

# AIR CONDITIONING

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### Description

Two types of original equipment air conditioning installations are available. The first option is a combination air conditioning and heating unit. It is a dash-mounted unit, operated by push buttons conveniently located on the instrument panel. A dual installation consisting of the combination front unit and a rear-unit evaporator assembly mounted in the luggage com-

partment is also available. This deluxe installation insures equal distribution of conditioned air to rear seat as well as front-seat passengers.

The dash-mounted front unit is the basic factory installed option. The rear unit, mounted in the luggage compartment is not available as single units without the front unit. Since the rear unit option operates automatically in conjunction with the front unit, only the front unit will be described in detail.

## SERVICE DIAGNOSIS

NOTE: No attempt should be made to use the diagnosis information as a method of trouble shooting or spot checking. When properly used (as an aid to complete test procedure), the diagnosis will be of considerable value to the service man.

Condition	Possible Cause	Correction
BLOWER NOT OPERATING	(a) Blown fuse, broken wire, faulty switch motor, loose or dirty connections.	(a) Test electrical circuit with point to point voltmeter test, repair or replace the faulty parts.
BLOWER AND COMPRESSOR OPERATING—NO COOLING	(a) Low refrigerant, moisture, frozen stuck or faulty expansion valve, stuck or faulty EPR valve. (b) Low compressor capacity. (c) Kinks in lines. (d) Faulty water valve or out of adjustment.	(a) Add refrigerant, test for leaks and repair, replace strainer-drier, clean or replace expansion valve, replace EPR valve. (b) Repair or replace compressor. (c) Repair or replace lines. (d) Adjust cable and/or replace valve.
BLOWER OPERATING PARTIAL COOLING	(a) Moisture, low refrigerant, low compressor capacity. (b) Slipping clutch. (c) Water valve out of adjustment or faulty. (d) Obstruction of condenser.	(a) Replace strainer-drier, add refrigerant test for leaks and correct, repair or replace compressor. (b) Repair or replace. (c) Adjust cable or replace. (d) Clean condenser, repair or replace.
LOW SUCTION AND LOW DISCHARGE PRESSURE	(a) Low refrigerant, moisture in system, expansion valve froze or stuck, thermal bulb lost charge, restriction in liquid line, faulty compressor valves, too much oil.	(a) Add refrigerant, test for leaks and correct, replace strainer-drier, clean or replace expansion valve, repair or replace liquid line, repair or replace compressor, remove excess oil.

Condition	Possible Cause	Correction										
HIGH DISCHARGE PRESSURE	(a) Too much refrigerant.	(a) Purge system for 10 seconds.										
	(b) Air in system.	(b) Purge system for 10 seconds.										
	(c) Dirty condenser.	(c) Clean condenser, no bug screens.										
	(d) High ambient temperature.	(d) NOTE: Discharge and Suction pressures will vary with ambient temperature and heat load applied to evaporator. Normal suction pressure will vary between 25 to 40 psi. Normal discharge pressure at 800 engine rpm as indicated below:										
		<table border="1"> <thead> <tr> <th>Ambient Temperature</th> <th>Discharge Pressure</th> </tr> </thead> <tbody> <tr> <td>60°F</td> <td>100-150 psi</td> </tr> <tr> <td>80°F</td> <td>140-190 psi</td> </tr> <tr> <td>100°F</td> <td>190-240 psi</td> </tr> <tr> <td>110°F</td> <td>230-280 psi</td> </tr> </tbody> </table>	Ambient Temperature	Discharge Pressure	60°F	100-150 psi	80°F	140-190 psi	100°F	190-240 psi	110°F	230-280 psi
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60°F	100-150 psi											
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100°F	190-240 psi											
110°F	230-280 psi											
HIGH SUCTION PRESSURE	(a) Moisture in system.	(a) Change strainer-drier—recharge.										
	(b) Expansion valve froze or stuck.	(b) Change strainer-drier—recharge, clean or replace expansion valve.										
	(c) Expansion valve equalizer tube plugged.	(c) Clean or replace expansion valve.										
	(d) Bad compressor valves.	(d) Replace valve plates.										
	(e) Not enough oil.	(e) Add oil.										

**OPERATION**

Selection of the degree of air conditioning desired is controlled by the push buttons located on the instrument panel. The larger lever below the push buttons, provides control of the hot water flow through the heater core to regulate the temperature. The smaller lever controls the switch which regulates the speed of the blower motor fan. (Fig. 1).

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

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

**ELECTRICAL CONTROLS AND CIRCUITS**

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

clutch circuit. The push-button switch also controls the "feed" circuit to the blower motor speed control switch.

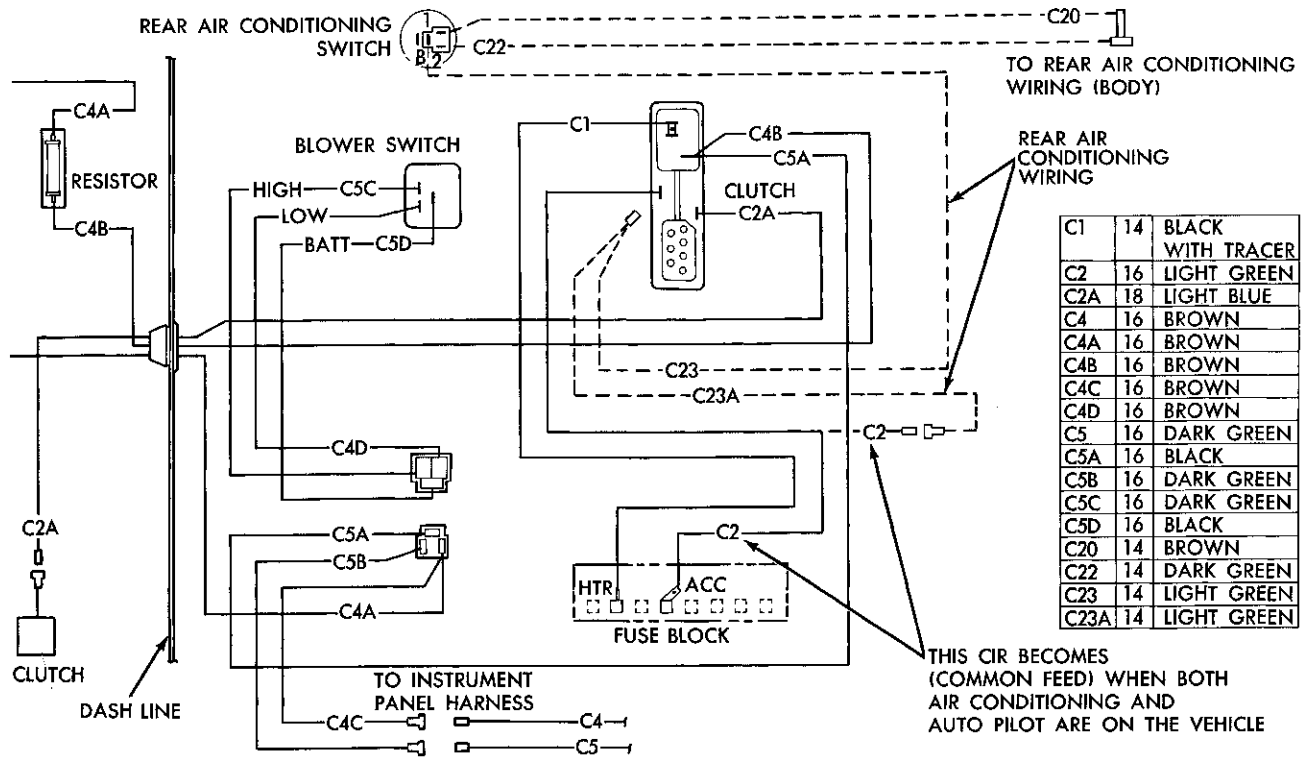
**Push-Button Control**

The power "feed" circuit connects directly to the air conditioning terminal of the fuse block (Fig. 2).

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



Fig. 1—Air Conditioning Controls



NK1193

Fig. 2—Electrical Control Circuits

**Blower Motor Speed Control Switch**

The speed control switch and control circuits are the same for all models, and the switch is controlled by moving the control lever from left (low) to right (high).

**Trunk Unit Control**

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

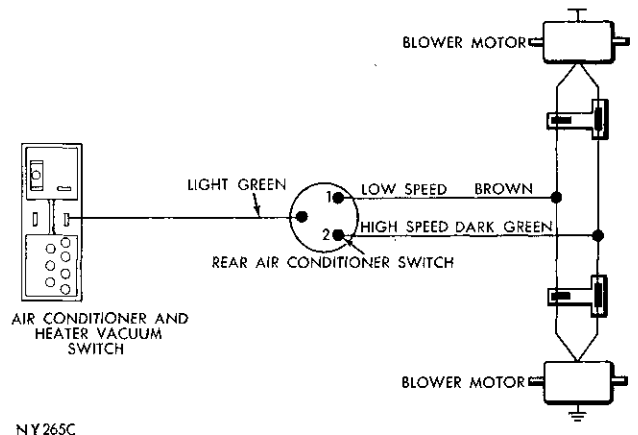
The blower circuit of the trunk unit is entirely independent of the front unit (Fig. 3).

**Antifreeze Required for Summer Operation**

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

**Bug Screens**

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



NY265C

Fig. 3—Trunk Unit Wiring Diagram

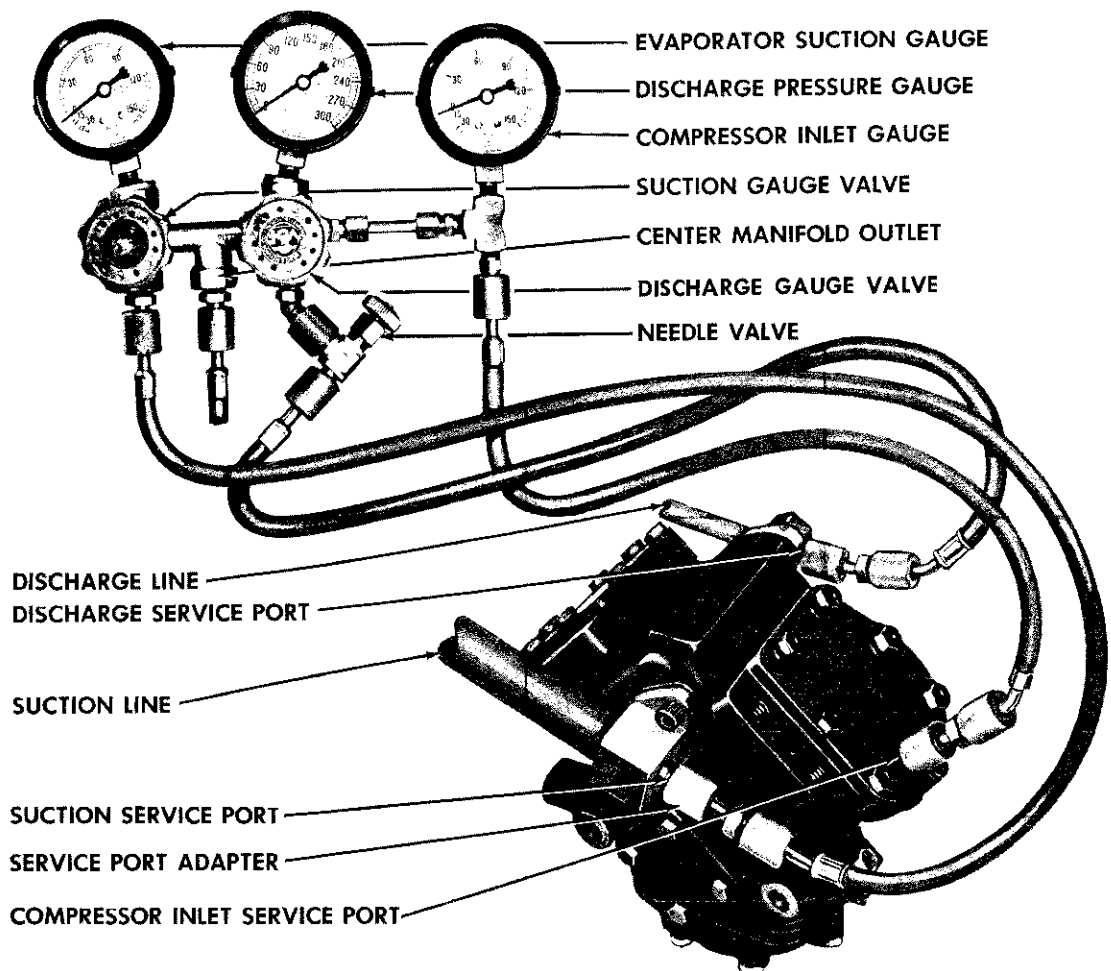


Fig. 4—Gauge Set Manifold Connections

NY268A

## INSPECTION, TEST PROCEDURE AND DIAGNOSIS

### THE GAUGE SET MANIFOLD

The gauge set manifold (Tool C-3740) has two compound suction gauges and one discharge pressure gauge. Two accurately calibrated suction pressure gauges are required for the evaporator pressure regulator valve test. (Refer to Fig. 4.)

### PRELIMINARY TEST, INSPECTIONS AND ADJUSTMENTS

Satisfactory performance of the combined air-conditioning and heating system is dependent upon proper operation and adjustment of all operating controls, as well as proper functioning of all refrigeration system units.

#### Testing the Operation of All Controls

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

(1) Inspect compressor drive belt tension and adjust if necessary.

(2) Open the vehicle windows.

(3) Move the temperature control lever to the "OFF" position.

(4) Start the engine and adjust engine speed to 800 rpm. Use a reliable tachometer. Remove radiator cap.

(5) Push the "FRESH COOL" button in.

(6) Test the blower operation at all three speed positions. If the blower does not operate correctly, refer to paragraph "Electrical Controls and Circuits." Leave the blower in the "High" position.

(7) The compressor clutch should be engaged, the compressor operating, and the air-conditioning system in operation. If the clutch does not engage, test the circuit. (Refer to "Electrical Controls and Circuits.")

#### Test the Push Button Operation

Reduce the engine speed to normal idle. With the engine operating at idle speed, the vacuum will be high and the vacuum actuators should operate quickly. If the actuator operation is slow, check the source

**PUSH BUTTON CONTROL CHART**  
**IMPERIAL**

BUTTON	OFF	MAX. COOL	FRESH COOL	DEFROST	HEAT
FRESH AIR DOOR	CLOSED	CLOSED	OPEN	OPEN	OPEN
RECIRCULATING DOOR	OPEN	OPEN	CLOSED	CLOSED	CLOSED
BYPASS DOOR	OPEN	OPEN	OPEN	CLOSED	CLOSED
DEFLECTOR	UP	UP	UP	DOWN	DOWN
DAMPER	DOWN	DOWN	DOWN	DOWN	UP
BLOWER SPEED	OFF	HI-MED. LOW	HI-MED. LOW	HI-MED. LOW	HI-MED. LOW
COMPRESSOR CLUTCH	OFF	ON	ON	OFF	OFF
SPOT COOLER—RIGHT	OPEN	OPEN	OPEN	CLOSED	CLOSED
LEFT	OPEN	OPEN	OPEN	OPEN	OPEN

hose connection at the engine manifold. Push each button to test the over-all operation of the electrical and vacuum controls. The Push Button Control Chart summarizes the actions that should take place when each button is pushed.

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

**Water Temperature Control Valve Adjustment**

Move the temperature control lever on the instrument panel to the extreme "WARM" position, and

then back to the "OFF" position. At the same time, inspect the control cable action and the movement of the water temperature control valve lever. The valve should be moved to the wide-open position and back to the fully closed position. Figure 5 shows the valve in the fully closed position. The water valve is pushed to open and pulled to close.

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

Test the water valve by momentarily disconnecting the heater outlet hose at the upper side of the heater housing (Fig. 6). A slight spillage of water when the hose is removed is normal. (The radiator cap was removed at the start of this test to minimize pressure in the car's cooling system.) A continuous flow of water indicates that the valve is not closing properly.

