Section XVII
CHRYSLER AIR CONDITIONING SYSTEM
CONTENTS

DATA AND SPECIFICATIONS

COMPRESSOR

	Tecumseh	Copeland
Location	Right Cylinder Bank	
Type	2 cyl.	4 cyl. V
Bore	2 inch	1⅞ inch
Stroke	1⅜ inch	1 inch
Displacement	8.67 cu. in.	11 inch
Type Valve	Reed Type	
Speed (Depends on axle ratio and tire size)	Approx. 915 r.p.m. at 25 m.p.h.	
Oil Capacity (MOPAR Refrigerant Oil; 300 Saybolt)	12 ounces	
Clutch	Rotating Coil	Stationary Coil
Mufflers	(Early type; External) (Late type; Integral)	None

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	250 to 300 cubic feet of air per minute at high speed
Current Draw	Approximately 10½ amps

SPECIAL TOOLS

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—¼" sq. Drive with 3/16" sq. and ½" 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 ¾" 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 ¼", 5/16", 3/8", 7/16", ½" 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

Section XVII

CHRYSLER AIR CONDITIONING SYSTEM

1. AIR CONDITIONING COMPONENTS

The Air Conditioning System includes evaporator unit with fresh air vents, condenser, compressor with magnetic clutch, refrigerant supply tank, connecting tubes, electrical harness, and control switches.

2. OPERATING THE AIR CONDITIONING SYSTEM

The blower control switch operates blowers only. Two types of blower control switches are used. The late production switch has four positions OFF, HIGH, MEDIUM and variable LOW. The earlier production switches also have four positions but LOW speed is not variable.

The temperature control switch has three positions. OFF, COLD and COOL. The temperature control switch completes the circuit to magnetic clutch, fast idle and also to solenoid by-pass valve.

The temperature control switch and blower control switch must be turned on to operate air conditioning system. To operate system under normal heat and dust conditions, close all windows and cowl vent, and open fresh air vents (if closed) by turning levers on evaporator in luggage compartment. Start engine and turn temperature and blower control switches to **HIGH and COLD.** After a few minutes of operation, adjust control switches to desired temperature condition. Under extreme dusty conditions, it is advisable to keep fresh air vents closed.

To cool car after it has been parked in hot sun, open all windows and cowl vents, and turn temperature control switch to **COLD.** Drive car a few blocks, close all windows and cowl vent, and turn blower switch to **HIGH.**

SERVICE INFORMATION

3. REFRIGERANT

Refrigerant Freon 12 (or Genetron 12) is used in the air conditioning system.

4. PRECAUTIONS TO OBSERVE IN HANDLING THE REFRIGERANT

When properly used, refrigerant is harmless. A few simple precautions however, should be observed to guard against injuries or sickness that might occur when improperly handled.

a. Precaution: Do not expose eyes to liquid. Do not rub eyes if splash of refrigerant hits them. Apply cold water immediately to area of eye to gradually raise temperature above freezing point. The use of antiseptic oil is helpful since oil forms a protective film over eye ball **until** medical aid can be obtained. **Safety Goggles, C-3355, should be worn to protect the eyes.**

b. Precaution: Do not discharge refrigerant in areas where an open flame is present. The refrigerant normally is non-poisonous. A concentration of gas however in a live flame will produce poisonous gas. Splashing refrigerant on bright metal or chrome should also be avoided because gas will tarnish bright metal.

c. Precaution: Do not leave charging drum uncapped. Always replace cap after using charging drum. A charging drum is shipped equipped with a heavy, protective cap which is used to protect valve and safety plug from damage.

d. Precaution: Do not expose charging drum to high temperature. The drum should never be exposed to radiant heat or an open flame as resultant pressure from such heat may cause safety plug to blow out. In charging system, it may be necessary to heat drum to raise drum pressure higher than pressure in system. **Use pail of hot water (no hotter than you can put your hand into) to supply heat to drum.**

5. INSTALLING GAUGE SET MANIFOLD

Remove valve stem protective caps from compressor discharge and suction service valves. Using Tool C-3361, make sure both valves are completely back-seated (counter-clockwise). The normal operating position is when valve is rotated in a counter-clockwise direction. This position also isolates service valve ports from system pressure.

Remove protective caps from both discharge and suction service port caps. Install four-foot test hose from 600 pound gauge fitting on Tool C-3354 to discharge service valve port fitting (Fig. 1). Install the other four-foot test hose from 300 pound compound gauge fitting on Tool C-3354 to suction service valve port fitting (Fig. 2). Turn both valve handles of gauge set C-3354 clockwise as far as they will go. 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.

6. INSPECTION AND TESTING OF COMPLETE AIR CONDITIONING SYSTEM

a. Preparation for Tests

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, and blow out from side opposite entrance with compressed air. Place an electric fan (15 to 20 inch fan) in front of radiator so it will blow as much air as possible over condenser and maintain the temperature pressure relationship, as outlined in Paragraph 27. Check

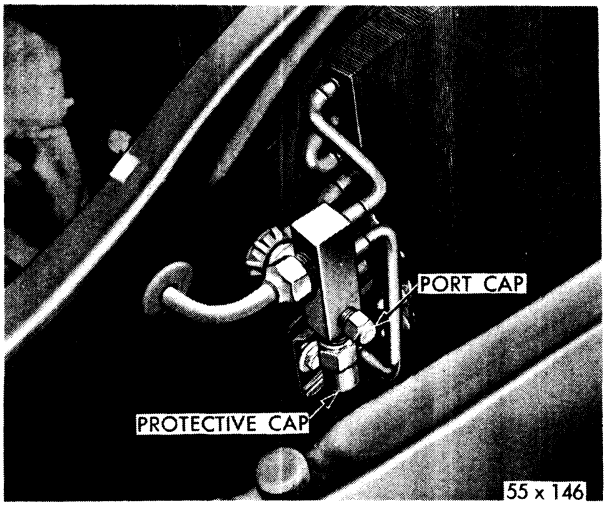

Fig. 1—Discharge Service Valve

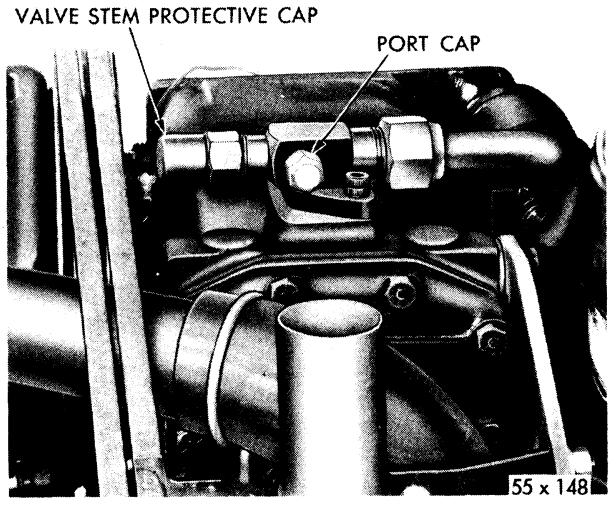

Fig. 2—Suction Service Valve

radiator pressure cap. Cars equipped with air conditioning system require a 14-pound pressure cap. Check or add water to cooling system to maintain proper level.

Check compressor belt tension by applying a 9 to 12 pound pull with a scale at center of longest span. Compressor belt deflection (each belt) should be ¼ inch.

Remove cover from evaporator housing and inspect blower fans for proper installation. When 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 3. Blower fans should clear inlet ring not to exceed ⅛ inch. Fans may be moved in or out by loosening Allen set screw in fan hub.

Check direction of motor armature rotation. Fans should rotate clockwise when viewed from left side of car. Remove motor and turn assembly around if rotation is incorrect. Be sure blower fans are properly installed and check speed by rotating blower switch to **High, Medium, and Low.**

Turn blower switch to high position and test battery voltage at battery. Test voltage from motor lead junction block to ground. Difference (voltage drop) between voltage at battery and at motor should not exceed .2 volt. Test ground circuit from motor ground to frame. Voltage drop should not exceed .1 volt. Clean and tighten all connections if voltage drop exceeds specifications. Install evaporator housing cover.

b. Testing Compressor Valves

Install gauge set, start engine and operate at 1200 r.p.m. Turn blower switch to **High** and the temperature switch to **Cold.** Operate for five to ten minutes to warm compressor, and slow to 500 r.p.m.

Close **SUCTION** service valve with Tool C-3361 (Fig. 2), by turning it clockwise until it is tightly seated (engine running at idle speed.) Never shut off **DISCHARGE** service valve with engine running or compressor will be damaged. Do not operate system with **SUCTION** valve closed any longer than absolutely necessary.

Observe suction pressure on compound gauge. The pressure reading on the gauge should drop steadily. The pressure should drop 12 to 20 inches of vacuum if suction valves are in good condition. If 12 to 20 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.

Shut off engine and watch suction (compound) gauge. Just as compressor stops rotating, gauge hand will make a sudden drop of several inches of vacuum and then hold steady. The vacuum should hold without dropping more than five inches within one minute, if the discharge valve is in good condition. Return suction valve stem to full counter-clockwise position and then clockwise one turn. Replace valve plate assembly if tests do not meet these conditions. Refer to Paragraph 16.

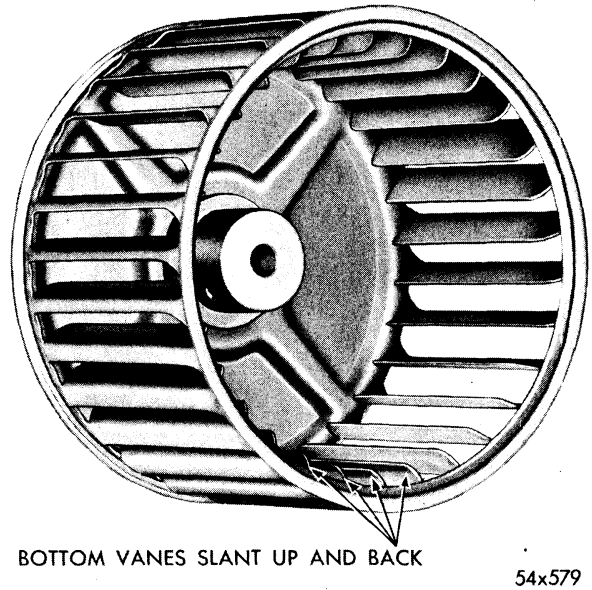

Fig. 3—Blower Fan (Right)

c. Check Refrigerant Level by Sight Glass

Connect a tachometer to engine, start engine, and adjust speed 1200 r.p.m. Turn blower control knob to **High** position and temperature control to **Cold.** Open car windows and allow engine to operate at 1200 r.p.m. to clear sight glass.

Observe sight glass on right-hand fender panel. Sight glass should be perfectly clear (no bubbles) within three to five minutes from 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. Refer to Paragraph 6(f). If this test is O.K., the system should be partially charged to remove bubbles. If high pressure gauge shows a high pressure and suction pressure is normal, it is an indication of air in system, a restriction in the system, bugs or dirt on condenser, or too much refrigerant. Purge system of air by loosening discharge port cap a couple of turns and leaving cap in that position for a few seconds. Inspect radiator and condenser for bugs and dirt, and bleed off refrigerant until bubbles appear in sight glass. Charge system to remove bubbles. Recheck gauge pressures. If condition still exists, the system is restricted.

