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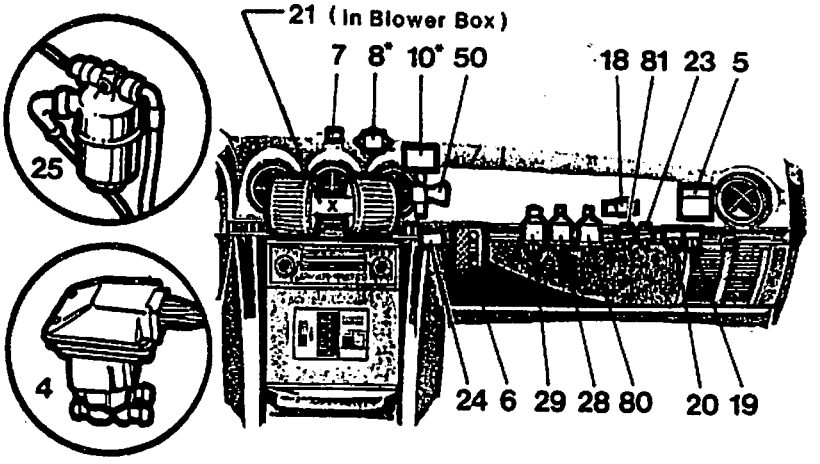
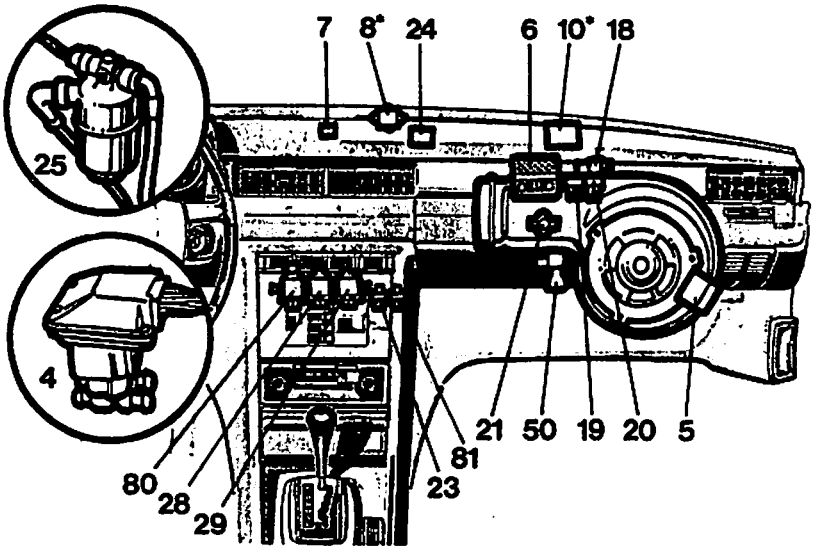
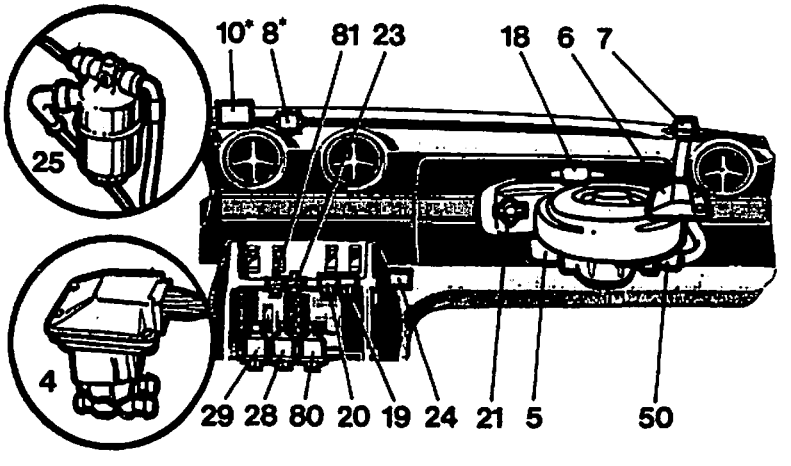
R107



W116



W123



* Firewall Side

KEY TO COMPONENTS

4 SERVO ASSEMBLY
5 10 PIN PLUG FOR TESTER
6 AMPLIFIER
7 IN-CAR TEMPERATURE SENSOR
8 AMBIENT TEMPERATURE SENSOR
10 BLOWER RESISTOR BLOCK
18 DOUBLE POLE RELAY
19 BLOWER MASTER SWITCH
20 COMPRESSOR SWITCH
21 TEMPERATURE SWITCH FOR AUXILIARY WATER PUMP
23 BI-LEVEL COMPRESSOR SWITCH
24 ETR (EVAPORATOR TEMPERATURE REGULATOR)
25 LOW PRESSURE CUT-OFF SWITCH
28 SWITCH-OVER VALVE (FOOTWELL FLAPS)
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35 COLD ENGINE LOCK-OUT SWITCH
50 ASPIRATOR
80 SWITCH-OVER VALVE ("DEF" MODE ONLY)
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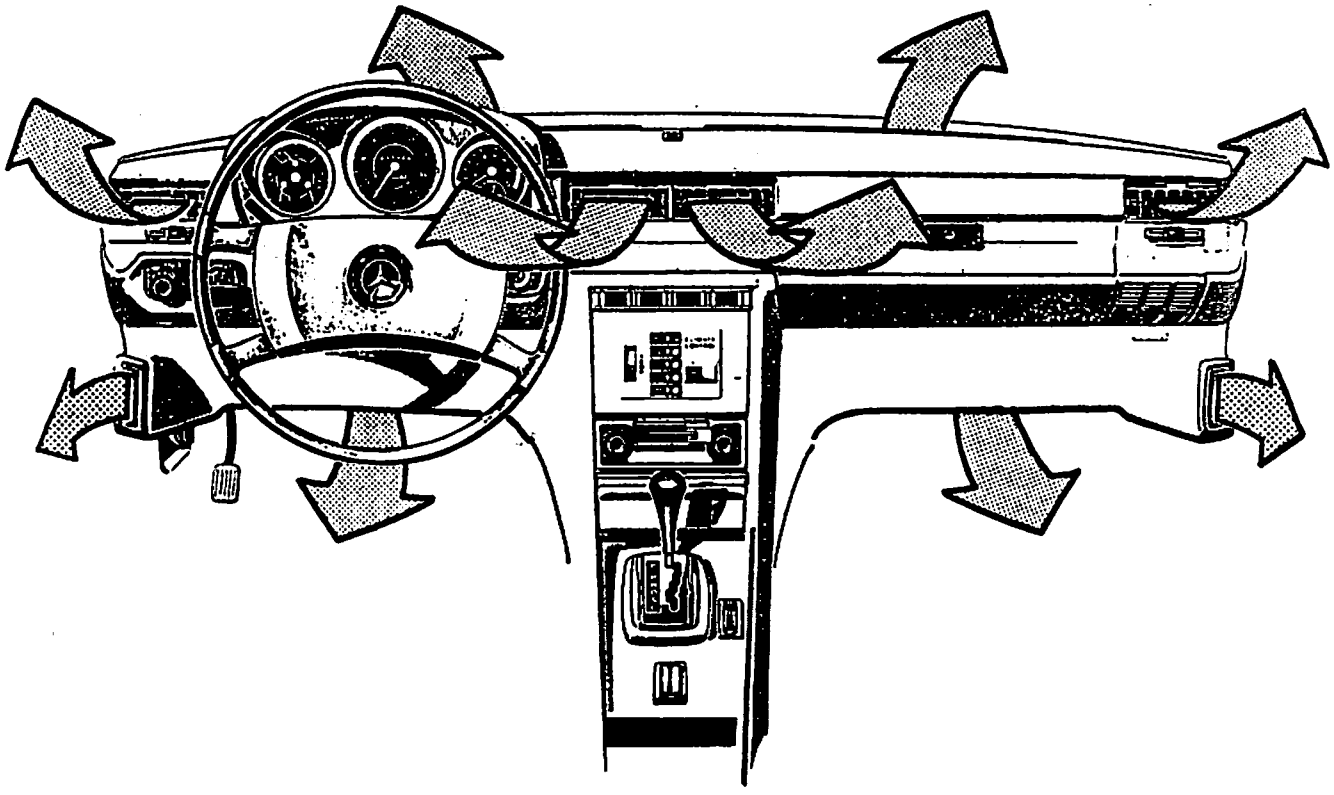
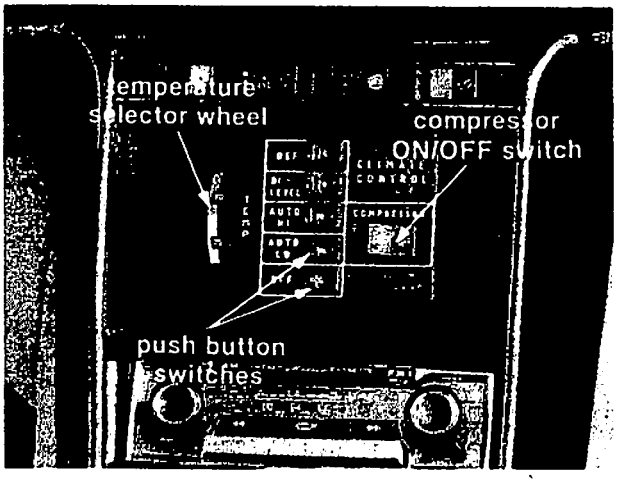
AIR DISTRIBUTION OUTLETS (Typical)



OPERATING THE SYSTEM

The Automatic Climate Control system has an automatic temperature regulating mechanism which can be adjusted by the driver to a setting between approximately 65 and 85°F. (20-32°C). After a setting is selected, the temperature is maintained automatically regardless of variations in ambient temperature. Heating or air conditioning is provided as necessary to maintain the selected temperature. The standard Mercedes-Benz heating, air conditioning and ventilation system support the automatic controls. Information on these systems is found in the appropriate technical literature.

CONTROL PANEL



An understanding of how each component on the control panel affects the system operation is necessary. The control panel contains the following: a temperature selector wheel, 5 push button switches which control the electrical functions and distribute vacuum to the various ACC components, and, an ON/OFF switch to control the air conditioning compressor clutch.

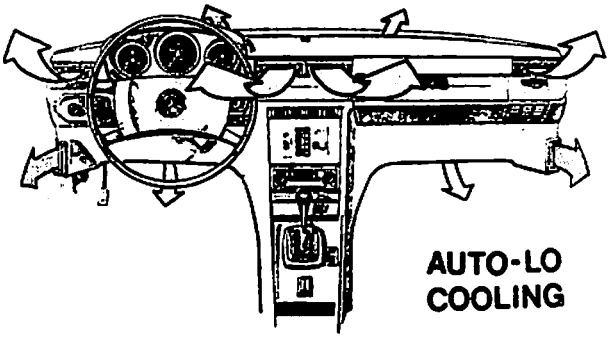
Temperature Selector Wheel

The temperature selector wheel has a range of 65 to 85°F (20-32°C) and is connected to a resistance potentiometer. This potentiometer forms part of a sensor chain which provides the control signal to maintain a selected temperature. A description of the sensor chain and components begins on page 10.