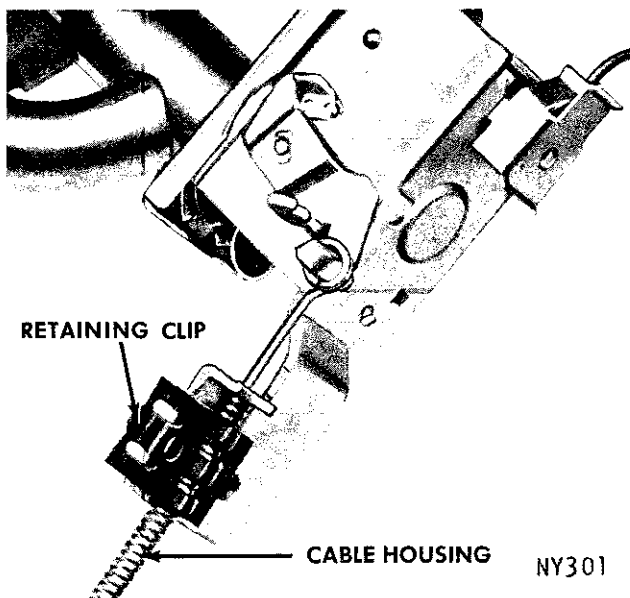


Fig. 5—Temperature Control Valve Closed



Fig. 6—Water Valve Test

This may be caused by an improperly adjusted control cable or a faulty valve. Readjust the control cable or replace the valve, as necessary, and retest.

#### Radiator Cap

It is an absolute necessity for the air-conditioned vehicle to be equipped with a radiator cap having a holding pressure of 15 to 16 psi.

#### Inspect the Condenser and Sub-Cooler

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

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

Inspect the condenser and sub-cooler for bent or damaged fins.

The bent fins on the condenser and/or sub-cooler deflect air flow across the bent portions, decreasing

the condenser area. Be sure the fan shroud is properly positioned.

### TEST 1 SYSTEM PRESSURE (Engine Not Running)

Install the gauge set manifold. For identification of test hose connections at the service ports see Figure 4. After tightening all three service port adapters, make sure that the needle valve located below the discharge pressure gauge is open. Purge air from the hoses (Fig. 7) as follows:

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

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

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

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

### TEMPERATURE—PRESSURE RELATIONSHIP CHART

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

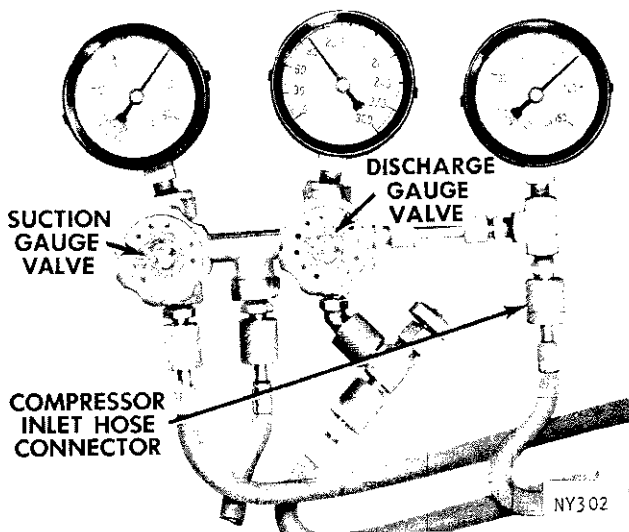


Fig. 7—Purge Gauge Hoses

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

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

### TEST 2

#### Refrigerant Level

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

The sight glass is an integral part of the receiver-strainer-drier. The outlet line (liquid) from the condenser must be attached to the connection marked IN. The word IN is stamped on the top face of the inlet connection (Fig. 8). If the receiver-strainer-drier is reversed and the lines are connected wrong, the system must be purged, the lines reversed and the system recharged.

Block the air flow across the condenser as required to raise the discharge pressure to 225 to 250 psi, and inspect the sight glass for foam. If the sight glass is clear, remove the air restriction from the condenser and allow the discharge pressure to return to normal.

If foam shows in the sight glass when the discharge pressure is 225 to 250 psi, it indicates the system is low on refrigerant. The proper amount of refrigerant required to complete a full charge may be added to the system as follows: Maintaining the discharge pressure at 225 to 250 psi, add refrigerant gas through

the suction side of the system until foam is cleared from the sight glass. Then add exactly one-half (½) pound of refrigerant.

### TEST 3

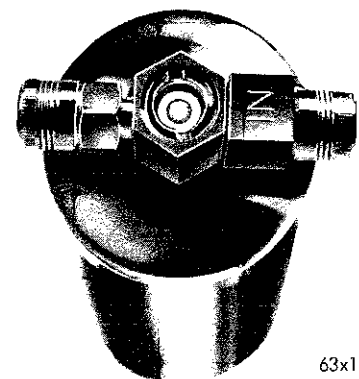
#### TESTING THE SYSTEMS FOR LEAKS

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

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

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

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



63x105

Fig. 8—Sight Glass

**Test Precautions**

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

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

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

**Remove Sweep-Test Charge**

If the system is free of leaks, or after correcting a leak, or if no air conditioning components have been removed, add the necessary refrigerant as described under "Correcting Low Refrigerant Level." If any parts of the refrigerant system were disconnected, remove the sweep test charge. Close the refrigerant manifold valve so that any refrigerant remaining in

the container is sealed. Remove the long test hose from the refrigerant manifold. Insert the free end of this test hose into an exhaust system outlet. Open the right-hand gauge set manifold valve a fraction of a turn to let the sweep-test charge escape slowly. Allow the system to discharge until the discharge pressure gauge registers zero. Open the lefthand gauge valve to allow any refrigerant trapped in the suction side of the system to escape.

**TEST 4  
CORRECTING LOW REFRIGERANT  
LEVEL**

Since the refrigeration system is completely sealed, the refrigerant level will not be low unless there is a leak in the system or the refrigerant has been allowed to escape by depressing one of the service port valves. For detailed instructions on the proper procedure for checking refrigerant level, refer to TEST 2 "Refrigerant Level."

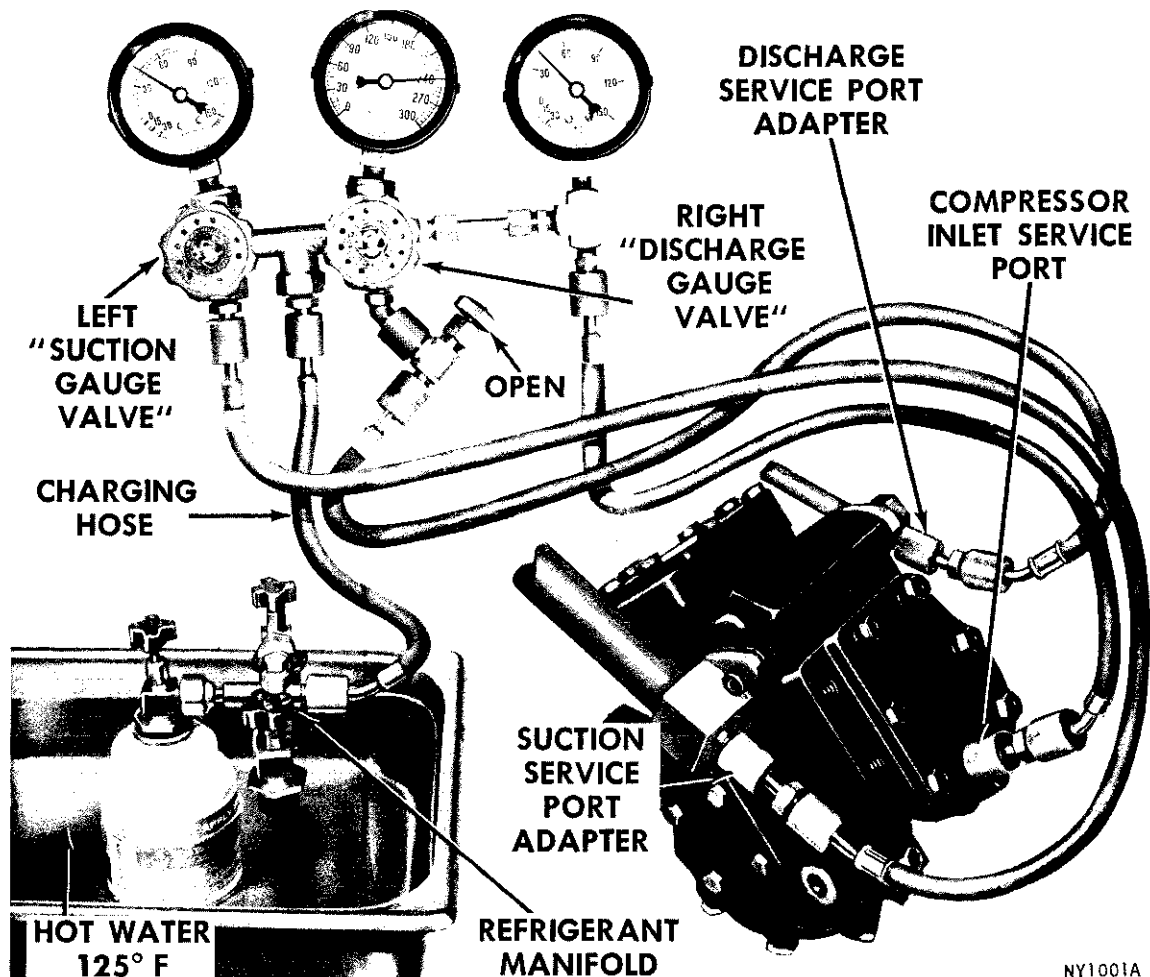


Fig. 9—Adding Partial Refrigerant Charge



Before adding the refrigerant where the cause of low level is not known, the system should be tested for leaks. Assuming no leaks are present, or that leaks have been corrected without discharging the system, proceed with partial charge (refer to Fig. 9).

Install and connect the gauge set manifold as shown in Figure 9.

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

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

**CAUTION: Keep the refrigerant container upright.**

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

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

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

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

## TEST 5 PERFORMANCE TEST

Humidity (the amount of moisture in the air) has an important bearing on the temperature of the air delivered to the vehicle interior. High humidity greatly reduces the evaporator's ability to lower the temperature of the air delivered to the vehicle's interior.

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

### Performance Test Preparations

The Gauge Set Manifold should be connected as shown in Fig. 9 according to instructions covered in "Gauge Manifold Connections Test 1. Move the temperature control lever to "OFF" position.

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

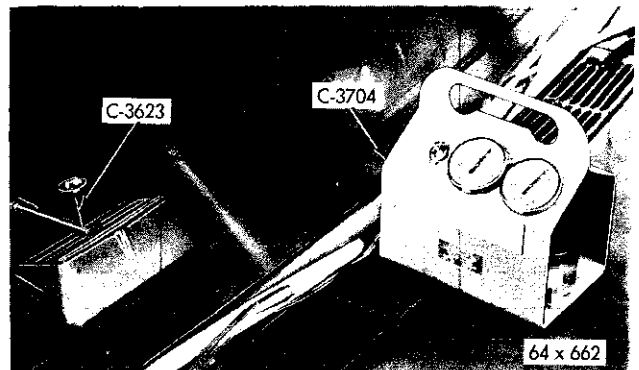


Fig. 10—Psychrometer and Thermometer

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

Adjust engine speed to 800 rpm. Arrange the gauge set manifold hoses and tachometer leads to allow the hood to be lowered, and close the hood.

Install the motor-driven psychrometer (Tool C-3704) near the air inlet grille, as shown in Fig. 10. Install the thermometer (Tool C-3623) in the right-hand instrument panel outlet grille.

Operate the air-conditioning system until a stabilized condition on the gauges and thermometers has been established. One of the most important factors in making the over-all performance test is that the engine must be operated at 800 rpm for a sufficient time to build up to operating temperatures and to allow all the underhood components of the system to be subjected to the underhood operating temperature for a period of time.

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

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

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

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

### Determination of System Performance

Observe and record both the "Inlet Dry Bulb Tem-

**AIR CONDITIONING PERFORMANCE CHART**

DRY BULB TEMP.	WET BULB AIR TEMPERATURE																																									
	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90			
75	48	48	48	48	48	48	48	48	49	49	49	50	50	51	51	52	53	53	54	55	55	56	57																			
76	48	48	48	48	48	48	49	49	49	49	49	50	50	51	51	52	53	53	54	55	56	56	57	57																		
77	48	48	48	48	49	49	49	49	49	49	50	50	50	51	51	52	53	53	54	55	56	57	57	57	59																	
78	48	48	49	49	49	49	49	49	50	50	50	50	51	51	52	52	53	54	54	55	56	57	57	58	59	60																
79	49	49	49	49	49	49	49	50	50	50	50	50	51	51	52	52	53	54	54	55	56	57	58	58	59	60	61															
80	49	49	49	49	49	50	50	50	50	50	50	50	51	51	52	52	53	54	54	55	56	57	58	59	59	60	61	62														
81	49	49	49	50	50	50	50	50	50	50	51	51	51	51	52	52	53	54	55	55	56	57	58	59	60	61	62	63	63													
82	50	50	50	50	50	50	50	50	51	51	51	51	52	52	53	53	54	54	55	56	56	57	58	59	60	61	62	63	64	64												
83	50	50	50	51	51	51	51	51	51	51	52	52	52	53	53	54	54	55	56	57	58	58	59	60	61	62	63	64	65	66												
84	51	51	51	51	51	51	52	52	52	52	52	52	53	53	53	54	54	55	56	57	58	59	59	60	61	62	63	64	65	66	67											
85	51	51	51	51	52	52	52	52	52	52	52	53	53	53	54	54	55	56	57	57	58	59	60	60	61	62	63	64	65	66	67	68										
86	52	52	52	52	52	52	52	52	53	53	53	53	53	53	54	54	55	56	57	57	58	59	60	61	61	62	63	64	65	66	67	68	68									
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89	54	54	54	54	54	54	54	54	54	54	55	55	55	55	55	56	56	57	57	58	59	60	60	61	62	63	64	64	65	66	67	68	68	69	70	71						
90			54	54	54	54	55	55	55	55	55	55	55	55	56	56	56	57	58	58	59	60	61	61	62	63	64	65	65	66	67	68	69	69	70	71	72					
91				55	55	55	55	55	55	55	55	55	55	55	56	56	56	57	57	58	58	59	60	61	61	62	63	64	65	66	66	67	68	69	70	70	71	72	73			
92				55	55	55	55	56	56	56	56	56	56	56	56	57	57	58	58	59	59	60	61	62	62	63	64	65	66	66	67	68	69	70	70	71	72	73				
93					56	56	56	56	56	56	56	56	56	56	57	57	58	58	59	59	60	61	61	62	63	63	64	65	66	66	67	68	69	70	70	71	72	73				
94					57	57	57	57	57	57	57	57	57	57	57	57	58	58	59	60	60	61	61	62	63	63	64	65	66	66	67	68	69	70	70	71	72	73				
95					57	57	57	57	57	57	57	57	57	57	57	58	58	58	59	59	60	60	61	62	62	63	63	64	65	66	66	67	68	69	70	70	71	72	73			
96					58	58	58	58	58	58	58	58	58	58	58	58	58	59	59	59	60	61	61	62	62	63	64	64	65	66	67	67	68	69	70	71	71	72	73			
97					58	58	58	58	58	58	58	58	58	59	59	59	59	60	60	60	61	61	62	62	63	63	64	65	65	66	67	68	68	69	70	71	72	72	73			
98						59	59	59	59	59	59	59	59	59	59	60	60	61	61	61	62	62	63	63	64	64	65	66	67	67	68	69	69	70	71	72	72	73				
99						60	60	60	60	60	60	60	60	60	60	60	61	61	61	62	62	63	63	63	64	65	65	66	67	67	68	69	70	70	71	72	72	73				
100						60	60	60	60	60	60	60	60	60	60	61	61	61	61	62	62	62	63	63	63	64	65	65	66	67	67	68	69	70	70	71	72	72	73			
101															61	61	61	61	62	62	62	62	63	63	63	64	64	65	66	66	67	68	68	69	70	71	71	72	73	74		
102															61	61	62	62	62	62	62	63	63	63	64	64	65	65	66	66	67	68	69	69	70	71	71	72	73	74		
103																62	62	62	62	62	63	63	63	63	64	64	64	65	65	66	67	67	68	69	70	70	71	72	73	74	74	
104																62	62	62	62	63	63	63	63	64	64	65	65	66	66	67	67	68	69	70	70	71	72	73	74	75		
105																62	62	62	63	63	63	63	63	64	64	64	65	65	66	66	67	67	68	69	70	70	71	72	73	74	75	
106																63	63	63	63	63	63	63	64	64	64	65	65	66	66	67	67	68	69	70	71	71	72	73	74	75		
107																63	64	64	64	64	64	64	64	64	65	65	65	66	66	67	67	68	69	70	71	72	72	73	74	75		
108																64	64	64	64	64	64	64	65	65	65	65	66	66	67	67	68	68	69	69	70	71	72	73	74	75	76	
109																64	64	64	65	65	65	65	65	65	66	66	66	66	67	67	68	68	69	70	70	71	72	73	74	75	76	
110				NY282B												65	65	65	65	65	65	65	65	65	65	66	66	66	67	67	68	68	69	70	70	71	72	73	74	75	76	

**MAXIMUM DISCHARGE AIR TEMPERATURE**

Fig. 11—Performance Temperature Chart—Front Unit Only

**AIR CONDITIONING PERFORMANCE CHART**

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

**MAXIMUM DISCHARGE AIR TEMPERATURE**

Fig. 12—Performance Temperature Chart—Front Unit of Dual System

## AIR CONDITIONING PERFORMANCE CHART

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

**MAXIMUM DISCHARGE AIR TEMPERATURE**

NY285B

Fig. 13—Performance Temperature Chart—Trunk Unit of Dual System

perature" and "Inlet Wet Bulb Temperature" as registered on the psychrometer.

