HEATER MAKES NOISE WHEN STARTING

If the heater "pops" or "spits" when starting or cycling, a leaking solenoid valve seat or plunger is permitting fuel to flow in the "off" position. Another cause is low fuel pressure from a defective pump, or a combination of low fuel pressure and insufficient combustion air caused by a slow burner motor. Check the fuel pressure first; if the pressure is satisfactory (5 to 7 lbs.) remove the entire burner assembly from the heater. Disconnect the ignition cable and solenoid leads, but re-connect the fuel line. Examine the inside of the mixer can to make sure the nozzle is dry. Turn the heater switch on to start the burner blower. Start the engine which will apply fuel pressure to the solenoid valve. Watch the nozzle carefully for signs of leakage. The slightest amount of leakage through the nozzle will indicate a defective shut-off valve which must be repaired. This condition could also be caused by spark plug electrodes bent out of position, even though adjusted to the proper gap. The center electrode of the plug must be approximately straight to locate the spark gap in the proper position with respect to the spray. Install a new plug and adjust by bending only the ground electrode.

HEATER FAILS TO START WHEN SWITCH IS TURNED ON, COMBUSTION AIR BLOWER DOES NOT RUN

1. Burned out fuse
2. Loose wire from ignition unit to combustion air blower
3. Defective combustion air blower motor
4. Defective heater switch

COMBUSTION AIR BLOWER RUNS BUT HEATER FAILS TO IGNITE

1. Defective thermostat or wiring
2. Defective overheat switch
3. Defective coil
4. Defective spark plug
5. Open circuit in solenoid valve
6. Clogged fuel nozzle
7. Combustion air hose disconnected, torn or kinked
8. Defective breaker points or cam

HEATER IGNITES BUT GOES OUT LATER

1. Fresh air blower not running
2. Obstruction in fresh air passage
3. Duct missing between fresh air blower and heater case

HEATER BURNS INTERMITTENTLY, HEAT OUTPUT IS TOO LOW

1. Thermostat out of adjustment
2. Fuel line pinched or clogged

HEATER BURNS INTERMITTENTLY, HEAT OUTPUT IS TOO GREAT

1. Thermostat out of adjustment or shorted out

HEATER BURNS CONTINUOUSLY, HEAT OUTPUT IS TOO LOW

1. Clogged fuel nozzle
2. Low fuel pressure

ODOR OF BURNED GASOLINE IN CAR

1. Leaking connection in exhaust tube
2. Broken or loose burner clamp.

EXCESSIVE AMOUNT OF SMOKE FROM HEATER EXHAUST WHEN HEATER STARTS

1. Leaking shut-off valve
2. Insufficient combustion air
3. Exhaust system partially obstructed

POPPING NOISE WHEN HEATER STARTS OR CYCLES

1. Leaking solenoid valve
2. Loose, dripping nozzle
3. Nozzle spray directed away from spark plug
4. Intermittent spark caused by too wide gap
5. Insufficient combustion air

See last section of Manual for wiring diagrams.

SECTION III—AIR CONDITIONING

1. GENERAL INFORMATION

The Heater-Air Conditioning on the 1959 Plymouth models is a dual purpose unit combining both heating and cooling for all seasons of the year.

The unit is controlled by vacuum diaphragms which are actuated by push buttons. The heating and cooling cycle is similar to the 1958 models. A water valve and capillary tube is used to control water temperature through a sliding temperature control lever, located to the right of the push buttons.

The new unit incorporates several new features:

1. High air-flow distribution
2. Larger cooling capacity
3. Push button controls
4. Vacuum actuated doors and dampers
5. Larger compressor output capacity

REMOVAL, INSTALLATION AND SERVICING

The procedures for servicing the unit including discharging, charging, removal and installation of the engine side housing, evaporator coils, expansion valve, condenser and other components are similar as the procedures outlined in the 1958 *Plymouth Service Manual.* However, caution must be used when making a compressor capacity test. Do not exceed a total of five minutes of continuous compressor operation as this may cause damage to the compressor from overheating.

CAUTION

When replacing compressor assembly the crankshaft should be rotated approximately six complete revolutions to clear oil accumulation from compressor head before the clutch is energized to avoid damage to the compressor reed valves.

CAUTION

If the evaporator coil assembly has to be removed, extreme care must be taken to see that the fresh air door is completely closed before any attempt is made to remove or install the unit. Damage to the door seal and distortion of vent and recirculating doors may result if this precaution is not taken.

