SERVICE REFERENCE BOOK **SESSION 114**

1957
AIR-CONDITIONING
SERVICE

Prepared by

CHRYSLER CORPORATION

Plymouth • Dodge • De Soto
Chrysler • Imperial

TECH
SEZ:

"CUSTOMER COMFORT LEADS THE WAY TO GREATER SERVICE SALES!"

It's easy to please your service customers when you can keep them driving in greater comfort. In fact, that's become the best way to a customer's heart. Keeping an owner cozy often paves the way to greater service sales.

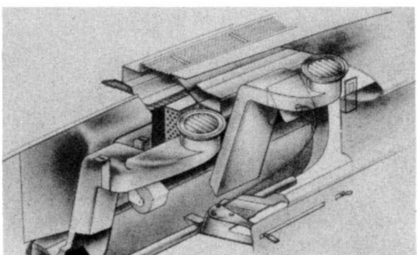
As an example, when an owner can enjoy the luxury of an air-conditioned car because you helped maintain the unit in first-class working order, it's a constant reminder that you served him well. He'll tell his friends about your good service and look you up again himself when something else might require attention.

This reference book, then, goes into what's what on the 1957 Air-Conditioning System. It covers operation of the controls, how they should be checked, and outlines a general performance test that will help you isolate any area in need of correction. In other words, it takes the guesswork out of trouble shooting.

Here's where you'll find this useful information:

GENERAL FEATURES—
1957 AIR-CONDITIONING SYSTEM

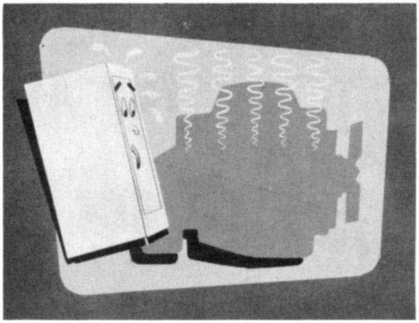
New cars equipped with air conditioning feature a combination heating and air-conditioning unit mounted in the dash panel. This differs from the previous models that used luggage compartment space for the evaporator, intake and outlet vents and the blower.



Moving the unit under the hood, of course, made more trunk space available. It also improved the distribution of cold air, delivering it at the front of the car instead of against the back of the passengers' necks.

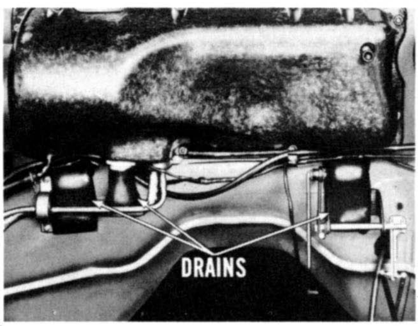
The new location, however, introduces new and different service problems.

For one thing, it's a lot like moving the refrigerator next to the stove. The engine compartment heats up like a furnace room—especially in city traffic during the hot weather.

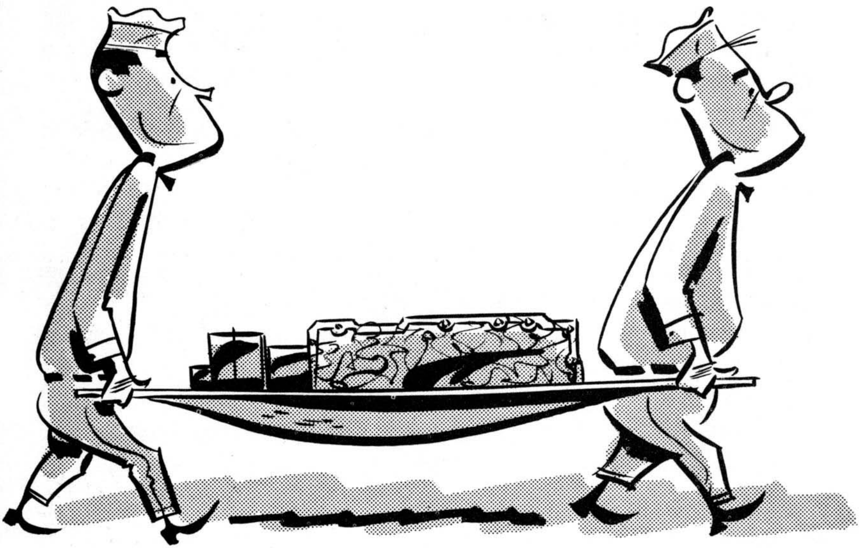


The blower, on the engine compartment side, acts quite a bit like a vacuum cleaner. Just a small leak on the suction side of the blower can draw in enough hot air to raise the temperature of the air entering the car, and make a noticeable difference in cooling. In short, the refrigeration part of the unit can be perfectly okay, but hot-air leaks can nullify the results. Leak possibilities, therefore, have to be checked out very carefully.

Incidentally, the evaporator acts like an "eager beaver" under some operating conditions and cools the air down to about 32°. On high-humidity days, therefore, a lot of water will be condensed out of the conditioned air. This dehumidifying job, of course, is a good feature. But it also means there's a lot of condensation to get rid of. All drains, then, must work properly to let the water get out, and still act as one-way valves so that hot engine air will be kept out of the cooling unit.



WHEN A UNIT COMES IN FOR ATTENTION



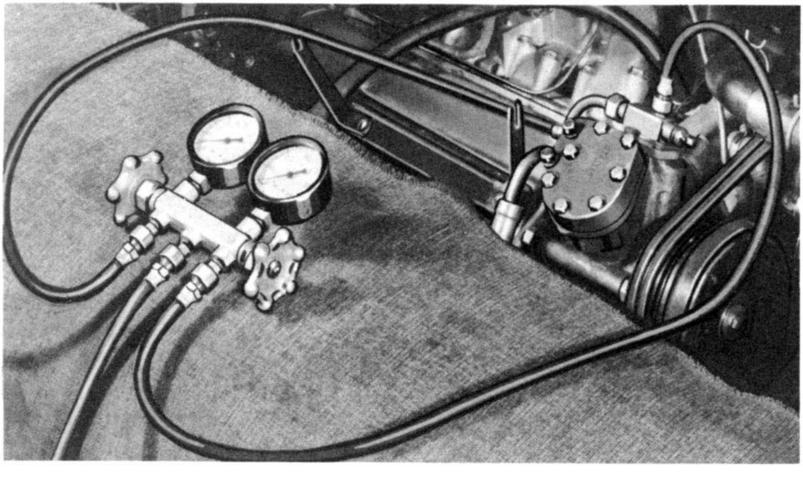
In general, here's how to check a unit that needs attention. First, get the engine compartment as hot as it would become under normal driving conditions. Run both the engine and air-conditioning system 20 minutes or more, at 1200 r.p.m. to simulate 25 m.p.h. city driving.