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

From the appropriate Front Unit Performance Temperature Chart for vehicle and type of installation being tested, Figs. 11 thru 14 determine the maximum allowable discharge air temperature for the prevailing "Dry" and "Wet" bulb temperatures recorded. If the vehicles discharge air temperature is at or below the temperature given on the Performance Chart, the air conditioning is delivering its rated cooling capacity.

#### Trunk Unit Performance Test (Fig. 14)

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

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

1. "The Evaporator Pressure Regulator Test."
2. "The Compressor Capacity Test."
3. "The Expansion Valve Test."

### TEST 6 EVAPORATOR PRESSURE REGULATOR VALVE TEST

TEST 6 is divided into two parts to simplify the

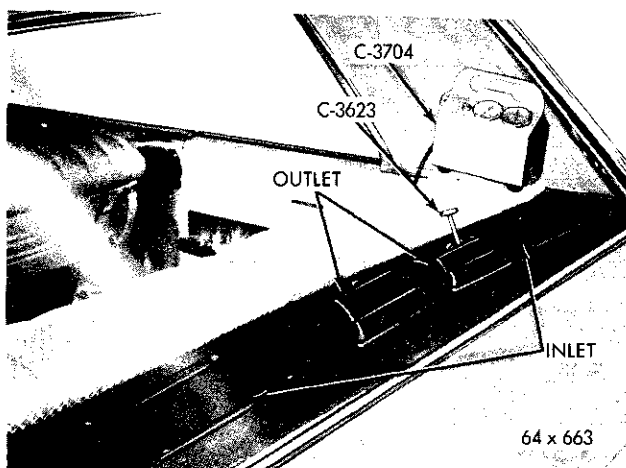


Fig. 14—Trunk Unit Performance Test

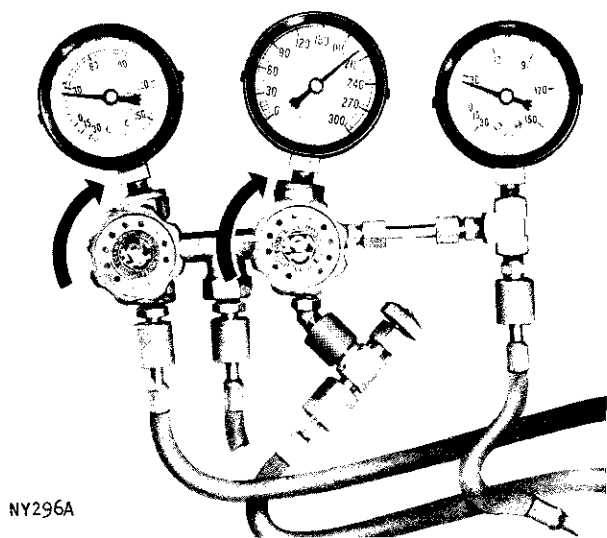


Fig. 15—Pressure, EPR Valve Open

test procedures. As both parts of the test must be made progressively, it is important that both parts be read thoroughly before proceeding with the test.

## PART 1

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

The evaporator pressure regulator test determines whether or not the valve is functioning properly.

#### EPR Valve Test Conditions

Normally, this test is performed after completion of the "Performance Test." The gauge set manifold will be connected as illustrated in Figure 4.

Adjust the engine speed to 800 rpm. **Close the hood for this test.** Close the car windows and turn the blower on "HIGH." Push the "FRESH COOL" button.

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

Observe the evaporator suction gauge and the compressor inlet gauge. Both should register 26 psi (Fig. 15), or slightly higher. This indicates that the EPR valve is open. The next step is to determine the mini-

imum evaporator suction pressure maintained in the suction line by the "EPR" valve. "EPR" valve action can be accelerated by reducing the heat load on the evaporator. This is accomplished by pushing the blower control switch to the "LOW SPEED" position, thus reducing the volume of air passing through the evaporator. Push in the "MAXIMUM COOL" button. Immediately, the evaporator will start to get colder.

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

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

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

(3) When fluctuation at the compressor inlet gauge stops and the pressure registered drops steadily, the "EPR" valve is maintaining minimum suction line pressure. Allow the pressure registered at the compressor inlet gauge to drop to 15 psi or lower, then read the evaporator suction gauge. (Refer to Figure 16).

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

(4) The suction gauge pressure should be 22 to 25 psi. This indicates that the suction pressure maintained by the "EPR" valve is correct. However, if engine speed is increased to approximately 2000 rpm in

order to pull the inlet pressure down to 15 psi, this also increases the suction pressure 24 to 28 psi. Again, determine the pressure at which the valve is fully open.

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

(6) Watch both the evaporator suction and the compressor inlet pressure gauge. The pressure registered at the compressor inlet gauge will increase quite rapidly. Both suction gauges should again stabilize at a pressure of 26 psi or slightly higher within a few minutes.

If the minimum suction pressure registered (Step 4, above) is 22 to 26 psi and the suction pressure registered with the valve fully open (Step 6 above) is 31 psi or slightly higher, the "EPR" valve is functioning normally. A system which passes both the Over-All Performance Test and the "EPR" Valve Test requires no further tests.

#### Suction Pressure Above 26 psi.

If the minimum suction pressure is higher than 26 psi (Step 4, above), the evaporator will not get as cold as it should for maximum performance. It will be necessary to replace the "EPR" valve, repeat the "EPR" Valve Test and the Performance Test.

#### Suction Pressure Below 22 psi.

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

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

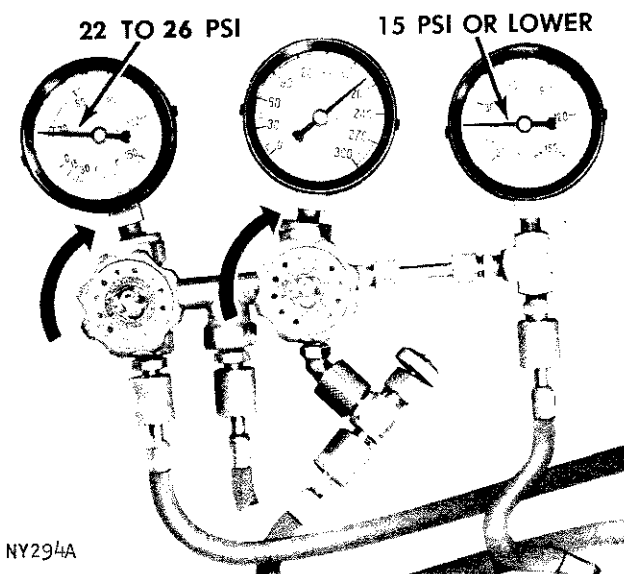


Fig. 16—EPR Valve Test Pressures

## PART 2

This part of the test will save time as the expansion valve and compressor are being tested during the EPR valve test. There is always a definite relationship between the temperature and pressure of refrigerant vapor in a system that's working right; however, this temperature-pressure relationship will be upset if the compressor capacity is not up to specifications, or if the expansion valve is not doing its job properly.

**NOTE: If the expansion valve opens too much, the evaporator will be flooded and there will be liquid refrigerant leaving the evaporator outlet. If there is liquid refrigerant along with the vapor, the vapor can't become superheated and the gas temperature will be low in relation to pressure.**

**NOTE: If the expansion valve doesn't open enough, the evaporator will be starved and the liquid re-**

refrigerant will be vaporized before it gets to the outlet. As the temperature of the vapor is somewhere around 30 degrees, it will be cooler than the outside air so that the vapor will still absorb some heat before it leaves the evaporator. This will create a over-superheated condition where the temperature will be very high in relation to pressure.

If the compressor capacity is low, it is because the refrigerant vapor is leaking internally, usually past the reed valves or a blown gasket. This will be indicated by low discharge pressure. With the refrigerant being recirculated in the compressor due to the internal leakage, heat will be generated and the refrigerant will absorb some of this heat; superheating the refrigerant. This will result in a discharge temperature which will be above the maximum.

When you hook up the gauges, install the thermometer clip on the discharge line, getting the clip as close to the compressor as possible and making sure you have a tight contact between the clip and the discharge line. The thermometer bulb must fit tightly in the loop and none of the bulb should overhang the clip otherwise you will measure air temperature instead of refrigerant temperature.

**NOTE: It is recommended to wrap the bulb and clip to insulate them from the engine compartment heat.**

You must have a high heat load to get head pressure within the range of the chart.

When the head pressure is in the chart range, wait a few minutes. This will allow the pressure to stabilize and the thermometer to register the exact temperature. Then read the discharge pressure and temperature. Consult the chart to see if the temperature is correct for the discharge pressure reading.

**COMPRESSOR DISCHARGE TEMPERATURE-PRESSURE CHART**

DISCHARGE PRESSURE GAUGE READING (PSI)	TEMPERATURE ° FAHRENHEIT	
	MINIMUM	MAXIMUM
190-195	168	214
195-200	170	216
200-205	172	218
205-210	174	220
210-215	176	222
215-220	178	224
220-225	180	226
225-230	182	228

For example, suppose the pressure is 201 psi. In the chart, you will see that the minimum temperature should be 172 degrees and the maximum temperature is 218 degrees.

**NOTE: If the temperature is in the range, the compressor and the expansion valve are okay. No further testing is necessary.**

If the temperature is below the minimum, the expansion valve is flooding the evaporator and the expansion valve should be replaced.

If the temperature is above the maximum, either the compressor or the expansion valve is faulty in which case the system will have to be discharged.

Test the compressor and expansion valve separately using Tests 7 and 8 which follow.

A conclusive result from this new test eliminates the need for a separate compressor and expansion valve test.

**TEST 7  
COMPRESSOR CAPACITOR TEST**

The Performance Test and the Evaporator Pressure Regulator Valve Test should be performed before testing compressor capacity. These tests are made with the system fully charged with refrigerant. It is necessary to discharge the system before making the Compressor Capacity Test. It is also necessary to discharge the system in order to perform the Expansion Valve Test. It is recommended that tests be made in the order in which they are presented in this service manual. Experience has proven this to be the surest and quickest way to locate and correct the cause of unsatisfactory performance.

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

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

1. Attach the gauge set manifold.
2. Start the engine and adjust speed to 800 rpm.
3. Position the blower switch in the "HIGH" position, move the temperature control lever to "OFF" and push in the "FRESH COOL" button.
4. Allow the air-conditioning system to operate at full capacity for at least 15 minutes. This will cause most of the compressor oil in the system to be returned to the compressor crankcase.

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

**Discharge the System**

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

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

- (2) Fully open the manifold needle valve.
- (3) Open the discharge (right-hand) gauge valve a small amount. This will allow the refrigerant vapor to discharge slowly.

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

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

**Test Preparation and Connections**

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

- (1) Disconnect the discharge line from the muffler. Cap the muffler outlet with a 1/2 inch cap. Seal the discharge line.

- (2) Disconnect the evaporator suction line (hose) from the suction muffler. Use a 3/8 inch fitting cap to close off the suction line fitting. Seal the suction line.

The compressor is now isolated from the system and sealed at both the suction and the discharge sides. Refer to Figure 17, and make the following gauge set manifold connections:

- (3) Disconnect the test hose and adapter from the compressor inlet port.
- (4) Remove the valve body from the compressor inlet port. The tire valve stem Tool C-3788 can be used for this purpose.
- (5) Disconnect the test hose from the suction service port of the fitting.
- (6) Install the test cap (SP-2922 at the center manifold outlet.

**NOTE: Be sure the test cap is perfectly clean. Particles adhering to the cap or the metering orifice can restrict the flow and cause false readings. Never use a wire or probe of any kind to clean the cap.**

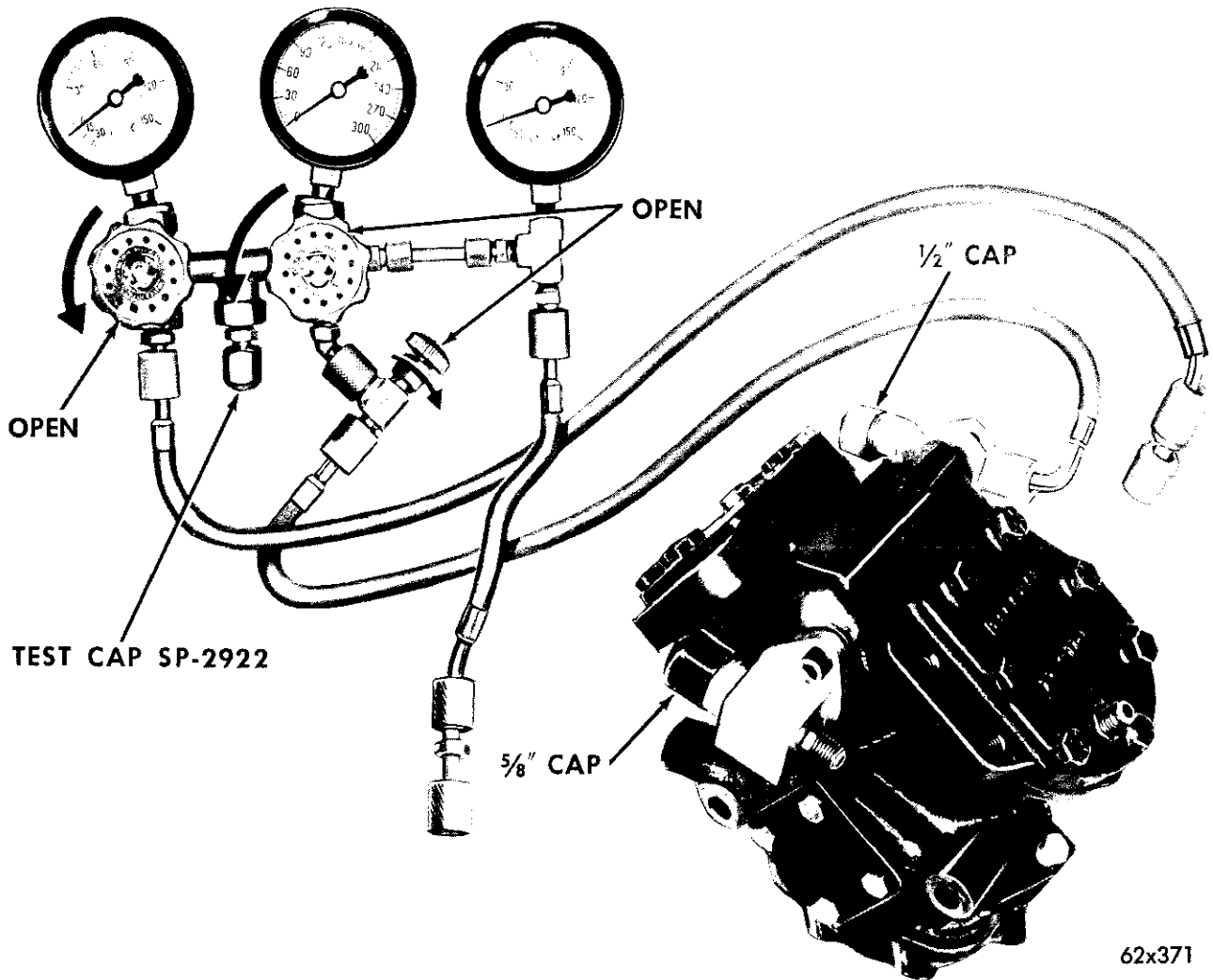


Fig. 17—Compressor Test Connections



Wash it with clean solvent and blow dry with compressed air.

