

*SECTION 412-04: Control Components*  
*DESCRIPTION AND OPERATION*

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*1998 Mark VIII Workshop Manual*

## **Control Components**

### **Electronic Automatic Temperature Control**

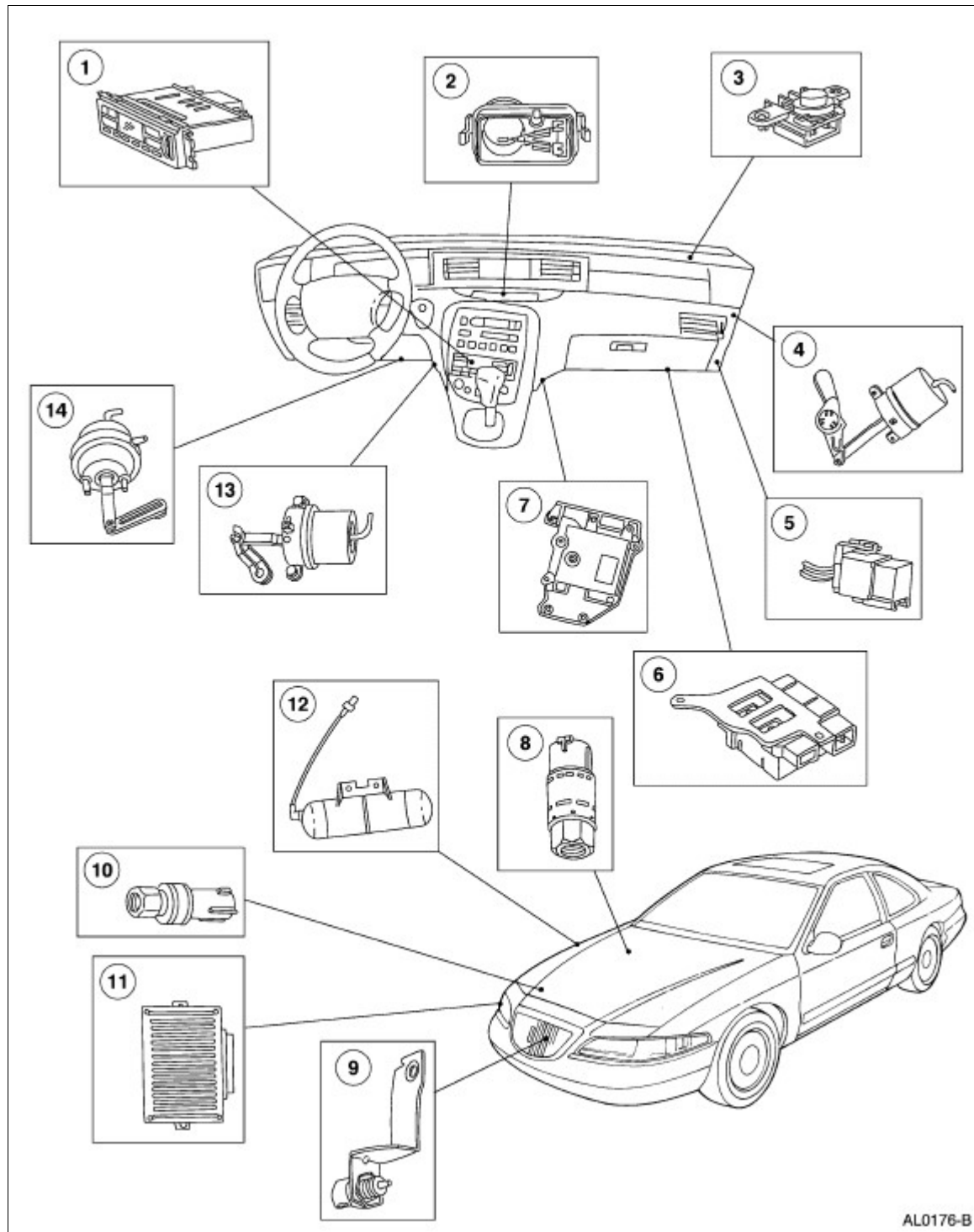
With the use of a microcontroller, the electronic automatic temperature control (EATC) module analyzes input from the following major sources:

