

Granada and Monarch A.T.C.

PART
36-72

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CK3456-2B

DESCRIPTION AND OPERATION

The Automatic Temperature Control System will automatically control the temperature and reduce the relative humidity of air inside the car. Two slide control levers are provided to maintain the desired temperature and system function. The system will deliver heated or cooled air to maintain the car interior temperature and will maintain the set comfort level automatically. The blower speed can be adjusted for more or less air as desired, depending on the operating condition.

Automatic control of temperature is maintained in both summer and winter. In hot weather, it will cool the car to the pre-set comfort level and then modulate cooling to whatever is required to maintain the desired temperature.

In mild weather, the interior of the vehicle is heated or cooled automatically as required to maintain comfort. In cold weather, provision is made in the HEAT position of the function lever to delay the operation of the system until engine coolant has warmed enough to minimize the discharge of cold air from the heater outlets. The system will then heat the car quickly to the desired temperature and level out to maintain the pre-set temperature.

During operation, outside air is drawn from the cowl vent just below the windshield at all times, except during maximum cooling in the A/C function lever position, when recirculated air is used.

The system utilizes what is called a "reheat" method to provide conditioned air to the car interior. With this method all air flow from the blower passes through the evaporator core, where it is cooled and dehumidified. Temperature is then regulated by reheating a portion of the cooled dry air and blending it with the remaining cool air to the desired temperature. Temperature blending of the evaporator outlet air is automatically varied by the temperature blend door which controls the amount of cooled air that flows through or around the heater core, where it is mixed and directed into the distribution plenum. The air is finally diverted to the heater ducts, the defroster nozzles, or the panel (A/C)

registers according to the selected function lever position.

CONTROL LEVER

The Automatic Temperature Control includes a function control slide lever for OFF, ECONOMY-VENT, A/C, HI-LO, HEAT, DEFOG (▽) and DEFROST that determines the manner in which the system will operate, a calibrated temperature control slide lever for setting the desired comfort temperature, and a blower switch to control the volume of air movement. Each position of the function control lever and blower switch is detented for positive engagement.

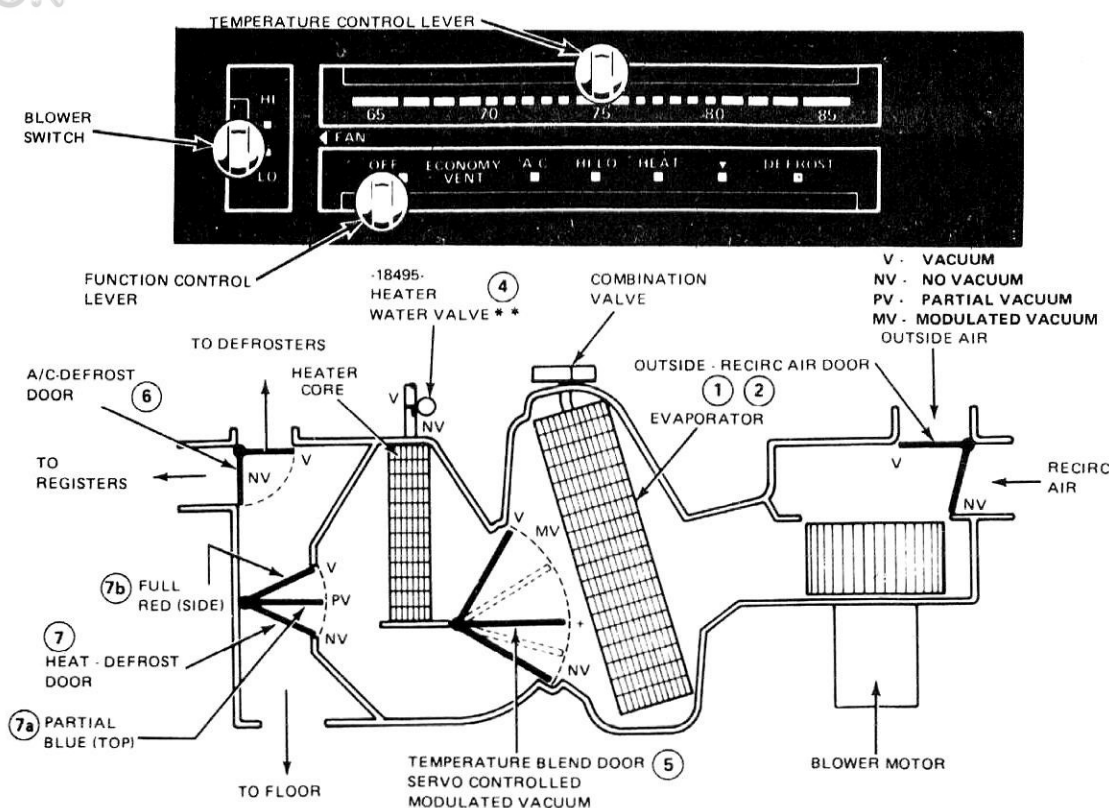
The blower switch provides four manually selected blower speeds.

AUTOMATIC TEMPERATURE CONTROL

The electrical and airflow schematics and vacuum charts shown in Figs. 1, 2 and 3 may be used in conjunction with the following explanation to clarify system operation:

Temperature control of the ATC system is primarily determined by the vacuum modulation produced by the mechanical sensor assembly that controls the servo vacuum motor. Discharge air outlet is manually controlled by the control head assembly. Temperature control is accomplished by means of a control cable between the control head assembly and sensor assembly.

The sensor assembly is basically a bimetal operated vacuum modulator. The sensor directly converts air temperature into corresponding values of modulated vacuum. The bimetal senses in-car temperature and is mechanically linked to an internal vacuum modulator to directly control and regulate a vacuum which is proportional to temperature. The bimetal and vacuum modulator are placed within a plastic aspirator. Air is diverted by an air scoop near the high pressure side of the blower (before the evaporator), through a tube to



AUTOMATIC TEMPERATURE CONTROL SYSTEM VACUUM MOTOR TEST CHART							
FUNCTION CONTROL LEVER POSITION	ATC REQUIREMENT	OUTSIDE- RECIRC.	VACUUM MOTORS APPLIED WITH VACUUM				
			WATER VALVE **	TEMP BLEND +	A/C-- DEFROST	HEAT-DEFROST	
						PARTIAL	FULL
OFF	—	1-2	**	+	—	7a	7b
ECONOMY VENT	Cool	—	4	5	6	—	—
	Mid	—	—	+	6	—	—
	Warm	—	—	—	6	—	—
A/C *	Cool	1-2**	4	5	6	—	—
	Mid	—	—	+	6	—	—
	Warm	—	—	—	6	—	—
HI-LO *	Cool	—	4	5	6	7a	—
	Mid	—	—	+	6	7a	—
	Warm	—	—	—	6	7a	—
HEAT	Cool	1-2†	4	5	—	7a	7b
	Mid	1-2†	—	+	—	7a	7b
	Warm	1-2†	—	—	—	7a	7b
▽ (DEFOG) *	Cool	—	4	5	—	7a	—
	Mid	—	—	+	—	7a	—
	Warm	—	—	—	—	7a	—
DEFROST *	Cool	—	4	5	—	—	—
	Mid	—	—	+	—	—	—
	Warm	—	—	—	—	—	—
VACUUM LINE COLOR CODE		WHITE	GREEN	TAN	YELLOW	BLUE (TOP)	RED (SIDE)

* COMPRESSOR CLUTCH ENGAGED WHEN AMBIENT CUT-OFF SWITCH IS CLOSED.

† DELAYED BY ENGINE TEMP. SENDER AND E.V. RELAY UNTIL 130°F. ENGINE COOLANT TEMP.

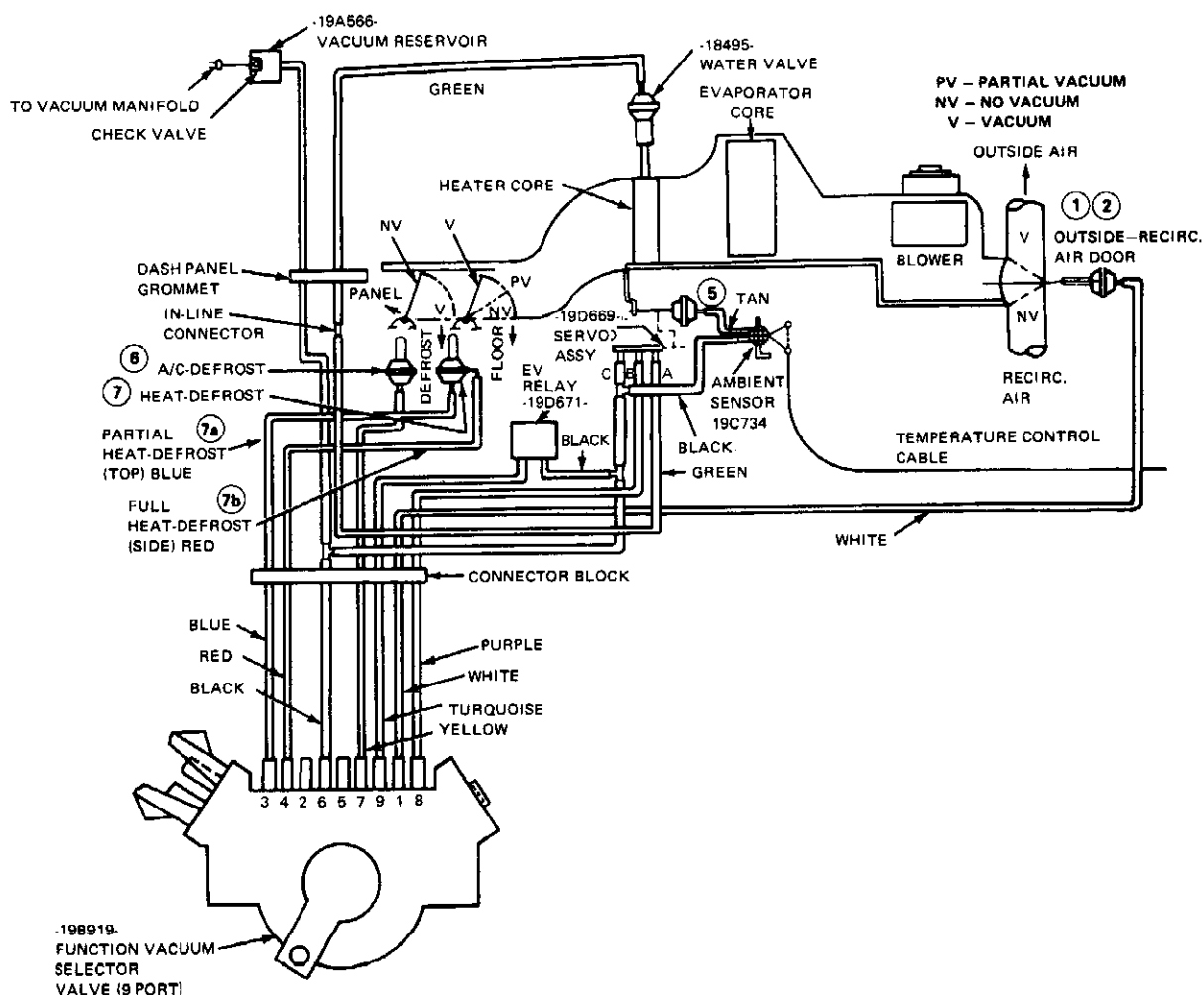
** DEPENDENT ON HEATING/COOLING REQUIREMENT OF SERVO DIVERter VALVE

+ MODULATED VACUUM

— NO VACUUM

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FIG. 1 ATC System Air Flow Schematic and Vacuum Control Chart



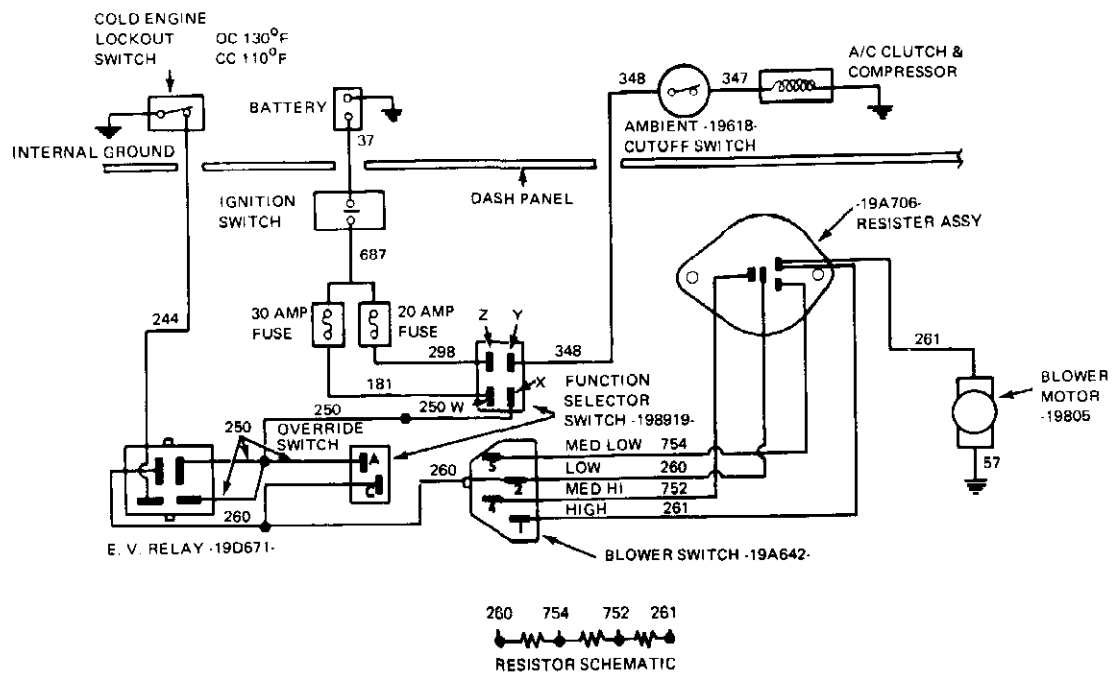
PORT	FUNCTION	FUNCTION SELECTOR VALVE LEVER POSITIONS							HOSE COLOR
		OFF	ECONOMY VENT	A/C	HI-LO	HEAT	DEFROG	DEFROST	
1	Outside-Recirc.	V		To 8		To 2			White 1-2
2	From EV Relay	Seal	Seal	Seal	Seal	To 1	Seal	Seal	Turquoise
3	Partial Heat-Defrost	V			V	V	V		Blue 7a
4	Full Heat-Defrost	V				V			Red 7b
5	No Function	Seal	Seal	Seal	Seal	Seal	Seal	Seal	—
6	No Function	Seal	Seal	Seal	Seal	Seal	Seal	Seal	—
7	Defrost A/C-Defrost		V	V	V				Yellow 6
8	From Diverter Valve No. 2	Seal	Seal	To 1	Seal	Seal	Seal	Seal	Purple
9	Source	V	V	V	V	V	V	V	Black

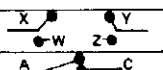
V - VACUUM

BLANK - ATMOSPHERE

FIG. 2 ATC System—Vacuum Schematic and Selector Test

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FUNCTION SELECTOR AND OVERRIDE SWITCH -198919-							
SWITCH SCHEMATIC	TERMINAL CONNECTIONS						
	OFF	ECONOMY VENT	A/C	HI-LO	HEAT	DEFROG	DEFROST
	None	W - X	W - X Y - Z	W - X Y - Z	W - X	W - X Y - Z	W - X Y - Z
	A - C	A - C	A - C	A - C	None	A - C	A - C

BLOWER SWITCH -19A642-			
BLOWER SPEED	TERMINAL CONNECTIONS	CURRENT IN CAR (AMPS)	BLOWER VOLTAGE
Low	2	8	5
Med Low	2 - 5	11	7
Med High	2 - 4 - 5	20	10
High	2 - 1 - 4	25	14

CIRCUIT NO.	WIRE COLOR
37	Yellow
57	Black
181	Brown W/Orange Stripe
260	Red W/Orange Hash
261	Orange W/Black Stripe
347	Black W/Yellow Hash
348	Lt. Green W/Purple Hash
687	Gray W/Yellow Stripe
752	Yellow W/Red Dot
754	Lt. Green W/White Hash
244	Yellow/White Hash
298	Purple W/Orange Hash
250	Orange

FIG. 3 ATC System—Electrical Wiring Diagram and Continuity Test

the sensor assembly. The air flows through the aspirator which draws vehicle interior air over the in-car bimetal. This combined air is then exhausted from the sensor underneath the instrument panel where it will not be felt by the passengers or driver.

The modulated vacuum from the sensor is directly connected to the large calibrated vacuum motor portion of the servo assembly. The modulated vacuum controls and positions the blend door attached to the arm of the servo motor assembly. The calibrated vacuum motor moves the blend door to mix various proportions of hot air from the heater core and cold air that has by-passed the heater core. Vehicle air temperatures produce compensating discharge air temperatures, i.e., high vehicle interior temperatures produce high sensor output vacuums which position the blend door to deliver cool discharge air. Low vehicle interior temperatures produce low sensor vacuum levels which cause warm discharge air.

Blower motor speed is manually controlled to satisfy the operator. There are four switch positions to provide four blower speeds. There are no automatic speeds. A vacuum diverter valve, a part of the power servo assembly and also attached to the arm of the servo motor, turns off the water valve under maximum cooling conditions, and controls the outside air/recirculating door for maximum cooling conditions when the function control lever is in the A/C position.

Sensor Assembly

The "sensor" consists of a bi-metallic sensor that senses in-car air temperature. The output controls a vacuum modulator and higher temperatures cause higher vacuum gauge readings. A bias to the vacuum output levels is accomplished by means of a control arm attached by a cable assembly to the temperature control lever. Thus, the modulated vacuum output is the result of the effects of the control bias and the temperature of the air across the bi-metallic sensor.

The SENSOR also includes an aspirator or venturi (as it is called in previous ATC systems). The aspirator performs the same function as it has in the past, which is to provide a very small vacuum to draw a continuous sampling of in-car air across the air temperature sensing element. In this case, the sensing element is a bi-metallic strip. Air is piped to the sensor via a tube from the blower stream providing the power to operate the aspirator for the in-car sensor.