(7) Make sure both the left and right gauge valves are open. The compressor can now be operated as an air pump. Air will be drawn in through the compressor inlet port, compressed and delivered (through the test hose attached to the discharge port) to the gauge set manifold. The compressor capacity is determined by noting the pressure registered at the discharge gauge when the compressor is driven at an engine speed of exactly 450 rpm.

**NOTE:** The tachometer used must be accurate. The compressor capacity test results are dependent upon controlling the engine speed at exactly 450 rpm.

#### Test Pressures and Results

(1) Start the engine and adjust speed to exactly 450 rpm.

(2) Slowly close the left-hand gauge valve. Refer to Figure 18. All air delivered by the compressor will now be discharged through the metering orifice in the test cap. The pressure registered at the discharge gauge should build up to at least 230 psi.

(3) The load on the compressor may affect engine speed. If necessary, readjust the engine speed to exactly 450 rpm. The discharge pressure should build up to a minimum of 230 psi.

(4) Open the left-hand gauge valve momentarily to allow the pressure to drop. Then close the valve to make sure the pressure again builds up to a minimum of 230 psi with the engine operating at 450 rpm.

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

ENGINE EXACTLY 450 RPM  
VALVE CLOSED 230 PSI MINIMUM

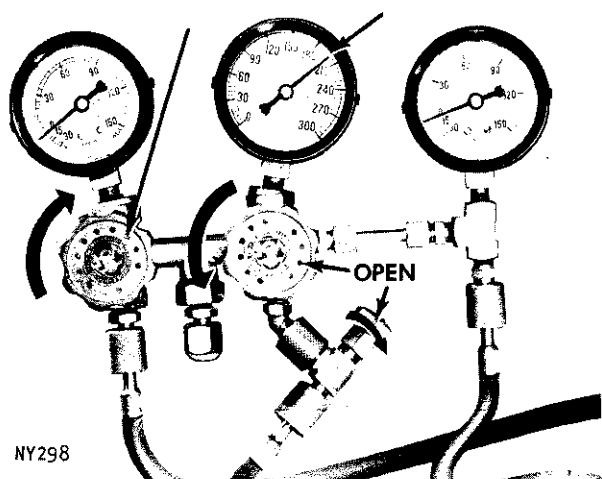


Fig. 18—Compressor Test Pressures

If the compressor does not develop a minimum of 230 psi at 450 rpm both the compressor valve plate assemblies and gaskets must be replaced. (See "Compressor Service Instructions"). After repair, the compressor capacity must be tested before charging the system and repeating the "Over-All Performance Test."

A compressor that consistently builds up to a minimum of 230 psi at exactly 450 rpm is delivering rated capacity. Reconnect the evaporator suction line to suction muffler and the discharge line to muffler discharge fitting. When connecting these lines use a new gasket, and lubricate both male and female threads and the turning surface of the female nut with refrigerant oil. Proceed with the "Expansion Valve Test."

## TEST 8 EXPANSION VALVE TEST

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

When testing the expansion valves on dual installations (front and rear units) **each expansion valve must be tested separately.** To test the expansion valve of the front unit, disconnect and cap the liquid and suction lines leading to the rear unit evaporator and expansion unit. To test the expansion valve of the rear unit, disconnect and cap the liquid and suction lines leading to the front unit evaporator and expansion valve.

**IMPORTANT:** It is absolutely necessary for the compressor to pass the "compressor capacity" test before testing the expansion valve in its installed position.

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

#### TEST PREPARATIONS AND CONNECTIONS

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

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

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

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

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

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

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

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

This completes all the test connections necessary for the expansion valve test. Compare the test set-up against those illustrated in Figure 19.

Then, proceed with the following preparation steps:

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

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

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

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

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

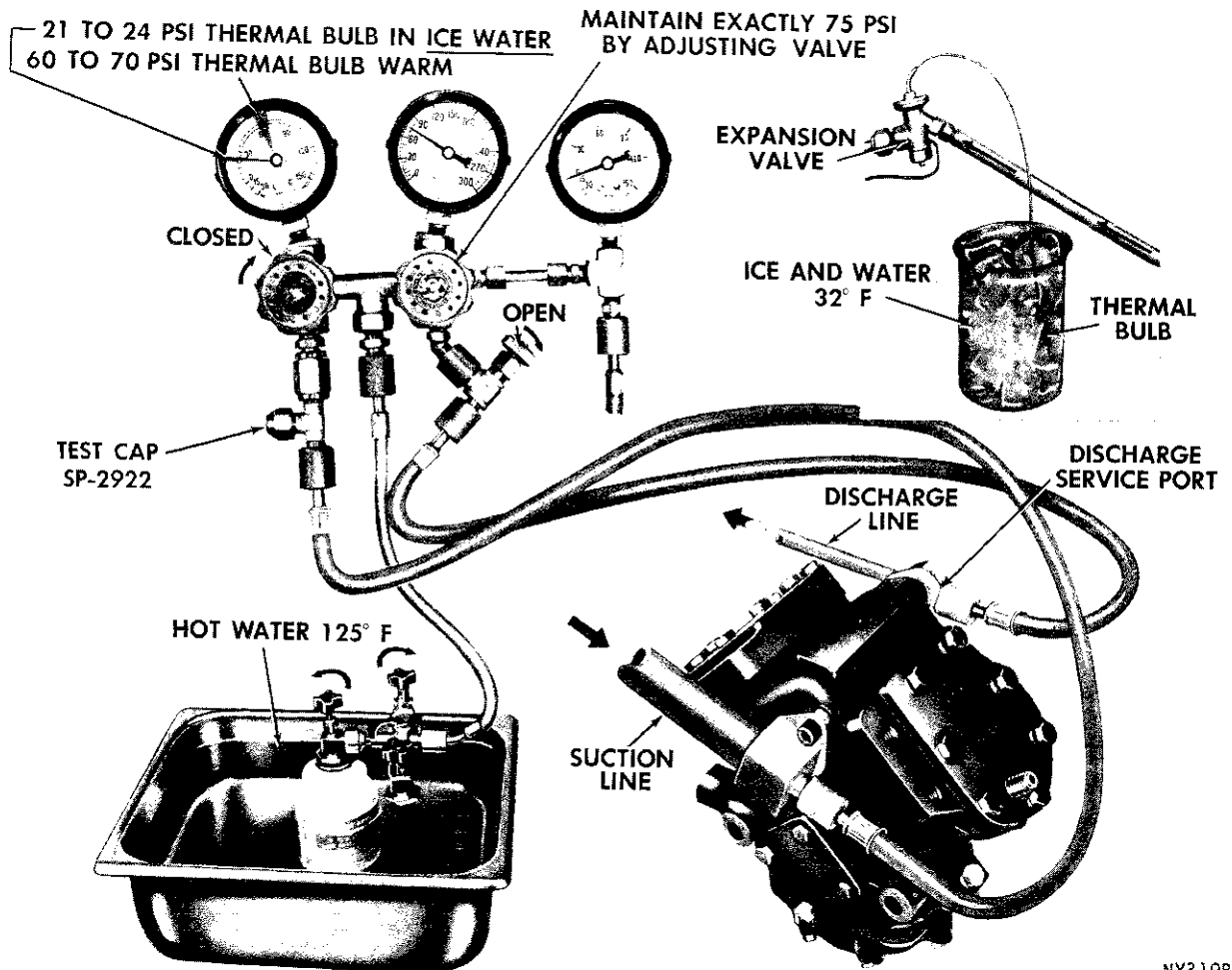


Fig. 19—Expansion Valve Test

**Maximum Flow Test—Thermal Bulb Warm**

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

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

(3) Adjust the right-hand gauge set manifold valve to maintain **exactly 75 psi** on the discharge gauge.

(4) The suction gauge should register 60 to 70 psi for the front and rear units, when pressure registered at the discharge gauge is maintained at exactly 75 psi. An expansion valve that passes this test is performing up to specifications for maximum flow. Next test for "minimum flow."

**Minimum Flow Test—  
Thermal Bulb at 32° F**

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

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

(3) Adjust the right gauge valve to maintain exact-

ly 75 psi as registered at the discharge pressure gauge.

(4) The suction gauge should register 21 to 24 psi when discharge pressure is maintained at **exactly 75 psi**.

**Test Results and Corrections**

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

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

Since the system is without refrigerant, it is a good practice to remove the expansion valve inlet screen, clean it if necessary and reinstall it before charging the system. Clean the thermal bulb, the thermal bulb well and the brass thermal bulb wedging strips. Wedge the bulb into its well so that the brass strips wedge the bulb against the suction line. This fit must be mechanically tight and all surfaces clean to insure good thermal contact.

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

**SERVICE PROCEDURES****SAFETY PRECAUTIONS**

The refrigerant used in all 1965 air-conditioning installations is Refrigerant 12. It is transparent and colorless in both the liquid and vapor state. Since it has a boiling point of **21.7 degrees F. below zero**, it will be a vapor at all normal temperatures and pressures. It is a safe refrigerant. The following precautions, however, must be observed when handling Refrigerant 12.

**CAUTION: Wear safety goggles Tool C-3335 when servicing the refrigeration system. Refrigerant 12 evaporates so rapidly at normal atmospheric pressures and temperatures that it tends to freeze anything it contacts. For this reason, extreme care must be taken to prevent any liquid refrigerant from contacting the skin and especially the eyes.**

**Always wear safety goggles (Tool C-3335) when servicing the refrigeration part of the air-conditioning system. Keep a bottle of sterile mineral oil and a weak solution of boric acid handy when working on the refrigeration system. Should any liquid refrigerant get into the eyes, use a few drops of mineral oil to wash them out. Refrigerant 12 is rapidly absorbed by the oil. Next, wash the eyes with the**

**weak solution of boric acid. Call your doctor immediately even though irritation has ceased after first aid treatment.**

**NOTE: Do not heat Refrigerant 12 above 125 degrees F. In most instances, moderate heat is required to bring the pressure of the refrigerant in its container above the pressure of the system when charging or adding refrigerant. A bucket or large pan of hot water not over 125 degrees F. is all the heat required for this purpose.**

**Keep Refrigerant 12 containers upright when charging the system.**

**Do not permit liquid refrigerant to touch bright metal parts.**

**HANDLING TUBING AND FITTINGS**

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system.

Use a suitable tube bender (Tool C-3362) when bending the refrigerant lines to avoid kinking. Never attempt to rebend formed lines to fit. Use the correct line for the installation you are servicing.

Dirt and moisture can enter the system when it is

opened for repair or replacement of lines or components. The following precautions must be observed.

The system **must be completely discharged** before opening any fitting or connection in the refrigeration system.

A good rule for the flexible hose lines is keep the radius of all bends at least 10 times the diameter of the hose. The flexible hose lines should be routed so that they are at least 3 inches from the exhaust manifold.

"O" rings and fittings must be in good condition. The slightest burr or foreign material may cause a leak. "O" rings and fittings must be coated with refrigerant oil to allow the connections to seat squarely and to be tightened evenly to the proper torque. Fittings which are not oiled with refrigerant oil are almost sure to leak (Fig. 20).

The use of the proper wrenches (Tools C-3358 and C-3363) when making connections is very important. Improper wrenches or improper use of wrenches can damage the fittings. **Always use two wrenches** when loosening or tightening the tube fittings to prevent distorting of lines and components.

Cap or plug all lines and fittings as soon as they are opened to prevent the entrance of dirt and moisture. All lines and components in parts stock should be capped or sealed until they are ready to be used.

**Only refrigerant oil** should be used in the system or on the fittings and lines.

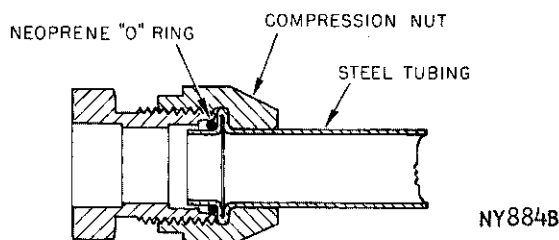
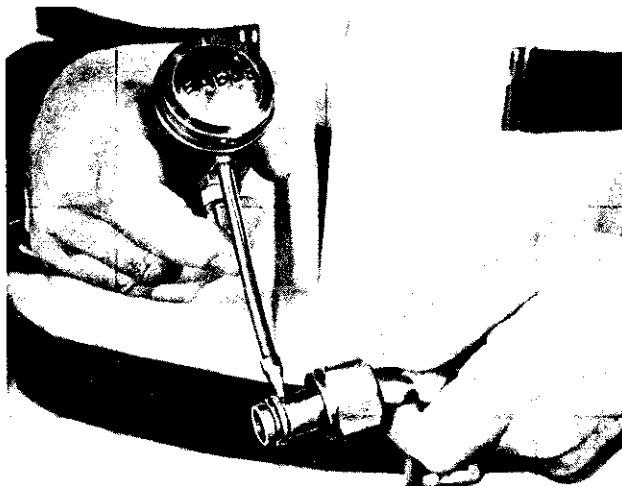


Fig. 20—Lubricate with Refrigerant Oil

## COMPRESSOR DRIVE BELT ADJUSTMENT

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

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

If the deflection method is used, deflection should be  $\frac{3}{8}$  inch at the mid-point under a 5-pound load.

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

(3) On all new-belt installations, new-belt tension specifications should be used when the belt is first installed to obtain the proper tension. Thereafter, these replacement belts should be serviced according to the above procedure. Always replace belts in pairs, otherwise the old belt will have insufficient tension and the load will be primarily on the new belt. The torque method of adjusting new belts is preferred. Proper tension for new belts is 60 foot-pounds for all models.

(4) If the deflection method is used, deflection at mid-point should be  $\frac{1}{4}$  inch for all models.

## ANTIFREEZE RECOMMENDATIONS

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

## RADIATOR PRESSURE CAP REQUIREMENTS

It is absolutely necessary for the 1965 air-conditioned vehicles to be equipped with a 15 to 16 psi radiator cap.

## VACUUM CONTROL SYSTEM ADJUSTMENTS AND TESTS

### Heater Bypass Door Adjustment

Press the "DEFROST" or "HEAT" button. The bypass door should be fully closed and the vacuum actuator should move the over-center lever into a straight line with the pivot screw. To adjust the over-center linkage, loosen the pivot lever screw (Fig. 21). Slide the pivot and screw in its slot as you push the actuator rod rearward to close the by-pass door completely. Hold the actuator rod and tighten the pivot screw to maintain the adjustment.

