CHRYSLER AIR CONDITIONING SYSTEM

SPECIFICATIONS

COMPRESSOR

Location	On right bank cylinder
Type	2-cylinder
Bore	2 inch
Stroke	1⅜ inch
Displacement	8.67 cubic inch
Valve	Reed Type
Speeds	935 rpm at 25 mph
Oil Capacity (MOPAR Refrigerant Oil; 300 Saybolt)	12 ounces

CONDENSOR

Location	Front of radiator

RECEIVER STRAINER-DRIER

Type	Cylindrical steel container
Location	Front of Front Frame Crossmember

REFRIGERANT

Refrigerant	Freon 12
Total Charge	4 pounds

EVAPORATOR

Location	Luggage Compartment

BLOWERS

Type	Centrifugal
Location	In evaporator unit
Capacity	320 cubic feet of air per minute at high speed
Current Draw	Approximately 20 amps

SPECIAL TOOLS

(Refer to Figure 27)

Tool Number	Tool Name
C-3354	TESTING OUTFIT—Consisting of one manifold complete with two valves; one 30x300 lbs. compound gauge; and one 600 lbs. pressure gauge. (Use with C-3365 and C-3366 Test Hoses.)
C-3355	GOGGLES—Safety (Pair).
C-3356	THERMOMETER SET—Two in separate pocket cases. (Calibrated from minus 0° to 220° F.)
C-3444	TORCH—Leak Detector—Includes extra tank of liquid petroleum fluid.
C-3358	WRENCH—Flare Nut—Open End Box Type 7/8" and 1 1/8" (two per set).
C-3361	WRENCH—Ratchet Special Refrigeration Type—1/4" sq. Drive with 3/16" sq. and 1/2" Hex. in Handle.
C-3372	PUMP—Refrigeration Vacuum (Pump charged with 75 Vis. Ref. Oil.)
C-3128	PLIERS—Drive Pulley Seal Retainer Snap Ring.
C-3420	ADAPTOR—Freon Cylinder Valve to Test Hose.
C-3421	CLIP—Set of two—Attaching Thermometer to Tube.
C-3363	WRENCH SET—Flare Nut—Open End Box Type 3/4" and 1" Openings (two per set).
C-3365	HOSE—Test with End Plugs—4 Feet Long (set of two) (use with C-3354).
C-3366	HOSE—Test with End Plugs—8 Feet Long (use with C-3354).
C-3362	BENDER SET—For 1/4", 5/16", 3/8", 7/16", 1/2" and 5/8" Tubes.
C-804	TOOL—Tube Flaring.
C-3478	CUTTER—Tube.
C-3429	SCALE—Freon Weighing.
C-744	TEST LAMP.
C-3473	SEAT PULLER and installing tool.

TIGHTENING REFERENCE

The following parts should be tightened by means of an approved torque wrench to the limits specified below:

	Foot-Pounds
Compressor Mounting Bracket to Compressor Bolts	85
Compressor Support Bracket to Compressor Bolts	30
Compressor Cylinder Head Bolts	20
Compressor Suction and Discharge Valves	20
Compressor Pulley to Crankshaft Attaching Bolts	20
Compressor Front Bearing Retainer Bolts	15
Compressor Rear Bearing Retainer Bolts	15
Compressor Adaptor Plate Attaching Bolts	25
Compressor Sight Glass Plug	35
Compressor Muffler Mounting Bolts	20
Compressor Side Plate	20

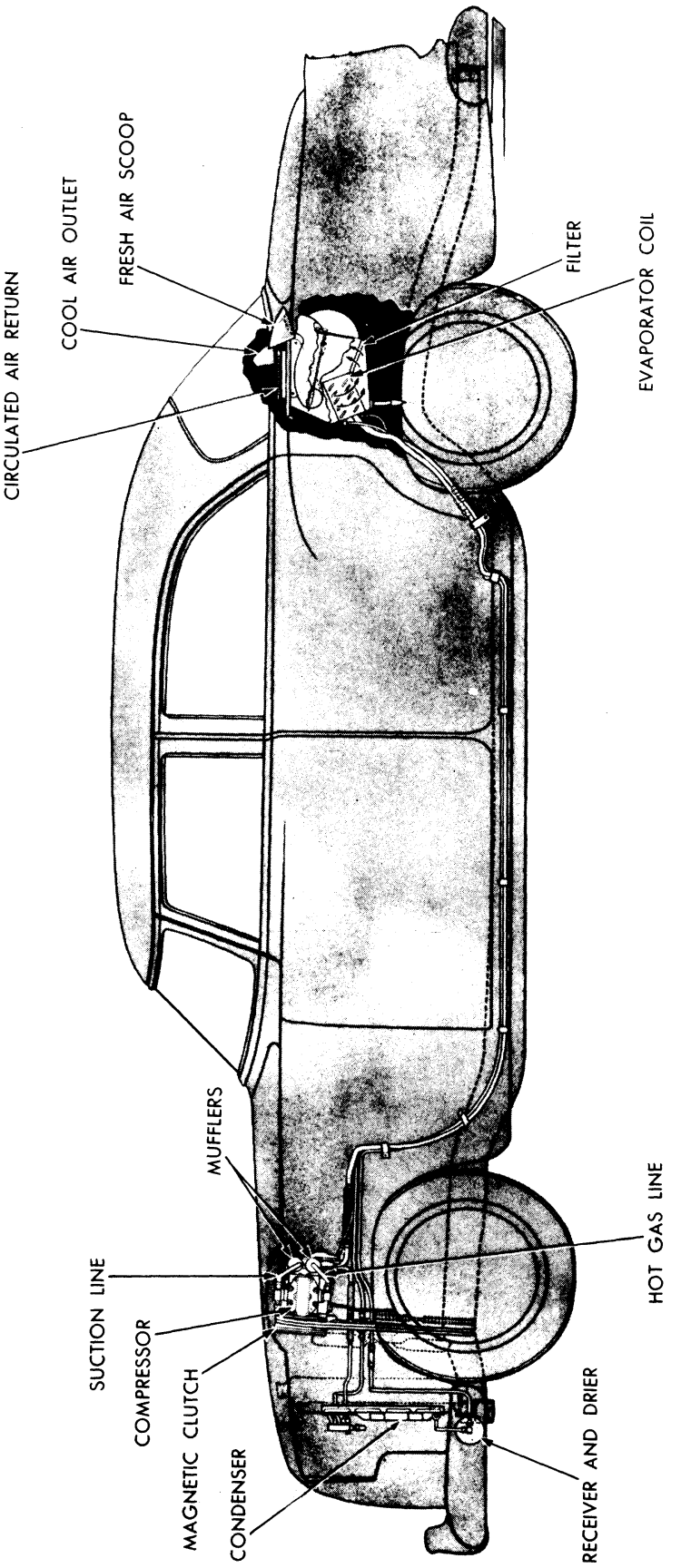


Fig. 1—Air Conditioning System Installed

Section XVII

CHRYSLER AIR CONDITIONING SYSTEM

1. GENERAL INFORMATION

The occupants of an air conditioned car may select the temperature and volume of the air that is circulating in the car interior that will provide them with the most comfort.

In addition to the conditioned air that is recirculating in the car (Fig. 1), scoops pick up fresh air from the outside, bring it through ducts into the evaporator, where it joins with the circulating air.

With the blower operating at high speed, more than 300 cu. ft. per minute of cool air is forced into the car. Approximately ⅓ of this is outside air. This will give a complete change of all the air in the car every 1½ minutes.

By providing this complete change of filtered air in air conditioned cars every 1½ minutes, it is unnecessary to open the car windows in either winter or summer. This greatly reduces road noises and keeps out practically all dirt, when driving in dusty areas.

Three blower speeds are provided with each of the two cooling conditions. Low, Medium and High in the Cold, or full capacity cooling position. Low, Medium and High in the Cool, or Moderate cooling position. A choice of the three blower speeds for circulating air without the air being cooled by the air conditioning unit is also provided.

The refrigerant used in the Air Conditioning System is Freon 12.

AIR CONDITIONING SYSTEM COMPONENTS

2. COMPRESSOR

The compressor, as shown in Figure 12, is a two cylinder reciprocating type unit with a speed of approximately 935 rpm. at 25 mph.

3. COMPRESSOR LUBRICATION

Lubrication is by a combination of splash and centrifugal pressure. As the rods, counterweights and slinger rotate through the oil in the crankcase it is picked up and thrown over the interior of the crankcase. The rear main bearing is lubricated by this splash and the connecting rods are partially splash lubricated.

In addition to the splash lubrication, oil is thrown into cavities in both bearing retainer plates. As the shaft rotates, a pressure is built up on the oil in the rear bearing retainer cavity and the oil is forced through the rifle drilled crankshaft. Transverse passages are drilled through the shaft and supply oil to the connecting rod bearings, the piston pins and the shaft seal.

The front main bearing is lubricated from the oil in the front bearing retainer plate oil cavity.

4. COMPRESSOR VALVES

The discharge and suction valves, as shown in Figures 2 and 3, are inertia type Reed Valves

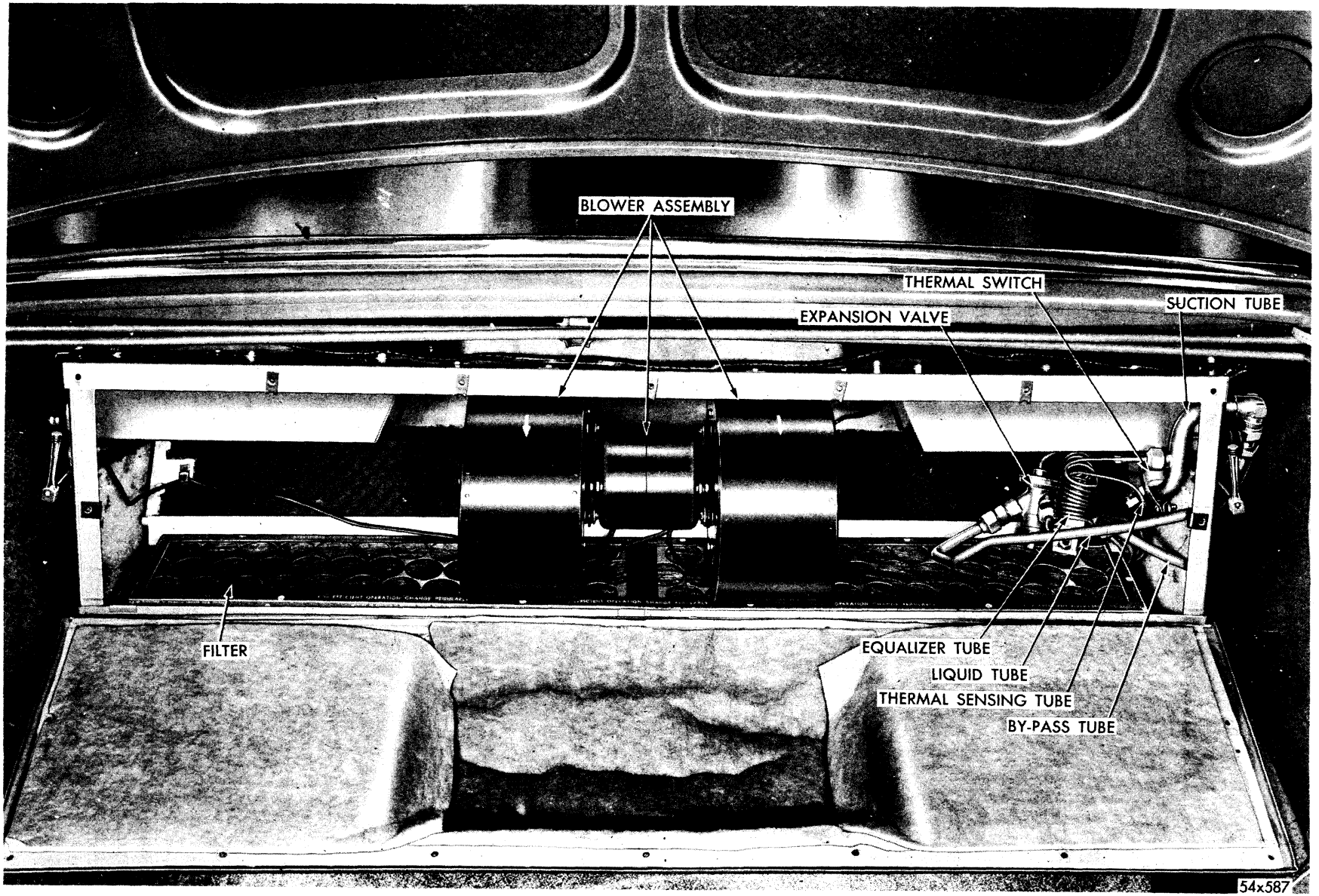


Fig. 2—Evaporator Installed

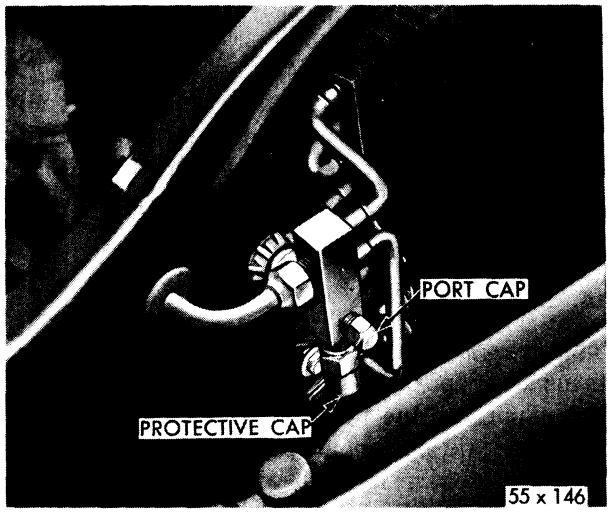


Fig. 3—Discharge Service Valve

with both the suction and discharge ports in the one valve plate. The valve plate is located between the cylinder head and the cylinder block.

5. CRANKSHAFT

The crankshaft is a forged steel counterbalanced shaft, utilizing integral cams for the connecting rod throws. The shaft is mounted in ball bearings at both ends and is belt driven through pulleys and a magnetic clutch. Counterweights are attached to the shaft to smooth out vibrations.

6. CONNECTING RODS

The connecting rods are of forged steel and are drilled to provide lubrication to the piston pin bushings. Lubrication to the connecting rod bearings is provided from drilled passages in the crankshaft and from splash. The rod bearings are selected fit bushings.

The piston pins are hardened steel and are a pressed fit into the connecting rod. Steel backed bronze bearings are a selective fit to the pins.

7. CRANKSHAFT SEAL (Early Type)

The crankshaft seal surface is a flat vertical bearing, with a spring loaded bellows attached to the bearing retainer. A lapped seal face is held by the constant spring pressure against a lapped and polished cast iron seal face, as shown in Figure 11. Two neoprene "O" rings used. One "O" ring is located in the bearing retainer plate and the other in the seal ring. A small amount of oil seepage is always present at the seal to provide lubrication to the seal. A small fan is attached to the seal assembly to rapidly dissipate heat.

8. CRANKSHAFT SEAL (Late Type)

A new type oil seal is now in production for the air conditioning system compressor shaft (Fig. 15). A heavy spring type bellows presses against a carbon seal which is held into the front bearing retainer plate. An "O" ring fits into a groove in the bearing retainer plate. A smaller "O" ring is mounted inside the bellows and bears against the compressor shaft. The seal assembly is held in place by a snap ring.

NOTE

The early type seal assembly functions only with the early type bearing end plate. The late type seal can be used only with the late type bearing end plate.