Servicing of the blower motor and fan assembly requires the removal of the distribution duct assembly.

TESTING

Positioning of the bowden cable housing in the retaining clips is important for proper operation of the temperature control. The valve must be checked for the full open position and the fully closed position and the cable housing properly adjusted to allow for full operation of the valves.

Before attempting to diagnose any possible malfunction or to check for proper operation of the system, the test gauge manifold set should be installed, Figure 1. Open the suction and discharge service valve stems by rotating them two turns clockwise, Figure 1.

Open each of the manifold valves, alternately to purge air from the manifold hoses. Hold each one open momentarily, shut it off and then open the other. Read the pressures on the gauges, if they are abnormal, the cause must be determined. If no pressure is indicated, the system is empty and has a leak. It will be necessary to vacuum the system and charge it. This will allow the pressure to build up and the leak can be located. After the leak has been corrected, it will be necessary to purge the gas from the system and install a new drier, always use new gasket contained in kit. The new drier must be tightened 10-12 ft. lbs. torque. The system then should be vacuumed and charged for the proper amount of refrigerant.

Where the gauges show normal pressure for the temperature, proceed with the system check by removing the radiator cap, opening the car windows, moving the temperature lever to the "OFF" position and then start the engine. With the engine running push in the "FRESH AIR" button and pull the blower switch out for high speed.

These operations should engage the compressor and start the cooling system to operate. Adjust the engine speed to 1250 rpm and momentarily remove the heater outlet hose at the upper left side of the heater housing, Figure 2. Check the hot water valve for complete closing. A flow of water indicates the valve is not closing properly. This may be caused by an improperly adjusted bowden cable or a defective valve.