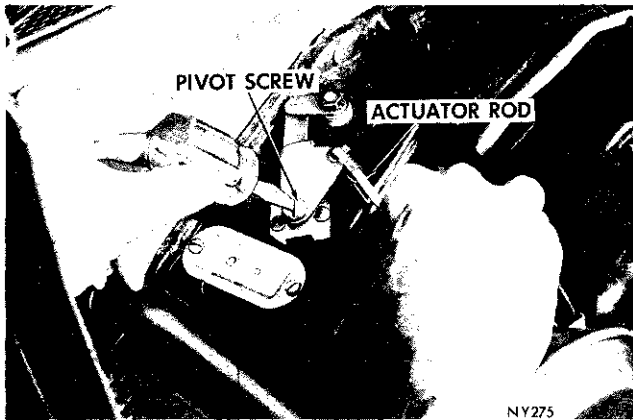


Fig. 21—Heater By-Pass Door Adjustment

**Recirculation and Fresh Air Door Linkages**

Inspect and correct any binding of the recirculating door over-center lever, hinges and fresh air door connecting rod. To adjust the fresh air door connecting rod, remove the cowl inlet grille and push the "FRESH COOL" button in. The fresh air door will open, and the connecting rod (Fig. 22) is then readily accessible.

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

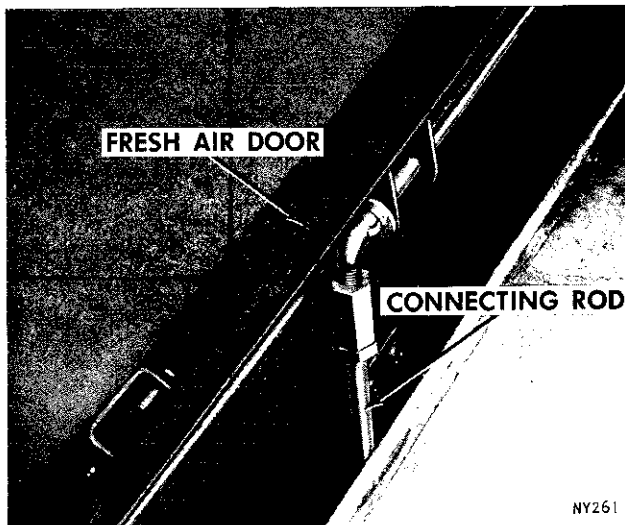


Fig. 22—Fresh Air Door Connecting Rod

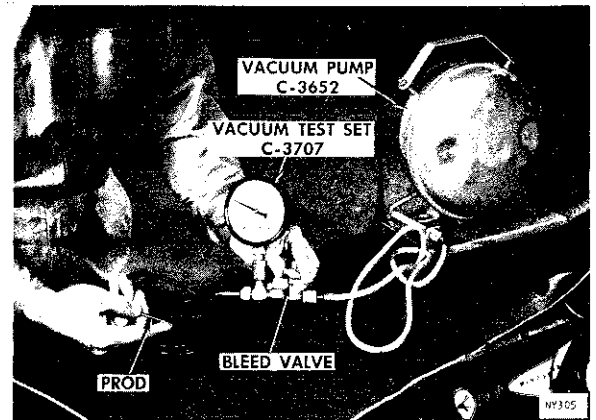


Fig. 23—Adjust Vacuum Test Bleed Valve

**Vacuum Control System Test**

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

Start the vacuum pump (Tool C-3652) and connect to the vacuum test set (Tool C-3707). Adjust the bleed valve on the test set to obtain exactly 8 inches of vacuum, with a finger blocking the prod on the end of the test hose (Fig. 23).

It is absolutely essential that the bleed valve be adjusted so the vacuum gauge pointer will return to exactly 8 inches when the prod is covered by a finger.

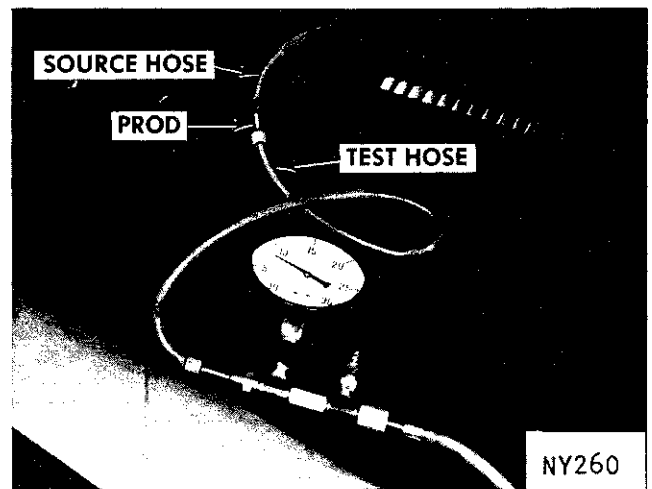


Fig. 24—Push Button Vacuum Test

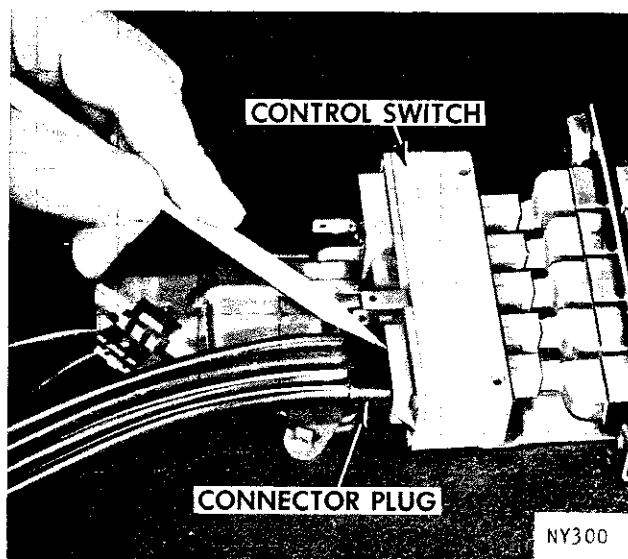


Fig. 25—Connector Plug Installed

Otherwise a false reading will be obtained when the control circuit is tested.

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

Disconnect the engine vacuum source hose (Fig. 24) at the plastic junction connector under the instrument panel, and insert the vacuum tester hose prod into the source hose leading to the control switch.

Start the test by pushing the "H" or heat button. The vacuum tester gauge needle will drop until the actuator has operated, and then will return to 8 inches. Note how much the vacuum drops below 8

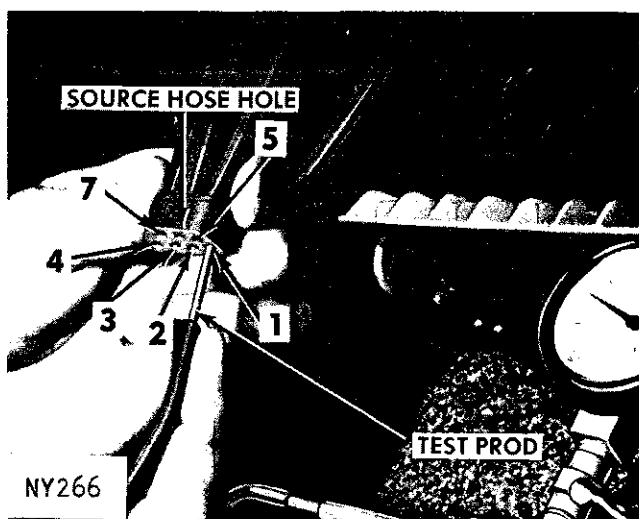


Fig. 26—Vacuum Tube Assembly Test

inches. Continue to push buttons; "OFF," "MAX. COOL," "FRESH COOL," "DEFROST" and "HEAT" allowing time for actuators to operate after each button is pushed, and note the vacuum drop below 8 inches after each operation. The maximum allowable vacuum drop below 8 inches after each operation is  $\frac{3}{4}$  inch.

If the vacuum drop is more than  $\frac{3}{4}$  inch, first recheck the tester for reading exactly 8 inches. If correct, inspect the fit of the 7-hole hose connector plug on the control switch (Fig. 25). This plug must be positioned all the way on the 7 prods on the control switch.

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

#### Retest

If vacuum drop is now within limits, proceed with the over-all performance test. If the vacuum drop is still in excess of  $\frac{3}{4}$  inch, remove the connector plug from the switch. Insert the vacuum test prod alternately in each of the connector holes except the source hose connector hole (Fig. 26). Note the amount of vacuum drop below 8 inches after each actuator has operated. If the vacuum test gauge comes back to 8 inches at each of the 6 holes, the hoses and actuators aren't leaking. The control switch is faulty and must be replaced. If excessive vacuum drop shows up at one or more holes in the connector block, isolate the faulty hose or actuator.

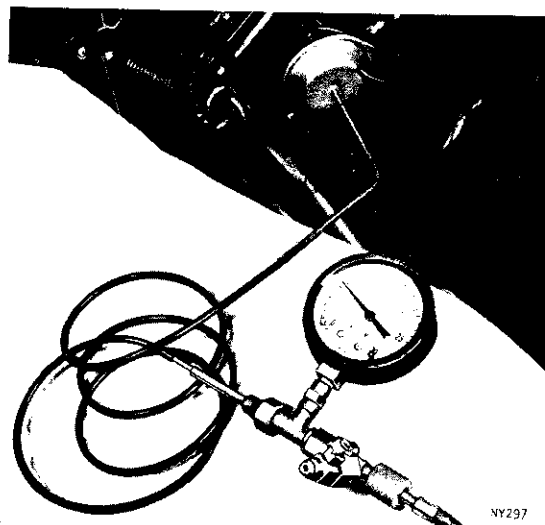


Fig. 27—Vacuum Actuator Test

If the vacuum drop occurs at numbers 5 or 7 holes, first check the tee connectors under the instrument panel that tie numbers 5 and 7 hoses to the bypass door and deflector hoses. If the tee connections are all right, inspect the hose connections to the actuator involved. Then test whether the actuator or hose is at fault; use the test hose on the actuator involved (Fig. 27).

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

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

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**SERVICING THE HELI-GRIP CLUTCH**

The Heli-Grip Clutch (Fig. 28) uses a stationary electromagnetic clutch field assembly. The electromagnet clutch field assembly does not rotate, eliminating the need for collector rings and brushes.

**TESTING THE CLUTCH FIELD ASSEMBLY**

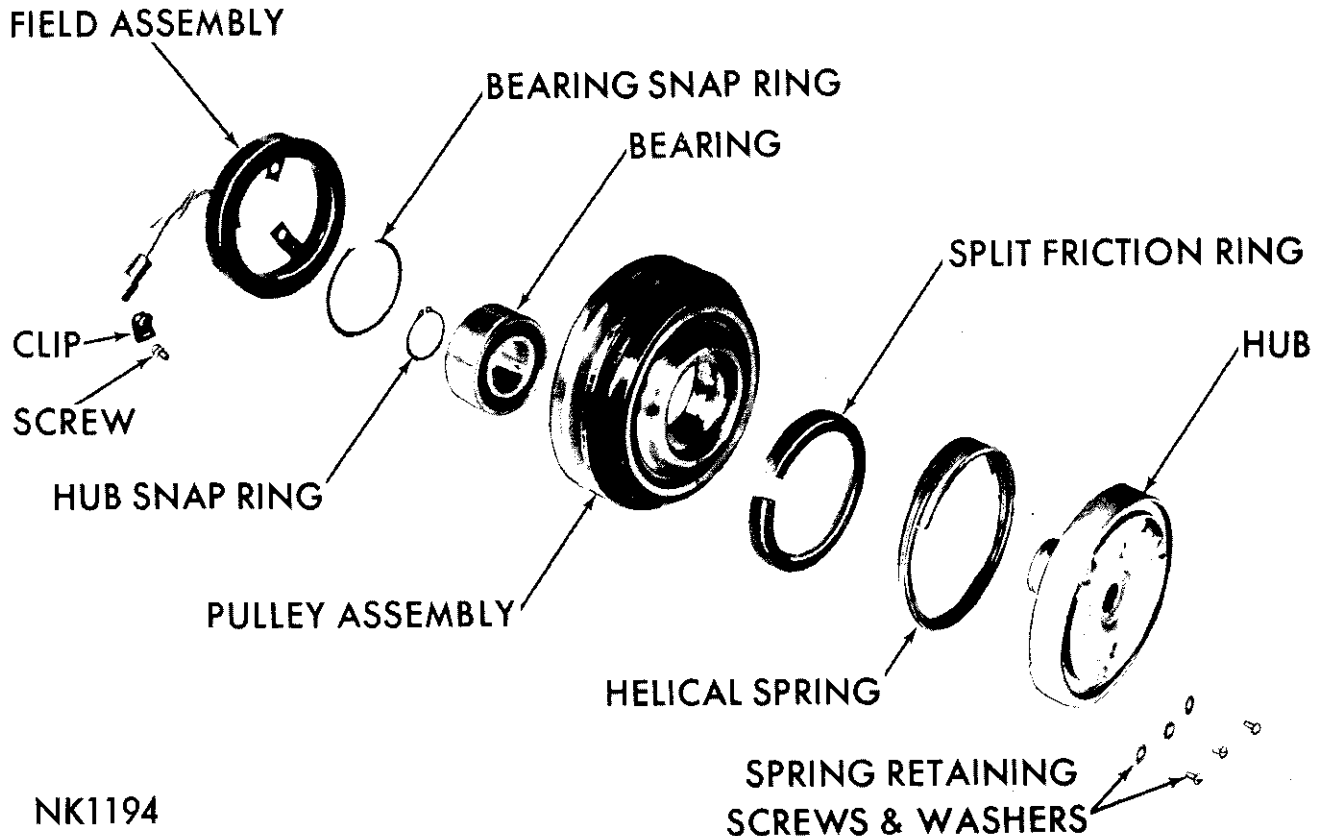
To test the coil for a short or open circuit, connect an ammeter (0-10 ampere scale) in series with a fully charged 12 volt battery and the field coil lead. The current draw at 12 volts should be 2.7 to 3.1 amperes at 68° temperature.

**Removal**

- (1) Loosen and remove the belts. Disconnect the clutch field coil lead wire.
- (2) Remove the special locking bolt and the washer from the compressor crankshaft at the front center of the clutch.
- (3) Insert a 5/8"—11 x 2 1/2" cap screw into the threaded portion of the hub assembly.
- (4) Support the clutch with one hand, then tighten the cap screw until the clutch is removed.
- (5) Remove the three hexagon head screws attaching the clutch field coil assembly and lift off the assembly.

**Disassembly**

- (1) Remove the small snap ring from the drive hub with Tool C-3128 or equivalent.
- (2) Place the pulley assembly on an arbor press,



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Fig. 28—Heli-Grip Clutch

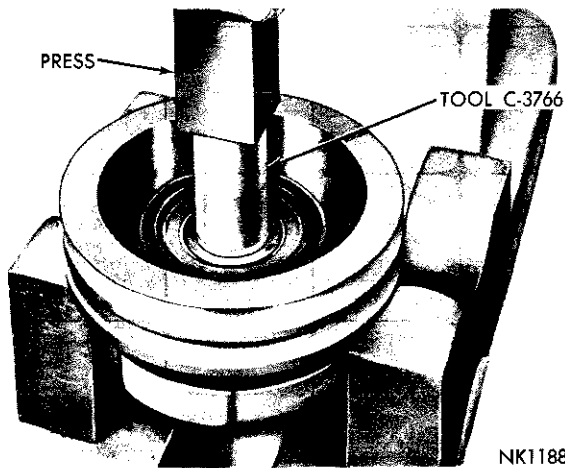


Fig. 29—Removing Hub Assembly

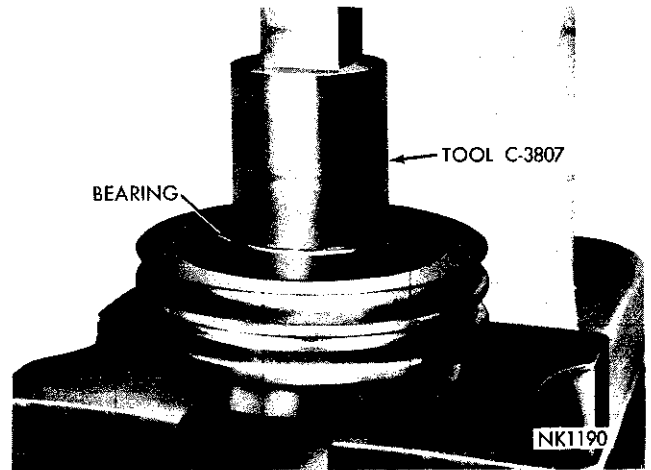


Fig. 31—Installing a New Bearing in the Pulley Assembly

with the hub down and free to turn. With a suitable driver centered on the hub, press out the hub from the pulley assembly (See Fig. 29).

