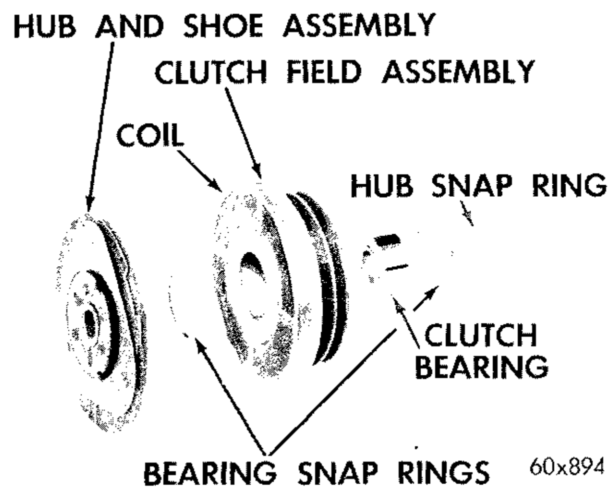


Fig. 62—Magnetic Clutch

d. Assembly

(1) Install a bearing snap ring on the coil side of the field assembly.

(2) Place the field assembly with the coil side down, and insert **new** bearing squarely into the field drive assembly bore. Place Tool C-3807 against the new bearing and press it in place using an arbor press.

(3) Place field assembly with coil side up on Tool C-3807. Start hub and shoe assembly squarely into inner bearing race.

(4) Press hub and shoe assembly in place, using an arbor press.

(5) Install remaining bearing snap ring and hub snap ring.

(6) Using a feeler gauge, measure air gap between the hub and shoe assembly and the field assembly. Air gap should measure .050 - .060 inch. Loosen lock nuts and adjust air gap by turning the three screws on the front face of the hub and shoe assembly. Adjust all screws to obtain an evenly spaced air gap, and tighten lock nuts.

e. Installation

(1) Insert woodruff key in crankshaft.

(2) Align key and keyway and push clutch assembly onto crankshaft.

(3) Install washer and new self-locking bolt, and tighten to 20 foot-pounds torque.

(4) Install belts, and adjust to specified tension.

EXPANSION VALVE, HEATER CORE, EVAPORATOR, BLOWER REMOVAL AND INSTALLATION

30. EXPANSION VALVE

The expansion valve is a factory-calibrated, trouble-free unit. It should not be removed or replaced unless a complete test has proven it to be faulty. It is suggested that you review "The Expansion Valve Test", Paragraph 16, before replacing the expansion valve.

a. Removal

The system must be completely discharged before opening any of the refrigerant lines.

(1) Remove the equalizer line from the evaporator suction line fitting.

(2) Disconnect the valve from the 3/8 inch inlet line and from the 1/2 inch outlet line. Use two flare wrenches to loosen each of these connections.

(3) Remove the grommet retainer and the rubber grommet from the evaporator engine-side housing. Carefully pull the thermal bulb (Fig. 63) and thermal bulb wedging shims from the well located inside the evaporator housing.

b. Installation

Clean the thermal bulb well, wedging shims and thermal bulb before installing the expansion valve. The valve will not function properly unless there is a good thermal contact between the bulb and its well.

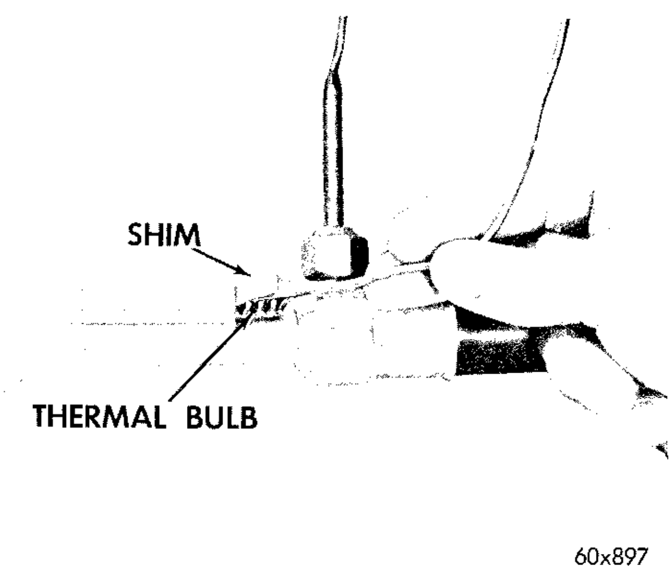


Fig. 63—Thermal Bulb Installed

Clean parts and a tight fit of the bulb in the well will insure good thermal contact.

(1) Install the thermal bulb in its well, using brass wedging strips to insure a tight mechanical fit.

(2) Lubricate all expansion valve and line fittings with clean refrigerant oil. Install the expansion valve, using two flare wrenches to prevent rotation and twisting of lines.

(3) Install the rubber grommet in the housing, and install the grommet retainer.

