FIGURE 15–1 All computer systems perform four basic functions: input, processing, storage, and output.

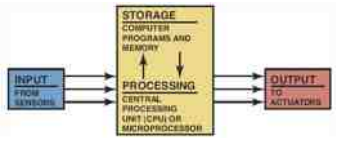

FIGURE 15–2 A potentiometer uses a movable contact to vary resistance and send an analog voltage right to the PCM.

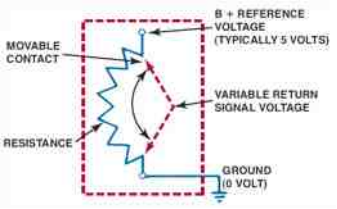

FIGURE 15–3 An AD converter changes analog (variable) voltage signals into digital signals that the PCM can process.

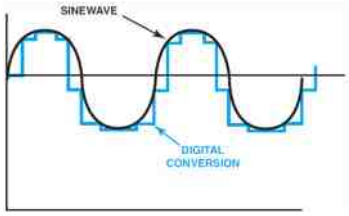

FIGURE 15–4 Many electronic components are used to construct a typical vehicle computer including chips, resistors, and capacitors.

FIGURE 15–5 Typical engine map developed from testing and used by the vehicle computer to provide the optimum ignition timing for all engine speeds and load combinations.

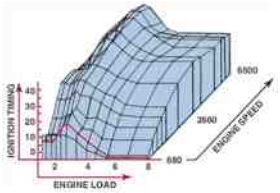

FIGURE 15–6 The clock generator produces a series of pulses that are used by the microprocessor and other components to stay in step with each other at a steady rate.

FIGURE 15–7 This powertrain control module (PCM) is located under the hood on this Chevrolet pickup truck.

FIGURE 15–8 This PCM on a Chrysler vehicle can only be seen by hoisting the vehicle, because it is located next to the radiator and in the airflow to help keep it cool.

FIGURE 15–9 A typical output driver. In this case, the PCM applies voltage to the fuel pump relay coil to energize the fuel pump.

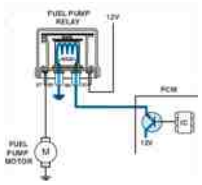

FIGURE 15–10 A typical low-side driver (LSD) which uses a control module to control the ground side of the relay coil.

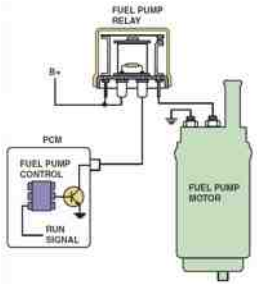

FIGURE 15–11 A typical module-controlled high-side driver (HSD) where the module itself supplies the electrical power to the device. The logic circuit inside the module can detect circuit faults including continuity of the circuit and if there is a short-to-ground in the circuit being controlled.

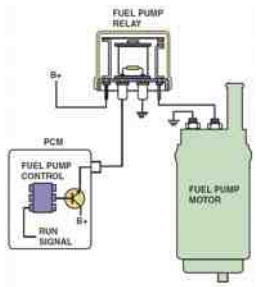

FIGURE 15–12 Both the top and bottom pattern have the same frequency. However, the amount of on-time varies. Duty cycle is the percentage of the time during a cycle that the signal is turned on.