Pulse Time Modulation:
Pulse Width Modulation & Pulse Position Modulation

Pulse Time Modulation (PTM) is a class of signaling technique that encodes the *sample values* of an analog signal onto the *time axis* of a digital signal.

The two main types of pulse time modulation are:

1. Pulse Width Modulation (PWM)
2. Pulse Position Modulation (PPM)

In PWM the sample values of the analog waveform are used to determine the width of the pulse signal. Either instantaneous or natural sampling can be used.

In PPM the analog sample values determine the position of a narrow pulse relative to the clocking time. It is possible to obtain PPM from PWM by using a mono-stable multivibrator circuit.


Figure 3-43   Pulse time modulation signaling.
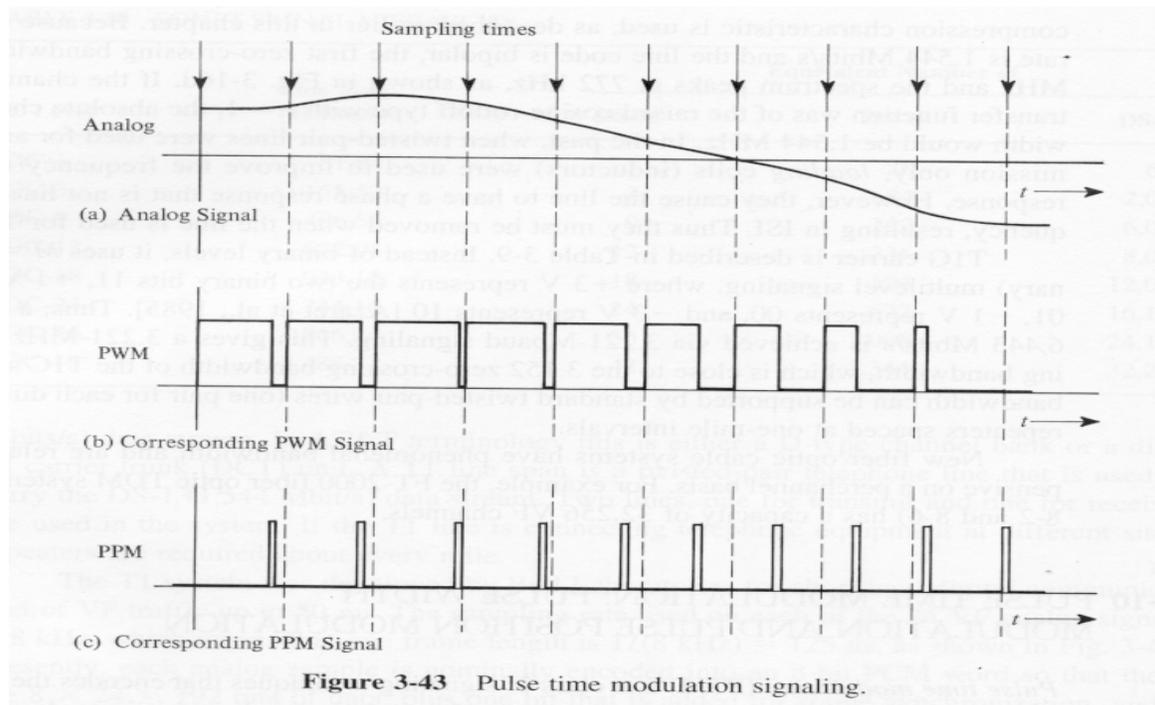
Figure 3.44 below shows PWM generation using *instantaneous sampling*