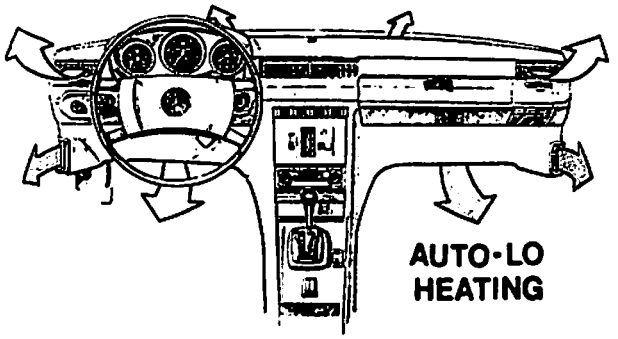
Push Button Switches

OFF—When OFF is selected, the blower is switched off and no outside air is supplied to the car's interior; however, the electronic control circuit continues to operate ready to provide a selected temperature. The air conditioning compressor clutch is disengaged.

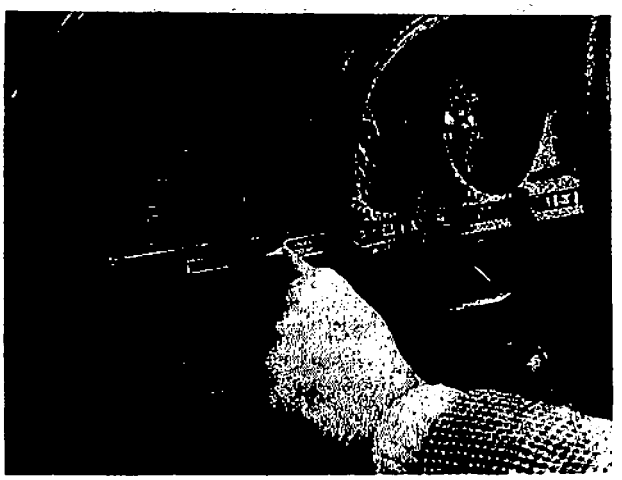
AUTO-LO—AUTO-LO is used for normal driving conditions and interior temperature is maintained at the preselected setting.



If cooling is required, the blower starts as soon as AUTO-LO is selected. The air conditioning system operates and cool air is distributed to the car's interior through the center and side dashboard outlets with a bleed-off to the defroster and footwell outlets. (On W116 models, bleed air is also provided to the door panel outlets.) The blower will operate at one of the five low range speeds.



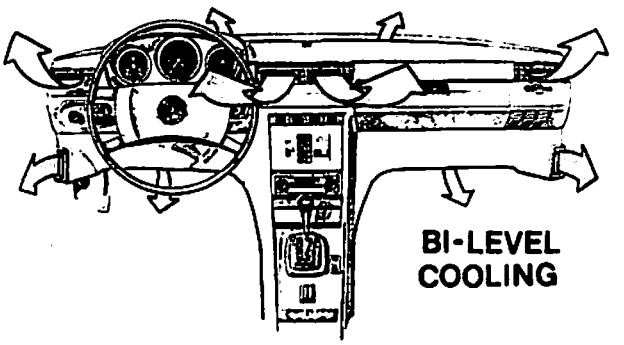
If heating is required, the system will not operate until the engine water temperature reaches 104°F (40°C). This prevents cool air from being blown into the car causing discomfort to the passengers. At 104°F (40°C) the outside air intake flap opens and the blower switches on. Warm air is distributed through the footwell and side dashboard outlets with a bleed-off to the defroster outlets. (On W116 models, bleed air is also provided to the door panel outlets). The blower will operate at one of the first 4 low range speeds.

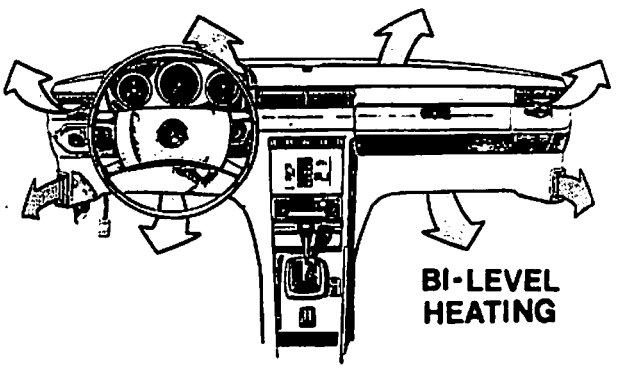


The change over from cooling to heating and vice versa is made automatically. Both cooled and heated air is continuously emitted from the side dashboard outlets. Flow from these outlets must be manually controlled.

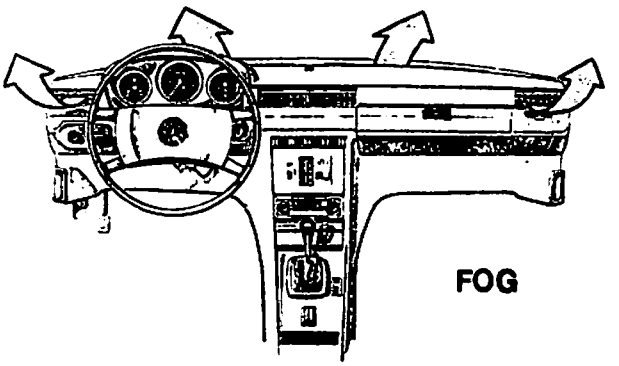
AUTO-HI—AUTO-HI is selected when higher blower speeds are necessary to maintain the desired level of comfort. Conditions such as stop and go traffic, and rear seat occupancy may necessitate the AUTO-HI position. All the temperature control and air distribution functions are the same as in AUTO-LO but the blower operates at one of the 3 high range speeds.

BI-LEVEL—BI-LEVEL is selected to clear a fogged windshield.





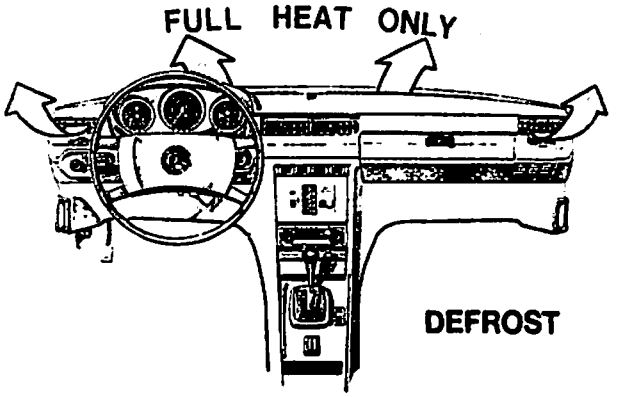
In BI-LEVEL, the temperature is regulated at the value selected, the same as in AUTO-LO and AUTO-HI; but, the blower operates only in one of the two highest speeds. Air distribution is the same as in AUTO-LO and AUTO-HI except that more air is directed to the windshield through the defroster outlets. The A.C. compressor automatically engages to provide dehumidification.



FOG

1976 cars have a FOG position instead of BI-LEVEL. The difference between FOG and BI-LEVEL is air distribution, as air is distributed only by FOG to the defroster and side dashboard outlets.

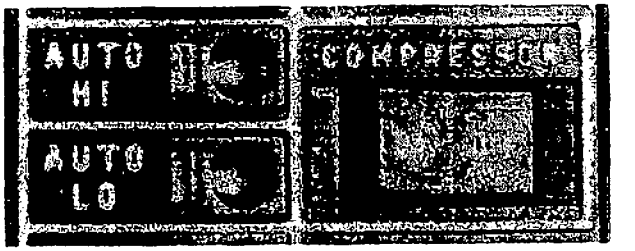
DEF—Defrost is used for defrosting the windshield.



DEFROST

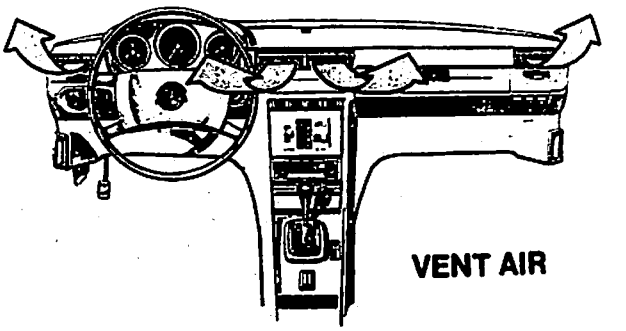
In defrost, the selector wheel setting does not control the temperature. Instead, full heat is directed only to the defroster and side dashboard outlets. To speed defrosting, the blower operates at maximum speed.

Compressor ON/OFF switch—This rocker switch allows the driver to turn off the A.C. compressor in the AUTO-LO and AUTO-HI positions as an economy feature.



OPERATING NOTES

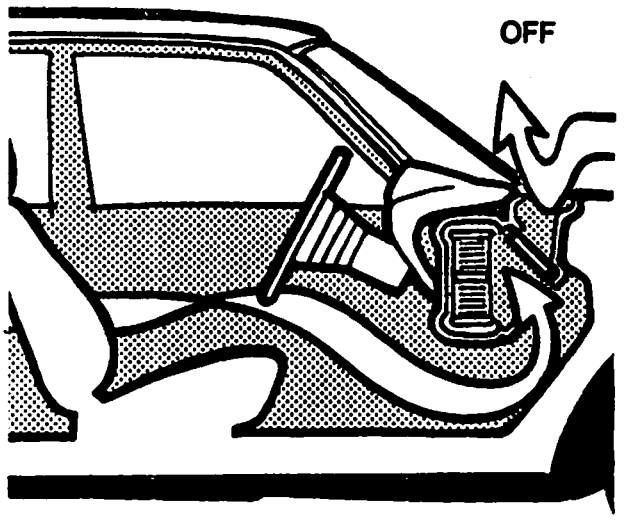
1. In BI-LEVEL and DEF positions, the blower operates when the position is selected regardless of engine water temperature. If the driver next selects AUTO-LO or AUTO-HI, the blower will continue to operate. After BI-LEVEL or DEF is selected, the driver must depress OFF to turn the blower off. If he then selects AUTO-LO or AUTO-HI, the blower will operate when the 104° temperature switch opens.



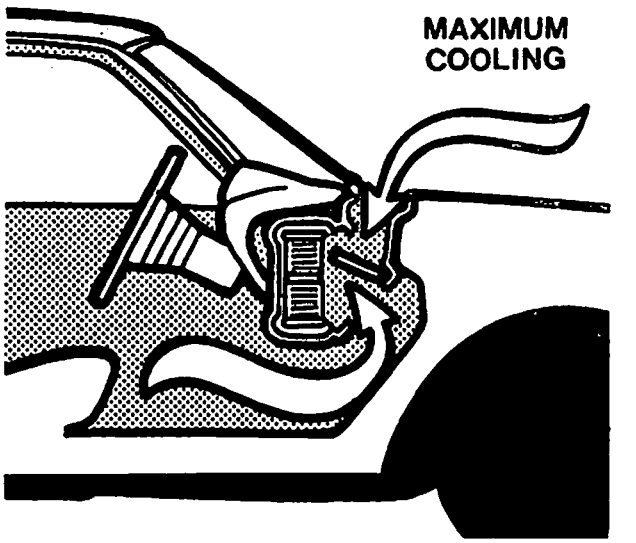
VENT AIR

2. If the driver wishes to have vent air the selector wheel is set at maximum cooling, AUTO-LO or AUTO-HI is selected, and the compressor ON/OFF is switched OFF. This will cause the air flap in the blower housing to be full open allowing 100% outside air flow through the center and side dashboard outlets.

