EXPERIMENT No.- 02

TITLE: Generation and detection of Binary amplitude shift keying BASK.

AIM: To Generate and detect Binary amplitude shift keying BASK signal.

EQUIPMENTS: Scientech 2156 and Scientech 2157, 2 mm Banana cable, Oscilloscope, Power supply.

THEORY:

Amplitude Shift Keying (ASK):

The simplest method of modulating a carrier with a data stream is to change the amplitude of the carrier wave every time the data changes. This modulation technique is known as Amplitude Shift Keying.

The simplest way of achieving amplitude shift keying is by switching 'ON' the carrier whenever the data bit is '1' & switching it 'OFF' whenever the data bit is '0' i.e. the transmitter outputs the carrier for a' 1 ' & totally suppresses the carrier for a '0'. This technique is also known as ON-OFF keying. Figure 1 illustrates the amplitude shift keying for the given data stream. Thus,

Data = 1 carrier transmitted

Data = 0 carrier suppressed

The ASK waveform is generated by a balanced modulator circuit, also known as a linear multiplier as shown in the figure 13 given below. As the name suggests, the device multiplies the instantaneous signal at its two inputs. The output voltage being product of the two input voltages at any instance of time. One of the inputs is AC coupled 'carrier' wave of high frequency. Generally, the carrier wave is a sinusoidal signal since any other waveform would increase the bandwidth, without providing any advantages. The other input which is the information signal to be transmitted, is DC coupled. It is known as modulating signal.

The data stream applied is unipolar i.e. 0 volts for logic '0' & + 5 Volts for logic '1'. The output of balanced modulator is a sine wave, unchanged in phase when a data bit ‘l' is applied to it and is zero when the data bit '0' is applied.

The ASK modulation result in a great simplicity at the receiver. The method to demodulate the ASK waveform is to rectify it, pass it through the filter & ‘shape up’ the resulting waveform. The output is the original data stream. Figure 2 shows the functional blocks required in order to demodulate the ASK waveform at receiver.

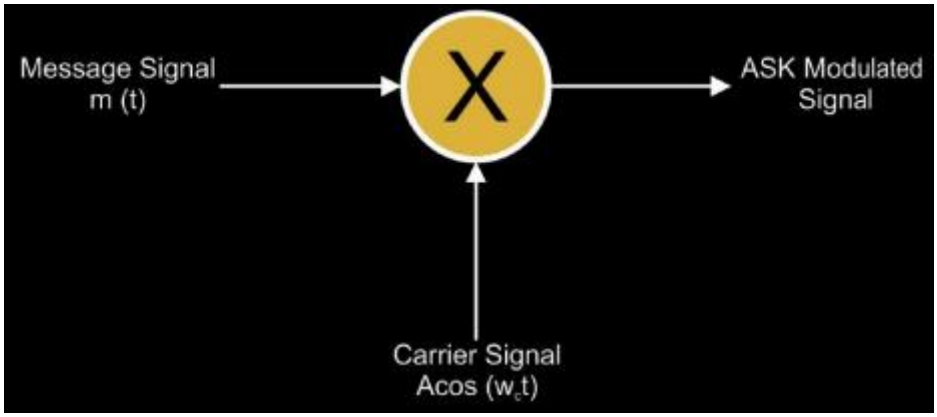


Fig.1 Amplitude Shift Keying Modulator

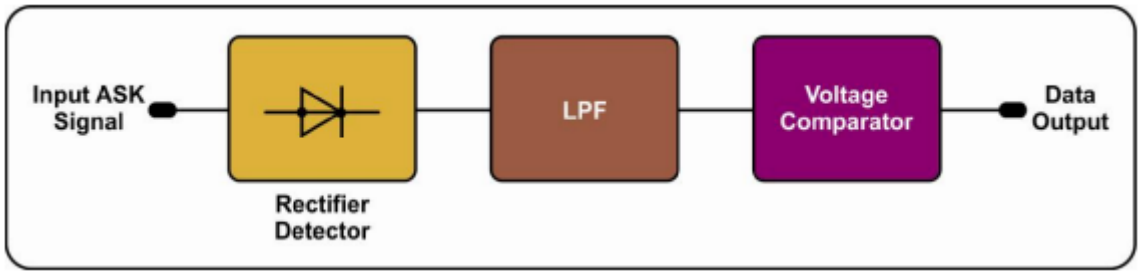


Fig.2 Amplitude Shift Keying Demodulator

Advantages and limitations of Amplitude Shift Keying Modulation:

Amplitude shift keying is fairly simple to implement in practice, but it is less efficient, because the noise inherent in the transmission channel can deteriorate the signal so much that the amplitude changes in the modulated carrier wave due to noise addition, may lead to the incorrect decoding at the receiver. Hence, this technique is not widely used is practice. Application wise, it is however used in diverse areas such as old emergency radio transmissions and Fiber-optic communications.