Figure 3-44   Technique for generating instantaneously sampled PTM signals.
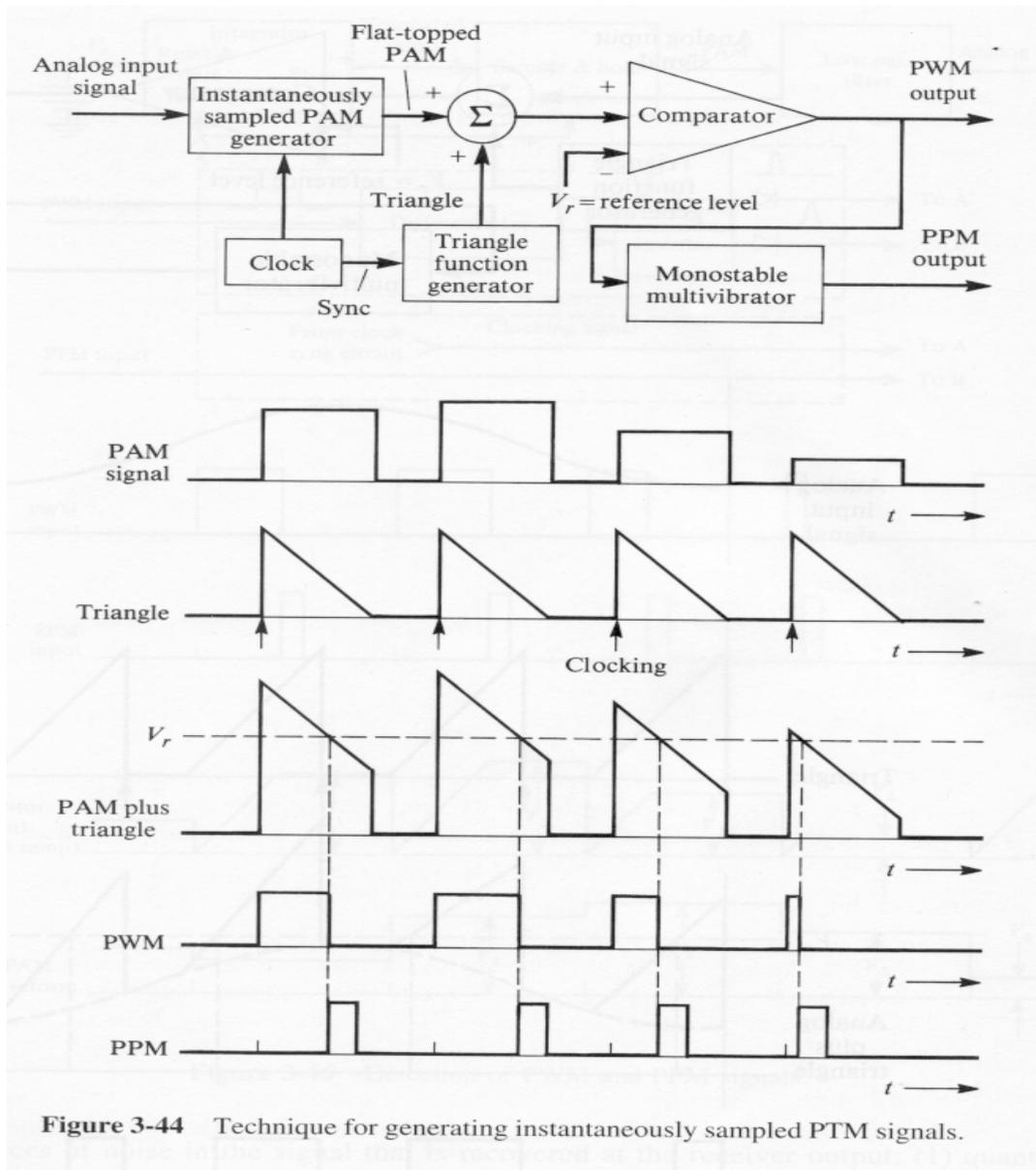
Figure 3-45 shows PWM signal generation using *natural sampling*.