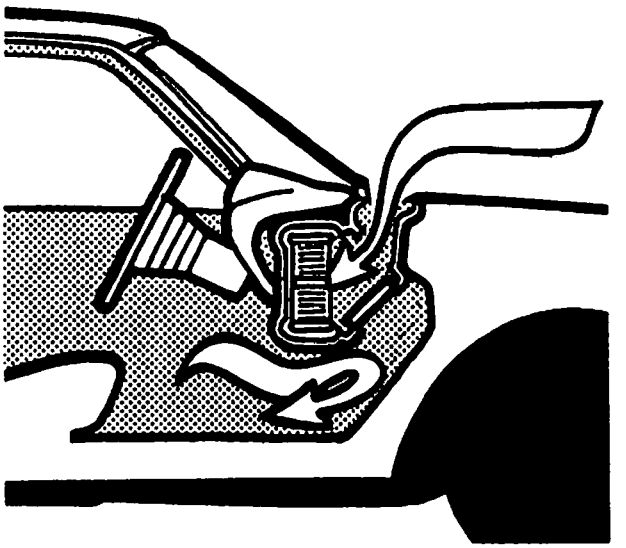
3. The air flap in the blower housing has three positions.



When "OFF" is selected, the flap is closed allowing no outside air to enter the blower.



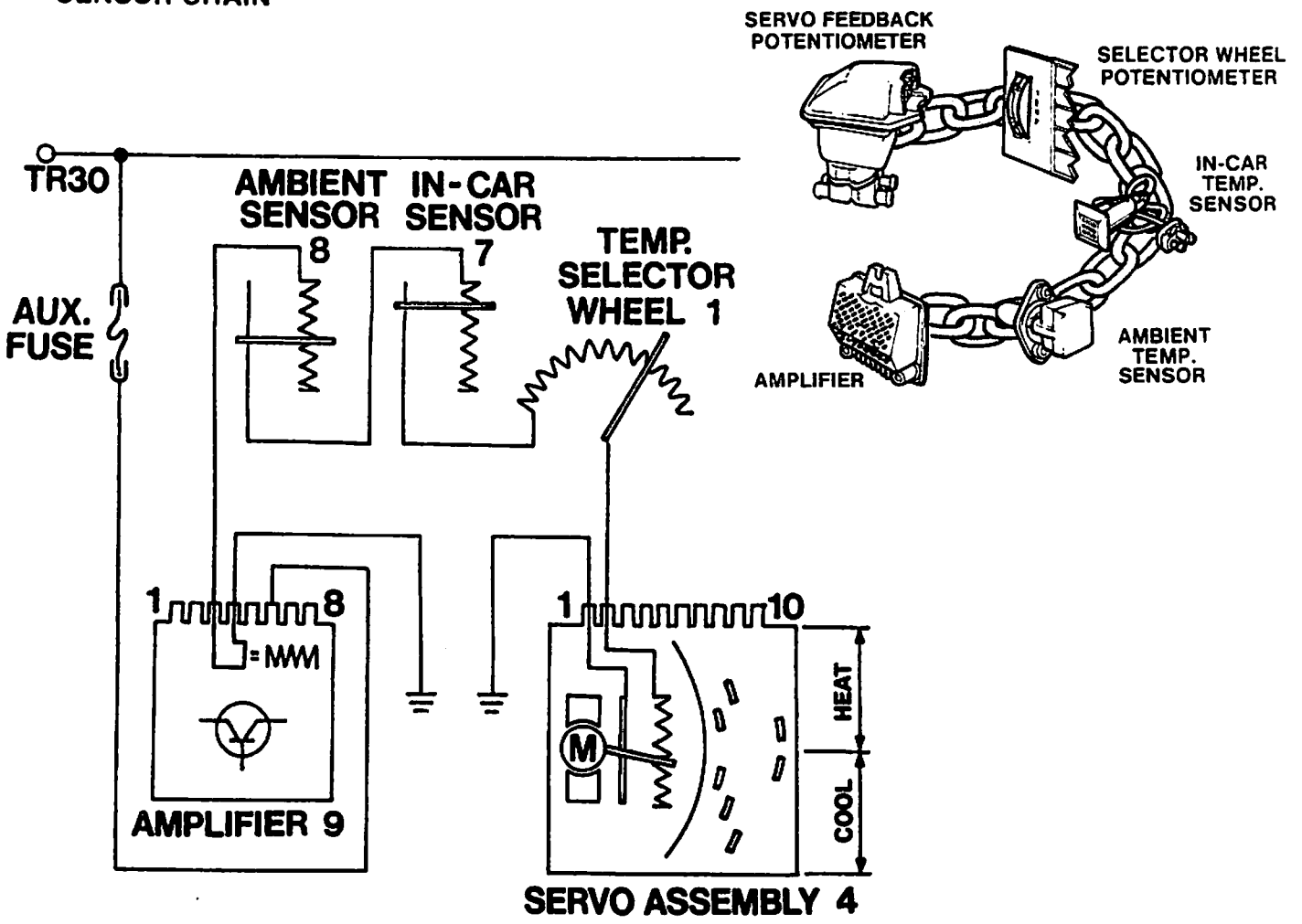
When maximum cooling is necessary, the flap is partially open allowing only a small percentage of outside air into the car. The remaining air is recirculated from the car's interior.



In all other switch positions, the flap is full open allowing 100% outside air flow into the blower.

DESCRIPTION OF TEMPERATURE CONTROL

SENSOR CHAIN



NOTE: Refer to page 4 for component location on the various models.

The control signal to maintain a selected temperature is provided by a sensor chain, and the amplifier. The sensor chain consists of four components which are connected in series: the servo (4) feedback potentiometer, the selector wheel (1) potentiometer, the in car (7) and ambient temperature (8) sensors. The amplifier (6) contains a fixed resistance value which the sensor chain is constantly measured against, and tries to equal in its total resistance value. This is explained further under the following explanation of the individual components. To simplify the explanation, the components are not described in order.

DESCRIPTION OF TEMPERATURE CONTROL

Selector Wheel Potentiometer (1)—The selector wheel potentiometer changes resistance as the selector wheel is moved. When the selector wheel is moved to a higher temperature, the potentiometer resistance becomes greater.

And, when the selector wheel is moved to a lower temperature, the potentiometer resistance becomes less. Since the potentiometer is connected in series with the other sensor chain components, changes in the potentiometer resistance change the entire sensor chain resistance.

In-Car Temperature Sensor (7)—The in-car sensor is a temperature sensitive resistor called a thermistor. It is located in the car's interior where it can accurately measure temperature. The interior temperature is converted into a resistance value by the sensor.

When the interior temperature increases, the sensor resistance drops. And, when the temperature drops, the resistance increases. Again this effects the resistance of the entire sensor chain.

To reduce lag and increase control accuracy, interior air is drawn over the in-car sensor when the blower is in operation. An aspirator (50) mounted on the blower housing, provides air flow.

Ambient Temperature Sensor (8)—The ambient sensor is also a thermistor, and is located in the outside air intake duct.

Its operation is identical to that of the in-car sensor except that it measures the temperature of the outside intake air. Outside air is drawn over the sensor when the blower is in operation.

Servo Feedback Potentiometer—The servo assembly (4) provides continuous adjustments from maximum cool to maximum heat. This maintains the selected temperature. The servo also contains a feedback potentiometer which forms part of the sensor chain. As only the sensor chain is being described here, a complete description of the servo assembly is not included. (See page 13 for servo description.)

The feedback potentiometer is activated and changes resistance as the servo assembly moves from cool to heat and vice versa. Moving to cool increases resistance and moving to heat decreases resistance. The purpose of this resistance change will be explained with the next sensor chain component.

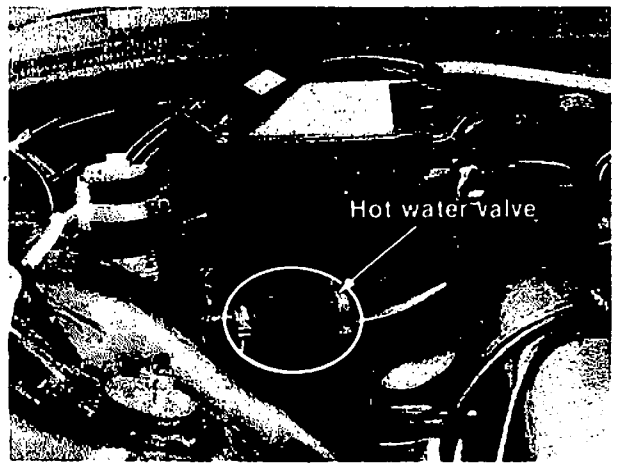
Amplifier (6)—The amplifier compares the total sensor chain resistance received from the selector wheel potentiometer, the in-car and ambient temperature sensors, and the feedback potentiometer in the servo assembly. This total resistance is compared to a fixed resistance in the amplifier.

If the values are not equal, a potential difference occurs. The amplifier boosts this potential difference and drives the servo motor until both values are equal.

Monitoring of in-car and ambient temperature by the two sensors provides continuous adjustments to the servo through the amplifier. In this way, the selected temperature is maintained.

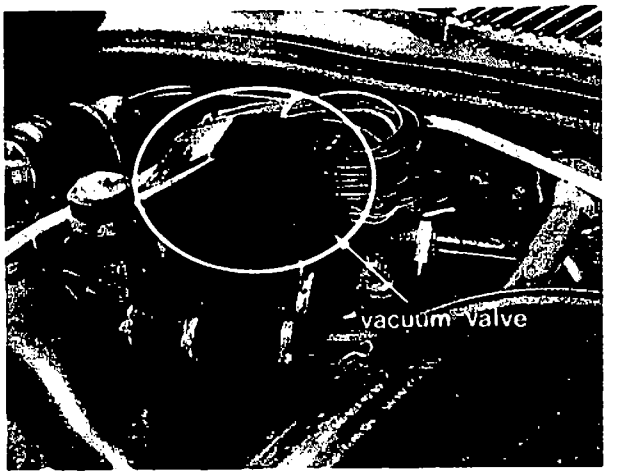
The feedback potentiometer in the servo assembly aids the amplifier in maintaining a selected temperature by not allowing the servo to be overcontrolled by the amplifier.