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

d. Testing Strainer-Drier

With engine operating at 1200 r.p.m., hold hands on fittings at both ends of receiver strainer-drier. The temperature should be same at both ends. If end of receiver toward left-hand side of car is cooler than it is at other end, the strainer-drier is defective (partially plugged) and must be replaced.

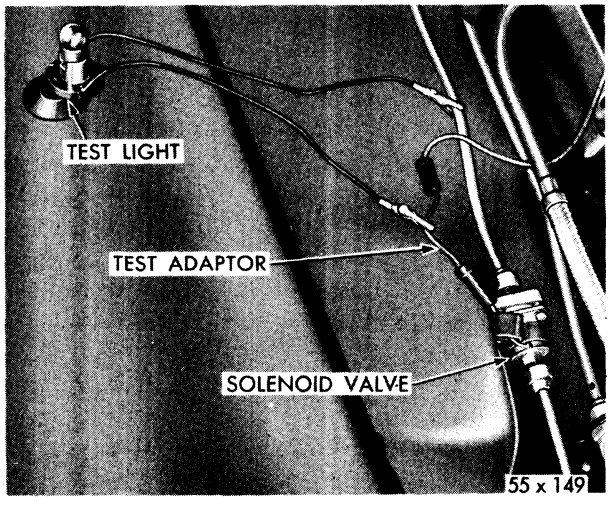

Fig. 4—Thermal Switch and Solenoid Valve (Test Adaptor Connected)

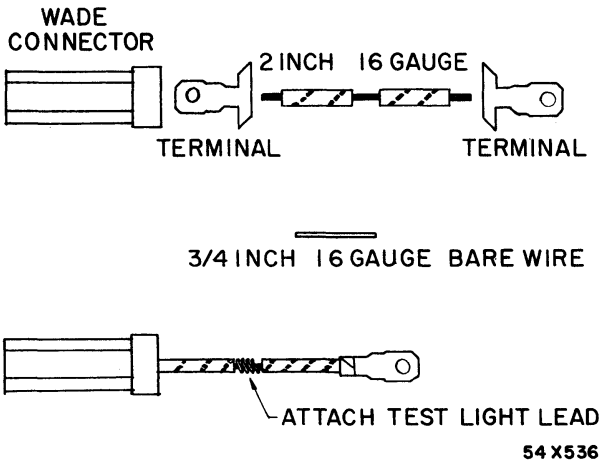

Fig. 5—Test Adaptor

e. Checking Compressor Oil Level

Check oil level, as outlined in Paragraph 14.

f. Testing Thermal Switch and Solenoid By-Pass Valve (Early Type Thermal Switch.)

Disconnect lead wire from Wade connector at solenoid valve and insert special adaptor (Fig. 4) in series with disconnected lead and Wade connector. The adaptor (Fig. 5) is used for testing thermal switch and solenoid valve.

Connect lead from test lamp (Tool C-744) to adaptor and ground remaining test lamp lead. Place test lamp suction cup on fender so light is visible from right rear of car (Fig. 4).

Thoroughly clean evaporator suction tube outlet fitting and install thermometer clip on clean surface. Place thermometer in clip, making sure it fits tightly and can be easily read. Wrap clip and thermometer with narrow piece of cloth, leaving scale visible. Start engine and adjust speed to 1200 r.p.m. Turn temperature control to **Cold** and blower switch to **Low.** Operate system until test lamp goes out while, at same time, observing thermometer. The temperature will gradually drop. The lowest reading obtained is opening temperature of thermal switch. The normal opening temperature is 30

degrees F., plus or minus five degrees. Turn blower switch to "Low" and operate system until test lamp lights. Again take temperature reading of suction pressure fitting thermometer. This reading will be closing temperature of thermal switch. The normal closing temperature is 45 degrees F., plus or minus five degrees.

NOTE

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

g. Late Type Thermal Switch

The late type thermal switch capillary tube is inserted between evaporator fins under left return grille. Test operation of this switch in same manner as early type switch to following specifications. With cam on switch set to NORMAL position (scribe marks on cam and switch body lined up) switch open at 34° ± 2° and close at 37° ± 2°. Replace thermal switch if it does not operate within specified tolerance.

h. Testing Operation of Expansion Valve for Proper Super Heat

Refer to Paragraph 26, and test operation of expansion valve for proper super heat.

i. Final Test

Remove test equipment from vehicle and road test car.

7. TESTING FOR LEAKS WITH LEAK DETECTOR

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

Partially charge system with refrigerant, as outlined in Paragraph 10, and proceed as follows: This is necessary only where supply in system is very low, or when system has been evacuated.

The Tool C-3444 uses petroleum gas and does not require generating to light. Just turn valve on, light it, and adjust to small flame. Move leak detector sniffer tube over all connections. When leak if found, flame in burner will turn bright green. Move detector tube around connection to determine magnitude of leak. If larger leak is found, color of flame will turn from bright blue to bright purple.

NOTE

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

8. DISCHARGING THE SYSTEM

Install gauge set manifold Tool C-3354. Using Tool C-3361, be sure both discharge and suction service valves are fully back-seated (counter-clockwise). Connect eight-foot test hose to gauge set manifold center fitting. Insert the free end of eight-foot test hose into exhaust suction system and turn exhaust system blower on.

NOTE

Expelling the gas into the exhaust system is a recommended safety precaution.

Open discharge and suction service valves one turn. Crack manifold gauge set discharge hand valve a fraction of a turn counter-clockwise to allow gas to escape. Opening manifold discharge hand valve too much in order to more quickly discharge system will draw compressor lubricant off with the gas. As pressure on manifold discharge gauge drops near zero, open manifold suction hand valve.

NOTE

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

9. EVACUATING AND SWEEPING SYSTEM

Whenever system has been open to atmosphere, it is absolutely essential that system be evacuated and swept with refrigerant to remove all air and moisture. Connect gauge set manifold Tool C-3354 to compressor and condenser service valves. Discharge system (if not previously discharged), as outlined in Paragraph 8.

CAUTION

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

Connect eight-foot test hose to center fitting of gauge set manifold and to connection on 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 system. 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 refrigerant, as outlined in Paragraph 10.

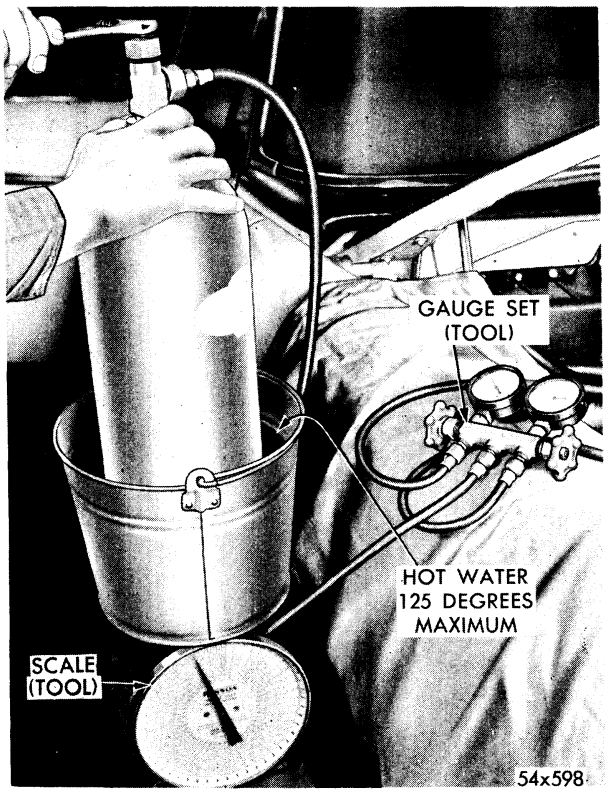

Fig. 6—Charging System with Freon 12

Start engine and adjust speed to 1200 r.p.m. Turn blower control to **High** and temperature control to **Cold.** Operate in this manner for five minutes and test for leaks. Discharge system to sweep out any remaining moisture and again evacuate system at 26 to 28 inches of vacuum for 30 minutes. Recharge system with four pounds of refrigerant.

10. CHARGING THE SYSTEM

Connect eight-foot test hose to the center fitting of gauge manifold and to connection of refrigerant tank (Fig. 6). Be sure both gauge manifold valves are fully closed (clockwise). Open both discharge and suction service valves one turn (clockwise), if not previously done. If discharge gauge hand fluctuates when engine is running, close discharge valve slowly (counter-clockwise) until gauge hand steadies.

Open valve on tank one turn and loosen eight-foot test hose at gauge manifold. Leave connection loose for about a second to purge air from hose. Start engine and operate at 1200 r.p.m., with blower control set to **Low** and temperature control set at **Cold.**

Set tank (upright) in pail of warm water. The temperature of warm water must not exceed 125 degrees F. Set pail and tank on scale (Tool C-3429) and weight assembly. Make note of combined weight.

WARNING

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

Open suction valve on gauge manifold slightly (counter-clockwise). Control refrigerant entering 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 tank valve off when system has absorbed four pounds. If partial charge is desired for testing leaks, charge system with one pound, or charge until 100 pounds pressure is reached on discharge pressure gauge.

Close suction valve on gauge manifold (clockwise). To disconnect tank, loosen eight-foot

test hose, allow refrigerant in hose to escape slowly and remove hose from tank.

11. ADDING REFRIGERANT BY SIGHT GLASS METHOD

In some cases, it may be necessary to add refrigerant to system to provide cooling without weighing, as is normally required.

Follow preliminary steps in charging system (paragraph 10), but eliminate those steps involving scale. Start engine and operate at 1200 r.p.m. Turn blower control switch to **High** position and temperature switch to **Cold.** Rotate both suction and discharge service valves one turn (clockwise). Where discharge gauge hand fluctuates when engine is running, close discharge valve slowly (counter-clockwise) until gauge hand steadies.

Open tank valve one turn. Open suction valve on gauge manifold slightly (counter-clockwise). Control refrigerant entering system with this valve. **Do not allow suction pressure to exceed 60 psi.**

Carefully watch sight glass. Close gauge manifold suction valve (clockwise) the moment sight glass is clear of bubbles. Stopping flow of refrigerant into system as soon as sight glass is clear (free of bubbles) is important. Too much refrigerant in 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 carefully charge until sight glass is clear, and repeat five minute run. Where no bubbles are present after five minutes of operation, charge system with an additional charge of refrigerant for 10 seconds.

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

12. PRECAUTIONS TO OBSERVE IN HANDLING TUBING

a. Cleanliness During Installation

A piece of tubing that has been cut, flared and prepared for installation should be clean and dry.

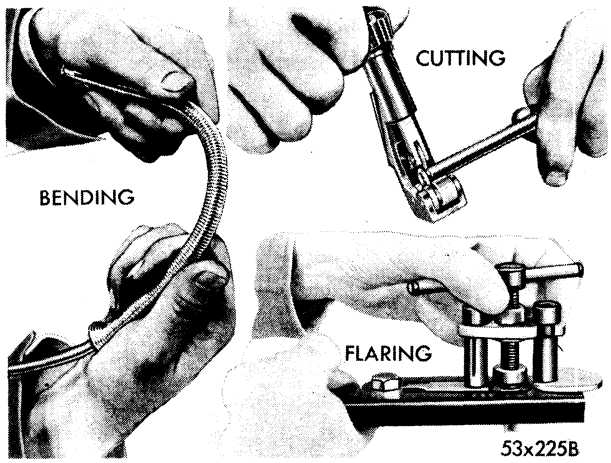

Fig. 7—Bending, Cutting and Flaring Tubing

b. Cutting and Flaring

Use Tool C-3478 (Fig. 7) to cut, eliminate burrs, and ream tubing. The tube should be double-flared with tool.