Servo Assembly

The servo assembly is a large calibrated vacuum motor and vacuum diverter valve. See Fig. 4. The calibrated vacuum motor provides specific temperature blend door positions for given vacuum levels. The attached vacuum diverter valve controls water valve operation and recirc or outside air operation.

Electro-Vacuum Relay (E.V.R.)

The E.V.R. is a combination normally closed vacuum solenoid valve and a single pole single throw normally closed electrical relay, both are actuated by one electrical coil. The E.V.R. performs two functions in the system. It is used during cold engine operation in the HEAT function lever position, to lock-out blower

operation, and to switch the system to recirculating air until the engine coolant warms-up to about 115°F.

Control Head Assembly (Figs. 5, 6 and 7)

The control head consists of three main parts: 1) the function selector—a nine port vacuum selector valve combined with two cam operated electrical switches; 2) blower switch—an electrical switch that provides four speeds of blower operation; and 3) the temperature control lever which connects through a bowden control cable to the sensor assembly.

1. The 9-port vacuum selector valve is very similar to the manual A/C 9-port vacuum selector valve. It directs source vacuum to various vacuum motors and connects the vacuum from the electro-vacuum relay to the outside air-recirc. door in HEAT (See Vacuum Schematic - Fig. 8). A single pole and double pole cam operated electrical switch is also controlled by the vacuum selector. The combination of these cam operated electrical switches controls the electrical supply to the A/C clutch and blower switch.
2. The four-position blower switch is identical to the manual A/C-heater system blower switch.
3. The temperature control lever is connected to the sensor assembly by a Bowden cable assembly. Movement of the control lever from 65°F to 85°F causes a corresponding movement on the pre-load (bias) portion of the sensor assembly, and determines the temperature that the system will maintain. See Fig. 1.

Resistor Assembly

The blower motor resistor assembly is located on the evaporator assembly and is identical to the manual A/C-heater resistor assembly. See Fig. 8. There are three resistance elements mounted on the resistor board to provide four blower speeds. Depending on the blower switch position, series resistance is added or shorted out of the blower motor circuit to decrease or increase speed.

Water Temperature Switch

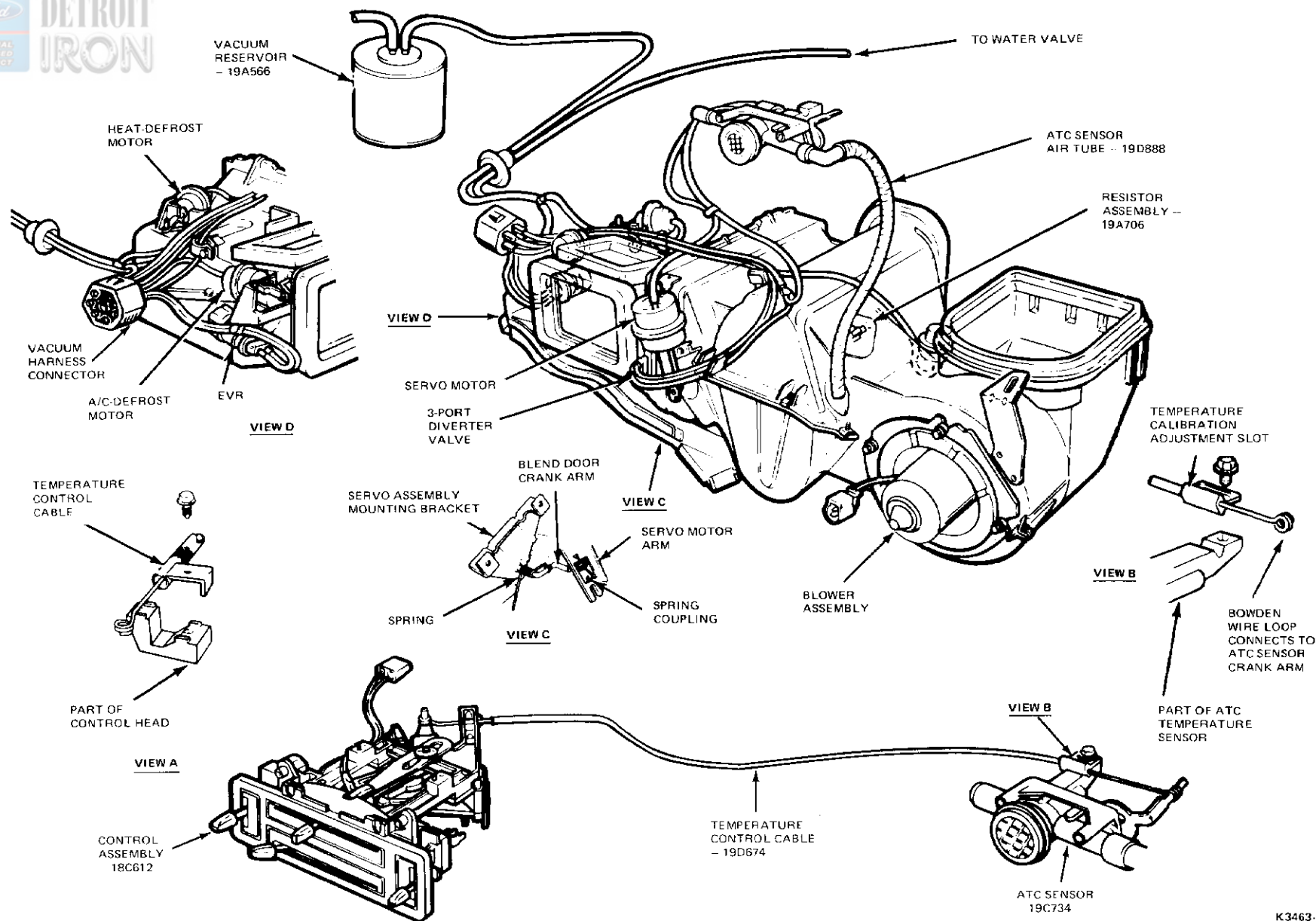
In the HEAT position only, a ground circuit from the engine water temperature switch to the E.V. relay prevents blower operation until the engine coolant temperature reaches about 115°F. This minimizes any cold air discharge from the heater ducts. See Fig. 8. The E.V. relay also provides vacuum to position the outside air-recirc. door in recirc. during cold engine operation in heat.

SYSTEM AIR FLOW

Figs. 2, 3 and 4 contain system vacuum schematics and vacuum motor charts which illustrate vacuum routings and air flow during the various system conditions. Fig. 4 is a system electrical wiring diagram including continuity test information.

Off Position

In OFF position the outside recirc. air door is in recirculating position. The heat-defrost door is in the heat (full vacuum) position, and the A/C-defrost door is in the defrost (no vacuum) position. The blower is off



K3463-2C

FIG. 4 ATC Vacuum System Locations

and the temperature blend door and water valve assume a position depending on the modulated vacuum from the sensor to the power servo.

NOTE: A modulated vacuum is produced in ALL function control lever positions and is entirely dependent on the temperature lever setting and existing in-vehicle temperature conditions.

Economy/Vent Position

In ECONOMY/VENT Position, outside air is directed through the panel (A/C) registers with automatic control of discharge air temperature and water valve actuation. However, refrigerated cooling is not available. ECONOMY-VENT and HEAT positions provide the most economical operation because the compressor does not operate.

A/C Position—Maximum Cooling (Recirculate)

With the function lever in A/C position, maximum cooling is required to achieve or maintain the temperature setting, the modulated vacuum is high at the servo motor, causing:

1. The outside recirc door to go to recirc position;
2. The water valve to close;
3. The temperature blend door to close, allowing all air to by-pass the heater core. Air is drawn from the passenger compartment, directed through the evaporator core where it is cooled and returned to the car interior through the panel (A/C) ducts and registers.

A/C Position—Modulated Cooling (Outside-Air)

When modulated cooling is required to maintain the temperature setting, the temperature blend door is actuated to near the mid-position. The blend door has moved to a position where part of the air leaving the evaporator core is directed through the heater core where it is warmed. Blend air (the combination of cooled and heated air) is then mixed in the plenum and directed into the car interior through the panel (A/C) ducts and registers. The position of the temperature blend door changes automatically to maintain the temperature selected. If the in-car temperature rises above the

temperature lever setting, the blend door moves to admit more cooled air and less heated air. If the in-car temperature drops below the setting, the blend door moves to admit more heated air and less cooled air.

Hi-Lo Position

Operation is similar to that described in the A/C position paragraphs, except that airflow is divided between the panel registers and floor ducts. The system will not recirculate interior air for maximum cooling.

Heat Position—Maximum Heating

With the function control lever in the HEAT position and full heat is required to achieve or maintain the temperature setting, the modulated vacuum is low, causing the water valve to open and the temperature blend door to fully open.

Blower operation will be delayed until the engine coolant reaches about 115°F. Then the air is forced by the blower through the evaporator and all of the air passes through the heater core before being distributed through the heater ducts (floor) into the car interior. A portion of this air is diverted to the defroster nozzles.

Heat Position—Modulated Heating

When modulated heating is required to maintain the temperature setting the temperature blend door has moved to a position so that only part of the air leaving the evaporator core is directed through the heater core where it is warmed. Blended air (the mixture of outside air and heated air) then is directed into the car interior. The A/C clutch does not operate in HEAT position.

Defog (▽) Position

In DEFOG (▽) operation is the same as the heating position, except that the A/C-Defrost door is in the Defrost (no vacuum) position and the Heat-Defrost door is in a partial position. The air flow is directed to the defroster nozzles and the floor outlets. The A/C clutch will also be engaged when the outside air temperature is sufficiently high enough to close the ambient cut-off switch. This assists in reducing the windshield fogging by dehumidifying the outside air.

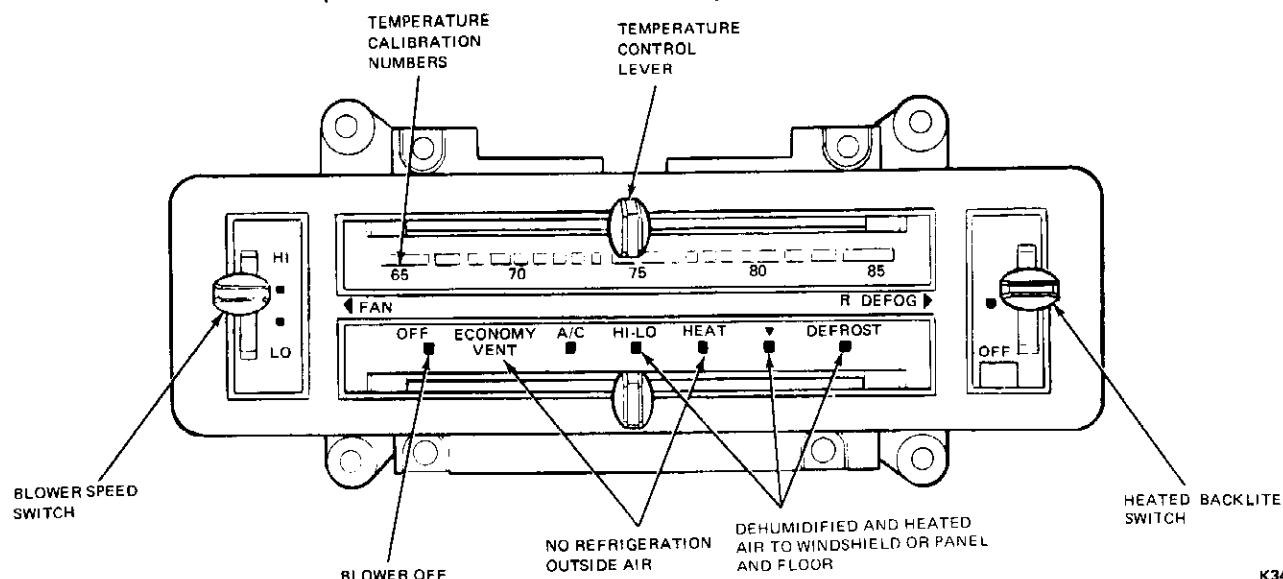


FIG. 5 ATC Control Head Functions

K3459-2B

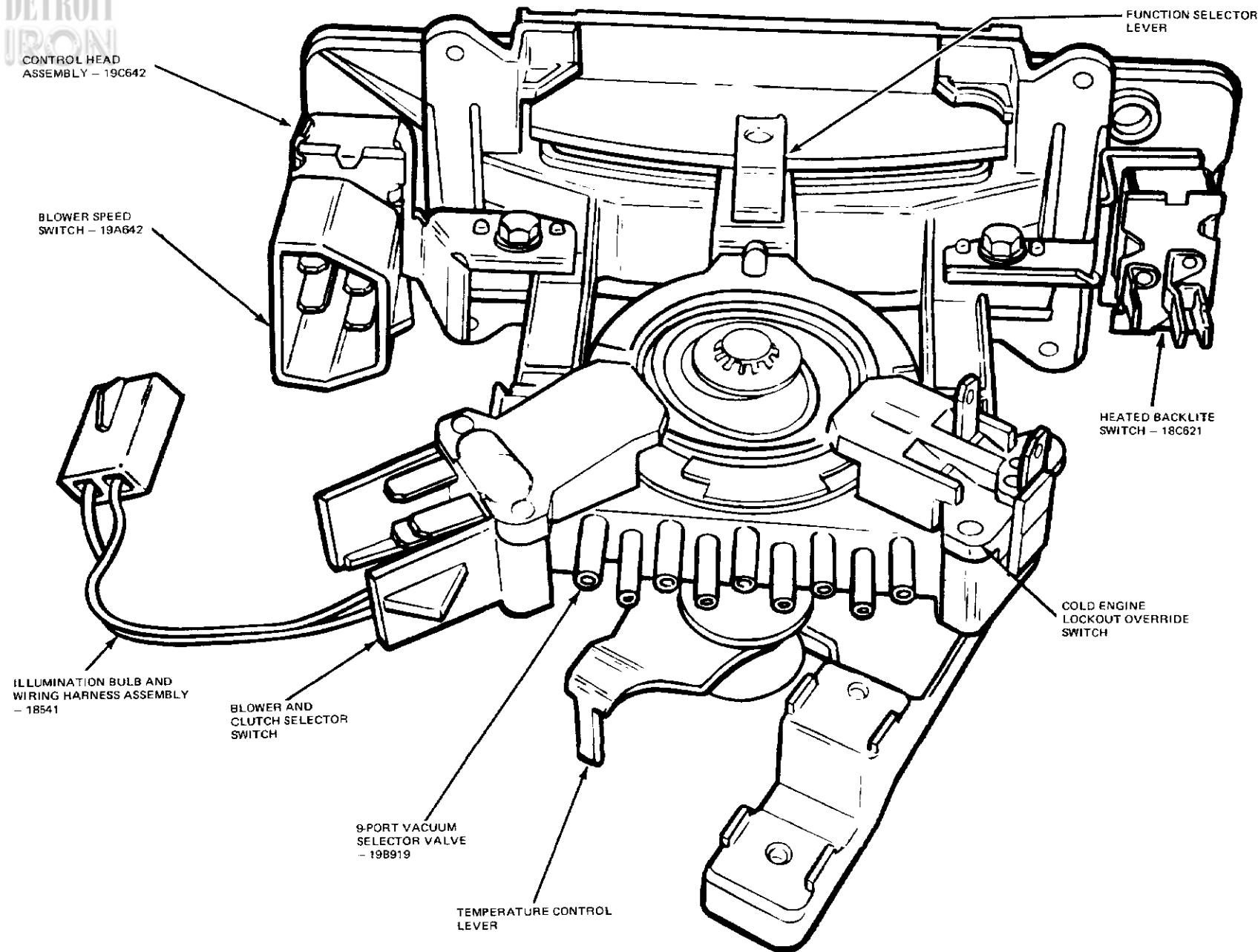


FIG. 6 ATC Control Head, Bottom View

K3467-2B

Defrost Position

When the function lever is in the DEFROST position, the A/C-Defrost and Heat-Defrost doors are in the full defrost (no vacuum) position so that all incoming air is directed to the defroster nozzles with slight bleed to the

floor. The temperature blend door modulates in this position but maximum heat can be obtained by moving the temperature lever to the highest temperature position. The A/C clutch also operates in this position to dehumidify the air and reduce fogging.