Servo Assembly (4)—The servo is driven by an electric motor and gear train which, as stated, is controlled by the amplifier. The servo provides continuous adjustments from maximum cool to maximum heat by doing three things:



1. It adjusts the integral hot water valve to control hot water flow to the heater core from maximum to full closed.

2. It regulates blower speeds through a remotely mounted resistor block. Electrical connection to the resistor block is established by a switch arm moving over contact segments as the servo moves from cool to heat and vice versa.



3. It adjusts the integral vacuum valve which controls the combinations of flap positions for outside air intake and interior air direction.

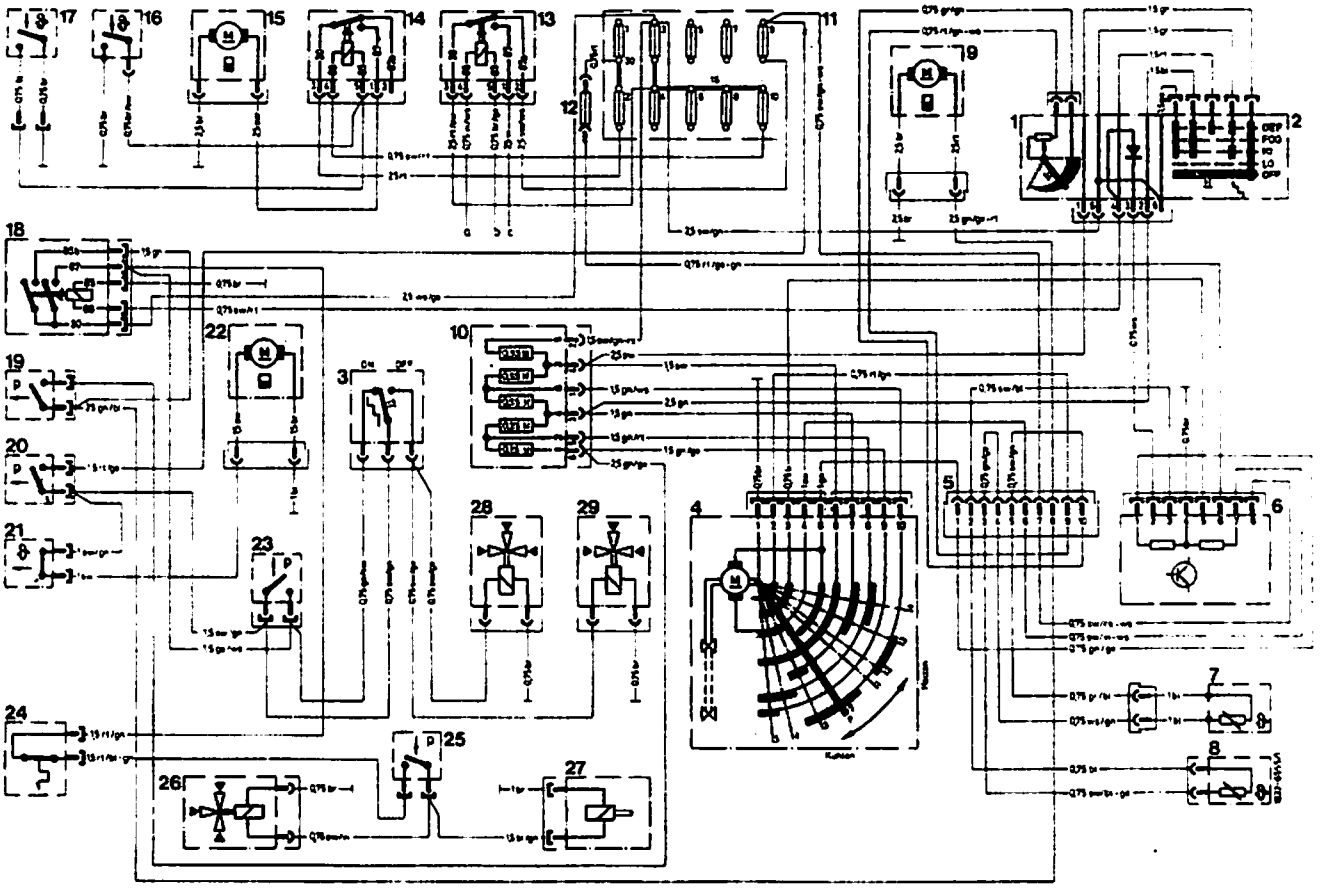
OPERATING NOTES:

1. When the ignition is turned off, the amplifier signals the servo assembly to move to the second blower speed in the cooling position, independent of sensor temperature or selector wheel setting.

2. When DEF is selected, the sensor chain is by-passed, and the amplifier signals the servo assembly to move into the maximum heating position.

3. Power is supplied to the amplifier through a 2 amp auxiliary fuse located by the main fuse block in a separate bayonette housing.

OPERATING PRINCIPLES OF INDIVIDUAL CIRCUITS



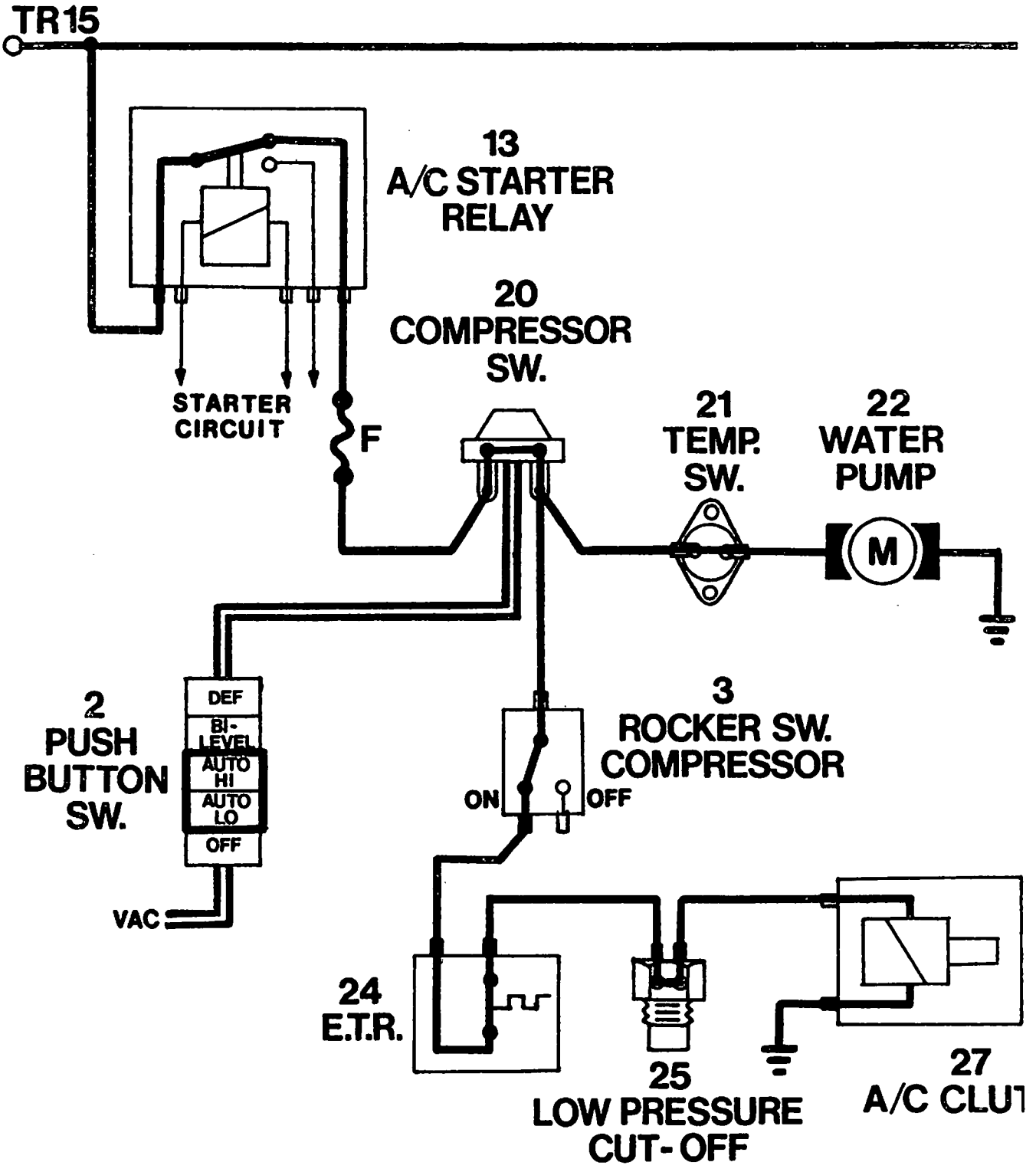
Electrical wiring diagram (Ignition off, servo assembly in position „PARK")

The following diagrams show the operation of some of the major circuits in a simplified form. Referring to these diagrams will help you in understanding how the individual components are related in performing their functions. Please remember that these are **not** actual wiring diagrams and should not be used as such. Refer to the Electrical Troubleshooting Manual or the brief introduction booklet for the model year for the actual diagram.

NOTE: Refer to page 4 for component location on the various models.

1 Temperature selector wheel
2 Pushbutton switches
3 „ON/OFF" Rocker switch, compressor
4 Servo assembly
5 10-pin plug for tester
6 Amplifier
7 In-car temperature sensor
8 Ambient temperature sensor
9 Blower
10 Resistor block for blower
11 Main fuse box
12 Auxiliary fuse (2 amps) for amplifier
13 Relay, air conditioning
14 Relay, auxiliary fan
15 Auxiliary fan
16 100°C (212° F) temperature switch in thermostat housing for auxiliary fan
17 62°C (144° F) temperature switch in receiver/drier for auxiliary fan
18 Double-pole relay
19 Blower master switch
20 Compressor switch
21 Temperature switch for water pump
22 Auxiliary water pump for heater
23 Compressor switch
24 ETR (evaporator temperature regulator) switch
25 Low-pressure cut-off switch for compressor
26 Switch-over valve, ignition retard (M 117 only)
27 Electromagnetic clutch for compressor
28 Switch-over valve (footwell flaps)
29 Switch-over valve (fresh/recirculating air flap)

A/C CLUTCH-WATER PUMP CIRCUIT AUTO-LO/AUTO-HI



A/C-starter relay (13)—As with all Mercedes-Benz vehicles with A/C, this relay disconnects the A/C compressor clutch during cranking of the engine to eliminate the extra load on the starter.

Compressor switch (20)—The compressor switch receives vacuum from the cold engine lock out switch. When vacuum is applied, the compressor clutch is switched on.

ETR (24)—The evaporator temperature regulator switch which is connected in series with the compressor switch (20) interrupts current flow to the compressor clutch when the evaporator temperature falls too low. This prevents the evaporator from icing up.

Low Pressure Cut-off Switch (25)—The low pressure cut-off switch, mounted on the receiver/drier, is also connected in series with the compressor switch (20). Being pressure activated, the switch interrupts current flow to the compressor clutch when the refrigerant pressure in the air conditioning system drops too low. This prevents damage to the compressor caused by a loss of oil due to a refrigerant leak.

