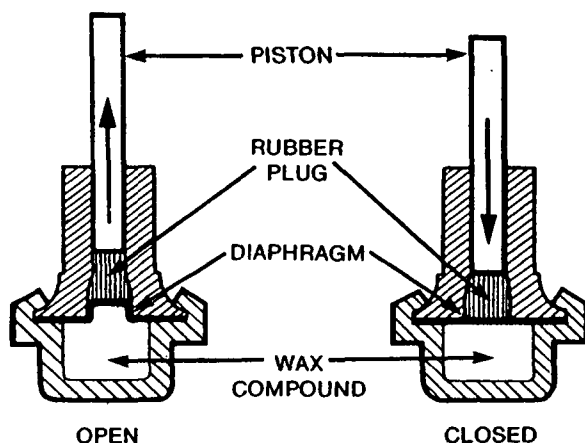


Now that we've seen how the thermostat directs and regulates the flow of the coolant, let's consider how it senses the temperature changes.

Most present day engine thermostats use actuators (the part that actually moves the valve open and closed) based on the expanding wax principle. These actuators (or heat motors) are usually one of two types: diaphragm or boot. Both types use a closed cup filled with a heat-expansive, wax-like material specially blended to react to changes in temperature in a predictable manner. The wax melts and solidifies at specific temperatures. When it melts it expands; when it solidifies, it contracts.

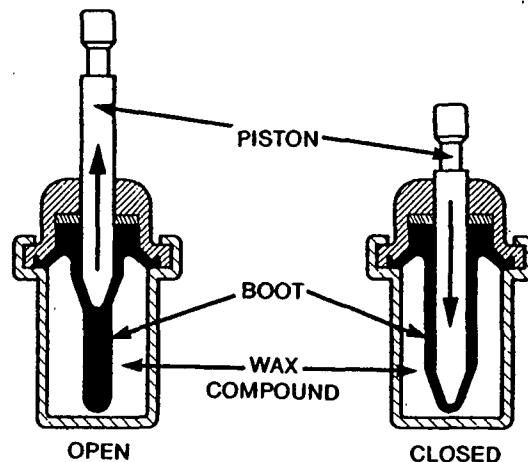


(Figure 10) The Diaphragm Actuator

In the diaphragm actuator, the expanding wax creates pressure against a rubber plug forcing it up against the actuator piston. The diaphragm seals the top of the wax cup and must stretch up into the piston when the expanding wax reacts on the plug. The disadvantages of this type of actuator are that the piston movement is not smooth, predictable and positive, and that the diaphragm is prone to distortion or severe localized deformation which can result in rupture as it stretches around sharp corners.

The boot (or positive piston) actuator uses a wax compound sealed within the cup by a synthetic rubber boot that extends down into the cup to form a core. The boot envelops a lubricated, tapered-end, stainless steel piston. When the wax melts and expands, exerting pressure on the outside of the boot, the piston is expelled with considerable force. When the temperature

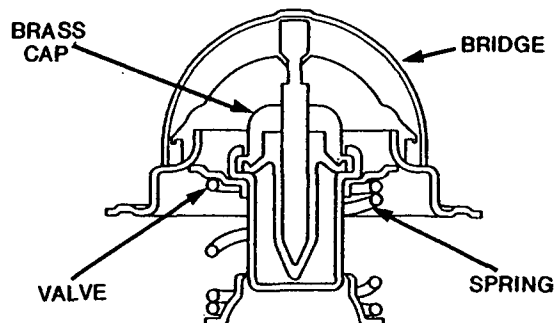
of the coolant drops, the wax compound solidifies and contracts, allowing the thermostat spring to return the piston into the boot, closing the valve. In some designs the piston is connected to the valve. In others, the valve is part of the wax cup and the piston is connected to a solid bridge. (See Figure 11)



(Figure 11) The Boot or Positive Piston Actuator

The boot material (synthetic rubber) is not affected by coolant fluids and maintains high elasticity and strength under temperatures as extreme as below zero to 250 degrees F.

A brass cap seals the boot, wax compound and cup. The cap also serves as a support and upper guide for the piston.



(Figure 12) The boot actuator showing the valve and bridge.

Thermostats are usually provided with one or more bleed holes or vent notches in the valve face. These holes or notches serve to vent the system during filling and allow air to escape past the thermostat during operation. They also allow steam pockets to bleed into the radiator when the thermostat is closed. Without these