(4) Connect the equalizer tube to the fitting on the evaporator suction line.

(5) Using two flare wrenches, recheck all connections for tightness.

After the expansion valve is installed, it must be completely tested. Then the system must be checked for leaks and recharged.

31. HEATER CORE

The heater core is located behind a separate cover attached to the evaporator engine-side housing. The core is held in position in its cover by two plastic rivets. The heater core and cover are removed and installed as an assembly. (Refer to Fig. 64.)

a. Removal

(1) Drain the cooling system and remove the heater hoses from the core.

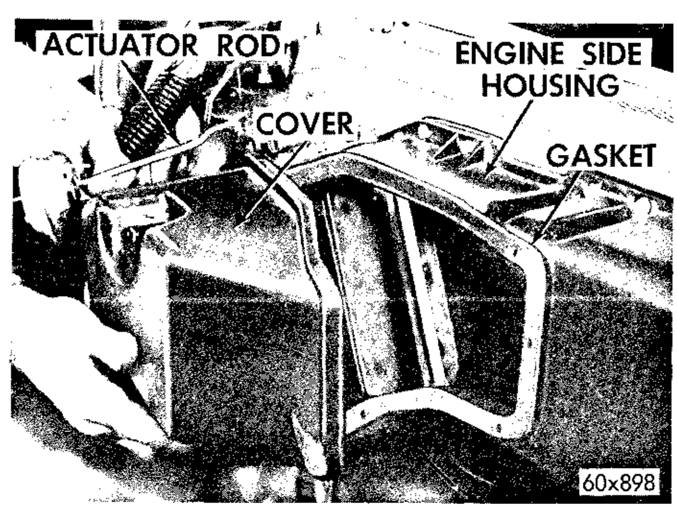


Fig. 64—Heater Core Removal or Installation

(2) Disconnect the by-pass door vacuum actuator rod from the actuator linkage on the engine side housing. Disconnect the vacuum lines from the actuator.

(3) Remove the heater core and cover attaching screws, and lift the entire assembly from the evaporator engine-side housing.

(4) Remove the cover-to-evaporator-housing gasket to expose the two plastic rivets. These are expandable-type rivets. Pull the expanding pin from each of the rivets so the core can be separated from the cover without damaging the rivets.

b. Installation

(1) Position the heater core in its cover and install the two plastic rivets to maintain alignment of these two parts.

(2) Install the rivet expanding pins in the rivets to hold the core and cover assembly together.

(3) Carefully position the gasket between the cover and the engine-side evaporator housing so it will seal both the core-to-cover flange and the cover-to-evaporator-housing joint. Cement the gasket in place to facilitate installation.

(4) Install and tighten the heater core and cover attaching screws. Be careful to maintain gasket alignment to insure an air-tight seal at this point.

(5) Connect the by-pass door actuator rod and vacuum lines.

(6) Connect the heater hoses, and refill the cooling system. For summer operation as well as winter operation, be sure system is protected with proper type and amount of antifreeze.

32. EVAPORATOR ASSEMBLY

The evaporator assembly includes the evaporator core, the cast evaporator housing with fresh-air and recirculating doors, and the evaporator engine-side housing with the heater by-pass door. These sub-assemblies are built up before installation on the car to form a complete unitized evaporator assembly. The unitized evaporator assembly must be removed and installed as a complete assembly. (Refer to Fig. 65.)

a. Removal

(1) Remove the heater core and cover assembly from the evaporator engine-side housing. Remove the temperature control valve capillary from its well in the engine-side housing.

(2) Discharge the refrigerant from the system, and disconnect the expansion valve and the suction

Fig. 65—Evaporator Removal or Installation

line. Cap all refrigerant lines to prevent entrance of dirt and moisture.

(3) Disconnect the recirculating door actuator rod from the recirculating door linkage. This actuator is located on the distribution duct in the passenger compartment. Position the recirculating door linkage so the **fresh-air door** is fully closed.

(4) Remove all 15 evaporator assembly attaching screws. These screws, particularly the ones located along the lower edge of the housing, are difficult to reach. They must all be removed before attempting to pull the evaporator assembly out of the dash panel. A 3/8" drive flexible extension (Tool C-3622) and palm grip ratchet (Tool C-3616) will facilitate removal of the evaporator housing attaching screws. The evaporator assembly can now be pulled from the dash panel. Make sure that the fresh-air door remains closed as the assembly is removed.

It will not be necessary to separate the evaporator housing from the evaporator engine-side housing unless the evaporator core is to be repaired or replaced. To separate these two housings, drill out the tubular rivets. After installation of a new or repaired core, install new gaskets and cement them in place to insure an air-tight seal between the two housings. Reassemble the core in the evaporator housing and then assemble the evaporator housing to the engine-side housing, using tubular rivets.

b. Installation

Before installing the evaporator assembly, inspect the evaporator drains. Make sure they are secure and functioning properly. There is one tubular-type drain valve in the engine-side housing. If this valve sticks in the closed position, condensed moisture will collect in the evaporator. If the valve sticks in the open position, it will allow hot air to leak into the air distribution system. There are four flapper-type valves in the cast evaporator housing. It is recommended that a small piece of tape be used at the rear edge of each of these valves to hold it in place during installation of the evaporator assembly. Also, make sure there is an air-tight seal between the engine-side housing and the cast evaporator housing.