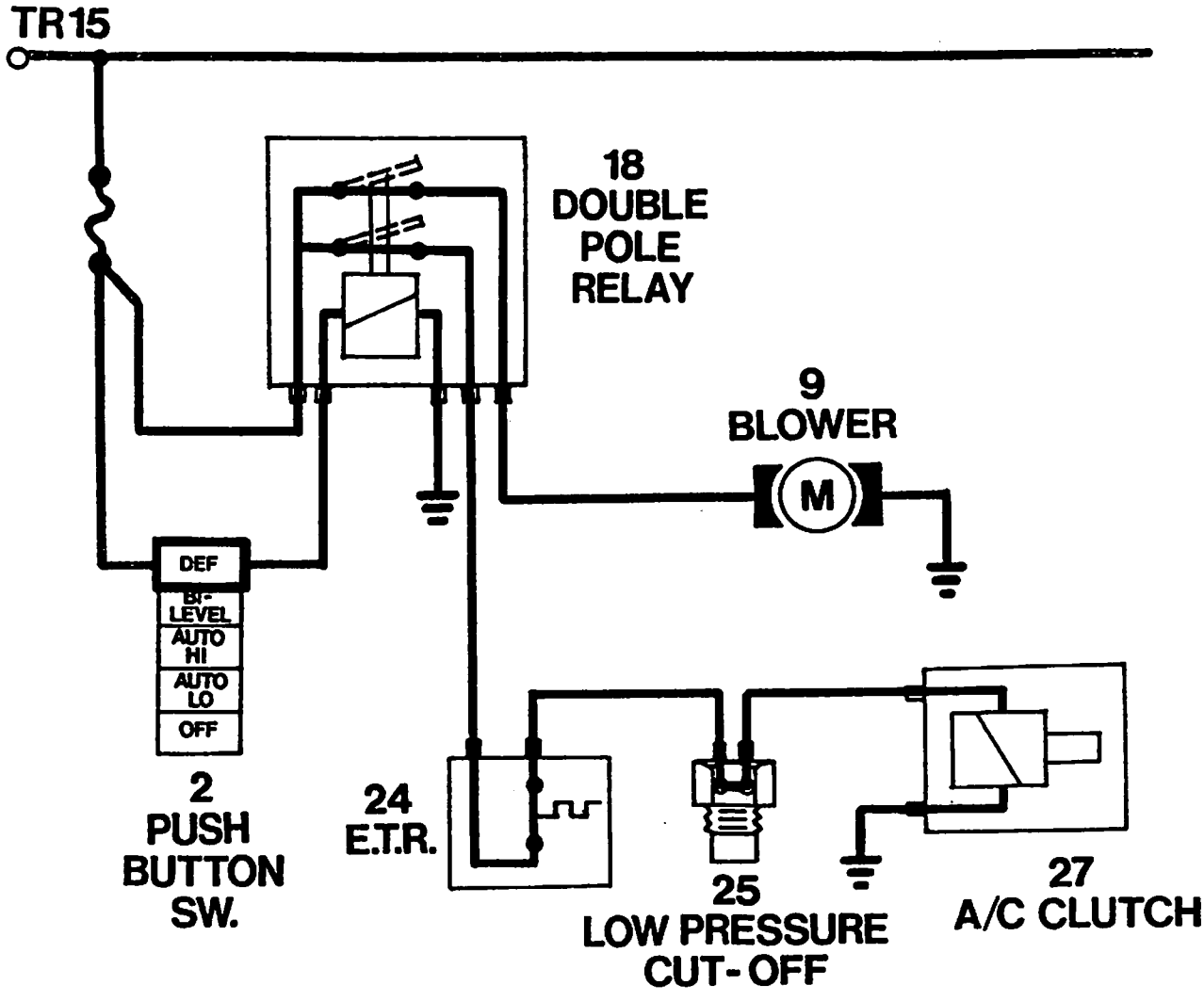
Compressor ON/OFF rocker switch (3)—This switch is used to switch off the air conditioning compressor if the driver desires.

The ON/OFF switch will only switch off the compressor if AUTO-LO or AUTO-HI is selected. In the other positions, the ON/OFF switch is by-passed.

Auxiliary water pump for heater (22)—An auxiliary water pump for the heater maintains constant heating water flow through the heater core at low engine RPM. The pump is connected in series through a temperature switch (21) to the compressor switch (20).

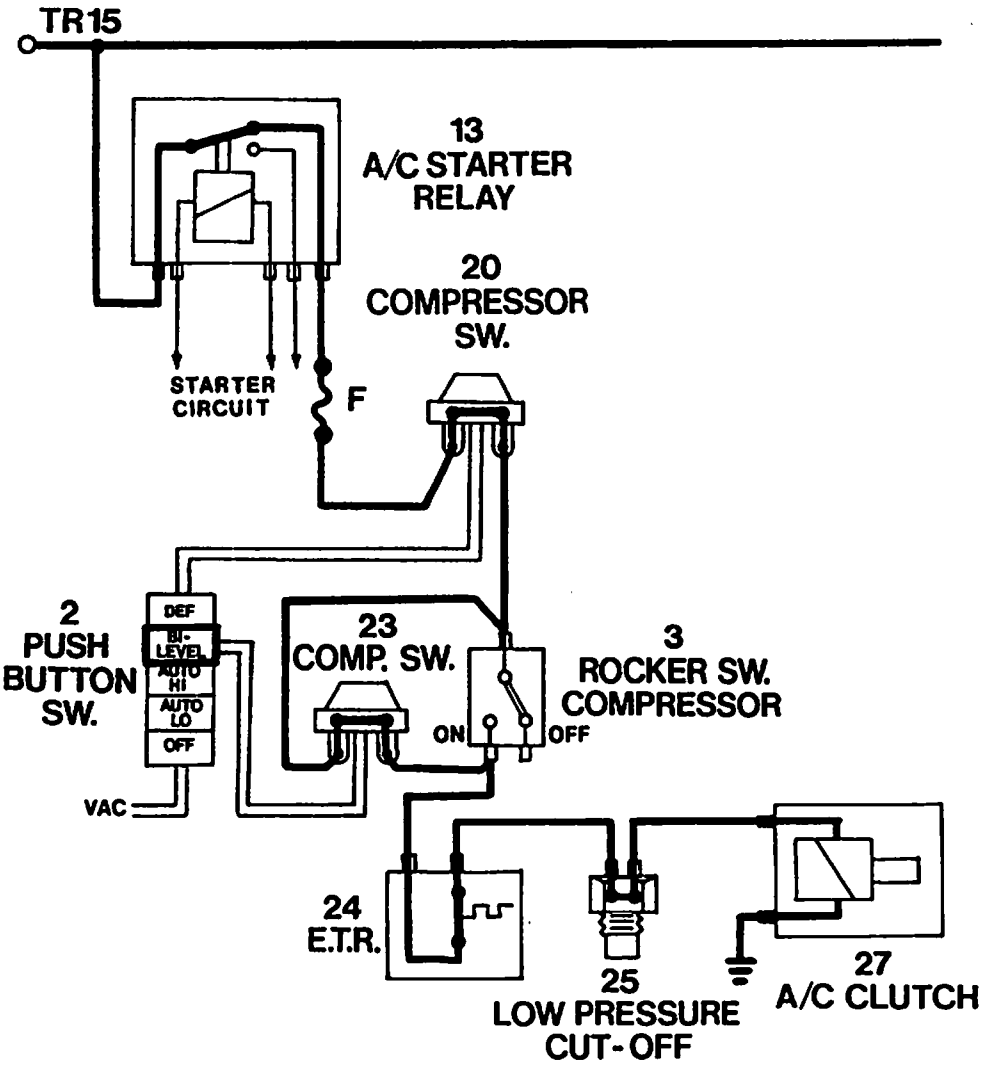
Temperature switch for auxiliary water pump (21)—This switches on the auxiliary water pump below an ambient temperature of 61°F (16°C) and switches off the pump above 79°F (27°C) ambient temperature.

A/C CLUTCH BY-PASS CIRCUIT DEFROST



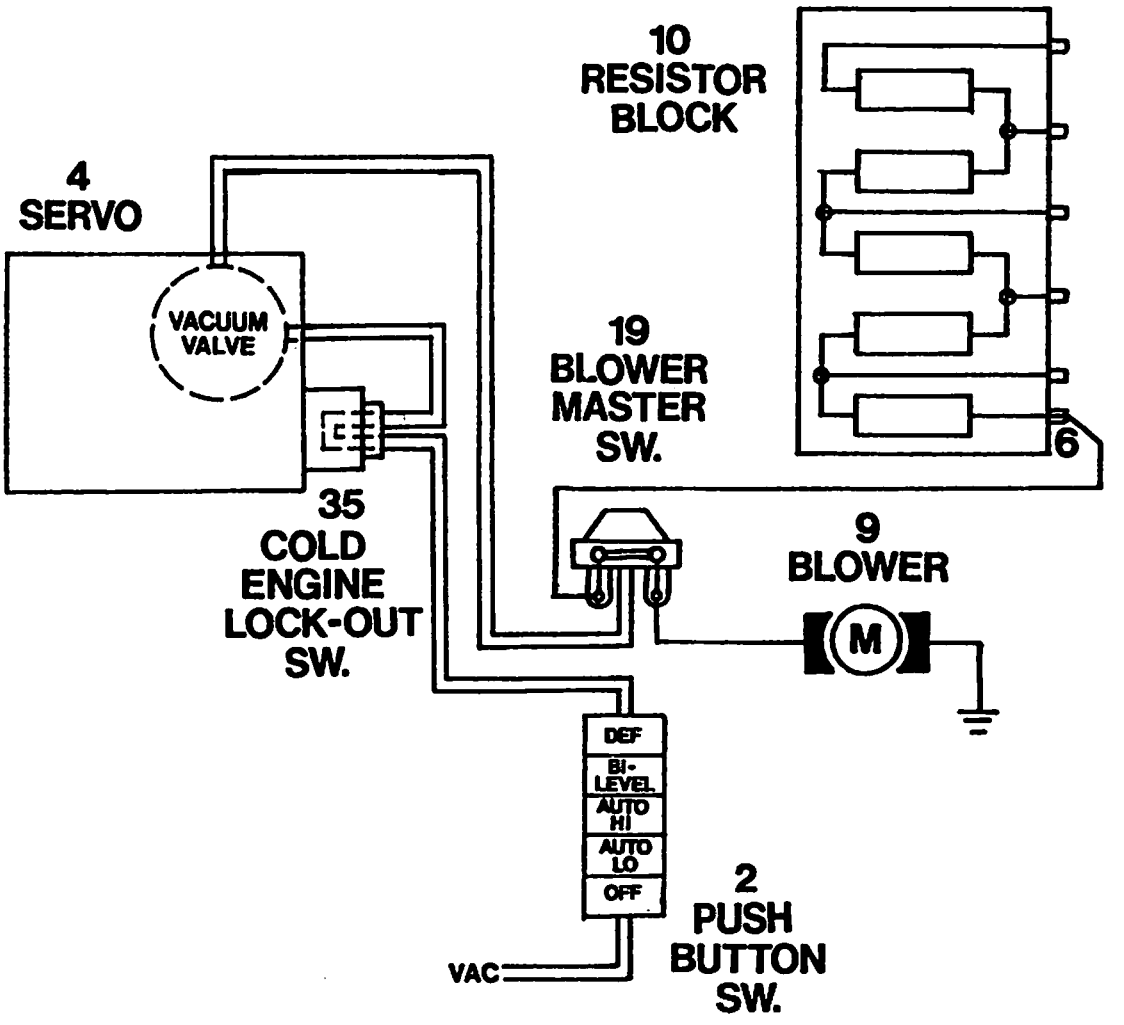
Double pole relay (18)—A double pole relay is used to by-pass the blower master switch (19) and the compressor ON/OFF switch (3) when DEF is selected. This permits defrosting under all conditions, even a vacuum loss.