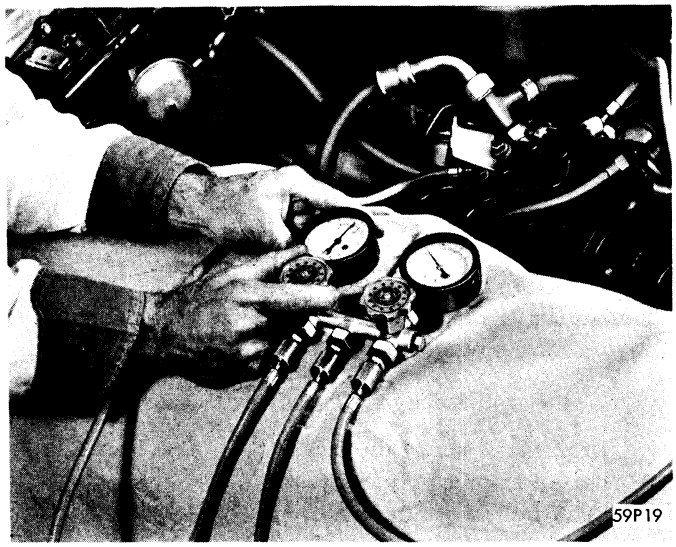


Figure 1—Test manifold gauge set

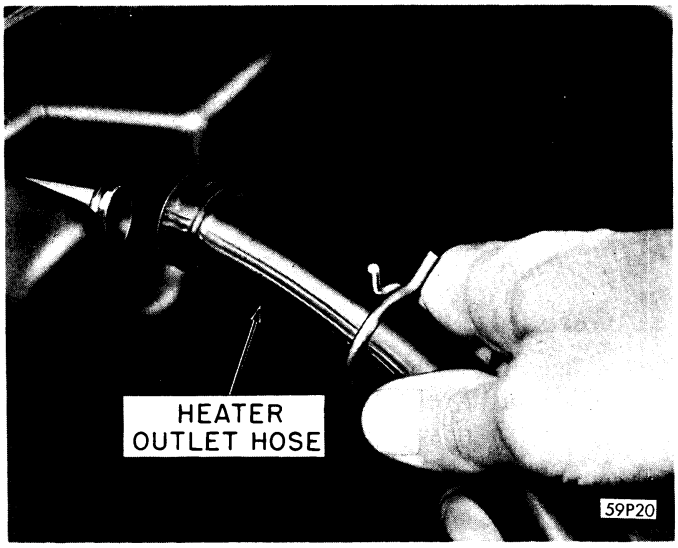


Figure 2—Removing heater outlet hose

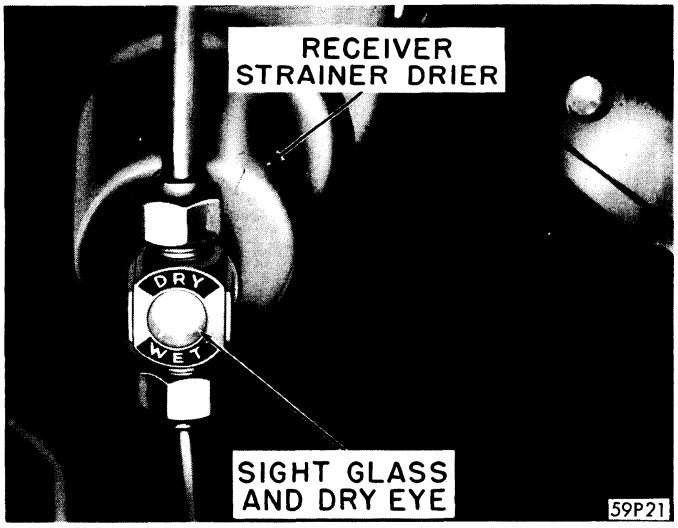


Figure 3—Drier and sight glass

CAUTION

Remove the radiator cap to relieve pressure before removing heater hose.

If the valve is functioning properly, replace hose and radiator cap. Check dry eye for proper color, Figure 3. The dry eye should be "BLUE." If the dry eye is "PINK" it indicates moisture in the system and it will be necessary to purge the system. Replace the drier and recharge.

Block air flow across the condenser as required to raise discharge pressure up to 225 to 250 psi and check sight glass in dry eye for foam. If foam is present, it is an indication that the system is low on refrigerant and requires charging.

No pressure on gauges, it is possible that a lack of pressure on the gauges may be due to the fact that the magnetic clutch is not engaging. Refer to wiring diagram and trace the circuit from the source to the clutch. If voltage is available at clutch, check brushes.

2. AIR FLOW CIRCUIT

The air is drawn by and through the blower into the distribution duct. The distribution duct damper directs the air up and out of the instrument panel outlets and down and out through the deflector, Figure 4.

The air circuit through the flow system varies according to which one of the control buttons has been depressed. This is made possible by the combination vacuum and the electrical push button control switch.

Pushing the button position, a slide valve to cover or uncover the proper vacuum passages and open or close the proper electrical circuit.

When the maximum cool (MC) and the fresh cool (FC) buttons are depressed the electrical circuit to the thermal switch and the magnetic clutch is energized. Where the "OFF," defroster (DEF) and "HEAT" buttons are depressed, the electrical circuits are opened to the thermal switch and clutch.

The electrical circuit to the "BLOWER SWITCH" is completed when the "MC," "FC," "DEF" and "HEAT" buttons are depressed and opened when the "OFF" button is pushed.

The vacuum switch has an air tight valve plate that slides back and forth. The plate automatically connects the vacuum source which is the engine and the other tubes where vacuum is to be applied. The remaining tubes are vented to atmosphere to provide the pressure differential.

The vacuum source tube orifice is .050 in. and the remaining six tubes have orifices of .030 in., Figure 5.

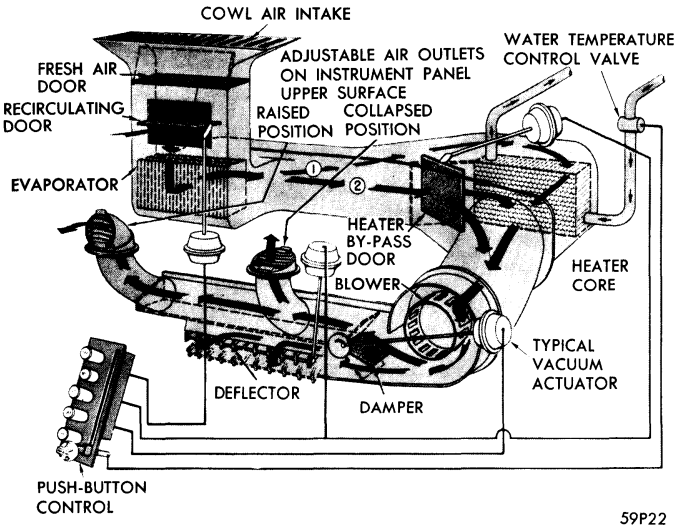
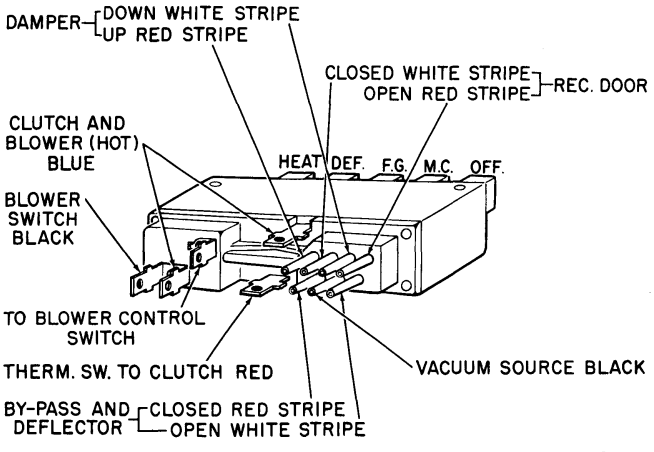