9. CRANKCASE OIL CHECK VALVE

A small self energizing check valve is located in the oil return passage between the suction manifold and the crankcase. The oil that is entrained in the refrigerant is separated from the refrigerant in the manifold due to velocity. The oil flows through the return passage, opens the check valve and flows into the crankcase.

Another function of the check valve is to reduce the amount of oil pumped out of the compressor after a prolonged idle period. Oil and Freon 12 are miscible in each other and during periods of non-operation the oil in the crankcase absorbs some refrigerant. When the compressor is started, following a long idle period, the check valve is closed to a small orifice by crankcase pressure so that pressure will reduce slowly. The slow reduction of crankcase pressure minimizes foaming of the oil and consequently oil pumping.

10. PISTONS AND PINS

The cast iron pistons are a selective fit to a very close tolerance with the cylinder bore. Due to the close fit of the pistons in the cylinder bores it is not necessary to use piston rings thus reducing friction and wear.

11. OIL LEVEL

An access plug is provided in the crankcase for the purpose of measuring the height of the oil in the crankcase. (See Fig. 12.) A new compressor before installation contains 12 ounces of oil and is charged with dry air, however, due to some of the oil being picked up and entrained in the system, the crankcase does not contain 12 ounces of oil after it is in service.

The proper height of the oil in the compressor after it is in service should not exceed ¾ inch to one inch as measured on a dip stick inserted through the access hole. A sight glass is provided to indicate that oil is present, but does not tell how much.

12. SERVICE VALVES

Due to the fact that it may be necessary to remove the compressor for compressor or engine service and also to provide means for connecting test equipment, two service valves are provided.

The suction service valve is attached to the inlet side of the compressor, as shown in Figure 4. The discharge service valve is connected in the discharge tube at the inlet side of the condenser. (See Fig. 3.)

Rotating the valve stems clockwise until the valves are fully seated, front seats the valve and isolates the compressor from the system. Rotating the valve stem clockwise from the back-seat position also opens the service port to supply pressure to the gauges. Rotating the valve stems counter-clockwise, back seats the valves and is the operating position.

13. MAGNETIC CLUTCH

The magnetic clutch shown in Figure 20, is provided in the compressor drive pulley. The clutch consists of a spring loaded drive plate that is attached to the compressor crankshaft. The electro-magnet coil is mounted in the pulley with the ends of the coil connected to separate brush or collector rings. Hinged type brush holders hold the brushes against the collector rings.

When the electro-magnet is not energized the pulley assembly free-wheels on a double roll ball bearing. When the electro-magnet is energized the plate is magnetically attracted to the electro-magnet and the compressor crankshaft is then coupled to the drive pulley.

The magnetic clutch can be engaged at any engine speed without damage. A sintered iron brake shoe, impregnated with fibrous material is bonded to the drive plate to reduce chatter and wear during engagement.

14. EVAPORATOR

The evaporator unit, shown in Figure 2, contains an evaporator wherein the liquid refrigerant vaporizes due to the heat which it absorbs from the air passing over the evaporator tube fins. This absorption of heat from the air results in a considerable reduction in the air temperature. It is located in the luggage compartment and contains the expansion valve and evaporator coil which is connected by tubing from the expansion valve to the compressor. The unit also contains the motor and blower assembly.

15. BLOWER SYSTEM

The blower motor and fans are located in the evaporator. The blower motor has three speeds; low, medium and high. The speeds are controlled through the blower switch located on the instrument panel.

16. SOLENOID VALVE

The solenoid valve is connected into a by-pass line between the high pressure side of the compressor and the inlet side of the evaporator at the distributor. The normal position of the valve is open.

With the blower switch on and the temperature control switch in the "Cool" position, the valve is not electrically energized and is therefore open. With the valve open, gas flows through the by-pass line and into the evaporator, mixing with the liquid refrigerant from the expansion valve. The amount of heat absorbed from the air by the evaporator is decreased and the temperature of the car interior will be moderately cooled.

Rotation of the temperature control to the "Cold" position completes the electrical circuit to the solenoid windings, which energizes the solenoid and closes the valve. The flow of hot gas through the by-pass line is cut-off and the system can then operate at full capacity.

17. THERMAL SWITCH

A Thermal Switch is provided to prevent frosting of the evaporator such as might occur on cool days when the air conditioning system is being operated in the full capacity cooling position with the blower speed set at "Low."

The thermal switch, shown in Figure 6, is attached to the suction pressure line at the evaporator outlet manifold. The electrical contacts in the switch are connected in series with the temperature control switch and the solenoid by-pass valve winding. In the normal position the contacts are closed. A decrease in the temperature of the refrigerant gas leaving the evaporator, will cause the thermal blade to bend and open the electrical circuit to the solenoid valve when the temperature reaches approximately 25 degrees F. Opening the solenoid valve allows a charge of hot refrigerant gas to flow into the evaporator. When the temperature increases again to approximately 40 degrees F. the contacts close and the solenoid will energize, closing the by-pass valve.

18. EXPANSION VALVE

The expansion valve, shown in Figure 2, is attached to the inlet distributor of the evaporator. The purpose of the valve is to meter the flow of liquid refrigerant to the evaporator. The valve is also the dividing point between the high and low pressure and temperature sides.

19. AIR CONDITIONING SYSTEM CYCLE

Starting with the compressor inlet, the vapor entering the compressor is at a relatively low temperature and pressure. On the downstroke of the compressor piston, the suction valve opens due to differential pressure (not mechanically operated as in an automobile engine), and vapor is drawn into the cylinder. On the up-stroke, the suction valve closes and the vapor is compressed until sufficient pressure is reached to force open the discharge valve, discharging the high pressure and temperature vapor into the condenser.

In the condenser the heat of compression and the heat absorbed by the refrigerant in the cooling coil is rejected to the air flowing over the finned condenser tubes, and the refrigerant is liquefied.

The liquid refrigerant then flows into the receiver which acts as a storage tank. In the receiver, it passes through a strainer-drier unit, which removes dirt and moisture. The liquid refrigerant then enters the expansion valve which throttles the flow so that some of the refrigerant flashes into vapor, and cools the remaining liquid down to the saturation temperature at the expansion valve outlet.

The liquid and vapor then enter the cooling coil in the evaporator where the remaining liquid evaporates due to heat absorbed from the air flowing through it. The cooling of the air effected by the cooling coil is due to the evaporation of liquid refrigerant in the coil. The completely vaporized refrigerant is then drawn back to the compressor thus completing the refrigeration cycle.

Control of the flow of refrigerant from the expansion valve to the evaporator is automatic. The flow is controlled by spring tension, suction manifold pressure and temperature. The expansion valve is pre-set at the factory and is non-adjustable.

The temperature control functions through a manually operated switch, a solenoid by-pass valve and a thermal switch. The solenoid valve is normally open. When the temperature control switch is turned to the cold position the solenoid is electrically energized and the valve is pulled closed. This allows the system to operate at full capacity. Turning the switch to the cool position breaks the circuit to the solenoid and the valve opens. This allows hot vapors to flow from the compressor to the evaporator and moderates the cooling effect of the system. A drop in the temperature of the suction pressure line to 30 degrees ± five degrees, causes the thermal switch to open and breaks the circuit to the solenoid valve. When the temperature again reaches 45 degrees ± five degrees, the thermal switch closes.

Fundamentally, the refrigerant which is circulated through the system by the compressor, picks up heat at the evaporator coil, carries it to the condenser, and there discharges it to the outside air.

20. OPERATING THE AIR CONDITIONING SYSTEM

The procedure required of the driver to operate

the Air Conditioning System has been reduced to a minimum. The only action required when the occupants of an air conditioned vehicle desire air conditioning, is to close the car windows and cowl ventilator (if open) then, with the engine running, turn on the blower and temperature control switches. **Where a car has been parked in the hot sun it is sometimes advisable to open car windows, drive for a few blocks, then close windows and turn on air conditioning.**

The control switches are mounted on a single shaft and are conveniently located to the left of the steering column on the instrument panel.

Periodic owner service is limited to an occasional cleaning of the outside of the condenser—about as often as bugs and other matter are cleaned out of car radiator. No special care is required for winter with the exception of closing the fresh air doors by turning the levers on the evaporator in the luggage compartment. (See Fig. 2.)

SERVICE PROCEDURES

21. PRECAUTIONS IN HANDLING FREON 12

Freon 12 when properly used is harmless. However, a few simple precautions should be observed to guard against injuries or sickness that might occur where it is improperly handled.

a. Do Not Expose Eyes to the Liquid

When working around a refrigerating system liquid refrigerant may splash and hit your face. If the eyes are protected with goggles (Tool C-3355) (or glasses) no serious damage may result. **If a splash of refrigerant does hit the eyes the eyes must not be rubbed.** Freon 12 is at least 20 degrees below zero—a temperature that the eyes cannot normally withstand. Apply cold water immediately to the area of the eye to gradually get the temperature above freezing point. Use of an antiseptic oil is helpful as a protective film over the eye ball until medical aid can be obtained.

b. Do Not Discharge in Areas Where An Open Flame Is Exposed

Discharging large quantities of Freon 12 in an average size work room can usually be done safely as the vapor will produce no ill effect, however, this should **never** be done if the area contains an open flame such as a torch or gas heater. Freon 12 normally is non-poisonous. Concentration of the gas in a live flame will produce poisonous gas. Splashing Freon 12 on bright metal or chrome should be avoided as the gas will tarnish bright metal.

c. Do Not Leave Charging Drum Uncapped

Charging drums are shipped with a heavy protecting cap. This cap is to protect valve and safety plug from damage. Always replace cap after using charge drum.

d. Do Not Expose Drum to High Temperature

The drum should never be exposed to radiant heat or an open flame as the resultant pressure from such heat may cause the safety plug to blow out. In charging the system it may be necessary to heat the drum to raise the drum pressure higher than the pressure in the system. **Use a pail of hot water no hotter than you can put your hand into to supply heat to the drum.**

Never transport the charging drum in the passenger compartment, as this can be done more safely in the trunk compartment.

22. INSTALLING MANIFOLD GAUGE SET

(1) Remove valve stem protective caps from compressor discharge and suction service valves.

(2) Using Tool C-3361 make sure both valves are completely back-seated (counter-clockwise).

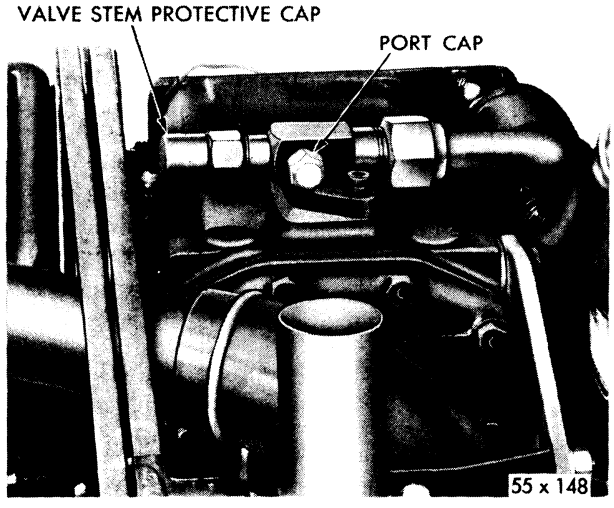


Fig. 4—Suction Service Valve

The normal operating position is then rotated in a counter-clockwise direction. This position also isolates the service valve ports from the system pressure.

(3) Remove the protective caps from both the discharge and service port caps.

(4) Install the four foot test hose from the 600 pound gauge fitting on Tool C-3354 to the discharge service valve port fitting. (See Fig. 3.)

(5) Install the other four foot test hose from the 300 pound compound gauge fitting on Tool C-3354 to the suction service valve port fitting. (See Fig. 4.)

(6) Turn both valve handles of gauge set Tool C-3354 clockwise as far as they will go, as this will completely seat valves and isolate gauge set manifold center outlet from test hoses. To admit pressure to gauges, rotate valve stems of both suction and discharge service valves one turn clockwise.

23. INSPECTION AND TESTING OF COMPLETE AIR CONDITIONING SYSTEM

The following test procedures have been set up as a logical sequence for testing the air conditioning system for proper operation and isolating any of its components that are not functioning as they should.

a. Preparation for Tests

(1) Move car into a well ventilated area and shut off engine. Connect exhaust suction system to tail pipe. Inspect condenser and radiator for bugs, etc.

(2) Blow out from side opposite entrance with compressed air.

(3) Place an electric fan (15 to 20 inch) in front of radiator in such a manner as to blow as much air as possible over the condenser and maintain the temperature pressure relationship, as specified in Paragraph 40.

(4) Place fender covers over fenders. Check radiator pressure cap. Cars equipped with air conditioning system require fourteen pound pressure caps.

(5) Replace cap if it does not meet specifications. Check or add water to cooling system to maintain proper level.

(6) Check belt tension by applying a 9 to 12 pound pull with a scale at the center of the longest span. Belt deflections should be ¼ inch for compressor belts (each).

(7) Remove cover from evaporator housing. Inspect blower fans for proper installation. Looking into end of vanes at the bottom of fan, fan vanes should point up and toward rear of car. **Fans are not interchangeable with each other** and must be installed, as shown in Figure 5.

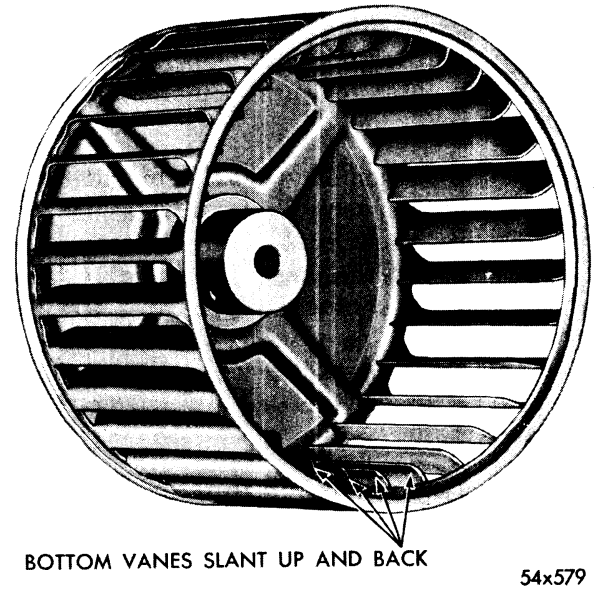


Fig. 5—Blower Fan (Right)

(8) Switch fans to opposite ends of motor shaft if they are improperly installed at wrong end of motor. Blower fans should clear inlet ring not to exceed 1/8 inch. Fans may be moved in or out by loosening Allen set screw in fan hub.

(9) Check direction of motor armature rotation. Fans should rotate clockwise when viewed from left side of car.

(10) Remove motor and turn assembly around if rotation is incorrect. Be sure blower fans are properly installed. Check speed by rotating blower switch to High, Medium and Low.

(11) Turn blower switch to high position. Test battery voltage at battery. Fully charged battery should read from 6 to 6.2 volts with blower switch on high speed position. (Engine not running.) Test voltage from motor lead junction block to ground. Difference (voltage drop) between voltage at battery and at motor should not exceed 2 volts. Test ground circuit from motor ground to frame, voltage drop should not exceed 1 volt.

(12) Clean and tighten all connections if voltage drop exceeds specifications. Install evaporator housing cover.

b. Testing Compressor Valves

(1) Start engine and operate at 1200 rpm.

(2) Turn blower switch to "High" and the temperature switch to "Cold." Operate for five to ten minutes to warm compressor, and, slow to 500 rpm.

