

# Digital Electronics

## 12.1 The Basics of Digital Electronics

Until now I have mainly covered the analog realm of electronics—circuits that accept and respond to voltages that vary continuously over a given range. Such analog circuits included rectifiers, filters, amplifiers, simple  $RC$  timers, oscillators, simple transistor switches, etc. Although each of these analog circuits is fundamentally important in its own right, these circuits lack an important feature—they cannot store and process bits of information needed to make complex logical decisions. To incorporate logical decision-making processes into a circuit, you need to use digital electronics.

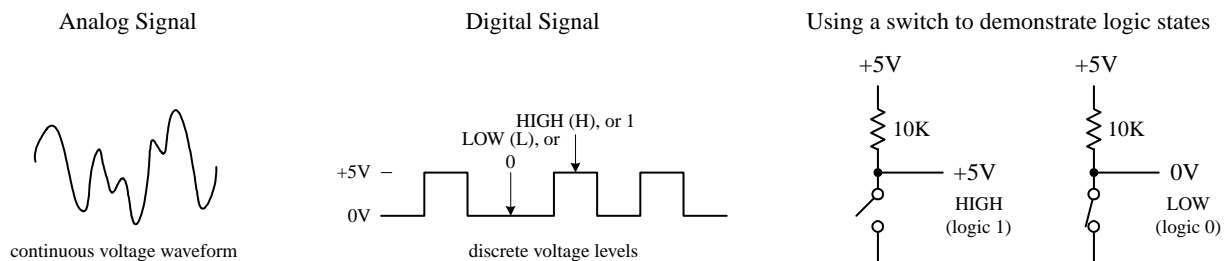


FIGURE 12.1

### 12.1.1 Digital Logic States

In digital electronics there are only two voltage states present at any point within a circuit. These voltage states are either *high* or *low*. The meaning of a voltage being high or low at a particular location within a circuit can signify a number of things. For example, it may represent the on or off state of a switch or saturated transistor. It may represent one bit of a number, or whether an event has occurred, or whether some action should be taken.

The high and low states can be represented as true and false statements, which are used in Boolean logic. In most cases, high = true and low = false. However, this does not have to be the case—you could make high = false and low = true. The decision to use one convention over the other is a matter left ultimately to the designer. In digital lingo, to avoid people getting confused over which convention is in use, the term