

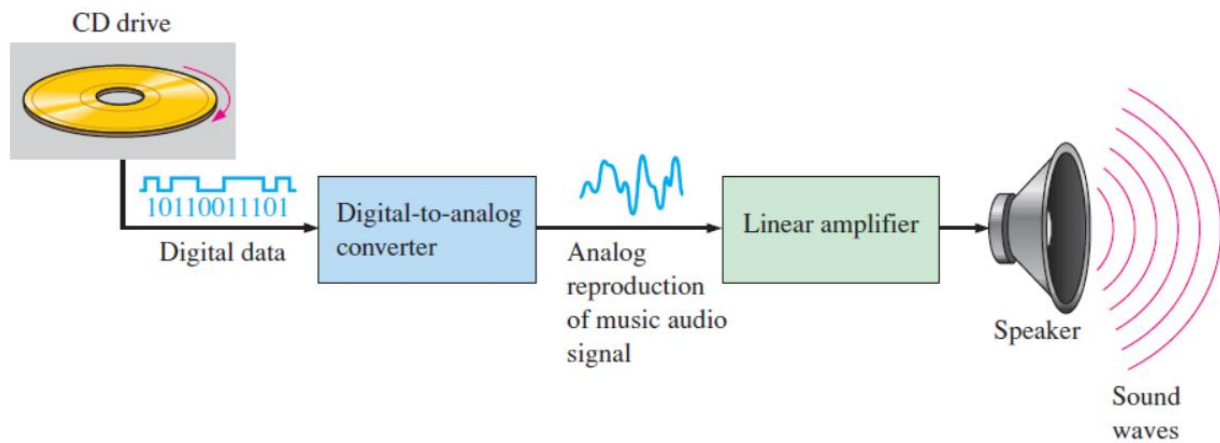


FIGURE 1-4 Basic block diagram of a CD player. Only one channel is shown.



FIGURE 1-5 Example of a mechatronic system and application. Part (b) Beawolf/Fotolia; Part (c) Small Town Studio/Fotolia.

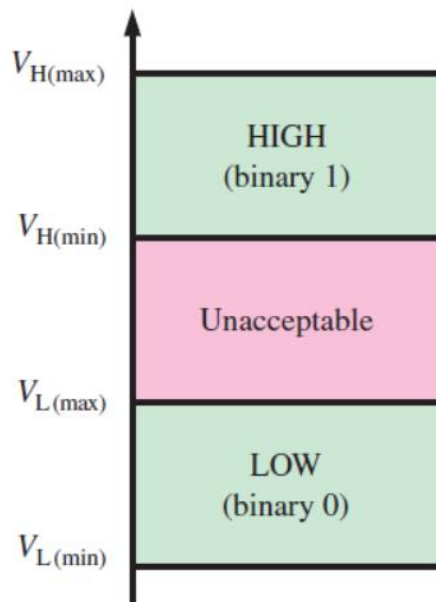
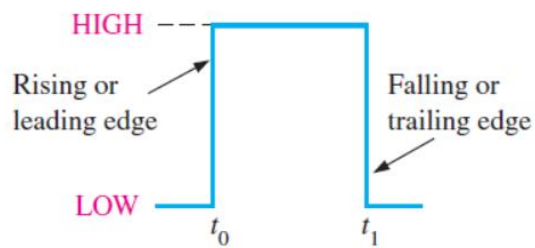
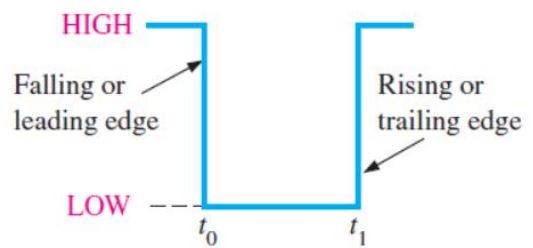


FIGURE 1-6 Logic level ranges of voltage for a digital circuit.



(a) Positive-going pulse



(b) Negative-going pulse

FIGURE 1-7 Ideal pulses.