(3) Close the suction service valve by rotating the valve stem, using Tool C-3361, as shown in Figure 4, clockwise until it is tightly seated (engine running at idle speed). **CAUTION: Never shut off DISCHARGE service valve with engine running, or the compressor will be damaged. Do not operate system with suction valve closed any longer than absolutely necessary.**

(4) Observe the suction pressure on the compound gauge. The pressure reading on the gauge should drop steadily. The pressure should drop to from 12 to 18 inches of vacuum if the suction valves are in good condition. **If 12 to 18 inches of vacuum cannot be obtained, check the suction service valve to be sure it is fully seated before condemning and replacing valve plate assembly.**

(5) Shut off engine and watch the suction (compound) gauge. The vacuum should hold without dropping more than five inches within one minute if the discharge valve is in good condition.

(6) Return suction valve stem to full counterclockwise position, then, one turn clockwise.

(7) Replace valve plate assembly if tests do not meet these test conditions, and refer to Paragraph 35.

c. Checking Freon Level

(1) Connect a tachometer to the engine. Start engine and adjust speed to 1200 rpm's.

(2) Turn the Blower control knob to "High" position and temperature control to "Cold." Open car windows.

(3) Allow engine to operate at 1200 rpm. to clear sight glass.

(4) Observe sight glass on right-hand fender panel. Sight glass should be perfectly clear (no bubbles) within three to five minutes from the time engine was started. If sight glass is not perfectly clear after three to five minutes operation, the thermal switch and by-pass valve should be tested as outlined on Page 639.

(5) If this test is O.K., the system should be partially charged to remove bubbles. (Refer to Paragraph 27.)

(6) If the high pressure gauge shows a high pressure and the suction pressure is normal, it is an indication of too much Freon. In this case bleed off Freon until bubbles appear in sight glass and then charge (refer to Paragraph 28) to remove bubbles.

A system that is low on Freon should be tested for leaks, corrected and system charged.

d. Testing Strainer-Dryer

With engine operating at 1200 rpm. hold hands on the fittings at both ends of the receiver strainer-drier. The temperature should be the

same at both ends. If the end towards the left-hand is cooler than it is at the right end, (right-hand) the strainer-drier is defective (partially plugged) and must be replaced. (Refer to Paragraph 45.)

e. Check Compressor Oil Level

Check oil level as outlined in Paragraph 31.

f. Testing Thermal Switch and Solenoid By-Pass Valve

(1) Disconnect the Wade connector at solenoid valve and insert special adaptor, as shown in Figure 6, in series with disconnected connector and Wade terminal.

(2) **The adaptor, as shown in Figure 7, is for testing the thermal switch and solenoid valve. It may be fabricated by using two 903895 terminals, a 1310489 Wade connector, two inch 16 ga. copper wire stripped as shown and a piece of 16 ga. bare wire ¾ inch long to wrap around bared section of two inch wire and solder in place.**

(3) Connect lead from test lamp (Tool C-744) to adaptor and ground the remaining test lamp lead to a good clean ground.

(4) Place test lamp suction cup on fender so light is visible from right rear of car, as shown in Figure 6.

(5) With engine running at 1200 rpm. turn the blower control knob to "Low" speed and the temperature control to "Cold." Close all car windows, doors and cowl ventilator.

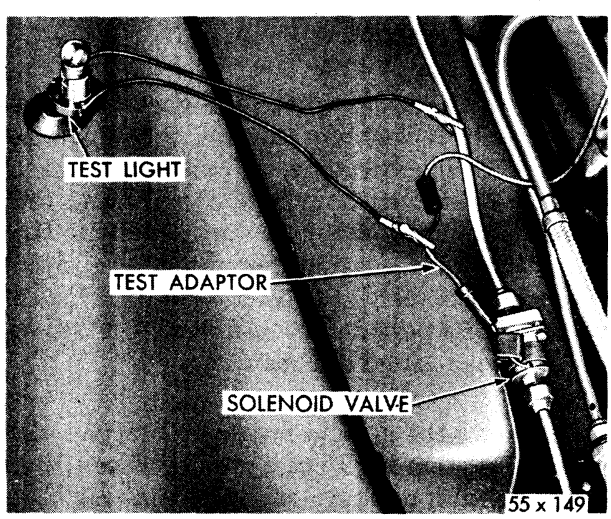


Fig. 6—Thermal Switch and Solenoid Valve (Test Adaptor Connected)

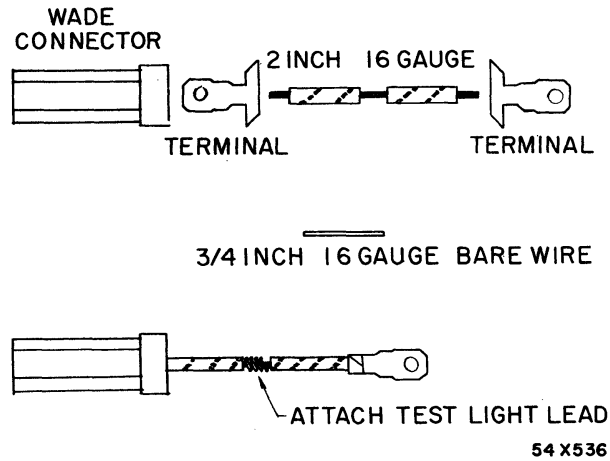


Fig. 7—Test Adaptor

(6) Install thermometer clip on evaporator suction tube outlet fitting, place thermometer in clip and wrap clip and bulb with a rag.

(7) Check temperature reading of thermometer at evaporator suction pressure outlet.

(8) If temperature reading is 45° F. (± 5°) or higher, the test lamp should be lit.

(9) Allow test to continue. When the temperature of the suction pressure tube at the evaporator drops to 30° F. (± 5°) the light should go out.

(10) **With the temperature of the suction pressure evaporator outlet at or above 45° F. (±5°) the thermal switch contacts should be closed and the electrical circuit to the solenoid complete. If the test results are as outlined then the solenoid valve is functioning or the temperature would not change. If the light goes off, and on, the thermal switch is functioning.**

g. Testing Operation of Expansion Valve for Proper Super Heat

Refer to Paragraph 40 and test operation of expansion valve for proper super heat.

h. Final Test

Remove test equipment from vehicle and road test car.

24. TESTING FOR LEAKS WITH LEAK DETECTOR

Where a system has been found to be low on

Freon or following repairs on the system that necessitated the opening of a connection, it is necessary to test for leaks and tighten connections or make repairs as required before the system is charged and put in operation. **If a system has been discharged for making repairs or to eliminate moisture, the system must be evacuated before partially charging to test for a leak.**

Partially charge the system with Freon 12 as outlined in Charging the System with Freon 12, Paragraph 27, and proceed as follows: **This is necessary only where the Freon supply in the system is very low or where system has been evacuated.**

The Tool C-3444 using petroleum gas does not require generating to light. Just turn valve on and light it, and adjust to small flame.

Move the leak detector snifter tube over all connections. When a leak is found the flame in the burner will turn bright green. Move the detector tube around the connection to determine the magnitude of the leak. If a larger leak is found the color of the burner will turn from bright blue to bright purple.

If a leak is found at a flared connection, try tightening the connection using two wrenches. If the leak cannot be eliminated by tightening, the system must be discharged. The connection or flare must be reseated or replaced and the system evacuated and again partially charged and retested. If no leaks are found, add to the partial charge until the system contains four pounds of Freon 12.

25. DISCHARGING FREON

Install gauge set manifold Tool C-3354 (if not installed, as shown in Fig. 8). Using Tool C-3361 be sure both discharge and suction service valves are fully back-seated (counter-clockwise). Connect eight foot test hose to the gauge set manifold center fitting. Insert the free end of the eight foot test hose into exhaust suction system and turn exhaust system blower on. **Although Freon is non-toxic unless released in or near an open flame, expelling the Freon gas into the exhaust system is a recommended safety precaution.**

Open the discharge and suction service valves one turn. Crack manifold gauge set discharge

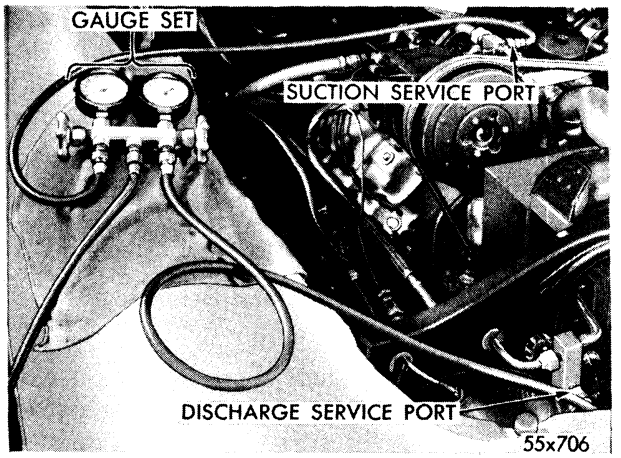


Fig. 8—Gauge Set Manifold Installed

hand valve a fraction of a turn counter-clockwise to allow gas to escape. **CAUTION: Opening the manifold discharge hand valve too much in order to more quickly discharge the system will draw the compressor lubricant off with the Freon. As the pressure on the manifold discharge gauge drops near zero, open the manifold suction hand valve.**

NOTE

If brazing or some similar repair is to be made on system leave the system open to atmospheric pressure. After service work has been completed the system must be evacuated, partially charged and leak tested before final charge.

26. EVACUATING AND SWEEPING THE SYSTEM

Whenever the system has been open to atmosphere, as in replacing a component to make repairs or through damage, it is absolutely essential that the system be evacuated and swept with Freon to remove all air and any moisture that has entered. Evacuating the system means that it must be subjected to a suction of 28 inches of vacuum for a period of 30 minutes, after sweeping with one pound of Freon 12.

Sweeping the system means to charge a discharged system with one pound of Freon 12 or charge until a pressure of 100 pounds registers on the discharge gauge. Operate the system for five minutes and again discharge to remove as much mositure as possible.

Evacuate the Air Conditioning System as Follows:

Connect gauge set manifold Tool C-3354 to the compressor (if not installed), as shown in Figure 8.

Discharge system if not previously discharged, as outlined in Paragraph 27.

CAUTION

Be sure pressure has dropped to zero before attaching hose to vacuum pump.

Connect the eight foot test hose to the center fitting of the gauge set manifold and to the connection on the vacuum pump (Tool C-3372). Open both discharge and suction service valves about one turn, rotating both valve stems clockwise. Open both gauge set manifold hand valves, (turn counter-clockwise). Start vacuum pump and observe compound gauge. Operate pump until gauge registers 26 to 28 inches of vacuum. Continue evacuating at 26 to 28 inches for five minutes. Failure to obtain 26 to 28 inches of vacuum would indicate a leak in the system.

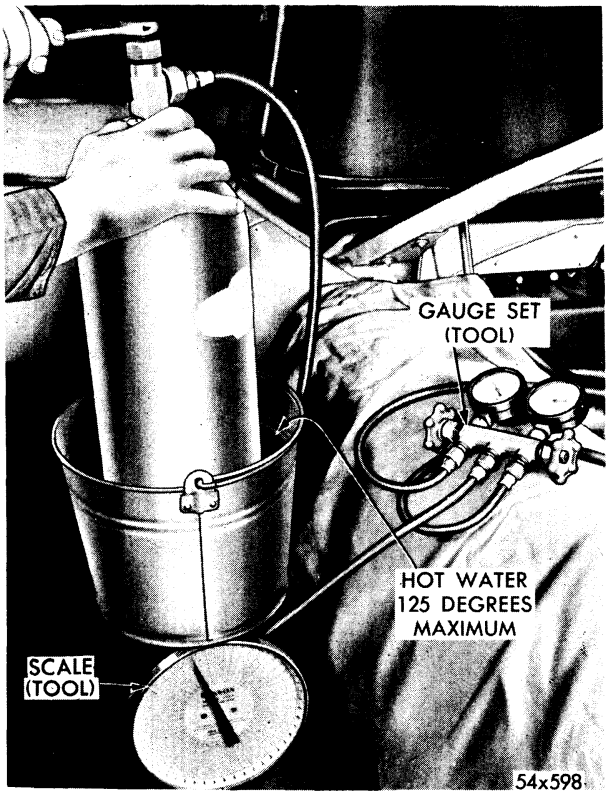


Fig. 9—Charging System with Freon 12

Close both gauge set manifold hand valves (clockwise). Turn off vacuum pump and remove long test hose from pump. Charge system with one pound of Freon 12, as outlined in Paragraph 27.

Start the engine and adjust speed to 1200 rpm. Turn blower control to "High" and temperature control to "Cold." Operate in this manner for five minutes, and test for leaks. Discharge the system, which will sweep out any remaining moisture. Again evacuate the system at 26 to 28 inches of vacuum for 30 full minutes. Recharge system with four pounds of Freon 12.

27. CHARGING SYSTEM WITH FREON 12

Connect the eight foot test hose to the center fitting of the gauge manifold and to the connection of the Freon 12 tank, as shown in Figure 9. Be sure both gauge manifold valves are fully closed (clockwise).

Open both the discharge and suction service valves one turn (clockwise) if not previously done. **NOTE: Where discharge gauge hand fluctuates when engine is running, close discharge valve slowly (counter-clockwise) until gauge hand steadies.**

Open the valve on the Freon 12 tank slightly and loosen the eight foot test hose at the gauge manifold. Leave connection loose for about a second to purge the air from the hose. Close Freon tank valve.

Start the engine and operate at 1200 rpm. with blower control set to "Low" and Temperature control set at "Cold."

Set the Freon 12 tank (upright) in a pail of warm water. Temperature of warm water not to exceed 125 degrees F. Set pail and Freon tank on scale (Tool C-3429) and weigh assembly. Make a note of the combined weight.

WARNING

It is absolutely essential that an accurate scale Tool C-3429 be used. Bath scales are not accurate below 100 lbs.

Open the Freon 12 tank valve ½ turn. Open suction valve on gauge manifold slightly (counter-clockwise). Control the Freon 12 entering the system with this valve. **DO NOT** allow suction pressure to exceed 60 psi. Be sure both discharge and suction pressure service valves are open

about one turn (clockwise). Carefully watch scale and shut Freon 12 tank valve off when system has absorbed four pounds of Freon 12. **(If a partial charge is desired for testing leaks, charge system with one pound of Freon 12, or charge until 100 pound pressure is reached on the discharge pressure gauge.)**

Close suction valve on gauge manifold (clockwise). To disconnect Freon 12 tank, loosen eight foot test hose and allow Freon in hose to escape slowly, then, remove hose from tank.

28. ADDING FREON 12 BY SIGHT GLASS METHOD

In some cases, due to extenuating circumstances, it may be necessary to add Freon 12 to the system to provide cooling, without weighing the Freon as is normally required.

Follow the preliminary steps in charging the system, but, eliminate those steps involving the scale. Start the engine and operate at 1200 rpm. Turn the blower control switch to the "Low" position and the temperature switch to "Cold." Rotate both the suction and discharge service valve stems one turn clockwise. Where discharge gauge hand fluctuates when engine is running, close discharge valve slowly (counter-clockwise) until gauge hand steadies.

Open the Freon tank valve ½ turn. Open the suction valve on the gauge manifold slightly (counter-clockwise). Control the Freon entering the system with this valve. **DO NOT** allow suction pressure to **EXCEED** 60 psi.

Carefully watch the sight glass. **CLOSE** gauge manifold suction valve (clockwise) the moment the sight glass is clear of bubbles. **Stopping the flow of Freon into the system as soon as the sight glass is clear (free of bubbles) is important. Too much Freon in the system can cause damage.**

Operate system for five minutes and again observe sight glass for presence of bubbles. If there is still evidence of bubbles, continue to charge carefully until sight glass is clear and repeat five minute run. Where no bubbles are present after five minutes of engine operation; charge system with additional Freon for ten seconds.