Always inspect flared joint before installation to determine if there are any cracks or blemishes on flare that would cause a possible leak.

NOTE

Copper washers must be used where joint is steel-to-steel, or steel-to-brass. Copper to steel or brass requires no washer. Use refrigerant oil 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 tube flare and male surface.

c. Securing the Tubing

Copper tubing must be attached to car structure. A flexible connector (vibration eliminators) has been placed on the condenser side of compressor to guard against breakage at that point.

d. Brazing the Joints

Discharge system before using a torch to braze leaking joints. Avoid excessive heat when using an acetylene flame, to solder or braze a joint. The usual precautions should be followed before repairing a sweat-type joint, such as cleaning thoroughly, applying sufficient flux, heating to temperature that will cause silver solder to flow freely, and testing joint after making repairs.

Only following component parts of compressor are available for service: compressor unit valve plate assemblies, suction service valve, cylinder head, oil sight glass, gaskets, muffler assemblies, shaft seal and support brackets. The compressor refrigerant oil may be replaced or corrected to proper level. Any damage to pistons, cylinders, crankshaft or connecting rods, requires replacement of complete compressor assembly.

SERVICING THE TECUMUSEH COMPRESSOR (FIG. 8)

13. REPLACING THE COMPRESSOR (OIL LEVEL PRECAUTION)

When replacing compressor for any reason, it is imperative that oil level in compressor be corrected to proper amount. Refer to Paragraph 14.

CAUTION

New compressors are shipped with sufficient oil for a dry system. The surplus refrigerant oil must be siphoned off to a ¾ to ⅞ inch level before installation in system that has been in operation.

14. MEASURING COMPRESSOR OIL LEVEL

Start engine and run at moderate speed (air conditioning turned on) until compressor is warm. This will automatically cause compressor crankcase to become comparatively free of liquid refrigerant. An oil sight glass is provided in compressor crankcase so that oil splash may be observed while compressor is in operation.

If a splash is observed, it indicates **ONLY** that there is oil in compressor. It does not indicate there is **TOO MUCH OR TOO LITTLE OIL** in compressor. To determine oil level accurately, it is necessary to measure it with dip stick.

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

Clean dirt away from compressor oil filler plug with solvent and blow dry with compressed air. Carefully loosen cap on service port of discharge valve approximately one quarter of a turn and gradually release gas pressure from compressor. When gas pressure in head decreases, loosen but do not remove oil filler plug on side of compressor. This will allow gas pressure in compressor crankcase to drop. If oil level is checked immediately after a trip (car driven at high speeds), the level will be slightly higher than normal.

Remove oil filler plug and, using dry, clean, plunger type rod (⅛ inch welding rod), measure oil level. The correct oil level is from ¾ to ⅞ inch. Siphon off excess oil or add MOPAR Air Conditioning Compressor Oil (300 Saybolt at 100 degress F.), as required. After oil level has been checked and corrected, replace oil filler plug.

To purge air out of compressor cylinder and crankcase, make sure cap on discharge valve service port is loosened approximately one-half turn. Using Tool C-3361, slightly open suction service valve by turning valve stem counter-clockwise. Let gas drift slowly through compressor for about 10 seconds. Tighten cap on discharge service port. Back-seat both discharge and suction service valves by turning valve stems counter-clockwise. Replace protective caps on discharge and suction service valves.

15. REMOVAL AND INSTALLATION OF COMPRESSOR FOR ENGINE OR COMPESSOR SERVICE

a. Removal

Start engine, operate at fast idle until compressor is warm, and shut off engine. Remove valve stem protective caps from both discharge and suction service valves. Close off both valves by rotating valve stems fully clockwise with Tool C-3361. Loosen port caps on both service valves a couple of turns to gradually release gas pressure from compressor. Remove drive belts and belt tension adjusting strap from compressor. Disconnect magnetic clutch electrical lead.

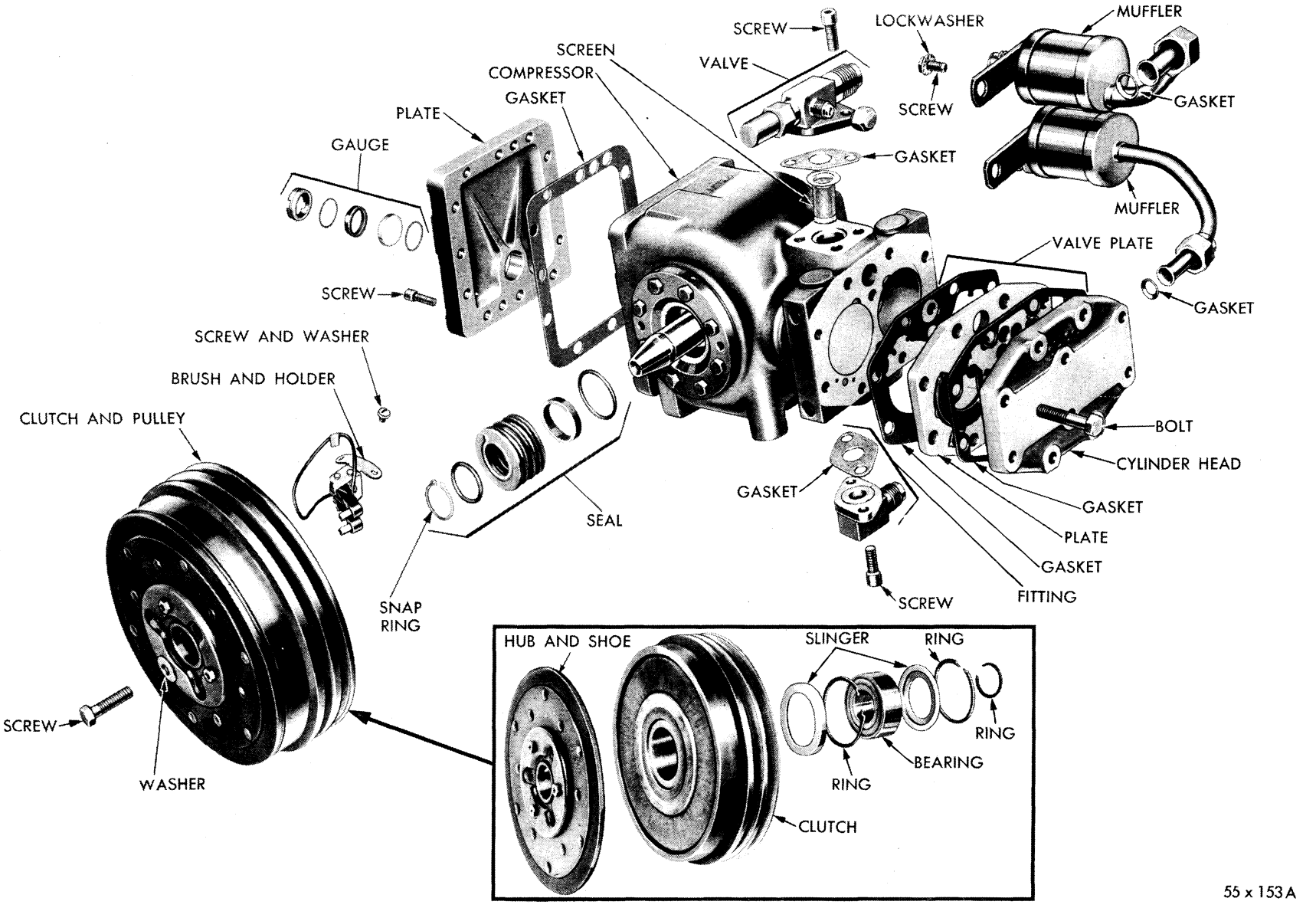

Fig. 8—Tecumseh Compressor (External Muffler Type; No mufflers used on integral type)

Disconnect discharge tube flared connection at discharge (lower) muffler and cap tube nut and male connector. Remove Allen screws from suction service valve. Remove upper muffler bracket to compressor attaching bolt and carefully lay suction valve, muffler and tube assembly to one side. **Do not bend vibration eliminator excessively or it may become damaged.** Cover suction port in compressor and suction valve with masking tape. Remove compressor to mounting bracket and support bracket bolts and remove compressor from engine.

NOTE

Disregard reference to mufflers on integral muffler type compressors.

b. Installation

Place compressor on mounting bracket and start bolts, tightening them finger tight. Remove masking tape from suction service valve and compressor ports, and make sure both surfaces are clean. Coat new suction service valve gasket with refrigerant oil and place over valve port. Install suction service valve and muffler bracket bolt. Tighten compressor mounting bracket to compressor and support bracket attaching bolts.

Remove caps from discharge tube nut and muffler connector. Insert new copper washer, connect flared connection, and tighten securely. Install compressor drive belts and bolt tension adjusting strap. Adjust bolts to ¼ inch deflection, with 9 to 12 pound pull applied with scale at center of longest span between pulleys. Install magnetic clutch electrical lead. Install manifold gauge set (Tool C-3354).

Purge air from compressor by opening suction service valve counter-clockwise slightly and loosening discharge service port cap a few turns for about 10 seconds. This will allow gas to drift through compressor and bleed air from system.

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

Start engine and 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 7. Also, test system for operation. If it is satisfactory, remove gauge set and replace caps.

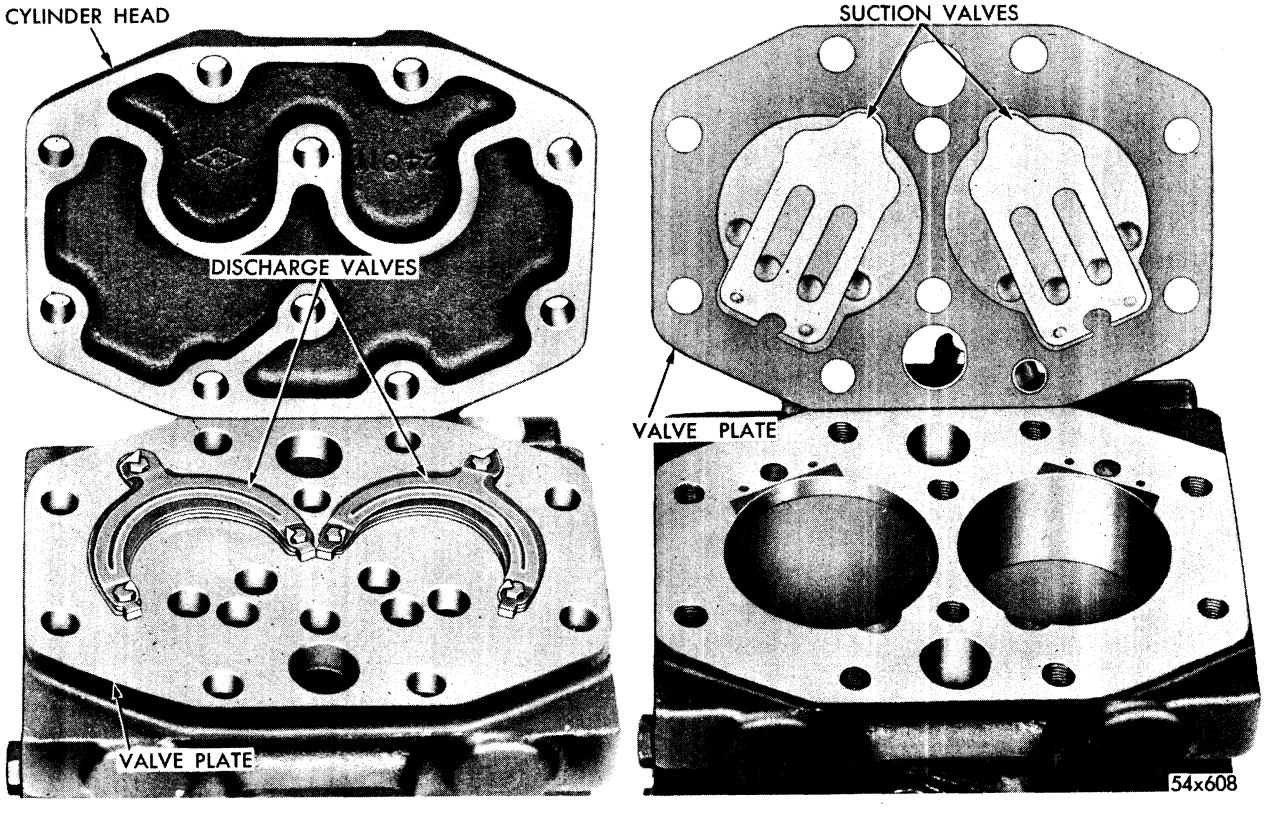

Fig. 9—Valve Plate Assembly

16. REPLACING COMPRESSOR VALVE PLATE ASSEMBLY (FIG. 9)

The usual indication of defective or damaged compressor valves is lack of cooling capacity. Before condemning valves, test them as follows:

