

Pulse Position Modulation

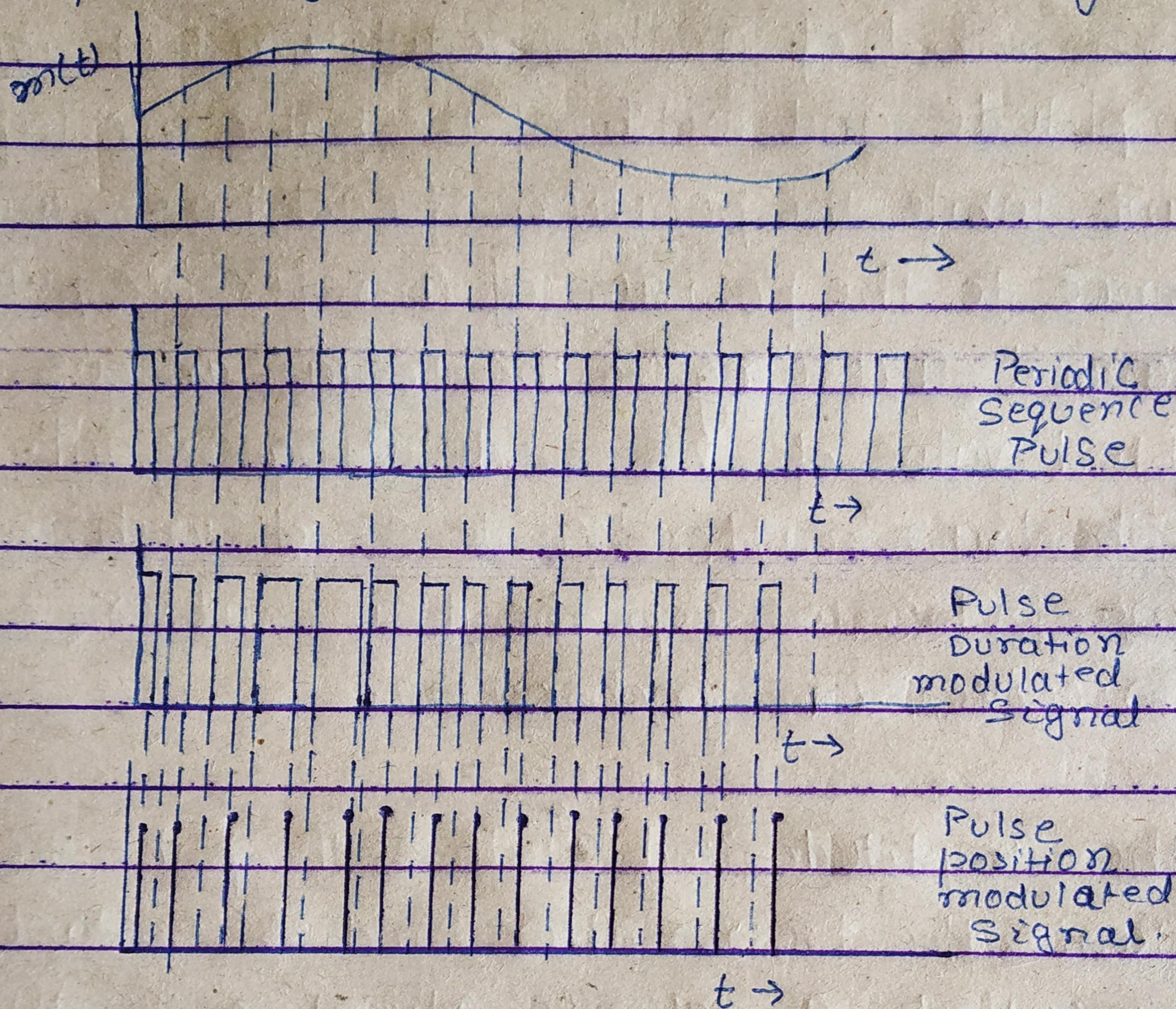
In this method of analog modulation technique the amplitude and width of the pulse are kept constant, while the position of each pulse, with reference to the position of a reference pulse is changed according to the instantaneous sampled value of the modulating signal. Thus, the transmitter has to send synchronizing pulse to keep the transmitter and receiver in synchronism.

As the amplitude and width of the pulse are constant, the transmitter handles constant power output, a definite advantage over the PWM.