Close Freon tank valve. Loosen hose connection at tank to gradually release Freon from hose. Disconnect hose after Freon has escaped. Back seat the suction and discharge service valves (counter-clockwise). Remove gauge manifold and install service valve and service port protective caps.

29. PRECAUTIONS IN HANDLING TUBING

a. Cleanliness During Storage and Installation

It is of the utmost importance that refrigeration tubing be kept clean and dry. Refrigeration tubing is ordinarily purchased in rolls with the ends crimped and sealed air tight. When tubing is used from a roll, reseal the unused portion of the roll to prevent dirt and moisture from getting inside. A piece of tubing that has been cut, flared and prepared for installation should have the ends sealed until the actual installation is being made.

b. Cutting and Flaring

Tubing should always be cut with a regular tube cutter, Special Tool C-3478, as shown in Figure 10. Never use a hack saw. After cutting the tube, ream out the inside of the tube with special Tool C-3478 to eliminate all burrs and provide a good seating area when the tube is flared. The tube should be double flared with special Tool C-804.

Always inspect a flared joint before installation to determine if there are any cracks or blemishes on the flare that would cause a possible leak. **It should be emphasized that the retention of Freon in a system requires flared or brazed joints of the highest quality.**

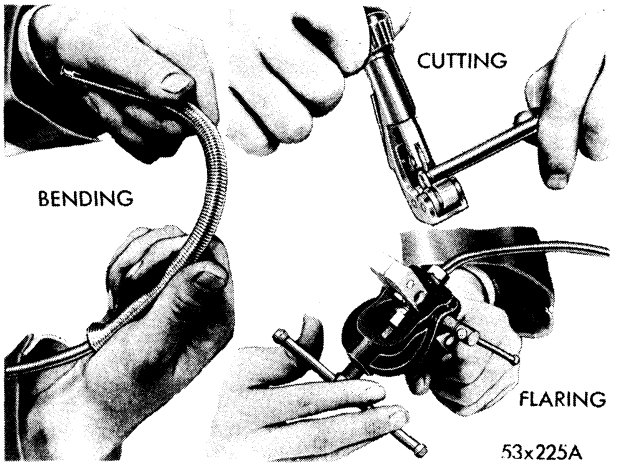
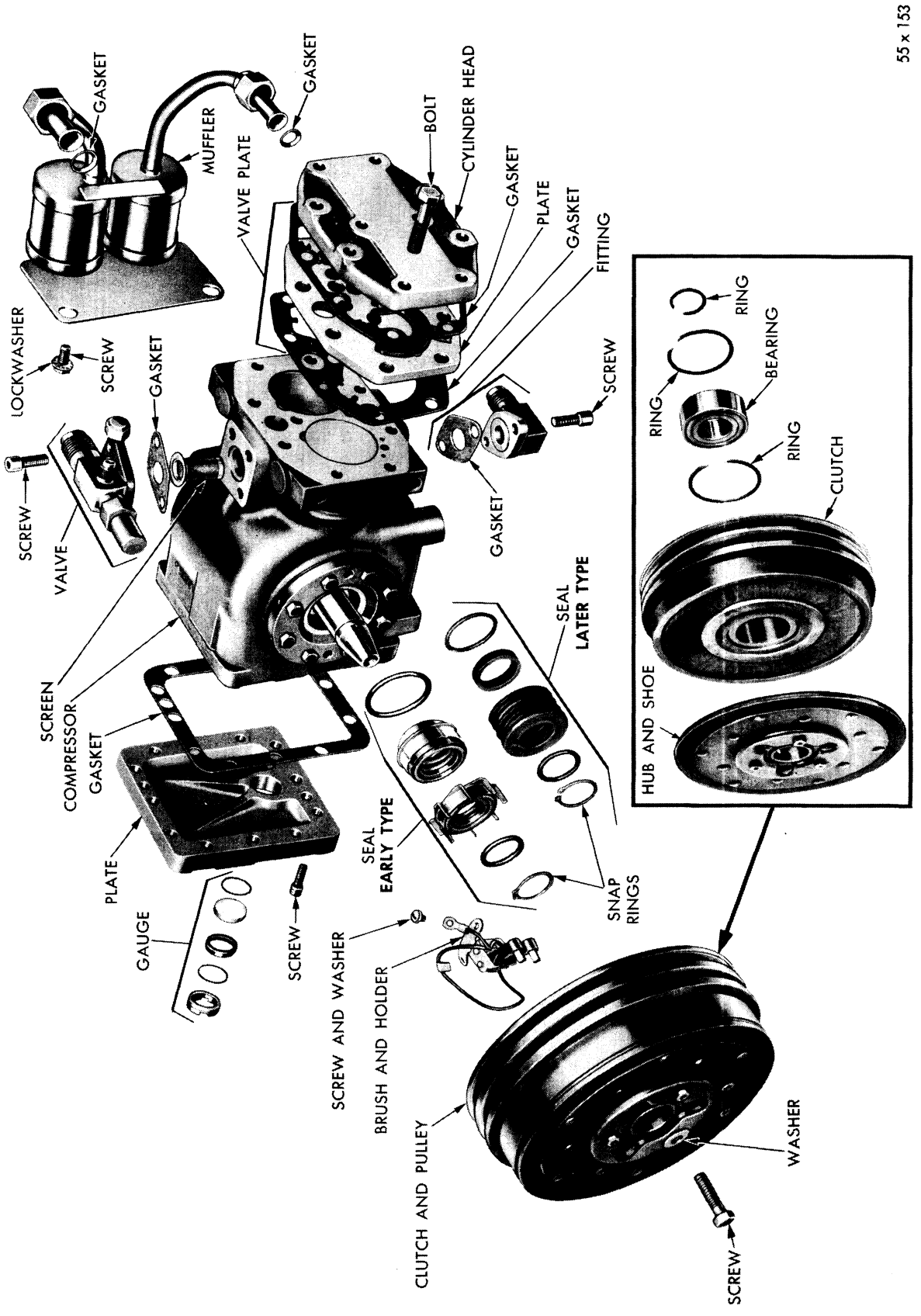


Fig. 10—Bending, Cutting and Flaring Tubing


55 x 153
GASKET
MUFFLER
GASKET
VALVE PLATE
BOLT
CYLINDER HEAD
GASKET
PLATE
GASKET
FITTING
SCREW
LOCKWASHER
SCREW
GASKET
SCREW
VALVE
SCREEN
COMPRESSOR
GASKET
PLATE
GAUGE
SCREW
SCREW AND WASHER
BRUSH AND HOLDER
CLUTCH AND PULLEY
SEAL
EARLY TYPE
SEAL
LATER TYPE
SNAP
RINGS
GASKET
RING
BEARING
RING
CLUTCH
HUB AND SHOE
WASHER
SCREW

Copper washers must be used where joint is steel to steel or steel to brass. Copper to steel or brass requires no washer. Use vaseline on flared surface connections when installing or repairing leaky tube connections to improve sealing and reduce torque required.

Never use any sort of sealing compound between the tube flare and the male surface.

c. Securing of Tubing

Tubing that is left free to vibrate and move about excessively will soon harden the area of the tube at the flared section so that it may become brittle and break. It is very important that copper tubing be attached to the car structure. Flexible connectors, known as "vibration eliminators," have been placed on either side of the compressor to guard against tube breakage at that point.

d. Brazing Joints

Leaks at brazed joints may be repaired with a Prest-o-lite torch or an ordinary acetylene torch.

CAUTION

Discharge system before using torch to braze leaking joints.

Care should be exercised to avoid excessive heat when using an acetylene flame to solder or braze a joint, as excessive heat will cause damage to tubing and fittings. Silver solder flux should be put on the joint before starting the brazing operation. When a joint is silver soldered or brazed, clean the newly made joint vigorously with a stiff wire brush before leak testing the joint to make sure the joint is properly soldered or brazed. Very often the flux will melt—forming a hard crust on the joint that is apparently leak tight until put in service when the slightest vibration breaks away the crust of the flux causing a leak. The usual precautions should be followed before repairing a sweat type joint—such as cleaning thoroughly, applying sufficient flux, heating to a temperature that will cause the silver solder to flow freely and testing after repairing the joint.

30. SERVICING THE COMPRESSOR

The following component parts of the compressor, as shown in Figure 11, are available for service only: compressor unit valve plate assemblies, suction service valve, cylinder head, oil sight glass, gaskets, shaft seal, and support brackets.

The compressor refrigerant oil may be replaced or corrected to the proper level.

Any damage to the pistons, cylinders, crankshaft or connecting rods, requires replacement of the complete compressor assembly.

31. REPLACING COMPRESSOR (OIL LEVEL PRECAUTION)

New compressors are shipped fully equipped with the exception of the drive pulley and magnetic clutch assembly. The compressors are charged with treated dry air to prevent air, moisture or dirt from entering and contain 12 ounces of 300 Saybolt refrigerant oil. (Oil level at center of sight glass compressor lying horizontal on bench.)

When replacing a compressor for any reason, it is imperative that the oil level in the compressor be corrected to the proper amount. Even though the oil compressor had no oil when removed, some oil may still be in the rest of the system.

Where an old compressor is found to have no oil, or where oil level is very low or too high; the oil in the new compressor must be siphoned off to the minimum level of ¾ inch. After the installation is completed the system should be operated for ten minutes, the engine shut down and the oil level checked and adjusted as outlined in Paragraph 14 from ¾ to one inch if required. (Use a suction gun to remove oil if level is too high.) This procedure should be repeated several times until level remains at ¾ to one inch.

CAUTION

When working on the air conditioning system under pressure, protect your eyes with goggles (Tool C-3355) or glasses, so no serious damage can result.

32. MEASURING COMPRESSOR OIL LEVEL

(1) Start engine and run at moderate speed (air conditioning turned on) until compressor is warm. This will automatically cause the compressor crankcase to become comparatively free of liquid refrigerant. **An oil sight glass is provided in the compressor**

crankcase so that the oil splash may be observed while the compressor is in operation. If a splash is observed it indicates ONLY that there is oil in the compressor. It does not tell you if there is TOO MUCH OR TOO LITTLE OIL. To determine the oil level accurately it is necessary to measure it with a dip stick.

(2) Stop engine, remove protective caps from discharge and suction valves. Using Tool C-3361 close both valves by turning valve stems clockwise until they seat firmly. **CAUTION: Never start engine with discharge valve closed and drive belts connected to engine when magnetic clutch is engaged.**

(3) Clean dirt away from compressor oil filler plug with solvent and blow dry with compressed air. Loosen the cap carefully on the service port of the discharge valve approximately ¼ turn and gradually release the gas pressure from the compressor.

(4) When the gas pressure in the head decreases, loosen, but do not remove the oil filler plug on the side of the compressor. This will allow the gas pressure in the compressor crankcase to drop. **If the oil level is checked immediately after a trip, driven at high speeds, the level will be slightly higher than normal.**

(5) Remove the oil filler plug and using a dry, clean, plunger type dip rod, (⅛ inch welding rod) measure the oil level. The correct oil level is from ¾ to one inch.

(6) Siphon off excess oil or add MOPAR Air Conditioning Compressor Oil (300 Saybolt at 100 degrees F.) as required.

(7) After oil level has been checked and corrected if required, replace the oil filler plug but do not tighten at this time.

(8) To purge air out of the compressor cylinder and crankcase, make sure cap on discharge valve service port is loosened approximately ½ turn and oil filler plug on side of the compressor a full turn.

(9) Using Tool C-3361, slightly open suction service valve by turning valve stem counterclockwise.

(10) Let gas drift slowly through the compressor for about 10 seconds.

(11) Tighten the oil filler plug and the cap on the discharge service port.

(12) Back-seat both discharge and suction service valves by turning the valve stems counter-clockwise.

(13) Replace protective caps on discharge and suction service valves.

33. REPLACING DAMAGED COMPRESSOR

To replace an old compressor with a new one, where the indications are the compressor has failed, and where metal particles are circulating in the system, proceed as follows:

a. Removing Compressor

(1) Completely discharge the entire system as outlined in Paragraph 25.

(2) Remove the drive belts and generator adjusting strap from compressor. (Refer to Fig. 12).

(3) Disconnect the discharge and suction tube flared connectors at the compressor mufflers, shown in Figure 12.

(4) **Always use two wrenches when disconnecting flared connections to prevent damage to flares or tubes.**

(5) Remove the four compressor to mounting bracket bolts.

(6) **Remove compressor and set on bench. Be careful not to damage brushes when removing or installing magnetic clutch.**

(7) Remove clutch assembly by removing retaining bolt from end of shaft. While supporting clutch with one hand tap on the pulley with a soft hammer and remove assembly.

(8) Remove receiver, strainer-drier unit, expansion valve and solenoid valve.

(9) Connect jumper tubes across vacated spaces left by removal of receiver, strainer-drier unit, expansion valve and solenoid valve.

(10) Connect a pressure pump to the suction side of the system.

(11) Connect a hose or tube to the discharge side.

(12) Insert hose or tube in a pail to receive flushing.

(13) Reverse flush the system with carbon tetrachloride. At least one gallon of the solution should be pumped through the system.

(14) **The pump used to reverse flush the system must be clean and capable of at least 50 pounds pressure.** (Where no pump is available a 1954 type receiver may be used.)

(15) Fill the receiver with carbon tetrachloride.

(16) Attach a jumper to one end of the receiver and to the suction pressure tube.

(17) Attach air hose from dry air or nitrogen source to free end of receiver and turn on pressure.

(18) Fill receiver and flush system at least twice.

(19) Remove the mufflers from the old compressor and reverse flush them with carbon tetrachloride and install mufflers on the new compressor using new gaskets. **Be sure to use new copper washers in the flared connections.**

(20) Thoroughly clean the expansion valve inlet screen and valve. Install a new receiver strainer-drier.

(21) Install a new solenoid valve. Install a clutch assembly on new compressor.

(22) Lay the compressor flat on bench in horizontal position. Oil level in compressor should be at center of sight glass.

b. Installing Compressor

(1) Set new compressor with full factory oil level (mufflers attached) on the mounting bracket and install the bolts, lockwashers and nuts.

(2) Tighten evenly to 85 foot-pounds torque.

(3) Install generator adjusting strap.

(4) Adjust compressor drive belt tension to obtain a ¼ inch deflection (9 to 12 pound pull with scale applied at the center of the longest span between pulleys).

(5) Connect flared tubes to compressor muffler connectors using two wrenches.