Next, while the engine and unit operate, check the controls to see if they're doing what they're supposed to do. If the controls do work properly, then make sure the evaporator is getting cold enough to provide satisfactory cooling. This will involve a new test to check the point at which the thermal switch cycles the compressor clutch, and this will be explained later under the heading of Checking Operation of the Controls.

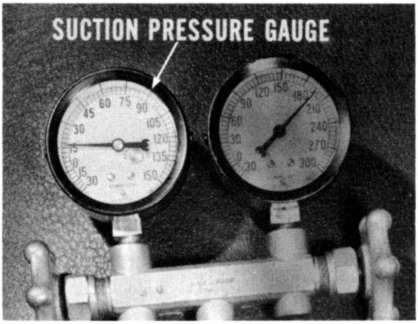
Finally, you should make an over-all performance test to find out if the air being delivered inside the car is as cold as it ought to be. Let's look at the details involved in each of these basic trouble-shooting steps.

PREPARATION FOR TEST

Install the manifold gauge set. When making a performance test, the engine must be hot. Therefore, it is easier to install the manifold gauge set (Testing Outfit C-3627) now, before the engine gets heated up. Remove the valve stem protective caps from both the suction service and the discharge service valves. Make sure that both of these valves are turned fully counterclockwise so that they are completely back-seated. Use the new Ratchet Wrench (Tool C-3361A) for this operation. It lets you open and close these valves without removing the wrench from the valve stem. Then, remove the protective caps from both the discharge and suction service ports.

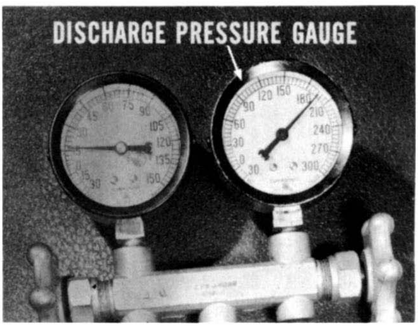


Make sure that both manifold gauge set hand valves are fully closed. Next, connect the hose from the left-hand gauge to the suction port, and the hose from the right-hand gauge to the discharge port.



Notice the combination gauge that gives vacuum readings down to 30 inches of mercury and pressure readings up to 150 psi. This is the left-hand, or "suction pressure" gauge.

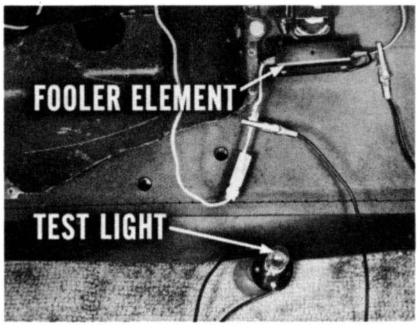
Notice, also, that the right-hand gauge registers from zero to 300 psi for discharge pressures. You can see that the previous model testing outfit (C-3354), designed mainly for Freon 22, had a 300-psi range on the left-hand gauge and a 600-psi range on the right-hand gauge. This would not lend itself to accurate readings on the new air-conditioning units which use Freon 12.



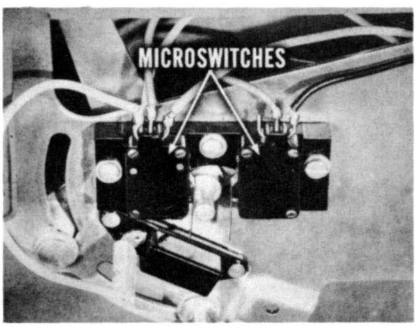
You can modify your present testing outfit (C-3354) very easily. Just move the 300-psi combination gauge from the left to the right side of the test manifold. Next, install a new combination gauge at the left side. This gauge should register from 30 inches of mercury to 150 psi. Save the 600-psi gauge and reinstall it when necessary to test units using Freon 22.

Once the gauge set is installed, turn both the suction service valve and the discharge service valve two turns clockwise so pressures will register on the gauges. Both gauges, by the way, should show pressure even when the system isn't operating. If they don't, it means there's a leak somewhere in the system. Naturally, you'd locate and correct such a leak before going any farther with your checks.

Connect a test light. Connect a test light across the "fooler" element circuit. You can use a short length of heavy copper wire as an adapter for this parallel test light connection.



CAUTION: Make this connection very carefully. Don't ground the adapter, or it will burn out one of the microswitches in the temperature control unit. Actually, it pays to play safe by turning off the ignition before you open *any* of the circuits leading to the microswitches. Be mighty careful not to ground *any* of the wires in the control circuit.



Connect a tachometer. Now, you'll want to run the engine at 1200 r.p.m. with the compressor clutch engaged to duplicate driving in traffic at about 25 m.p.h. So, connect a tachometer and start the engine.

When the choke is fully open and the idle screw is off the fast-idle cam, adjust engine idle to 1200 r.p.m. Accelerate the engine a few times and make sure the tachometer needle falls back and holds steadily at 1200 r.p.m.

NOTE: **If you were only going to check out the controls, you wouldn't have to adjust engine speed to 1200 r.p.m. In that case you would have the engine running only to provide oil pressure to actuate the power piston which, in turn, operates the fresh-air and recirculating doors.**

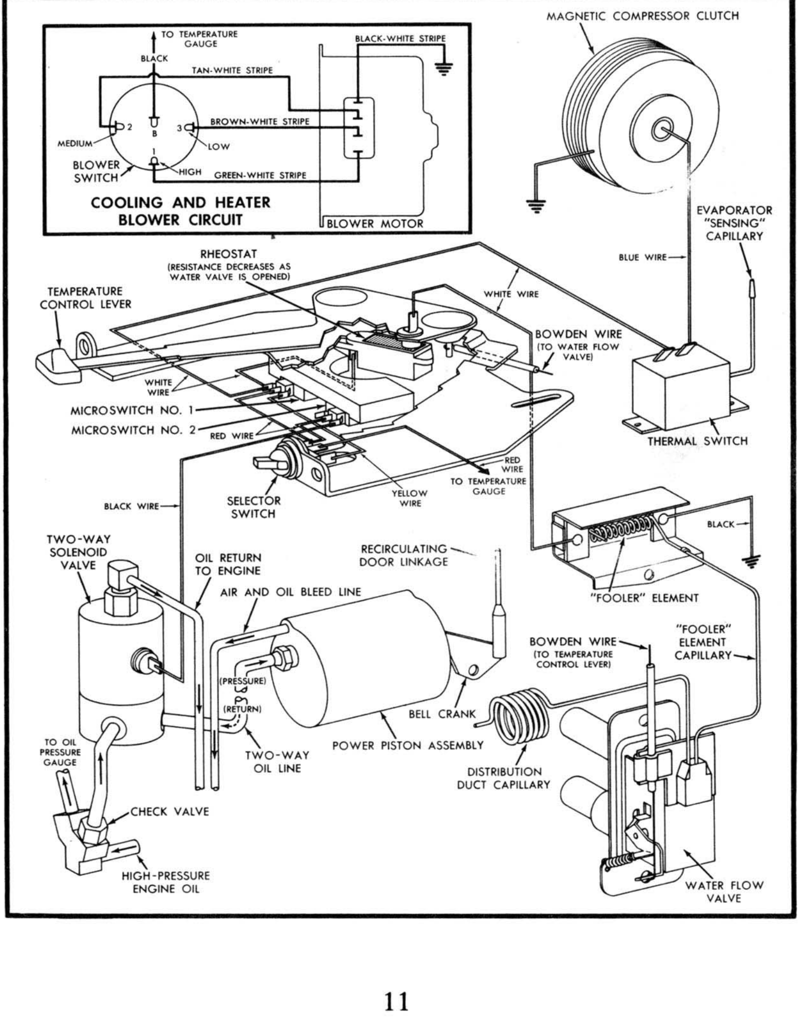
CHECKING OPERATION OF THE CONTROLS

From time to time, during the following tests, reference to the diagram on the opposite page will help to fix in your mind the relationship of the various control units of the system, and how they are connected.