(1) Close the fresh-air door and install the evaporator assembly as shown in Figure 65. Make sure rear edge of rain shield is folded upward.

(2) Install all evaporator assembly attaching screws, and tighten lightly. After all screws are installed, tighten alternately until all are tight. Alternate tightening of the screws will prevent distortion or damage to the assembly.

(3) Install the heater core and cover. Install the temperature control valve sensing bulb in the engine-side housing. Connect the heater hoses.

(4) Reconnect the by-pass door and recirculating door vacuum actuators.

After the evaporator assembly is installed in the car, it will be necessary to connect the expansion valve, sweep the system, test for leaks, and charge the system with the proper amount of refrigerant. It is recommended that the operation of all controls be tested and an over-all performance test be made after repair or replacement of the evaporator assembly.

33. BLOWER AND DISTRIBUTION DUCT

a. Removal

(1) Disconnect the battery ground cable.

(2) Disconnect the heater ground wire at windshield wiper motor mounting bracket and disconnect blower and clutch circuit wires from the harness connectors.

(3) Disconnect the vacuum hoses and actuator rods from each vacuum unit. Remove hoses from their attaching clips.

(4) Disconnect the distribution duct damper control cable.

(5) Remove temperature control valve capillary from the engine-side housing.

(6) Remove the three screws attaching the distribution duct to the dash panel (one is located to the left of the recirculating door and to the right of brake pedal bracket; one below the floor outlet at passenger side, and one screw is located at the windshield wiper motor right link pivot).

NOTE: To facilitate removal, disconnect the windshield wiper right link at pivot to expose the housing screw.

(7) Remove the housing and blower by pulling down and out of driver's compartment. Remove the blower, mounting plate and motor. (See Fig. 66.)

b. Installation

NOTE: If the blower is removed from the mounting plate, be sure the mounting grommets are installed at the attaching bolts.

(1) Install the blower motor and mounting plate to the distribution duct. Be sure the blower wheel is free and does not rub.

(2) Position the housing on dash panel, making sure the large mounting-plate-to-dash-panel gasket is properly positioned to insure a good seal. Install the three attaching screws.

CAUTION

There is a spacer at each attaching screw. Be sure these spacers are installed between the distribution duct and the dash panel when installing housing; otherwise, the housing could be damaged when tightening the screws.

(3) Reposition the temperature control valve cap-

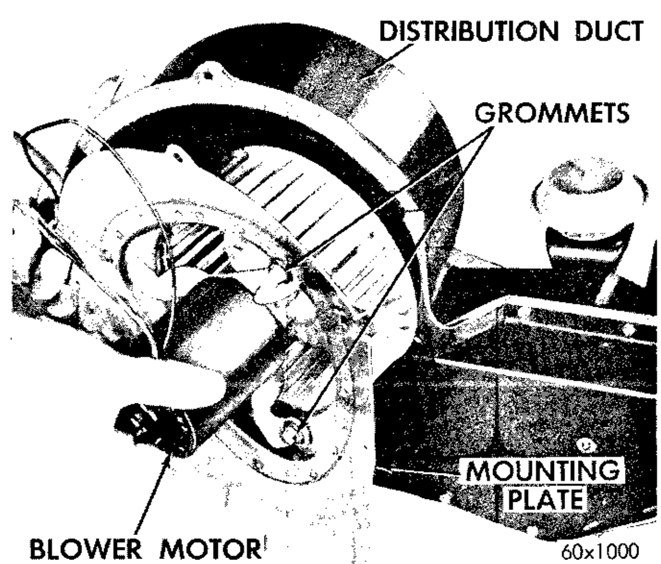


Fig. 66—Blower Removal or Installation

illary in the engine-side housing.

(4) Connect the vacuum actuator hoses and rods, and install all attaching clips.

(5) Connect and adjust the distribution duct damper control cable.

(6) Connect the blower and clutch circuit wires. Install the ground wire at windshield wiper motor bracket.

(7) Attach the windshield wiper motor pivot link (if disconnected). Connect the battery ground cable.

(8) Test operation of all controls and actuators.

34. REFRIGERANT SERVICE

Use only Refrigerant 12 in the 1960 air-conditioning system. Refrigerant 12 is available in bulb tanks or in sealed 15 ounce cans. The use of canned refrigerant is preferred by most technicians because it provides a very quick and simple means of adding refrigerant or charging the system completely.