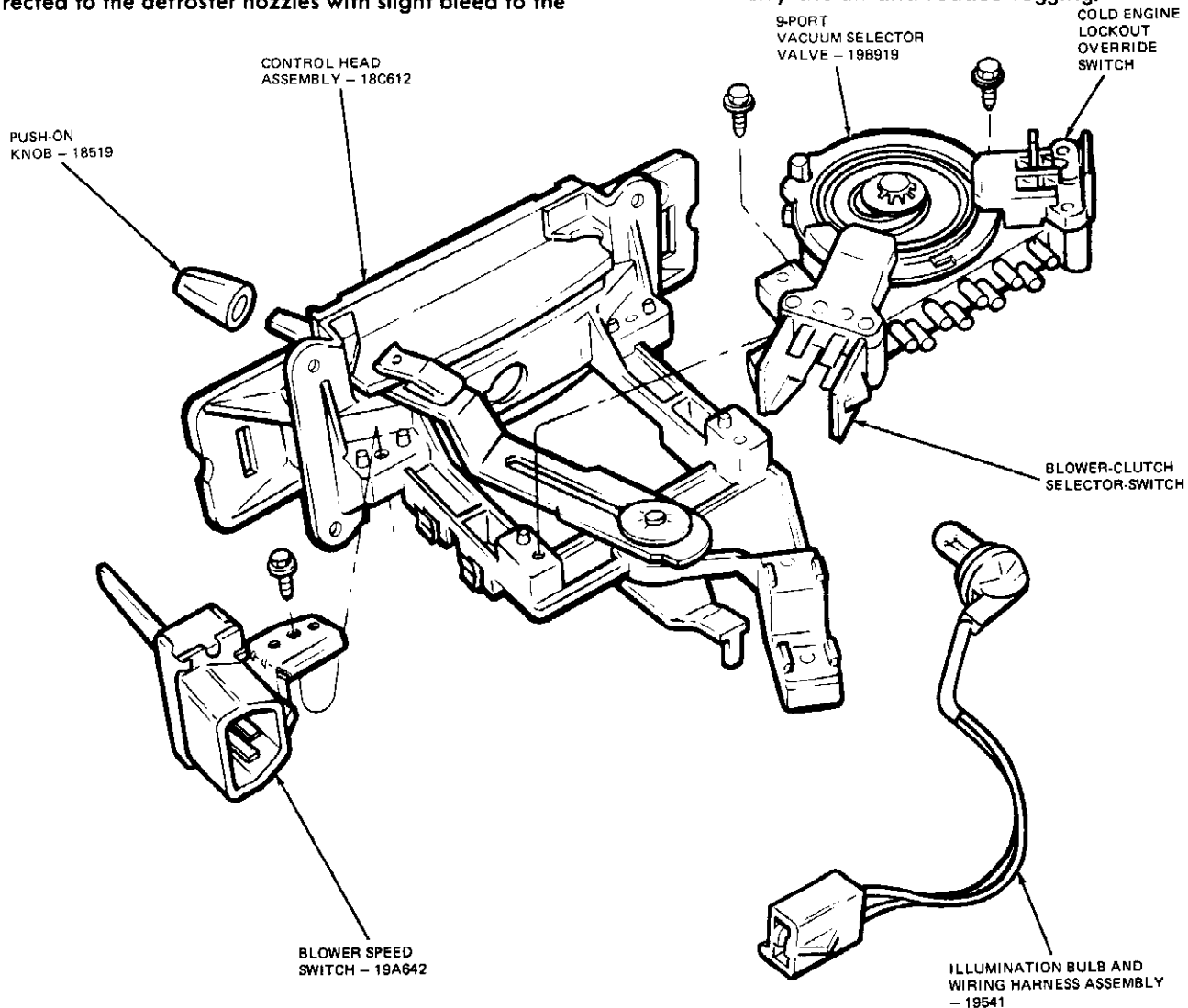
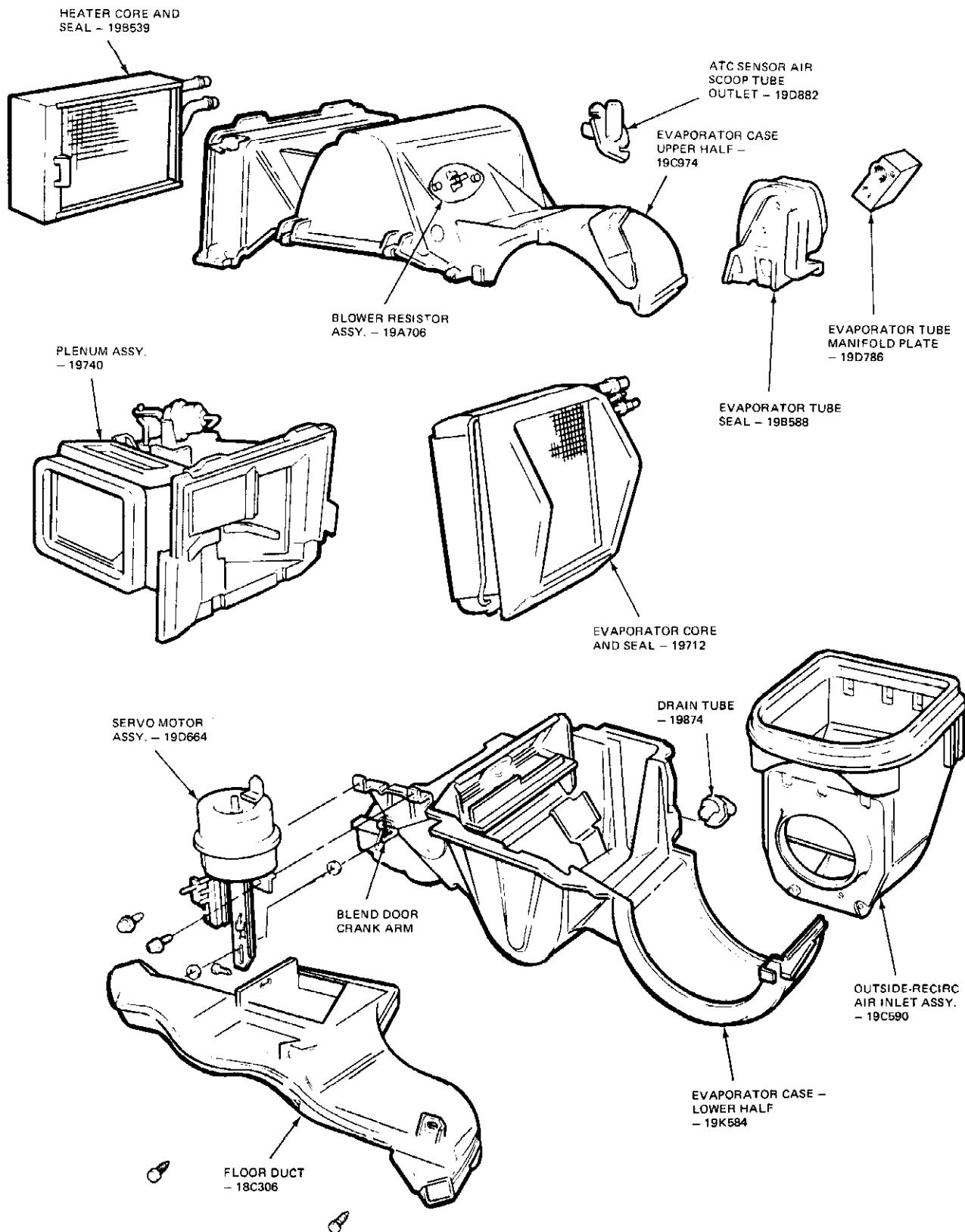


FIG. 7 ATC Control Head, Disassembled

K3468-2B



K3465-2B

FIG. 8 ATC Evaporator Case Assembly, Disassembled

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ADJUSTMENTS

SENSOR CALIBRATION (FIG. 9)

1. Remove the instrument panel pad and visually determine which direction to rotate the sensor calibration locking pin.
2. While moving the temperature control lever, rotate the calibration locking pin into the 75°F calibration notch of the sensor control arm.
3. Check the position of the temperature control lever, it should be at 75. If it is not, loosen the bowden cable housing-to-sensor attaching screw and move the temperature control lever to 75 while the sensor control arm is locked in the calibration position. Retighten the bowden cable housing-to-sensor attaching screw, making sure the temperature control stays at 75 and the sensor arm stays locked.

READJUSTING CALIBRATION POINT

If it should become necessary to change the calibration point to suit a customer, first check the

sensor calibration as described in the above procedure. If O.K., use the following procedure:

1. Establish the customer's preference and the difference between the present and desired comfort level setting.
2. Determine the direction of change.
3. To decrease or increase, adjust the temperature control lever position with the sensor arm locked in the 75°F calibration notch. Loosen the bowden cable housing-to-sensor attaching screw, move the temperature control lever the desired amount and retighten the attaching screw.

NOTE: Move the temperature control lever **HIGHER** to **DECREASE** and **LOWER** to **INCREASE** the controlled temperature at a given setting.

CAUTION: If a readjustment of the temperature control lever of more than 4°F is required, and the cable adjustment is correct per Sensor Calibration Procedure above, replace the sensor assembly.

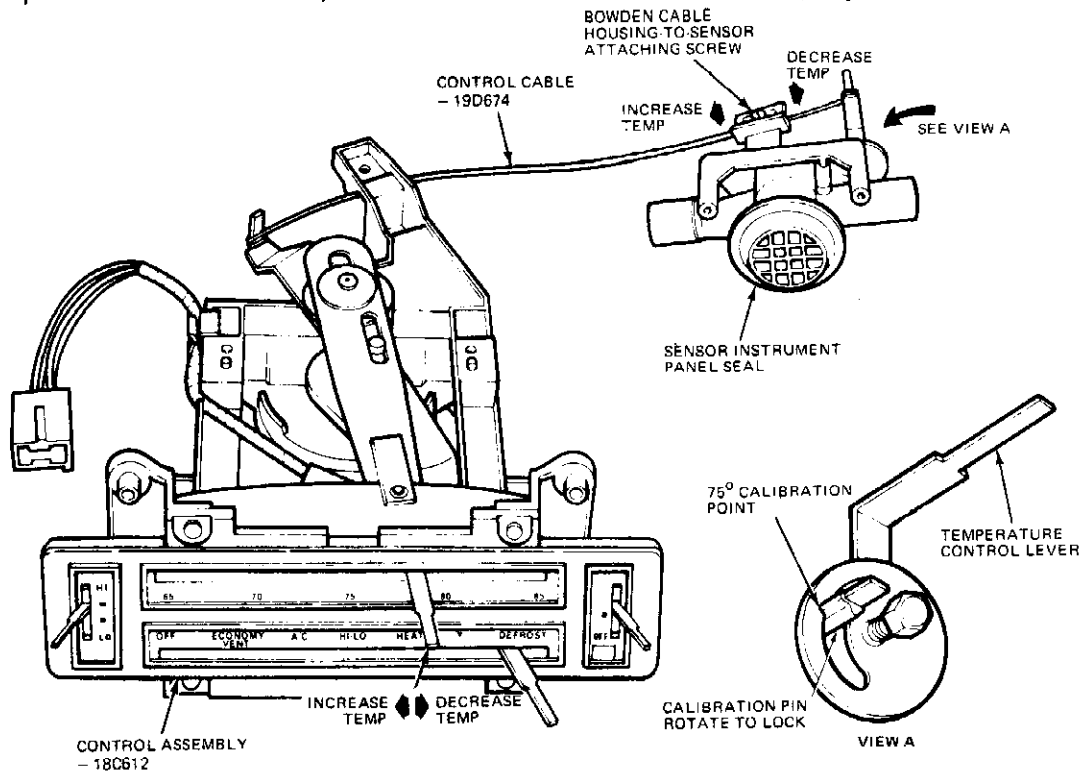


FIG. 9 A.T.C. System Temperature Calibration

REMOVAL AND INSTALLATION

SENSOR ASSEMBLY

See Fig. 10 for an ATC System installation drawing.

Remove the instrument panel pad to gain access to the sensor assembly. Carefully disconnect the inlet air elbow, the vacuum connector and control cable. Remove two (2) mounting screws and remove the sensor.

To install, rotate the sensor control arm to the mid position and turn the plastic calibration pin to the locked 75°F position. Install the sensor, connect the inlet air elbow and vacuum connector. Connect control cable to sensor control arm and adjust cable with reference to Sensor Calibration procedure.

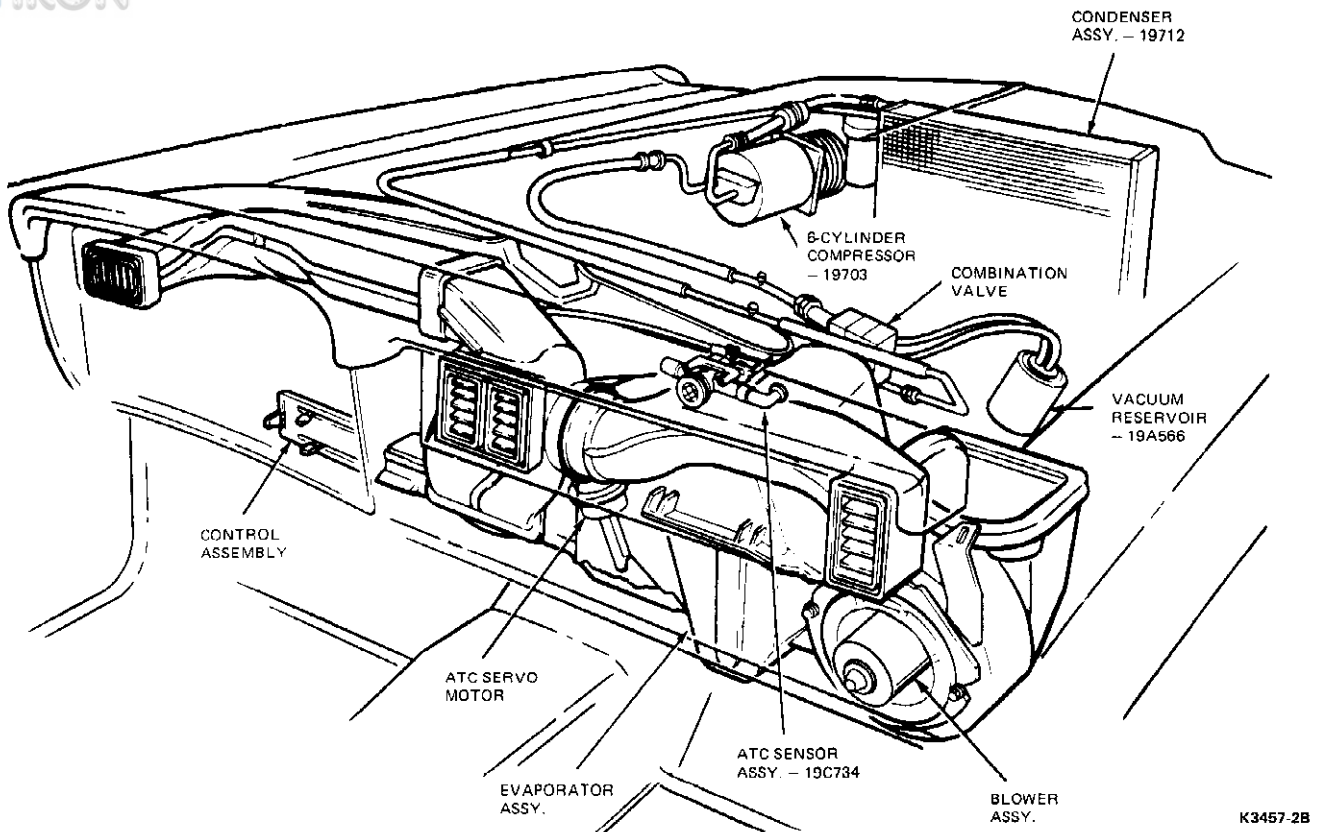


FIG. 10 ATC System Installation

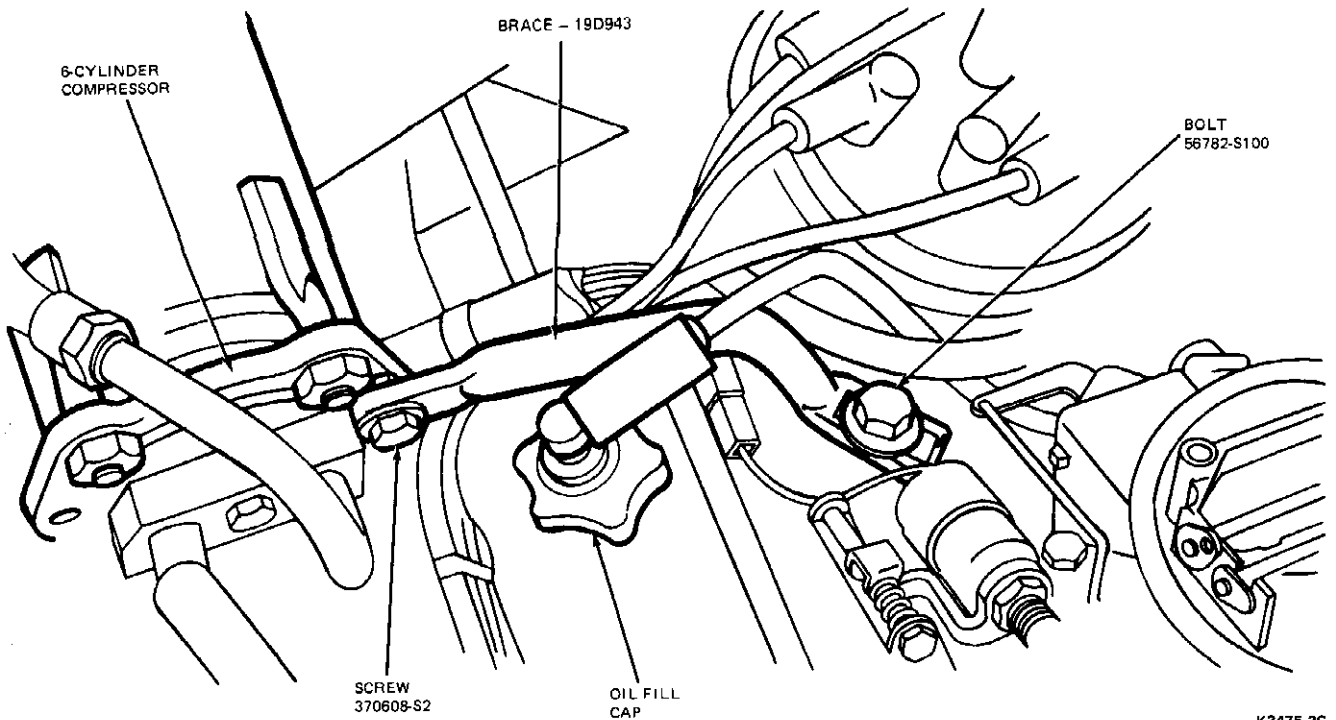


FIG. 11 Compressor Installation—5.0L (302 CID) V-8 Engine

ELECTRO VACUUM RELAY (EVR)

1. Remove EVR mounting screw from bracket on plenum assembly.
2. Disconnect the vacuum connector and electrical connector.
3. Reverse this procedure to install.

SERVO ASSEMBLY

1. Remove the glove box.
2. Remove tan hose from servo motor.
3. Remove one (1) retaining nut and remove vacuum multiple connector from diverter valve.
4. Remove retainer from temperature blend door crank arm. Avoid bending the crank arm.
5. Remove two (2) servo mounting screws, disconnect the servo arm and tension spring from the temperature blend door crank arm and remove the servo assembly.
6. Install a new servo assembly by reversing the above procedure.

CONTROL HEAD ASSEMBLY

1. Remove A/C control knobs and accessory switch knob.
2. Remove two (2) lower control assembly attaching screws.

3. Remove two (2) upper control assembly attaching screws.
4. Remove temperature control cable from control head (1 screw).
5. Disconnect multiple vacuum harness connector from the 9-port vacuum selector valve.
6. Disconnect electrical wiring connectors from blower switch, override switch, selector switch, illumination bulb and rear defogger switch.
7. Reverse the above procedure to install and check the temperature control cable adjustment, using Sensor Calibration Procedure in Section VI, Paragraph 3. Adjust if required.