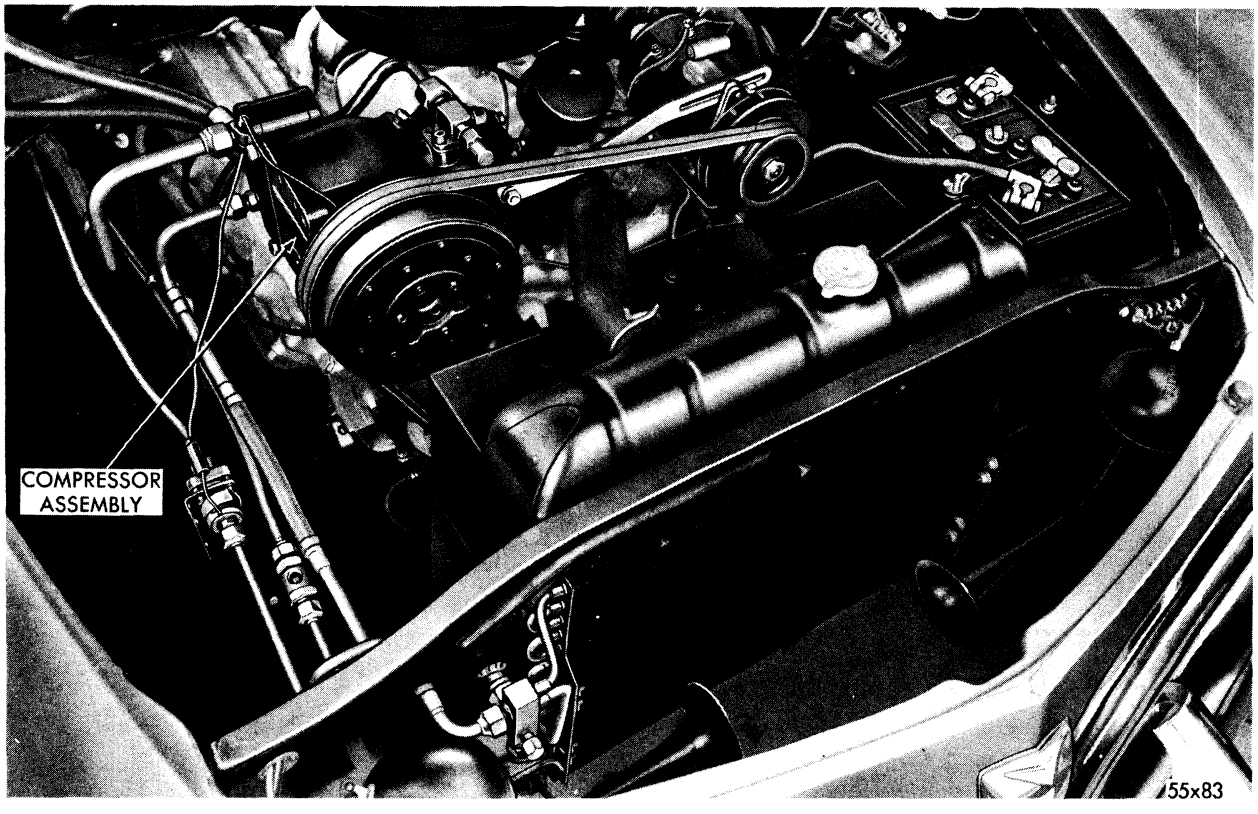


Fig. 12—Compressor Installed

(6) Use new copper washers in flared connections.

(7) Install manifold gauge set Tool C-3354 and attach eight foot test hose to gauge manifold center fitting and to vacuum pump. (Refer to Paragraph 22.)

(8) Evacuate and sweep the system as outlined in Paragraph 26. **During the time that the sweep charge is in the system, test for leaks as outlined in Paragraph 24. Continue evacuation procedure after eliminating any leaks found.**

(9) Charge system with four pounds of Freon 12 as outlined in Paragraph 27. Operate system for 20 minutes (engine running at 1200 rpm). Blower control set at "High" and temperature control at "Cold." Stop engine and check oil level as outlined in Paragraph 32.

(10) Rotate discharge and suction service valve stems counter-clockwise until fully backseated.

(11) Remove gauge set manifold and replace protective caps.

34. REMOVAL AND INSTALLATION OF COMPRESSOR FOR ENGINE OR COMPRESSOR SERVICE

a. Removal

To eliminate the need of discharging the complete system for the removal of the compressor for engine or compressor service, it is permissible to split the muffler bracket with a hacksaw, as shown in Figure 31, and proceed as follows:

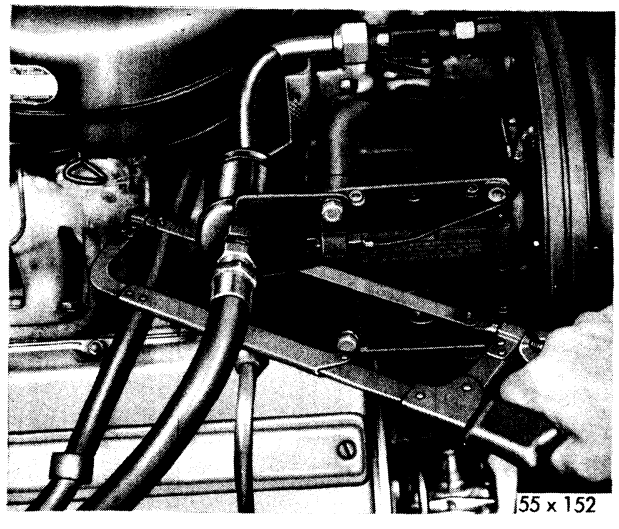


Fig. 13—Separating Muffler Bracket

(1) Start the engine and operate at a fast idle until compressor is warm then, shut off engine.

(2) Remove valve stem protective caps from both the discharge and suction service valves.

(3) Close off both valves by rotating valve stems fully clockwise with Tool C-3361.

(4) Loosen the port caps on both the service valves a couple of turns to gradually release the Freon gas pressure from the compressor. Loosen oil filler plug a few turns.

(5) Remove the drive belts and belt tension adjusting strap from the compressor. Disconnect magnetic clutch electrical lead.

(6) Disconnect the discharge tube flared connection at the discharge (lower) muffler and cap tube nut and male connector. Remove the Allen screws from the suction service valve.

(7) Remove the upper muffler bracket to compressor attaching bolt and gently lay the suction valve, muffler and tube assembly to one side. **Do not bend the vibration eliminator excessively or it may become damaged.** Cover suction port in compressor and suction valve with masking tape.

(8) Remove the compressor to mounting bracket and support bracket bolts and remove compressor from engine.

b. Installation

(1) Place compressor on mounting bracket and start bolts, tightening finger tight.

(2) Remove the masking tape from suction service valve and compressor ports, being sure both surfaces are clean.

(3) Coat a new suction service valve gasket with refrigerant oil and place over valve port.

(4) Install suction service valve and tighten Allen screws to 20 foot-pounds torque.

(5) Install muffler bracket bolt and tighten to 20 foot-pounds torque.

(6) Tighten compressor mounting bracket to compressor attaching bolts to 85 foot-pounds torque.

(7) Remove caps from discharge tube nut and muffler connector. Insert a new copper washer and connect flared connection, tightening securely.

(8) Install compressor drive belts and belt tension adjusting strap.

(9) Adjust belts to a ¼ inch deflection with a 9 to 12 pound pull applied with a scale at the center of the longest span between pulleys.

(10) Install magnetic clutch electrical lead. Install manifold gauge set (Tool C-3354).

(11) Crack the suction service valve open (counter-clockwise), and tighten oil filler plug.

(12) Crack suction gauge hand valve for an instant to purge air from compressor and suction tube.

(13) Close suction gauge hand valve and open discharge service valve (counter-clockwise) slightly. Crack discharge gauge hand valve for an instant to purge air from discharge side of compressor.

(14) Rotate both gauge set hand valves clockwise until they are fully seated.

(15) Rotate both discharge and suction service valve stems counter-clockwise until they are fully back-seated.

(16) Start engine, turn on blower and temperature control switches to "high and "cold." Operate engine for five minutes. Stop engine and test for leaks as outlined in Paragraph 24. Test system for operation, if satisfactory, remove gauge set and replace caps.

35. REPLACING COMPRESSOR VALVE PLATE ASSEMBLY (See Fig. 14)

a. Testing Valves

The usual indication of defective or damaged compressor valves is a lack of cooling capacity. Before condemning valves they should be tested as follows:

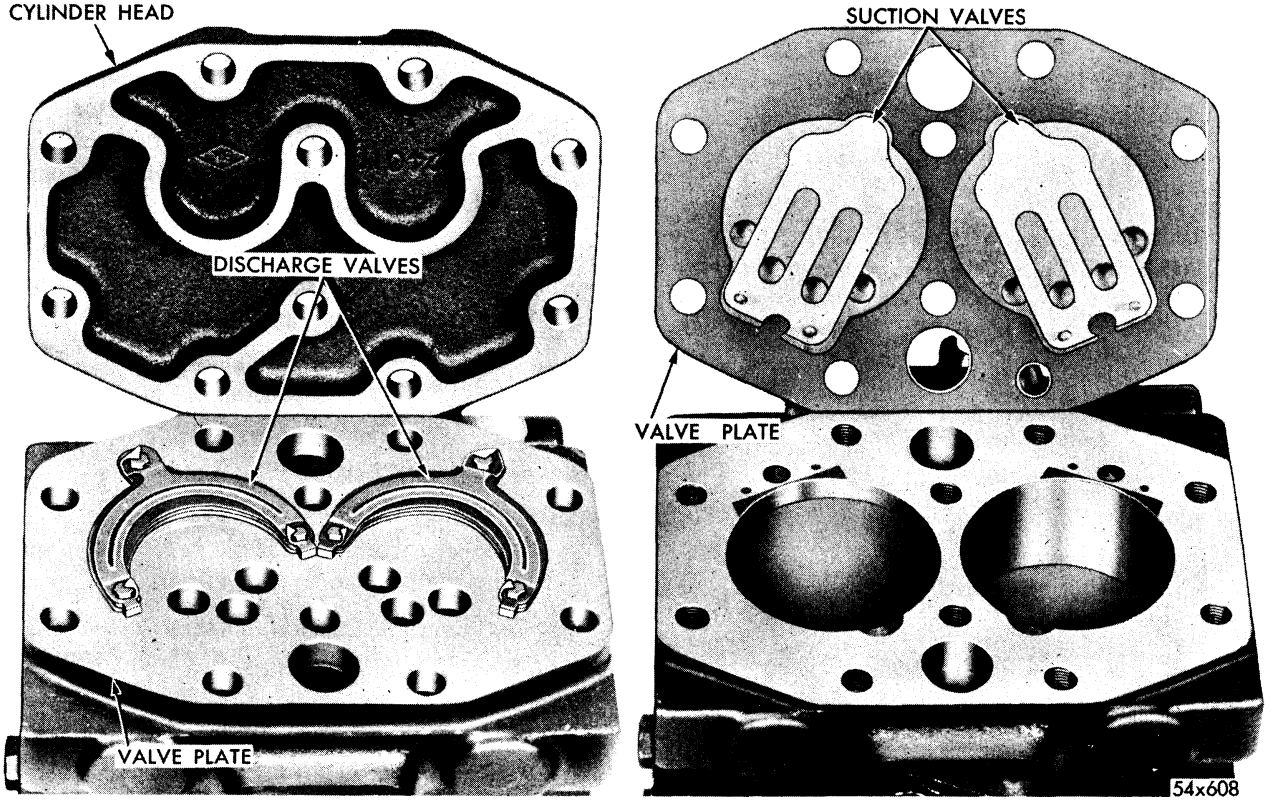


Fig. 14—Valve Plate Assembly

(1) Install gauge set on compressor, refer to Paragraph 25.

(2) Start engine, turn on blower and temperature switches to "High" and "Cold." Operate for 10 to 15 minutes at 1200 rpm to warm up compressor so that the crankcase is free of excessive refrigerant saturation.

(3) Slow engine speed to idle and rotate suction service valve stem clockwise until the valve is fully front seated.

CAUTION

Never front-seat (clockwise) discharge service valve while engine is running or compressor will be damaged.

(4) Observe suction gauge on gauge set. The pressure should drop to zero when valve is seated and on down from 12 to 18 inches of vacuum if the suction valves are in good condition.

(5) Replace valve plate assembly if defective. Shut off engine while watching the gauge.

(6) The vacuum should not lose over five inches in one minute if the discharge valves are in good condition.

(7) If, when the engine is stopped should the gauge hand drop back to zero, the valves are defective and should be replaced. Replace the complete valve plate assembly.

b. Replacing Valve Plate Assembly (Gauge Set Installed)

(1) Rotate the discharge and suction service valve stems clockwise until both valves are fully front-seated.

(2) Slowly open the discharge gauge set hand valve slightly to relieve compressor pressure through the center outlet hose and into the exhaust suction system.

(3) When pressure drops to zero on discharge gauge, open suction pressure gauge set hand valve.

(4) Remove compressor cylinder head bolts and tap the cylinder head with a plastic hammer.

(5) If, when lifting the cylinder head, the valve plate comes off with it, separate the head from the plate by placing a brass rod against the plate and head between the cylinders at the side of the head, and tapping it.

(6) **DO NOT** tap the plate near a finished surface. Remove head, valve plate and gaskets.

(7) Examine the valves; if the valves are broken, and the parts have damaged the top of the piston or scored the cylinders, replace the complete compressor.

(8) If the compressor is not damaged clean cylinder block top and cylinder head thoroughly. Be sure to remove all shreds left from old gaskets.

(9) Install the cylinder head bolts in the head.

(10) Place a piece of cardboard over the bolt heads and turn assembly upside down. Lay on the bench with bolts facing up. **Handle new gaskets carefully as they are fragile. Dip new gaskets in clean refrigeration oil.**

(11) Place the cylinder head gasket, then the valve plate, and last, the valve plate gasket over the bolts. (See Fig. 11.)

(12) Lift the cardboard, turn assembly over and place the entire assembly carefully on the cylinder block and start bolts.

(13) Tighten bolts evenly (from the center out) to 20 foot-pounds torque. Bleed air from compressor and remove gauge set.

36. COMPRESSOR SHAFT SEAL REPLACEMENT

Two types of shaft seals have been used on the compressors for the Chrysler 1955 model air conditioning equipped cars. The early type seal has been superseded by the type now in production. The replacement in the field of the new type seal for the old type includes the bearing and plate. Replacement of the new type seal with a seal of the same type requires the seal only.

a. Preliminary Step for Removal of Seal

(1) Start engine and operate at a fast idle with the temperature control switch at "Cold" and the blower switch set to "High" speed until compressor is warm, and shut off engine.

(2) Remove valve stem protective caps from both the discharge and suction service valves.

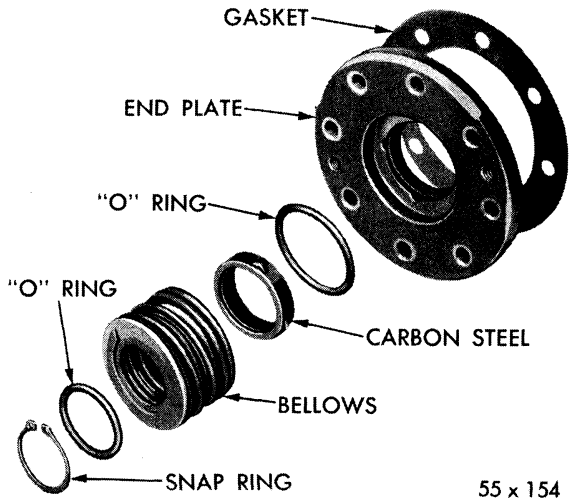


Fig. 15—Compressor Shaft Seal (After Type)

(3) Close off both valves by rotating both valve stems clockwise with Tool C-3361 until they are fully seated.

(4) Gradually loosen oil filler plug a few turns to release pressure from compressor.

(5) Remove the upper right-hand radiator fan shroud. Remove the self-locking bolt and washer from the compressor shaft at the front center of the magnetic clutch.

(6) While supporting pulley and clutch assembly with one hand, tap the pulley with a soft hammer to jar hub from tapered shaft and remove assembly from compressor.

(7) **Be careful not to damage brushes when removing pulley and clutch assembly.** Remove brush holder assembly.