All 1960 models equipped with front-end units only require 2⅝ to 2⅞ pounds of refrigerant. Three 15-ounce cans of Refrigerant 12 provide a complete charge without the necessity of weighing the refrigerant as it is dispensed. All 1960 models equipped with dual installations require 3⅝ to 3⅞ pounds

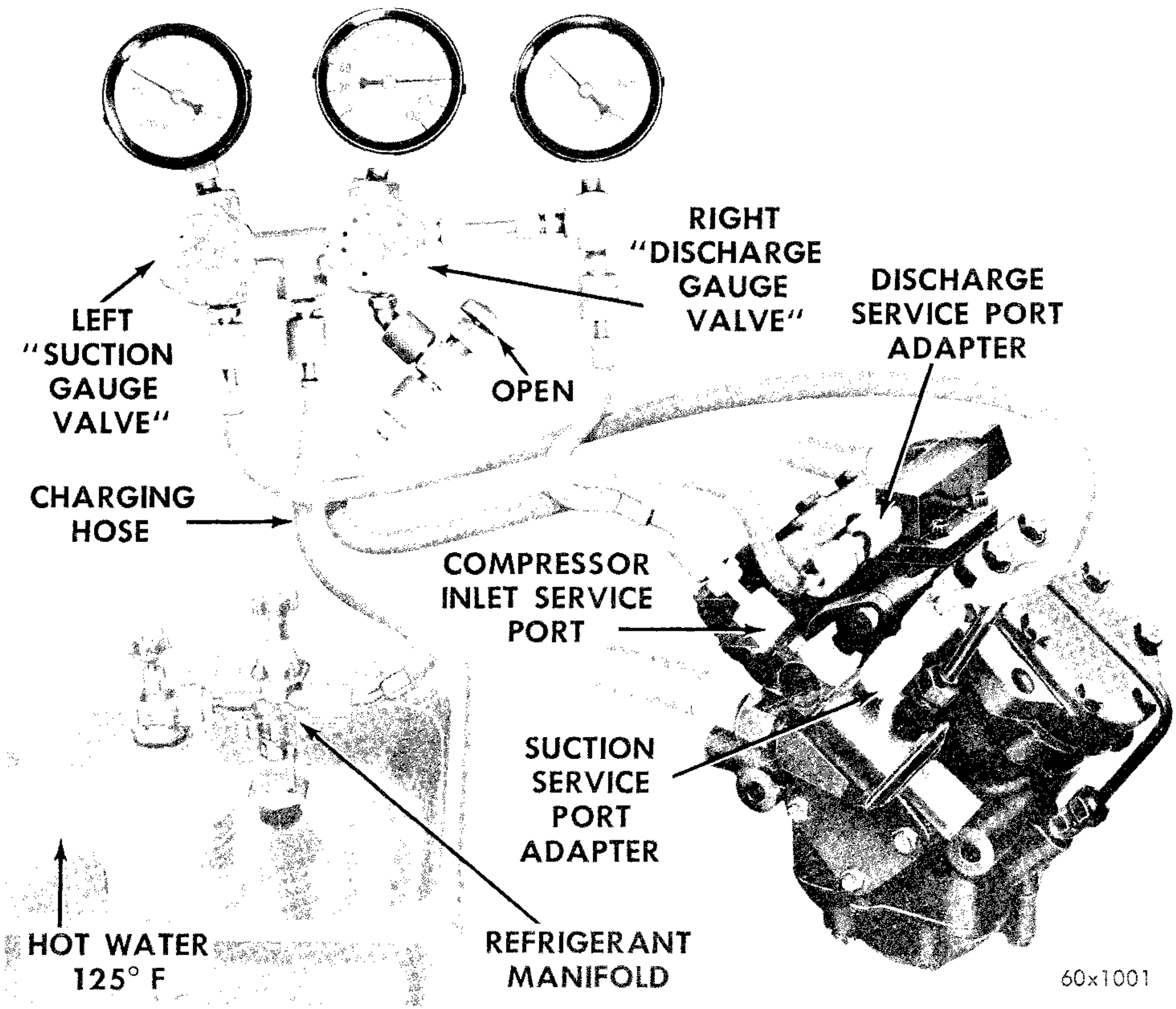


Fig. 67—Adding Partial Refrigerant Charge

of refrigerant. Four 15-ounce cans of Refrigerant 12 provide a complete recharge for these dual installations.

If the bulk tank method of charging is used, an accurate scale must be used to insure charging with the proper amount of refrigerant. Since the use of canned refrigerant is preferred almost universally, only that method is described in the following paragraphs.

35. CORRECTING LOW REFRIGERANT LEVEL

Since the refrigeration system is completely sealed, refrigerant level will not be low unless there is a leak in the system or refrigerant has been allowed to escape by depressing one of the service port valves. For detailed instructions on the proper procedure for checking refrigerant level, refer to Paragraph 10-F, "Refrigerant Level and Moisture."

Before adding refrigerant where cause of low level is not known, the system should be tested for leaks. Assuming no leaks are present, or that leaks have been corrected without discharging the system, proceed with partial charge (refer to Fig. 67).

