

EXPERIMENT NUMBER 4

Pulse Position Modulation (PPM)

AIM: To understand and implement Pulse Position Modulation (PPM) using IC 555 and plot the relevant waveforms.

LEARNING OBJECTIVE:

- To understand the operation of Timer IC 555 as a multivibrator in astable and monostable mode.
- To understand the classification of Pulse modulation.

PRIOR CONCEPTS: Modulation and its types, Pulse modulation, Sampling Theorem, PWM, Timer IC 555 in monostable mode of operation.

EQUIPMENT REQUIRED

Equipment	Range	Quantity
CRO	(0-20)MHz	1
Function Generator	(0-1)MHz	2
Experiment Kit		1

COMPONENTS REQUIRED

Components	Value	Quantity
Timer IC	IC 555	2
Capacitor	0.01 μ F	1
	0.1 μ F	2
Resistor	10k Ω	2
	1 k Ω	1

THEORY: Modulation of a pulse carrier wherein the value of each instantaneous sample of a modulating wave varies the position in time of a pulse relative to its unmodulated time of occurrence. As the name implies, PPM is a data-encoding scheme where the position of the transmitted pulses is modified. Typically this will result in a long stream of pulses that are unevenly spaced in time. Pulse position modulation (PPM) use pulses that are of uniform height and width but displaced in time from some base position according to the amplitude of the signal at the instant of sampling. The position of each pulse, in relation to the position of a recurrent reference pulse, is varied by each instantaneous sampled value of the modulating wave. Pulse position modulation is also sometimes known as pulse-phase modulation.

PROCEDURE

1. Connections are made as shown in the circuit diagram.
2. Vary the input (sine wave) between 5 to 15V at pin no. 5 of first IC.
3. Check the working of 555 timer as a monostable multivibrator by giving an unmodulated PWM signal. Verify the pulse width of output signal for the designed value.
4. By applying the PWM signal note the change in the position of the pulses i.e. PPM signal.
5. Plot the observed waveform for any one reading.

OBSERVATIONS:

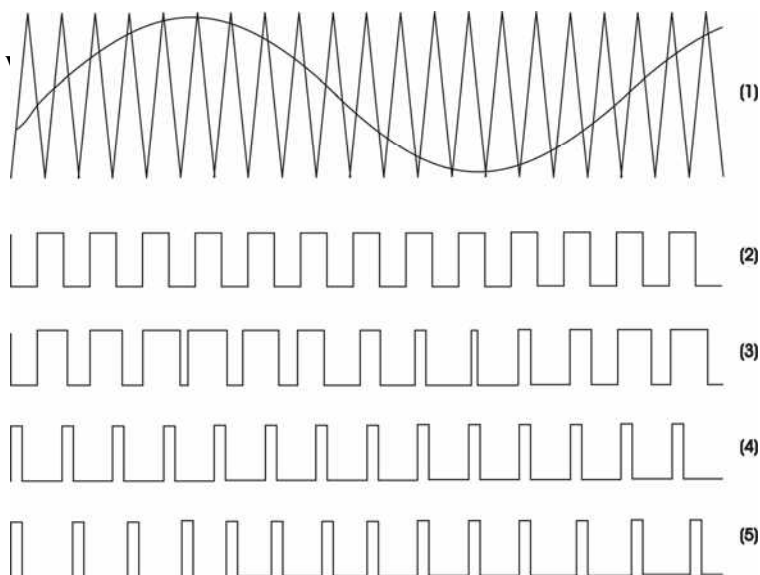
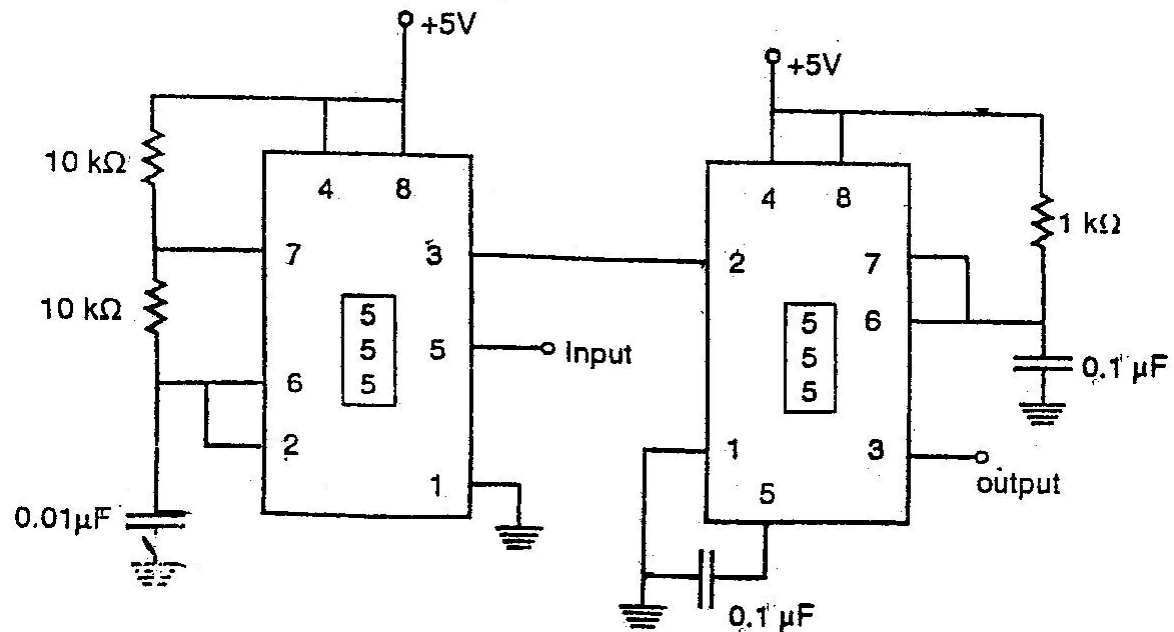
Measurement of Amplitude and Frequency of Various Waveforms

S.No.	Type of Signal	Amplitude	Frequency
1.	Modulating		
2.	Carrier		
3.	PWM		
4.	PPM		

CONCLUSION: Thus, in PPM, (amplitude/time/position) of carrier changes in accordance to the instantaneous _____ of the modulating signal. Write the conclusion based on the amplitude and position of pulses.

CIRCUIT DIAGRAM

Pulse Position Modulation



- (1) Modulating Signal & Triangular Signal
- (2) Comparator O/P (With zero Modulating Signal)
- (3) PWM
- (4) Monostable Multivibrator O/P (With zero Modulating Signal)
- (5) PPM