You'll notice that the blower circuit is fairly simple. It is independent of the other heating and cooling controls. Blower speed is controlled by a four-position blower switch. When the ignition switch is turned on, the hot (or positive) side of the circuit is completed through a black wire from the ignition switch to the temperature gauge. A black wire from the temperature gauge to the input (B) terminal of the blower switch is "hot" whenever the ignition switch is turned on. At the blower motor, a black wire with a white stripe provides a permanent ground. The wiring circuit between the switch and the blower motor is illustrated in the diagram.

1957 AIR CONDITIONING

DIAGRAM OF OPERATING CONTROLS



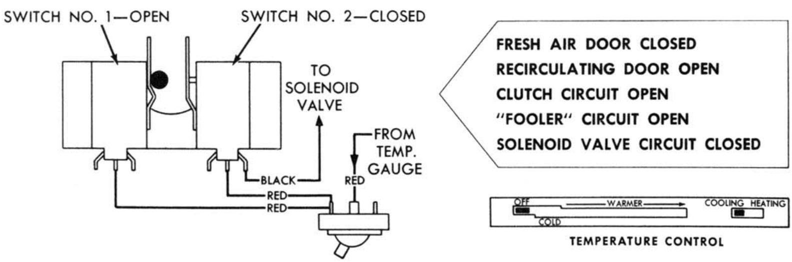
Another glance at the diagram will show you that the temperature control lever operates a Bowden wire connected to a water flow valve. It also controls opening and closing of microswitches #1 and #2.

Microswitch #1 controls the electrical circuit to the thermal switch and compressor clutch, as well as the circuit to the "fooler" element. Current to the fooler element is regulated by a rheostat in the temperature control assembly. Microswitch #2 controls opening and closing of the fresh-air and recirculating doors by controlling the circuit to the two-way solenoid valve.

NOTE: The YELLOW wire circuit was eliminated on some cars, in order to keep the recirculating door closed when the selector switch is in the *heating* position. This prevented cold drafts. Another way to prevent cold-air drafts is to close the two slots in the fresh-air door with pressure-sensitive tape. This not only prevents cold drafts but actually improves cooling, because no hot outside air can enter the plenum chamber when the fresh-air door is closed. In other words, the system will operate entirely on recirculated air. If you close the slots in the fresh-air door, be sure the YELLOW wire *is* connected.

Checking the "Cooling Position" Circuit. With the manifold gauge set, test light, and tachometer installed and engine speed adjusted to 1200 r.p.m., flip the selector switch to "COOLING", and move the temperature control lever to "OFF".

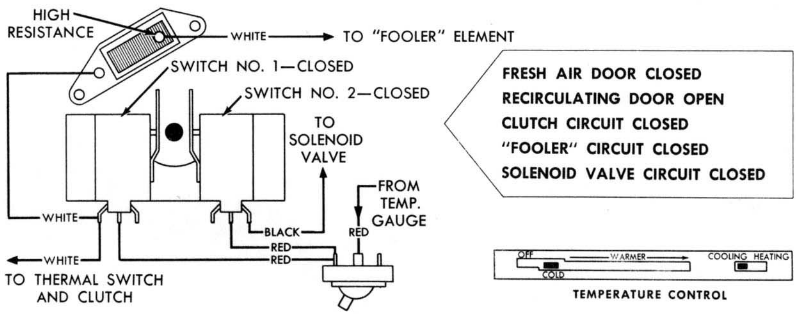
"HOT CIRCUITS"—ENGINE RUNNING—TEMPERATURE CONTROL "OFF"



When the selector switch is on "COOLING", a *red* wire from the switch makes a "hot" (positive) connection at both microswitches (see diagram). Therefore, the red wire leads to both switches are always hot when the ignition switch is on, and the selector switch is on "COOLING". What happens in the system, then, depends on the position of the temperature control lever. As you can see, the recirculating door should be open, the clutch should disengage, and the test light in the "fooler" circuit should not light.

Now, move the temperature control lever to "COLD". The fresh-air door should be closed, the recirculating door should remain open. You'll notice the test light glowing dimly because not much current will be flowing to the fooler element.

"HOT CIRCUITS"—ENGINE RUNNING—TEMPERATURE CONTROL "COLD"

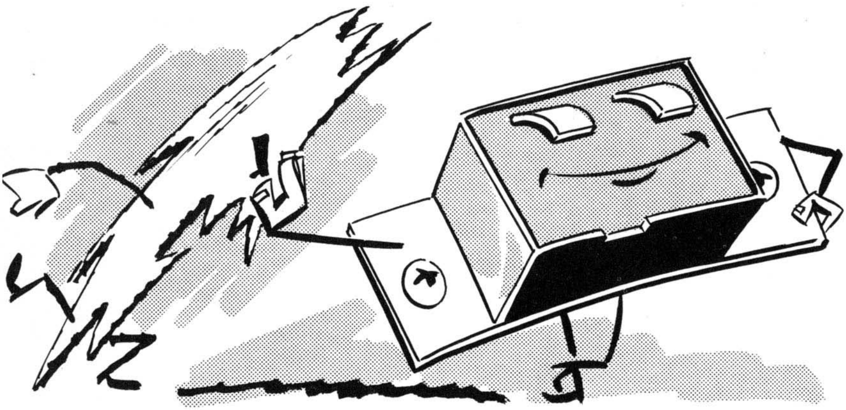


By referring to the diagram above, and to the illustration of the control unit arrangement, you will note what happens with the temperature control lever on "COLD". The Bowden wire still won't be moved far enough to open the water valve. Microswitch #1 will be closed, completing the circuit from the *red* wire input to the two *white* wires leading from the switch.

While evaporator temperature is above the frost point, the thermal switch will be closed. Current will be carried from the thermal switch to the compressor clutch by means of a *blue* wire.

Since the compressor clutch has a permanent ground, the clutch will be energized and the compressor will start to operate. It will keep operating until evaporator coil temperature approaches the frost point. At that point, the thermal switch will open the clutch circuit, stopping the compressor. That's how the thermal switch automatically cycles the compressor to prevent evaporator frosting.