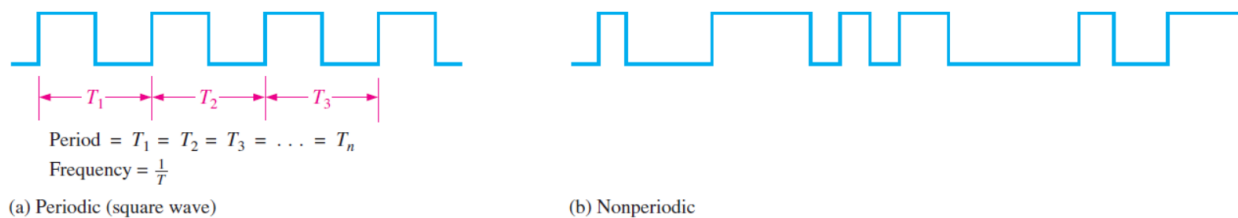


FIGURE 1-9 Examples of digital waveforms.

EXAMPLE 1-1

A portion of a periodic digital waveform is shown in Figure 1-10. The measurements are in milliseconds. Determine the following:

- (a) period (b) frequency (c) duty cycle

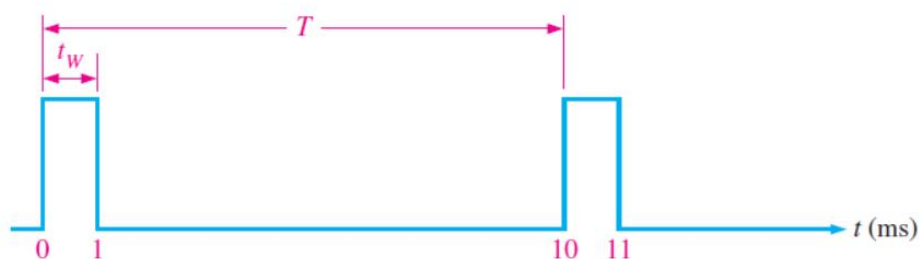


FIGURE 1-10

Solution

- (a) The period (T) is measured from the edge of one pulse to the corresponding edge of the next pulse. In this case T is measured from leading edge to leading edge, as indicated. T equals **10 ms**.

(b) $f = \frac{1}{T} = \frac{1}{10 \text{ ms}} = \mathbf{100 \text{ Hz}}$

(c) Duty cycle $= \left(\frac{t_W}{T} \right) 100\% = \left(\frac{1 \text{ ms}}{10 \text{ ms}} \right) 100\% = \mathbf{10\%}$

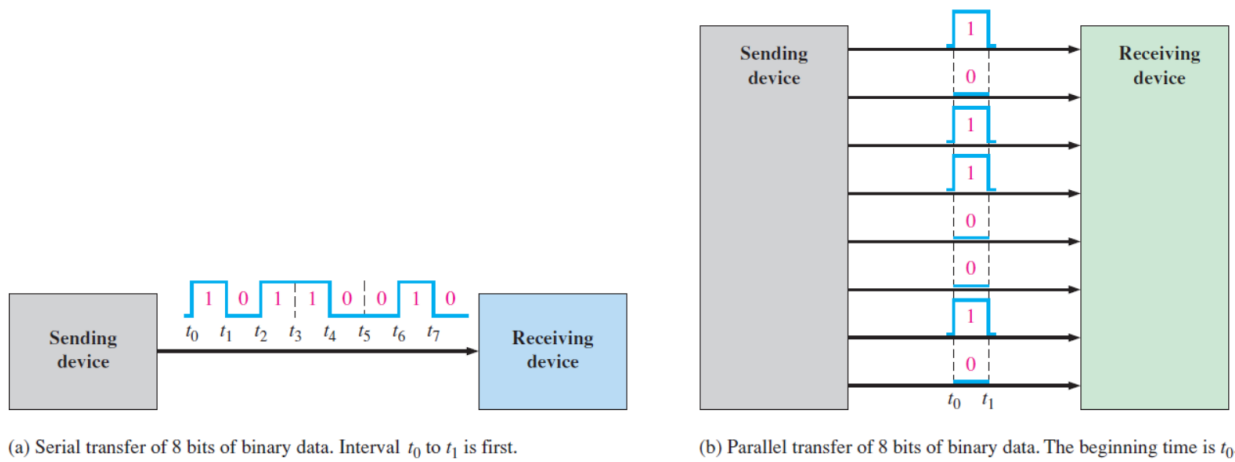


FIGURE 1-13 Illustration of serial and parallel transfer of binary data. Only the data lines are shown.

