ExperimentNo.3

Objective

Understand communication theory, including amplitude modulation and demodulation.

Component of Circuit

1- Analog Communication Trainer
2- Oscilloscope

Part 1: Modulation

Amplitude modulation is a process by which the wave signal is transmitted by modulating the amplitude of the signal. It is often called AM and is commonly used in transmitting a piece of information through a radio carrier wave. Amplitude modulation is mostly used in the form of electronic communication. Currently, this technique is used in many areas of communication such as in portable two-way radios; citizens band radios, VHF aircraft radios, and in modems for

computers. Amplitude modulation is also used to mention mediumwave AM radio broadcasting.

Theory:

What is Modulation?

It is a process in a communication system. For communication, we need some fundamental elements. One is the high-frequency carrier wave, and other is the information that has to be transmitted (modulating signal) (or) input signal. These are essential for communication which is done using a device from one place to another. All in all, we need the help of the communication system.

Why Do We Need Modulation?

Practically speaking, modulation is required for:

To transmit the low-frequency signal to a longer distance.

To reduce the length of the antenna.

Power radiated by the antenna will be high for high frequency (small wavelength).

To avoid the overlapping of modulating signals.

Modulation Index:

Is the ratio of the Amplitude of the modulating signal to the amplitude of the carrier wave. $\mu = Am/Ac$

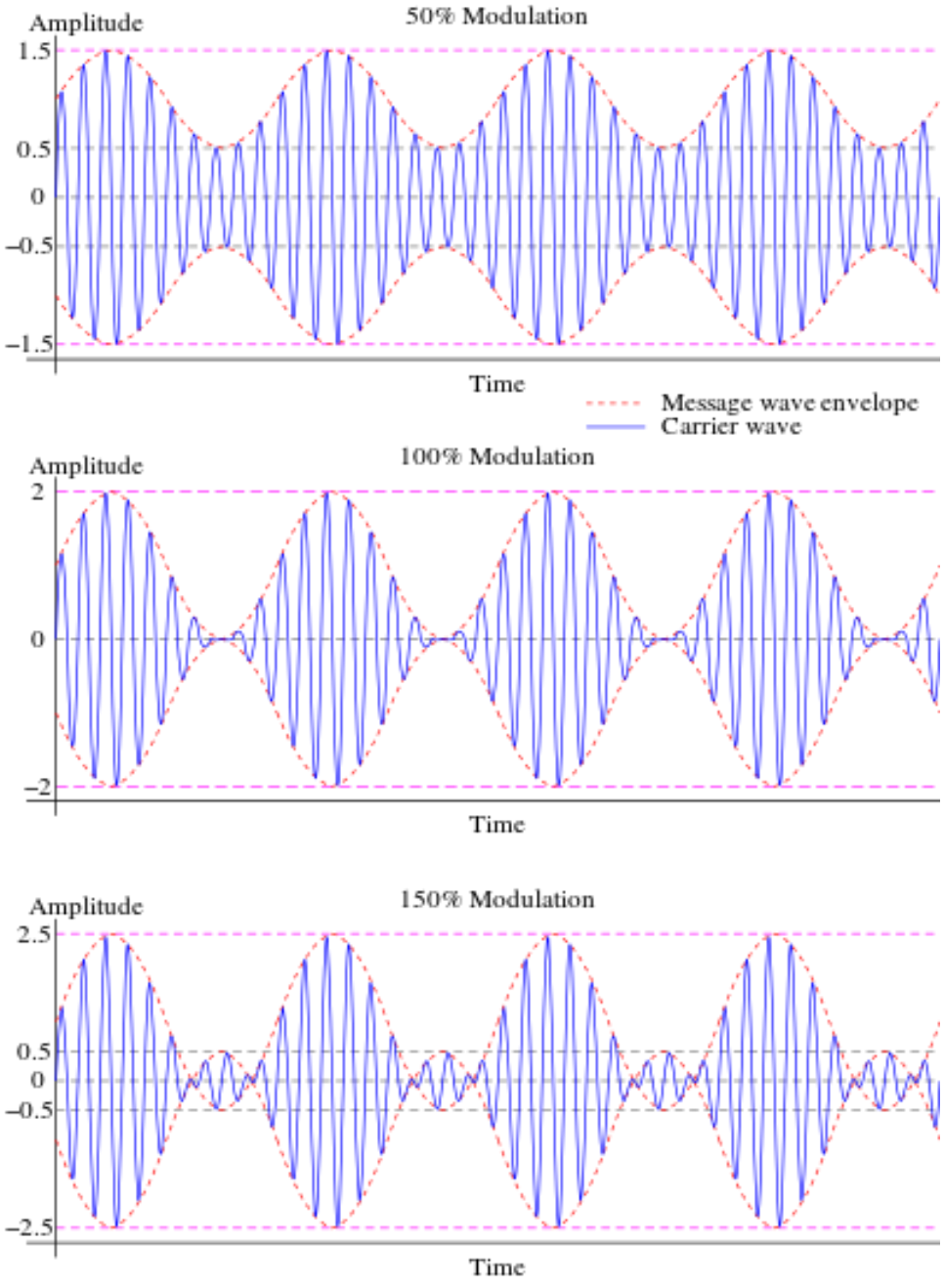

Figure 1. Types of modulation index.

