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***Lab Assesment – 1***

# Amplitude Modulation and Demodulation

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## Aim

*To input a message signal in sine wave form and use a carrier wave to make it amplitude modulated signal, ready to transmit. Also, demodulate the same, on the receiver end and retain the original message signal.*

## Abstract

*Amplitude modulation is a common method used to transmit message signals. The message is modulated using a carrier wave of a higher frequency and then transmitted. There are few advantages that come along with this method, such as having smaller receiver antennas, lesser noise effects, etc.*

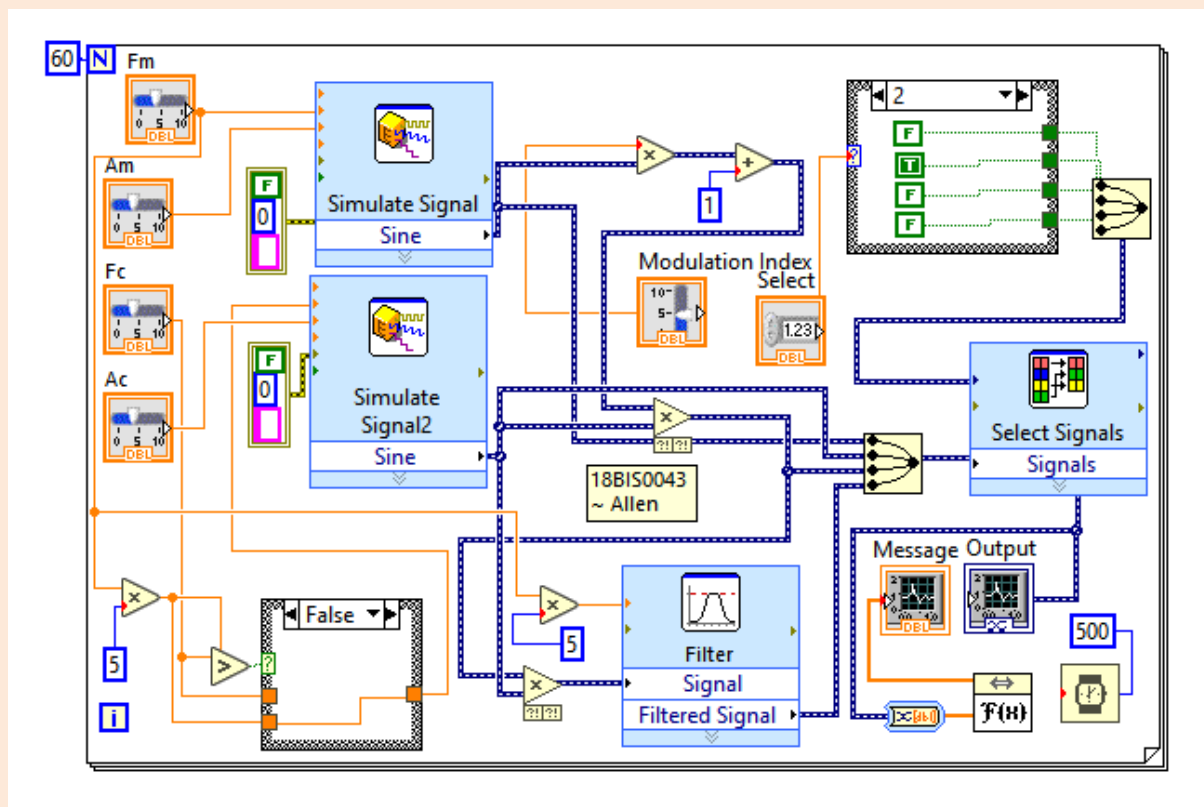
*Therefore, this LabVIEW program accepts the amplitude and the frequency of the message wave, the amplitude and frequency of the carrier wave and the modulation index, from the user, for displaying the output, the FFT and the demodulated wave output on the receiver end.*

*Demodulation is done by multiplying the signal with the carrier signal and then using a low pass cut off filter to remove the higher frequency and the DC component inside.*