The disadvantage of PPM system is the need for transmitter-receiver synchronization.

Pulse position modulation is obtained from pulse width modulation. Each trailing edge of the PWM pulse is a starting point of the pulse in the TPM. Therefore, position of the pulse is 1:1 proportion to the width of pulse in PWM.

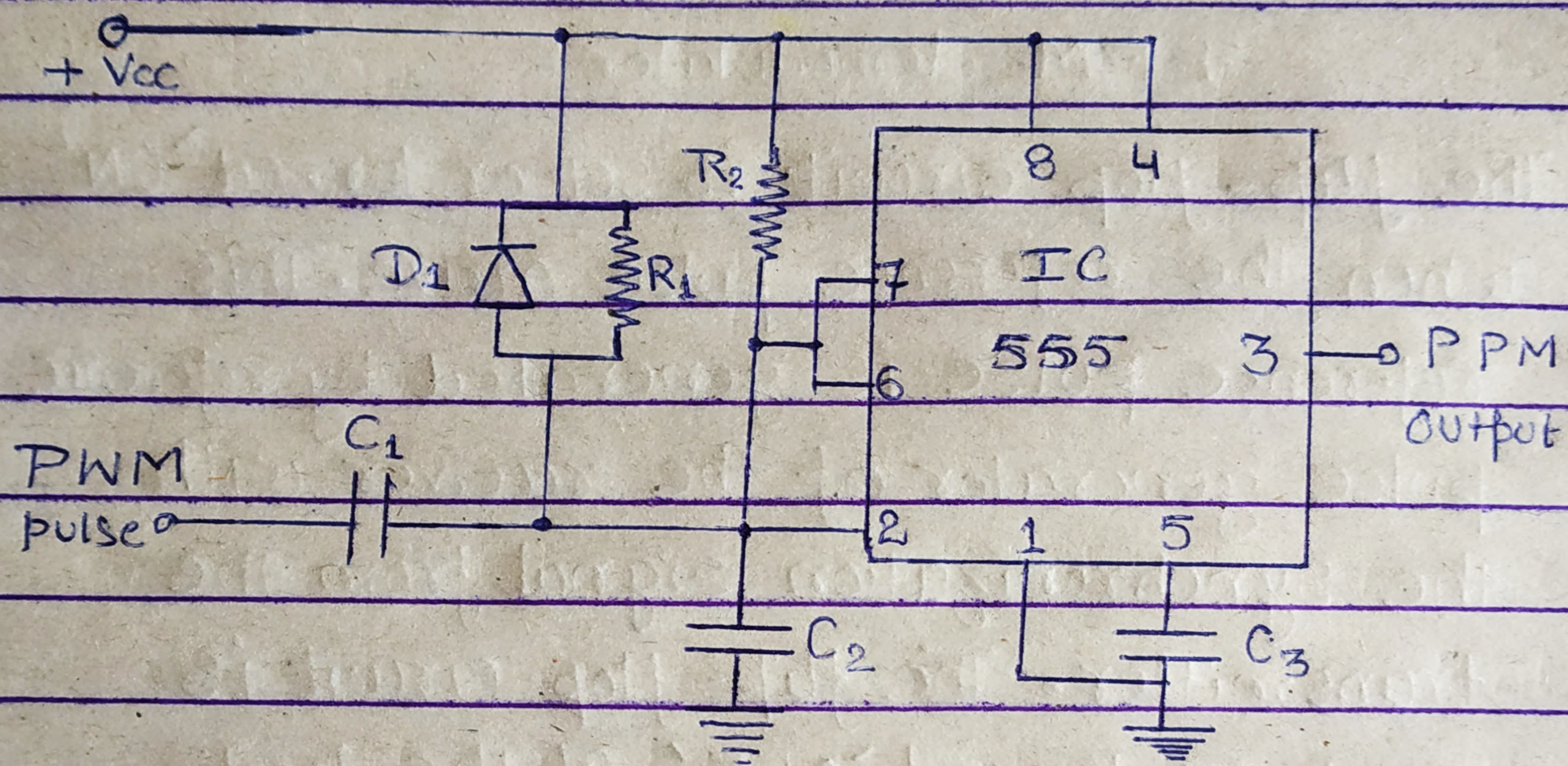
and hence, it is proportional to the instantaneous amplitude of the sampled modulating signal.