Figure 4—Air conditioning and heating system



(REAR VIEW)

Figure 5—Push button control (rear view)

Due to the smallness of the orifices at the push button control and at the engine itself, there would be no noticeable difference in engine operation if one or more of the vacuum hoses becomes disconnected, other than perhaps a rough idle and the air conditioning and heater unit will not function properly.

The operation of the doors and the damper is provided by the vacuum being connected to one side or other of the rubber vacuum actuator diaphragm. The remaining side is vented back through the control switch to atmosphere.

There are four of these actuators used on the air conditioning and heating system to operate the doors, damper and deflectors, Figure 6. Vacuum is always applied to one side or the other of the vacuum diaphragms when the engine is running.

The position of the various doors for different requirements depends on what button is depressed. This sequence of actions chart indicates the proper positioning for each button that may be pushed, see chart.

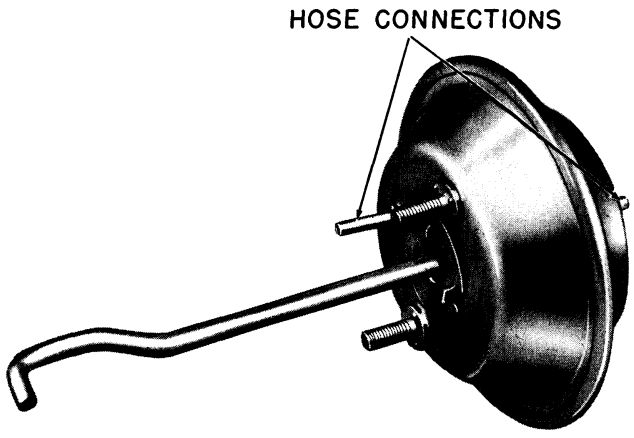


Figure 6—Vacuum actuator

	Off	Max. Cool	Fresh Cool	Defrost	Heat
Fresh Air Door	closed	closed	open	open	open
Recirculating Door	open	open	closed	closed	closed
By-Pass Door	open	open	open	closed	closed
Deflector	up	up	up	down	down
Damper	down	down	down	down	up
Blower Speed	off	Hi & Lo	Hi & Lo	Hi & Lo	Hi & Lo
Clutch Compressor	off	on	on	off	off

For instance, with the "OFF" "MAX. COOL" (MC) button depressed, the fresh air door is closed and the recirculating door is open. The air flow is into the open recirculating door through the evaporator and blower to the distribution duct, Figure 7.

The duct damper is down so the majority of the cooled air will be up through the upper outlets and a small per cent will be out through the lower outlet to the deflectors which are shown "up."

To provide this sequence of actions, the low pressure or vacuum has been directed to the side of the actuator diaphragm which will allow the higher atmosphere pressure to operate the doors and dampers.

