FIGURE 18–1 All computer systems perform four basic functions: input, processing, storage, and output.

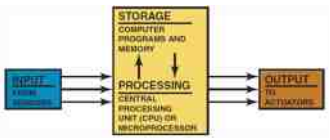


FIGURE 18–2 A potentiometer uses a movable contact to vary resistance and send an analog voltage to the PCM.

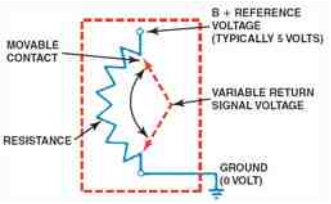


FIGURE 18–3 A replaceable PROM used in an older General Motors computer. Notice that the sealed access panel has been removed to gain access.

FIGURE 18–4 A typical output driver. In this case, the PCM applies voltage to the fuel pump relay coil to energize the fuel pump.

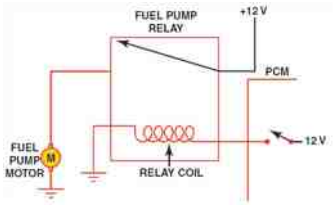


FIGURE 18–5 A typical low-side driver (LSD) which uses a control module to control the ground side of the relay coil.

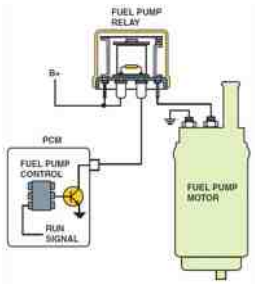


FIGURE 18–6 A typical module-controlled high-side driver (HSD) where the module itself supplies the electrical power to the device. The logic circuit inside the module can detect circuit faults including continuity of the circuit and if there is a short-to-ground in the circuit being controlled.

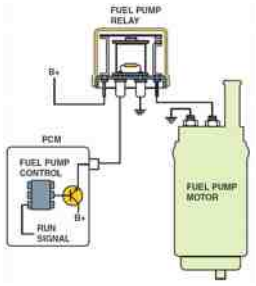


FIGURE 18–7 Both the top and bottom pattern have the same frequency. However, the amount of on-time varies. Duty cycle is the percentage of the time during a cycle that the signal is turned on.

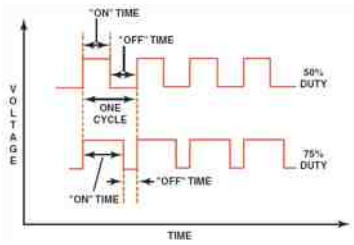


FIGURE 18–8 Many electronic components are used to construct a typical vehicle computer. Notice the quantity of chips, resistors, and capacitors used in this General Motors computer.

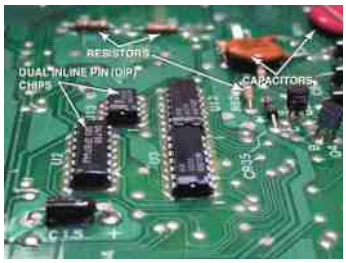


FIGURE 18–9 Typical ignition timing map developed from testing and used by the vehicle computer to provide the optimum ignition timing for all engine speeds and load combinations.

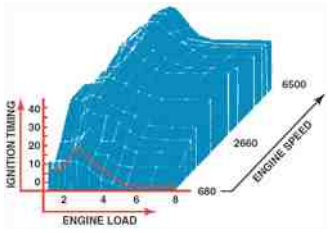


FIGURE 18–10 The calibration module on many Ford computers contains a system PROM.

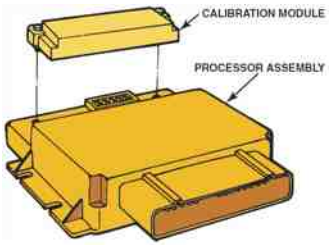


FIGURE 18–11 The clock generator produces a series of pulses that are used by the microprocessor and other components to stay in step with each other at a steady rate.

FIGURE 18–12 This Powertrain Control Module (PCM) is located under the hood on this Chevrolet pickup truck.

FIGURE 18–13 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 18–14 A network allows all modules to communicate with other modules.

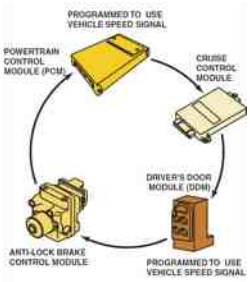


FIGURE 18–15 A ring link network reduces the number of wires it takes to interconnect all of the modules.

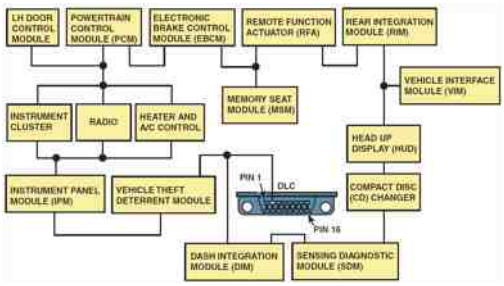


FIGURE 18–16 A star-link-type network where all of the modules are connected together using splice packs.

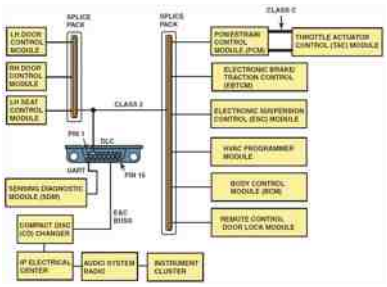


FIGURE 18–17 A typical bus system showing module CAN communications and twisted pairs of wire.

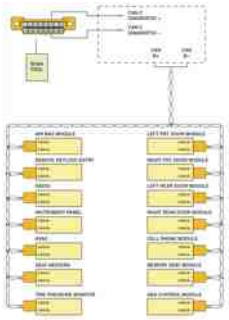


FIGURE 18–18 Checking the terminating resistors using an ohmmeter at the DLC.

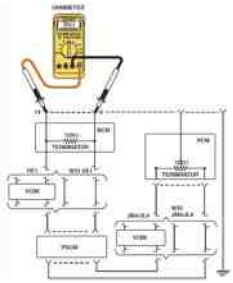
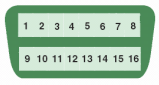


FIGURE 18–19 Sixteen-pin OBD II DLC with terminals identified. Scan tools use the power pin (16) ground pin (4) for power so that a separate cigarette lighter plug is not necessary on OBD II vehicles.



OBD-II DLC

PIN NO.	ASSIGNMENTS
1.	MANUFACTURER'S DISCRETION
2.	BUS + LINE, SAE J1850
3.	MANUFACTURER'S DISCRETION
4.	CHASSIS GROUND
5.	SIGNAL GROUND
6.	MANUFACTURER'S DISCRETION
7.	K LINE, ISO 9141
8.	MANUFACTURER'S DISCRETION
9.	MANUFACTURER'S DISCRETION
10.	BUS – LINE, SAE J1850
11.	MANUFACTURER'S DISCRETION
12.	MANUFACTURER'S DISCRETION
13.	MANUFACTURER'S DISCRETION
14.	MANUFACTURER'S DISCRETION
15.	L LINE, ISO 9141
16.	VEHICLE BATTERY POSITIVE (4A MAX)