a. Testing Valves

Install gauge set on compressor (refer to Paragraph 5). Start engine and turn on blower control switch to **High** and temperature switch to **Cold.** Operate 10 to 15 minutes at 1200 r.p.m. to warm up compressor so that crankcase is free of excessive refrigerant saturation. Slow engine speed to idle and rotate suction service valve stem (clockwise) until valve is fully front-seated.

CAUTION

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

Observe suction gauge on gauge set. The pressure should drop to zero when valve is seated and drop on down to 15 to 20 inches of vacuum, if suction valves are in good condition. If valves are faulty, replace valve plate assembly. Shut off engine while watching gauge. As compressor just stops, gauge hand will jump suddenly showing a drop of several inches of vacuum and then hold. The vacuum should not lose over five inches in one minute if discharge valves are in good condition.

b. Replacing Valve Plate Assembly (Gauge Set Installed)

Drain cooling system and remove inlet hose and tube. Rotate discharge and suction service valve stems clockwise until both valves are fully front-seated. Slowly open discharge gauge hand valve slightly to relieve compressor pressure through center outlet hose and into an exhaust suction system. When pressure drops to zero on discharge gauge, open suction pressure gauge hand valve.

Remove compressor cylinder head bolts and tap cylinder head with plastic hammer. If, when lifting cylinder head, valve plate does not come off with it, separate head from plate by placing brass rod against plate and head (between cylinders at side of head) and tapping it. **Do NOT tap plate near a finished surface.** Remove head, valve plate and gaskets. Examine valves; if valves are broken and parts have damaged top of piston or scored cylinders, replace complete compressor.

If compressor is not damaged, clean cylinder block top and cylinder head thoroughly. Be sure to remove all shreds from old gaskets. Install cylinder head bolts in head. Place piece of cardboard over bolt heads and turn assembly upside down. Lay unit on bench, with bolts facing up. Handle new gaskets carefully. Dip new gaskets in clean refrigerant oil. Install cylinder head gasket, valve plate, and valve plate gasket over bolts (Fig. 9). Place assembly carefully on cylinder block and start bolts. Tighten bolts evenly (from center out) 15 to 20 foot-pounds torque. Bleed air from compressor and remove gauge set. Install inlet hose and tube and refill cooling system.

c. Preliminary Steps for Removal of Seal

Start engine and operate at fast idle with temperature control switch at **COLD** and the blower switch set to **HIGH** speed until compressor is warm. Shut off engine. Remove Valve Stem Protective Caps from both discharge and suction service valves. Close off both valves by rotating both valve stems (Clockwise) with Tool C-3361 until they are fully seated. Loosen discharge service port cap slightly to relieve pressure.

Remove upper right-hand radiator fan shroud. Remove self-locking bolt and washer from compressor shaft at front center of magnetic clutch. While supporting pulley and clutch as-

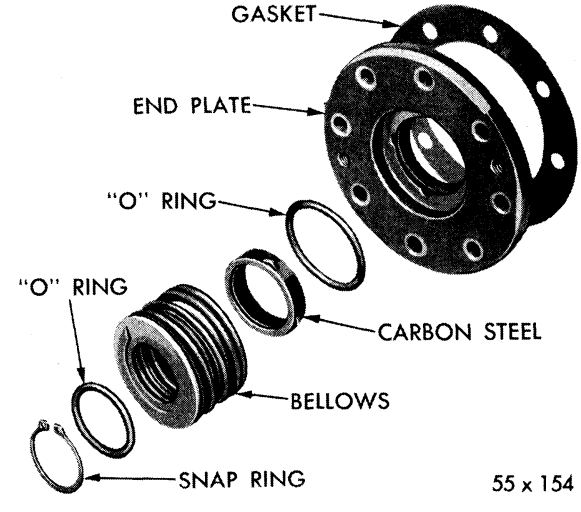

Fig. 10—Compressor Shaft Seal (After Type)

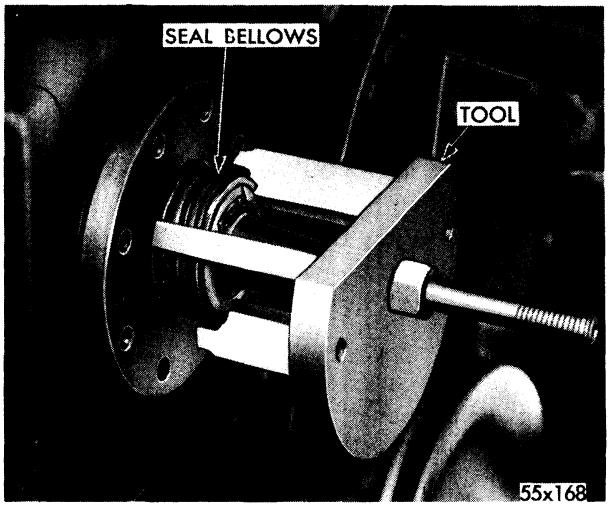

Fig. 11—Puller Installed (Tool C-3473)

sembly with one hand, tap pulley with soft hammer and remove assembly from compressor. **Be careful not to damage brushes when removing pulley and clutch assembly.** Remove brush holder assembly.

d. Removing Metal Bellows Seal (Fig. 10)

Remove compressor front bearing end plate screws. Install special puller Tool C-3473, as shown in Figure 11, and screw in on alignment screws until inner steps on puller contact bellows evenly. Hold compressor shaft from rotating by placing screwdriver in shaft keyway slot and allow it to rest against puller leg while turning puller screw (Fig. 12). When bellows have compressed far enough to clear snap ring retainer, remove snap ring with snap ring

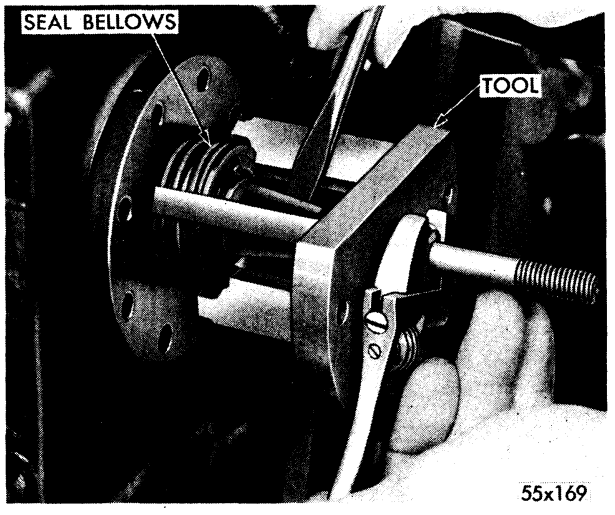

Fig. 12—Removing Seal Bellows

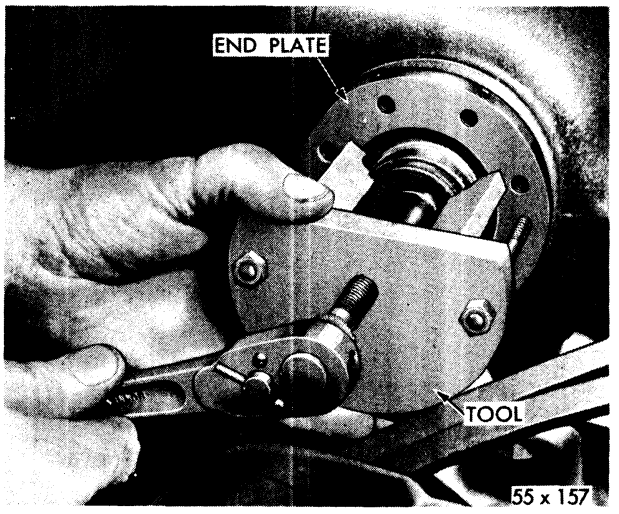

Fig. 13—Removing Bearing End Plate

pliers.

Change puller screw in center of puller as shown in Figure 13. (Turn in on center screw and remove compressor front bearing end plate and seal assembly.) Remove puller from end plate. Remove carbon seal and "O" ring from bearing end plate.

e. Installation of Metal Bellows Seal

Coat new bearing end plate gasket and large "O" ring with refrigerant oil. Install "O" ring in front bearing end plate. Install gasket, end plate and two long screws at opposite sides of end plate. Be sure that oil pocket is **UP.** Start end plate squarely and tighten screws evenly, finger tight. Install puller, as shown in Figure 14. While holding compressor shaft with screw-

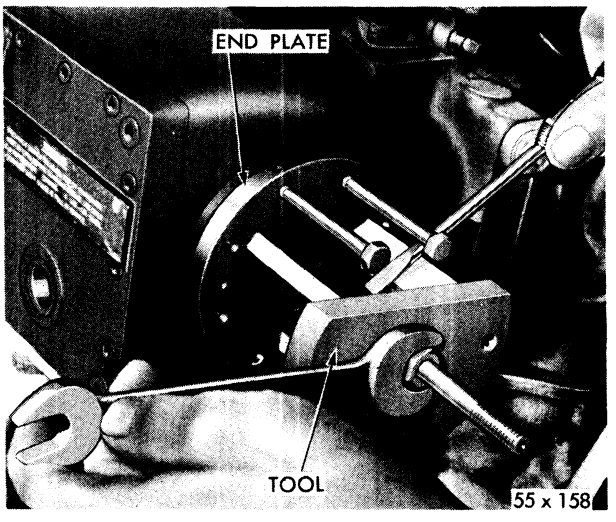

Fig. 14—Installing Bearing End Plate

driver, turn puller screw to pull bearing end plate into compressor housing. Remove puller and install end plate screws. Tighten screws evenly 15 to 20 foot-pounds torque.

Coat carbon seal with refrigerant oil and place over shaft, positioning tangs on carbon in recesses in bearing end plate. Lubricate "O" ring in bellows with refrigerant oil and place bellows and snap ring over compressor shaft. Install puller, as shown in Figure 12. 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.