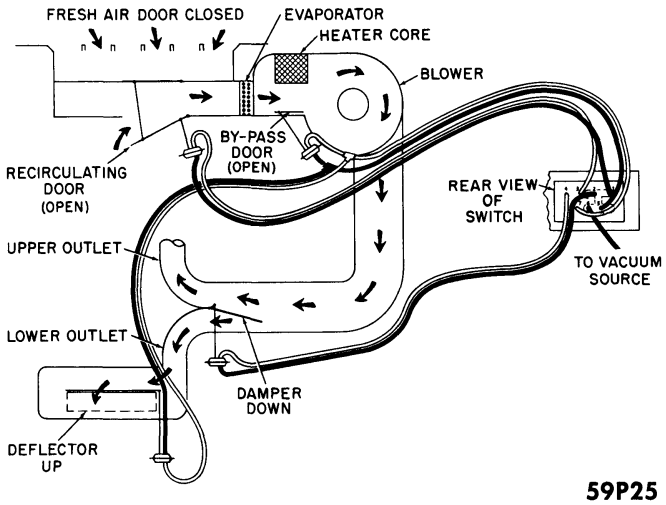


Figure 7—Off and max. cool position

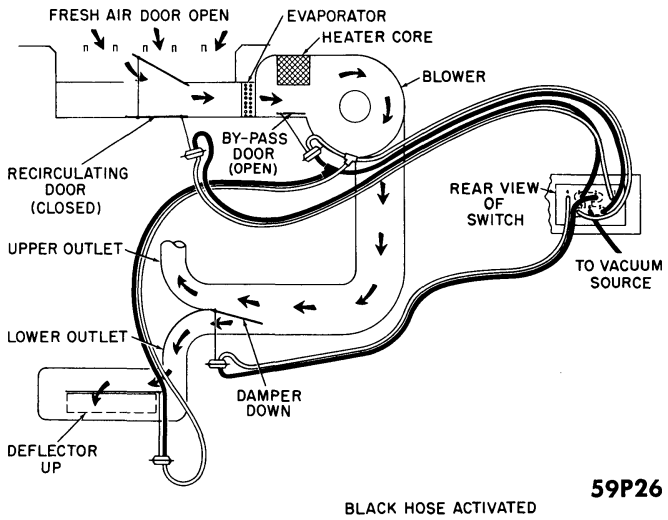


Figure 8—Fresh cool position

When the "FRESH COOL" (FC) button is depressed, the fresh air door opens and the recirculating door closes. The balance of the doors and the damper are in the same positions as for the "OFF" and (MC) positions, Figure 8. The difference being determined by the change in the pressures being applied to the opposite side of the fresh air, recirculating door actuator.

In the "DEFROST" position (DEF) the change in pressure is made on the by-pass door actuator. This change has directed the flow of incoming air through the heater core after it passes through the evaporator. The balance of the doors and the damper are the same as for the "FC" switch position, Figure 9.

In the "HEAT" position the positions of the controls are the same as for the "DEFROST" with the exception of the damper. The hose to the opposite side of the damper actuator has been activated and the damper is now positioned up to direct the heated air out through the deflectors at floor level, Figure 10.