(3) Remove the three spring retaining screws and washers. Use a thin screwdriver to pry out the tanged end of the helical spring and turn the helical spring counter-clockwise to remove from the hub.

(4) Remove the bearing snap ring from the pulley assembly.

(5) Place the pulley assembly on an arbor press, with the pulley side down and the bearing hub centered on Tool C-3835. Install Tool SP-3496 on the inner race of the bearing, and press the bearing from the pulley assembly (See Fig. 30).

**NOTE:** Remove the bearing only if it is rough or dry.

**Assembly**

(1) Install the pulley assembly with the pulley side

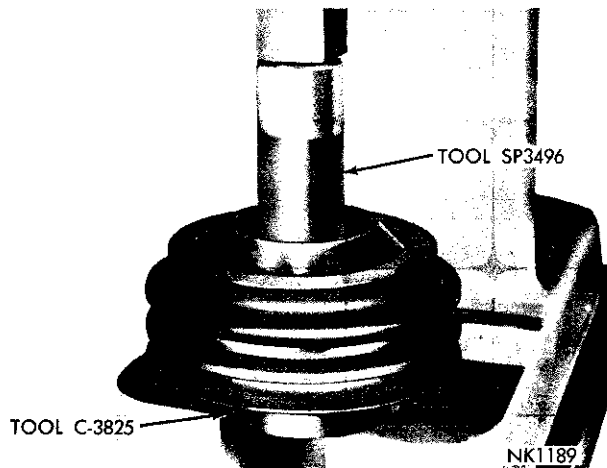


Fig. 30—Removing Bearing from Pulley Assembly

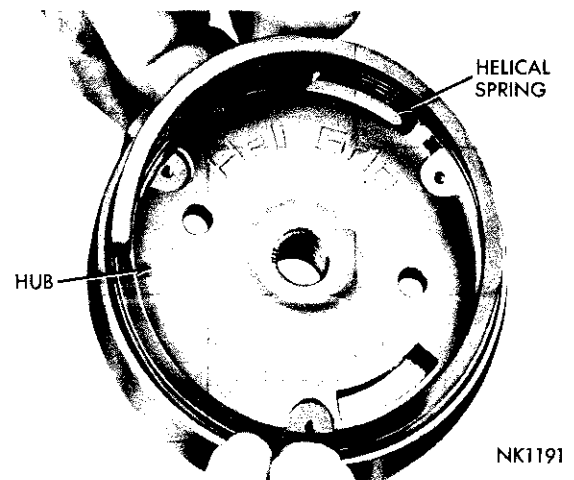


Fig. 32—Installing Helical Spring

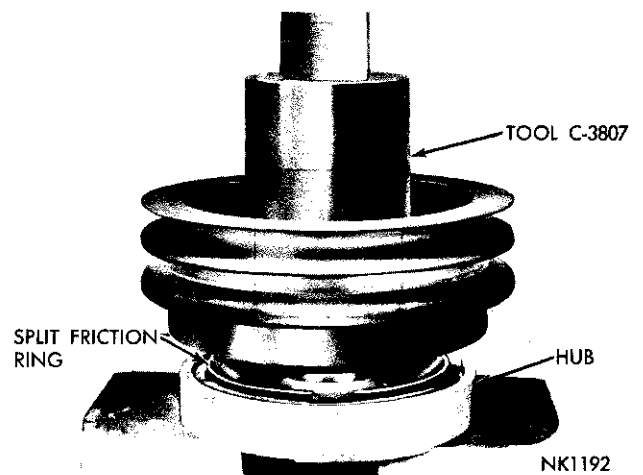


Fig. 33—Installing Hub Assembly



up on an arbor press and insert a new bearing (if necessary) into the pulley bore. Place Tool C-3807 against the bearing and press the bearing into position. (Fig. 31).

(2) Start the flat end of the helical spring into the slot in the face of the hub and turn the spring in with a clockwise motion until the tang is positioned in the hub. Install the three retaining washers and screws; tighten securely (Fig. 32).

(3) Place the hub with the face down in an arbor press; install the split friction ring in the spring with the bevel side up.

(4) Start the drive hub into the inner bearing race; place Tool C-3807 against the bearing and press the hub into position with an arbor press (See Fig. 33).

(5) Install the bearing retaining snap ring and hub retaining snap ring.

### Installation

(1) Install the clutch field coil assembly on the base of the compressor bearing housing. Make sure the coil assembly is positioned so that the lead wire points to the left of the compressor as viewed from

the front. Install the three mounting screws and tighten to 17 inch pounds.

(2) Insert the woodruff key in the crankshaft.

(3) Insert the clutch assembly onto the crankshaft.

(4) Install the washer and a new self-locking bolt, and tighten to 2 foot-pounds.

(5) Connect the field lead wire and retainer clip.

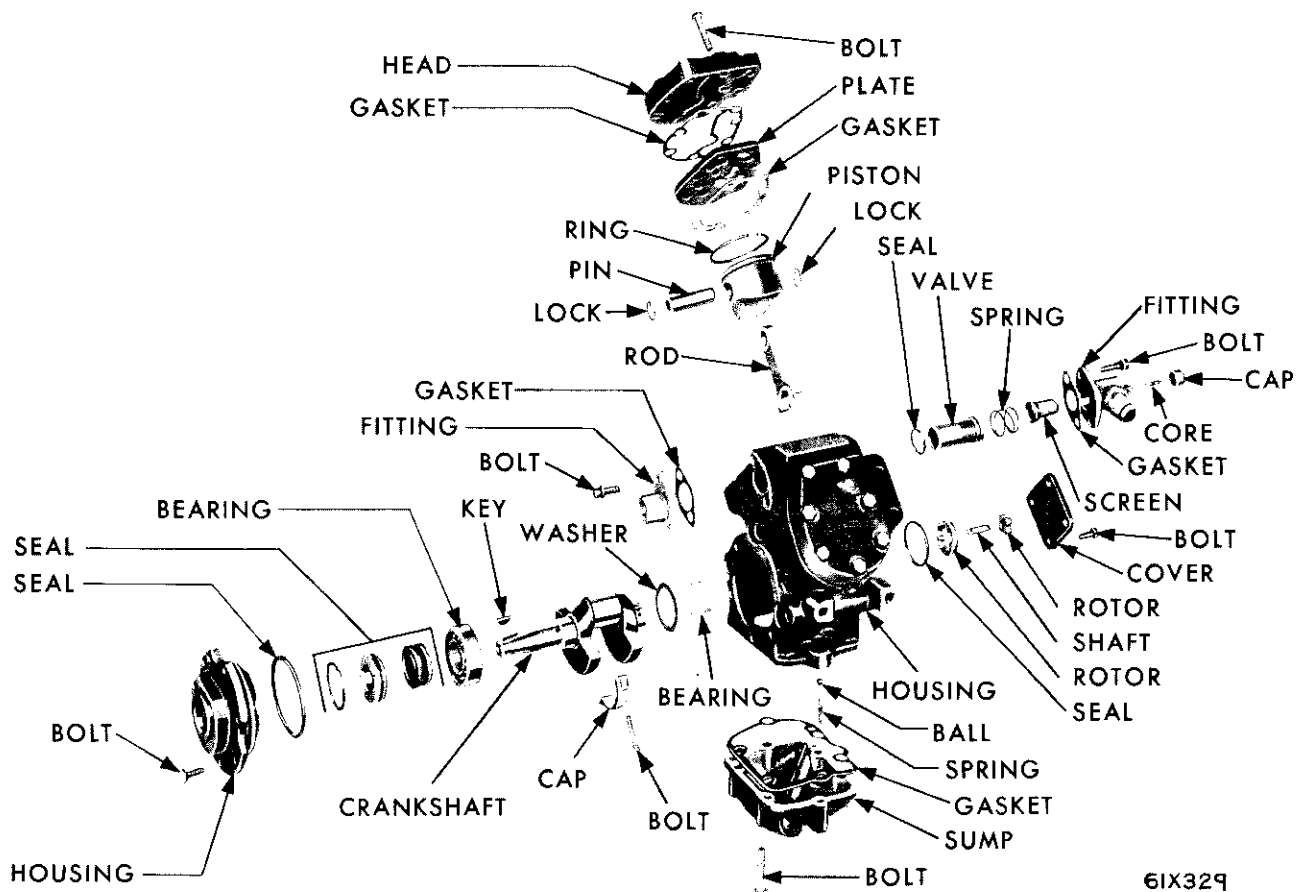
(6) Install the belts and tighten to the specified tension in "Cooling Section" of this manual.

### SERVICING THE COMPRESSOR

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

Figure 34 is a disassembled view of the compressor with the nomenclature of the parts. Some parts are serviced individually and some are serviced in packages which include two or more service parts. Refer to the parts book for this information.

**CAUTION:** The refrigerant oil used in the compressor is carried through the entire system by the



61X329

Fig. 34—Compressor Disassembled

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

Complete disassembly and assembly of the compressor must be performed with the compressor removed from the vehicle. On some models however, the valve plate and crankshaft gas seal assemblies can be repaired with the compressor installed on the vehicle.

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

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

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

**CAUTION:** Before reassembly of any unit, all contact surfaces must be liberally coated with clean refrigerant oil. Refrigerant oil must be kept in a sealed container until ready for use to prevent entrance of moisture and dirt. Never use engine oil as a substitute for refrigerant oil.

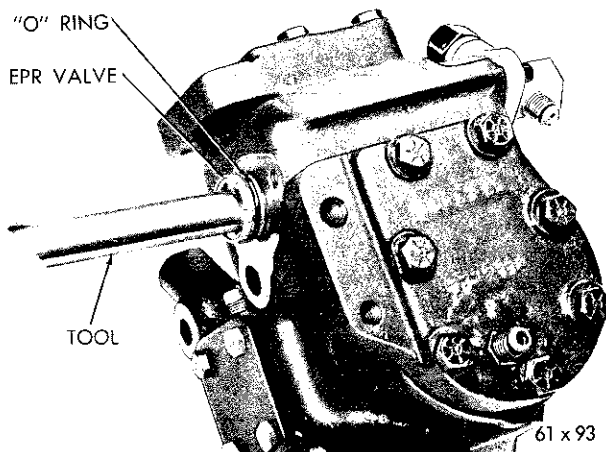


Fig. 35—Removing the EPR Valve

## EPR VALVE

### Removal

(1) Remove the two "EPR" Valve suction line fitting bolts, the fitting which also contains the compressor suction screen, spring, and the gasket.

(2) Remove the "EPR" Valve and "O" ring from the compressor using Tool C-3822, by rotating the valve counterclockwise slightly, as shown in Figure 35.

### Installation

(1) Install the "O" ring on the "EPR" Valve.

(2) Lubricate the "O" ring with refrigerant oil and install the "EPR" Valve in the compressor with Tool C-3822 and rotating the valve counterclockwise.

(3) Install the compressor suction screen in the "EPR" Valve suction line fitting.

(4) Install the suction line fitting gasket, spring, fitting, and attaching bolts.

## COMPRESSOR

### Removal

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

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

(3) Disconnect the suction line from the suction muffler and the discharge line from the muffler fitting.

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

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

(5) Loosen and remove the compressor pulley belts.

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

### Installation

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

(2) Install the compressor pulley belts.

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

(4) Remove the caps or plugs and connect the suction line to the suction muffler and connect discharge line to the muffler fitting.

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

**NOTE:** After the compressor is installed, it is imperative that the oil level in the compressor be adjusted to the level registered before removing the compressor. If the original oil level is not known, adjust the level to 2 inches measured through the oil filler opening.

### CYLINDER HEAD AND VALVE PLATE ASSEMBLY

#### Removal

(1) Remove the cylinder head bolts, the head and valve plate assembly. If the plate does not separate from the head, tap the removing lip on the valve plate lightly with a plastic hammer (see Fig. 36). Do not pry apart.

#### Inspection

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

Use care to remove all shreds of old gasket from plate, block and head surfaces. Clean attaching stud holes in the block. If the valve plate or cylinder head

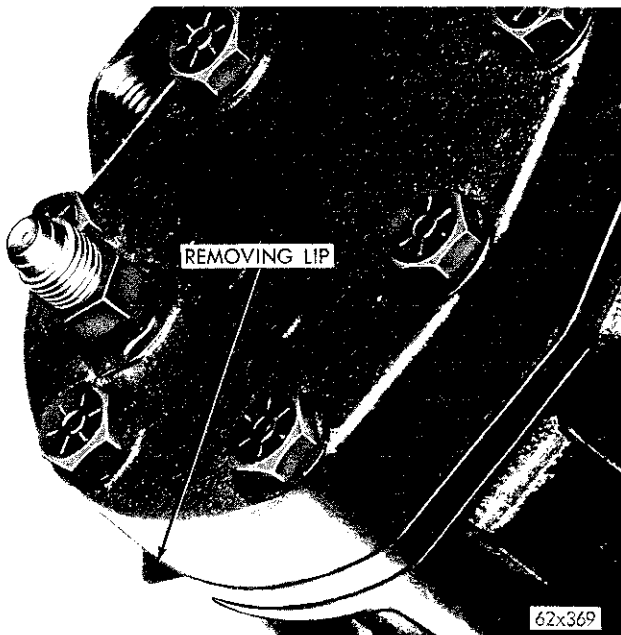


Fig. 36—Valve Plate and Head Removing Lip

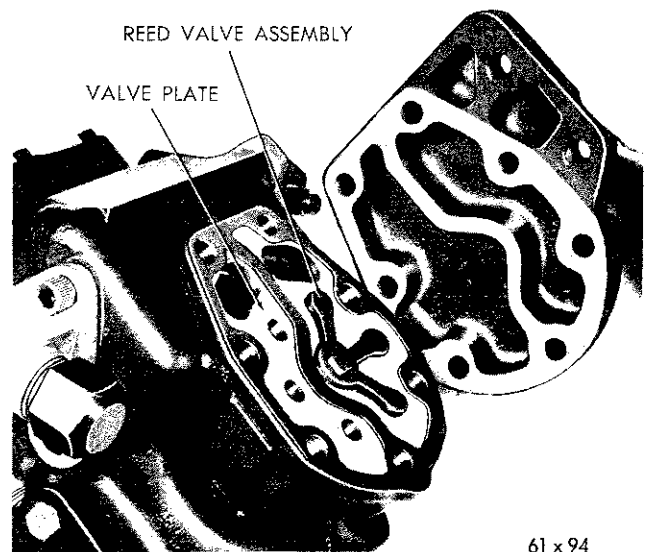


Fig. 37—Valve Plate—Installed Position

is damaged, replace, using a complete compressor valve plate replacement package.

#### Installation

(1) The valve plate and the cylinder head must be assembled with the reed assembly, as shown in Figure 37.

(2) Dip the gaskets in clean refrigerant oil. Using the pilot studs as a guide, install the valve plate gasket, valve plate, cylinder head gasket and cylinder head, as shown in Fig. 38.