Install snap ring retainer when bellows clear groove in shaft. Remove puller. **The snap ring must be securely seated in shaft groove, otherwise, it may slip out and result in a leaky seal.**

Install brush holder assembly. Install pulley and magnetic clutch assembly, lining up key and keyway. Push assembly over shaft and install washer and self-locking bolt. Tighten bolt 15 to 20 foot-pounds torque. Bleed air from compressor and back-seat both service valves. Install protective caps and test for leaks.

NOTE

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

17. SERVICING MAGNETIC CLUTCH (ROTATING COIL TYPE)

Servicing magnetic clutch assembly is limited to drive plate, pulley and electro-magnet assembly, snap rings, bearing and brush holder assembly.

CAUTION

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

a. Testing Electro-Magnet Current Draw

To test coil for a short or open circuit, connect an ammeter (0-10 Ampere Scale) in series with a fully-charged 12-volt battery and insulated brush lead. The current draw at 12 volts should be 1.5 to 2 amperes.

b. Removing Clutch Assembly from Compressor

Operate engine at 1200 r.p.m. for five to 10 minutes until compressor is warmed up and system is stabilized. Shut off engine.

Rotate both compressor service valve stems fully clockwise and loosen discharge port cap slightly. This should always be done to release pressure from compressor before pulley and clutch assembly is removed.

Loosen and remove belts. Remove upper right shroud section. Remove special locking bolt and washer from compressor crankshaft at front center of clutch. **Do NOT damage brushes when removing or installing clutch.** While supporting clutch assembly with one hand, tap pulley with soft hammer and remove assembly from compressor.

c. Removing and Installing Drive Plate

Remove drive plate retaining snap ring hub (Fig. 15) with Tool C-3301. Place suitable sleeve against hub and remove drive plate by tapping against sleeve with a soft hammer.

Inspect springs for loss of tension and (or) cracks, and inspect liner on face of plate. Replace drive plate if liner is worn, springs are weak or broken, or if drive plate is warped. (A sintered iron liner impregnated with fibrous material is bonded to drive plate).

Start drive plate hub squarely into inner bearing race. Place brass drift against 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. Use a long feeler that will reach into gap at hub and measure air gap between drive plate and electro-magnet (Fig. 16). Air gap should measure .025 to .035 inch. Adjust air gap by turning three screws on front face of drive plate. Adjust all three screws to obtain an evenly spaced air gap.

d. Removing Clutch Bearing

Remove drive plate, as outlined in c above. Remove snap ring and grease slinger (at outer race of bearing) from pulley assembly. Tap bearing from pulley assembly. Install bearing, snap ring and drive plate.

e. Installing Clutch Assembly on Compressor

Align key and keyway and push assembly over

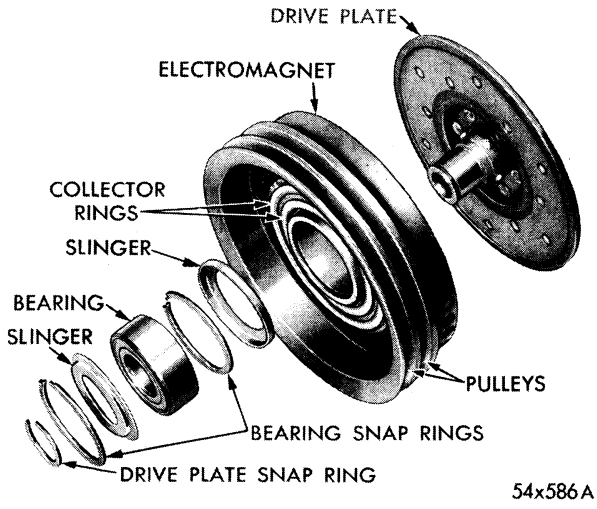

Fig. 15—Magnetic Clutch (Exploded View)

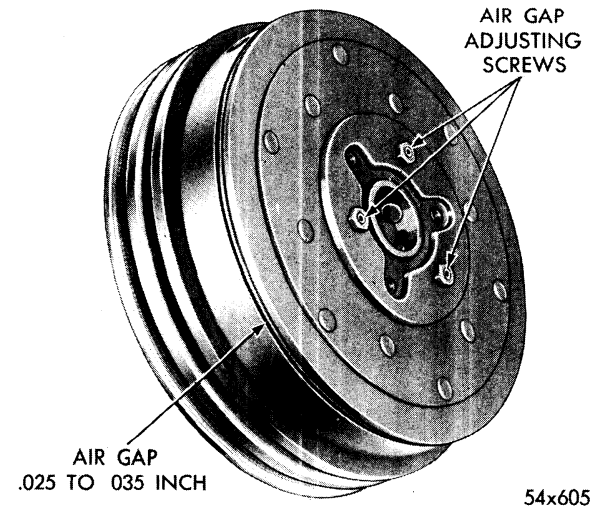

Fig. 16—Adjusting Air Gap

shaft and key. Install self-locking bolt and washer. Install upper right shroud section. Purge air from compressor, back-seat both service valves, and tighten oil filler plug.

18. REPLACING THE BRUSH ASSEMBLY

Disconnect insulated lead Wade connector. Remove two screws attaching brush holder, to compressor and remove brush holder assembly. Clean collector rings in clutch assembly with carbon tetrachloride and wipe surplus grease from around clutch bearing. Install new brush holder assembly. **If brushes are allowed to snap to end of their travel, they may break.**

SERVICING THE COPELAND COMPRESSOR (FIG. 17)

Service to compressor is limited to following components which are available in package form; Seal assembly, valve plate assembly, discharge flange, suction service (Shutoff valve, suction strainer screen, gasket replacement assortment and cylinder heads). Refer to Figures 17 and 18 for proper location of parts when removing or replacing any components.

19. SEAL ASSEMBLY

The seal assembly consists of the seal cover plate and gasket, carbon nose, rubber retainer spring and spring collar. This assembly is held in place in bearing housing in front of compressor by six bolts. (Fig. 17).

a. Removal

Start engine and operate at fast idle with air conditioning system turned on for five to ten minutes to warm up compressor. This will vaporize any liquid refrigerant that may be present in compressor.

Stop engine and valve off compressor by rotating both service valves clockwise until they are fully seated against their seats. Then, loosen valve port caps to gradually release pressure in compressor.

NOTE

The discharge service valve is at condenser, and suction service valve is on compressor.

Remove belts and clutch pulley assembly. Remove six bolts attaching seal plate to compressor and remove seal plate and seal assembly. Be sure to remove spring collar from between spring and crankshaft shoulder.

b. Installation

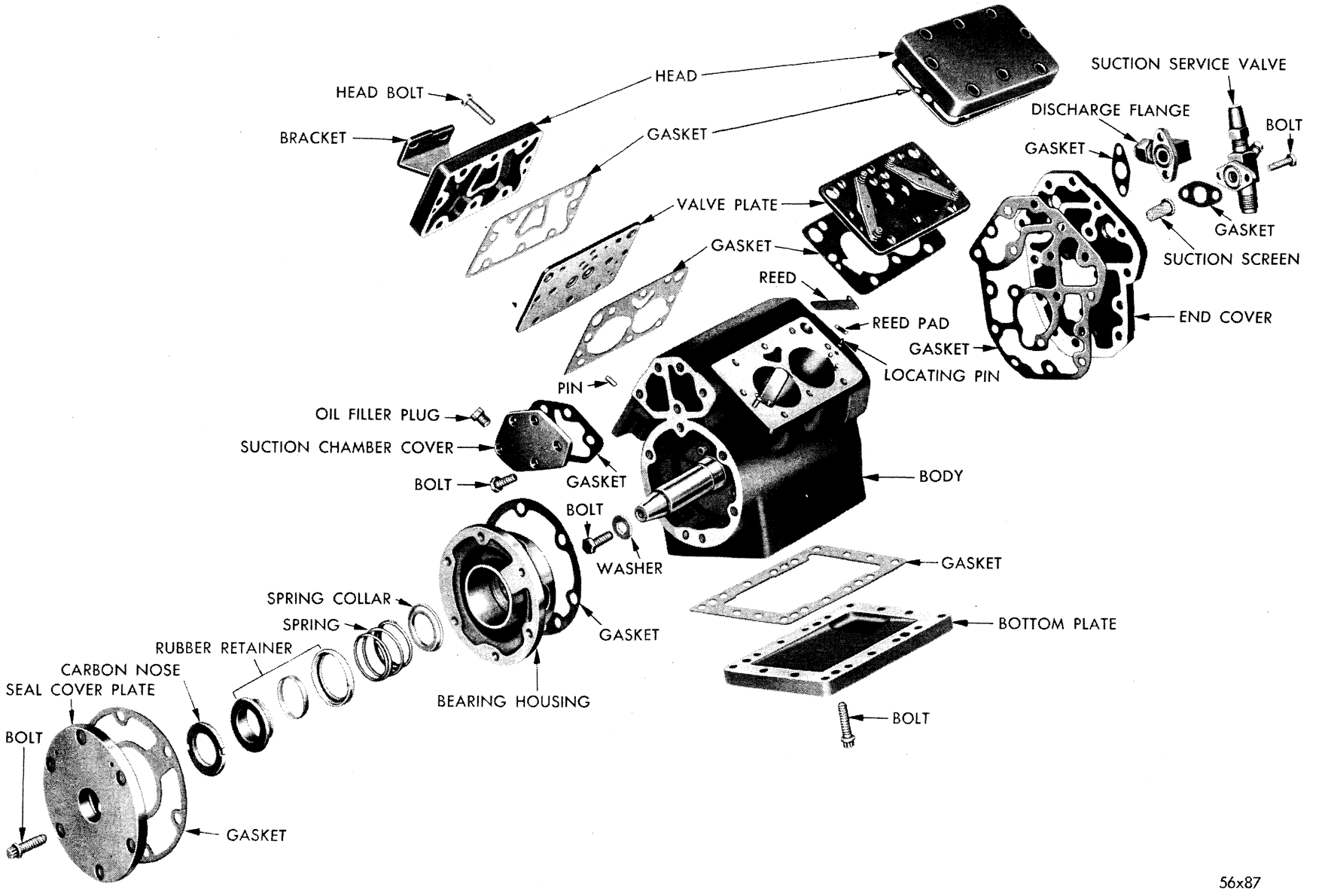

Fig. 17—Compressor (Disassembled View)

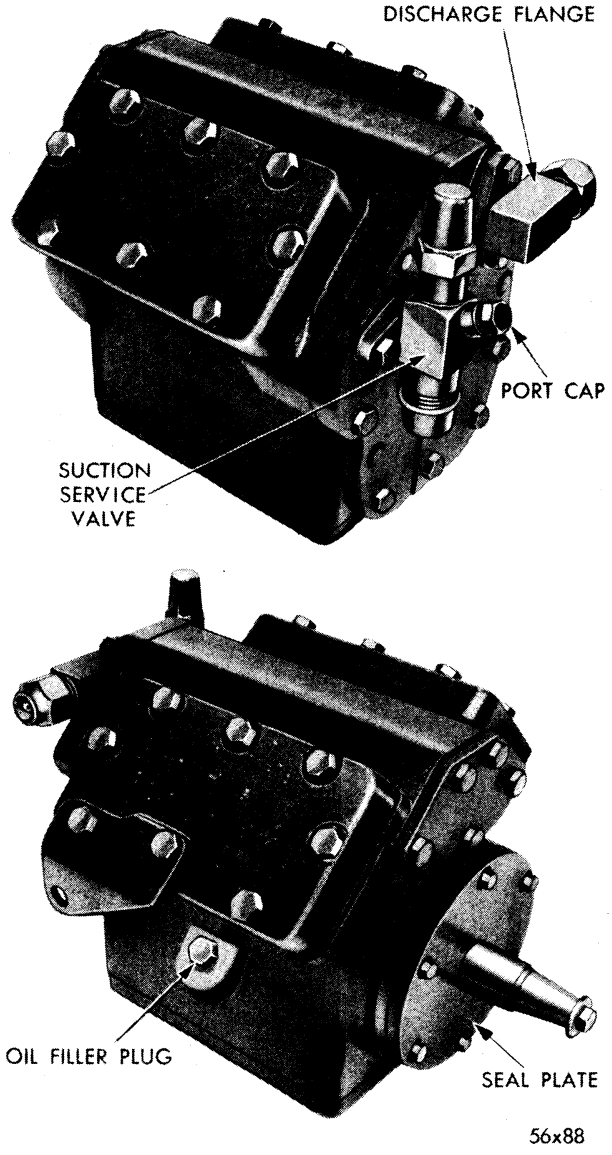

Fig. 18—Compressor (Exterior View)

After seal is removed, clean crankshaft carefully making sure that there are no burrs or scratches. If there is any rust or corrosion, polish shaft with fine crocus cloth to a bright smooth finish, then wash with clean solvent; oil with refrigerant oil. Dip new seal parts in clear refrigerant oil and install seal collar and spring.