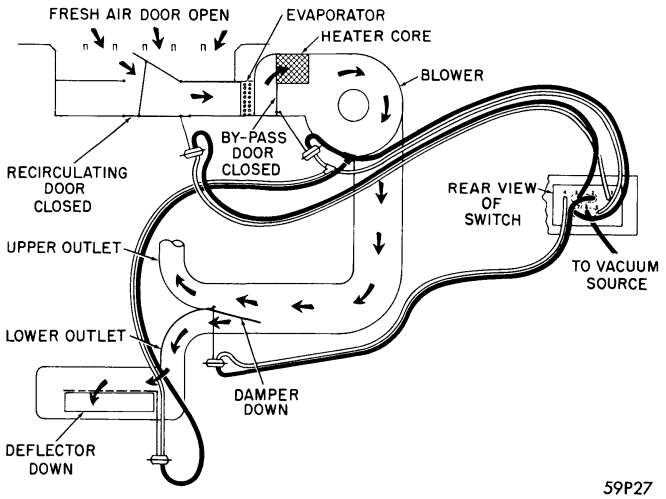


Figure 9—Defrost position

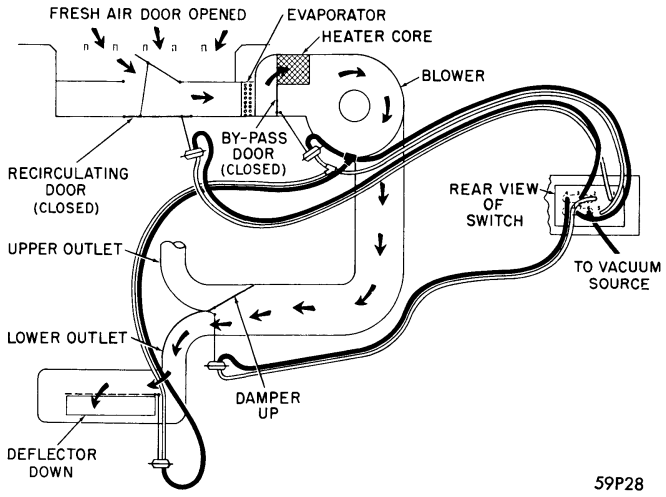


Figure 10—Heat position

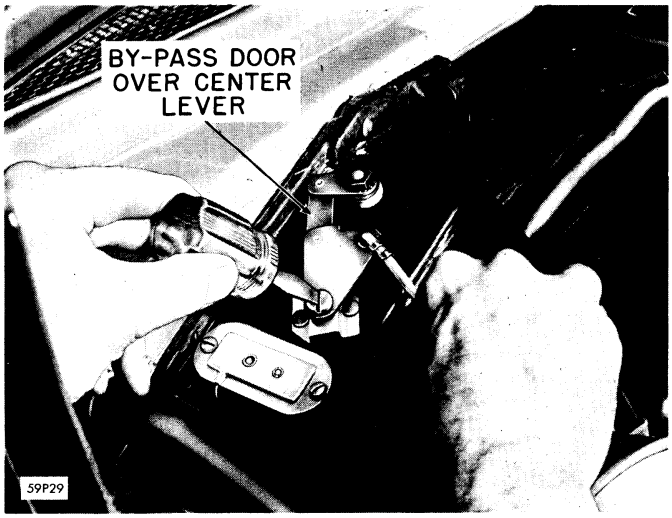


Figure 11—Adjusting by-pass door

Both the "DEFROST" position or the "HEAT" position can be used as "vent" or "FRESH AIR" without either heating or cooling by moving the temperature control lever to the "OFF" position. Adjustments are provided on some of the doors and the damper. A door that is maladjusted can prevent normal operation. If the by-pass door is out of adjustment, the heater by-pass door may not fully close and when in the "HEAT" or "DEFROST" position will allow cold outside air to by-pass the heater core and flow into the car. This condition can be corrected by proper adjustment.

To adjust the by-pass door, loosen the adjustment screw and push the actuator diaphragm rod toward the rear of the car, until the over center lever straightens out and tighten the screw, Figure 11.

The deflectors are provided to direct the flow of air to the floor level or up towards the front seat passenger and/or driver. The deflectors are operated by an actuator and are automatically positioned up when the "OFF," MAX. COOL" and "FRESH COOL" buttons are depressed.

An over-ride feature is provided to allow manual adjustment either by hand or foot. The deflectors may be moved on the shaft for the personal comfort of individuals should they desire to deflect the flow of air to some other direction (up or down) than that provided by the actuator, Figure 12.

The recirculating door is hinged in the center, providing a butterfly action. When the door is open, it offers very little resistance to the flow of air. A large volume of air can be recirculated.

AIR CONDITIONING DATA AND SPECIFICATIONS

Clutch	Air Gap	.050—.060
	Torque	75 ft. lbs. minimum
Compressor	Type	2 Cyl. "V" type
	Bore	$2\frac{5}{16}$"
	Stroke	$1\frac{1}{8}$"
	Displacement	9.45 cu. in. per rpm
	Type Valve	Reed type
	Speed (depends on axle ratio and tire size)	Approx. 1250 rpm at 25 mph
	Oil Capacity (Refrigerant Oil 300)	10—11 ounces
	Clutch	Rotating coil
	Mufflers	In compressor discharge line
Condenser	Location	Front of radiator
Receiver Strainer Drier	Type	Dry-Eye—Replaceable dryer
	Location	Fender shield
Refrigerant	Type	Refrigerant 12
	Total Charge—Dash Unit Only Dash and Roof Unit	$2\frac{1}{2}$ to $2\frac{3}{4}$ lbs. $3\frac{3}{4}$ to 4 lbs.
Evaporator	Location	Cowl panel
Blowers	Type	Centrifugal
	Location	Distributor duct
	Capacity	250 cu. ft. of air per minute at high speed
	Current Draw	Approx. 14.17 amps at 14 volts

TOOLS

Service tools remain the same except for the following additional tool:

C-3668 ..... Psychrometer—Humidity Testing

The air inlet grille can be removed. The fresh air door is then readily accessible. The rod connecting the fresh air door and the recirculating door is provided with a turn buckle nut. The length of the rod can be adjusted by using two $\frac{7}{16}$ in. end wrenches.

OVERALL PERFORMANCE TEST

When making the overall performance test, it is necessary that it be performed as follows: Open the car windows and move the temperature control lever to the "OFF" position. Start the engine, push in the "FRESH AIR" button and pull the blower switch to "HIGH." Adjust the engine rpm to 1250 ± 50 rpm.