(1) Close both of the gauge set manifold valves. Open the gauge set manifold needle valve.

(2) Connect the evaporator suction gauge test hose to the suction service port of the compressor, the discharge pressure gauge test hose to the discharge service port of the compressor.

(3) Connect one end of the long test hose to the center manifold outlet, the other end to the refrigerant dispensing manifold.

(4) Close two of the dispensing manifold valves and open the remaining dispensing manifold valve. Remove the protective cap from the **opened** valve.

(5) Screw a can of Refrigerant 12 to the opened manifold valve. Be sure the gasket is in place and in good condition. Tighten the refrigerant can and the manifold locking nut to insure a good seal. Do not over-tighten since 6 to 8 foot pounds is sufficient if the gasket is in good condition.

(6) Turn the manifold valve (above the refrigerant can) completely clockwise to puncture the can. This closes the valve and seals the refrigerant in the can.

(7) Place the refrigerant in a large pan of water heated to 125° F. Place pan of water containing the refrigerant can on an accurate scale (C-3429) so that the amount of refrigerant added can be weighed. Open the refrigerant manifold valve.

(8) Purge all air from test hoses. Air in the system will be trapped in the condenser causing abnormally high discharge pressures and interfering with condensation of the refrigerant.

a. Loosen the test hose adapters at both the suction service port and the discharge service port.

b. Loosen the charging hose connection at the gauge set manifold. This will purge air from the charging hose. Tighten the connection as soon as air is purged.

c. Open the left gauge set manifold valve to purge air from the suction service test hose. Close the valve and tighten the test hose adapter at the suction service port.

d. Open the right gauge set manifold valve to purge air from the discharge test hose. Close the valve and tighten the discharge test hose adapter at the discharge service port.

Operate engine at 1250 rpm, car windows open "FRESH COOL" Button pushed in, blower on high and the car hood up. On dual installations, both blowers must be on high speed during the charging operation. If necessary, block the condenser to maintain a discharge pressure of 225 to 250 psi. The system must be charged through the evaporator suction service port as follows:

(1) Slowly open the suction service gauge valve. Meter flow of refrigerant by adjusting the suction service gauge valve so that pressure registered at the suction service gauge does not exceed 50 psi. **Keep refrigerant container upright.**

(2) Add refrigerant gas until there is no foam visible at the sight glass. As soon as all foam clears, note the weight registered on the refrigerant scale.

(3) Watch the refrigerant weighing scale and add **EXACTLY** ½ pound more refrigerant to the system. Close the suction gauge valve.

NOTE: Too much refrigerant in the system can cause abnormally high discharge pressures. Care must be used so that exactly ½ pound of refrigerant is added after foam clears in the sight glass.

(4) Close the dispensing manifold valve. Remove the test hoses and adapters from the service ports of the compressor, and install the protective caps at the service ports.

Complete System Discharge and Recharge

Before the system can be opened for replacement of lines or components, the system must be completely discharged. It is also necessary to discharge the system before performing the compressor capacity test and the expansion valve test. Whenever the system has been opened, it must be swept with a partial charge, and the entire system tested for leaks. The drier should be replaced and the system evacuated using a vacuum pump to remove all air and moisture. The system should then be charged with the proper amount of refrigerant. Detailed instructions for performing these operations follow.

36. DISCHARGE THE SYSTEM

(1) Attach the gauge set manifold (suction test hose to the suction service port and discharge test hose to the discharge service port). Attach the long test hose to the center connection of the gauge set manifold. Lead the other end of this hose into an exhaust ventilation system outlet or to the outside of the building.

(2) Open the gauge set manifold needle valve and close both of the gauge set manifold gauge valves.

(3) Start the engine and adjust speed to 1250 rpm.

(4) Pull blower switch to "HIGH" position, move temperature control to "OFF" and push the "FRESH COOL" button.

(5) Allow the system to operate at full capacity for at least 15 minutes. This will cause most of the compressor oil in the system to return to the compressor crankcase.

(6) Open the discharge (right-hand) gauge valve a small amount. This will allow the refrigerant vapor to discharge **slowly.**

CAUTION

Do not allow the system to discharge rapidly since this would sweep some of the refrigerant oil out of the compressor.

(7) Allow the system to discharge until the discharge pressure gauge registers zero. Open the left-hand valve to release any vapor trapped at the suction side of the system.

37. SWEEP-TEST CHARGE

The purpose of the sweep-test charge is to pressurize the system so that a leak test can be made. The sweep-test charge also serves the purpose of drying the system or sweeping out trapped moisture. Repairs and component replacement must be completed before charging with the sweep-test charge.

(1) Close both gauge set manifold valves and open the gauge set manifold needle valve.

(2) Attach the free end of the long hose used for discharging to the refrigerant dispensing manifold.

(3) Attach a single can of Refrigerant 12 to the dispensing manifold. Place refrigerant in 125 degree water. For detailed instructions on attaching refrigerant can for charging, see "Charging the System," Paragraph 42.