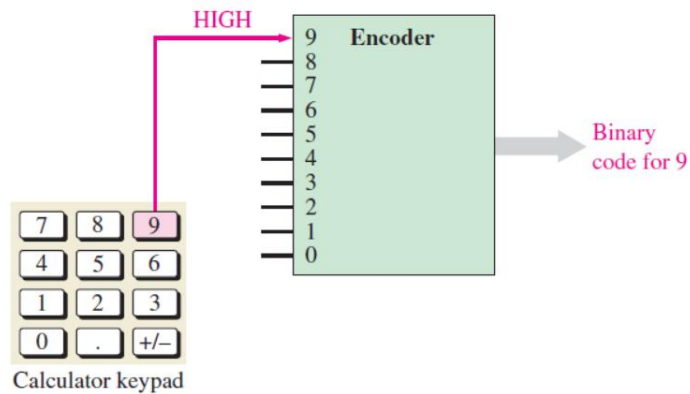


FIGURE 1-22 An encoder used to encode a calculator keystroke into a binary code for storage or for calculation.

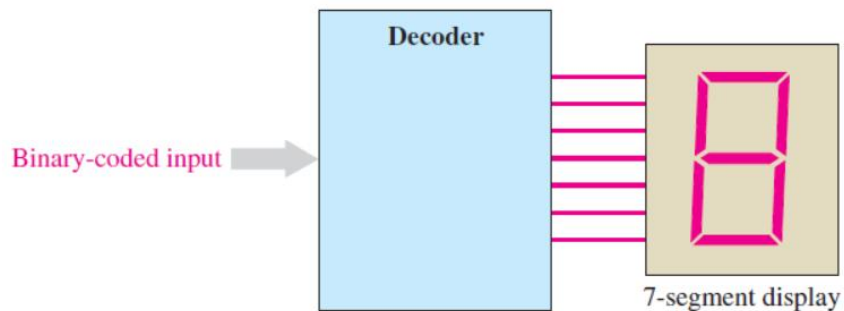


FIGURE 1-23 A decoder used to convert a special binary code into a 7-segment decimal readout.