Arrange the gauge set manifold hoses and tachometer leads to allow the hood to be lowered and close the hood, Figure 13. Place a thermometer in the instrument panel right hand outlet grille, Figure 14.

Check the discharge pressure, and restrict the air flow across the condenser to adjust the pressure to 190 to 210 psi. The 190-210 pressures change according to ambient temperatures, humidity and efficiency of the entire system.

If air is in the system causing excessive head pressures, it may be removed as follows:

1. Operate system as in performance test for 10 minutes.
2. Stop engine.
3. Open discharge valve on gauge manifold for a couple of seconds.
4. Any air in system will gather between the compressor discharge valve and condenser, above the refrigerant gas.

Open the manifold gauge discharge valve. The refrigerant gas below the air will force the air out. If system does not pass the performance test and all components previously tested are OK, test compressor capacity and replace valve plate assemblies, if necessary. If a motor driven psychrometer (B) is available, Figure 13, place it near the inlet grille as shown at B.

If the motor driven psychrometer is not available the sling type (A) may be used but this type requires swinging. Operate the air conditioning system until air equilibrium condition on the gauges and thermometers has been established.

One of the most important factors in making the overall performance test, is that the engine must be operated at 1250 ± 50 rpm with the hood closed for a sufficient time to raise the temperature to operating temperature.

When measuring the wet and dry bulb (psychrometer) inlet temperatures, the psychrometer must be placed in the right front inlet grille.

NOTE

When testing a roof or rear end unit used with a dual installation, the blower for the front unit must be "OFF," and a jumper wire must be connected across the thermal switch. This is essential to prevent the clutch from cycling.

THERMAL SWITCH TEST

Adjust the engine speed to 1250 ± 50 rpm. Depress the "MAX. COOL" (MC) button and closely observe the suction pressure gauge. The suction pressure should slowly decrease.

When the suction pressure is between 18 to 24 psi, the clutch should de-energize and the suction pressure should immediately begin to increase. If the suction pressure goes below 18 psi, without the clutch de-energizing, the thermal bulb may not be making a good contact in the evaporator.