RESISTOR ASSEMBLY

1. Disconnect the electrical connector.
2. Remove the resistor assembly from the evaporator assembly. To install, reverse the above procedure. Always apply body sealer between the resistor board and evaporator case before installing the resistor assembly.

COMPRESSOR

- For compressor installation drawings, refer to Fig. 11.

SPECIFICATIONS

1. Protective Device - 20 amp fuse in clutch circuit; 35 amp fuse in blower circuit.
2. Control Illumination - one ICP-161 bulb.
3. Blower Motor Current (Amps) and Voltage:
Low - 8 amps - 5 volts;
Medium Low - 11 amps - 7 volts;
Medium High - 20 amps - 10 volts;
High - 25 amps - 14 volts.
4. Compressor - 6-cylinder:
Type - Swash Plate - Three double acting pistons - axial type;
Cylinder Bore - 1-1/2 inches;
Stroke - 1-3/16 inches;
Rotation - Clockwise;
Type of Oil - TL4538 Texaco 525 Viscosity Refrigeration Oil or equivalent;
Oil Capacity - 10-1/2 ounces (Ford DIVY-19577-A or equivalent).
5. Clutch - Magnetic:
Approximately 3.44 amps @ 12.8 volts.
6. Compressor Drive Belt Tension:
New: 120 to 160 lbs;
Used: 75 to 120 lbs (after operation for 10 minutes or more).
7. Combination Valve Screws:
Manifold to Expansion Valve: 4 to 8 ft.-lbs.;
STV Housing to Expansion Valve: 4 to 6 ft.-lbs.
8. Refrigerant:
Capacity: 4 lbs. plus 1/4 lb., minus 0;
64 oz. plus 4 oz., minus 0;
1.814 Kg. plus 0.113 Kg., minus 0.
Type: Refrigerant 12 (R-12).

Versailles Automatic Temperature Control

PART
36-73

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DESCRIPTION AND OPERATION

The Versailles Automatic Temperature Control System is an independent case design, integral blower system and will automatically control the temperature and reduce the relative humidity of air inside the car. Refer to Fig. 1. Two control levers are provided to maintain the desired temperature and system functions. The system will deliver heated or cooled air to maintain the car interior temperature and will maintain the set comfort level automatically. The blower speed can be adjusted for more or less air as desired. Refer to Fig. 2.

Automatic control of passenger compartment temperature is maintained in all function control settings shown in Figure 2, except when the system is turned off. In hot weather, it will cool the car to the pre-set comfort level and then modulate cooling or heating to whatever is required to maintain the desired temperature. In cold weather, provision is made in the HEAT position of the function lever to delay the operation of the system until engine coolant has warmed enough to

minimize the discharge of cold air from the heater outlet. The system will then heat the car to the desired temperature and level out to maintain the pre-set temperature.

During system operation, outside air is drawn from the cowl vent just below the windshield at all times, except during maximum cooling when recirculated air is used.

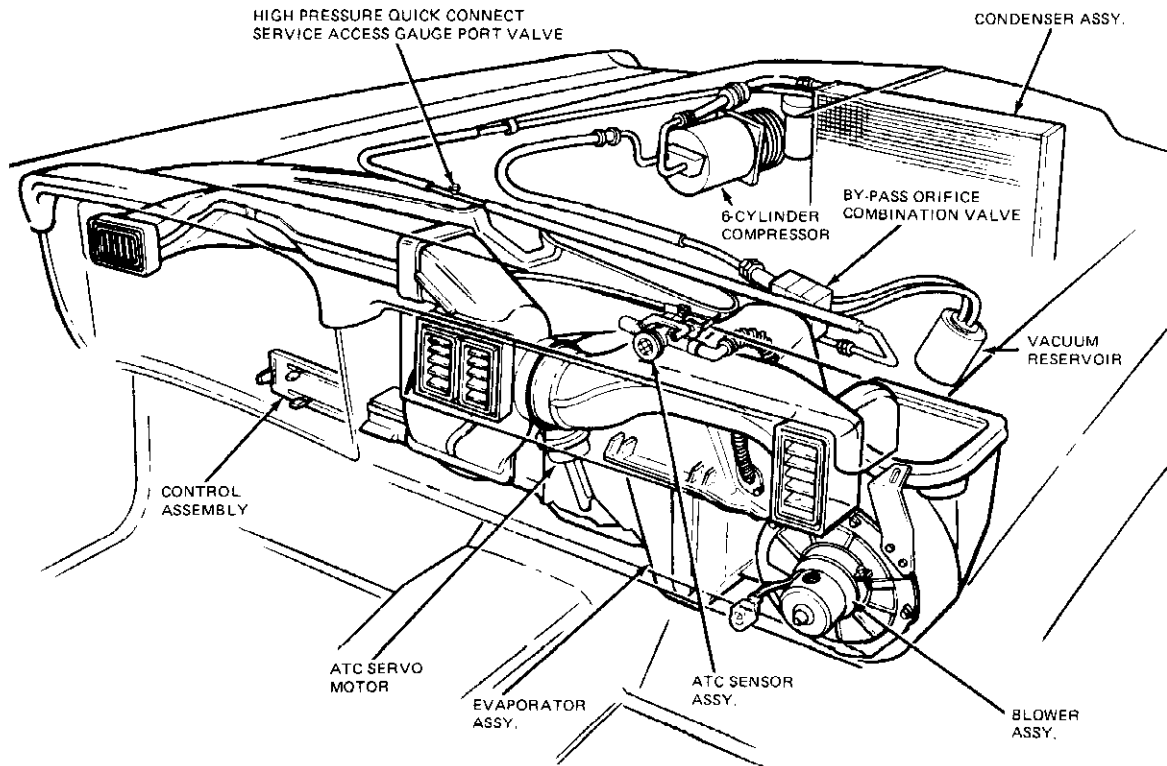
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nozzles, or the instrument panel (A/C) registers according to the selected function lever position.

CONTROL LEVER OPERATION

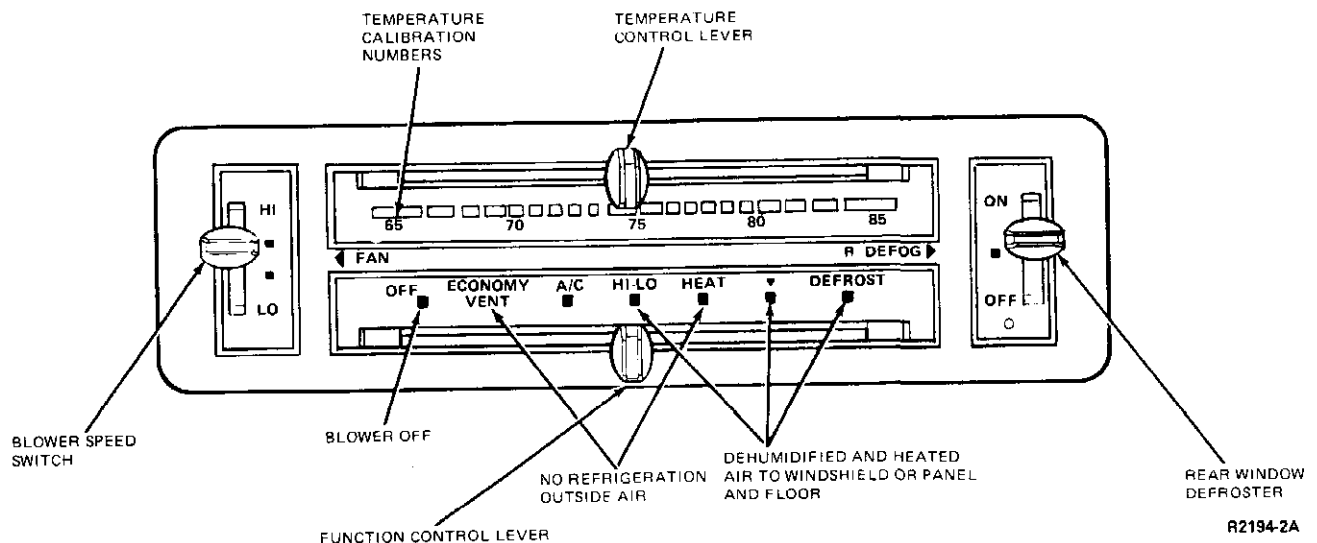
The Automatic Temperature Control (Fig. 2.) includes a function control lever for OFF, ECONOMY-VENT, A/C, HI-LO, HEAT, DEFOG (▼) and DEFROST that determines the manner in which the system will

operate, a calibrated temperature control lever for setting the desired comfort temperature and a blower switch to control the volume of air movement. Each position of the function control lever and blower switch is detented for positive engagement. The blower switch provides four manually selected blower speeds. The switch can be operated in any position to select the desired amount of air flow.



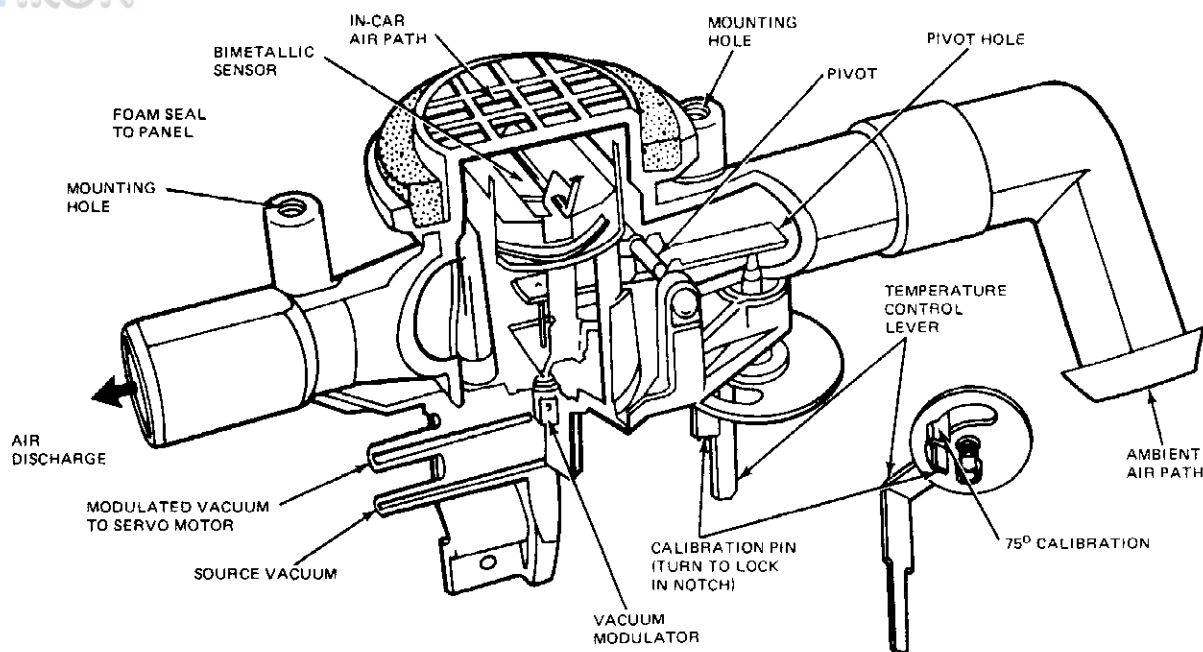
R2198-2A

FIG. 1 ATC System Installation



R2194-2A

FIG. 2 ATC Control Head Functions



L1808-2E

FIG. 3 Sensor Assembly

AUTOMATIC TEMPERATURE CONTROL

Automatic temperature control of the ATC system is determined by the modulated vacuum produced by the sensor assembly which controls the servo vacuum motor (Fig. 1). Temperature level changes are accomplished by means of a control cable between the control assembly and sensor assembly. System air flow is manually controlled by the control assembly. A vacuum selector valve, controlled by the function control lever, distributes vacuum to the various door vacuum motors which in turn direct the air flow through the system.

The sensor assembly contains a bimetal operated vacuum modulator, which directly converts air temperature into corresponding values of modulated vacuum (Fig 3). The bimetal senses in-car temperature and is mechanically linked to an internal vacuum modulator to control and regulate a vacuum which is proportional to temperature. The bimetal and vacuum modulator are placed within a plastic aspirator. Air is diverted by an air scoop near the high pressure side of the blower (before the evaporator) through a tube to the sensor assembly. The air flows through the aspirator which draws vehicle interior air over the bimetal. This combined air is then exhausted from the sensor underneath the instrument panel where it will not be felt by the passengers or driver.

Modulated vacuum from the sensor is directly connected to the large calibrated vacuum motor portion of the servo assembly. The modulated vacuum controls and positions the blend door attached to the arm of the servo motor assembly. The calibrated vacuum motor moves the blend door to mix various proportions of hot air from the heater core and cold air that has bypassed the heater core. Vehicle air temperatures produce compensating discharge air temperatures, i.e.,

high vehicle interior temperatures produce high sensor output vacuums which position the blend door to deliver cool discharge air. Low vehicle interior temperatures produce low sensor vacuum levels which cause warm discharge air.

A vacuum diverter valve (part of the power servo assembly and also attached to the arm of the servo motor) turns off the water valve under maximum cooling conditions and controls the outside air/recirc door for maximum cooling (recirculating air) conditions when the function control level is in the A/C position.

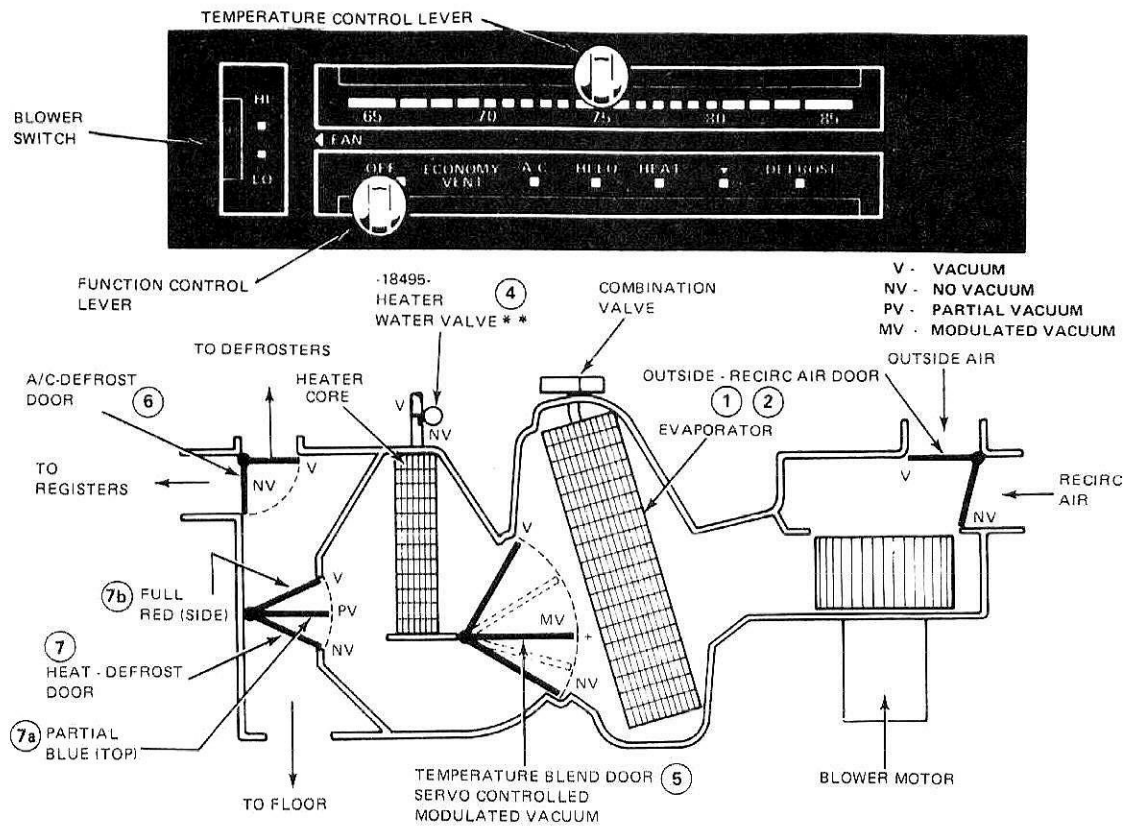
SYSTEM AIR FLOW

Figure 4 contains system vacuum schematics and vacuum motor charts which illustrate vacuum routings and air flow during the various system conditions. Figure 5 is a system electrical wiring diagram including continuity test information. Refer to the tests section for these illustrations.

OFF POSITION

In OFF position the outside-recirc air door is in the recirculating position. The A/C-Defrost door is in the defrost (no vacuum) position, and the heat-defrost door is in the heat (full vacuum) position. The blower is off and the temperature blend door and water valve assume a position depending on the modulated vacuum from the sensor to the power servo.

NOTE: A modulated vacuum is produced in ALL function control lever positions and is entirely dependent on the temperature lever setting and existing in-vehicle temperature conditions.



AUTOMATIC TEMPERATURE CONTROL SYSTEM VACUUM MOTOR TEST CHART							
FUNCTION CONTROL LEVER POSITION	ATC REQUIREMENT	OUTSIDE- RECIRC.	VACUUM MOTORS APPLIED WITH VACUUM				
			WATER VALVE **	TEMP BLEND +	A/C- DEFROST	HEAT-DEFROST	
						PARTIAL	FULL
OFF	—	1 - 2	**	+	—	7a	7b
ECONOMY VENT	Cool	—	4	5	6	—	—
	Mid	—	—	+	6	—	—
	Warm	—	—	—	6	—	—
A/C *	Cool	1 - 2 **	4	5	6	—	—
	Mid	—	—	+	6	—	—
	Warm	—	—	—	6	—	—
HI - LO *	Cool	—	4	5	6	7a	—
	Mid	—	—	+	6	7a	—
	Warm	—	—	—	6	7a	—
HEAT	Cool	—	4	5	—	7a	7b
	Mid	—	—	+	—	7a	7b
	Warm	1 - 2 †	—	—	—	7a	7b
▽ (DEFOG) *	Cool	—	4	5	—	7a	—
	Mid	—	—	+	—	7a	—
	Warm	—	—	—	—	7a	—
DEFROST *	Cool	—	4	5	—	—	—
	Mid	—	—	+	—	—	—
	Warm	—	—	—	—	—	—
VACUUM LINE COLOR CODE		WHITE	GREEN	TAN	YELLOW	BLUE (TOP)	RED (SIDE)

* COMPRESSOR CLUTCH ENGAGED WHEN AMBIENT CUT-OFF SWITCH IS CLOSED.