- temperature, function and blower selection (made by the vehicle occupants)
- in-vehicle temperature
- ambient temperature
- sunload
- vehicle speed
- engine coolant temperature

Using these inputs, the microcontroller determines the correct conditions for the following outputs:

- A/C compressor clutch engagement
- blower speed
- air temperature blend door position
- heater air damper door position
- windshield defroster door position
- air inlet duct door position

### **Component Locations**



Item	Part Number	Description
1	18C612	Electronic Automatic Temperature Control Module
2	19D888	In-car Temperature Sensor
3	19E663	A/C Sunload Sensor
4	18A318	A/C Air Inlet Duct Door Vacuum Control Motor
5	14B193	Blower Motor Relay

6	19E624	A/C Blower Motor Speed Control
7	19E616	A/C Electric Blend Door Actuator
8	19E561	A/C Cycling Switch
9	19E702	A/C Ambient Air Temperature Sensor and Bracket
10	19D594	A/C Pressure Transducer
11	—	Variable Load Control Module
12	19A566	A/C Vacuum Reservoir Tank and Bracket
13	18A318	Windshield Defroster Door Vacuum Control Motor
14	18A318	Heater Air Damper Door Vacuum Control Motor

## Control System Inputs

### Climate Control Assembly

The electronic automatic temperature control (EATC) module, located in the instrument panel, has the following features:

- 11 push buttons
- a blower speed override thumbwheel for manual input
- a vacuum fluorescent display for displaying set temperature, ambient temperature, function and diagnostic trouble codes (DTCs)
- an On-Board Diagnostic (OBD) feature to supply the technician with diagnostic trouble codes (DTCs). These DTCs direct the technician to the inoperative component.

### A/C Ambient Air Temperature Sensor

The A/C ambient air temperature sensor and bracket (19E702):

- is located in front of the A/C condenser core (19712) near the center of the vehicle.
- contains a thermistor which measures the temperature of outside air as a resistance and sends that reading to the electronic automatic temperature control assembly.

### In-Car Temperature Sensor

The in-car temperature sensor, which is part of the message center control panel, operates in the following manner:

- A thermistor in the in-car temperature sensor measures air temperature inside the passenger compartment.
- An automatic temperature control sensor hose and elbow (19D888) is connected between the A/C evaporator housing (19850) and the in-car temperature sensor.
- The automatic temperature control sensor hose and elbow takes air from the A/C evaporator housing air stream to create a suction in the in-car temperature sensor.
- The suction draws in-vehicle air into the in-car temperature sensor and across the thermistor.

### A/C Sunload Sensor

The A/C sunload sensor (19E663):

- is located on the top RH side of the instrument panel (04320) above the glove compartment (06010) .
- contains a photovoltaic diode that is sensitive to light.
- has some unspecified resistance across the terminals depending upon the amount of light reaching the photovoltaic diode; therefore the only test that can be performed is for an internal short circuit.

## Control System Outputs

### A/C Blower Motor Speed Control

The A/C blower motor speed control (19E624) is located under the A/C evaporator housing, forward of the blower motor (18527).

- The function of the A/C blower motor speed control is to convert low power signals from the electronic automatic temperature control module to a high current, variable ground feed for the blower motor.
- A/C blower motor speed is infinitely variable and is controlled by the electronic automatic temperature control module software.
- A delay function provides a gradual increase or decrease in blower motor speed under all conditions.

### A/C Electric Blend Door Actuator

The A/C electric blend door actuator is located on the rear of the A/C evaporator housing.

- Its function is to move the air temperature blend doors on command from the control assembly.
- The A/C electric blend door actuator contains a reversible electric motor and a potentiometer. The potentiometer wiper is connected to the actuator output shaft and moves with the output shaft to indicate the position of the air temperature blend door.
- A 5 volt signal is applied to the ends of the potentiometer. The voltage available at the wiper indicates the position of the potentiometer. The expressed value of the actuator wiper voltage is sent to the electronic automatic temperature control module and is matched with the wiper voltage of the module potentiometer. The control module then drives the actuator motor in whichever direction is necessary to make the actuator wiper voltage agree with the control module wiper voltage.