(4) Operate the engine at 1250 rpm, car windows open, "FRESH COOL" button pushed in and the blower on high. If working on dual installations, operate both blowers on high speed.

(5) Slowly open the left-hand gauge set manifold valve to meter the refrigerant into the system. When the full can of refrigerant has been metered into the system, close the gauge set manifold valves and the refrigerant manifold valve.

If the system has been opened for repair or replacement, a complete leak test must be made to make sure the system is sealed. Also, if the system has accidentally lost its charge it will be necessary to perform a leak test while the sweep-test charge is in the system. Stop the engine and disconnect the test hoses and adapters from the compressor service ports.

38. TESTING THE SYSTEM FOR LEAKS

The Leak Detector Torch (Tool C-3569) is a propane gas-burning torch used to locate a leak in any part of the refrigeration system. Refrigerant gas drawn into the sampling or "Snifter" tube will cause the flame to change color in proportion to the size of the leak. A very small leak will produce a flame color varying from yellowish-green to bright green. A large leak will produce a brilliant blue flame.

(1) Open the torch valve until you hear a faint hiss of escaping gas. Light the test torch and adjust the valve until flame is very small. A small flame will detect large as well as small leaks, whereas a large flame will detect only large leaks. As soon as the reaction plate seen through the window in the burner shield becomes red hot, the tester is ready for use.

(2) Examine all tube connectors and other possible leak points by moving the end of the sampling hose from point to point. Since Refrigerant 12 is heavier than air, it is good practice to place the open end of the sampling hose directly below the point being tested. Be careful not to pinch the sampling tube since this will shut off the air supply to the flame and cause a color change.

(3) Watch for a change in the color of the flame. Small leaks will produce a green and large leaks a bright blue color. If leaks are observed at tube fittings, tighten the connection, using the proper flare wrenches, and retest.

39. TEST PRECAUTIONS

Do not use the lighted detector in any place where explosive gases, dust, or vapors are present.

Do not breathe the fumes that are produced by the burning of refrigerant gas. Large concentrations of refrigerant in the presence of a live flame become dangerously toxic. Observe the flame through the window of the burner shield, not through the top of the shield.

If the flame remains bright yellow when the tester is removed from a possible leak point, insufficient air is being drawn in through the sampling tube, or the reaction plate is dirty.

Remove Sweep-Test Charge

If the system is free of leaks, or after correcting a leak, remove the sweep test charge. Close the refrigerant manifold valve so that any refrigerant remaining in the container is sealed. Remove the long test hose from the refrigerant manifold. Insert the free end of this test hose into an exhaust system outlet. Open the right-hand gauge set manifold valve a