A/C CLUTCH CIRCUIT
BI-LEVEL



Bi-level compressor switch (23)—The bi-level compressor switch is used to by-pass the compressor ON/OFF switch (3) when BI-LEVEL or FOG is selected. This switches on the compressor providing dehumidication.

BLOWER CIRCUIT (GENERAL)
AUTO-LO/AUTO-HI

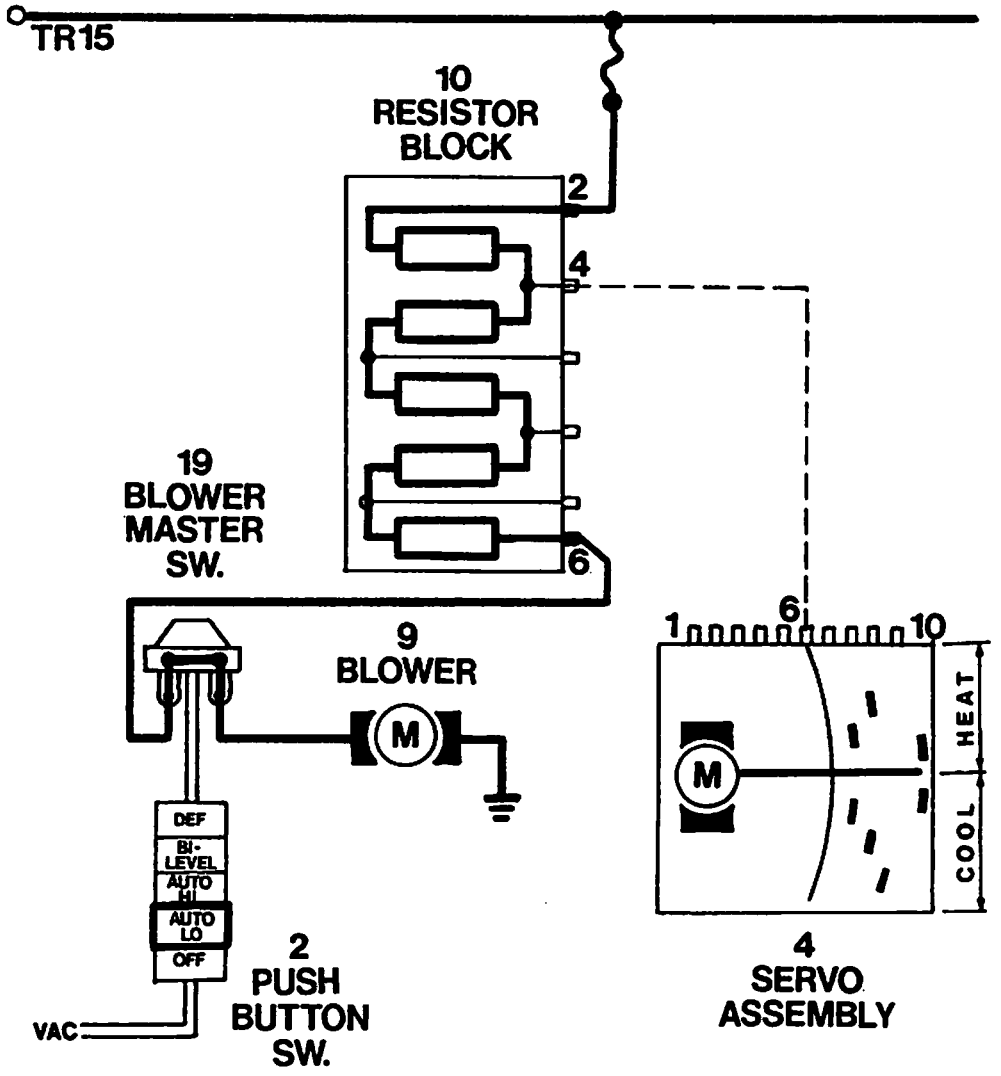


Cold engine lock-out switch (35)—The cold engine lock-out switch is located at the base of the servo assembly. This is a bimetallic vacuum switch that connects vacuum to the blower master switch at a temperature above 104°F (40°C) and disconnects vacuum below 68°F (20°C). This overlap between the two points is a normal characteristic of the bimetallic switch. The switch senses both ambient and engine water temperatures.

Blower Master Switch (19)—The vacuum actuated blower master switch receives vacuum from the cold engine lock out switch and switches on the blower in AUTO-LO and AUTO-HI.

Blower resistor block (10)—The blower resistor block contains five resistors which provide for the different blower speeds. The resistor block receives its signal as the switch arm moves over the servo contact segments. The various switch positions and corresponding blower speeds are shown on the following diagrams:

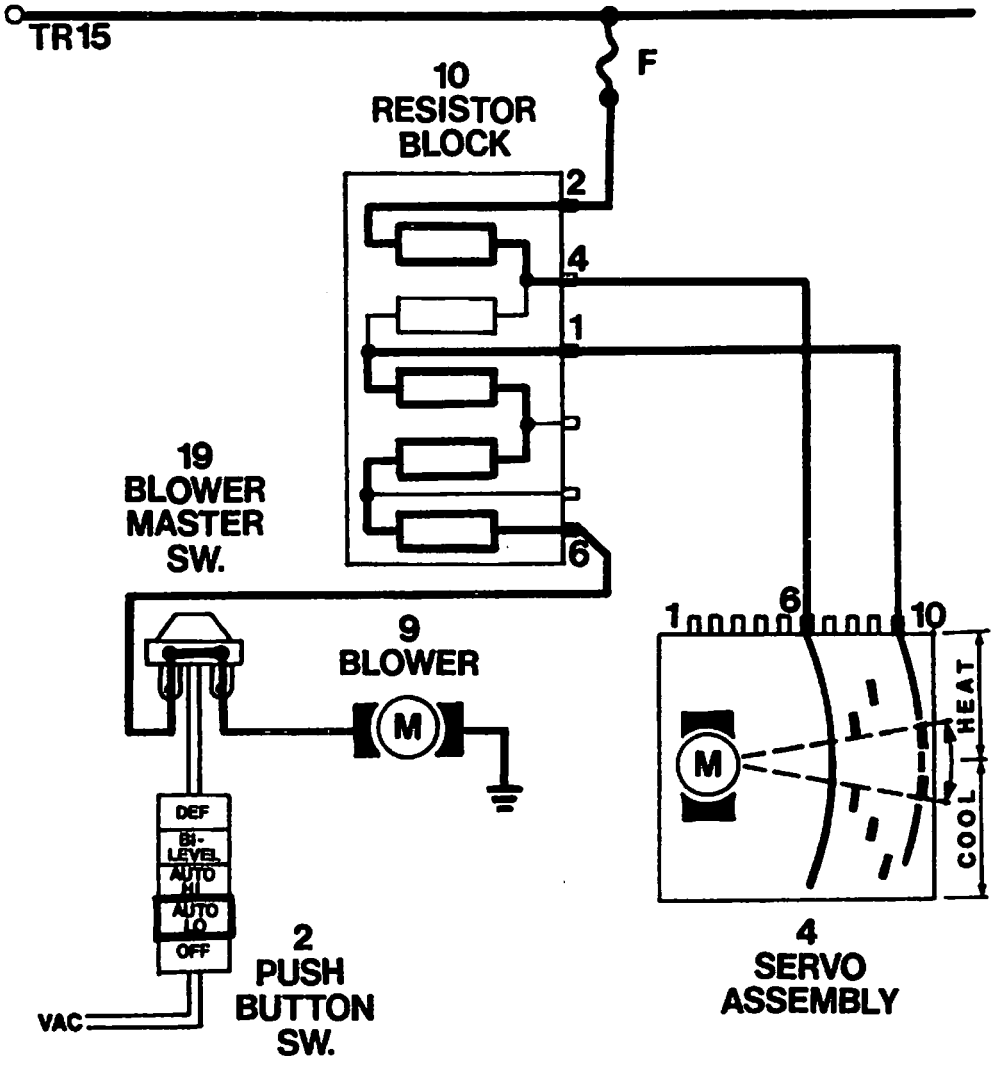
BLOWER CIRCUIT AUTO-LO SPEED 1



The AUTO-LO push button switch has no electrical function related to blower speed. However, it does provide the vacuum function of closing the blower master switch (19). AUTO-LO speed 1 occurs when the servo switch arm moves through the neutral area between the heating and cooling modes. Here, the servo does not complete any electrical connections which influence blower speed.