## Vacuum Control Motors

The vacuum control motors (18A318):

- are located on the A/C evaporator housing, A/C recirculating air duct (19C590) and heater air plenum chamber (18471).
- direct system airflow to the vehicle interior as determined by the electronic automatic temperature control module or manual override.

## Variable Load Control Module

The variable load control module:

- is located behind the RH front wheel inner splash shield.
- incorporates circuit control provisions for the fan motor (8C607) and the A/C clutch field coil (2987) .
- communicates with the powertrain control module through the multiplex communication network.

## SYSTEM RESPONSE

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<b>Control Assembly Selection</b>	<b>Air Temperature Blend Door Response</b>	<b>Heater Air Damper Door Response</b>	<b>Windshield Defroster Door Response</b>	<b>Air Inlet Duct Door Response</b>	<b>Blower Motor Response (Unless Manually Overridden)</b>	<b>A/C Clutch Response<sup>a</sup></b>
OFF	Remains fixed	Air to the Plenum Chamber	Fixed in DEFROST	Fixed in RECIRC	Blower Motor OFF	A/C Clutch disabled.
AUTO	Varies according to the sensor temperatures and the customer temperature selection. The air temperature blend door is in the heat position when the sensors are cool. The air temperature blend door is in the A/C position when the sensors are hot.	Air to the floor during heating. Air to the plenum chamber during cooling. Air to both between heating and cooling.	Air to the windshield defroster hose nozzle during heating. Air to the panel during cooling.	Recirculates air when maximum air conditioning is required. Otherwise outside air.	Variable blower motor speeds when the engine coolant temp. is above 49°C (120°F) or A/C is required. Low blower motor speed when the engine coolant is below 49°C (120°F) and heating is required. <sup>b</sup>	A/C Clutch enabled if outside temp. is above 10° C (50°F)
MAX A/C	Varies according to the sensor temperatures and the customer temperature selection.	Air to the plenum chamber.	Fixed in the PANEL position.	Fixed in the RECIRC position.	Variable blower motor speeds.	A/C Clutch enabled if outside temp. is above 10° C (50°F)
VENT	Varies according to the sensor temperatures and the customer temperature selection.	Air to the plenum chamber.	Fixed in the PANEL position.	Fixed in the outside air position.	Variable blower motor speeds.	A/C Clutch disabled
PNL-FLR	Varies according to the sensor temperatures and the customer temperature selection.	Air to the plenum chamber and the floor.	Fixed in the PANEL position.	Fixed in the outside air position.	Variable blower motor speeds.	A/C Clutch enabled if outside temp. is above 10° C (50°F)
FLOOR	Varies according to the sensor temperatures and the customer temperature selection.	Air to floor.	Fixed in the DEFROST position.	Fixed in the outside air position.	Variable blower motor speeds.	A/C Clutch disabled
FLR-DEF	Varies according to the sensor temperatures and the customer temperature selection.	Air to the plenum chamber and the floor.	Fixed in the PANEL position.	Fixed in the outside air position.	Variable blower motor speeds.	A/C Clutch enabled
DEFROST	Varies according to the sensor	Air to the plenum	Fixed in the DEFROST	Fixed in the outside air	Variable blower motor speeds.	A/C Clutch enabled

	temperatures and the customer temperature selection.	chamber.	position.	position.		
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<sup>a</sup> The A/C clutch circuit is energized by the EATC module but the final control of clutch operation is determined by the powertrain control module through the variable load control module. The A/C clutch can be shut off (or kept off) for several seconds at engine start-up, during high engine speeds, during acceleration, during low engine idle conditions (approximately 200 rpm below idle specs) and when the engine coolant temperature sensor reading exceeds approximately 120°C (248°F).

<sup>b</sup> If the engine coolant temperature fails to reach 50°C (122°F) after 3 1/2 minutes of operation, the heater blower motor speed will increase and the windshield defroster door will shift from the defrost position to the floor position.

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