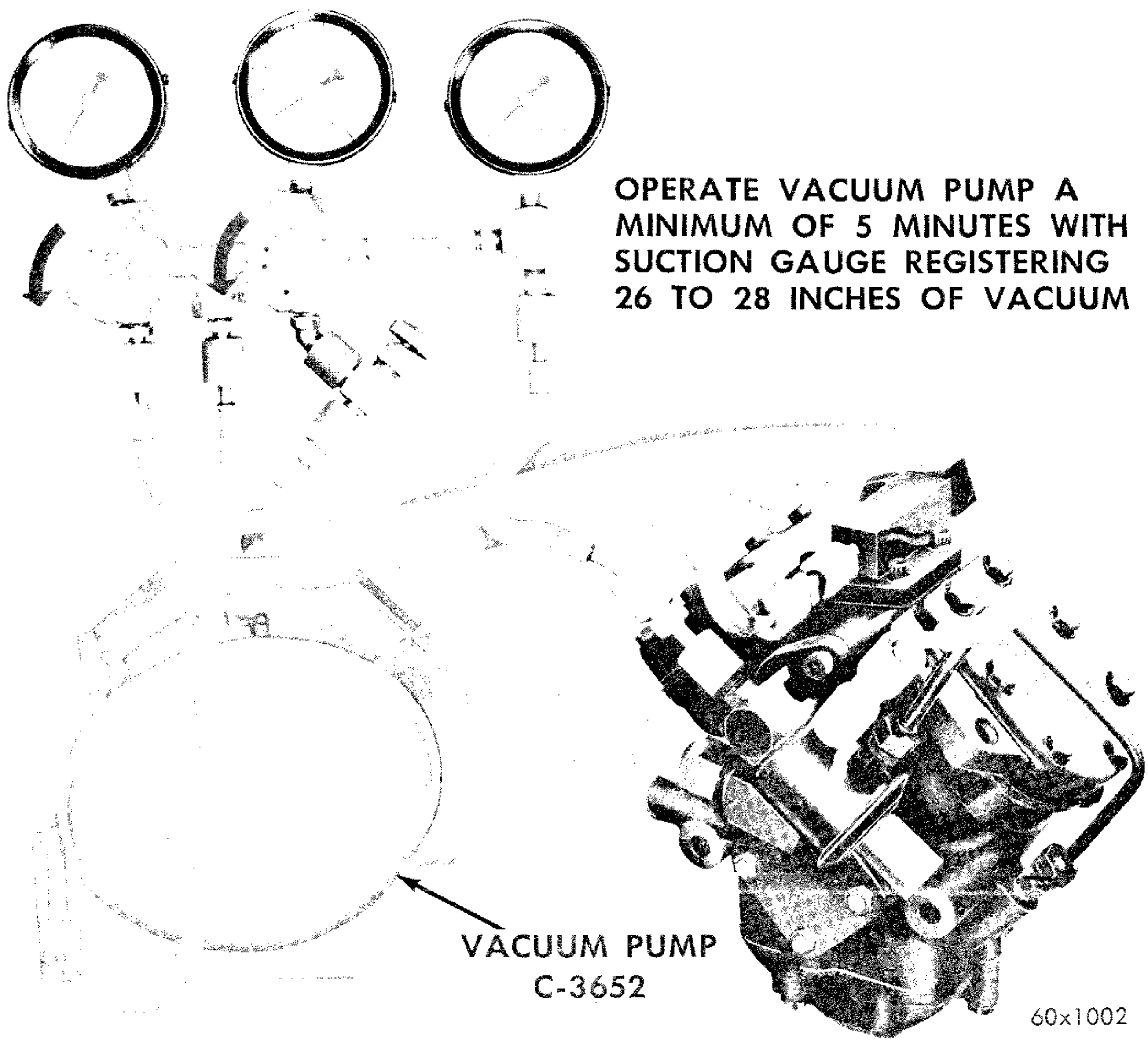


Fig. 68—Evacuating the System

fraction of a turn to let the sweep-test charge escape slowly. Allow the system to discharge until the discharge pressure gauge registers zero. Open the left-hand gauge valve to allow any refrigerant trapped in the suction side of the system to escape.

40. REPLACE RECEIVER—DRIER—STRAINER

The system must be discharged and swept with a test charge before replacing the receiver-drier-strainer. To remove the receiver-drier-strainer, simply unscrew it from the combination dry-eye sight glass. When installing a new receiver-drier-strainer, use a new gasket. Tighten the new unit to 12 foot pounds. Do not overtighten since this might damage the gasket.

CAUTION

Replacement receiver-drier-strainer unit must be sealed while in storage. The drier used in these units is so hungry for moisture that they can saturate quickly upon exposure to the atmosphere. When installing a drier, have all tools and supplies ready for quick reassembly to avoid keepng the system open any longer than necessary.

41. EVACUATE THE SYSTEM

Whenever the system has been opened to atmosphere, it is absolutely essential that the system be swept with refrigerant and evacuated or "vacuumed" to remove all air and moisture. If any