PROCEDURE:

1. Connect the power supplies of Scientech 2156 and Scientech 2157 but do not turn on the power supplies until connections are made for this experiment.

2. Make the connections as shown in the figure

3. Switch 'ON' the power.

4. On Scientech 2156, connect oscilloscope CH1 to ‘Clock In’ and CH2 to ‘Data In’ and observe the waveforms.

5. On Scientech 2156, connect oscilloscope CH1 to ‘NRZ (L)’ and CH2 to ‘Output’ of modulator Circuit (l) on Scientech 2156 and observe the waveforms.

6. Vary the gain potentiometer of modulator circuit on Scientech 2156 to adjust the amplitude of ASK Waveform.

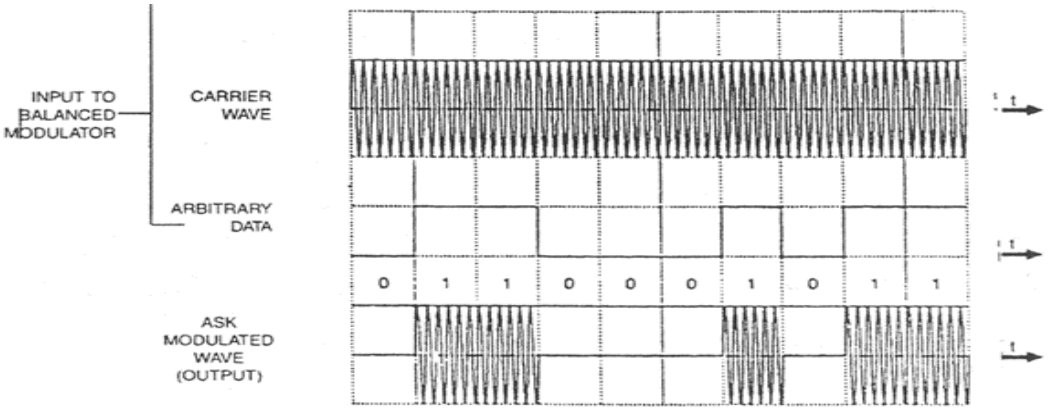
7. On Scientech 2156, connect oscilloscope CH1 to ‘NRZ (L)’ and CH2 to ‘Output’ of comparator on Scientech 2157 and observe the waveforms.

OBSERVATION:

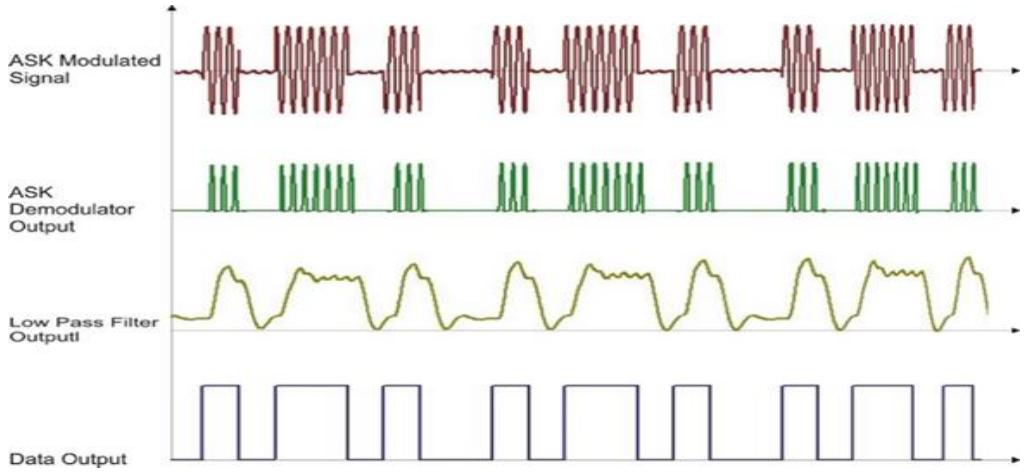
1. The output at ‘Data In’ is repeating sequence of bits generated by Data Source.

2. The output at Modulator Circuit (l) is the ASK waveform which contains carrier transmitted for Data ‘1’ and carrier suppressed Data ‘0’.

3. The output at comparator on Scientech 2157 is the same as ‘Data In’ on Scientech 2156.



Waveforms Of ASK Modulation



Waveforms Of ASK Demodulation

CONCLUSION:

1. Amplitude shift keying is fairly simple to implement in practice, but it is less efficient, because the noise inherent in the transmission channel can deteriorate the signal so much that the amplitude changes in the modulated carrier wave due to noise addition, may lead to the incorrect decoding at the receiver.

2. The technique is not widely used is practice. Application wise, it is however used in diverse areas and old as emergency radio transmissions and fiber-optic communications.