Experiment 3

Nitish Kumar Thakur
RE000144

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1 Objective

1.Study the AM-DSB full carrier modulation and demodulation and implement practically using IC-AD633
2.Study the AM-DSB supressed carrier modulation and demodulation and implement circuit practically using IC-AD633

2 Components and Equipment Required

IC AD-633 *Capacitor(0.1uf)-2 *Power supply *Fuction generator *connecting wire *Breadboard *DSO

3 Theory

Modulation:-one of parameter amplitude,phase,frequency of carrier signal varied according to message signal amplitude variation

3.0.1 Double-sideband full carrier Modulation

In Double side band Full carrier modulation technique amplitude of carrier signal varied with respect to message signal amplitude variation.we uses square wave modulation technique to generate modulated signal

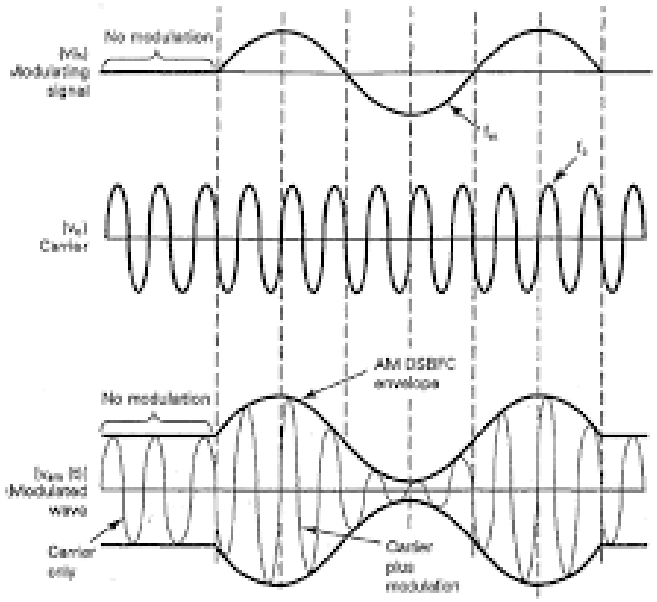

Figure 1: DSB-FC

3.1 Double-sideband full carrier demodulation

For demodulation of double side band full carrier we uses Envelope detector.proper choice of RC for envelope detection is

$1/\text{fc} \ll RC \ll 1/fm.$

for good detection of modulated signal RC must lie between those two value.

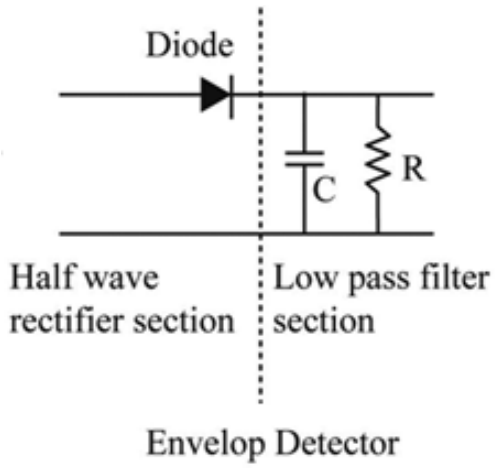

Figure 2: Envelope detector

3.2 Double-sideband suppressed carrier Modulation

In double side band supressed carrier demodulation we just multiply the message signal with carrier signal for this we uses multiplier IC AD-633.

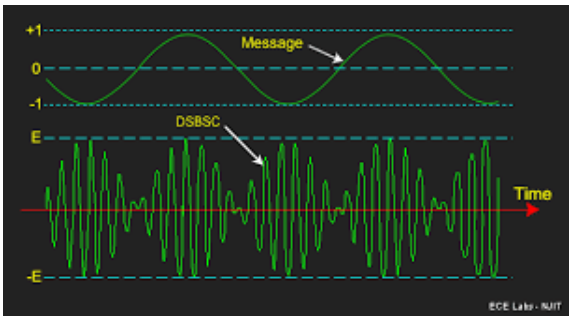

Figure 3: DSB-SC Modulation

3.3 Double-sideband suppressed carrier demodulation

For demodulation of DSB-SC we use coherent demodulation method.

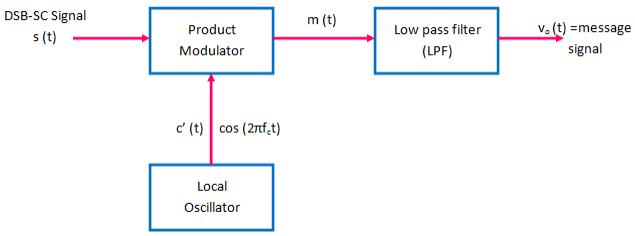

Figure 4: DSB-SC Demodulation

3.3.1 IC AD-633

The AD633 is a four-quadrant, analog multiplier. It includes high impedance, differential X and Y inputs,and a high impedance summing input (Z). total accuracy of 2 percent of full scale.

100 µV rmsin.....bandwidth 10 Hz to 10 kHz .