Remove carbon seal nose from new retainer and slide rubber retainer over shaft without carbon seal nose. Use **OLD OIL SEAL PLATE** to force rubber retainer into place by pulling it in evenly with bolts.

Remove old seal plate. Install carbon seal nose, new gasket and new seal plate. Tighten bolts evenly. This must be done carefully to avoid breaking carbon seal nose. Replace pulley and clutch assembly and belt.

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

Open service valve stems counter-clockwise until valves are fully back-seated. Test for leaks and for proper amount of refrigerant. Check compressor oil level.

20. VALVE PLATE ASSEMBLY—Replacement

Start engine and adjust speed 800 to 1200 r.p.m. Turn temperature control to **Cold** and blower to **High** speed. Operate in this manner 5 to 10 minutes to warm up compressor. This will vaporize any liquid refrigerant in compressor. Stop engine and turn off air conditioning.

Isolate compressor from system by rotating both valve stems clockwise until they are fully seated against their seats. Loosen both service valve port caps to gradually bleed pressure from compressor.

NOTE

The discharge service valve is located at condenser and suction service valve on compressor.

Remove cylinder heads and valve plate assemblies; scrape off all old particles of gaskets and install new valve plates and gaskets. Tighten cylinder head bolts 20 foot-pounds torque. Tighten port caps and oil filler plug. Rotate both valve stems counter-clockwise until they are fully seated against their seats. Test for leaks and proper operation.

21. MAGNETIC CLUTCH (STATIONARY COIL TYPE)

The Warner Magnetic Clutch used with Copeland compressor has a stationary type field coil. No brushes are used with this type construction. The coil is connected between air conditioning control switch and ground. When temperature control, and blower switches are turned on, current flows through field coil and sets up a magnetic field. The drive pulley armature is magnetically attracted to drive member. The driven member is mounted on compressor shaft and rotates with driven member, when it is magnetically connected to drive pulley.

Service to clutch assembly is limited to clutch pulley bearing and hub assembly, and to field coil and mounting bracket assembly.

a. Clutch Removal

Remove belts from compressor drive pulley, and remove self-locking bolt and retaining washer from front center of drive pulley.

Use a 5/8 x 18 thread bolt as puller for drive pulley, by screwing it into drive pulley hub, while supporting pulley to keep it from falling when free of shaft.

Disconnect field coil lead, and remove cap screws that attach coil assembly to compressor, and remove field coil.

b. Installation

Install field coil assembly on compressor and tighten bolts evenly. Connect field coil lead. Inspect compressor shaft and key for burrs. Remove all burrs. Line-up key, and install pulley assembly on shaft. Install retaining washer and self-locking bolt. Tighten bolt 17 to 21 foot-pounds torque.

Check clearance between field coil housing and driven member, as shown in Figure 19. There should be a minimum clearance .010 to .015 inch all the way around. Where clearance is less than specified, it is probably due to misalignment of coil assembly, or from pulley assembly being cocked on compressor shaft. Align pulley and/or coil assembly, and recheck for proper clearance.

22. TESTING STATIONARY COIL FOR GROUND

To test for grounded field, remove field coil assembly and unsolder ground lead from housing. Connect 110-volt test lamp from lead terminal to housing; the lamp should not light. Replace field coil assembly if test lamp lights. Re-solder field coil ground lead, if coil tests OK.

23. TESTING STATIONARY COIL FOR SHORT

Disconnect lead wire. Connect a Carbon Pile Rheostat across battery (1,000-watts or more). Connect a test ammeter (0 to 10 amps) in series wih disconnected field lead and the battery positive post. Adjust battery voltage to 12-volts with Rheostat and read the amperage flowing through the field coil. The field current draw at 12-volts should be two amperes.

24. AIR CONDITIONING SYSTEM PERFORMANCE TEST

To quickly determine whether air conditioning system is performing satisfactorily, proceed as follows:

Place thermometers over return and discharge air grilles; close fresh air doors; close all windows and cowl ventilator; open summer ventilation doors.

Operate engine at 1200 rpm with temperature control switch turned to coldest position and blower to **High** speed.

Operate car heater to obtain a return air temperature of 80° to 85° F. Operate in this manner for a few minutes to obtain a balanced condition.

Check temperature readings of both thermometers. If air conditioning system is functioning properly and there is a temperature of 80° to 85° F., at return air grille; the temperature at discharge grille should be at least 24° lower.

Turn blower switch to all three positions, checking velocity and volume of air at discharge grille. There should be a good volume of air and a noticeable change in velocity as blower speed is varied.

25. REMOVAL AND INSTALLATION OF EXPANSION VALVE (FIG. 20)

a. Removal

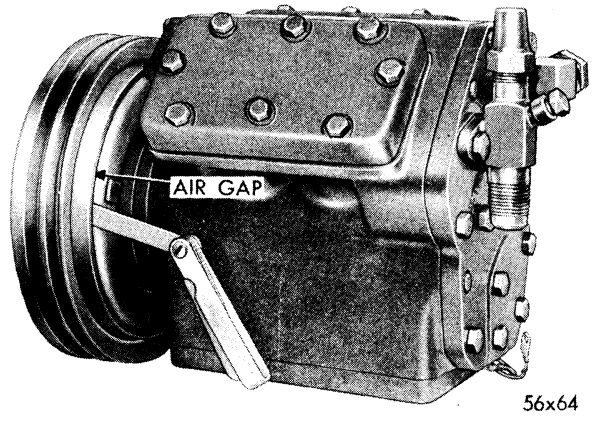

Fig. 19—Checking Magnet Air Gap

To remove valve for cleaning or replacement, discharge system, as outlined in Paragraph 8, and proceed as follows:

Remove evaporator rear cover and loosen expansion valve mounting clip from distributor head flared nut. Disconnect liquid tube and equalizer tube. Remove thermostatic capillary tube bulb from suction tube well (Fig. 20). Save two brass strips between thermal bulb and well. The strips must be inserted with bulb for proper thermal contact. Disconnect expansion valve to distributor flared connection and remove expansion valve.

NOTE

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. SEAL OR PLUG all openings to system, immediately, if valve was removed for cleaning. If replacing valve, install new valve immediately to keep dirt and moisture from entering system.

b. Disassembly and Assembly

Remove liquid tube inlet fitting from valve body, and remove inlet screen. Remove protective cap from valve spring and remove valve assembly from valve body. Wash parts with carbon tetrachloride, blow dry with compressed air, and reassemble valve.

c. Installation

Clean thermal bulb, the bulb well on suction tube and brass strips. This will assure a good thermal contact. Insert brass strips and thermal bulb in well. Connect expansion valve to distributor flare connection and install retaining clip.

Connect liquid tube and equalizer tube and, using two wrenches, tighten flared nuts. Evacuate and charge system, as outlined in Paragraphs 9 and 10. Be sure to test for leaks after partial charge, as outlined in Paragraph 7. Replace evaporator cover and shield. **The air conditioning expansion valves are nonadjustable.**

26. TESTING EXPANSION VALVE OPERATION FOR PROPER SUPER HEAT

With blowers, condenser, solenoid valve, thermal switch, strainer-drier and compressor working properly, and with system charged with proper amount of refrigerant and oil at 100 degrees F. (300 Saybolt), following test and adjustment should be carefully followed. (The proper super heat should be 10 to 15 degrees F.):

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

On cool days where temperature is below 75 degrees F., it will be necessary to turn on car heater, adjust heater control valve to warmest position and close all windows. The heat from heater will warm up temperature of air in car interior and keep thermal switch operating before reading of super heat is obtained.

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

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

Observe compressor pressures. They should be approximately same as those shown in chart, according to ambient temperature. If compressor head pressure is low, the air blast across radiator and condenser should be altered (moved further away) until proper head pressure is obtained. Refer to "Average Temperature-Pressure Relationship Chart" on next page.

After thermometer reading and suction pressures have stabilized, make note of indicated readings and refer to Temperature-Pressure Relation Chart. As there is approximately a three-pound differential in observed reading at suction gauge and that present at position of thermometer on suction tube at evaporator housing, add three-pounds to observed reading on suction gauge. This differential in reading is due to internal friction in tubes and this corrected factor will give actual reading at thermometer position.

To obtain actual super heat reading, find difference between thermometer reading and corrected chart reading. The following is an example. Insert values obtained in test. If super