† DELAYED BY ENGINE TEMP. SENDER AND E.V. RELAY UNTIL 130°F. ENGINE COOLANT TEMP.

** DEPENDENT ON HEATING/COOLING REQUIREMENT OF SERVO DIVERter VALVE

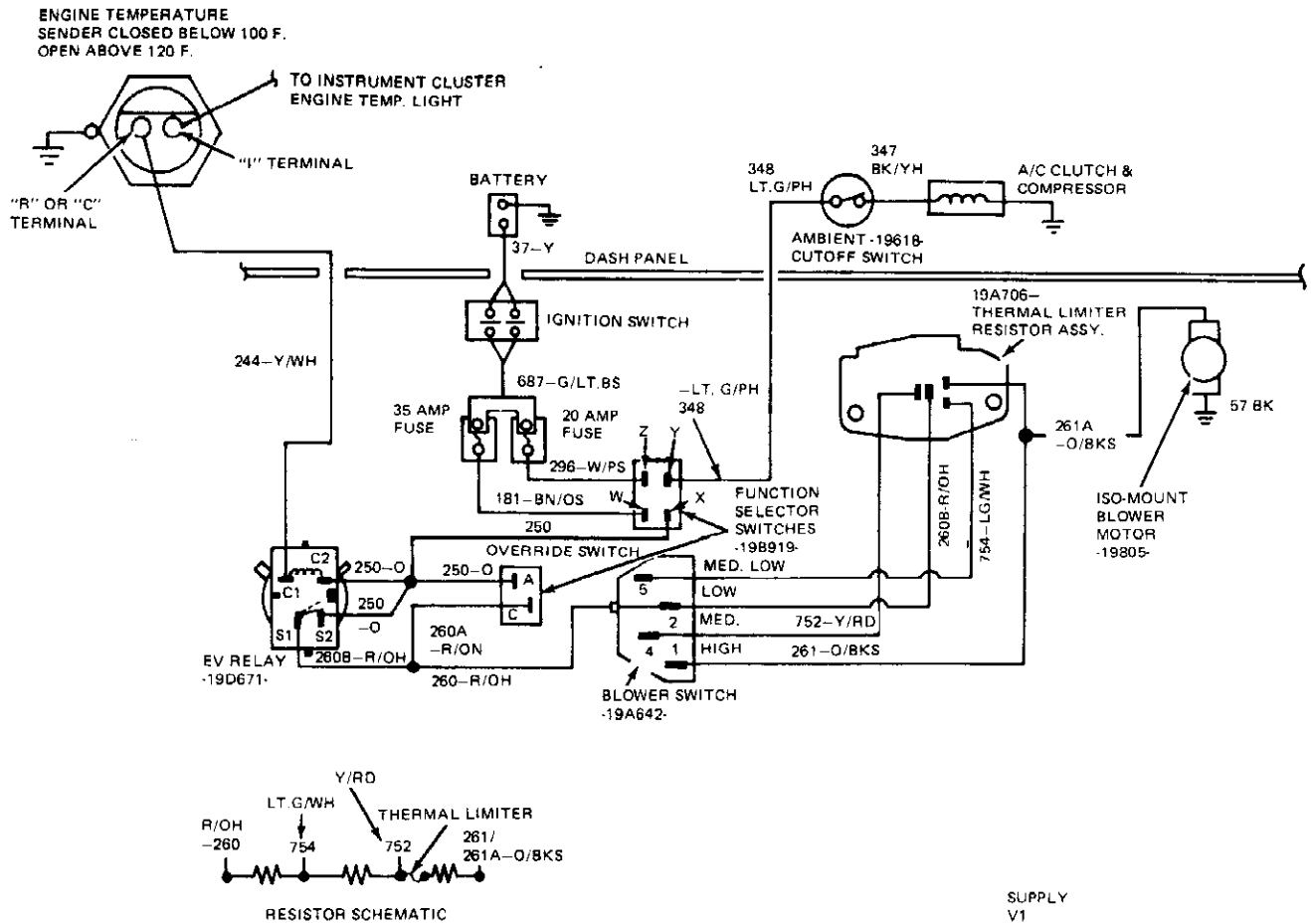
+ MODULATED VACUUM

— NO VACUUM

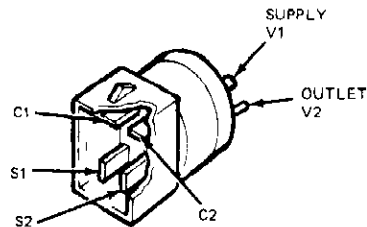
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FIG. 4 ATC System Air Flow Schematic and Vacuum Control Chart

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E.V. RELAY - 19D671			
COIL TERMINALS	SWITCH TERMINALS	VACUUM SWITCH	
C1 C2	S1 S2	V1	V2
12.8 VOLTS	OPEN	OPEN	OPEN
0 VOLTS	CLOSED	SEALED	VENTED



FUNCTION SELECTOR SWITCH -19B919-							
SWITCH SCHEMATIC	OFF	ECONOMY VENT	A/C	HI-LO	HEAT	DEFROST	DEFROST
A - C	A - C	A - C	A - C	A - C	Open	A - C	A - C
X - Y	None	W - X	W - X	W - X	W - X	W - X	W - X
W - Z			Y - Z	Y - Z		Y - Z	Y - Z

BLOWER SWITCH -19A642-			
BLOWER SPEED	TERMINAL CONNECTIONS	CURRENT IN CAR (AMPS)	BLOWER VOLTAGE
Low	-	8	5
Med Low	2 - 5	11	7
Med High	2 - 4 - 5	20	10
High	2 - 1 - 4	25	14

FIG. 5 ATC System Electrical Wiring Diagram and Continuity Test

ECONOMY-VENT POSITION

In ECONOMY-VENT position, outside air is directed through the panel (A/C) registers with automatic control of discharge air temperatures and water valve actuation. However, refrigerated cooling is not available. ECONOMY-VENT and HEAT positions provide the most economical operations because the compressor does not operate.

A/C POSITION —

MAXIMUM COOLING (RECIRCULATE)

With the function lever in the A/C position and the car interior temperature considerably above the temperature setting, the modulated vacuum is high at the servo motor, causing:

1. The outside-recirc door to go to the recirc position;
2. The water valve to close;
3. The temperature blend door to close, allowing all air to by-pass the heater core. Air is drawn from the passenger compartment, directed through the evaporator core where it is cooled and returned to the car interior through the panel (A/C) ducts and registers.

A/C POSITION —

MODULATED COOLING (OUTSIDE-AIR)

When less cooling is required to maintain the temperature setting, the temperature blend door is actuated to a mid-position where part of the air leaving the evaporator core is directed through the heater core. Blended air (the combination of cooled and heated air) is then mixed in the plenum and directed into the car interior through the panel (A/C) ducts and registers. The position of the temperature blend door changes automatically to maintain the selected temperature. If the in-car temperature rises above the temperature lever setting, the blend door moves to admit more cooled air and less heated air. If the in-car temperature drops below the setting, the blend door moves to admit more heater air and less cooled air.

HI-LO POSITIONS

Operation is similar to that described in the A/C position paragraphs, except that airflow is divided between the panel registers and floor ducts. The system will not recirculate interior air for maximum cooling.

HEAT POSITION — MAXIMUM HEATING

With the function control lever in the HEAT position and the car interior temperature below the temperature setting, the modulated vacuum is low, causing the water valve to open and the temperature blend door to fully open. Blower operation will be delayed until the engine coolant reaches approximately 120° F (49° C), then the air is forced by the blower through the evaporator and all of the air passes through the heater core before being distributed through the heater (floor) ducts into the car interior. A portion of this air is diverted to the defroster nozzles.

HEAT POSITION — MODULATED HEATING

When less heating is required to maintain the temperature setting, the temperature blend door has moved to a mid-position so that only part of the air

leaving the evaporator core is directed through the heater core. Blended air (the mixture of outside air and heater air) then is directed into the car interior. The A/C clutch does not operate in the HEAT position.

DEFOG (▼) POSITION

In DEFOG (▼) operation is the same as the HEAT position, except that the A/C-Defrost door is in the defrost (no vacuum) position and the heat-defrost door is in a partial position. The air flow is directed to the defroster nozzles and the floor outlets. The A/C clutch will also be engaged when the outside air temperature is sufficiently high to close the ambient cut-off switch. This assists in reducing windshield fogging by dehumidifying the incoming outside air.

DEFROST POSITION

When the function lever is in the DEFROST position, the A/C-Defrost door and the heat-defrost door are in the full defrost (no vacuum) positions so that all incoming air is directed to the defroster nozzles with a slight bleed to the floor. The temperature blend door modulates in this position but maximum heat can be obtained by moving the temperature lever to the highest temperature position. The A/C clutch also operates in this position to dehumidify the air and reduce windshield fogging.

COMPONENTS

SENSOR ASSEMBLY

The sensor assembly is located behind the instrument panel above the glove box as shown in Figure 1. A small opening in the instrument panel allows passenger compartment air to enter the sensor. The sensor assembly (Fig. 3) contains a bi-metallic sensor that senses the passenger compartment air temperature. The output controls a vacuum modulator and higher temperatures cause higher vacuum gauge readings. A bias to the vacuum output level is accomplished by means of a control arm attached by a cable assembly to the temperature control lever. Thus, the modulated vacuum output is the result of the effects of the control bias and the temperature of the air across the bi-metallic sensor.

The sensor assembly also includes an aspirator or venturi (as it is called in previous ATC systems). The aspirator provides a very small vacuum to draw a continuous sampling of passenger compartment air across the air temperature sensing bimetal. Primary air is ducted to the sensor via a tube from the blower stream providing the power to operate the aspirator for the in-car sensor.

SERVO ASSEMBLY

The servo assembly is a large calibrated vacuum motor and vacuum diverter valve and is located behind the lower left edge of the glove box on the mounting bracket attached to the heater core section at the upper case half. The calibrated vacuum motor provides specific temperature blend door positions for given vacuum levels. The attached vacuum diverter valve controls water valve operation and recirc or outside air operation.

ELECTRO-VACUUM RELAY (E.V. RELAY)

Located on the plenum assembly below the A/C-Defrost door vacuum motor, the E.V. Relay is a combination normally closed vacuum solenoid valve and a single pole single throw normally closed electrical relay, both actuated by one electrical coil. The E.V. Relay is used during cold engine operation, in the HEAT function lever position, to lock-out blower operation, and to switch the system to recirculating air until the engine coolant warms up to about 120° F (49°C).

CONTROL ASSEMBLY

The control assembly consists of three main parts: 1) the function selector — a nine-port vacuum selector valve combined with two cam operated electrical switches; 2) blower switch — an electrical switch that provides four speeds of blower operation; and 3) the temperature control lever which connects through a control cable assembly to the sensor assembly.

1. The 9-port vacuum selector valve directs source vacuum to various vacuum motors and connects the vacuum from the electro-vacuum relay to the outside air-recirc door in HEAT (See Vacuum Schematic — Figure). A single pole and a double pole cam operated electrical switch is also controlled by the vacuum selector. The combination of these cam operated electrical switches controls the electrical supply to the A/C clutch and blower switch.
2. The four-position blower switch is identical to a manual A/C heater system blower switch. It provides a current path for by-passing the resistors in the resistor assembly, one at a time, until full blower speed is attained in the Hi blower switch position.
3. The temperature control lever is connected to the sensor assembly by a control cable assembly. Movement of the control lever from 65 to 85 causes a corresponding movement on the pre-load (bias) portion of the sensor assembly, and determines the temperature that the system will maintain.

THERMAL LIMITER RESISTOR ASSEMBLY

The blower motor thermal limiter resistor assembly (Fig. 6) is located on the upper case half of the evaporator assembly. There are three resistance elements mounted on the resistor board to provide four blower speeds. Depending on the blower switch position, series resistance is added or by-passed in the blower motor circuit to decrease or increase blower motor speed.

A thermal limiter resistor assembly is similar to a standard resistor assembly except an overheating protective device (thermal limiter) has been added to prevent heat damage to the evaporator case assembly. Overheating of the resistor coil(s) may occur when the system air flow is reduced as a result of an inlet or outlet air restriction or if the blower wheel becomes locked and/or is unable to turn freely.

When the thermal limiter resistor circuit has opened as a result of excessive heat, it should be replaced only with the identical replacement thermal limiter resistor assembly. It must not be substituted with a standard resistor assembly which does not include the thermal limiter device.

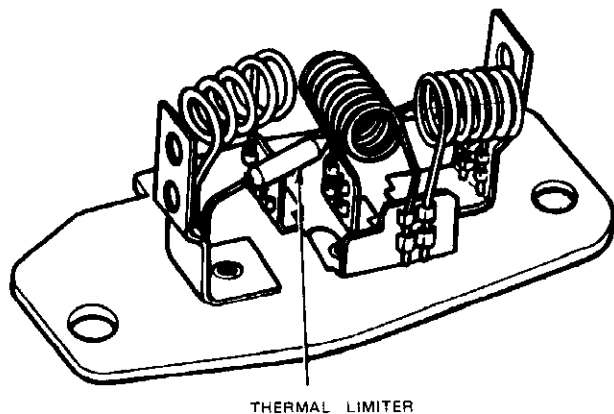


FIG. 6 Thermal Limiter Resistor Assembly

THERMAL LIMITER

The thermal limiter, used in the thermal limiter resistor assembly, serves as a temperature protecting fuse. Located a predetermined distance from the resistor coils and in series with the coil circuit, it will open the resistor coil circuit when the temperature of the thermal limiter reaches 300° F (149° C) interrupting blower operation in all speeds except high blower. Internal spring loaded contacts are held closed with a wax material which has a melting point of 300° F (149° C). When the wax softens, the spring contacts separate, opening the resistor circuit. The spring contacts cannot be closed again. As a result, it is necessary to replace the entire thermal limiter resistor assembly.

ENGINE TEMPERATURE SENDER SWITCH

The engine temperature sender switch is located on the engine and senses the engine coolant temperature near the engine thermostat. In the HEAT position only, a ground circuit from the engine temperature sender switch to the E.V. relay coil prevents blower operation until the engine coolant temperature reaches approximately 120° F (49°C).

REGISTER ASSEMBLIES

Retaining tabs lock the register assemblies into the register housings of the instrument trim panels. Horizontal registers swivel and direct the register outlet air up or down while the louvers permit side to side air distribution or closure of the register outlet. Vertically mounted registers swivel and direct the register outlet air from side to side while the louvers permit upward and downward air distribution or closure of the register outlet.

REFRIGERANT SYSTEM

The refrigerant system incorporates a six cylinder compressor with an ambient cut-off switch connected in series with the compressor clutch to control compressor operation. The ambient switch will open and close between 35° F (2° C) minimum and 50° F (10° C) maximum. The ambient switch is located on the head lock support bracket, in the airflow path, behind the radiator grille.

An internally equalized By-Pass Orifice (BPO) Combination Valve assembly is used to control refrigerant system pressures.

Refer to the Normal System Operation Charts and the Problem Refrigerant System Pressure Evaluation Chart for refrigerant system testing and diagnosis. Refer to Part 36-32 A/C General Service Section for servicing and refrigerant system.

BY-PASS ORIFICE (BPO) COMBINATION VALVE

By-Pass Orifice Combination Valve, designed to improve the efficiency of the refrigerant system and to maintain the reduced packaging space required for controlling the refrigerant system pressures, is incorporated in the Versailles refrigerant system.

Its advantages are:

- Lower refrigerant system compressor loads
- Slightly improved fuel economy
- Simplified servicing
- Improved service packages
- No exposed small tubing to be damaged

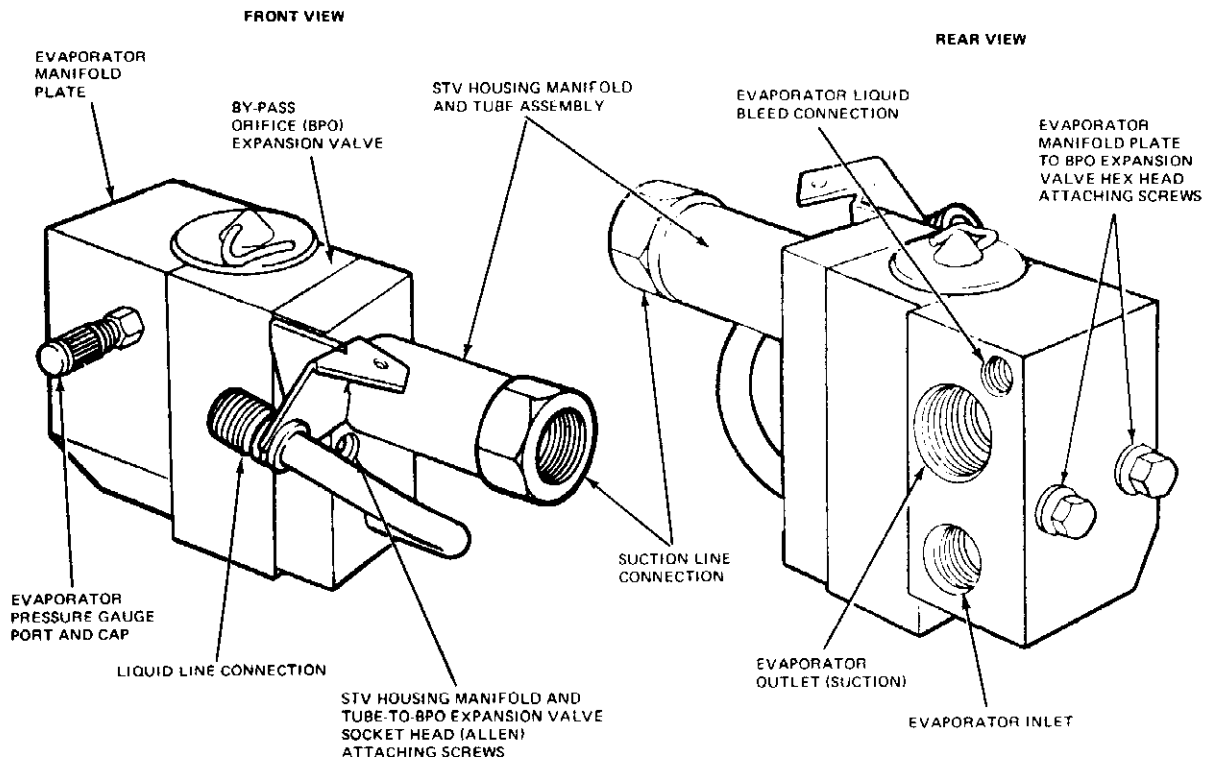
The By-Pass Orifice (BPO) Combination Valve is an assembly which combines the Expansion Valve and the Suction Throttling Valve into one integral unit. It also has an evaporator manifold plate assembly for attachment to the inlet and outlet evaporator core tubes, as well as an STV housing manifold and tube assembly for connecting the high pressure liquid line and the compressor suction line. Refer to Figure 7.