A 1 MHz bandwidth,20 V/µs slew rate

The block diagram of IC AD-633 is shown in Figure 5

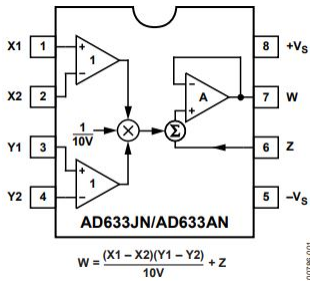

Figure 5: Block diagram of IC AD-633

Pin description of IC AD-633 in figure 6

Pin No.	Mnemonic	Description
1	X1	X Multiplicand Noninverting Input
2	X2	X Multiplicand Inverting Input
3	Y1	Y Multiplicand Noninverting Input
4	Y2	Y Multiplicand Inverting Input
5	$-V_S$	Negative Supply Rail
6	Z	Summing Input
7	W	Product Output
8	$+V_S$	Positive Supply Rail

Figure 6: Description of different pin of IC AD-633

The functional diagram of IC AD-633 as a multiplier is shown in Figure 7

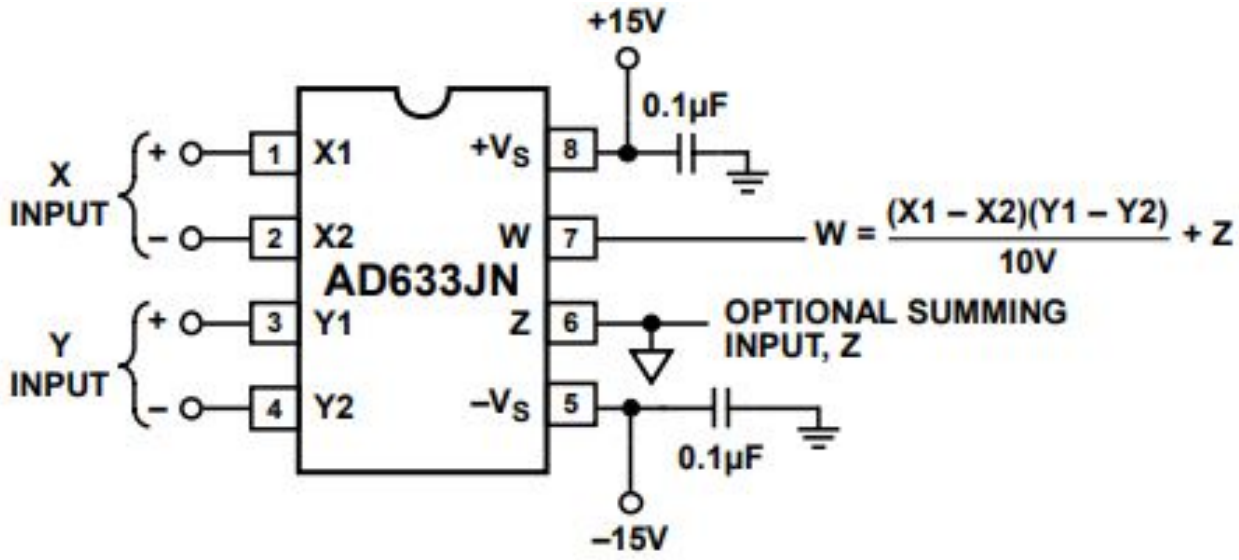

Figure 7: Functional diagram of IC AD-633 as a multiplier

4 Observation/Results

4.1 DSB-FC Modulation

In IC AD-633 we gave message signal in pin 1(+) and pin 2(-).and in Pin 3(+) and 4(-) we gave carrier signal

The message signal taken from DSO we take sin wave the value of signal is 7 Vp-p and frequency-103Hz
The value of carrier signal(sin wave) we taken from fuction generator with 2 Vp-p and frequency- 3 KHz.
in experiment we supply power +15v and -15v at pin 8 and 5 respectively and we connect o.1uf capacitor at pin 8 and 5.
pin-6 connected to pin-3

Figure 8: Waveform on DSO for DSB-FC modulated signal

4.2 DSB-FC Demodulation

for envelope detection codition is 1/fc $\ll RC \ll 1/fm$
1/3Khz $\ll RC \ll 1/3Khz$
0.33msec $\ll RC \ll 9.708msec$
c=0.01uf
R=12 kohm

Figure 9: Waveform after demodulation on DSO

4.3 DSB-FC

everything just same as DSB-FC just connect pin-6 to ground.

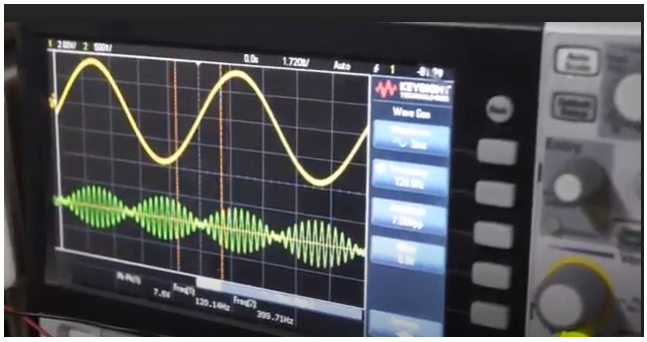

Figure 10: Waveform of DSB-SC after modulation on DSO

5 Conclusion

in this experiment we see Modulation demodulation technique of Double sideband full/suppressed carrier signal.for this experiment we uses multiplier IC AD-AD633.