The other white wire from microswitch #1 goes to a rheostat in the temperature control lever assembly. The rheostat, mechanically connected to the lever, provides maximum resistance when the lever is at the left ("OFF"), and minimum resistance as the lever is moved to the extreme right. Another *white* wire leads from the rheostat to the "fooler" or heating element. A capillary tube leading to the water control valve is coiled around the "fooler" element.

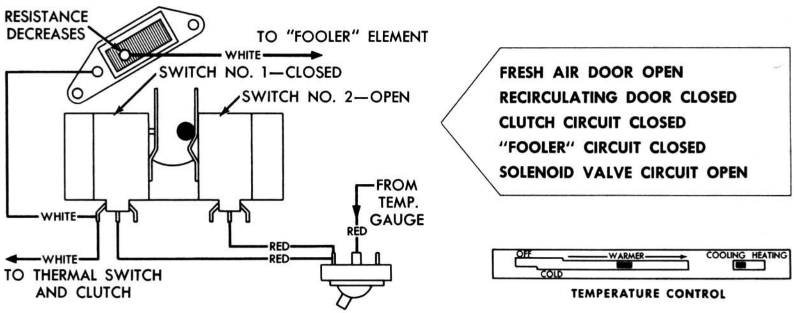


When the temperature control lever is at "COLD", the water control valve is closed by the Bowden wire. However, it is not closed tight enough to prevent a small amount of hot water forcing its way past the valve and into the heater core. The rheostat, however, sends a small amount of current to the fooler element, heating it slightly. This heats the capillary tube connected to the water valve, closing the valve tightly so no water can by-pass the valve and enter the heater core.

Microswitch #2 is also closed. The *red* wire leading to this switch is "hot". In this position, the switch completes the circuit through the *black* wire leading to the solenoid valve, energizing the valve. The opened solenoid valve sends oil to the power piston. This, in turn, closes the fresh-air door and opens the recirculating door to provide maximum cooling with 20% fresh air and 80% recirculated air.

Now, slowly move the temperature control lever from "COLD", into the "WARMER" range, and watch the test light. The light should burn brighter as the lever moves to the right. The fresh-air door should open, the recirculating door should close, the clutch should remain engaged, and the fooler element should start to get hot. The diagram will show you what happens circuit-wise.

"HOT CIRCUITS"—ENGINE RUNNING—TEMPERATURE CONTROL "WARMER"



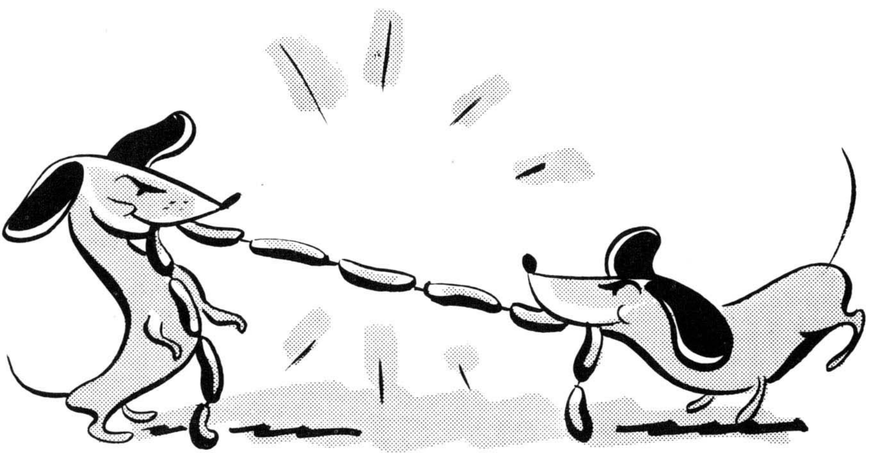
When the temperature control lever is in the "WARMER" range, the Bowden wire opens the water control valve. The more you move the lever to the right, the more hot water flows through the valve to the heater core.

Rheostat resistance decreases as the lever moves right, sending more current to the "fooler" element to make it get hotter. Heat on the capillary tube tries to close the water control valve. At any given position of the temperature control lever in the "WARMER" section, therefore, a balance is maintained between the valve opening the Bowden wire calls for, and the valve closing attempted by the heated capillary. At the extreme right of the range (WARMEST), evaporator cooling, plus heater core warming, results in air being delivered at about 75°.

Microswitch #1 remains closed, completing the circuit to the compressor clutch. Compressor cycling will then be controlled by the thermal switch in the evaporator.

Microswitch #2 is now open. The circuit to the solenoid valve is dead. So the fresh-air door is open and the recirculating door is closed, providing 100% fresh-air cooling.

Recirculating door doesn't close properly. If the recirculating door doesn't close properly, the trouble may be due to improper adjustment of the linkage between the recirculating door and the power piston bell crank. Interference between the linkage bell crank and the power piston rod will hold the recirculating door open.

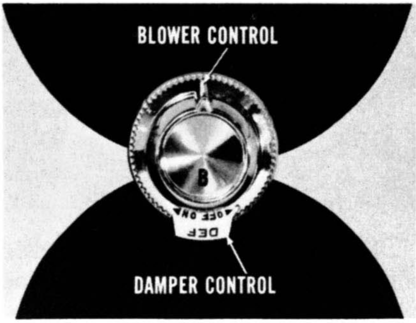


If the fresh-air door closes, but the recirculating door does *not close fully, lengthen* the linkage. If the fresh-air door is not *fully closed* when the recirculating door is fully open, *shorten* the linkage.

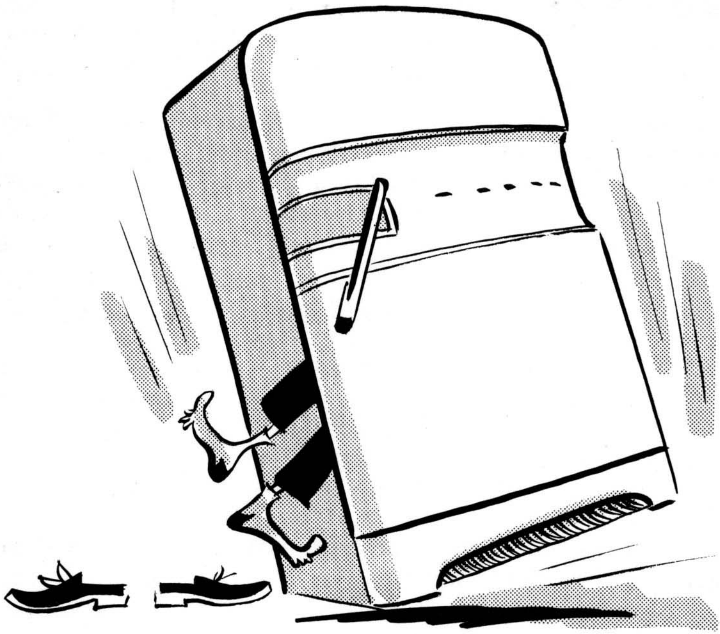
Power piston diagnosis and correction. If the power piston doesn't return fully when oil pressure is released, it will hold the recirculating door open. On early production cars the recirculating door springs alone were used to push the linkage bell crank and piston into a retracted position. Current production power pistons have a built-in return spring in addition to the recirculating door springs. On the early pistons, a throttle linkage spring connected between the bell crank (at the ball joint) and the windshield wiper bracket will do the same good job as the built-in spring on current models.