EVAPORATOR MANIFOLD PLATE

The Evaporator Manifold Plate provides the means to rigidly mount the By-Pass Orifice Combination Valve assembly to the evaporator core.

Its service access gauge port valve allows the attachment of a low pressure service gauge to test the constant evaporator pressure and to recharge the refrigerant system.

A fitting is included in the back of the manifold plate to attach the evaporator liquid bleed line. This keeps the bleed line short and out of the engine compartment where it could be damaged when other engine compartment services are being performed.



L2442-2A

FIG. 7 By-Pass Orifice (BPO) Combination Valve Assembly, Front and Rear View

BY-PASS ORIFICE (BPO) EXPANSION VALVE

The By-Pass Orifice Expansion Valve is the H-block type similar to that used on earlier refrigerant systems, except that the tapered ball seat is slotted to prevent complete sealing of the liquid refrigerant inlet to the evaporator. It is machined to accommodate the installation of the suction throttling valve. This eliminates the need for the external sensor tube and bulb for sensing the temperature of the evaporator suction line and the external equalizer line, as it is internally equalized. Refer to Figure 8.

It is attached to the evaporator manifold plate with two (2) hex-head screws which are torqued 4 to 8 lbs. ft.

The By-Pass Orifice (BPO) Expansion Valve must regulate the flow of liquid refrigerant during cool-down (while the car interior and evaporator core are cooling down). As the evaporator core temperature approaches 32°F, the suction throttling valve begins to control refrigerant pressure.

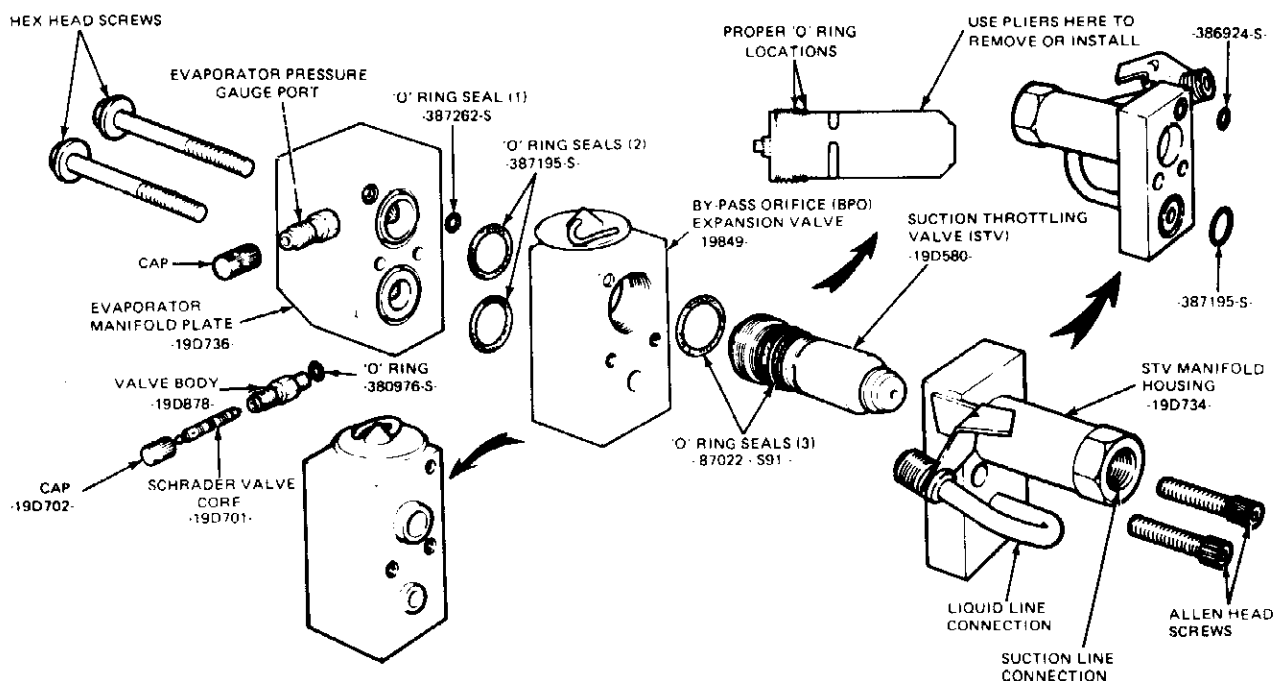


FIG. 8 By-Pass Orifice (BPO) Combination Valve—Disassembled

L2443-2A

SUCTION THROTTLING VALVE

The Suction Throttling Valve is the same used inside other model Combination Valve assemblies. Its purpose is to control suction pressure in the evaporator to prevent ice or frost from blocking the flow of air through the heat exchanging surfaces of the evaporator. Gauge pressure at sea level is specified at minimum of 28.5 psi. The pressure reading is higher at higher altitudes because of gauge error, not because of a change in pressure inside of the evaporator. Refer to the Normal Evaporator Pressure vs. Altitude Chart.

Suction "throttling" starts when the compressor suction pressure decreases below the pressure setting of the valve. Compressor suction pressure can continue to drop but evaporator pressure is held steady by the controlling or "throttling" action of the STV.

PRESSURE DIFFERENTIAL VALVE

A calibrated Pressure Differential Valve core is provided as a liquid refrigerant bleed circuit around

the STV to assure oil return to the compressor when the STV is closed due to minimum heat loading of the A/C system. Refer to Figure 9.

The Pressure Differential Valve is a Schrader valve that has been calibrated to open at a pressure range of 10 to 20 psi. Its function is to by-pass oil laden refrigerant around the restriction formed when the STV is closed (due to reduced heat load on A/C system) and thereby provide an assured oil return to the compressor. Under high heat loads this valve is closed, since ample refrigerant is moving through the compressor suction line back to the compressor. Substitution of a Schrader type service valve core from one of the gauge port valves is not permitted and would result in compressor damage by oil starvation because the substituted valve core would never open. The calibrated Pressure Differential Valve core is supplied installed in the expansion valve service part and is not to be serviced separately.

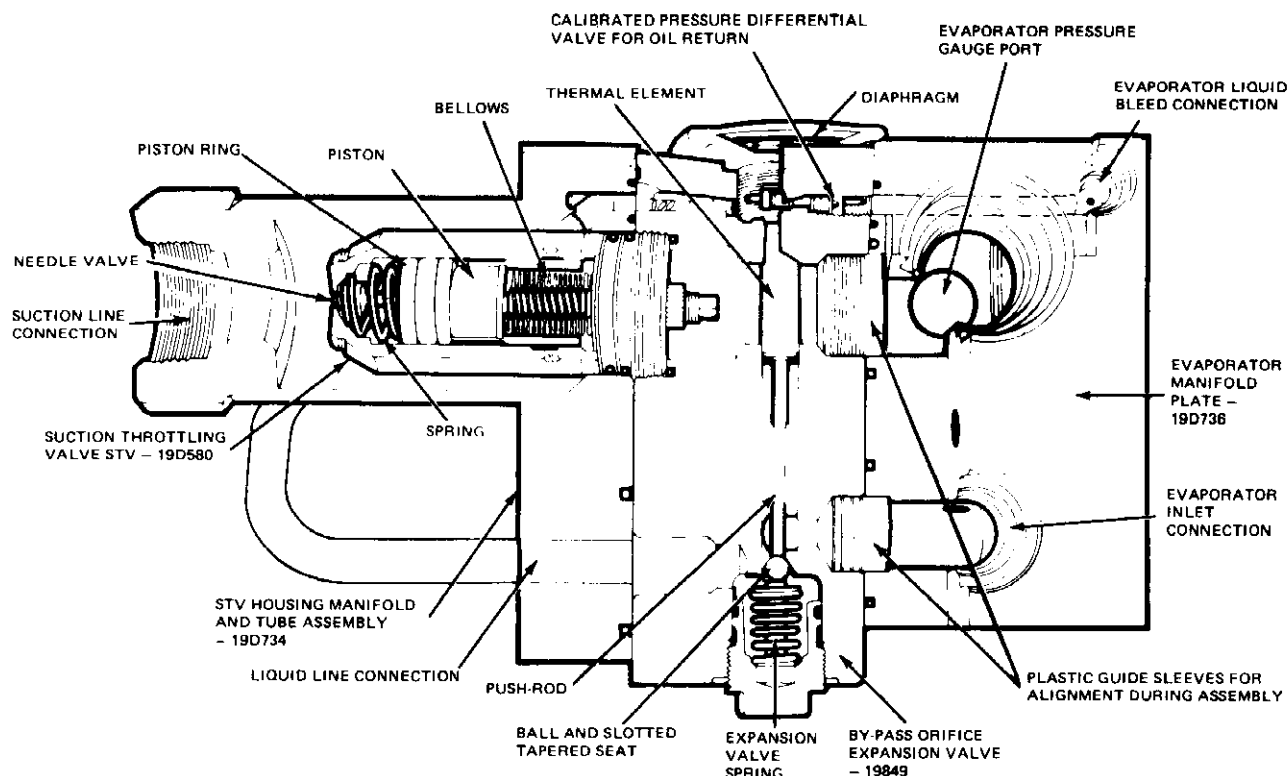


FIG. 9 By-Pass Orifice (BPO) Combination Valve Assembly—Cut-Away View

L2444-2A

STV HOUSING MANIFOLD AND TUBE ASSEMBLY

The STV Housing Manifold and Tube assembly provides a housing for the suction throttling valve.

It has connections for the high pressure liquid line (lower, smaller diameter tube and fitting) and the compressor suction line on the end of the STV housing.

It is secured to the body of the expansion valve with two (2) socket head (Allen) screws torqued 4 to 6 lb ft.

INSPECTION AND ASSEMBLY REQUIREMENTS

Facing seal surfaces must be free of dirt, burrs and scratches.

All O-rings must be lubricated with clean refrigerant oil immediately prior to installation.

NOTE: At any time a hose or surface connection leak is observed, tightening the connection will only stop the leak temporarily. To correctly repair the leak, the connector or surfaces must be separated, cleaned and a new O-ring installed. The O-ring and connector surfaces should be lubricated with refrigerant oil prior to assembly.

REFRIGERANT FLOW Refer to Figure 9

1. Liquid refrigerant from the receiver/drier enters the lower (high pressure) tube of the combination valve.
2. During stabilized (vehicle shutdown) conditions, the pressure on the bottom of the expansion valve diaphragm rises above the pressure on the top of the diaphragm, closing the valve.

3. When the system is started, the pressure on the bottom of the diaphragm drops rapidly, allowing the valve to open and spew liquid refrigerant to the lower evaporator tube where it begins to vaporize.
4. The compressor suction draws the vaporized refrigerant out of the top of the evaporator at the top tube where it passes the thermal element.
5. Gas pressure in the thermal element drops when cooled and the expansion valve starts to close. Its pressure rises with evaporator superheat and opens the expansion valve, allowing more refrigerant to flow.
6. Pressure differences between the evaporator and compressor force the control piston further into the valve cylinder. This allows the refrigerant to escape out of the side slots of the STV and enter the housing or suction side of the system.
7. As the system operates, the temperature (and pressure) in the evaporator core begins to drop. If operating conditions (ambient temperature, vehicle speed, blower speed) permits the temperature of the core to approach the freezing point, the reduced pressure in the evaporator core allows the STV piston to move back and partially cover the side slots. This action "throttles" or restricts refrigerant flow through the STV and maintains the evaporator core pressure above 28.5 psi. This pressure for R-12 corresponds to a temperature of 32°F. The evaporator core is therefore kept above the temperature at which it would freeze the condensate on the outside surfaces.

8. The liquid bleed line circuit parallels the suction throttling valve. The pressure differential valve in the circuit (no replacement part available) starts to open when the suction pressure in the STV housing is 10 psi less than the evaporator pressure. It will fully open when the suction pressure is 20 psi less than the evaporator pressure.

9. The bottom of the pressure sensing diaphragm (on top of the expansion valve) internally senses the evaporator pressure through the internal passage around the thermal element. As evaporator pressure is increased, the diaphragm flexes upward pulling the thermal element and push rod away from the ball seat of the expansion valve. The expansion valve spring forces the ball onto the tapered seat and the liquid refrigerant flow is reduced.

As the pressure is reduced, due to restricted refrigerant flow, the diaphragm flexes downward again opening the expansion valve to provide the required controlled pressure and refrigerant flow condition.

10. The internal sensing element produces the required pressure on the top of the pressure sensing diaphragm. As the cool refrigerant passes the body of the thermal element, the gas above the diaphragm will contract and allow the expansion valve spring to close the expansion valve. When heat from the passenger compartment is absorbed by the refrigerant, it will cause the gas to expand and the push rod will again force the expansion valve to open, allowing more refrigerant to flow so that more heat can be absorbed.
11. Under low refrigerant flow conditions, where the cooling requirements are very low, the expansion valve ball will close on the slotted tapered seat and provide a small flow of refrigerant. This insures proper cooling as well as proper compressor lubrication.

DIAGNOSIS AND TESTING

ELECTRICAL

Refer to the ATC System Electrical Wiring Diagram and Continuity Test illustration (Fig. 5) to assist in performing component and system electrical wiring and continuity tests. The blower switch chart also provides blower motor voltage and current information for each blower switch position.

VACUUM

Refer to the ATC System Vacuum Schematic and Selector Test illustrations (Fig. 10) to assist in performing vacuum system and function selector valve tests. Also refer to Figs. 11, 12 and 13 — ATC system vacuum leak charts.

AIR FLOW

Refer to the ATC System Air Flow Schematic and Vacuum Control Chart (Fig. 4) to assist in performing air flow function and Vacuum Motor Application Tests.

REFRIGERANT SYSTEM

Refer to the normal system operation charts in Fig. 14 for normal center register discharge air temperatures, Fig. 15 for normal evaporator pressure gauge readings vs. altitude and Fig. 16 for normal STV/BPO refrigerant system pressures. Also refer to the problem refrigerant system diagnosis of systems with pressures outside those specified in the charts.

COLD ENGINE BLOWER CIRCUIT INTERRUPTION

1. Turn the ignition switch ON (Do not start engine).
2. Move the blower switch to HI position.
3. Move the Function Control Lever to HEAT position.

Results: a. If the engine coolant temperature is below 100° F, the blower should not operate and the outside air door should be closed.

b. If the engine coolant temperature is above 120° F, the blower should turn on and the outside air door should be open.

c. If results of a or b are not satisfactory, proceed to step 4.

4. Start the engine and operate at idle rpm.
5. Disconnect the "D" shaped connector from the engine temperature sender unit (Fig. 5). The blower should turn ON. If the blower does not turn ON, the E. V. Relay should be checked for contact continuity between switch terminals S₁ and S₂. When below 100° F the contacts should **not** have more than one ohm resistance. If one ohm or more, replace the E. V. Relay. If the E. V. Relay is OK, check for an improper ground contact in the 244 (Yellow w/White Hash) circuit of the wire harness.
6. Connect a jumper wire from frame (ground) to the 244 circuit (Yellow w/White Hash) in the "D" shaped engine temperature sender wire harness connector. The blower should turn OFF.