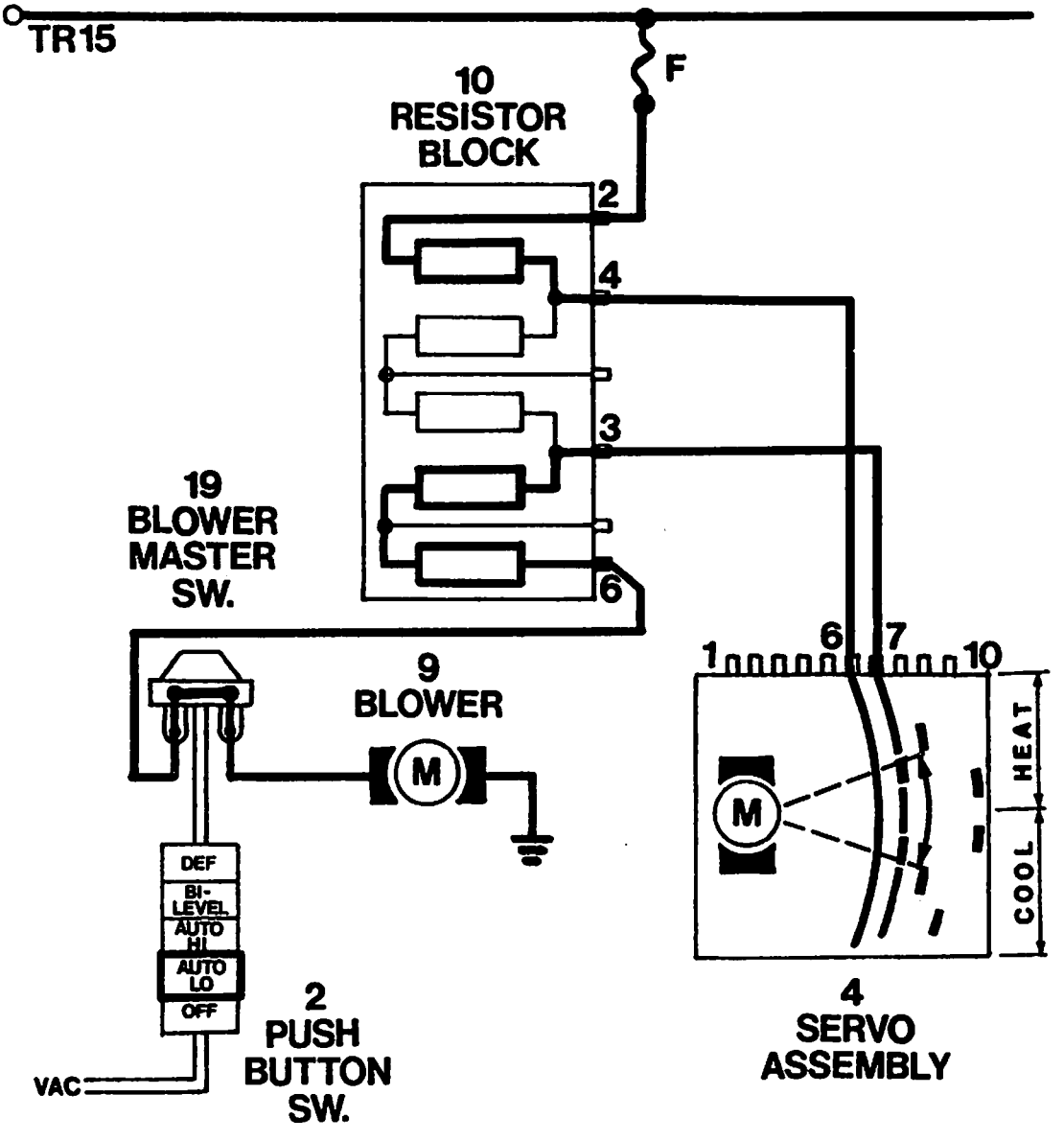
Therefore, the current to the blower is supplied directly from the fuse through all five resistors in the resistor block. This provides for the slowest blower speed.

BLOWER CIRCUIT AUTO-LO SPEED 2



When the servo moves from the neutral area towards either heating or cooling, the switch arm connects input terminal 6 with output terminal 10. The current from the fuse to the blower will always follow the path of least resistance, which is now through the servo. One of the five resistors is now by-passed, providing speed 2—AUTO-LO.

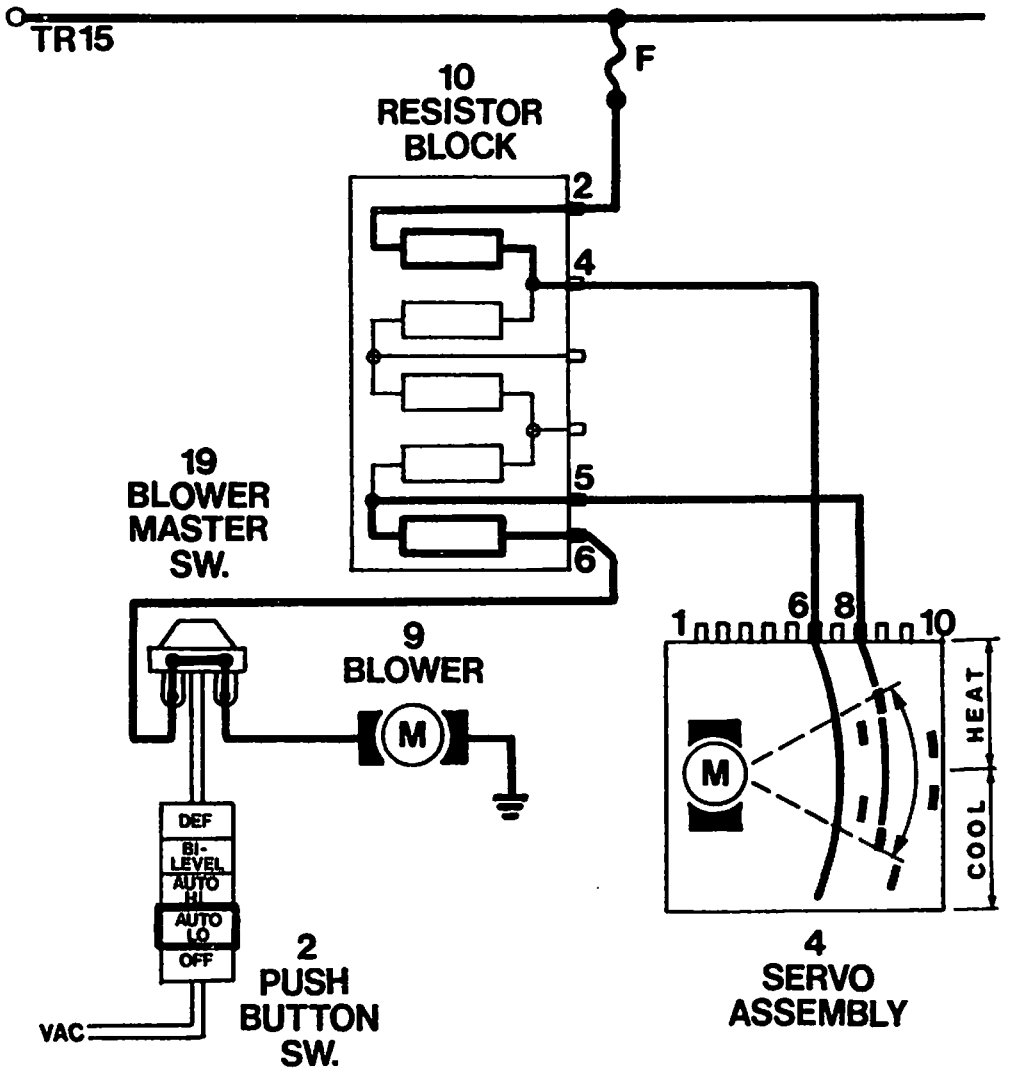
BLOWER CIRCUIT AUTO-LO SPEED 3



As the servo moves further toward heating or cooling, the switch arm connects terminals 6 and 7.

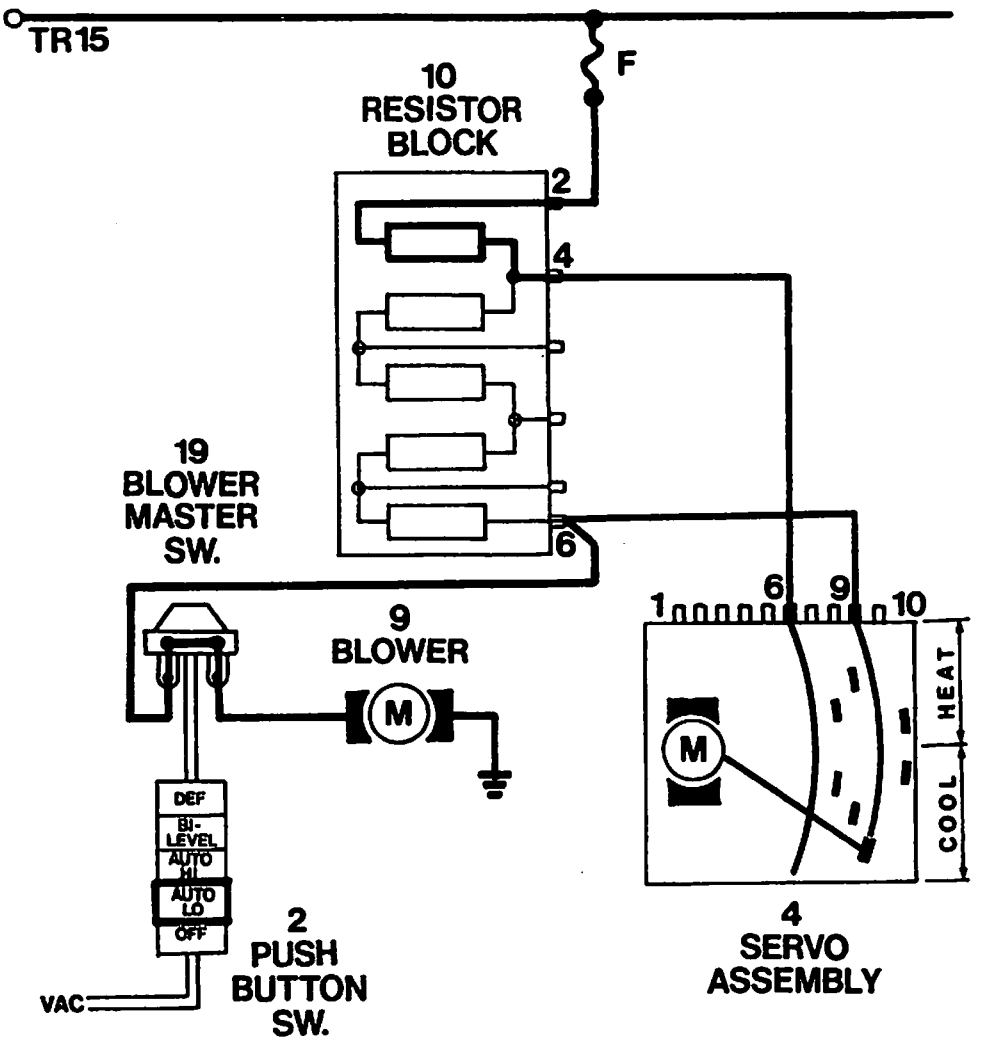
A second resistor is by-passed providing speed 3, AUTO-LO.