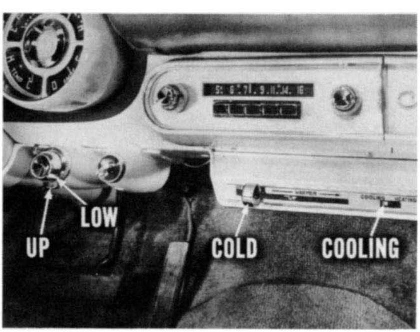
If the power piston sticks consistently on its return stroke, remove the whole assembly. Take out the snap ring on the end, and remove the piston from its cylinder. Inspect for chips or dirt. Also, inspect the piston "D" ring. Any roughness, or irregularity, on the "D" ring can cause the piston to stick, and not return. If you find this condition, replace the "D" ring.

If all your tests of the controls show that they're functioning as they should, take a look at the blower control. Move it clockwise and see if the blower operates on all of its three speeds. Finally, check the distribution duct damper control to see if it, too, is working properly. This control, as you know, directs the flow of air down to the lower outlets, or up to the defroster outlets. This will complete the checks you need to make on the operation of the unit controls.



CHECKING THE REFRIGERATION





After making sure your controls operate properly, turn your attention to the refrigeration part of the system. To do this, set the air control on "UP", the blower on "LOW", the temperature control lever on "COLD", and the selector switch on "COOLING". Close all car windows.

Inspect to make sure the sight glass is clear. If you spot any bubbles, add refrigerant. The engine should still be running at 1200 r.p.m., and the compressor clutch should be engaged.

Examine the condenser fins. They must be free from bugs or dirt because that can cut down the flow of air through the condenser and affect its efficiency. Close the hood so the heat will be confined to the engine compartment. Keep the front of the car away from a wall, so the air flow to the radiator grille will be unrestricted.

Now, suction pressure on the left-hand gauge should go down to 10 to 20 psi before the thermal switch opens the circuit to disengage the compressor clutch. When the clutch disengages, suction pressure should go back up to about 35 psi. In a few minutes, the evaporator will start to warm up. When this happens, the thermal switch will automatically close the circuit to the magnetic clutch. The clutch will then engage, and suction pressure will gradually decrease.

Let the thermal switch cycle the clutch several times until you're sure the clutch always disengages when suction pressure is in the 10- to 20-psi range. If that happens, you'll know the evaporator gets cold enough, and the refrigeration part of the system passes this test with flying colors.

Suction pressure too low. Suppose suction pressure was lower than 10 psi when the thermal switch opened the clutch circuit. In a case like this, it might mean a faulty thermal switch, or moisture in the system.

If the suction pressure, for example, went lower than 10 psi before the compressor clutch disengaged, chances are the thermal switch sensing tube isn't making a good contact with the evaporator fins and coils. Contact must be good to give the thermal switch an accurate temperature signal from the evaporator.

Now, if the suction pressure went very low and the gauge registered a vacuum without releasing the compressor clutch, the thermal switch wires may be shorted together so that the switch has no control over the clutch. Another possibility is that moisture in the system may have formed ice, and caused the expansion valve to stick in the closed position. Also, the thermal switch might be defective and need replacing.

Suction pressure too high. If suction pressure doesn't go low enough to cause the thermal switch to cycle the clutch (pressure remains higher than 20 psi), check the following possible causes:

(1) Compressor reed valves faulty, or compressor low on oil.
(2) Moisture causing expansion valve to stick in its open position.
(3) Expansion valve equalizer tube is plugged.
(4) Expansion valve thermal bulb not making good thermal contact.

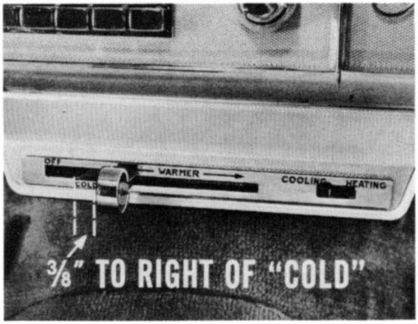
Always check for moisture first whenever you get abnormal suction pressure readings. If you find the system wet, correct it. Usually, this will let you continue your performance test without making any major disassembly of the unit.

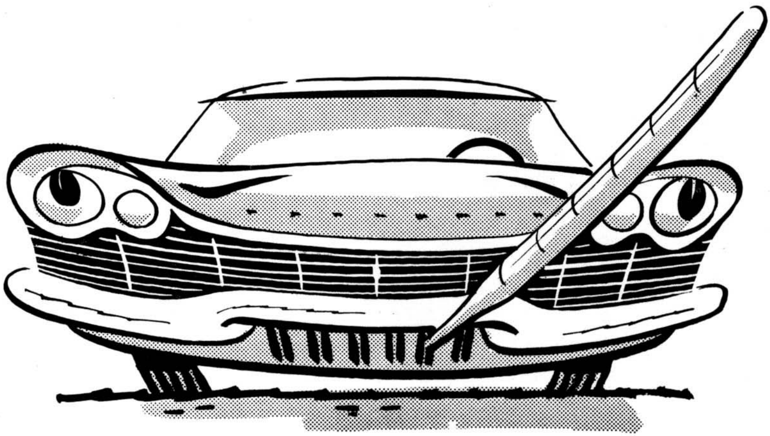
MAKING THE OVER-ALL PERFORMANCE TEST

An over-all performance test tells you if the unit delivers air properly cooled. The temperature of the air delivered to the car interior will vary with the relative humidity. So, in this test we will use the "wet bulb" method of correcting for local humidity.

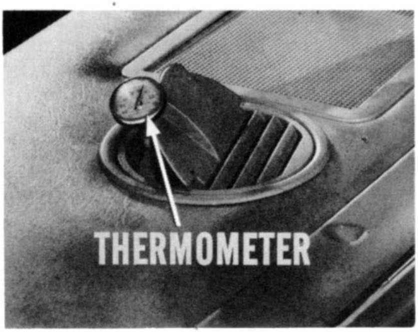
For test purposes, try to keep the discharge pressure in the 190- to 210-psi range. These pressures will vary quite a bit depending on the ambient temperature and the general efficiency of the entire system. If discharge pressure is lower than 190 psi, you can raise it by partially restricting the flow of air through the condenser. If pressure goes above 210 psi, you can lower it by using a large electric fan in front to increase the flow of air through the condenser.

