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YEAR

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SEM

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EC 8394

**ANALOG AND DIGITAL
COMMUNICATION**

UNIT No. II PULSE AND DATA COMMUNICATION

2.1.2 PULSE TIME MODULATION

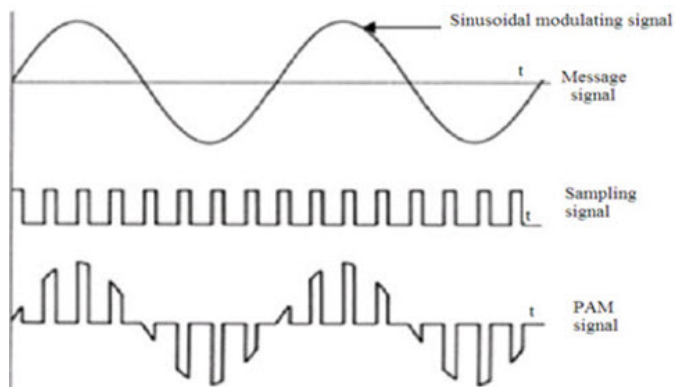


PULSE TIME MODULATION (PTM)

Here the pulses will have the same amplitude. However, one of their timing characteristics is made proportional to the amplitude of the sampled signal. This variable characteristic can be either frequency, position or width. This way pulse time modulation can be classified into three types.

Pulse Width Modulation

Pulse Width Modulation is also known as pulse duration modulation (PDM). Here, as the name suggests, the width of the pulse is varied in proportional to the amplitude of the signal. Since the width is changing, the power loss can be reduced when compared to PAM signals.



From the figure, it is clear that the amplitude of the signal is constant. Amplitude limiters are used for this. Since clipping of amplitude at desired levels take place, this modulation produces less noise.

Advantages of PTM

- Low power consumption.
- It has an efficiency of about 90 per cent.
- Noise interference is less.
- High power handling capacity.

Disadvantages of PTM

- The circuit is more complex.
- Voltage spikes can be seen.
- The system is expensive as it uses semiconductor devices.

- Switching losses will be more due to high PWM frequency.

Applications of PTM

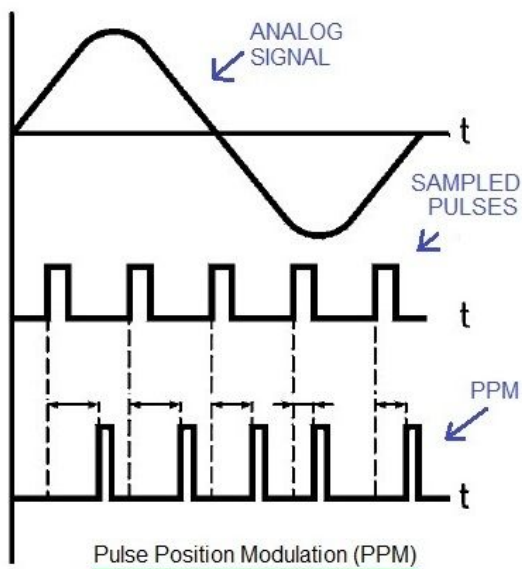
- Used in encoding purposes in the telecommunication system.
- Used to control brightness in a smart lighting system.
- Helps to prevent overheating in LED's while maintaining it's brightness.
- Used in audio and video amplifiers.

Pulse Position Modulation

In this type of modulation, both the amplitude and width of the pulse are kept constant. We vary the position of each pulse with reference to a particular pulse. Here a single pulse is transmitted with the required number of phase shifts. So we can say that pulse position modulation is an analogue modulation scheme where the amplitude and width of the pulse are kept constant, while the position of the pulse with respect to the position of a reference pulse is varied according to the instantaneous value of message signal.

PPM can be obtained from PWM. This is done by getting rid of leading-edge and bodies of PWM pulses. The main advantage of pulse position modulation is that it requires constant transmitter power output while the major disadvantage is that it depends upon transmitter-receiver synchronisation.

The waveforms of PPM are given below:



However, the third type, pulse-frequency modulation is not used.

Advantages of PPM

- As it has constant amplitude noise interference is less.
- We can easily separate signal from a noisy signal.
- Among all three types, it has the most power efficiency.
- Requires less power when compared to pulse amplitude modulation.

Disadvantages of PPM

- The system is highly complex.
- The system requires more bandwidth.

Applications of PPM

- It is used in the air traffic control system and telecommunication systems.
- Remote controlled cars, planes, trains use pulse code modulations.
- It is used to compress data and hence it is used for storage.