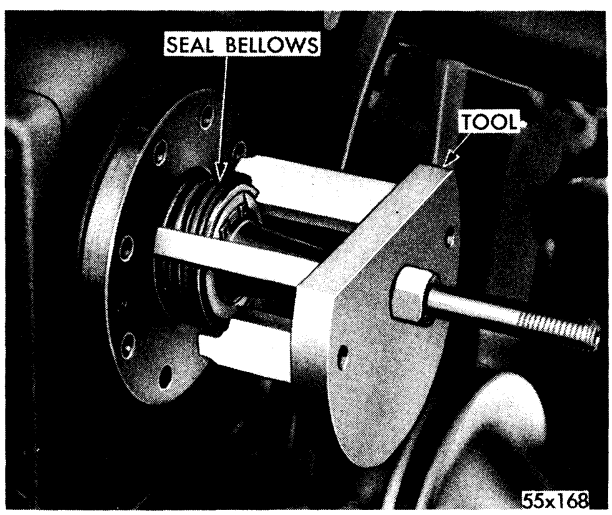


Fig. 16—Puller Installed (Tool C-3473)

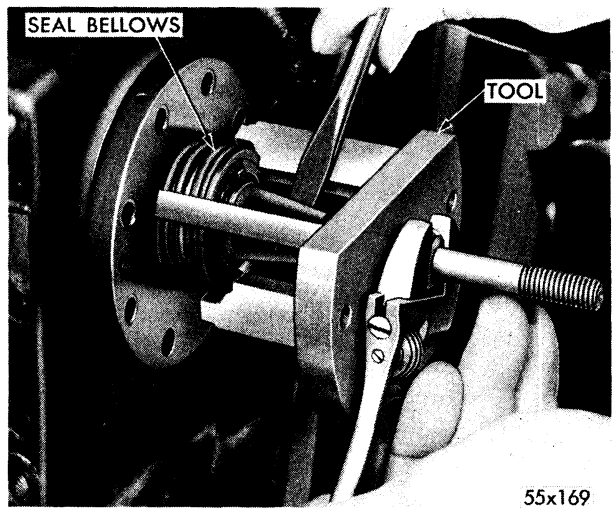


Fig. 17—Removing Seal Bellows

b. Removing Before Type Seal

Push seal ring towards compressor and remove snap ring with snap ring pliers. (Tool C-3106.) Pull seat assembly from shaft. (Fig. 11.) It may be necessary to pry bellows from front bearing end plate with a screwdriver.

c. Removal (After Type Seal) (Fig. 15)

(1) Remove compressor front bearing end plate screws.

(2) Install special puller (Tool C-3473), as shown in Figure 16.

(3) Hold compressor shaft from rotating by placing screwdriver in shaft keyway slot and allow it to rest against pulley leg, while turning puller screw. (See Fig. 17.)

(4) When bellows have compressed far enough to clear the snap ring retainer, remove snap ring with snap ring pliers.

(5) Change puller screw in center of puller (Fig. 18). Turn in on center screw and remove compressor front bearing end plate and seal assembly.

(6) Remove pulley from end plate. Remove carbon seal and "O" ring from bearing end plate.

d. Installation (After Type Seal)

(1) Coat new bearing end plate gasket and large "O" ring with refrigerant oil. Install "O" ring in front bearing end plate. **CAUTION: Be sure that oil pocket is up.**

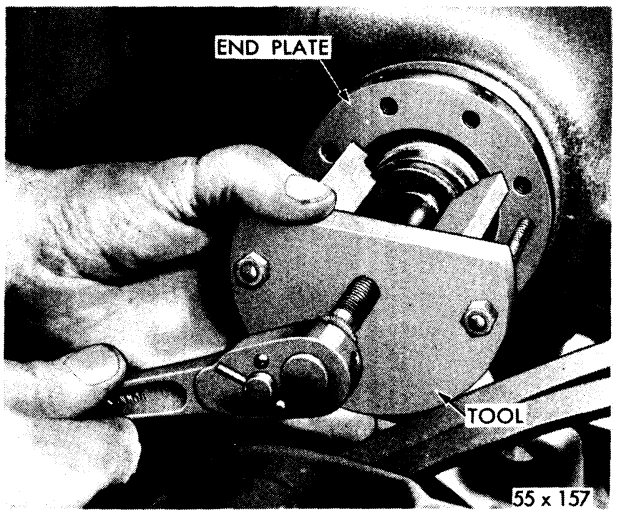


Fig. 18—Removing Bearing End Plate

(2) Install gasket, end plate and two long screws at opposite sides of end plate.

(3) Start end plate squarely and tighten screws evenly finger tight. Install puller, as shown in Figure 19.

(4) While holding compressor shaft with screwdriver, turn puller screw to pull bearing end plate into compressor housing.

(5) Remove puller, install end plate screws and tighten screws evenly to 20 foot-pounds torque.

(6) Coat carbon seal with refrigerant oil and place over shaft positioning tangs on carbon in the recesses in the bearing end plate.

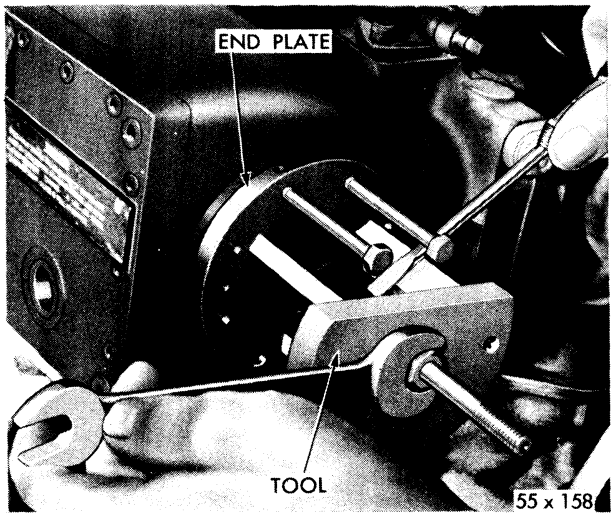


Fig. 19—Installing Bearing End Plate

(7) Lubricate "O" ring in bellows with refrigerant oil and place bellows and snap ring over compressor shaft.

(8) Install puller, as shown in Figure 17. Compress bellows with puller and at same time rotate the bellows assembly to insure proper alignment. **This will prevent pinching "O" ring which would result in a leaky seal.**

(9) Install snap ring retainer when bellows clear groove in shaft. Remove puller. **Caution: Check the snap ring to be positive that it is securely seated in the shaft groove otherwise it may slip out and result in a leaky seal.**

(10) Install brush holder assembly.

(11) Install pulley and magnetic clutch assembly, lining up key and keyway.

(12) Push assembly over shaft and install washer and self-locking bolt.

(13) Tighten bolt to 20 foot-pounds torque. Back-seat both service valves and bleed air from compressor. Tighten oil filler plug.

(14) Install protective caps and test for leaks.

NOTE

When new seals are installed leaks are more noticeable than after system has been in operation for a while and parts are worn in.

37. MAGNETIC CLUTCH

Service to the magnetic clutch assembly is limited to the following parts: Drive plate, pulley and electromagnet assembly, snap rings and brush holder assembly.

CAUTION

DO NOT attempt to remove the electromagnet coil from the pulley assembly. The coil is held in place by a special adhesive material. Once this bond is broken the coil cannot be re-attached.

a. Testing Electromagnet Current Draw

To test the coil for a short or open circuit, connect an ammeter (0-10 AMP Scale) in series with a fully charged 6-volt battery and the insulated brush lead. The current draw at 6 volts should be 3.3 to 3.6 amperes.

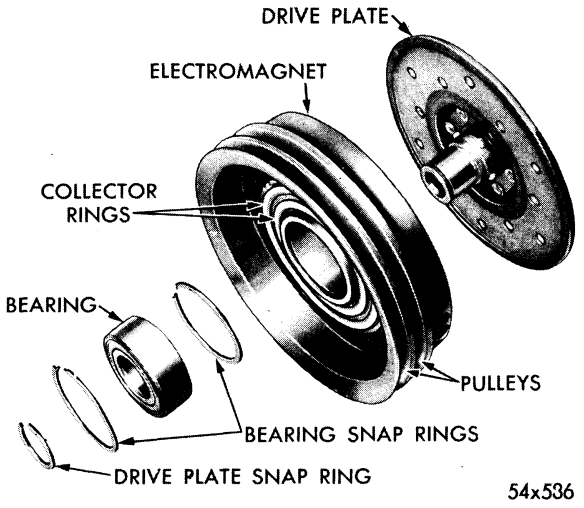


Fig. 20—Magnetic Clutch Assembly (Exploded)

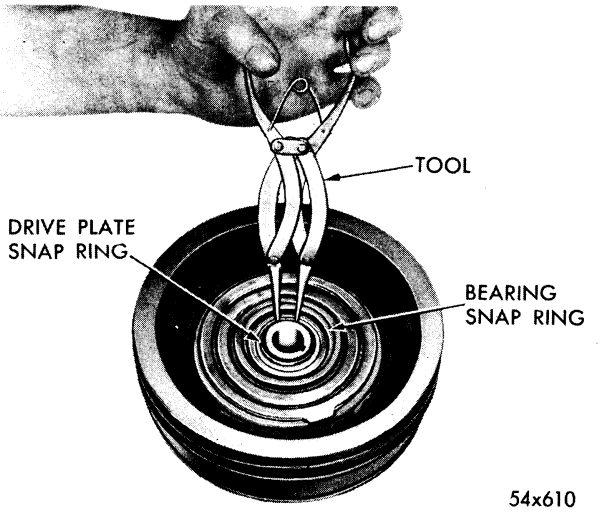


Fig. 21—Removing or Installing Magnetic Clutch Snap Ring

b. Removing Clutch Assembly from Compressor

(1) Operate the engine at 1200 rpm. for five to ten minutes until the compressor is warmed up and system is stabilized, then shut off engine. Rotate both compressor service valve stems fully clockwise.

(2) Loosen both port caps and the oil filler plug a few turns. This should always be done to release pressure from the compressor before the pulley and clutch assembly is removed.

(3) Loosen drive belts and remove them from the compressor pulley. Remove upper right shroud section.

(4) Remove 5/16 inch special locking bolt and washer from compressor crankshaft at front center of clutch. **CAUTION: DO NOT damage brushes when removing or installing clutch.**

(5) While supporting clutch assembly with one hand, tap the pulley with a soft hammer to jar hub from tapered shaft and remove assembly from compressor.

c. Removing and Installing Drive Plate

(1) Remove drive plate retaining snap ring hub, as shown in Figure 21, with Tool C-3301.

(2) Place suitable sleeve against hub and remove drive plate by tapping against sleeve with a hammer.

(3) Inspect springs for loss of tension and/or cracks. Inspect liner on face of plate.

(4) Replace drive plate if liner is worn, springs are weak or broken and if drive plate is warped.

(5) **A sintered iron liner impregnated with fibrous material is bonded to the drive plate. If this liner is worn through, replace drive plate.**

(6) Start drive plate hub squarely into inner bearing race.

(7) Place a brass drift against the drive plate inner hub and tap plate hub into bearing by tapping on brass drift with a hammer. Install snap ring on drive plate hub.

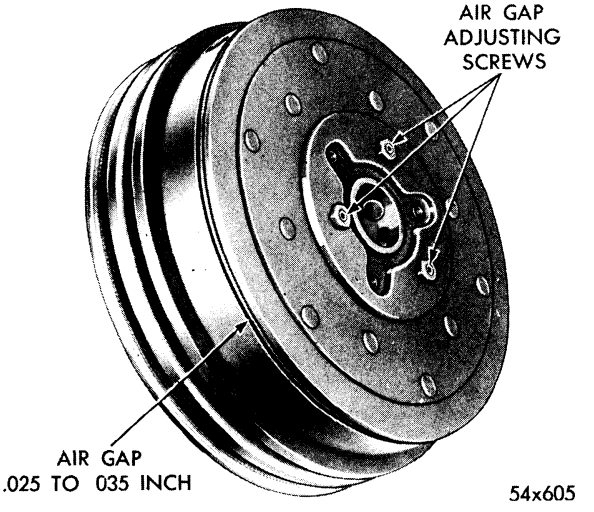


Fig. 22—Adjusting Air Gap

(8) Measure air gap between drive plate electromagnet, as shown in Figure 22. Air gap should measure .025 to .035 inch.

(9) The air gap is adjusted by turning the screws located in the center of the three hexagon headed nuts on the front face of the drive plate. Adjust all three screws to obtain evenly spaced air gap. Measure air gap with a long feeler that will reach into gap at hub.

d. Installing Clutch Assembly on Compressor

Align key and keyway. Push assembly over shaft and key. Install self-locking bolt and washer. Install upper right shroud section. Back-seat both service valves and tighten oil filler plug.

38. REPLACING BRUSH ASSEMBLY

(1) Remove the ground brush lead screw from the compressor.

(2) Disconnect the insulated lead Wade connector.

(3) Remove the two screws attaching brush holder to the compressor and remove brush holder assembly.

(4) Clean collector rings in clutch assembly with carbon tetrachloride and wipe the surplus grease from around clutch bearing.

(5) Install new brush holder assembly. **CAUTION: Be careful not to break brushes. If brushes are allowed to snap to the end of their travel they may break.**

39. EXPANSION VALVE REMOVAL AND INSTALLATION (See Fig. 2)

a. Removal

To remove the valve for cleaning or replacement, it is necessary to discharge the system as outlined in Paragraph 25, and proceed as follows:

(1) Remove fresh air levers and the evaporator rear cover.

(2) Loosen the expansion valve mounting clip from the distributor head flared nut.

(3) Disconnect the liquid tube and the equalizer tube.

(4) Remove the thermostatic capillary tube bulb from the suction tube well. Save the two copper strips between the thermal bulb and the well. The strips must be inserted with the bulb for proper thermal contact.

(5) Disconnect the expansion valve to distributor flared connection and remove expansion valve.

CAUTION

Protect trim and finish against oil or refrigerant escaping from valve body when removed. Use extreme care not to damage tubing flares. Always use two wrenches when possible. SEAL OR PLUG all openings to system immediately if valve is removed for cleaning. INSTALL new valve immediately if valve was removed for replacement. This will prevent dirt and moisture from entering the system.

(6) If valve is to be cleaned and reinstalled, remove the liquid tube inlet fitting from the valve body. The inlet fitting contains the fine mesh screen. Wash accumulation of any substance from the screen with carbon tetrachloride and blow dry with compressed air.

(7) Remove the protective cap from the valve spring and remove the valve assembly from the valve body.

(8) Wash valve parts with carbon tetrachloride and blow dry with compressed air, and, assemble valve.

b. Installation

(1) Clean the thermal bulb well on the suction tube, the thermal bulb and the copper strips. This will assure a good thermal contact.

(2) Insert copper strips and thermal bulb in well.

(3) Connect the expansion valve to distributor flare connection and install retaining clip.

(4) Connect the liquid tube and the equalizer tube.

(5) Using two wrenches tighten the flared nuts.

(6) Evacuate and charge the system as outlined in Paragraphs 26 and 27.

(7) Be sure to test for leaks after partial charge as outlined in Paragraph 24.

(8) Replace evaporator cover, shield and fresh air levers. **The 1955 model Air Conditioning Expansion Valves are non-adjustable.**

40. TESTING EXPANSION VALVE OPERATION FOR PROPER SUPER HEAT

The proper super heat should be 8 to 15 degrees F. Before attempting to measure the super heat, it is essential that all the components of the air conditioning system be functioning properly.

With the blowers, condenser, solenoid valve, thermal switch, strainer-drier and compressor working properly and with the system charged with the proper amount of Freon 12 and oil at 100° F. (300 Saybolt), the following test and adjustment should be carefully followed.

Make sure the compressor discharge pressure does not exceed 275 psi. The pressure will vary according to the ambient temperature. On hot days an electric fan placed in front of the car will hold the pressure down while testing.

On cool days where the temperature is below 70° F., it will be necessary to turn on the car heater, adjust the heater control valve to the warmest position and close all windows. The heat from the heater will warm up the temperature of air in the car interior and keep the thermal switch from operating before the reading of the super heat is obtained.

Install thermometer clip (Tool C-3421) on the suction tube fitting at evaporator outlet. Be sure there is a good tight mechanical connection between the fitting and the thermometer clip.

Wrap a soft, dry cloth around the suction tube fitting and thermometer bulb. This will prevent the atmospheric temperature from reaching the thermometer bulb which would increase the temperature of the bulb and give an incorrect reading.

