Exp No: 3 Date: 13-JAN-2019

PHASE SHIFT KEYING MDOULATION AND DEMODULATION

By Sparsh Arya(17BEC0656)

OBJECTIVE:

To observe waveforms at input and output of PSK modulators.

HARDWARE REQUIRED:

1. PSK Trainer Kit - AET-71

2. Dual Trace oscilloscope-POS-2020 3. Digital Multimeter

THEORY:

Phase shift keying is a modulation/data transmitting technique in which phase of the carrier signal is shifted between two distinct levels. In a simple PSK(ie binary PSK) unshifted carrier Vcosω0t is transmitted to indicate a 1 condition, and the carrier shifted by 1800 ie – Vcosω0t is transmitted to indicate as 0 condition. 4. IC CD 4052 is a 4 channel analog multiplexer and is used as an active component in this circuit. One of the control signals of 4052 is grounded so that 4052 will act as a two channel multiplexer and other control is being connected to the binary signal ie data to be transmitted. Unshifted carrier signal is connected directly to CH1 and carrier shifted by 1800 is connected to CH2.phase shift network is a unity gain inverting amplifier using OP-amp (TL084). When input data signal is 1 ie control signal is at high voltage, output of the 4052 is connected to CH1 and unshifted (or 0 phase)carrier is passed on to output. Similarly When data signal is 0 ie control signal is at zero voltage output of 4052 is connected to CH2 and carrier shifted by 1800 is passed on to output.

PSK Demodulator: Demodulation of PSK is achieved by subtracting the received carrier from a derived synchronous reference carrier of constant phase. Figure shows the simple coherent(synchronous) PSK demodulator. Received PSK signal is converted to square wave using an op-amp(TL084) based zero crossing detector and connected to EX-OR circuit. The derived reference carrier is connected to other input of the EX-OR Gate through an op-amp based zero crossing detector. For the simplicity same carrier is used at receiver as reference carrier (In practical communication system reference carrier is generated at receiver).We can observe the exact operation of demodulator with the help of waveforms at various nodes in the circuit.

CIRCUIT DIAGRAM:

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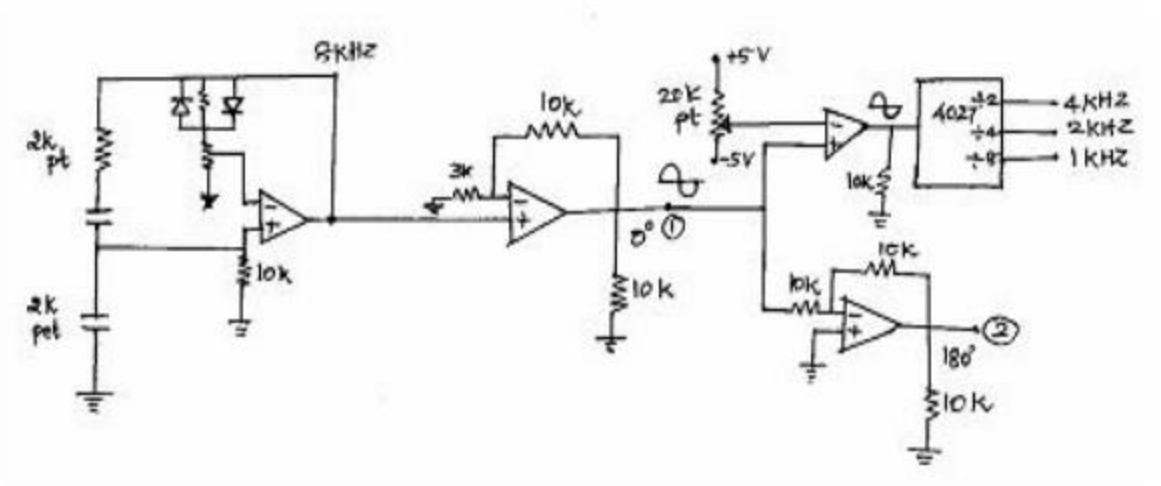

