



Computer System Engineering Department

ENEE3309

COMMUNICATION SYSTEMS

-Project Phase Two-

Prepared by:

1. Mohammad Qady

Instructor: Dr. Qadri Mayalla

Sec: Three

Student NO.1211099

2. Abd AlRahman Shaheen

Student NO. 1211753

3. Mahmoud Awad

Student NO. 1212677

Instructor: Dr. Ashraf Al-Rimawi

Sec: Two

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Introduction

In this project, amplitude modulation (AM) by designing, simulating, and constructing AM circuits using a switching modulator, a bandpass filter, and an envelope detector.

Executed in two distinct phases—simulation using Pspice, followed by hands-on construction on a breadboard with an oscilloscope using Tinkercad. The project Emphasizing theoretical analysis, practical implementation, and the utilization of modern engineering tools, for skill development in circuit design and experimentation.

Results:

Using Pspice:

1. Modulated signal

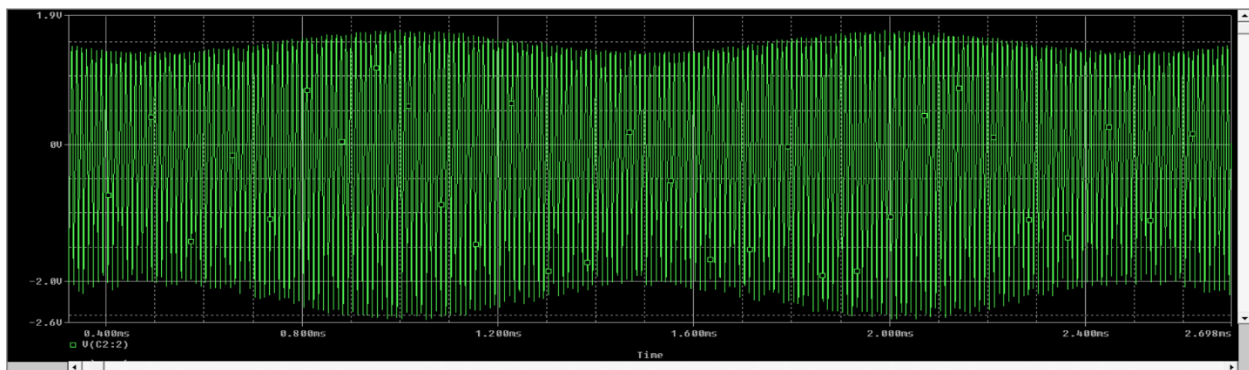


Fig.1:modulated signal using PSpice software

2. demodulated signal

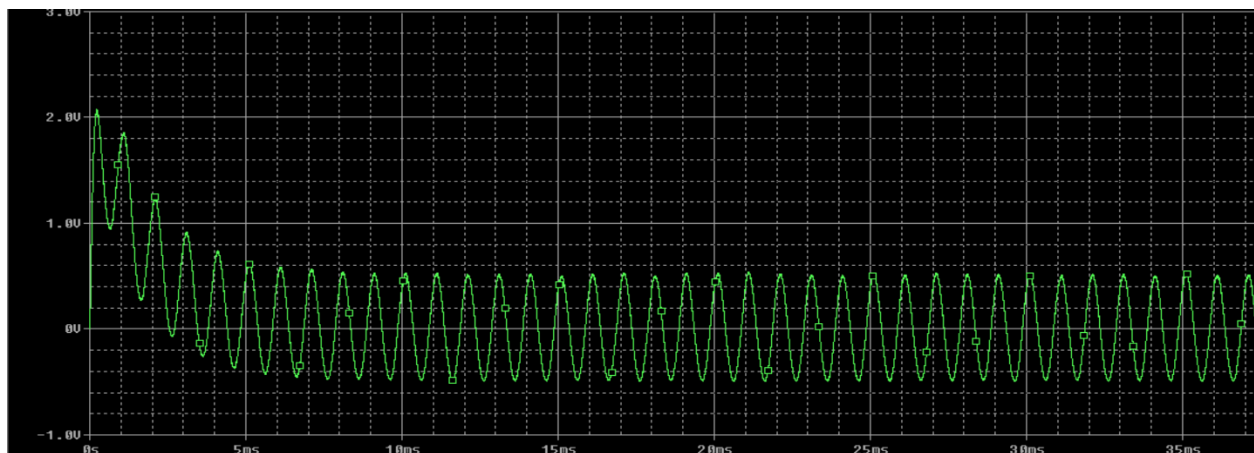


Fig.2: demodulated using PSpice software

Using Tinkercad:

1. First Circuit:

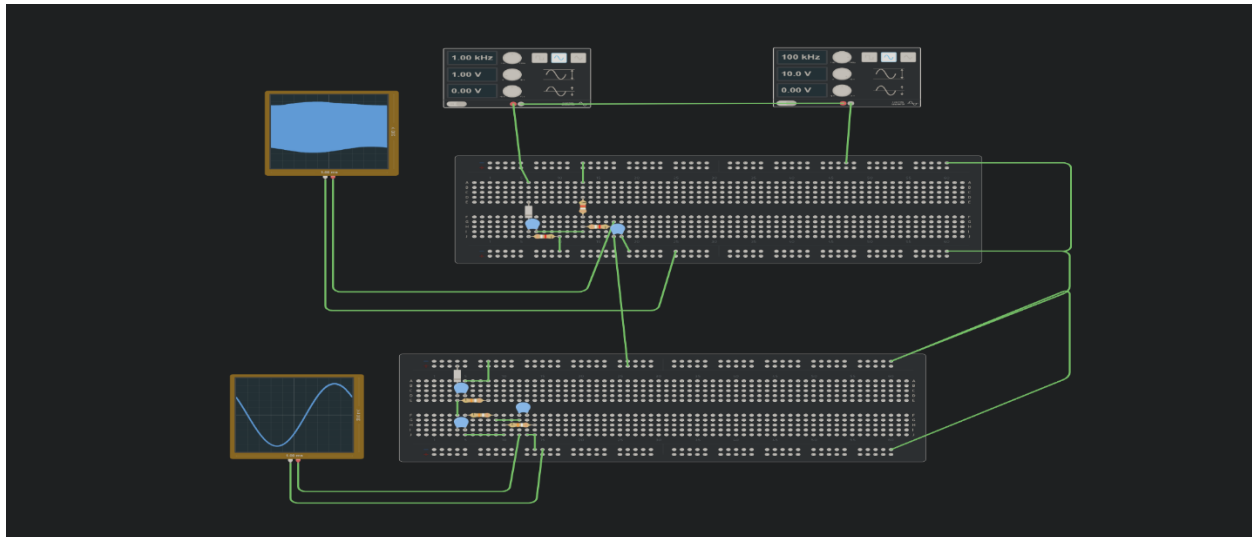


Fig.3 :modulated signal using TinkerCad software

2. Second Circuit:

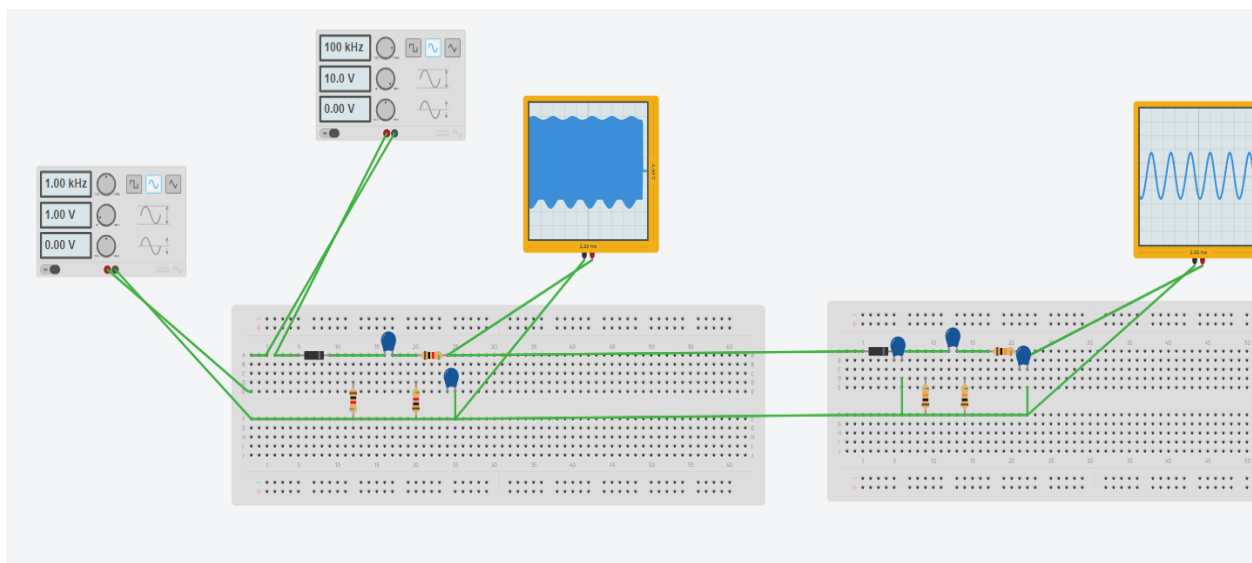


Fig.4 :demodulated signal using TinkerCad software

Result's Discussion:

Circuit Design:

- ❖ **Modulator:** We choose a switching circuit due to its simplicity and effectiveness in creating AM signals. To isolate the desired modulated signal and eliminate unwanted frequencies, a bandpass filter was designed.
- ❖ **Demodulator:** A good choice we considered, is an envelope detector circuit. due to its ability to efficiently extract the original message signal from the modulated wave.

Simulation and Breadboard Implementation:

- ❖ **Tinkercad Breadboard:** We constructed virtual versions of both circuits using Tinkercad's breadboard interface.
- ❖ **Oscilloscope Analysis:** We accurately examined the simulated waveforms to visualize the modulation and demodulation processes.

Key Findings:

- ❖ **Verification:** The close agreement that the simulated and the breadboard results validates our circuit designs and understanding of AM principles.
- ❖ **Filter Design:** The implementation of additional filtering showcases a practical approach to overcoming non-idealities and enhancing signal quality.

Conclusion:

This project has provided us with a comprehensive understanding of amplitude modulation through a hands-on approach. We have successfully designed, simulated, and implemented AM circuits, addressing real-world challenges and exploring potential solutions. Our findings underscore the importance of practical experimentation and the value of addressing non-idealities in circuit design.