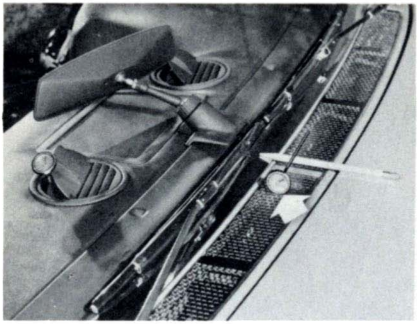
To make the test, first see that the system is not low on refrigerant. Make sure the drive belts and clutch aren't slipping. Also, see that the condenser isn't restricted, and that the thermal switch is working okay. Then, put the selector switch on "COOLING", and move the temperature control lever about ⅜″ to the right of "COLD". In addition, see that the recirculating door is closed, the test light is dimly lighted, and the water valve is closed.





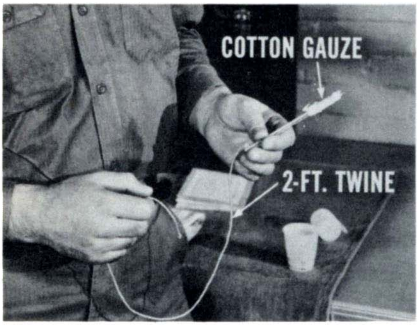
Direct all air "UP". Set the blower control on "HIGH". Then, suspend a thermometer in one of the open outlet grilles. Have it face so that you can read the outlet air temperature from outside the car.





Place a second thermometer near the center of the cowl vent. Rest it across a pencil to keep the thermometer bulb from touching the metal of the grille. Close all car doors and windows. Recheck your tachometer to see that engine speed is still 1200 r.p.m. while the compressor clutch is engaged.

Take a third thermometer and bandage the bulb with five or six layers of wide cotton gauze. Tie the gauze with string so it will stay in place. (This will be used for wet-bulb temperature readings.) Tie a two-foot length of twine to the upper end of the thermometer. Now, wet the bandage in water that's at room temperature. Using the string as a sling, swing the thermometer in a circle for several minutes to speed up evaporation at the bulb.



Check the reading quickly when you stop swinging. Re-wet the bandage and swing the thermometer again until you've cooled it as much as you can by evaporation. Write down the lowest temperature you get, as you'll need to find it on the Performance Chart on Page 24.

As an example, let's say you get a wet-bulb reading of 69° F. Let's also suppose that the thermometer on the cowl vent grille outside the car shows a reading of 88° F. You then look up both wet-bulb and inlet dry-bulb temperatures on the Performance Temperature Chart on Page 24.

As you can see, the maximum discharge temperature allowed for air delivered inside the car is 53° F. You then check this with the temperature reading of the thermometer placed in the outlet grille inside the car. That is the discharge air temperature.

To follow our example still farther, let's say that the thermometer at the discharge outlet inside the car reads 56° F., three degrees *warmer* than it ought to be. Since that's not up to standard, review the parts of the system that you've checked up to this point. Controls, let's say, were found to be okay. The thermal switch was cycling the clutch properly, and the evaporator was getting cold enough. Only one thing remains that can be affecting efficiency of the unit—hot-air leaks on the suction side of the blower. So, slow the engine down, and then cut it off.

PERFORMANCE TEMPERATURE CHART

INLET AIR	AMBIENT INLET AIR WET BULB 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
AMBIENT INLET 70	40	40	41	42	43	43	44	45	45	46	46	47	48	49	50	51	52									
71	40	41	42	43	44	44	45	46	46	47	47	48	48	49	50	51	52	53								
72	40	41	42	43	44	44	45	46	46	47	47	48	48	49	50	51	52	53	54							
73	41	42	43	44	45	45	46	46	47	47	47	48	48	49	50	51	52	53	54	55						
74	41	42	43	44	45	45	46	46	47	47	47	48	48	49	50	51	52	MAXIMUM DISCHARGE AIR TEMPERATURE								
75	42	43	44	45	46	46	46	46	47	47	47	48	48	49	50	51	52									
76	42	43	44	45	46	46	46	46	47	47	47	48	48	49	50	51	52	53	54	55	56	57	58			
77	43	44	44	45	46	46	46	46	47	47	47	48	48	49	50	51	52	53	54	55	56	57	58	59		
78	43	44	45	46	46	46	46	46	47	47	47	48	48	49	50	51	52	53	54	55	56	57	58	59	60	
79	44	45	45	46	46	46	46	46	47	47	47	48	48	49	50	51	52	53	54	55	56	57	58	59	60	61
80	45	45	45	46	46	46	46	46	47	47	47	48	48	49	50	51	52	53	54	55	56	57	58	59	60	61
81	45	45	45	46	46	46	46	46	47	47	47	48	48	49	50	51	51	53	54	55	56	57	58	59	60	61
82	45	45	45	46	46	46	46	46	47	47	47	48	48	49	50	51	51	53	54	55	56	57	58	59	60	61

PERFORMANCE TEMPERATURE CHART

INLET AIR		AMBIENT INLET AIR WET BULB 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
AMBIENT INLET	70	40	40	41	42	43	43	44	45	45	46	46	47	48	49	50	51	52									
	71	40	41	42	43	44	44	45	46	46	47	47	48	48	49	50	51	52	53								
	72	40	41	42	43	44	44	45	46	46	47	47	48	48	49	50	51	52	53	54							
	73	41	42	43	44	45	45	46	46	47	47	47	48	48	49	50	51	52	53	54	55						
	74	41	42	43	44	45	45	46	46	47	47	47	48	48	49	50	51	52	MAXIMUM DISCHARGE AIR TEMPERATURE								
	75	42	43	44	45	46	46	46	46	47	47	47	48	48	49	50	51	52									
	76	42	43	44	45	46	46	46	46	47	47	47	48	48	49	50	51	52	53	54	55	56	57	58			
	77	43	44	44	45	46	46	46	46	47	47	47	48	48	49	50	51	52	53	54	55	56	57	58	59		
	78	43	44	45	46	46	46	46	46	47	47	47	48	48	49	50	51	52	53	54	55	56	57	58	59	60	
	79	44	45	45	46	46	46	46	46	47	47	47	48	48	49	50	51	52	53	54	55	56	57	58	59	60	61
	80	45	45	45	46	46	46	46	46	47	47	47	48	48	49	50	51	52	53	54	55	56	57	58	59	60	61
	81	45	45	45	46	46	46	46	46	47	47	47	48	48	49	50	51	51	53	54	55	56	57	58	59	60	61
	82	45	45	45	46	46	46	46	46	47	47	47	48	48	49	50	51	51	53	54	55	56	57	58	59	60	61