## Formula

$$AM = A_c [1 + m (\cos(w_m t))] [\cos(w_c t)]$$

## Circuit Diagram

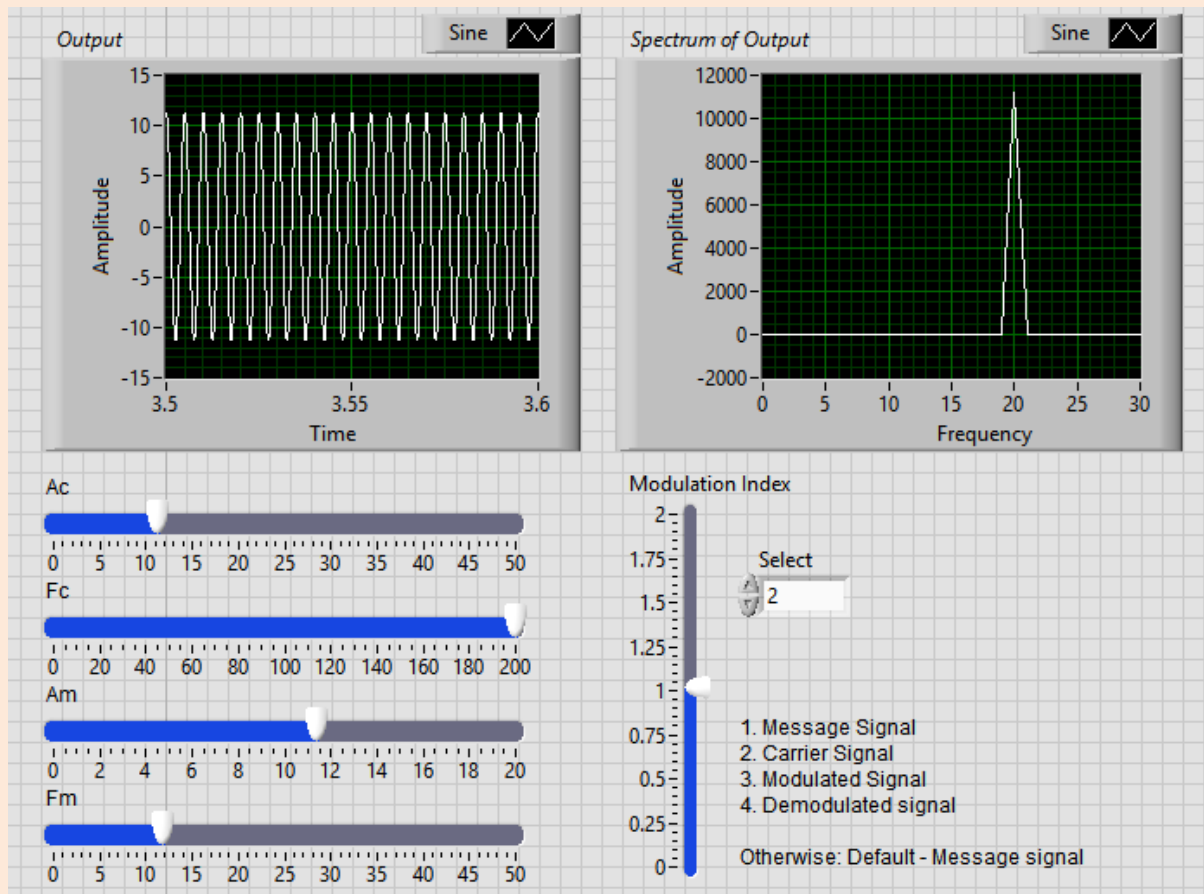


## Error encountered



On reducing the sampling rate to 20 from 1000, it violates the Nyquist rule of sampling. The sampling rate of the digital converter should always be greater than or equal to the frequency of the wave. Otherwise the Nyquist condition is violated and the program stops to work.

## Board Diagram



## Components

- ✓ Input slides for Carrier amplitude, Carrier Frequency, Message amplitude, Message frequency and Modulation Index.
- ✓ Output screens for showing output and its spectral graph
- ✓ 4 graphs multiplexed into the same screen with a toggle option

## Result

The message signal is modulated using AM on the transmitting end and is demodulated on the receiver end using LabVIEW software.