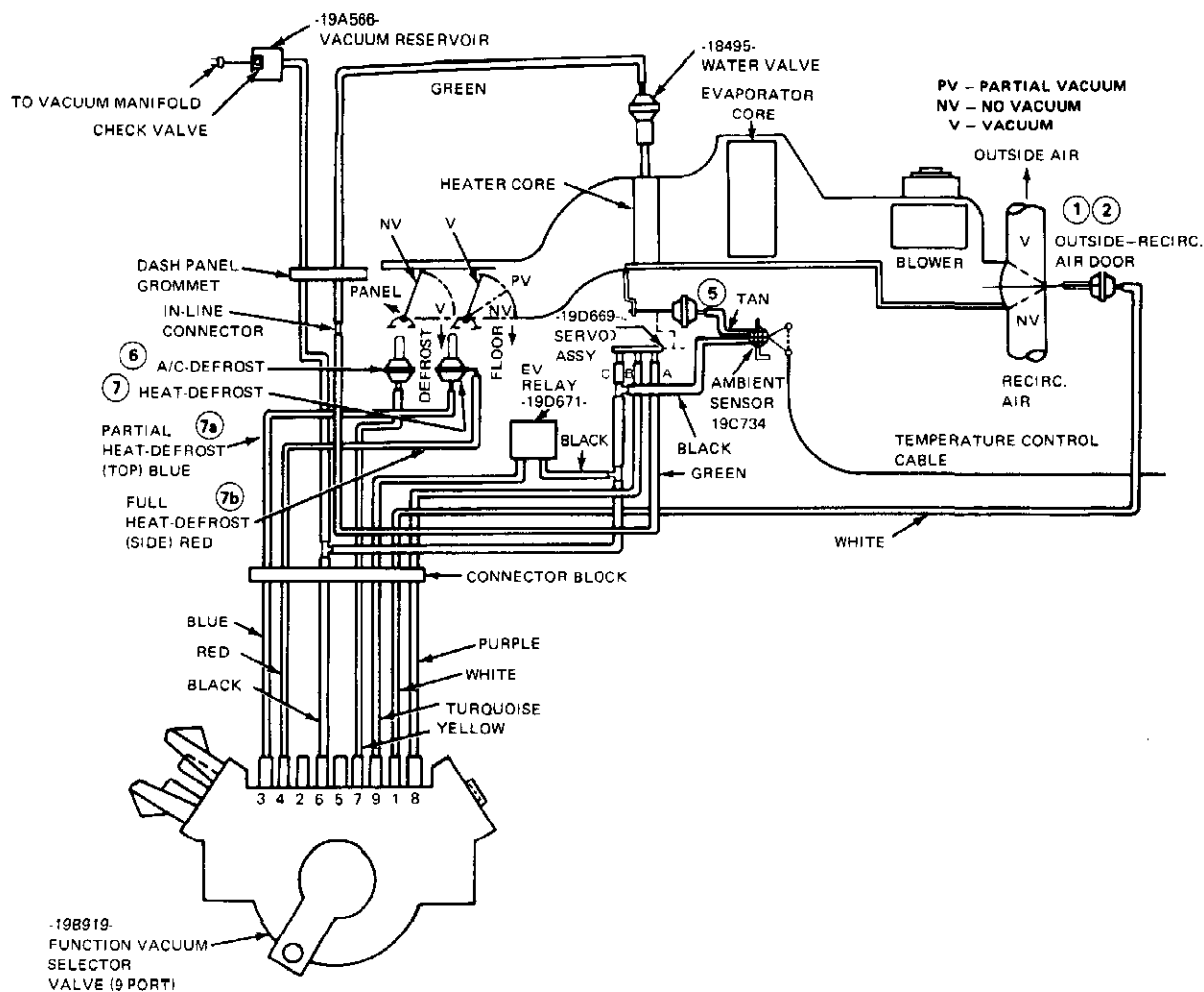
CAUTION: Do not accidentally ground the other terminal (I) of the "D" connector if the vehicle is equipped with a temperature gauge. Serious temperature gauge damage may result.

If the blower does not turn OFF, check for continuity between the coil terminals C₁ and C₂ should have continuity (approximately 31 ohms). If no continuity between terminal C₁ and C₂ exists, replace the E. V. Relay.

7. If the results in step 3a and 3b do not agree with step 5 and 6, the engine temperature sender should be further tested for improper operation. Refer to Engine temperature sender test.

ENGINE TEMPERATURE SENDER

The terminal marked "R" (vehicles with temperature gauge) or "C" (vehicles with engine temperature warning light system), should provide an engine ground circuit below 100° F and an open circuit above 120° F engine coolant temperature. If a terminal resistance of one ohm or more with the coolant temperature below 100° F, or if the circuit does not open above 120° F, replace the engine temperature sender.



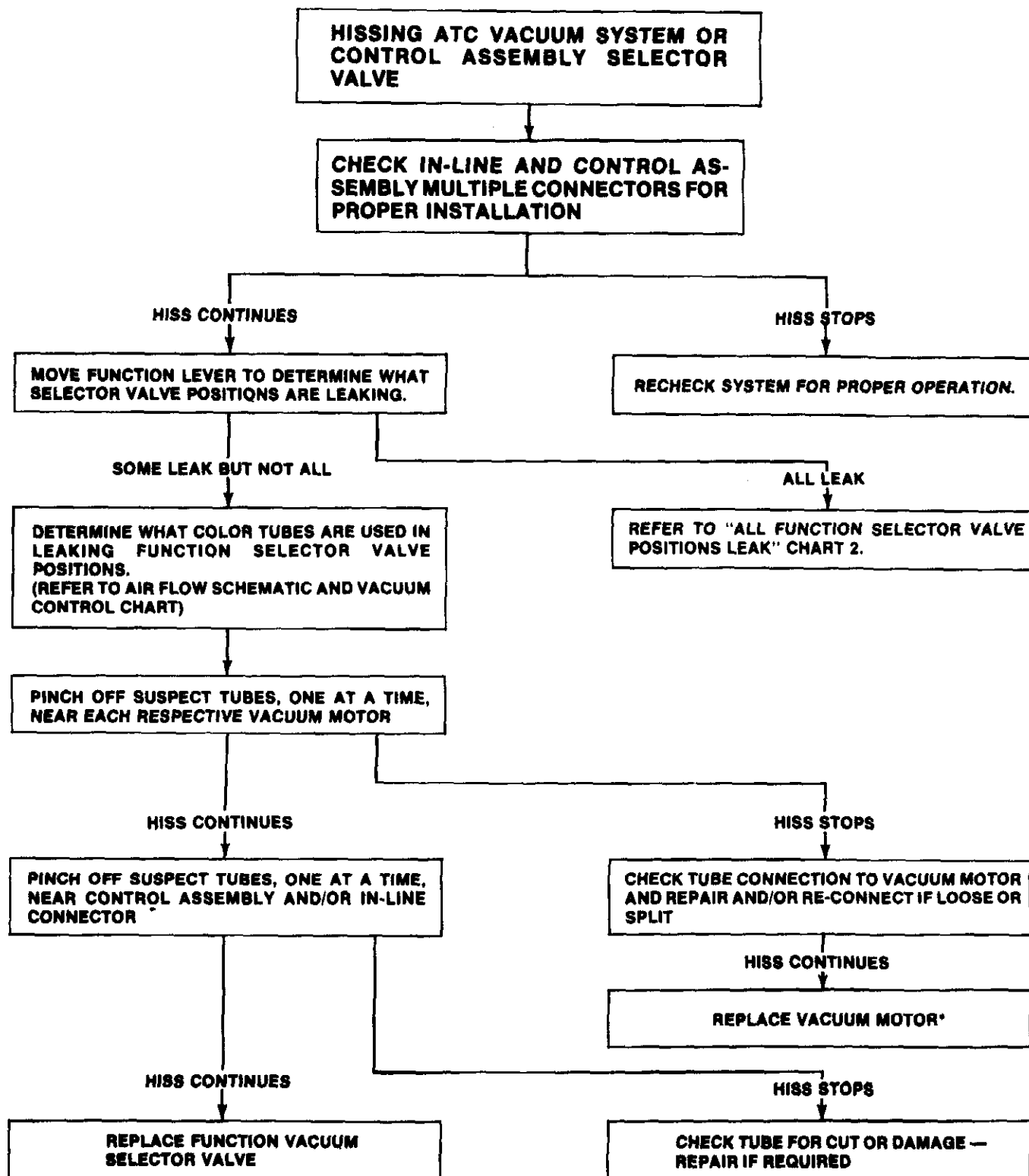
PORT	FUNCTION	FUNCTION SELECTOR VALVE LEVER POSITIONS								HOSE COLOR
		OFF	ECONOMY VENT	A/C	HI LO	HEAT	DEFROST	DEFROST	DEFROST	
1	Outside-Recirc.	V		To 8		To 2	Seal	Seal		White 1, 2
2	From EV Relay	Seal	Seal	Seal	Seal	To 1	Seal	Seal		Turquoise
3	Partial Heat-Defrost	V			V	V	V			Blue 7a
4	Full Heat-Defrost	V				V				Red 7b
5	No Function	Seal	Seal	Seal	Seal	Seal	Seal	Seal		-
6	No Function	Seal	Seal	Seal	Seal	Seal	Seal	Seal		-
7	Defrost A/C-Defrost		V	V	V					Yellow 6
8	From Diverter Valve No. 2	Seal	Seal	To 1	Seal	Seal	Seal	Seal		Purple
9	Source	V	V	V	V	V	V	V		Black

V - VACUUM

BLANK - ATMOSPHERE

FIG. 10 ATC System Vacuum Schematic and Selector Test

CHART 1



***NEVER MANUALLY OPERATE ANY VACUUM
MOTOR OR VACUUM MOTOR CONTROLLED
DOOR — THIS MAY CAUSE INTERNAL DAMAGE
TO THE VACUUM MOTOR DIAPHRAGM**

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FIG. 11 Vacuum Leak Diagnosis

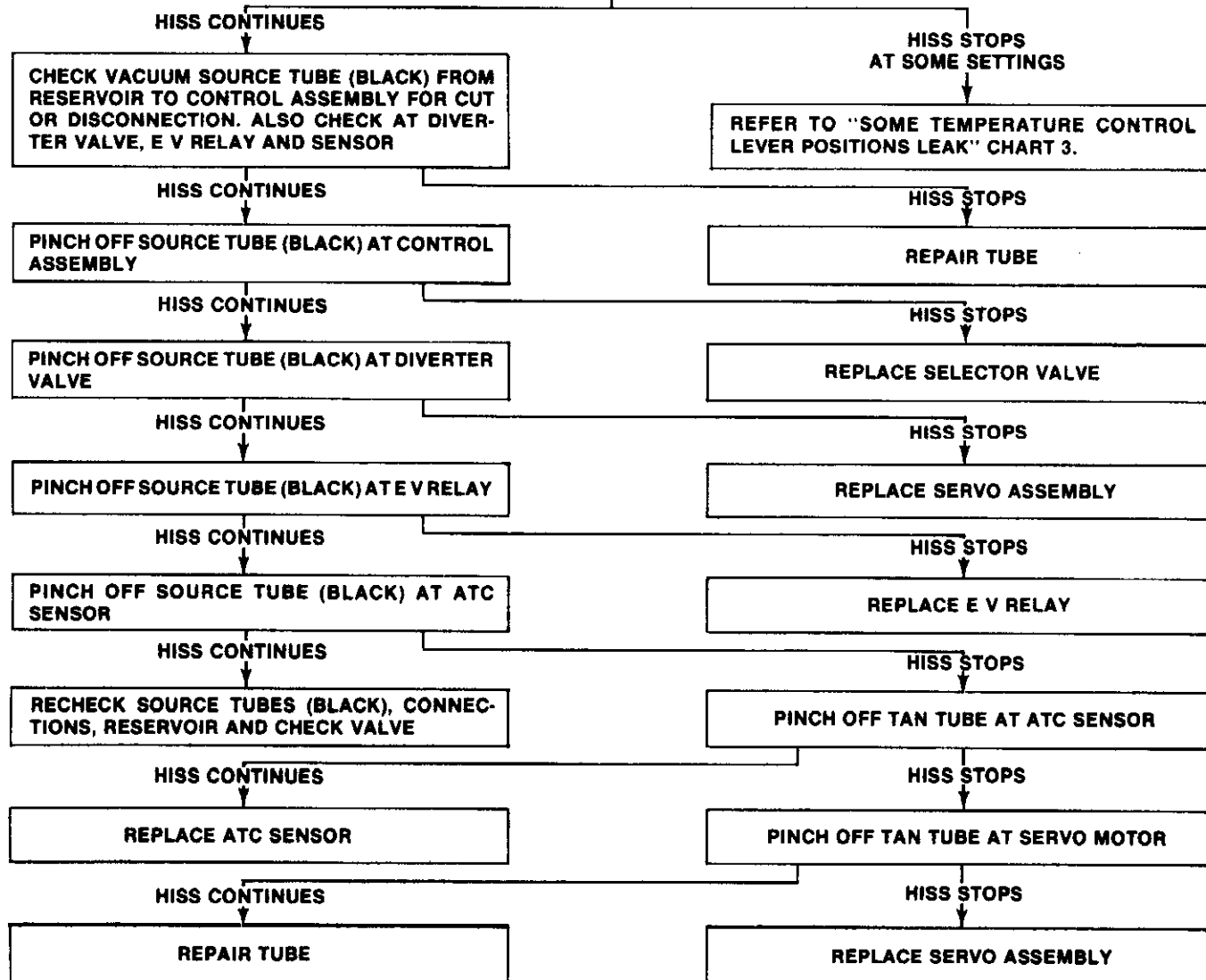
CHART 2

**HISSING ATC VACUUM SYSTEM OR
CONTROL ASSEMBLY SELECTOR
VALVE**

CONTINUED FROM CHART 1

**ALL FUNCTION SELECTOR VALVE
POSITIONS LEAK**

**MOVE TEMPERATURE CONTROL
LEVER FROM 65 TO 85**



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FIG. 12 Vacuum Leak Diagnosis

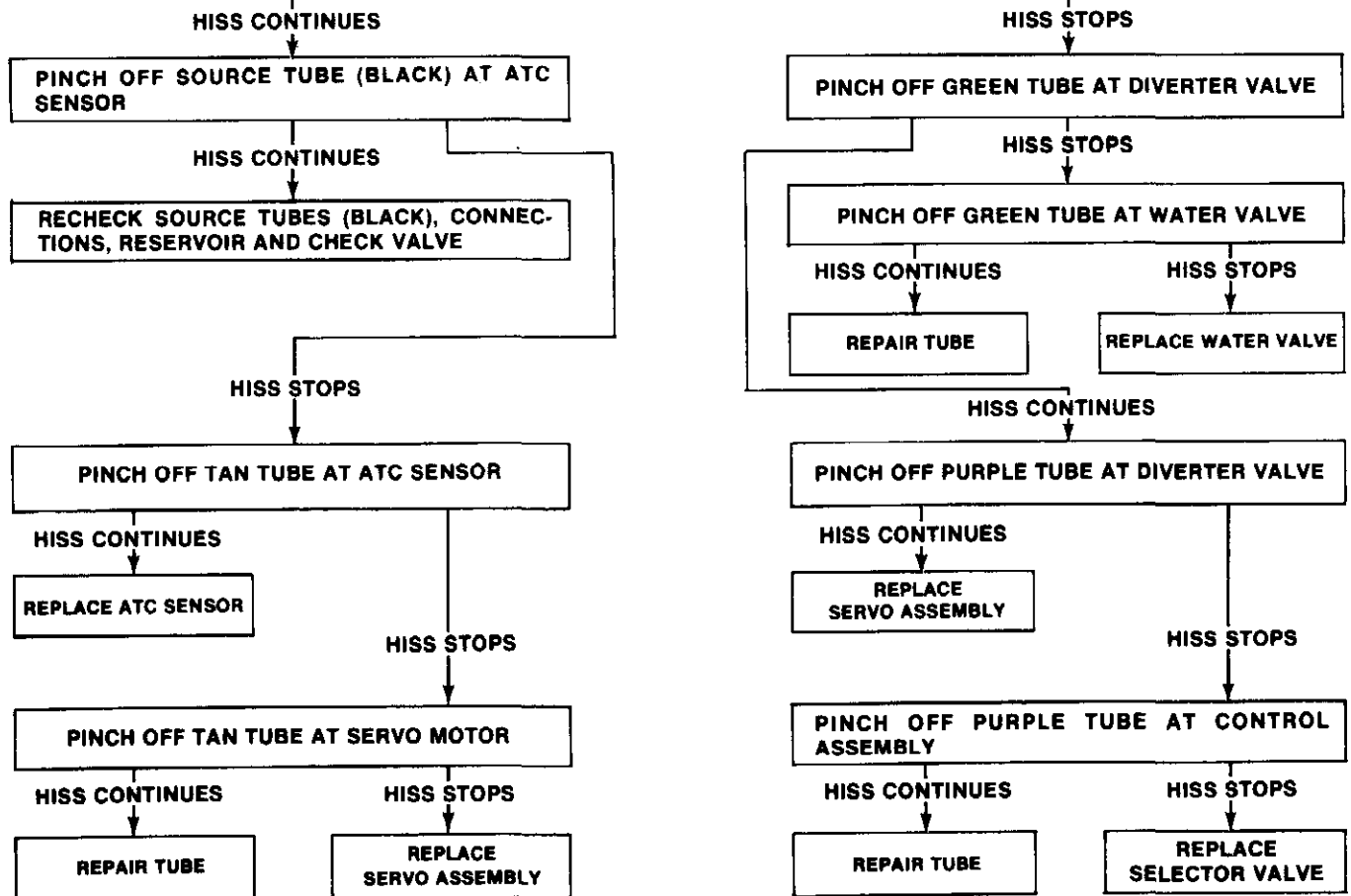
CHART 3

**HISSING ATC VACUUM SYSTEM OR
CONTROL ASSEMBLY SELECTOR
VALVE**

CONTINUED FROM CHART 2

**SOME TEMPERATURE CONTROL
LEVER POSITIONS LEAK**

**PINCH OFF SOURCE TUBE (BLACK) AT
DIVERTER VALVE**



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FIG. 13 Vacuum Leak Diagnosis