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

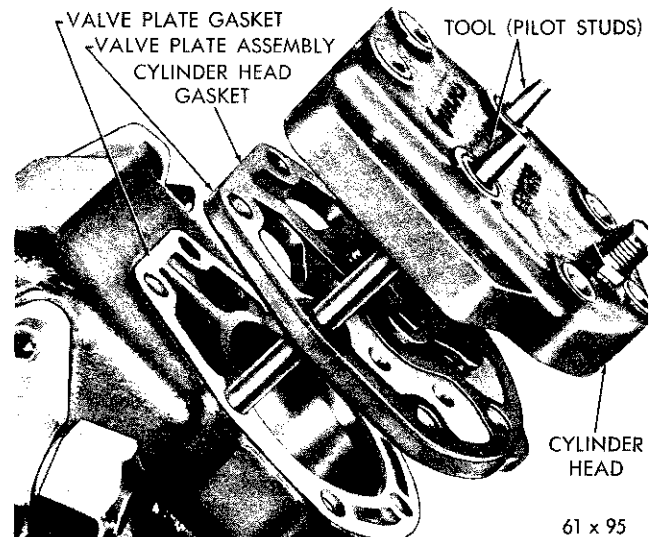


Fig. 38—Installing the Valve Plate and the Cylinder Head

**PISTON AND CONNECTING ROD**

**Removal**

- (1) Drain the oil from the compressor.
- (2) Remove the sump attaching bolts.
- (3) Separate the sump from the case by tapping with a plastic hammer being careful not to distort the oil pressure relief spring.
- (4) Remove the oil relief spring and (rubber) ball from the crankcase.
- (5) Remove the cylinder heads and the valve plates.

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

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

**Inspection**

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

**Installation**

- (1) Remove the bearing cap and install the piston in the bore. Use piston ring compressor to prevent ring damage.
- (2) Install the bearing caps, and tighten screws 52 to 56 inch-pounds torque. Be sure each cap is installed in its original position.
- (3) Install the valve plates and the cylinder heads.
- (4) Turn the compressor upside down. Install the pilot studs, gasket, oil pressure relief ball and spring.
- (5) Install the sump over the pilot studs (Fig. 39), making sure that the oil pressure relief spring depresses uniformly as the sump is lowered on the case.
- (6) Tighten the sump bolts finger tight to prevent spring misalignment, then tighten 15 to 19 foot-

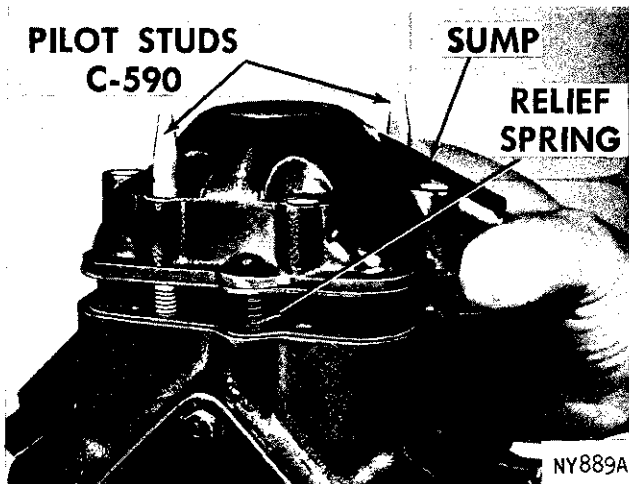


Fig. 39—Installing the Sump

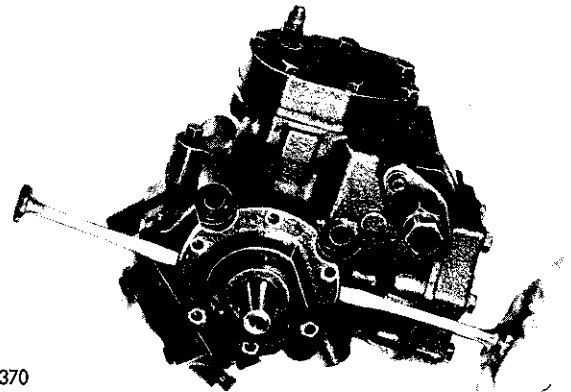


Fig. 40—Removing the Crankshaft Bearing Housing

pounds torque.

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

**CRANKSHAFT BEARING HOUSING AND GAS SEAL**

**Removal**

- (1) Remove the crankshaft housing seal bolts.
- (2) Remove the bearing housing from the case, using two screwdrivers inserted in the slots provided to pry the housing from the case. (See Fig. 40).
- (3) Remove the crankshaft bearing housing seal face plate from the bearing housing. This is part of the gas seal replacement package and must be replaced when the gas seal assembly is replaced.
- (4) Remove the gas seal from the crankshaft.

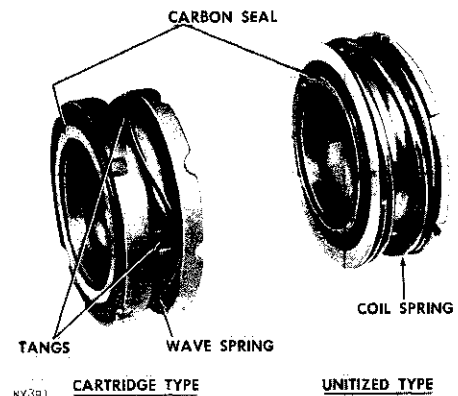


Fig. 41—Gas Seal Identification

### Installation

The crankshaft gas seal replacement package consists of the crankshaft gas seal assembly and the crankshaft bearing housing seal face plate. Two types of crankshaft seals are supplied for service, as shown in Fig. 41. If the replacement package contains the cartridge-type seal, follow the entire installation procedure given below. If the replacement package contains the unitized-type seals, steps 1, 2, and 4 will not apply.

(1) Before installing the cartridge-type gas seal assembly, inspect the assembly to make sure that tangs index in slots of mating part. This will insure the proper spring action. The carbon seal must be assembled as shown in Fig. 41.

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

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

(4) When the seal bottoms against the crankshaft bearing, inspect the indexing of tangs again by pressing down with thumbs to see if it has the proper spring action. (Refer to Fig. 42).

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

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

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

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

## CRANKSHAFT AND BALL BEARING

### Removal

- (1) Remove the cylinder heads and the valve plates.
- (2) Remove the pistons and connecting rods.
- (3) Remove the crankshaft bearing housing and gas seal.

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

(4) Remove the crankshaft and thrust washer from the crankcase.

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

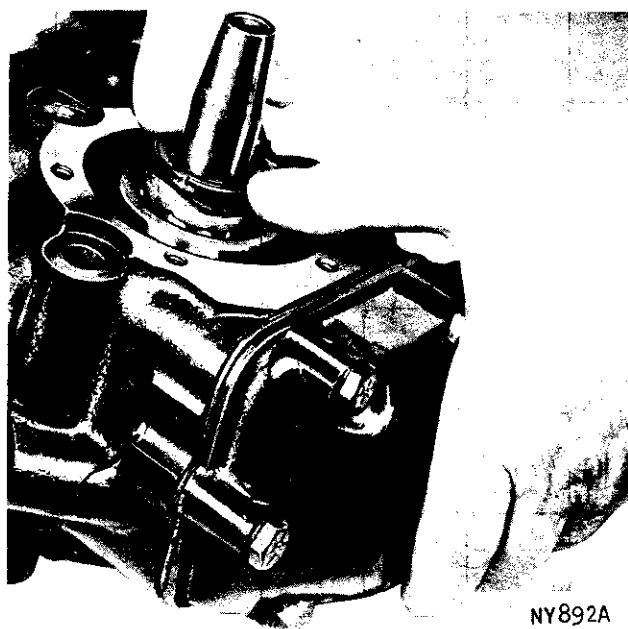


Fig. 42—Inspect the Indexing of Tangs

### Inspection

Clean and inspect all the parts. Replace the questionable parts as required. If the crankshaft ball bearing is in good condition and clean, protect it against entry of dirt and re-use it. If the bearing is serviceable but dirty, or there is evidence of dirt, clean it carefully with mineral spirits and shake dry. Saturate the bearing with clean refrigerant oil and assemble immediately. If a new bearing is to be installed, leave it wrapped in its protective package until ready for installing.

**NOTE:** Do not wash a new bearing assembly before installation.

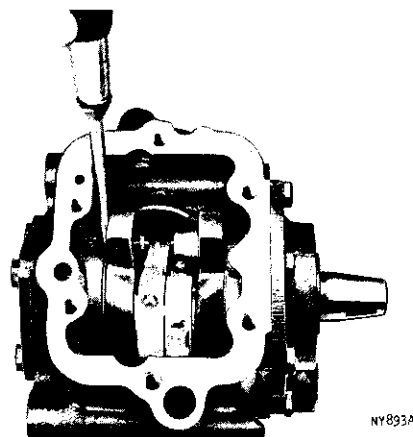


Fig. 43—Measuring the Crankshaft Axial Movement

**Installation**

- (1) Press the crankshaft ball bearing on the crankshaft using a sleeve which bears on the inner race only.
- (2) Install the crankshaft, making sure that the thrust washer is on the rear bearing journal before placing the crankshaft in the crankcase.
- (3) Rotate the crankshaft to engage the oil pump shaft in the crankshaft slot.
- (4) Install the gas seal and crankshaft bearing housing. Use a suitable tool, as shown in Fig. 43 to assure the free axial movement.
- (5) Install the pistons and connecting rods.
- (6) After the pistons and connecting rods are installed, turn the crankshaft to check freeness. The shaft should turn without binding.
- (7) Install the oil sump, valve plates and the cylinder heads.

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

**EXPANSION VALVE**

The expansion valve is a factory-calibrated trouble free unit. It should not be removed or replaced unless a complete test has proved it to be faulty. It is recommended that Test 8, "Expansion Valve Test," be performed before replacing the expansion valve.

**Removal**

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

- (1) Remove the equalizer line from the evaporator suction line fitting.
- (2) Disconnect the valve from the  $\frac{3}{8}$  inch inlet line and from the  $\frac{1}{2}$  inch outlet line. Use two wrenches to loosen each of these connections.

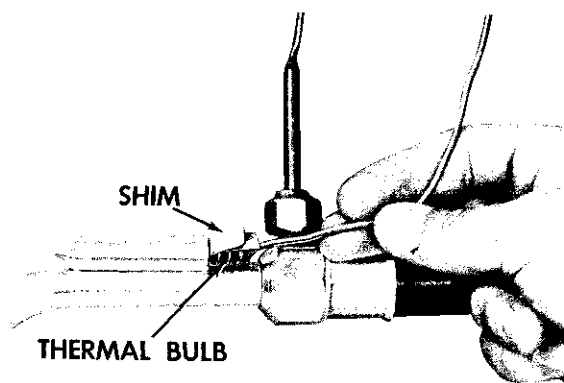


Fig. 44—Thermal Bulb Installed Typical

**OIL PUMP****Removal**

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

- (1) Remove the oil pump cover plate and the oil seal.
- (2) Remove the drive shaft and the rotors.

**Installation**

- (1) Install the oil pump drive shaft by rotating the shaft until the tang end engages in the crankshaft slot.
- (2) Install the inner rotor on the drive shaft, engaging the drive.
- (3) Install the outer rotor, and rotate it until it will slide forward over the inner rotor cams. Turn the compressor crankshaft with the oil pump in this position to determine that rotors do not bind.
- (4) Install the oil pump cover plate and the oil seal.
- (5) Tighten the bolts 10 to 13 foot-pounds torque.

- (3) Remove the grommet retainer and the rubber grommet from the evaporator engine-side housing. Carefully pull the thermal bulb (Fig. 44) and the thermal bulb wedging shims from the well located inside the evaporator housing.

**Installation**

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

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

- (1) Install the thermal bulb in its well, using brass wedging strips to insure a tight mechanical fit.
- (2) Lubricate all expansion valve and line fittings with clean refrigerant oil. Install the expansion valve,

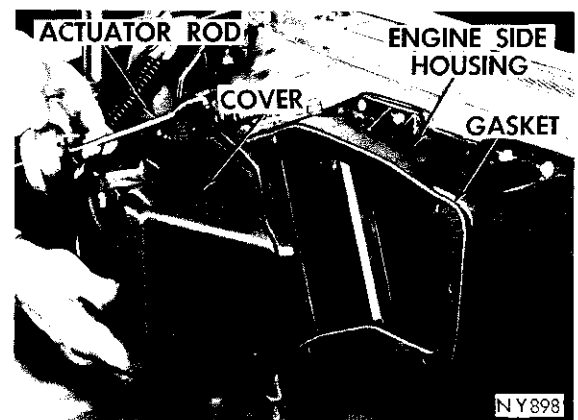


Fig. 45—Removing the Heater Core

using two wrenches to prevent rotation and twisting of the lines.

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

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

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

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

### HEATER CORE

The heater core is located behind a **separate cover** attached to the evaporator engine-side housing. The core is held in position in its cover by two plastic rivets. The heater core and cover are removed and installed as an assembly. (Refer to Fig. 45).

#### Removal

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

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

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

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

#### Installation

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

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

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

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

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

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

### EVAPORATOR ASSEMBLY

The evaporator assembly includes the evaporator



Fig. 46—Evaporator Installation Typical

core, the cast evaporator housing with fresh-air and recirculating doors, and the evaporator engine-side housing with the heater by-pass door. These sub-assemblies are built up before installation on the car to form a complete unitized evaporator assembly. The unitized evaporator assembly must be removed and installed as a complete assembly. (Refer to Fig. 46).

#### Removal

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

(2) Discharge the refrigerant from the system, and disconnect the expansion valve and the suction line. Cap all refrigerant lines to prevent entrance of dirt and moisture.

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

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

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

### Installation

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

(1) Close the fresh-air door and install the evaporator assembly as shown in Figure 46. Make sure the rear edge of the rain shield is folded upward.

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

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

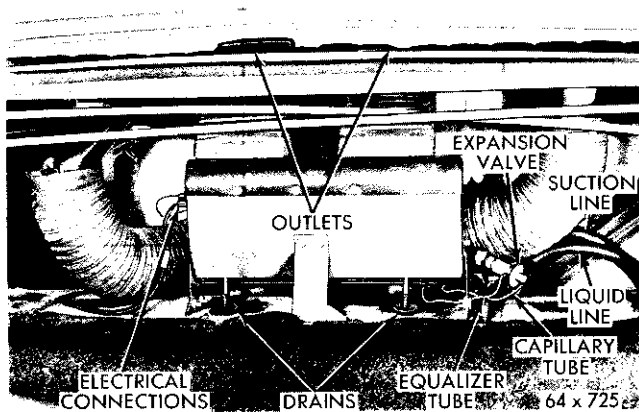


Fig. 47—Evaporator Installed in the Trunk

side housing. Connect the heater hoses.

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

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

### Trunk Unit Removal (Fig. 47)

(1) Discharge the refrigerant from the system.

(2) Remove the rear seat, back rest and insulation blanket to assist in removal of the trunk unit components.

(3) Release the four clamps on the flexible ducts (Fig. 48) and remove the ducts from the evaporator.

(4) Disconnect electrical connections and drains.

(5) Disconnect the suction and discharge lines. Cap all refrigerant lines to prevent dirt and moisture from entering the system.

(6) Remove the mounting bracket to flange bolts (six) and remove the evaporator assembly from the luggage compartment.

### Installation

(1) Position the evaporator assembly in the luggage compartment and install the mounting bracket to flange bolts. The blower motor ground is connected to the left front bolt.

(2) Install the electrical connection and drains.

(3) Use new "O" rings with clean refrigerant oil on connections. Install the suction and discharge lines using two wrenches to prevent rotation and twisting of the lines.

(4) Install the flexible ducts and secure the clamps.

(5) After the evaporator assembly is installed in the vehicle, it will be necessary to sweep the system.

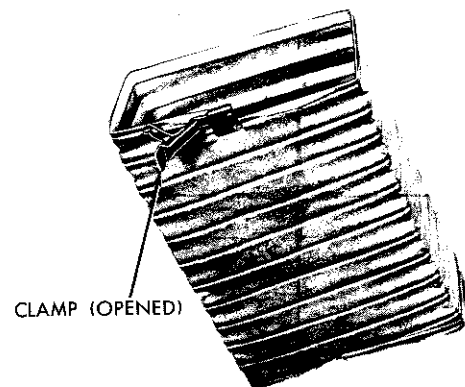


Fig. 48—Outlet Tube and Clamp



Test for leaks, and charge with the proper amount of refrigerant.

**NOTE: An over-all Performance Test should be made after repair or replacement of the evaporator assembly.**

(6) Install the insulation blanket, back rest and back seat.