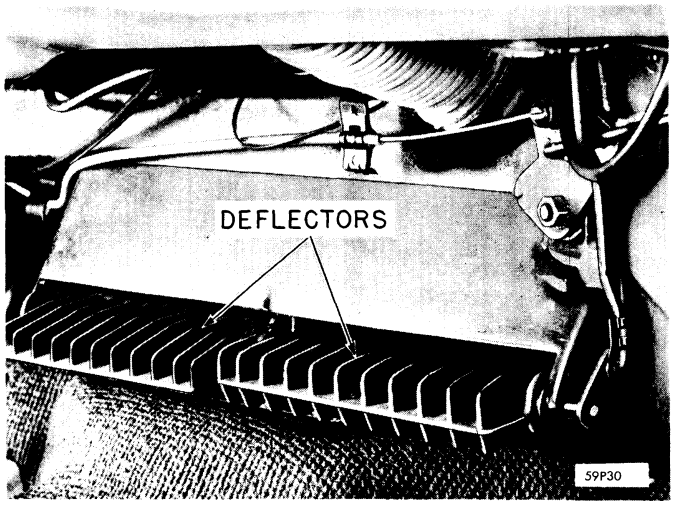


Figure 12—Air conditioning deflectors

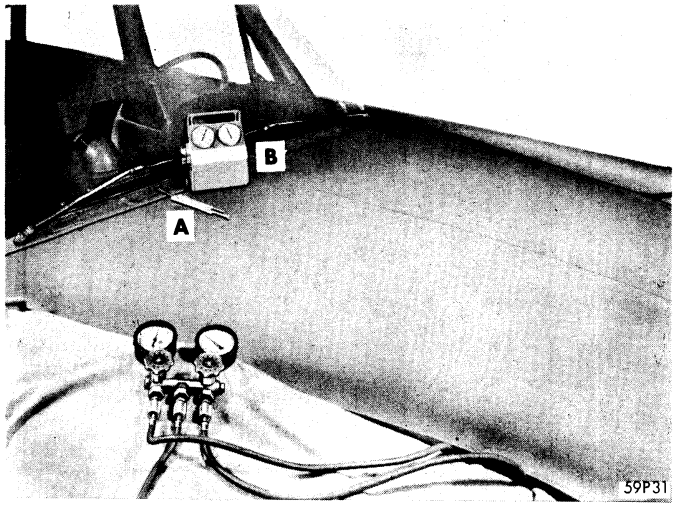


Figure 13—Manifold gauge, hood lowered

PERFORMANCE TEMPERATURE CHART

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

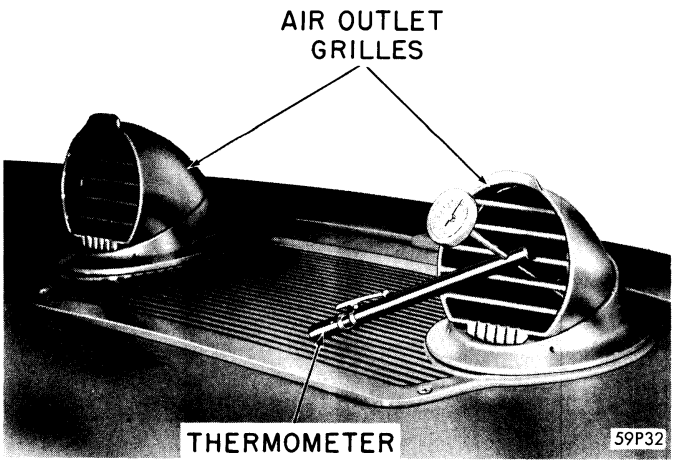


Figure 14—Thermometer in outlet grille

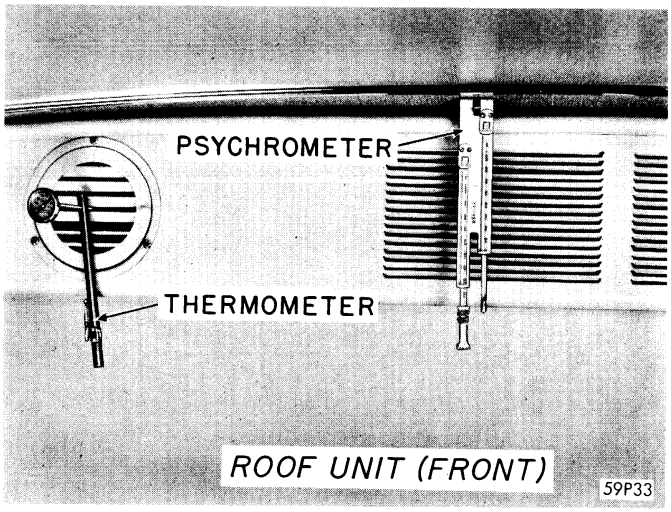


Figure 15—Checking roof unit

The clutch should again energize between 24 and 35 psi. The cluch engagements and disengagements are indicated by pressure reversals on the suction gauges. Because of this gauge action, the use of auxiliary indicators (test lamps, etc.) are not necessary.

This will allow all the under hood components of the cooling system to be subjected to the under hood operating temperatures and become temperature normalized. After the proper temperature condition has been established, observe and record the cowl vent inlet dry bulb temperature. Observe and record the wet bulb inlet temperature. Observe and record the instrument panel outlet grille air temperature.

Refer to the temperature correction chart and determine the degrees (F) plus or minus. Refer to the performance temperature chart and determine the maximum allowable discharge air temperature for the prevailing wet and dry bulb temperature.

NOTE

If the discharge air temperature is at or below the temperature given on the chart; the cooling system may be accepted as delivering its rated cooling capacity.

PERFORMANCE TEST "B"

When measuring the air discharge temperature of a front end installed unit, the thermometer should be positioned in the right hand instrument panel outlet grille.

PERFORMANCE TEST "C"

When measuring the air discharge temperature of a roof unit the thermometer must be placed in the right front air outlet, Figure 15. See last section of manual for wiring diagrams.

SECTION IV—INSTRUMENTS, GAUGES, HORNS AND WINDSHIELD WIPERS—SWITCHES

Servicing procedures of the instruments, gauges, horns, windshield wipers and switches are essentially the same as servicing of prior models. For complete servicing procedures of these units, refer to the 1957-58 *Plymouth Service Manual*. Refer to the data and specifications charts in this supplement for information concerning units on 1959 models.

1. HEADLAMP SWITCH

To remove the headlamp switch push the control knob and shaft to the off position (full in). Depress the button on top of switch and at the same time pull out the control knob and shaft. Remove the switch locking nut and remove switch assembly.