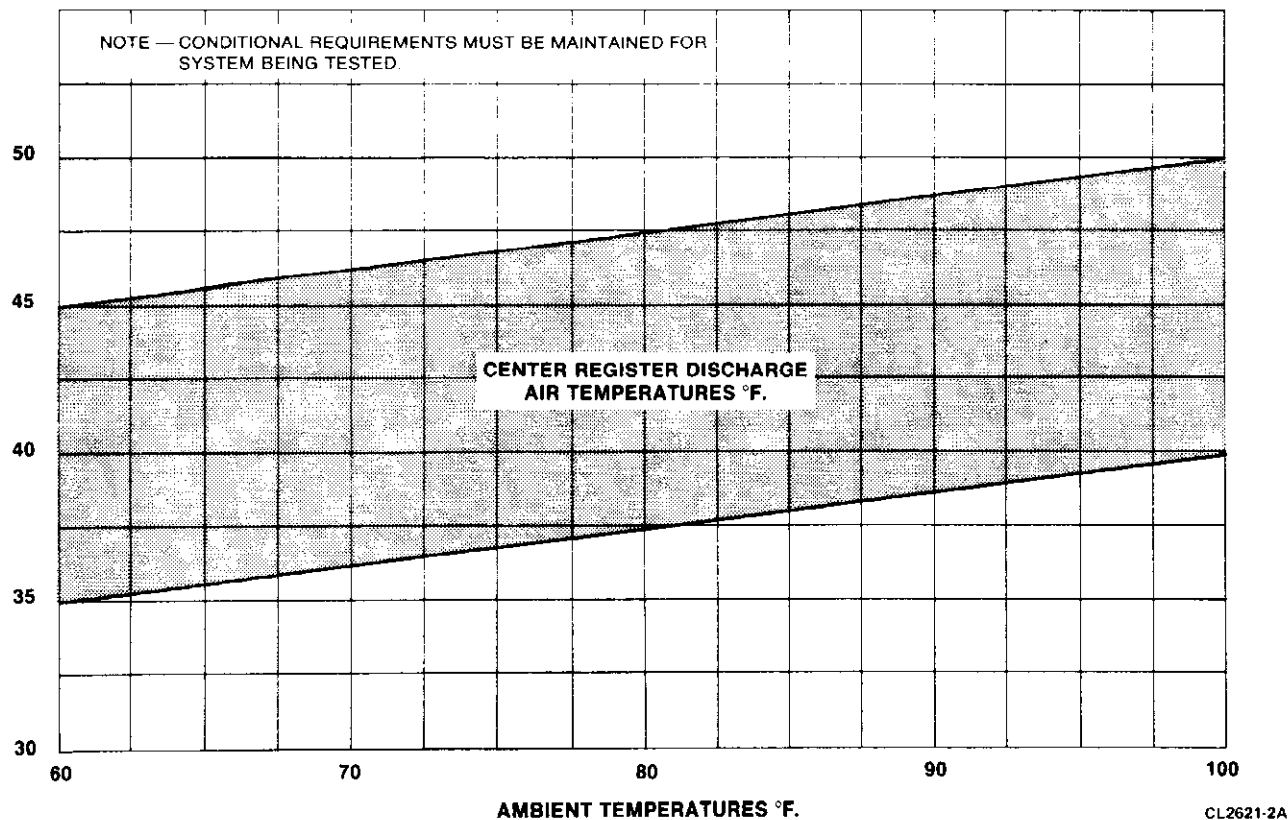
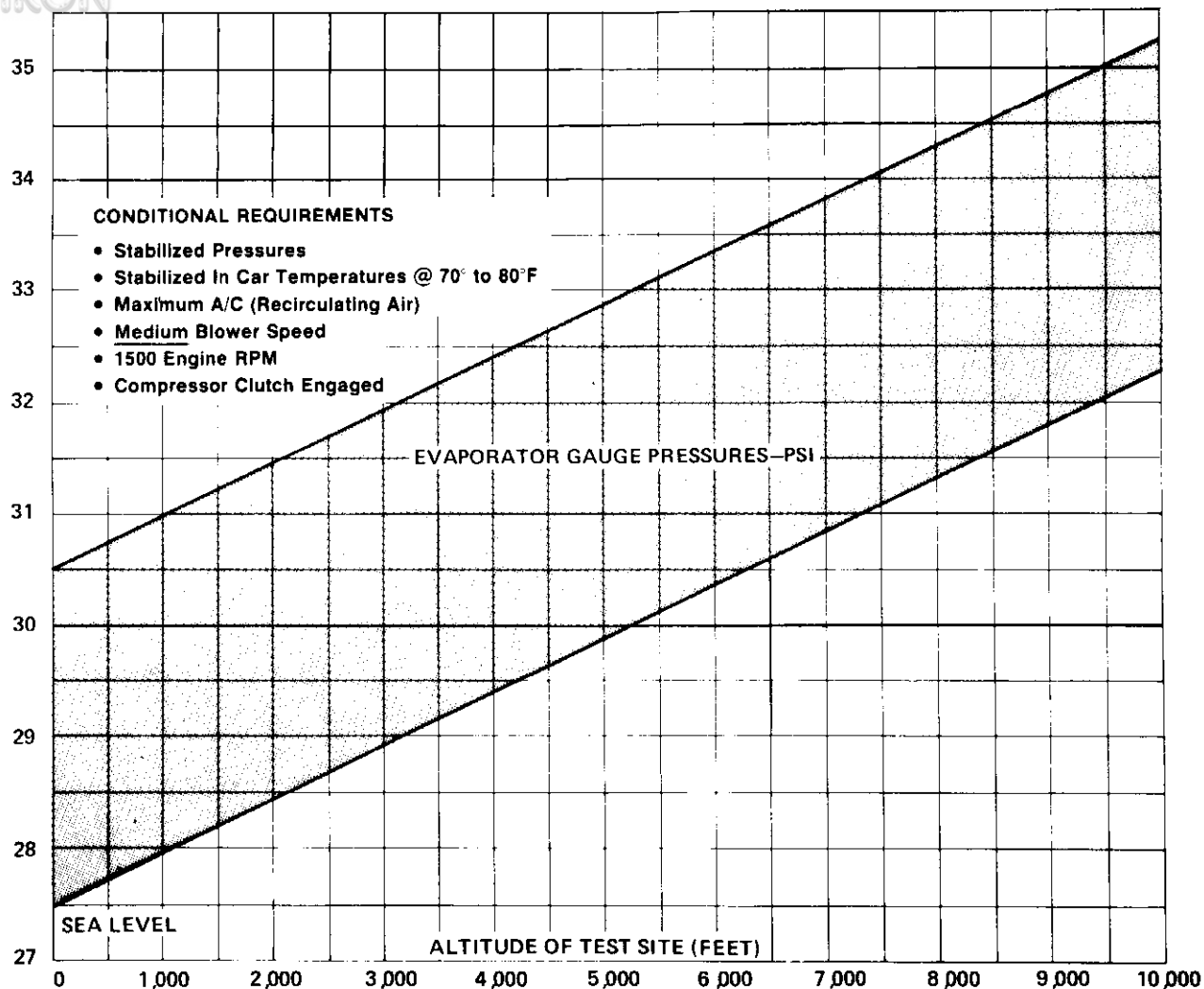


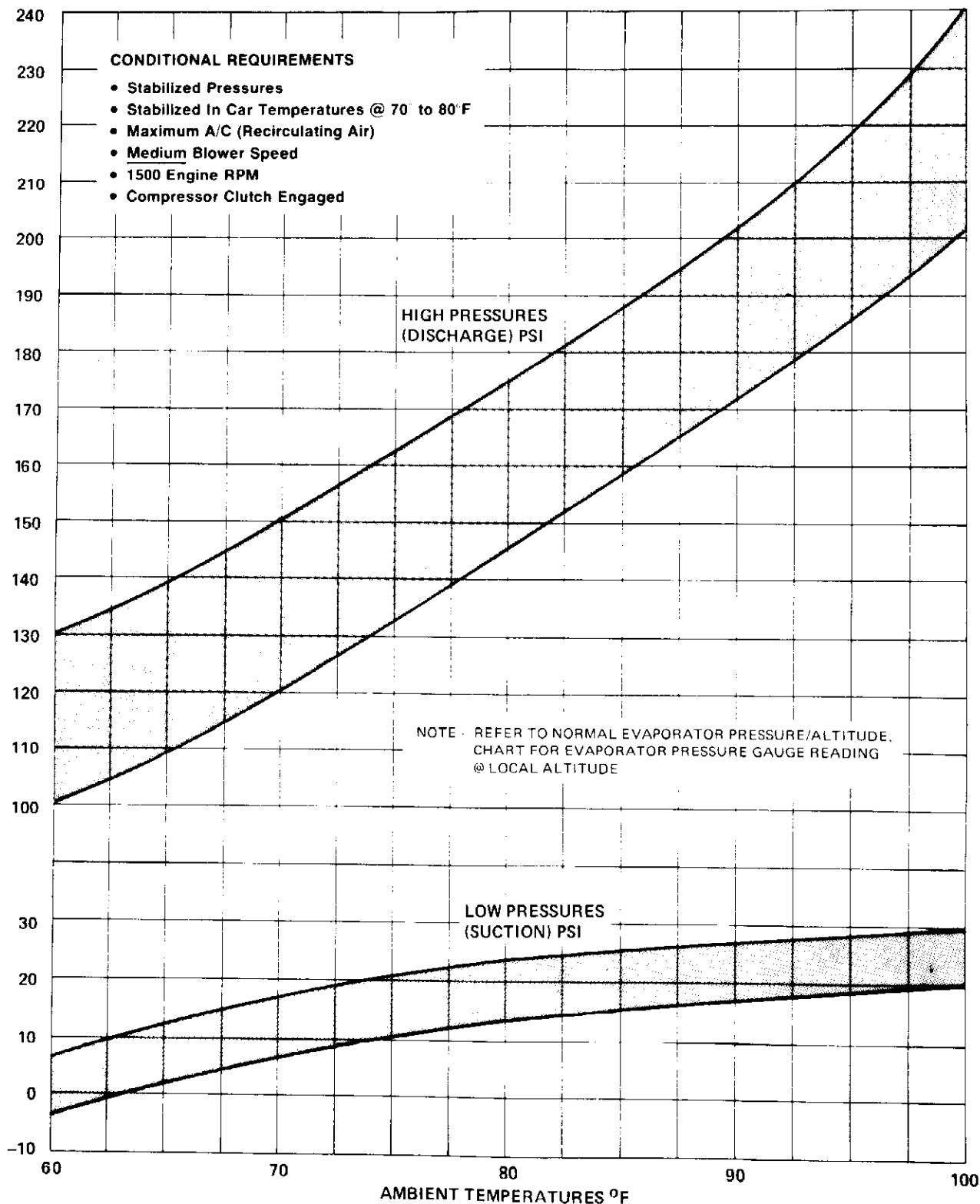
FIG. 14 Normal Center Register Discharge Temperatures



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FIG. 15 Normal Evaporator Pressure Gauge Readings Versus Altitude

NORMAL STV/BPO REFRIGERANT SYSTEM PRESSURES



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FIG. 16 Normal STV/BPO Refrigerant System Pressures

REFRIGERANT SYSTEM PRESSURE EVALUATION

For Systems Without Low Pressure Suction Service Access Gauge Port Valve

NOTE: Normal system conditional requirements must be maintained to properly evaluate refrigerant system pressures. Refer to chart applicable to system under test.

HIGH PRESSURE		EVAPORATOR PRESSURE	POSSIBLE PROBLEM/COMPONENT
@ LIQUID LINE	@ COMPRESSOR		
HIGH	HIGH	HIGH	ENGINE OVERHEATING / EXPANSION VALVE SENSING BULB -- Poor Contact, Inadequate Insulation
HIGH	HIGH	NORMAL TO HIGH	HEATER WATER VALVE -- Insufficient Closure / EVAPO- RATOR -- Too Much Air Flow - Reset Blower to Conditional Requirement / EXPANSION VALVE -- Sticking Open
HIGH	HIGH	NORMAL	AIR IN REFRIGERANT SYSTEM REFRIGERANT -- Overcharge
HIGH	HIGH	LOW	COMPRESSOR-TO-CONDENSER A/C LINE -- Restriction; After Service Access Valve
NORMAL TO HIGH	NORMAL TO HIGH	HIGH	CONDENSER -- Inadequate Air Flow (Bent Fins, Debris, Loose Radiator Fan Belt, Slipping Fan Clutch)
NORMAL TO HIGH	NORMAL TO HIGH	NORMAL TO HIGH	HUMIDITY WELL ABOVE NORMAL
NORMAL TO HIGH	NORMAL TO HIGH	NORMAL	EXCESSIVE REFRIGERANT OIL
NORMAL	NORMAL	LOW	SUCTION THROTTLING VALVE -- Sticking Open -- May Cause Iced-Up Evaporator, May Be Related to Moisture.
NORMAL TO ERRATIC	NORMAL TO ERRATIC	NORMAL TO ERRATIC	MOISTURE IN REFRIGERANT SYSTEM -- Affects Expan- sion Valve and STV Functions.
ERRATIC	ERRATIC	ERRATIC	EXPANSION VALVE SENSING BULB -- Kinked Capillary Tube
NORMAL TO LOW	NORMAL TO LOW	NORMAL	EVAPORATOR -- Restriction, Inadequate Air Flow - Reset Blower to Conditional Requirement and/or Confirm Blower Condition
LOW	HIGH	LOW	RECEIVER/DRIER -- Restriction / A/C LIQUID LINE -- Restriction; Before Service Access Valve / CONDENSER -- Restriction
LOW	LOW	NORMAL TO HIGH	A/C SUCTION LINE -- Restriction; SUCTION ACCUMULATOR -- Restriction
LOW	LOW	HIGH	COMPRESSOR -- Damaged Valves - (Inadequate compression) SUCTION THROTTLING VALVE -- Sticking Closed -- May Be Related to Moisture.
LOW	LOW	LOW	EVAPORATOR -- Iced-up / CONDENSER -- Plugged / RE- CEIVER/DRIER -- Plugged / A/C LIQUID LINE -- Restric- tion; After Service Access Valve / EXPANSION VALVE SENSING BULB -- Perforated Bulb / EXPANSION VALVE -- Sticking Closed / REFRIGERANT LEAK AND/OR UNDERCHARGE COMPRESSOR-TO-CONDENSER A/C LINE -- Restriction; Before Service Access Valve

**ADDITIONAL POSSIBLE COMPONENTS
ASSOCIATED WITH INADEQUATE COMPRESSOR OPERATION**COMPRESSOR CLUTCH -- Slipping / COMPRESSOR DRIVE BELT -- Loose / CLUTCH COIL -- Shorted Coils; Slipping / CLUTCH COIL --
Open Circuit / AMBIENT CUT-OFF SWITCH -- Sticking Open / BLOWN CLUTCH CIRCUIT FUSE / Improper Clutch Circuit Contact in
Control Assembly Switch**ADDITIONAL POSSIBLE COMPONENTS
ASSOCIATED WITH A COMPRESSOR FAILURE**PRESSURE DIFFERENTIAL VALVE (In Liquid Bleed Line) -- Sticking Closed / AMBIENT CUT-OFF SWITCH -- Sticking Closed / SUC-
TION THROTTLING VALVE -- Sticking Open / REFRIGERANT LEAK

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FIG. 17 Refrigerant System Pressure Evaluation

ADJUSTMENTS

SENSOR CALIBRATION

1. Remove the instrument panel pad and visually determine which direction to rotate the sensor calibration locking pin. Refer to Fig. 18.
2. While moving the temperature control lever, rotate the calibration locking pin into the calibration notch of the sensor control arm.
3. Check the position of the temperature control lever, it should be at 75. If it is not, loosen the cable housing-to-sensor attaching screw and move the temperature control lever to 75 while the sensor control arm is locked in the calibration position. Retighten the cable housing-to-sensor attaching screw, making sure the temperature control stays at 75 and the sensor arm stays locked.

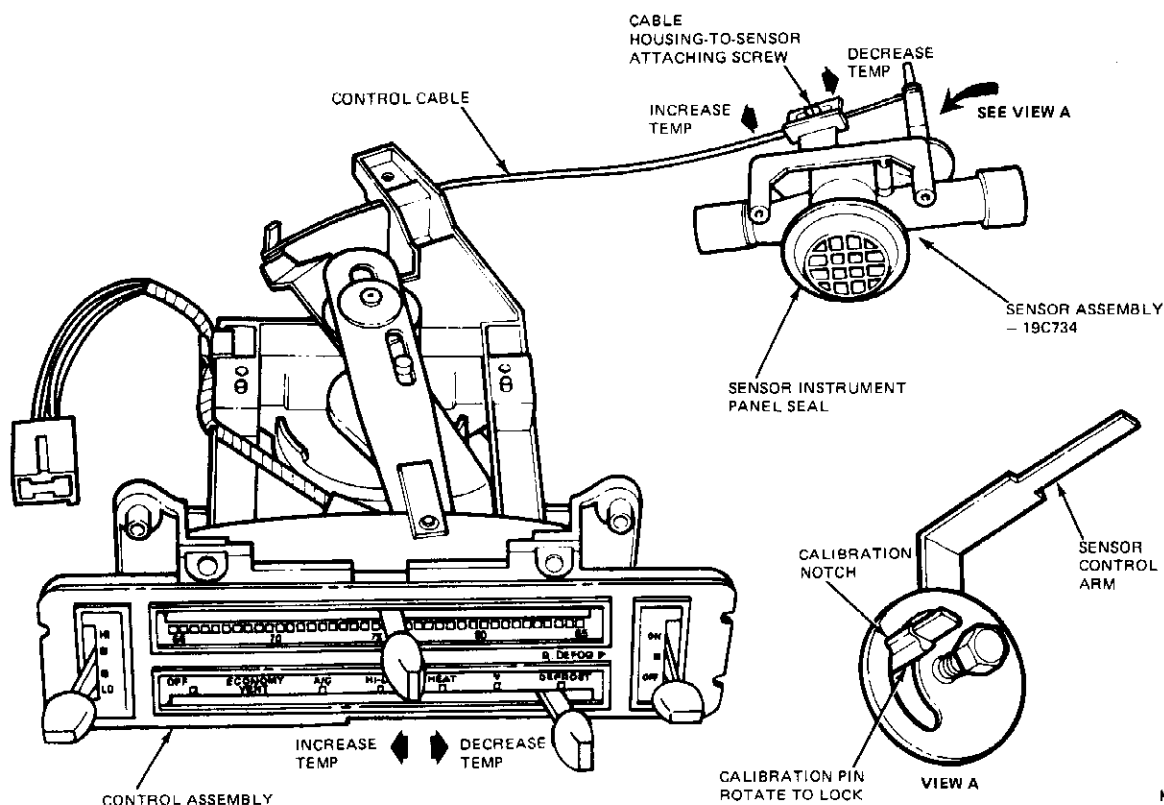
1. Establish the customers preference and the difference between the present and desired comfort level setting.
2. Determine the direction of change.
3. To decrease or increase, adjust the temperature control lever position with the sensor arm locked in the calibration notch. Loosen the cable housing-to-sensor attaching screw, move the temperature control lever the desired amount and retighten the attaching screw.

NOTE: Move the temperature control lever **HIGHER** to **DECREASE** and **LOWER** to **INCREASE** the controlled temperature at a given setting.

READJUSTING SENSOR CALIBRATION POINT

If it should become necessary to change the calibration point to suit a customer, first check the sensor calibration as described in the above procedure. If OK, use the following procedure (Refer to Fig. 18):

CAUTION: If a readjustment of the temperature control lever of more than 4° F. is required, and the cable adjustment is correct, per Sensor Calibration Procedure above, replace the sensor assembly.



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FIG. 18 ATC System Temperature Calibration