Lab # 1 AM Modulation and Demodulation

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Objective: Study the amplitude modulation (AM) of the signal [m(t)+A], which represents the message signal and A is a constant DC value. The message signal is combined with the DC component and then multiplied by a carrier signal to create a modulated output.

Next, analyze the demodulation process of the modulated signal using different methods, including:

Coherent demodulation

Rectifier detection

Envelope detection

1. Steps:

A. Adding a DC value to the message.

B. Multiplying the [m(t) + A] by the carrier.

C. Change the DC value to get a different wave.

D. Apply the 1st demodulation (Coherent demodulation).

E. Apply the 2nd demodulation (a Rectifier detector).

F. Apply the 3rd demodulation (the Envelope detector).

A. To keep the message signal above zero, you need to add a constant DC value to it. This will shift the entire signal upwards, ensuring that it doesn't go negative.using adder the first input is m(t) and the second input is A.

B. Use multiplier the first input in m(t) and second input is carrier 100 kHZ

C. If A > mp the modulated signal became under modulated ,if A < mp the modulated signal became over modulated and if A = mp the modulated signal became critical modulated.

D .Multiply modulated signal by the same carrier by using Multiplier to get m(t) as shown in fig 1.

E. Use a modulated signal as input in the rectifier then put it as input in a low pass filter then use a channel to see m(t) as shown in fig2.

F. Use a modulated signal as input in the diode and Rc as shown in fig 3.

3.Results and Observations

When using the Envelope detector we found ripples. We should use a low pass filter to avoid ripples.

4.Discussions

Advantages:

Demodulation can be done using a few components and a circuit .

Disadvantages:

The same problem as DSB_SC.

5.References

[1]Use some images from the lab experiments.
[2] Barry Duncan & carlo Manfredini, Emona 101 Trainer Lab

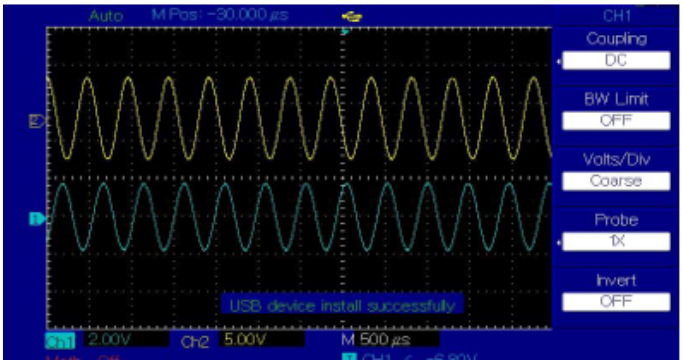

Fig. 1. Coherent Demodulation

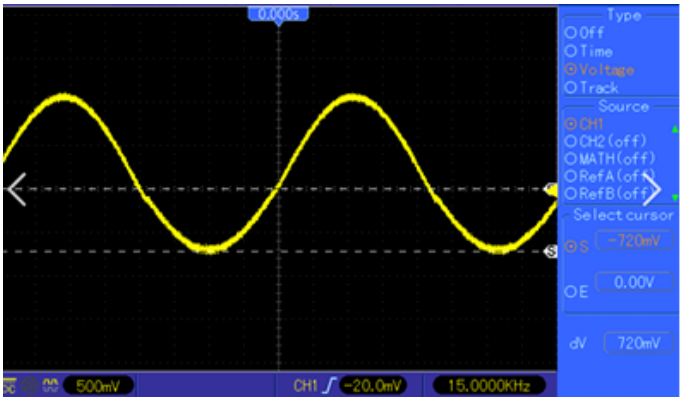

Fig. 2.Demodulation using Rectifier detector

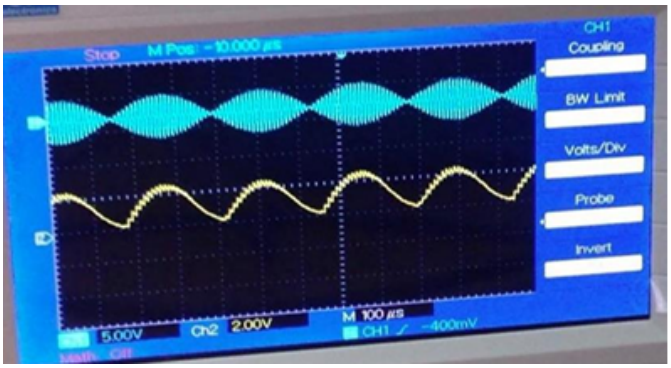

Fig. 3. Demodulation using Envelope detector