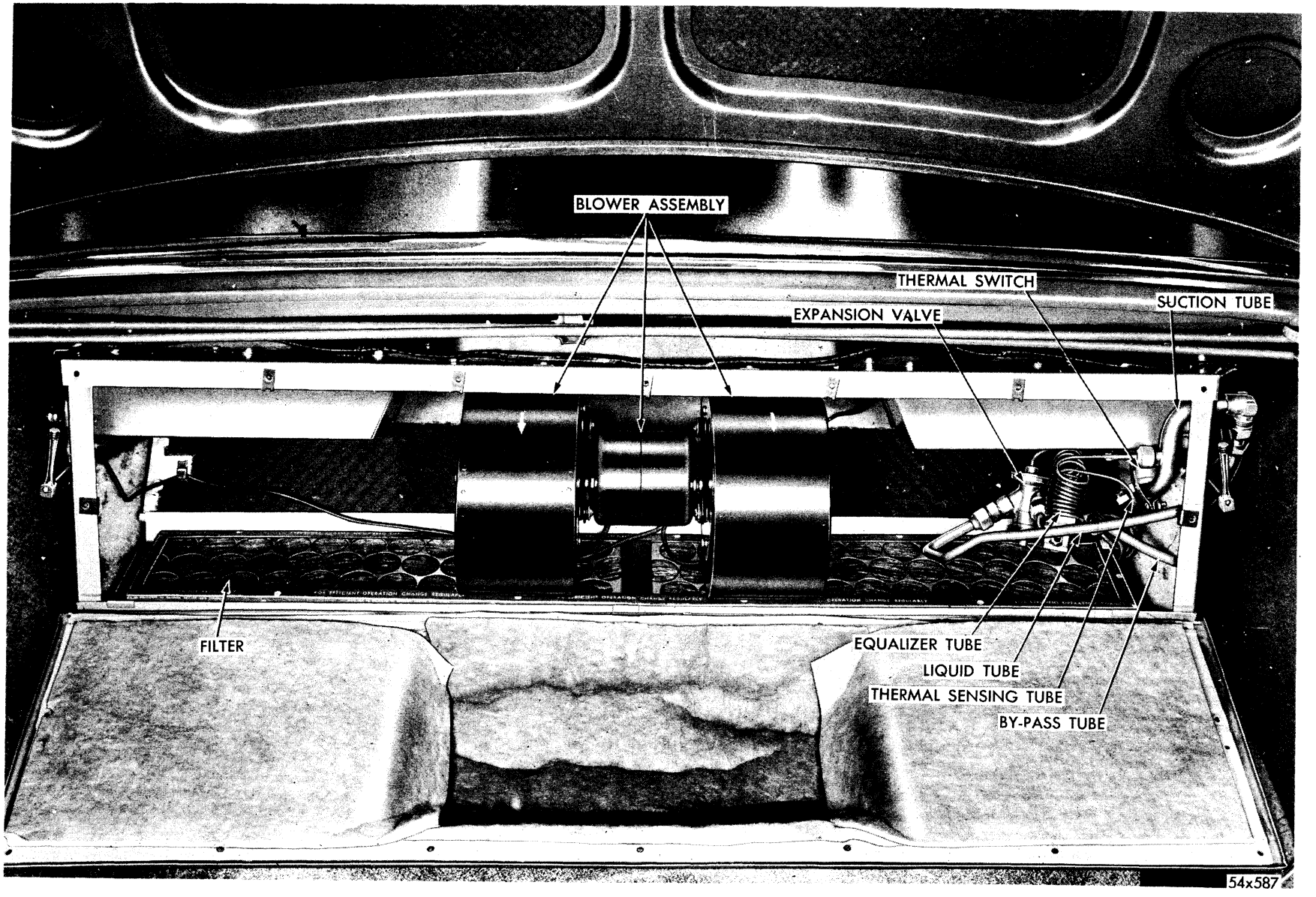

Fig. 20—Evaporator Installed

TEMPERATURE AND PRESSURE RELATION CHART FOR REFRIGERANT (FREON 12 OR GENETRON 12)

Temp. F.	Press. of Refrig.	Temp. F.	Press. of Refrig.	Temp. F.	Press. of Refrig.	Temp. F.	Press. of Refrig.
0	9.1	43	39.7	76	78.3	109	135.1
2	10.1	44	40.7	77	79.2	110	136.0
4	11.2	45	41.7	78	81.1	111	138.0
6	12.3	46	42.6	79	82.5	112	140.1
8	13.4	47	43.6	80	84.0	113	142.1
10	14.6	48	44.6	81	85.5	114	144.2
12	15.8	49	45.6	82	87.0	115	146.3
14	17.1	50	46.6	83	88.5	116	148.4
16	18.3	51	47.8	84	90.1	117	151.2
18	19.7	52	48.7	85	91.7	118	152.7
20	21.0	53	49.8	86	93.2	119	154.9
21	21.7	54	50.9	87	94.8	120	157.1
22	22.4	55	52.0	88	96.4	121	159.3
23	23.1	56	53.1	89	98.0	122	161.5
24	23.8	57	55.4	90	99.6	123	163.8
25	24.6	58	56.6	91	101.3	124	166.1
26	25.3	59	57.1	92	103.0	125	168.4
27	26.1	60	57.7	93	104.6	126	170.7
28	26.8	61	58.9	94	106.3	127	173.1
29	27.6	62	60.0	95	108.1	128	175.4
30	28.4	63	61.3	96	109.8	129	177.8
31	29.2	64	62.5	97	111.5	130	182.2
32	30.0	65	63.7	98	113.3	131	182.6
33	30.9	66	64.9	99	115.1	132	185.1
34	31.7	67	66.2	100	116.9	133	187.6
35	32.5	68	67.5	101	118.8	134	190.1
36	33.4	69	68.8	102	120.6	135	192.6
37	34.3	70	70.1	103	122.4	136	195.2
38	35.1	71	71.4	104	124.3	137	197.8
39	36.0	72	72.8	105	126.2	138	200.0
40	36.9	73	74.2	106	128.1	139	209.2
41	37.9	74	75.5	107	130.0	140	205.5
42	38.8	75	76.9	108	132.1		

EXAMPLE OF CHART FOR DETERMINING SUPER HEAT

Observed Suction Pressure at Gauge	Corrected Suction Pressure (3 Lbs. Added to Observed)	Temperature Degrees F. From T-P Relation	Temperature at Thermometer on Suction Line	Super Heat
48 lbs.	51 lbs.	54 F.	56 F.	2 F.
43 lbs.	46 lbs.	49 F.	54 F.	5 F.
39 lbs.	42 lbs.	45 F.	52 F.	7 F.
37 lbs.	40 lbs.	43 F.	51 F.	8 F.
35 lbs.	38 lbs.	41 F.	53 F.	12 F.

heat is outside specifications of 10 to 15 degrees F., replace expansion valve. Refer to chart that follows:

Average Temperature-Pressure Relationship At Engine Speed Of 1200 r.p.m.

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

27. SERVICING THE BLOWER AND MOTOR

a. Removal and Disassembly

Remove fresh air control lever from shaft on other side of evaporator cover. Remove evaporator housing rear cover mounting screws and lockwashers and remove cover. Disconnect main lead wire to blower motor and at thermal switch leads. Remove rubber grommet and pull wires through compartment. Disconnect ground wire from compartment. Remove six blower assembly mounting screws and lift assembly out of compartment. Remove eight blower housing mounting nuts and lockwashers and remove base plate from housing. Remove eight blower motor mounting plate screws and lockwashers. Remove blower housing and note difference between right and left housing for correct installation. Use an Allen wrench to loosen two blower fan set screws and remove blower fans from shaft.

CAUTION

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

Remove six blower motor mounting screws and lockwashers and remove two motor mounting plates. **Do not lose grommets or spacer from motor brackets as they are essential in maintaining vibration-free blower operation.** Remove four blower mounting bracket nuts and lockwashers and separate brackets from motor. Motor location should be marked when removed so motor can be re-installed to rotate in right direction.

b. Assembly and Installation

Place motor mounting brackets on motor, install four lockwashers and nuts, tighten securely, and install motor. Make sure motor rotates in right direction (clockwise as viewed from left side of car.) Inspect six blower mounting grommets for deterioration and hardness. Place two motor mounting plates into position on brackets, install six screws and lockwashers, and tighten securely. Spacers must be inserted in grommet before assembly. The motor must be installed with wire leads and drain wick located toward bottom of motor. Install blower fans on shaft so that air will be forced out of outlet duct. Vanes at bottom fan should point up and towards rear (Fig. 3).

CAUTION

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

Place right and left blower housing over fans, install eight mounting screws and lockwashers, and tighten securely. Place base plate into position on blower housing, install eight blower housing mounting nuts and lockwashers, and tighten securely. Position blower fans as near as possible to outside portion of housing. Check position of set screws in relation to flat on 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. Place blower assembly into position in evaporator compartment. Install mounting screws and tighten securely. Make sure ground wire terminal surface is clean; install wire and tighten. Push blower motor lead wire and thermal switch leads through opening in compartment and install rubber grommet. Install wires on terminal block mounting, making sure connections are tight. Check motor for proper operation. Place cover into position on evaporator housing and install mounting screws and lockwashers. Install fresh air control levers.

28. SERVICING THE BLOWER FANS

a. Removal and Disassembly

Remove fresh air control levers from shafts on both sides of evaporator. Remove evaporator housing rear cover mounting screws and washers and remove cover from compartment. Remove four air inlet ring mounting screws and air inlet ring. Use an Allen wrench to loosen set screw of appropriate blower fan and remove fan from shaft and housing. If both blower fans are to be removed, mark right fan and

left fan so they may be reinstalled in correct location to rotate in right direction.

b. Assembly and Installation

Mount correct blower fan on shaft but do not tighten set screw (Fig. 3). Replace air inlet ring and tighten four mounting screws securely. Position blower fan on shaft so that it is 1/8 inch from inlet ring. Tighten set screw securely on flat of shaft. Rotate fan by hand to make sure there is no interference between housing and fan at any point when fans are rotated. Install rear cover and fresh air control levers.

29. REMOVAL AND INSTALLATION OF CONDENSER

a. Removal

Discharge system, as outlined in Paragraph 8. Disconnect discharge and by-pass tubes from discharge valve and liquid line to receiver and cap tubes. Remove hood lock plate and support bracket. Remove four bolts that attach condenser brackets to radiator support and lift condenser from car.

b. Installation

Position condenser and install four attaching bolts in condenser brackets to radiator support. Tighten bolts to 20 foot-pounds torque. Remove caps from tubes (and condenser if so equipped). Connect condenser to receiver tube flared connection. Connect discharge and by-pass tubes to discharge valve. Charge system with partial charge and test for leaks. Correct any leaks, evacuate system, and charge with four pounds of refrigerant, as outlined in Paragraph 10. Test system operation.

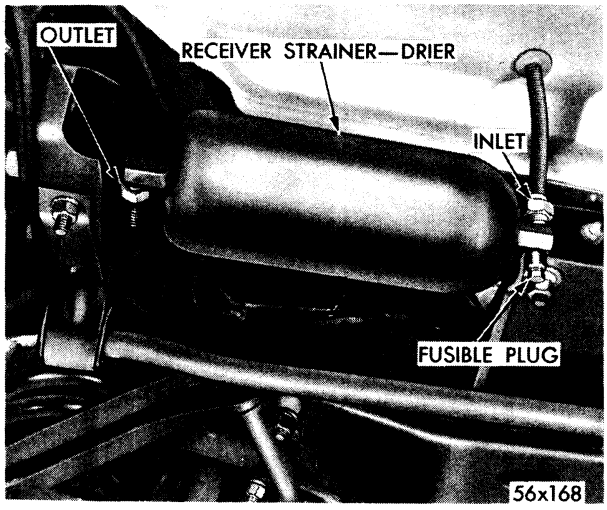

Fig. 21—Receiver Strainer-Drier Installed

30. REPLACEMENT OF RECEIVER FUSIBLE PLUG (FIG. 21)

Where it is necessary to replace fusible plug in receiver (because of damage, or from melting due to temperatures exceeding 210 to 214 degrees F.), it is possible to do so without removing receiver.

Remove old fusible plug after discharging system. Apply refrigerant oil to threads of new plug and install plug in receiver. Tighten 20 foot-pounds torque. Never replace damaged fusible plug with solid plug.

Evacuate system, as outlined in Paragraph 9. Charge system with four pounds of refrigerant, as outlined in Paragraph 10.

31. REPLACEMENT OF RECEIVER STRAINER-DRIER

Where receiver strainer-drier unit is found to be clogged when tested, as outlined in Paragraph 6, or where metal particles are found in system, it is necessary to replace receiver strainer-drier assembly.

a. Removal

Discharge system, as outlined in Paragraph 8.

CAUTION

Protect eyes with goggles when disconnecting receiver flare connections.

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

b. Installation

Position receiver in place, install bolts and nuts and tighten securely. Remove caps, connect flared connector nuts, and tighten securely. Charge system with partial charge and test for leaks. Correct any leaks and evacuate system, as outlined in Paragraph 9, and charge with four pounds of refrigerant, as outlined in Paragraph 10.