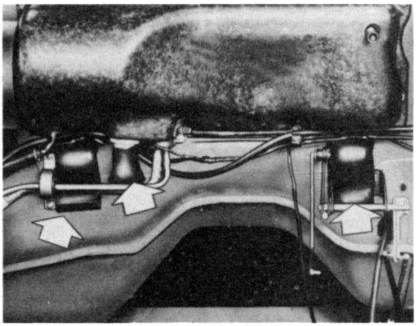
AIR DRY BULB TEMPERATURE

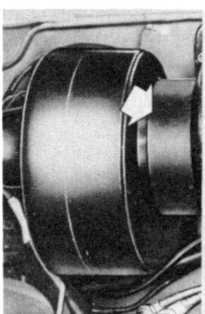
83	45	45	45	46	47	47	47	47	48	48	48	49	49	50	51	51	52	53	54	55	56	57	58	59	60	61
84	46	46	46	47	47	47	47	47	48	48	48	49	49	50	51	51	52	53	54	55	56	57	58	59	60	61
85	46	46	46	47	48	48	48	48	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	61
86	46	47	47	48	48	48	48	48	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	61
87	47	47	47	48	48	48	49	49	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	61
88	47	47	48	48	48	48	49	49	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	61
89	48	48	48	48	48	48	49	49	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	61
90	48	48	48	48	48	48	49	49	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	62
91	48	48	49	49	49	49	50	50	50	50	50	51	51	51	52	52	53	54	55	55	56	57	58	59	60	62
92	48	48	49	49	49	49	50	50	50	50	50	51	51	51	52	52	53	54	55	55	56	57	58	59	60	62
93	49	49	50	50	50	50	51	51	51	51	51	52	52	52	53	53	54	54	55	55	56	57	58	59	60	62
94	50	50	50	50	50	50	51	51	51	51	51	52	52	52	53	53	54	54	55	55	56	57	58	59	60	62
95	51	51	51	51	51	51	52	52	52	52	52	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62
96	51	51	51	51	51	51	52	52	52	52	52	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62
97	52	52	52	52	52	52	52	52	53	53	53	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62
98	52	52	52	52	52	52	53	53	53	53	53	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62
99	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62
100	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62

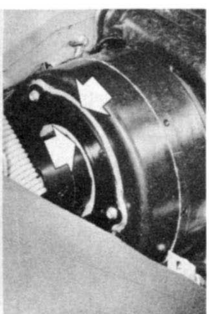
AIR DRY BULB TEMPERATURE	83	45	45	45	46	47	47	47	47	48	48	48	49	49	50	51	51	52	53	54	55	56	57	58	59	60	61
	84	46	46	46	47	47	47	47	47	48	48	48	49	49	50	51	51	52	53	54	55	56	57	58	59	60	61
	85	46	46	46	47	48	48	48	48	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	61
	86	46	47	47	48	48	48	48	48	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	61
	87	47	47	47	48	48	48	49	49	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	61
	88	47	47	48	48	48	48	49	49	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	61
	89	48	48	48	48	48	48	49	49	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	61
	90	48	48	48	48	48	48	49	49	49	49	49	50	50	50	51	51	52	53	54	55	56	57	58	59	60	62
	91	48	48	49	49	49	49	50	50	50	50	50	51	51	51	52	52	53	54	55	55	56	57	58	59	60	62
	92	48	48	49	49	49	49	50	50	50	50	50	51	51	51	52	52	53	54	55	55	56	57	58	59	60	62
	93	49	49	50	50	50	50	51	51	51	51	51	52	52	52	53	53	54	54	55	55	56	57	58	59	60	62
	94	50	50	50	50	50	50	51	51	51	51	51	52	52	52	53	53	54	54	55	55	56	57	58	59	60	62
	95	51	51	51	51	51	51	52	52	52	52	52	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62
	96	51	51	51	51	51	51	52	52	52	52	52	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62
	97	52	52	52	52	52	52	52	52	53	53	53	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62
	98	52	52	52	52	52	52	53	53	53	53	53	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62
	99	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62
	100	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53	54	54	55	55	56	57	58	59	60	62

CHECKING AND SEALING HOT-AIR LEAKS

You'll find it easier to seal hot-air leak possibilities if you remove the air cleaner. Then, the first places to check are both plenum chamber drains. Make sure they fit tightly against the dash panel. Also, the drains should be closed to keep air from coming in, but permit water to drain out; one-way water valves, in other words. Check the evaporator drain tube next. It attaches to a nylon connector that must make a good seal at the housing. At the blower, check the blower-to-housing connector. And, if necessary, tape it up.

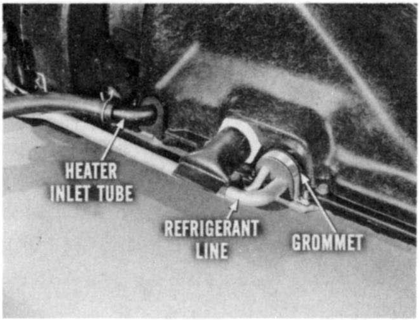




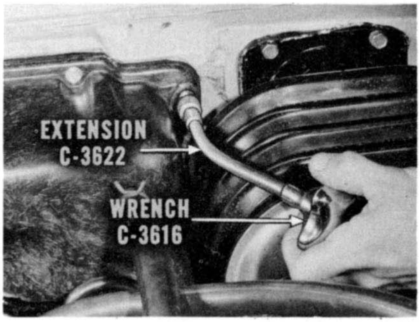


Normally you wouldn't think an air leak through the seam in the blower housing, or between the blower housing and the blower motor would be worth considering. But it is! So, use body sealer to seal these points thoroughly.

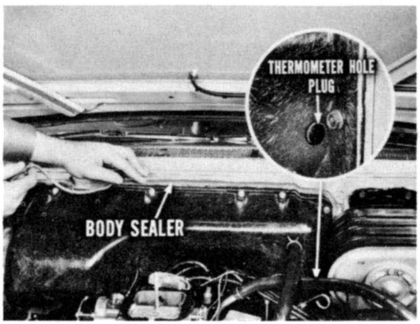
Check the grommet and seal at the refrigerant line opening. Also, check the grommet at the heater inlet tube. Use body sealer to seal around these points, too, if needed.



Then, check to make sure the evaporator and housing seal well against the dash panel. If any of the attaching bolts are loose, tighten them to 30 inch-pounds, but take it easy! There's a new palm-grip ratchet wrench (C-3616) with an extension (C-3622) that is a real handy one for these bolts. Always tighten these housing bolts in sequence, from the center outward. It's something like the care you'd exercise when tightening engine cylinder head bolts. If you tighten one bolt too much, or tighten them unequally, you may very likely crack the housing.



Next, seal around the entire housing with body sealer. And, while you're at it, seal up the thermometer hole plug. That will cover all of the most obvious points where leakage might take place. So, run another performance test and see if you've licked the



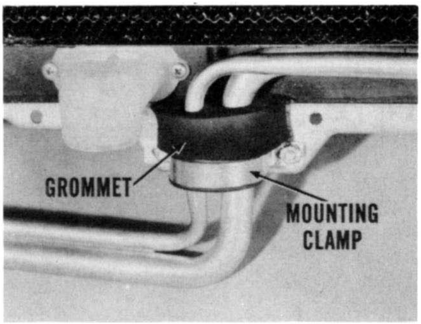
trouble. Just get the thermometers in place again, start the car, and get a new wet-bulb reading. If you find that your delivered air temperature is below the maximum temperature allowable, according to the chart, you've sealed up the leaks that were causing the trouble.