### BLOWER AND DISTRIBUTOR DUCT

#### Removal

- (1) Disconnect the battery ground cable.
- (2) Disconnect the heater ground wire at the windshield wiper motor mounting bracket and disconnect the blower and clutch circuit wires from the harness connectors.
- (3) Disconnect the vacuum hoses and the actuator rods from each vacuum unit. Remove the hoses from their attaching clips.
- (4) Disconnect the distribution duct damper control cable.
- (5) Remove the temperature control valve capillary from the engine-side housing.
- (6) Remove the three screws attaching the distribution duct to the dash panel (one is located to the left of the recirculating door and to the right of brake pedal bracket; one below the floor outlet at passenger side, and one screw is located at the windshield wiper motor ring link pivot).

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

(7) Remove the housing and the blower by pulling down and out of driver's compartment. Remove the blower, mounting plate and motor (See Fig. 49).

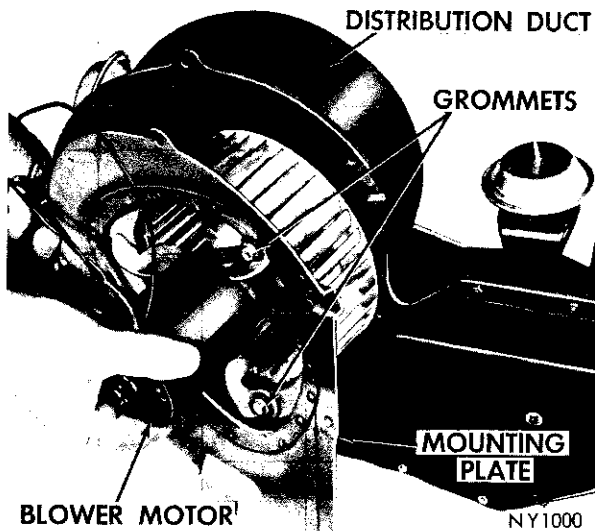


Fig. 49—Removing the Blower Motor

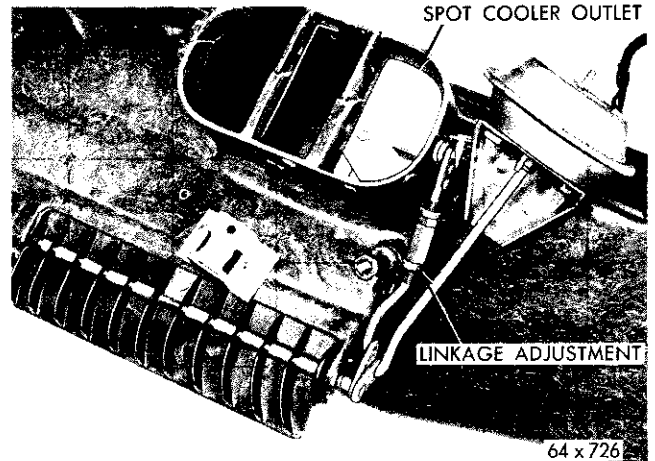


Fig. 50—Right Spot Cooler Outlet

#### Installation

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

- (1) Install the blower motor and mounting plate to the distribution duct. Be sure the blower wheel is free and does not rub.
  - (2) Test the operation of right spot cooler outlet by applying vacuum to actuator away from the rod side. If the linkage is correct, the outlet door will be fully closed, and adjust the linkage as necessary (Fig. 50).
  - (3) Position the housing on the dash panel, making sure the large mounting-plate-to-dash-panel gasket is properly positioned to insure a good seal. Install the three attaching screws.
- CAUTION: There is a spacer at each attaching screw. Be sure these spacers are installed between the distribution duct and the dash panel when installing the housing; otherwise, the housing could be damaged when tightening the screws.**
- (4) Reposition the temperature control valve capillary in the engine-side housing.
  - (5) Connect the vacuum actuator hoses and rods, and install all attaching clips.
  - (6) Connect and adjust the distribution duct damper control cable.
  - (7) Connect the blower and clutch circuit wires. Install the ground wire at the windshield wiper motor bracket.
  - (8) Attach the windshield wiper motor pivot link (if disconnected). Connect the battery ground cable.
  - (9) Test the operation of all controls and actuators.

### REFRIGERANT SERVICE

Use only Refrigerant 12 in the air-conditioning system. Refrigerant 12 is available in bulk tanks or in

sealed 15 ounce cans. The use of canned refrigerant is preferred by most technicians because it provides a very quick and simple means of adding refrigerant or charging the system completely.

Front-end units require 4 lbs. of Refrigerant 12.

Dual installations require a total of 4 lbs. 14 ozs. to 5 lbs. 2 ozs. of Refrigerant 12.

An accurate scale must be used to insure charging the proper amount of refrigerant.

## COMPLETE SYSTEM DISCHARGE AND RECHARGE

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

### DISCHARGE THE SYSTEM

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

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

(3) Start the engine and adjust speed to 800 rpm.

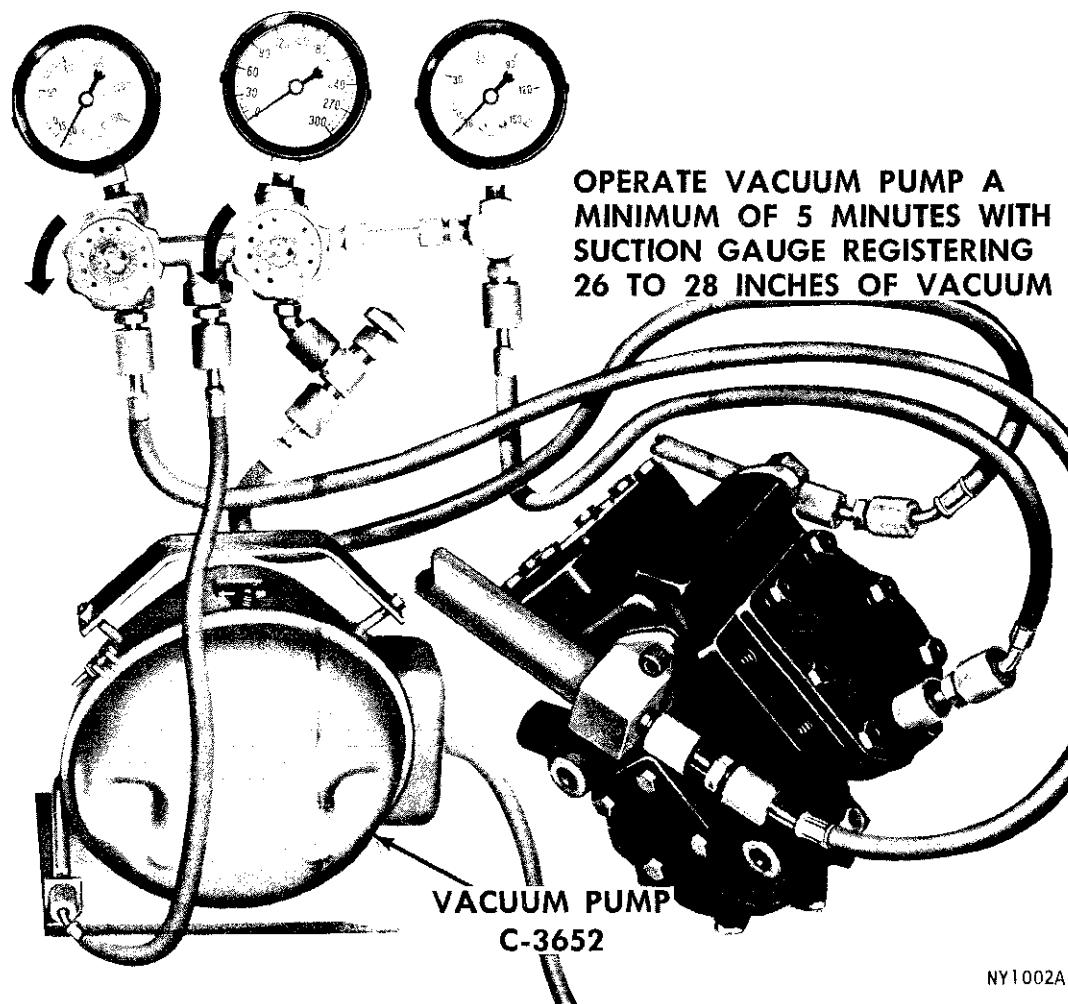


Fig. 51—Evacuating the System

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

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

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

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

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

### SWEEP-TEST CHARGE

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

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

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

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

(4) Operate the engine at 800 rpm car windows open, "FRESH COOL" button pushed in and the blower on high. If working on dual installations, operate both blowers on high speed.

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

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

### TESTING THE SYSTEM FOR LEAKS

The Leak Detector Torch (Tool C-3569) is a propane gas-burning torch used to locate a leak in any part of the refrigeration system. Refrigerant gas drawn into the sampling or "Snifter" tube will cause

the flame to change color in proportion to the size of the leak. A very small leak will produce a flame color varying from yellowish-green to bright green. A large leak will produce a brilliant blue flame.

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

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

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

### TEST PRECAUTIONS

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

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

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

### Remove Sweep-Test Charge

If the system is free of leaks, or after correcting a leak, if no air conditioning components have been removed, add the necessary refrigerant as described under "Correcting the Low Refrigerant Level." If any parts of the refrigerant system were disconnected remove the sweep test charge. Close the refrigerant manifold valve so that any refrigerant remaining in the container is sealed. Remove the long test hose from the refrigerant manifold. Insert the free end of this test hose into an exhaust system outlet. Open the right-hand gauge set manifold valve a fraction of a turn to let the sweep-test charge escape slowly. Allow the system to discharge until the discharge pressure gauge registers zero. Open the left-hand gauge valve to allow any refrigerant trapped in the suction side of the system to escape.

**RECEIVER—DRIER—STRAINER—REPLACEMENT**

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

**EVACUATE THE SYSTEM**

Whenever the system has been opened to atmosphere, it is absolutely essential that the system be swept with refrigerant and evacuated or "vacuumed" to remove all the air and the moisture. If any appreciable amount of air remains in the system when it is charged, the trapped air will concentrate near the top of the condenser and cause abnormally high discharge pressures. Air in the system will reduce the condenser's ability to condense the refrigerant gas

and supply adequate liquid refrigerant to the evaporator.

**To Evacuate the System:**

- (1) Connect the gauge set manifold to the compressor and the long test hose from the gauge set manifold center connection to the vacuum pump (Tool C-3652) as shown in Figure 51.
- (2) Open both gauge set manifold valves and the needle valve.
- (3) Start the vacuum pump and operate until the evaporator suction gauge registers at least 26 inches of vacuum. If the system is tight and the pump in good condition, the vacuum will go as low as 28 inches.
- (4) Allow the vacuum pump to operate with suction gauge registering 26 to 28 inches of vacuum for a minimum of five minutes.
- (5) Close both gauge set manifold valves, turn off the vacuum pump and remove the test hose from the vacuum pump. Leave the gauge set manifold con-

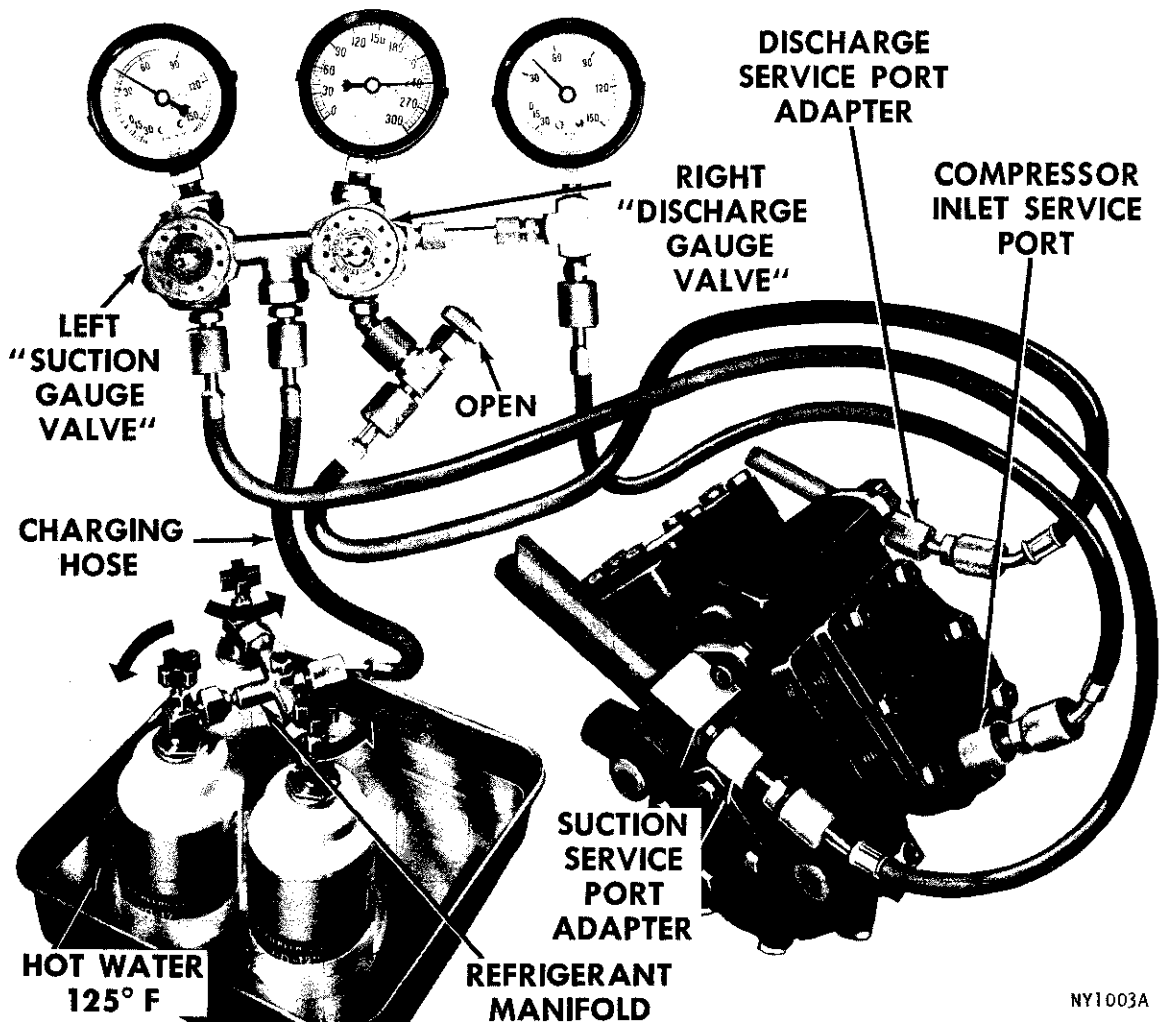


Fig. 52—Complete System Charging

nected to the compressor. Charge the system with the proper amount of Refrigerant 12.

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

#### CHARGING THE SYSTEM (Fig. 52)

Front-end units require 4 lbs. of Refrigerant 12. Dual installations require a total of 4 lbs. 14 ozs. to 5 lbs. 2 ozs. of Refrigerant 12. An accurate scale must be used to insure charging the proper amount of refrigerant.

The special refrigerant dispensing manifold permits charging three full cans of refrigerant at one time. Additional cans must be added after the three cans have been charged into the system.

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

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

(2) Screw the refrigerant cans into the manifold.

Be sure the manifold-to-can gasket is in place and in good condition. Tighten the can and the manifold nuts 6 to 8 foot-pounds.

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

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

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

(6) Place the three cans of refrigerant into a pan containing hot water at a temperature of 125 degrees F. on an accurate scale to insure charging with the proper amount of refrigerant.

(7) Start the engine and adjust the speed to 800 rpm.

(8) Charge the system through the suction side of the system by slowly opening the left-hand gauge set manifold valve. Adjust the valve as necessary so the charging pressure does not exceed 50 psi. Maintain the 125° temperature of the water in the pan by adding warm water as necessary.

When all three cans of refrigerant are completely empty, close the gauge set manifold valves and the refrigerant manifold valves.

If more than three cans of refrigerant are necessary to complete the charge repeat steps two through six.