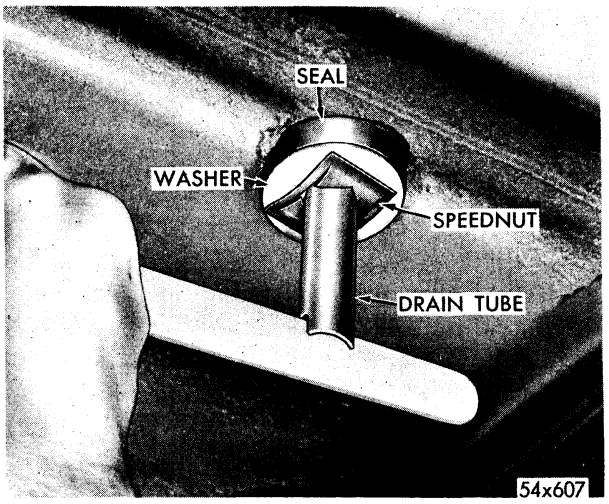

Fig. 22—Removing Evaporator Drain Tubes

32. REMOVAL AND INSTALLATION OF EVAPORATOR

a. Removal

Discharge the system, as outlined in Paragraph 8. Remove rear seat, seat back and panel. Remove evaporator cover and disconnect electrical lead wires. Place blocks under evaporator at each end to act as supports when attaching bolt nuts are removed. Raise car and disconnect suction pressure, liquid and by-pass connectors, being sure to tag liquid and by-pass tubes for identification when connecting. Unscrew drain tubes from lower side of trunk floor pan, as shown in Figure 22.

Lower car and remove fresh air duct hoses from fresh air valve flanges at each end of evaporator. Remove mounting brackets to body attaching nuts and washers. Remove evaporator from car, pulling disconnected refrigerant tubes up through floor pan. Cap all disconnected connections to prevent entrance of dirt and/or moisture into system.

b. Installation

Lift evaporator assembly into car trunk while guiding refrigerant tubes through hole in floor pan, and set assembly on blocks. Install attaching bolt washers and nuts. It may be necessary to pry assembly up to compress rubber seals so that nuts can be started. Install fresh air duct hoses and electrical lead wires. Connect suction pressure, by-pass, and liquid tube connectors, using new copper washers in flare connections. Install drain tubes through floor pan and into evaporator. Lower car, charge system with a partial charge, and test for leaks. Correct any leaks found, evacuate and charge with four pounds of refrigerant. Install panel, seat back, and rear seat. Replace cover and test operation of blowers and cooling system.

33. REPLACING THE EVAPORATOR FILTER

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

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

34. QUICK COOL DOWN OF CAR

To provide a means for a quick cool down of car interior, the wiring to temperature control switch has been changed from the **LOW** terminal on blower switch to **BAT** terminal, as shown in Figure 23.

This change in wiring connection allows temperature control switch to be turned on to provide operation of air conditioning system, without blowers being turned on, as was previously necessary.

Operation for Quick Cool Down

Open all car windows and turn temperature control knob (outer ring) to **COLD.** Start engine and drive car several blocks to expel hot air from car interior, then close all windows and turn blower control knob to **HIGH.**

35. ELECTRICAL CIRCUIT WIRING DIAGRAMS

Refer to Figures 23 and 24.

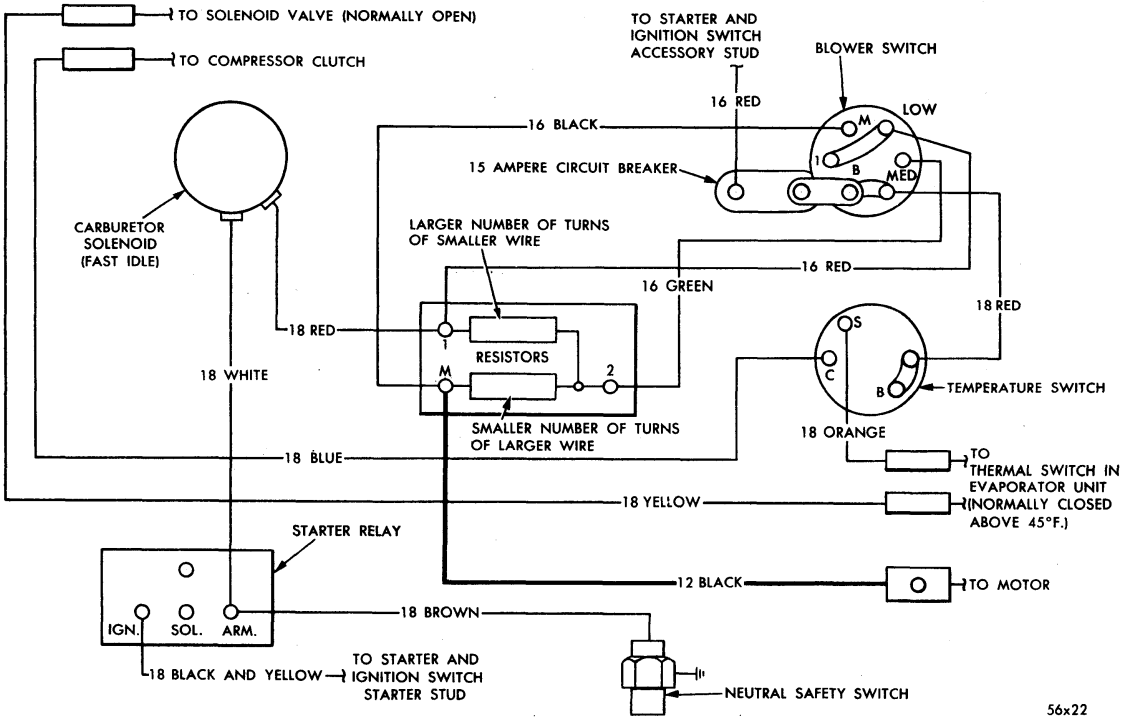

Fig. 23—Air Conditioning Schematic Wiring Diagram

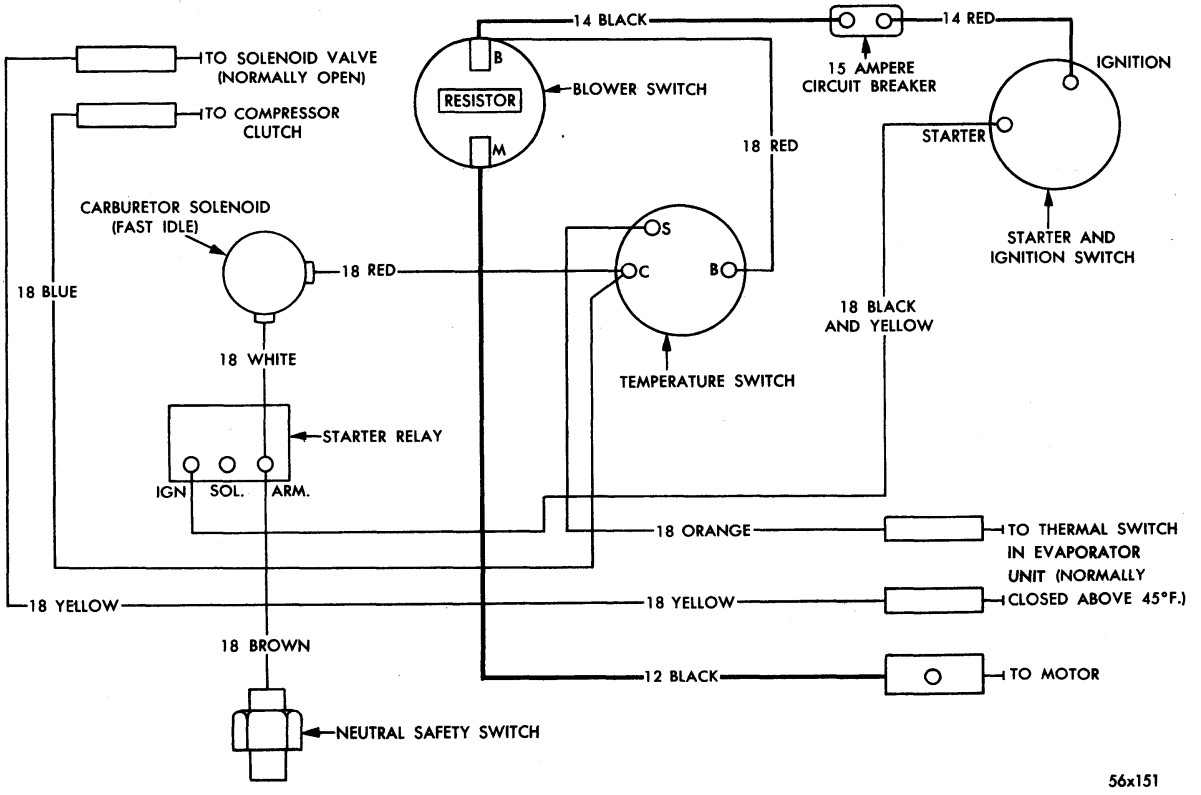

Fig. 24—Electrical Circuit Wiring Diagram (Late DeLuxe)

SERVICE DIAGNOSIS

36. BLOWER NOT OPERATING

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. Test motor and repair or replace.

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

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

37. BLOWERS AND COMPRESSOR OPERATING—NO COOLING

a. Check for low Refrigerant. Recheck system after testing and repairing all leaks.

b. Test for restriction in strainer-drier as outlined in paragraph 6. Test Expansion Valve and inspect lines for kinks.

c. Test compressor head pressures and valves.

d. Test expansion valve as outlined in Pargraph 6. Clean or replace valve.

38. BLOWERS OPERATING—PARTIAL COOLING

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

b. Test expansion valve as outlined in Paragraph 26. Clean, adjust or replace as required.

c. Test compressor valve as outlined in paragraph 6.

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

e. Test thermal switch and solenoid valve as outlined in paragraph 6.

f. Clean air passages through condenser with warm water and compressed air applied from side next to engine.

g. Test temperature pressure relation of refrigerant.

39. LOW SUCTION PRESSURE AND LOW HEAD PRESSURE

a. Check for leaks and recharge as outlined in Paragraph 7.

b. Test for restricted strainer-drier as outlined in Paragraph 6. Replace if faulty.

c. Check for plugged liquid line. Replace liquid line if required.

d. Check expansion valve super heat setting and adjust as outlined in paragraph 26.

e. Clean expansion valve as outlined in paragraph 25.

f. Test compressor valve as outlined in paragraph 6. Replace assembly if faulty.

40. HIGH HEAD PRESSURE

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

b. Check air and moisture in system. Discharge system, refer to Paragraph 8. Evacuate and recharge system.

c. Check for too much refrigerant. Discharge until bubbles appear in sight glass then add refrigerant until bubbles disappears.

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

a. Check for air in system. Open gauge manifold discharge pressure valve slightly and leave open for 10 seconds to purge air. Close valve, start engine and recheck gauge pressure at 1200 r.p.m.

b. Check for too much refrigerant. Operate engine at 1200 rpm with blower switch turned to high. Discharge refrigerant slowly through gauge manifold center fitting until bubbles appear in sight glass. Charge system with refrigerant as outlined in Paragraph 10.

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

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

b. Test strainer-drier and replace if required as outlined in Paragraph 6.

c. Check super heat as outlined in Paragraph 26. Replace valve if faulty.

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

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

a. Partially charge system with refrigerant as outlined in charging system with Freon 12, Paragraph 10 and proceed as follows:

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

b. Operate engine at 1200 rpm with blower switch turned to "High". Discharge refrigerant slowly through gauge manifold center fitting until bubbles appear in sight glass. Charge system with refrigerant as outlined in Paragraph 10.