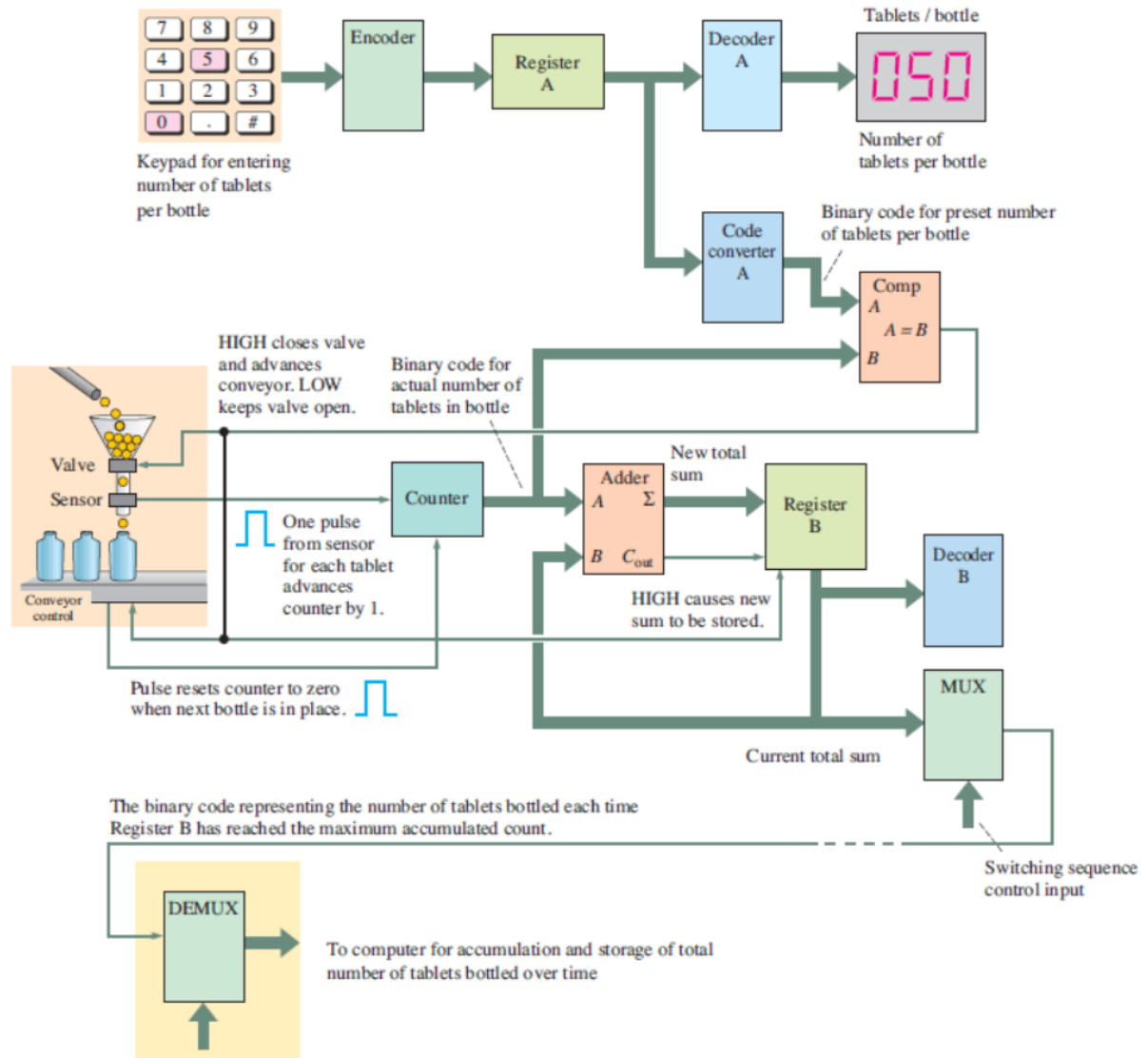


FIGURE 1-28 Block diagram of a tablet-bottling system.

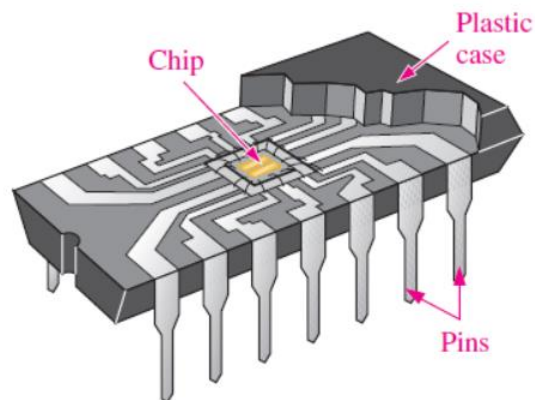
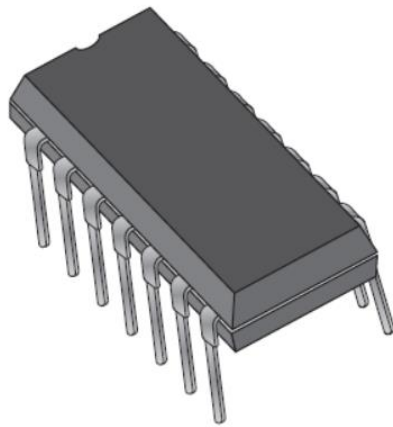
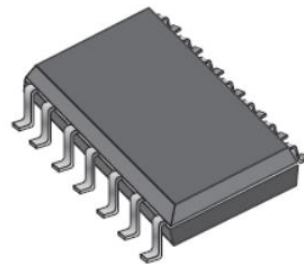


FIGURE 1-38 Cutaway view of one type of fixed-function IC package (dual in-line package) showing the chip mounted inside, with connections to input and output pins.



(a) Dual in-line package (DIP)



(b) Small-outline IC (SOIC)

FIGURE 1-39 Examples of through-hole and surface-mounted devices. The DIP is larger than the SOIC with the same number of leads. This particular DIP is approximately 0.785 in. long, and the SOIC is approximately 0.385 in. long.