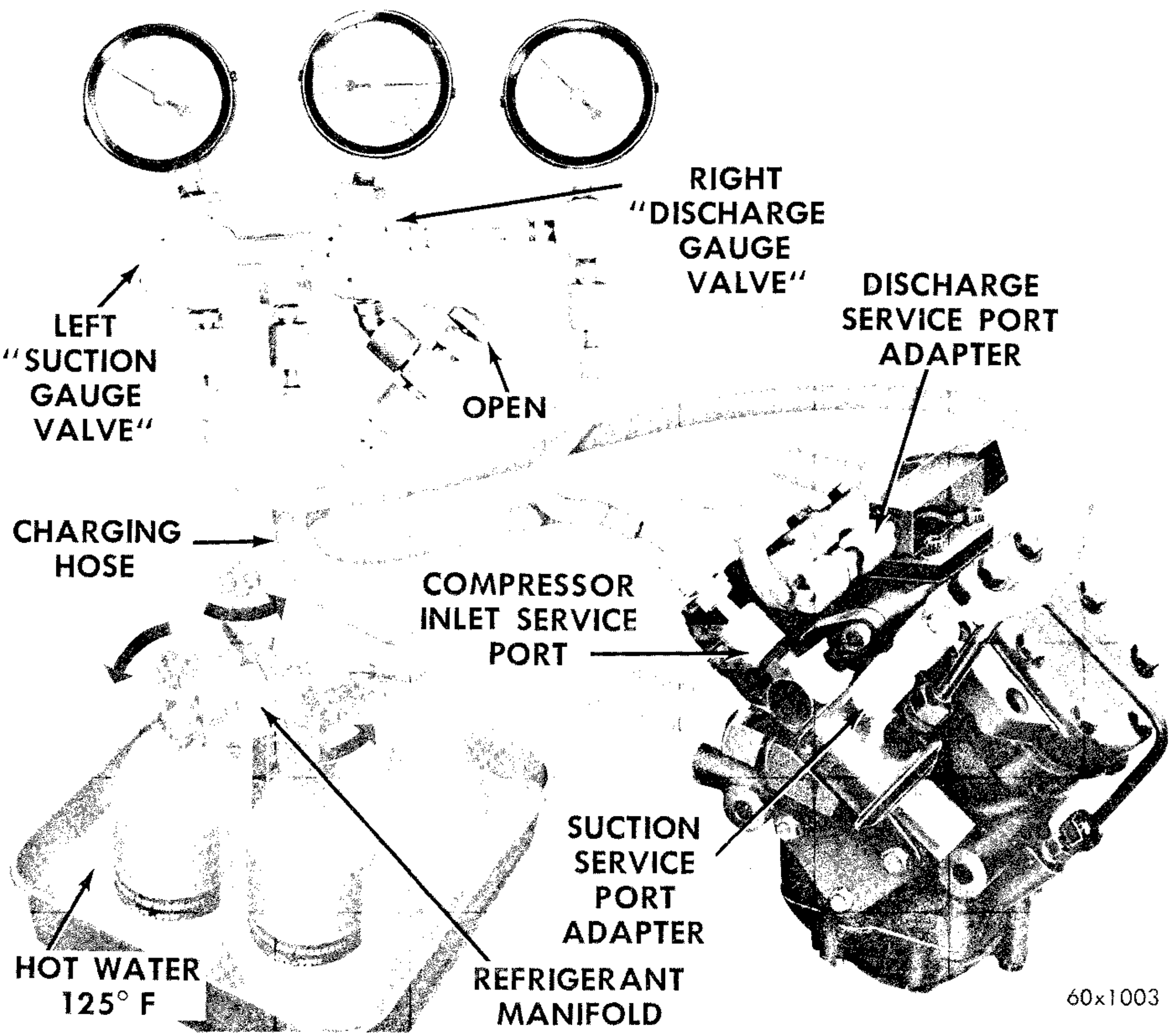


Fig. 69—Complete System Charging

appreciable amount of air remains in the system when it is charged, the trapped air will concentrate near the top of the condenser and cause abnormally high discharge pressures. Air in the system will reduce the condenser's ability to condense the refrigerant gas and supply adequate liquid refrigerant to the evaporator.

To evacuate the system:

(1) Connect the gauge set manifold to the compressor and the long test hose from the gauge set manifold center connection to the vacuum pump (Tool C-3652) as shown in Figure 68.

(2) Open both gauge set manifold valves and the needle valve.

(3) Start the vacuum pump and operate until the evaporator suction gauge registers at least 26 inches of vacuum. If the system is tight and the pump in good condition, the vacuum will go as low as 28 inches.

(4) Allow the vacuum pump to operate with suction gauge registering 26 to 28 inches of vacuum for a minimum of five minutes.

(5) Close both gauge set manifold valves, turn off the vacuum pump and remove the test hose from the vacuum pump. Leave the gauge set manifold connected to the compressor. Charge the system with the proper amount of Refrigerant 12.

NOTE: Failure to pull at least 26 inches of vacuum indicates a leak in the refrigeration system or a defective vacuum pump. Locate and correct the trouble before recharging the system.

42. CHARGING THE SYSTEM (Fig. 69)

All models equipped with front air-conditioning units only require three cans or 45 ounces of Refrigerant 12. All dual-type installations require four cans or 60 ounces of Refrigerant 12. The special refrigerant dispensing manifold permits charging three full cans of refrigerant at one time. On dual installations a single can must be added after the three cans have been charged into the system.

NOTE: Keep the refrigerant manifold valves capped when not in use. Keep a supply of extra refrigerant-can-to-refrigerant-manifold gaskets on hand so that gaskets can be replaced periodically This will insure a good seal without excessive tightening of the can or the manifold nuts.

(1) Attach the center hose from the gauge set manifold to the refrigerant dispensing manifold. Turn the refrigerant manifold valves completely counter-clockwise so that they are fully open. Remove the protective caps from the refrigerant manifold.

(2) Screw the refrigerant cans into the manifold. Be sure the manifold-to-can gasket is in place and in good condition. Tighten the can and the manifold nuts to 6 to 8 foot pounds.

(3) Turn the three refrigerant manifold valves completely clockwise to puncture the cans and close the manifold valves.

(4) Turn the refrigerant manifold valves counter-clockwise to open them.

(5) Momentarily loosen the charging hose at the gauge set manifold to allow refrigerant gas to purge air out of the charging hose.

(6) Place the three cans of refrigerant into a pan containing hot water at a temperature of 125 degrees F.

(7) Start the engine and adjust speed to 1250 rpm.

(8) Charge the system through the suction side of the system by slowly opening the left-hand gauge set manifold valve. Adjust the valve as necessary so charging pressure does not exceed 50 psi. Maintain the temperature of the water in the pan by adding warm water as necessary.

When all three cans of refrigerant are completely empty, close the gauge set manifold valves and the refrigerant manifold valves. If the system being worked on is a dual system, attach a single can and charge into the system using the above procedure.