Fig 4.1. Phase Shift Keying

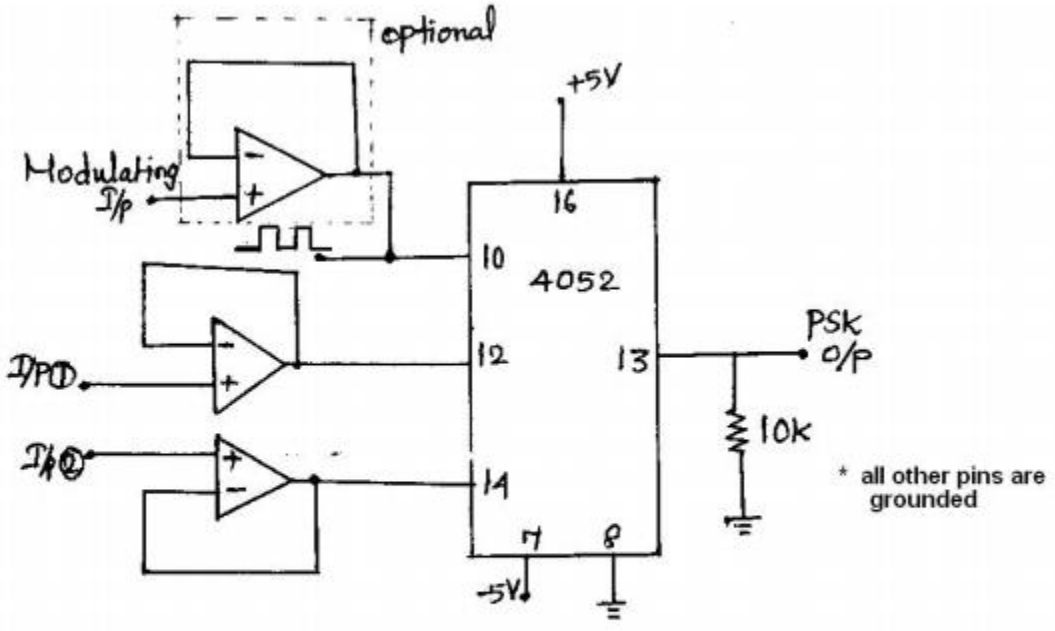

Fig 4.2 PSK Modulator

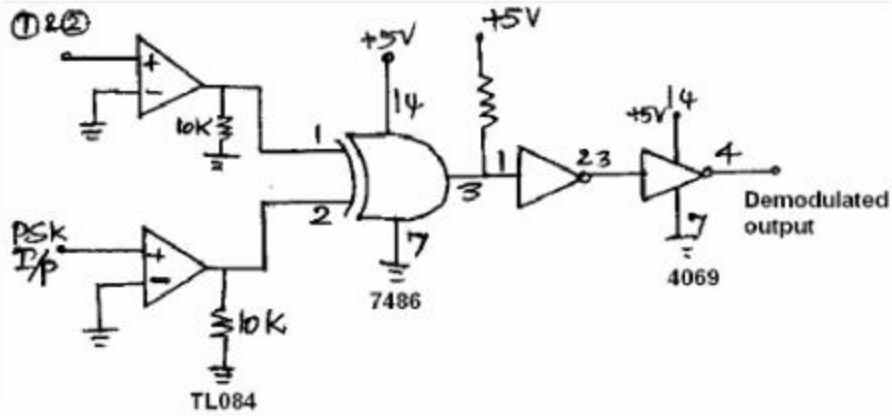

Fig 4.3 PSK Demodulator

Procedure:

Modulation:

Connect carrier signal to carrier input of the PSK modulator. 6. Connect data signal say 4KHZ from data source to data input of the modulator. 7. Keep CRO in dual mode and connect CH1 input of the CRO to data signal and CH2 to the output of the PSK modulator. 8. Observe the PSK output signal with respect to data signal and plot the waveforms.

Demodulation:

Connect the PSK output to the PSK input of the demodulator. 10. Connect carrier to the carrier input of the PSK demodulator. 11. Keep CRO in dual mode and connect CH1 to data signal(at modulator) and CH2 to the output of the demodulator. 12. Compare the demodulated signal with the original signal. By this we can notice that there is no loss in modulation and demodulation process 13. Repeat the steps 6 to 12 with different data signals ie 2KHZ and 1KHZ

MODEL GRAPH:

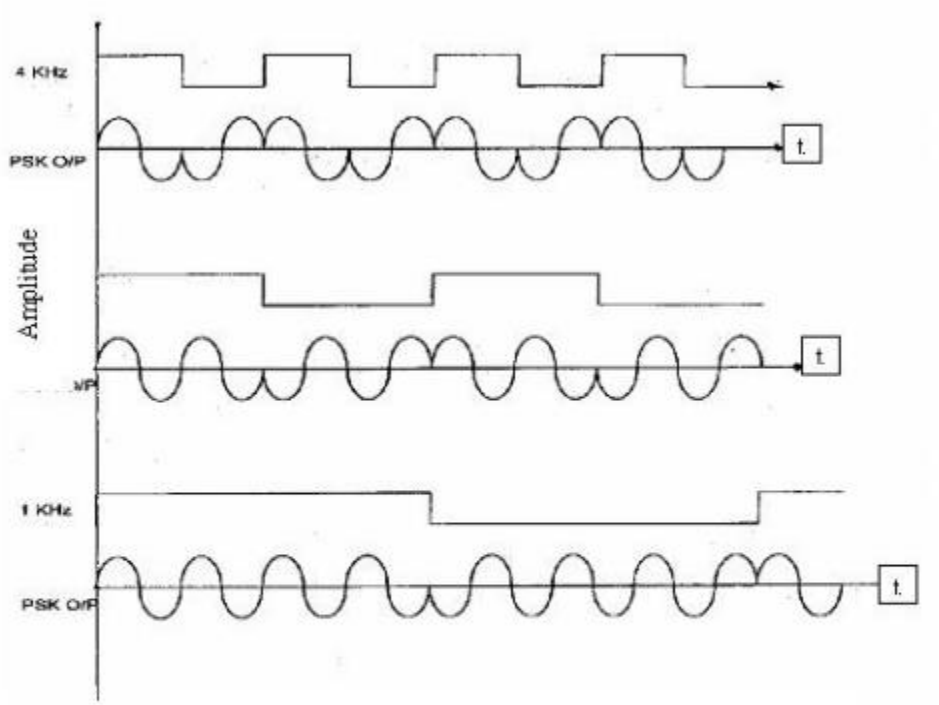

Fig 4.4. PSK Waveforms for different data input signals

OBSERVATIONS:

modulation

Signal	Amplitude	Time
Message	5 Vpp	2 ms
Carriers	5 Vpp	0.2 ms
BPSK o/p	1.57 Vpp	0.2 ms

Demodulation:

Siganl	AMP	Freq	Time
PSK	5 Vpp	500 Hz	2ms
O/P message	28.1Vpp	500.65 Hz	1.99ms

LAB RESULT:

Thus the waveforms of PSK modulation and demodulation were observed.