Observe compressor pressures. They should be approximately the same as those shown in the chart according to the ambient temperature. If the compressor head pressure is low then the air blast across the radiator and condenser should be altered until the proper head pressure is obtained. (Moved further away.)

Average Temperature Pressure Relationship At An Engine Speed Of 1200 rpm.

Ambient Temperature	Discharge Pressure
60° F.	100 - 150
80° F.	140 - 190
100° F.	190 - 240
110° F.	230 - 280

After the thermometer reading and the head pressures have stabilized, made a note of the indicated readings and refer to the temperature pressure relation chart on Page 655. As there is approximately two pounds differential in the observed reading at the suction gauge and that present at the position of the thermometer on the suction tube at the evaporator housing, you must add two pounds to the observed reading on the suction gauge. This differential in readings is due to internal friction in the tubes and this correction factor will give you the **actual** reading at the thermometer position.

To obtain your actual super heat reading, find the difference between the thermometer reading and the corrected chart reading. We will use the following as an example. Insert values obtained in test. If super heat is outside specifications of 8 to 15 degrees F., replace the expansion valve.

EXAMPLE OF CHART FOR DETERMINING SUPER HEAT

Observed Suction Pressure at Gauge	Corrected Suction Pressure (2 lbs. Added to Observed)	Temperature Degrees F. From T-P Relation	Temperature at Thermometer On Suction Line	Super Heat
48 lbs.	50 lbs.	53°F.	55°F.	2°F.
43 lbs.	45 lbs.	49°F.	54°F.	5°F.
39 lbs.	41 lbs.	45°F.	52°F.	7°F.
37 lbs.	39 lbs.	42°F.	51°F.	9°F.
35 lbs.	37 lbs.	40°F.	52°F.	12°F.

TEMPERATURE, PRESSURE RELATION CHART FOR FREON 12

PRESSURES		PRESSURES		PRESSURES		PRESSURES	
TEMP. °F	PRESS. F 12	TEMP. °F	PRESS. F 12	TEMP. °F	PRESS. F 12	TEMP. °F	PRESS. F 12
0	9.1	50	46.6	90	99.6	130	180.2
2	10.1	51	47.8	91	101.3	131	182.6
4	11.2	52	48.7	92	103.0	132	185.1
6	12.3	53	49.8	93	104.6	133	187.6
8	13.4	54	50.9	94	106.3	134	190.1
10	14.6	55	52.0	95	108.1	135	192.6
12	15.8	56	53.1	96	109.8	136	195.2
14	17.1	57	55.4	97	111.5	137	197.8
16	18.3	58	56.6	98	113.3	138	200.0
18	19.7	59	57.1	99	115.1	139	202.9
20	21.0	60	57.7	100	116.9	140	205.5
21	21.7	61	58.9	101	118.8		
22	22.4	62	60.0	102	120.6		
23	23.1	63	61.3	103	122.4		
24	23.8	64	62.5	104	124.3		
25	24.6	65	63.7	105	126.2		
26	25.3	66	64.9	106	128.1		
27	26.1	67	66.2	107	130.0		
28	26.8	68	67.5	108	132.1		
29	27.6	69	68.8	109	135.1		
30	28.4	70	70.1	110	136.0		
31	29.2	71	71.4	111	138.0		
32	30.0	72	72.8	112	140.1		
33	30.9	73	74.2	113	142.1		
34	31.7	74	75.5	114	144.2		
35	32.5	75	76.9	115	146.3		
36	33.4	76	78.3	116	148.4		
37	34.3	77	79.2	117	151.2		
38	35.1	78	81.1	118	152.7		
39	36.0	79	82.5	119	154.9		
40	36.9	80	84.0	120	157.1		
41	37.9	81	85.5	121	159.3		
42	38.8	82	87.0	122	161.5		
43	39.7	83	88.5	123	163.8		
44	40.7	84	90.1	124	166.1		
45	41.7	85	91.7	125	168.4		
46	42.6	86	93.2	126	170.7		
47	43.6	87	94.8	127	173.1		
48	44.6	88	96.4	128	175.4		
49	45.6	89	98.0	129	177.8		

41. BLOWER AND MOTOR (See Fig. 2)

a. Removal and Disassembly

(1) Remove fresh air control lever from shafts on either side of evaporator cover.

(2) Remove the evaporator housing rear cover mounting screws and lockwashers and remove cover.

(3) Disconnect main lead wire to blower motor and the thermal switch leads at the terminal block mounting located at side of evaporator assembly.

(4) Remove the rubber grommet and pull wires through compartment. Disconnect ground wire from compartment.

(5) Remove the six blower assembly mounting screws and lift assembly out of compartment.

(6) Remove the eight blower housing mounting nuts and lockwashers, and remove base plate from housing.

(7) Remove the eight blower motor mounting plate screws and lockwashers.

(8) Remove blower housings and note the difference between right and left housing for correct installation procedure.

(9) Use an Allen wrench to loosen the two blower fan set screws and remove the blower fans from shaft.

CAUTION

Blower fans function as right and left and should be installed accordingly. Always mark for identification before removal.

(10) Remove the six blower motor mounting screws and lockwashers and remove the two motor mounting plates. Do not lose the grommets or spacers from the motor brackets as they are essential in maintaining vibration-free blower operation.

(11) Remove the four blower mounting bracket nuts and lockwashers and separate brackets from motor. **Motor location should be marked when removed so the motor can be reinstalled to rotate in the right direction.**

b. Assembly and Installation

(1) Place motor mounting brackets on motor and install the four lockwashers and nuts, and tighten securely. Install motor. **(Make sure the motor rotates in right direction, clockwise as viewed from left side of car.)**

(2) Inspect the six blower mounting grommets for deterioration and hardness and replace if necessary.

(3) Place the two motor mounting plates into position on brackets and install the six screws and lockwashers; tighten securely.

(4) Make sure spacers are inserted in the grommets before assembly. **Make sure motor is installed with wire leads and drain wick located towards bottom of motor.**

(5) Install the blower fans on shaft so that air will be forced out of outlet duct. Vanes at bottom fan should point up and towards rear. (Refer to Fig. 5.)

CAUTION

Make sure blower fans are installed correctly, otherwise car cooling will be affected.

(6) Place right and left blower housings over fans and install the eight mounting screws and lockwashers. Tighten securely.

(7) Place base plate into position on blower housing and install the eight blower housing mounting nuts and lockwashers; tighten securely.

(8) Position the blower fans as near as possible to outside portion of housing.

(9) Check position of set screws in relation to flat on the shaft and tighten securely. **Rotate fans by hand to make sure there is no interference between fan and housing at any point when fans are rotated.**

(10) Place blower assembly into position in evaporator compartment. Install the mounting screws and tighten securely.

(11) Make sure ground wire terminal surface is clean, install wire and tighten.

(12) Push blower motor lead wire and thermal switch leads through opening in compartment and install rubber grommet.

(13) Install wires on terminal block mounting making sure connections are tight. Check motor for proper operation.

(14) Place cover into position on evaporator housing and install mounting screws and lockwashers. Replace fresh air control levers.

42. BLOWER FANS

a. Removal and Disassembly

(1) Remove fresh air control lever from shafts on both sides of evaporator.

(2) Remove the evaporator housing rear cover mounting screws and washers and remove cover from compartment.

(3) Remove the four air inlet ring mounting screws and the air inlet ring.

(4) Use an Allen wrench to loosen the set screw of the appropriate blower fan and remove fan from shaft and housing. **If both blower fans are to be removed, mark the right and left fan so that they may be reinstalled in the correct location to rotate in the right direction.**

b. Assembly and Installation

(1) Mount correct blower fan on shaft but do not tighten set screw. (Refer to Fig. 5.)

(2) Replace air inlet ring and tighten the four mounting screws securely.

(3) Position blower fan on shaft so that it is 1/8 inch from the inlet ring.

(4) Tighten the set screw securely on the flat of the shaft.

(5) Rotate fan by hand to make sure there is no interference between housing and fan at any point when fans are rotated. Replace rear cover. Replace fresh air control levers.

43. CONDENSER REMOVAL AND INSTALLATION

a. Removal

(1) Discharge system as outlined in Paragraph 25.

(2) Disconnect discharge and by-pass tubes from discharge valve and liquid line to receiver and cap tubes.

(3) Remove hood lock plate and support bracket.

(4) Remove four bolts that attach condenser brackets to radiator support and lift condenser from car.

b. Installation

(1) Position and install four attaching bolts in condenser brackets to radiator support. Tighten bolts to 20 foot-pounds torque.

(2) Remove caps from tubes (and condenser if so equipped).

(3) Connect condenser to receive tube flared connection.

(4) Connect discharge and by-pass tubes to discharge valve.

(5) Charge system with partial charge and test for leaks as outlined in Paragraphs 24 and 27.

(6) Correct any leaks, and evacuate system. Charge with four pounds of Freon 12 as outlined in Paragraph 27. Test system operation.

44. RECEIVER FUSIBLE PLUG REPLACEMENT (See Fig. 23)

Where it is found necessary to replace the fusible plug in the receiver (due to having been damaged by a blow or because of melting from temperatures exceeding 210° to 214° F.), it is possible to do so without removing the receiver.

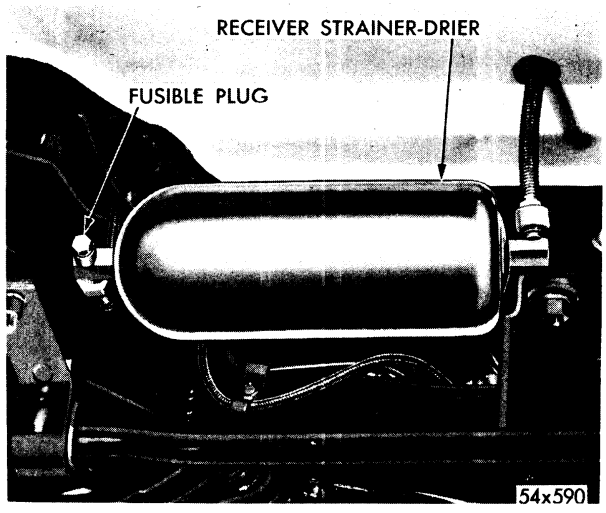


Fig. 23—Receiver Strainer-Drier Installed

Remove the old fusible plug after discharging system. Apply refrigerant thread sealer to threads of new plug and install plug in receiver. Tighten to 20 foot-pounds torque. **CAUTION: Never replace a damaged fusible plug with a solid plug.**

Evacuate system as outlined in Paragraph 26. Charge system with (4) pounds of Freon 12 as outlined in Paragraph 27.

45. RECEIVER STRAINER-DRIER REPLACEMENT

Where the receiver strainer-drier unit is found to be clogged when tested as outlined in Paragraph 23, or where metal particles are found in the system, it will be necessary to replace the receiver strainer-drier assembly.

a. Removal

Discharge system as outlined in Paragraph 25. Lift car with hoist.

CAUTION

Protect eyes with goggles or glasses when disconnecting receiver flare connections, to prevent any drops of liquid refrigerant from dropping in eyes when connections are broken.

Disconnect flared connections at both ends of receiver. Remove attaching bolt nuts and remove receiver. **Cap ends of receiver immediately if unit is to be used again. Leave caps on connectors until ready to make connections when installed.**

b. Installation

Position receiver in place and install bolts and nuts and tighten securely. Remove caps and connect flared connector nuts and tighten securely. Charge system with partial charge and test for leaks as outlined in Paragraphs 24 and 27. Correct any leaks and evacuate system as outlined in Paragraph 24. Charge with four pounds of Freon 12 as outlined in Paragraph 27.

46. EVAPORATOR REMOVAL AND INSTALLATION

a. Removal

(1) Discharge the system as outlined in Paragraph 25.

(2) Remove rear seat, seat back and panel.

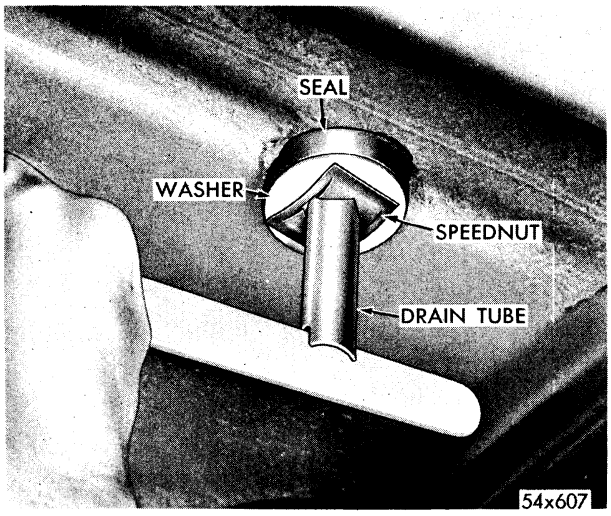


Fig. 24—Removing Evaporator Drain Tubes

(3) Remove the evaporator cover and disconnect the electrical lead wires. Place blocks under evaporator at each end to act as supports when attaching bolt nuts are removed.

(4) Raise the car and disconnect the suction pressure, liquid and by-pass connectors, being sure to tag the liquid and by-pass tubes for identification purposes when reconnecting.

(5) Unscrew the drain tubes from the lower side of the trunk floor pan, as shown in Figure 24.

(6) Lower the car. Remove the fresh air duct hoses from the fresh air valve flanges at each end of the evaporator.

(7) Remove mounting brackets to the car body, attaching nuts and washers.

(8) Remove evaporator from car, pulling disconnected refrigerant tubes up through floor pan. **CAUTION: Cap all disconnected connections to prevent entrance of dirt and/or moisture into the system.**

b. Installation

(1) Lift evaporator assembly into car trunk while guiding refrigerant tubes through hole in floor pan and set assembly on blocks.

(2) Install attaching bolt washers and nuts. It may be necessary to pry assembly up to compress rubber seals so that the nuts can be started.

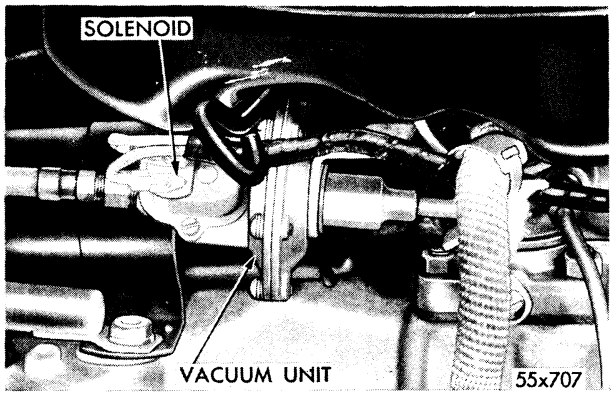


Fig. 25—Fast Idle Device

(3) Install fresh air duct hoses and electrical lead wires.

(4) Raise the car and connect the suction pressure by-pass and liquid tube connectors, using new copper washers in flare connections.

(5) Install drain tubes through floor pan and into evaporator.

(6) Lower car and charge system with a partial charge, and test for leaks, as outlined in Paragraphs 24 and 27.

(7) Correct any leaks found, evacuate and charge system with four pounds of Freon 12.

(8) Install panel, seat back and rear seat. Replace cover and test operation of blowers and cooling system.

47. FAST IDLE DEVICE (See Fig. 25)

The fast idle device is intended to increase engine idle speed from 700 to 800 rpm, when the transmission control lever is moved from drive to neutral when the air conditioning system is in operation. This is desirable for prolonged stops in heavy traffic. If accelerator is depressed and released when the fast idle device is energized it will further increase engine speed to approximately 1100 rpm.