More complete sealing may sometimes be necessary. While you'll be able to make most air-conditioning systems cool at a level that's commercially acceptable with the sealing procedures mentioned, you might come across a unit that will need more attention. In a case like this, you'd have to remove the blower and the housing.

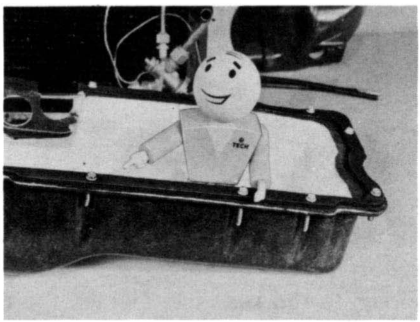
You'll find it easier to work on housing removal, incidentally, if you remove the air cleaner, ignition distributor, and the hood. Before you remove the hood, however, be sure to use a scribe and mark the position of the hood hinges. That way, you'll be able to reinstall the hood and maintain its original adjustment.

Once you remove the housing, inspect the flange for cracks and see that all the insulation is in place. Good insulation is needed to keep out all the engine compartment heat.

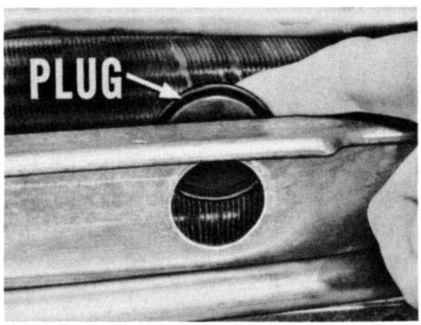
Next, be sure the grommets for the heater and evaporator lines are made of *sponge* rubber. If you should find *hard* rubber grommets, replace them with the new sponge rubber grommets. You install these grommets on the heater and evaporator lines before you install the housing. Remember that the evaporator line grommet is installed *above* the evaporator line mounting clamp.



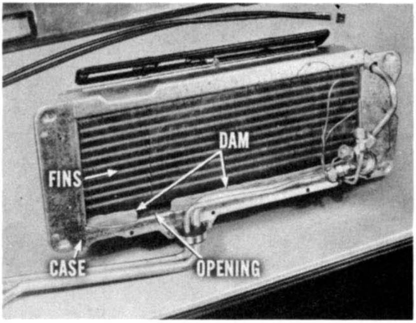
Use a sponge rubber evaporator gasket on the housing flange, too. This is the same gasket as the one used between the evaporator and the dash panel. You should leave the old composition gasket in place, and cement the sponge rubber gasket right on top of it. Cut out a short piece of the gasket at each grommet opening to make room for the grommets you installed on the heater and evaporator lines. Stick the mounting bolts through the holes in the flange and gasket. They'll help hold the gasket in place while the cement dries.



Be sure to check the internal evaporator drain. If it is missing, you can use a rubber plug—like the one in the rear face of the door—to plug the hole. You don't actually need a drain in this location, but the hole must be plugged or some of the inlet air will by-pass the evaporator and not be cooled.



Now, another type of internal or by-pass leak may occur along the bottom of the evaporator. If air is drawn under the evaporator instead of through the cooling coils, cooling efficiency suffers. To prevent this type of leak, use sealing compound to build a dam across the bottom of the evaporator case. That will keep air from sneaking in between the fins and case. Leave about a 2″ opening so water can flow out to the external evaporator drain.



It is extremely difficult to install the plenum chamber drains when the housing is in place. So, check the plenum chamber drains and make sure they fit securely in the dash panel openings. It's a good idea to cement these drains in place as soon as you remove the housing. That will give the cement a chance to set up and hold the drains securely so they won't be dislodged when the housing is reinstalled.

Anytime the blower is removed, remove the blower motor from the housing, too. Lay a bead of rope-type body sealer around the rubber motor mounting seal near the outside edge. Reassemble the motor to the housing. Tighten the three attaching screws until some sealer squeezes out at the edges of the flange. This will insure a good seal at this point.

Also, seal between the motor itself and the mounting. If there is a possibility of a leak in the housing seam, seal it with wide tape.

When reinstalling the housing to the dash panel, be careful not to dislodge the sponge rubber evaporator gasket. Also, check the positions of the evaporator tube and heater inlet tube grommets so they don't get pushed out of place. You'll have to do this by "feel" since you won't see what's happening along the bottom edge of the housing.

Once the housing is installed and attaching bolts properly tightened, you can reach through the blower opening and seal around the evaporator and heater inlet lines with body sealer. Make certain these points are sealed before you reinstall the blower.

Reinstall the ignition distributor, the air cleaner, and the hood. Then, get the inlet and outlet thermometers back in place. Take new wet-bulb readings and recheck performance of the air-conditioning unit. That's the best way to make sure your air-conditioning service has made the unit's performance acceptable to the owner.

A FINAL WORD...

More air-conditioned cars are turning up each year. So opportunities to be of service in this respect are on the increase. The wise technician will increase his air-conditioning know-how so he'll be able to keep up with the growing demand for service technicians in this relatively new phase of automotive service.

RECORD YOUR ANSWERS TO THESE QUESTIONS ON QUESTIONNAIRE NO. 78

A small leak on the suction side of the blower can make a noticeable difference in cooling ability of an air-conditioning unit.	RIGHT	1	WRONG
Because a lot of water is condensed out of conditioned air on high-humidity days, all drains must work properly as one-way valves.	RIGHT	2	WRONG
For proper testing, run the engine and air-conditioning system 20 minutes or more to duplicate hot-weather driving conditions.	RIGHT	3	WRONG
Both manifold gauges should show pressure even when the system isn't operating.	RIGHT	4	WRONG
To duplicate 25 m.p.h. traffic driving, run the engine at 500 r.p.m. while the compressor clutch is engaged.	RIGHT	5	WRONG
Suction pressure should read 10 to 20 psi before the thermal switch opens the circuit to disengage the compressor clutch, and rise to about 35 psi when the clutch disengages.	RIGHT	6	WRONG
Use a thermometer with a wet bandage around the bulb and swing it to get wet-bulb temperature readings.	RIGHT	7	WRONG
Tighten the unit housing bolts in sequence, from the center outward, somewhat like the treatment given cylinder head bolts.	RIGHT	8	WRONG
If all obvious points of leakage have been sealed, and the unit still doesn't cool satisfactorily, remove the evaporator and housing for complete sealing on the inside.	RIGHT	9	WRONG
The housing must be free of cracks, and must contain all the insulation for full protection against engine compartment heat.	RIGHT	10	WRONG

Litho in U.S.A.