BLOWER CIRCUIT AUTO-LO SPEED 4



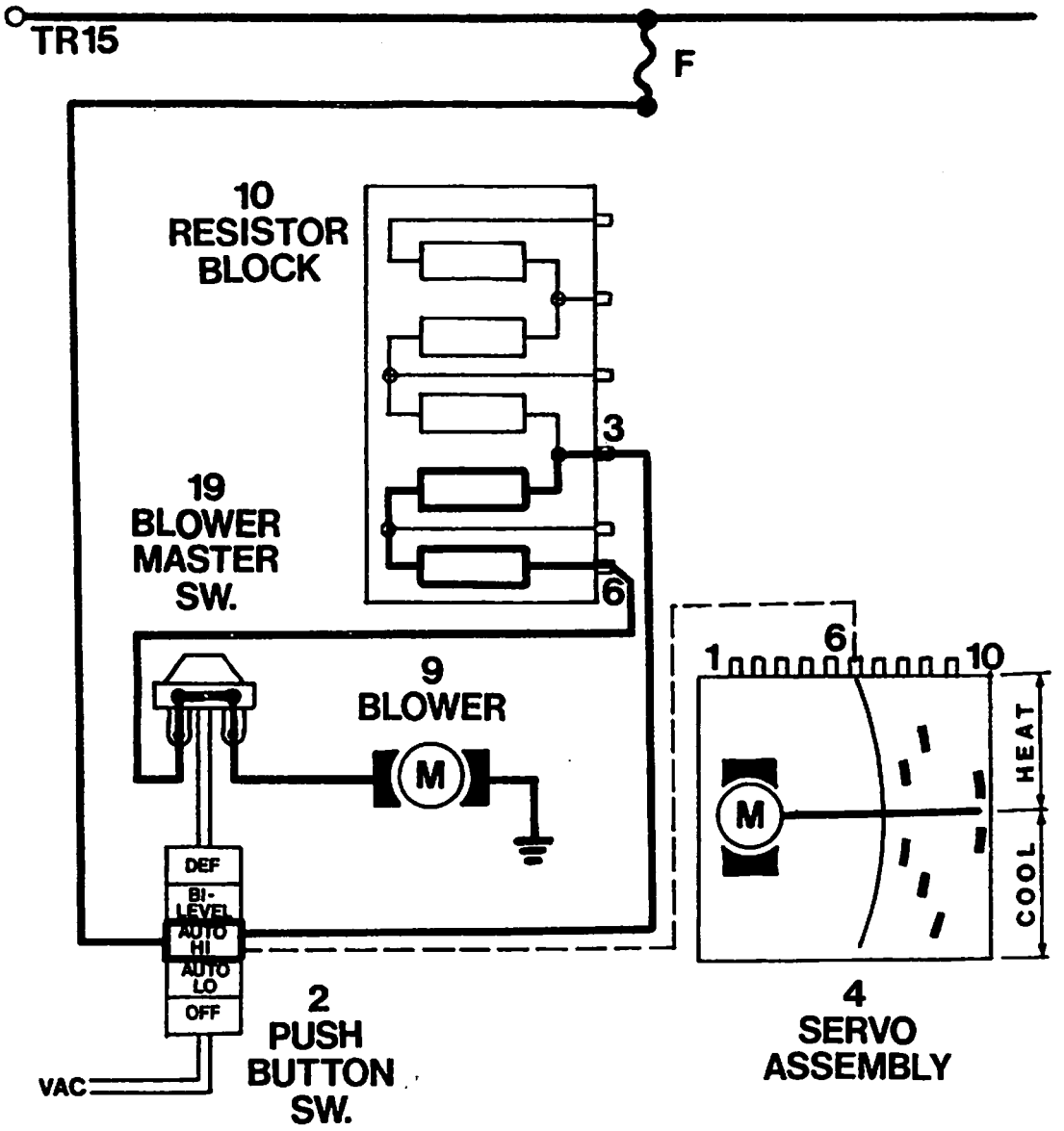
When the servo switch arm connects terminal 6 and 8, Speed 4 AUTO-LO is provided. This is the maximum blower speed available in the heating mode in AUTO-LO. One higher speed is available in the cooling mode. Three of the five resistors have now been by-passed to provide speed 4, AUTO-LO.

BLOWER CIRCUIT AUTO-LO SPEED 5 (cooling only)



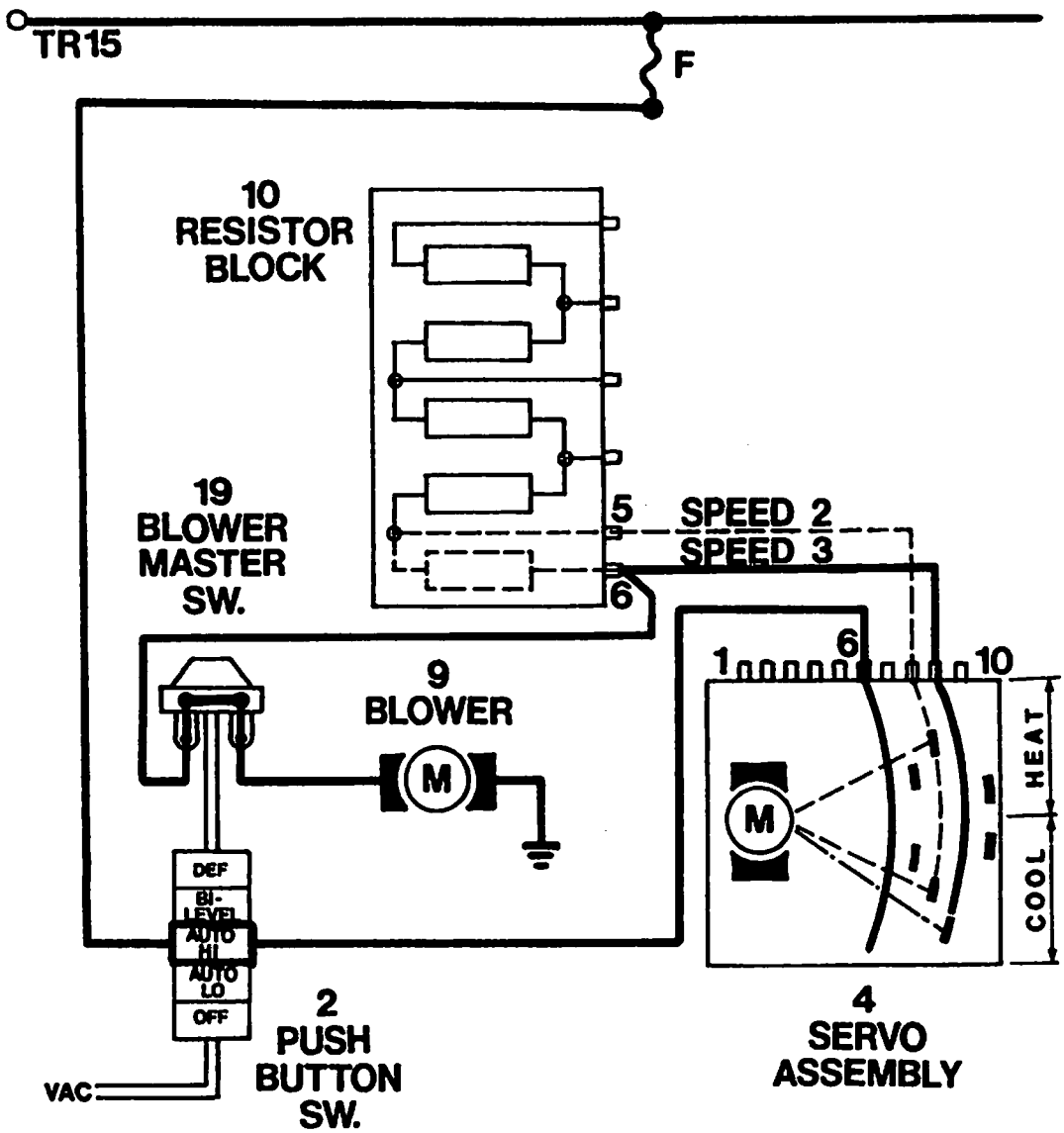
Only when at maximum cooling will the servo connect terminals 6 and 9 via the switch arm. This provides speed 5, AUTO-LO. Four of the five resistors have been by-passed.

BLOWER CIRCUIT
AUTO-HI
SPEED 1



In AUTO-HI, the push button switch directly establishes electrical connections which will influence the blower speed. It also establishes the vacuum connection which closes the blower master switch. In AUTO-HI speed 1, the servo switch arm is in the neutral area between heating and cooling. Here, the servo has no influence on blower speed. The current to the blower is connected via the AUTO-HI push button switch through two of the resistors in the resistor block (solid line). Speed 1, AUTO-HI is provided.

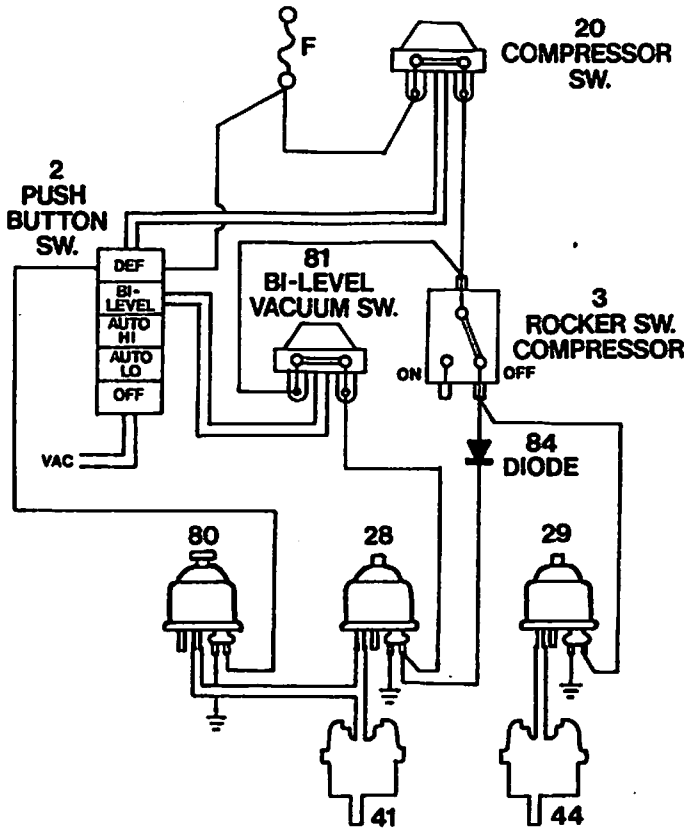
BLOWER CIRCUIT
AUTO-HI
SPEED 2 and 3 (COOLING ONLY)



When the servo switch arm moves far enough in the heating or cooling mode, it connects terminals 6 and 8, and one of the two resistors used at speed one is by-passed. Speed 2 AUTO-HI is provided (dashed line).

Only when the servo moves to maximum cooling is terminal 9 connected and speed AUTO-HI provided. Here the last resistor is by-passed.

SWITCH-OVER VALVE CIRCUITS



28 SWITCH-OVER VALVE (footwell flaps)
29 SWITCH-OVER VALVE (fresh/recirculating air flap)
41 VACUUM ACTUATOR (footwell flaps)
44 VACUUM ACTUATOR (fresh/recirculating air flap)
80 SWITCH-OVER VALVE (footwell flaps)

Switch-over valves (28, 29, 80)—The three switch-over valves are responsible for operating the vacuum actuators which control flap positions.

Switch-over valve (28) (Footwell flaps)—This valve operates the vacuum actuator for the foot well flaps (41).

The valve is controlled as follows:

BI-LEVEL or FOG versions, ACC: With the A/C compressor rocker switch (3) in the Off position, the valve is energized to open the footwell flaps.

BI-LEVEL versions ACC only: When Bi-level is selected, the contacts in vacuum switch 81 shut. This will also complete a circuit to energize valve 28 and open the footwell flaps.

Switch-over valve (29) (Fresh/Recirculating air flap): This valve operates the vacuum actuator for the fresh/recirculating air flap (44). When the A/C compressor rocker switch (3) is in the OFF position, the valve is energized to open the fresh/recirculating air flap.

Switch-over valve (80)—Bi-level version, ACC only: When Defrost is selected valve 80 is energized. The vacuum being supplied to the footwell flap actuator (41) is vented and the footwell flap closes.