To set fast idle device, back off round adjusting nut on diaphragm shaft away from the pawl, this prevents interference with idle adjustment. Start engine, attach tachometer and with transmission control lever in "Neutral" position and engine at operating temperature adjust engine idle to 475-500 rpm.

Turn blower control switch to first position, temperature control switch to second position. Adjust round adjusting nut on fast idle diaphragm shaft to increase engine 700 to 800 rpm.

With hand brake on, move transmission control lever to drive range and back to neutral position. Readjust fast idle if necessary. Lock round nut with hex nut.

48. REPLACING EVAPORATOR FILTER

The filter should be replaced whenever it becomes dirty. This would normally be at the time when bugs, dirt etc., are removed from the radiator and condenser.

To replace the filter remove the evaporator cover and lift out old filter and place new one in bottom of evaporator housing and replace cover.

49. ELECTRICAL SYSTEM CIRCUITS (De Luxe)

The electrical circuit wiring diagram is illustrated in Figure 26.

a. Blower Circuit

The voltage drop of the blower circuit from the battery to the blower motor should not exceed 2 volts. Blower switch set to "High" speed position and with a battery voltage of 6.0 to 6.2 voltage.

The blower motor current draw at six volts is 19 to 22 amperes, with a battery voltage of 6.0 to 6.2 volts, blowers switch in "High" speed position, with windows closed and fresh air vents open.

b. Temperature Control Circuit

The magnetic clutch coil draws 3.3 to 3.6 amperes at 6.0 to 6.2 volts.

The solenoid valve draws 2.1 to 2.3 amperes at 6.0 to 6.2 volts.

c. Blower Resistors

In the "Low" speed position the resistors are in series. The total resistance is .7 ohms approximately.

In "Medium" speed position, only one resistor is in the circuit. The resistance of the resistor is .22 ohms approximately.

In the "High" speed position the circuit is direct for maximum motor speed.

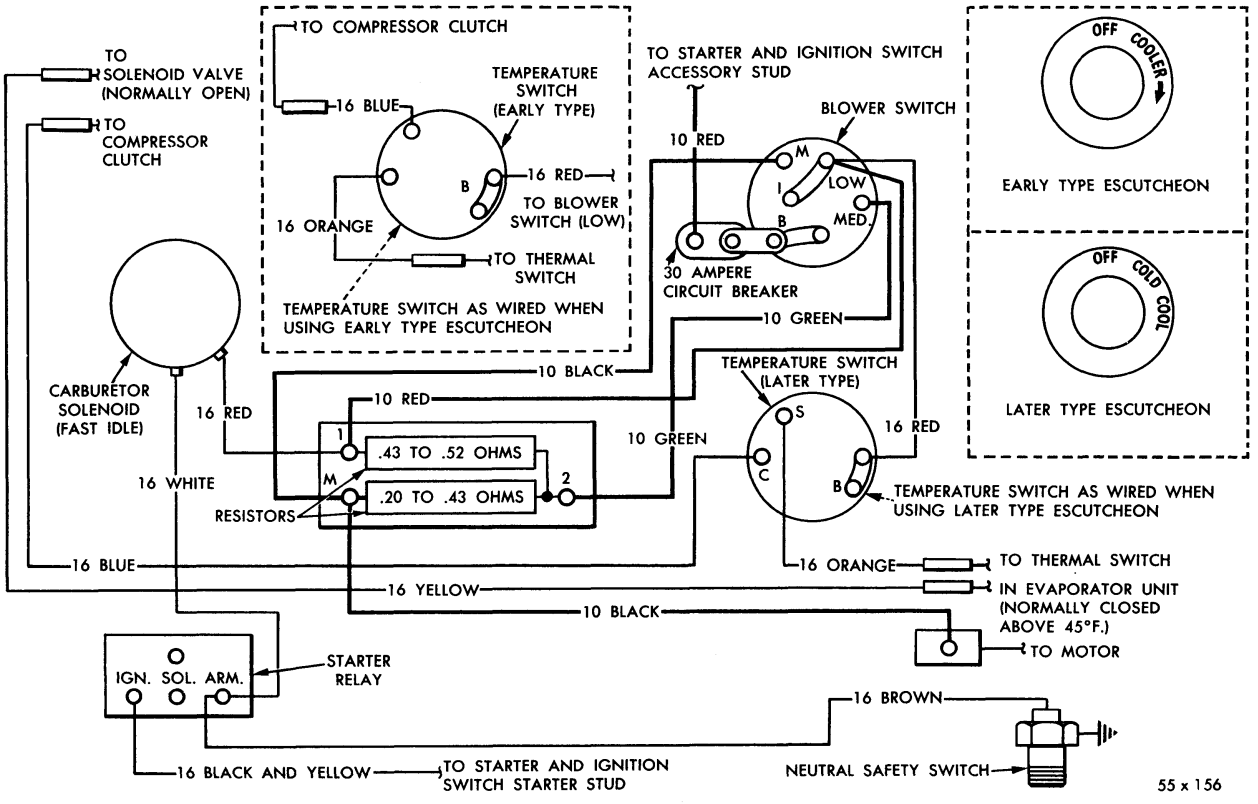


Fig. 26—Electrical Circuit Wiring Diagram

Some resistor blocks were released with the resistors reversed. With the wiring connected according to the diagram to resistors that are reversed, the proper blower speeds are not possible. To correct for the proper blower speeds, reverse the red and black wires on the resistor block (Fig. 26). With the wiring connected to the proper resistors three distinct blower speeds are apparent.

Two types of temperature control switches have been used on the 1955 air conditioning equipped cars, as shown in Figure 26. The only difference in the outward appearance other than the escutcheon plate, is that the early switch has no terminal markings. The late type switch terminals are marked with an S and a C. The switches vary internally and the wiring to the two switches is reversed. The escutcheons and the switches are not interchangeable.

50. ROAD TESTING CAR

Determine that the system is now functioning properly and instruct all parties concerned, including owner, how to obtain the maximum results from the air conditioning system.

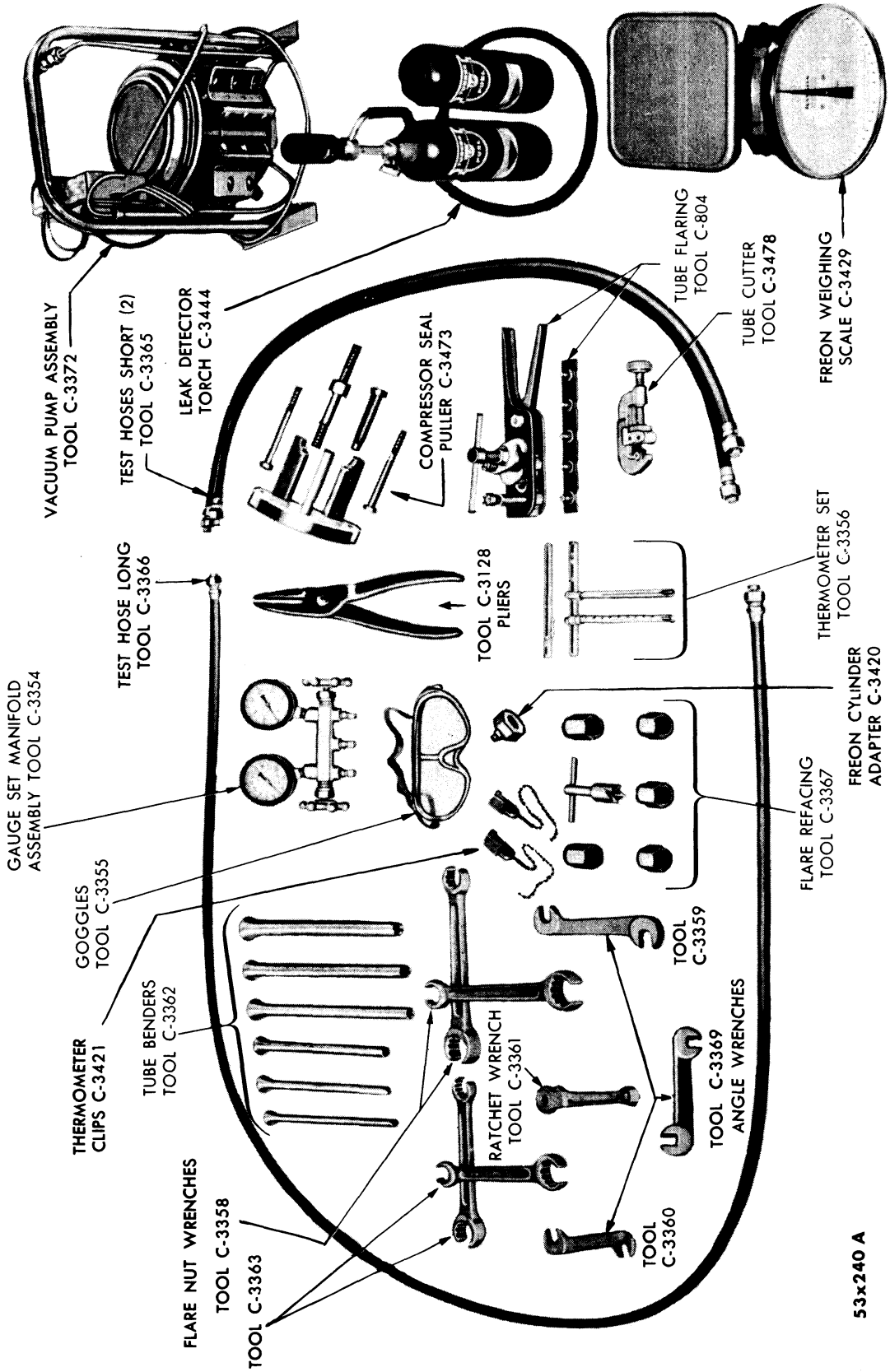


Fig. 27—Special Tools

SERVICE DIAGNOSIS

The following items of improper functioning of Air Conditioning System are meant to be used in conjunction with test procedures as outlined in Paragraph 40. No attempt should be made to use the diagnosis information as a method of trouble shooting or spot checking. Properly used (as an aid to the complete test procedure) the diagnosis will be of considerable value to the service man.

51. BLOWERS NOT OPERATING

Possible Causes:

a. Faulty circuit breaker.

b. Open circuit in wiring.

c. Faulty motor winding.

d. Faulty control switch or resistors.

e. Loose connections.

f. Motor burnt out.

g. Armature shorted or grounded.

h. Bearings frozen.

i. Stuck or worn brushes.

Remedies:

a. Test circuit breaker with jumper wire. Replace faulty circuit breaker.

b. Test electrical circuit with point to point voltmeter test. Replace or repair broken wire.

c. Replace motor.

d. Test switch and resistors with voltmeter or jumper wire. Replace faulty switch or resistors.

e. Test circuit with voltmeter for voltage drop. Clean and tighten all loose connections.

f. Replace motor.

g. Replace armature.

h. Replace motor.

i. Replace brushes, turn and undercut armature.

52. BLOWERS AND COMPRESSOR OPERATING—NO COOLING

Possible Causes:

a. Refrigerant low.

b. Refrigeration system restricted.

c. Compressor valves not functioning properly.

d. Expansion valve faulty.

Remedies:

a. Recharge system after testing and repairing all leaks.

b. Test strainer-drier as outlined in Paragraph 23. Test expansion valve. Inspect lines for kinks.

c. Test compressor head pressures and valves.

d. Test expansion valve as outlined in Paragraph 23. Clean or replace valve.

53. BLOWERS OPERATING—PARTIAL COOLING

Possible Causes:

a. Refrigerant supply low.

b. Expansion valve not functioning properly.

c. Compressor operating above normal pressure.

d. Compressor valves faulty.

e. Restricted condenser or discharge line.

f. Thermal switch or solenoid valve inoperative.

g. Air passages through condenser blocked by bugs, dirt, mud or by bug screen.

h. Improper refrigerant.

Remedies:

a. Check sight glass for indication of low refrigerant. Check for leaks, and charge system.

b. Test expansion valve as outlined in Paragraph 40. Clean, adjust or replace as required.

c. Follow test procedure and eliminate cause.

d. Test valves as outlined in Paragraph 40.

e. Discharge system, remove discharge line and inspect for restriction. Replace or clean as required. Inspect condenser for kinks or obstruction. Clean with air or replace.

f. Test thermal switch and solenoid valve as outlined in Paragraph 23.

g. Inspect for cause of obstruction. Clean with warm water and compressed air applied from side next to engine. Remove bug screens on air conditioned cars.

h. Test temperature pressure relation of refrigerant.

54. LOW SUCTION PRESSURE AND LOW HEAD PRESSURE

Possible Causes:

a. Low on refrigerant.

b. Strainer-drier plugged.

c. Liquid line plugged.

d. Expansion valve super heat setting.

e. Expansion valve thermal valve charge lost or poor contact in wall.

f. Expansion valve screen or port plugged with dirt or moisture.

g. Compressor valves faulty.

Remedies:

a. Check for leaks, refer to Paragraph 24. Recharge as outlined in Paragraph 27.

b. Test strainer-drier as outlined in Paragraph 23. Replace if faulty.

c. Replace liquid line.

d. Adjust super heat as outlined in Paragraph 40.

e. Check thermal bulb contact. Replace expansion valve if required.

f. Clean expansion valve as outlined in Paragraph 39.

g. Test compressor valves as outlined in Paragraph 23. Replace assembly if faulty.

55. LOW SUCTION PRESSURE AND HIGH HEAD PRESSURE

Possible Cause:

a. Plugged discharge line or condenser.

Remedy:

a. Replace or clean line or condenser.

56. HIGH HEAD PRESSURE

Possible Causes:

a. Exterior surfaces of condenser restricts flow of air due to bugs, dirt, mud or other obstructions.

b. Air and moisture in system.

c. Too much refrigerant.

Remedies:

a. Wash out condenser with warm water and compressed air from side next to engine.

b. Discharge system, refer to Paragraph 25. Evacuate and recharge system.

c. Discharge until bubbles appear in sight glass then add Freon until bubbles disappear.

57. SUCTION PRESSURE O.K. AND HIGH HEAD PRESSURE

Possible Causes:

a. Air in system.

b. Too much refrigerant.

Remedies:

a. Open gauge manifold discharge pressure valve slightly and leave open for 10 seconds to purge air. Close valve, start engine and recheck gauge pressures at 1200 rpm.

b. Operate engine at 1200 rpm with blower switch turned to high. Discharge Freon slowly through gauge manifold center fitting until bubbles appear in sight glass. Charge system with Freon 12 as outlined in Paragraph 27.

58. LOW SUCTION PRESSURE—HEAD PRESSURE O.K.

Possible Causes:

a. Blower not operating.

b. Strainer-drier plugged.

c. Expansion valve super heat setting too high.

Remedies:

a. Test electrical circuit for continuity. Replace faulty motor.

b. Test strainer-drier and replace if required, as outlined in Paragraph 23.

c. Adjust super heat as outlined in Paragraph 22. Replace valve if faulty.

59. TESTING FOR LEAKS WITH LEAK DETECTOR (For Diagnosis)

Where a system has been found to be low on Freon, or following repairs on the system that necessitated the opening of a connection, it is necessary to test for leaks and tighten connections or make repairs as required before the system is charged and put in operation. If a system has been discharged for making repairs or to eliminate moisture, the system must be evacuated before partially charging for a leak test.

(1) Partially charge the system with Freon 12 as outlined in Charging the System with Freon 12, Paragraph 27, and proceed as follows:

This is necessary only where the Freon supply in the system is very low or where system has been evacuated.

(2) Operate engine at 1200 rpm with blower switch turned to "High." Discharge Freon slowly through gauge manifold center fitting until bubbles appear in sight glass. Charge system with Freon 12 as outlined in Paragraph 27.