Generation of Pulse Position Modulation.

Pulse position generator consists of a differentiator and a monostable multivibrator. The input to the differentiator is a PWM waveform. The differentiator generates positive and negative spikes corresponding to leading and trailing edges of the PWM waveform. Diode D_1 is used to bypass the positive spike. The negative

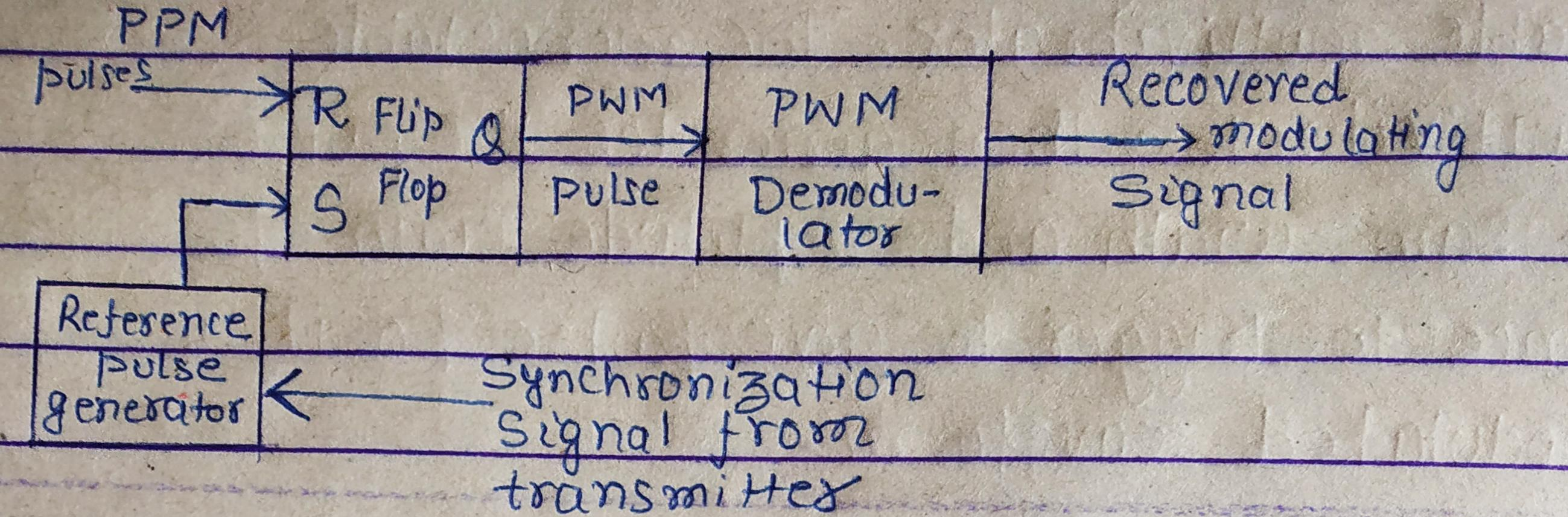
Spike are used to trigger the monostable multivibrator. The monostable multivibrator then generates the pulse of same width and amplitude with reference to trigger to give pulse position modulated waveform.



PPM Generator

Demodulation of Pulse position modulated wave.

Pulse position modulated wave is first of all changed into its corresponding pulse width modulated wave. Then after demodulation scheme of pulse width modulated ~~form~~ wave is followed to derive the required message signal.



PPM demodulator

The flip-flop circuit is set or turned 'ON' when the reference pulse arrive. This reference pulse is generated by reference pulse generator of the receiver with the synchronization signal from the transmitter. The flip-flop circuit is reset or turned 'OFF' at the leading edge of the position modulated pulse. This repeats and we get PWM pulse at the output of the flip-flop. The PWM pulses are then demodulated by PWM demodulator to get original modulating signal.

Advantage of Pulse Position Modulation

i> Like PWM, in PPM, amplitude is held

Constant thus less noise interference.

ii> Like PWM, Signal and noise separation is very easy.

iii> Because of constant pulse width and amplitudes, transmission power for each pulse is same.

Disadvantage of Pulse Position Modulation.

i> Synchronization between transmitter and receiver is required

ii> Large bandwidth is required as compared to PAM.