Figure 3-45   Technique for generating naturally sampled PTM signals.
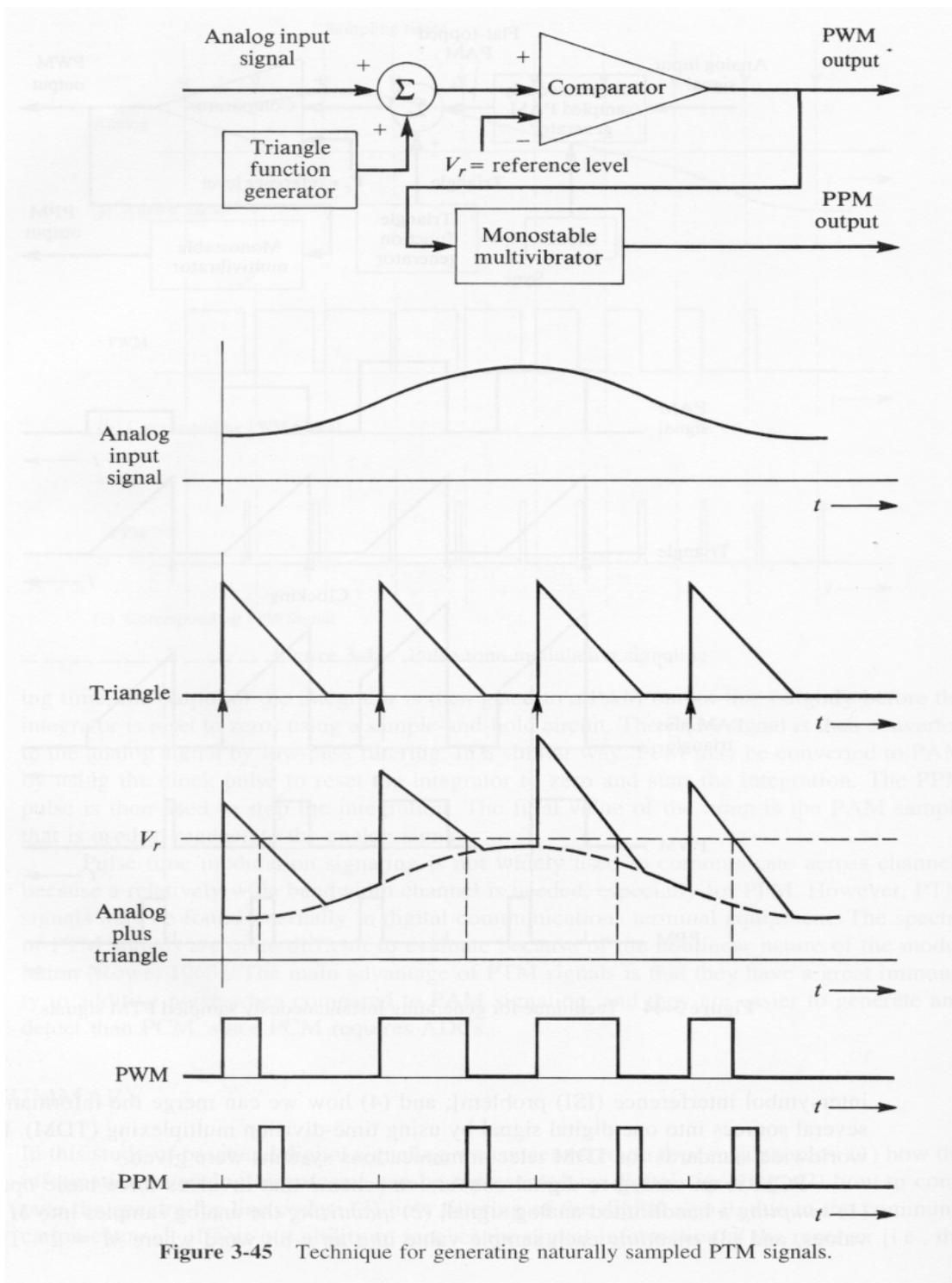
The PWM or PPM signals may be converted back to the corresponding analog signal by a receiving system as shown in Fig. 3-46.

