

Lab # 1 AM Modulation and Demodulation

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Communications Theory, 1st semester, 2024-2025

3rd Year (Computer and Control)

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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:

- Adding a DC value to the message.
- Multiplying the $[m(t) + A]$ by the carrier.
- Change the DC value to get a different wave.
- Apply the 1st demodulation (Coherent demodulation).
- Apply the 2nd demodulation (a Rectifier detector).
- 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 $A > m_p$ the modulated signal became under modulated, if $A < m_p$ the modulated signal became over modulated and if $A = m_p$ 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 R_c 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.

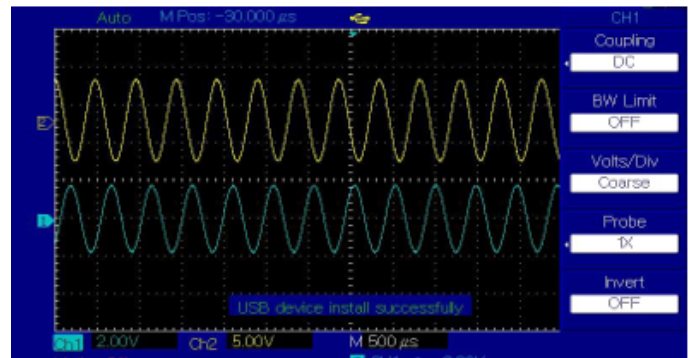


Fig. 1. Coherent Demodulation

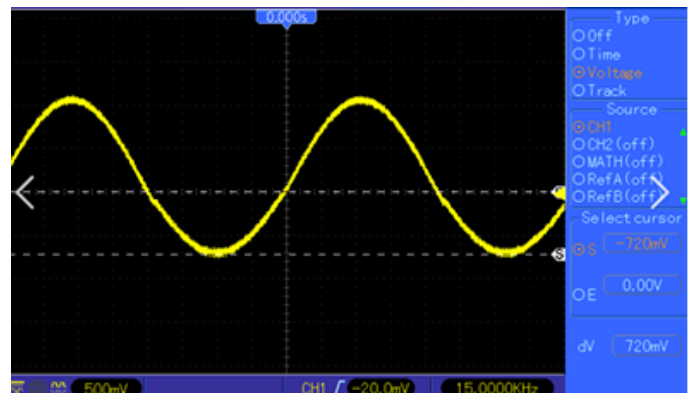


Fig. 2. Demodulation using Rectifier detector

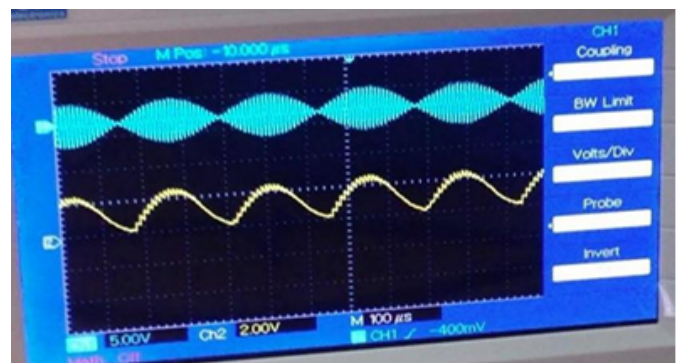


Fig. 3. Demodulation using Envelope detector