Figure 3-46 Detection of PWM and PPM signals.
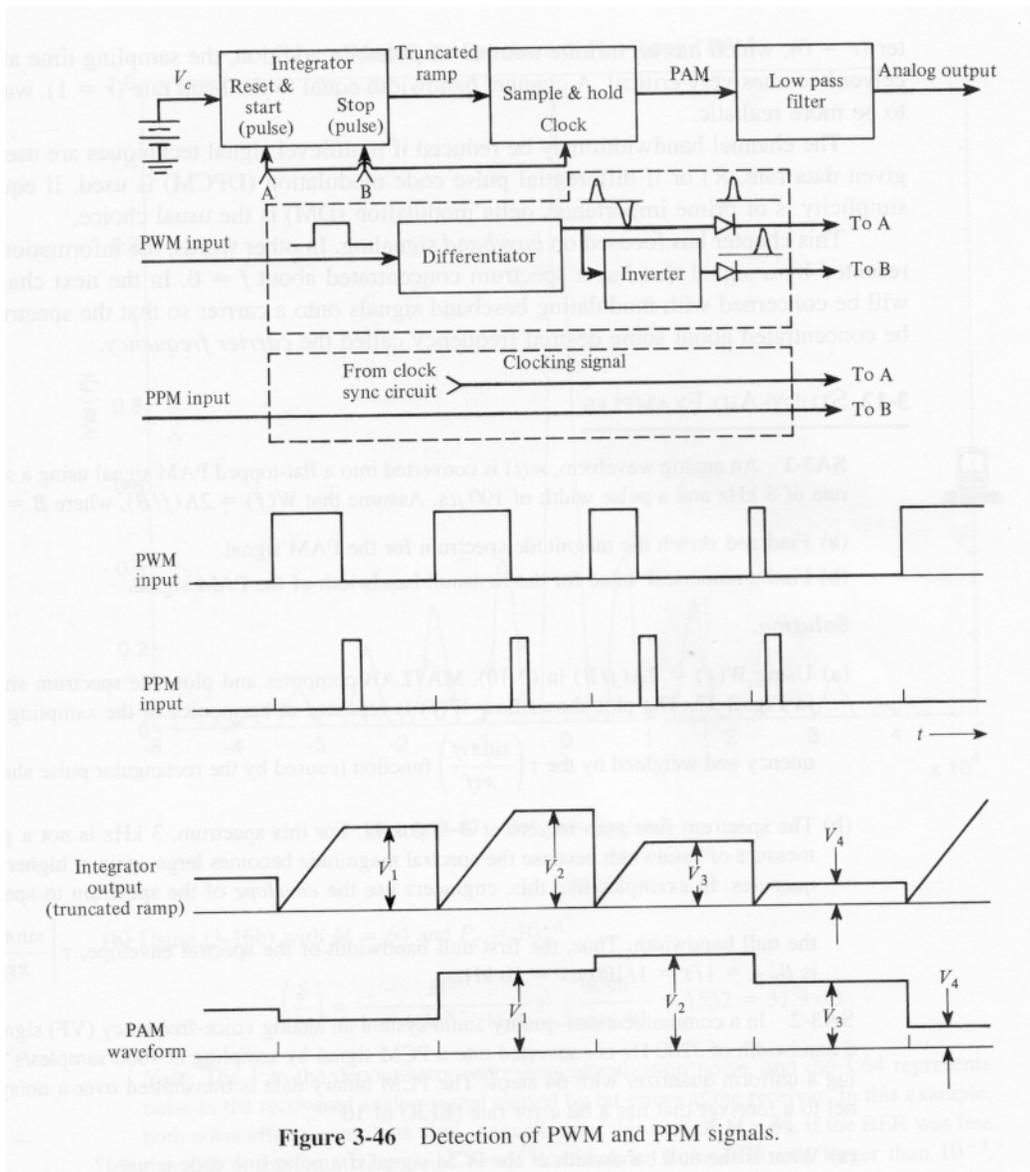
For PWM detection the PWM signal is used to start and stop the integration of the integrator. After reset integrator starts to integrate during the duration of the pulse and will continue to do so till the pulse goes low.

If integrator has a DC voltage connected as input , the output will be a truncated ramp. After the PWM signal goes low, the amplitude of the truncated ramp will be equal to the corresponding PAM sample value. Then it goes to zero with reset of the integrator.