Circuit diagram and its output:

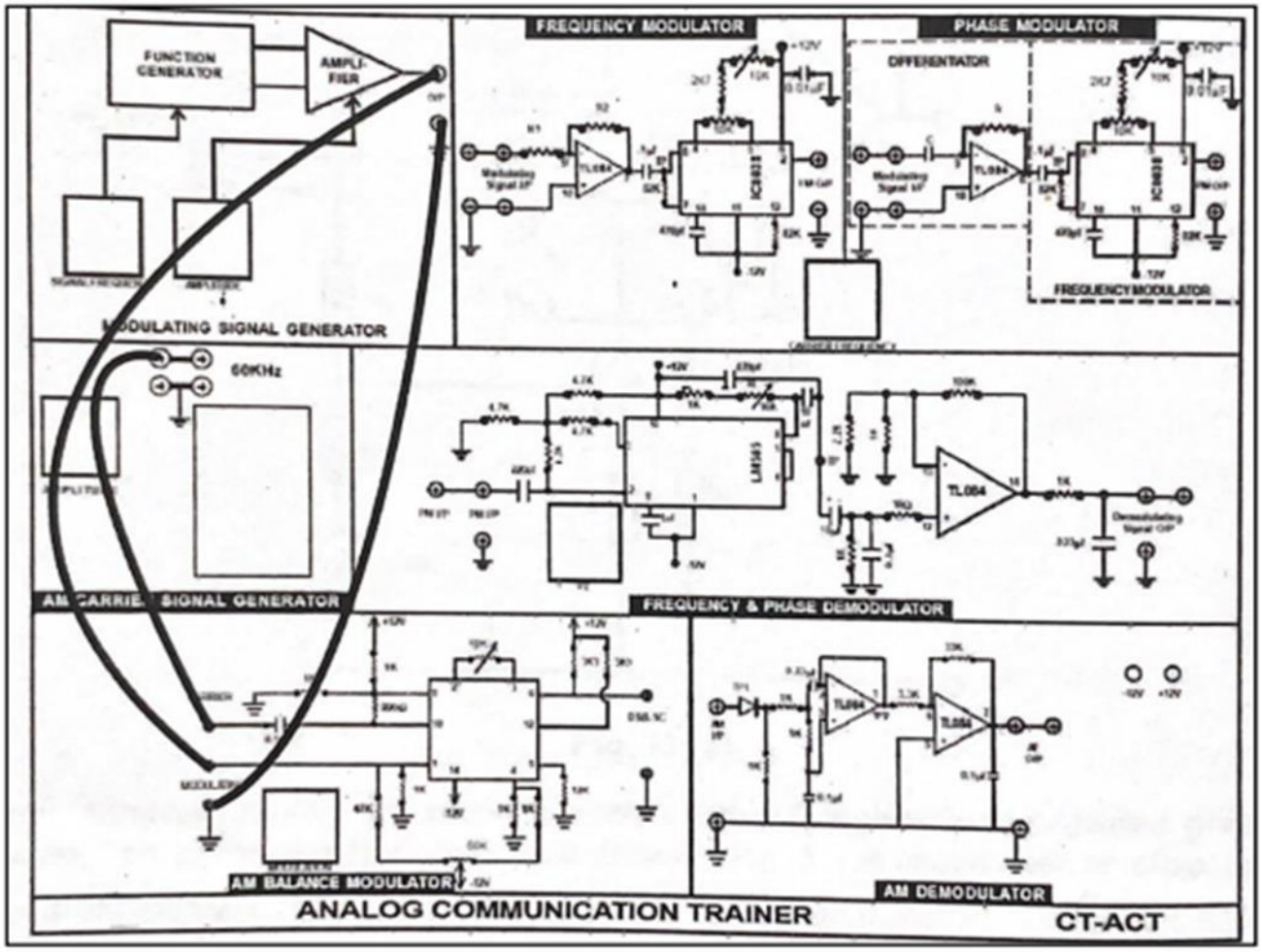

Figure 2. Connection diagram of Amplitude Modulation.

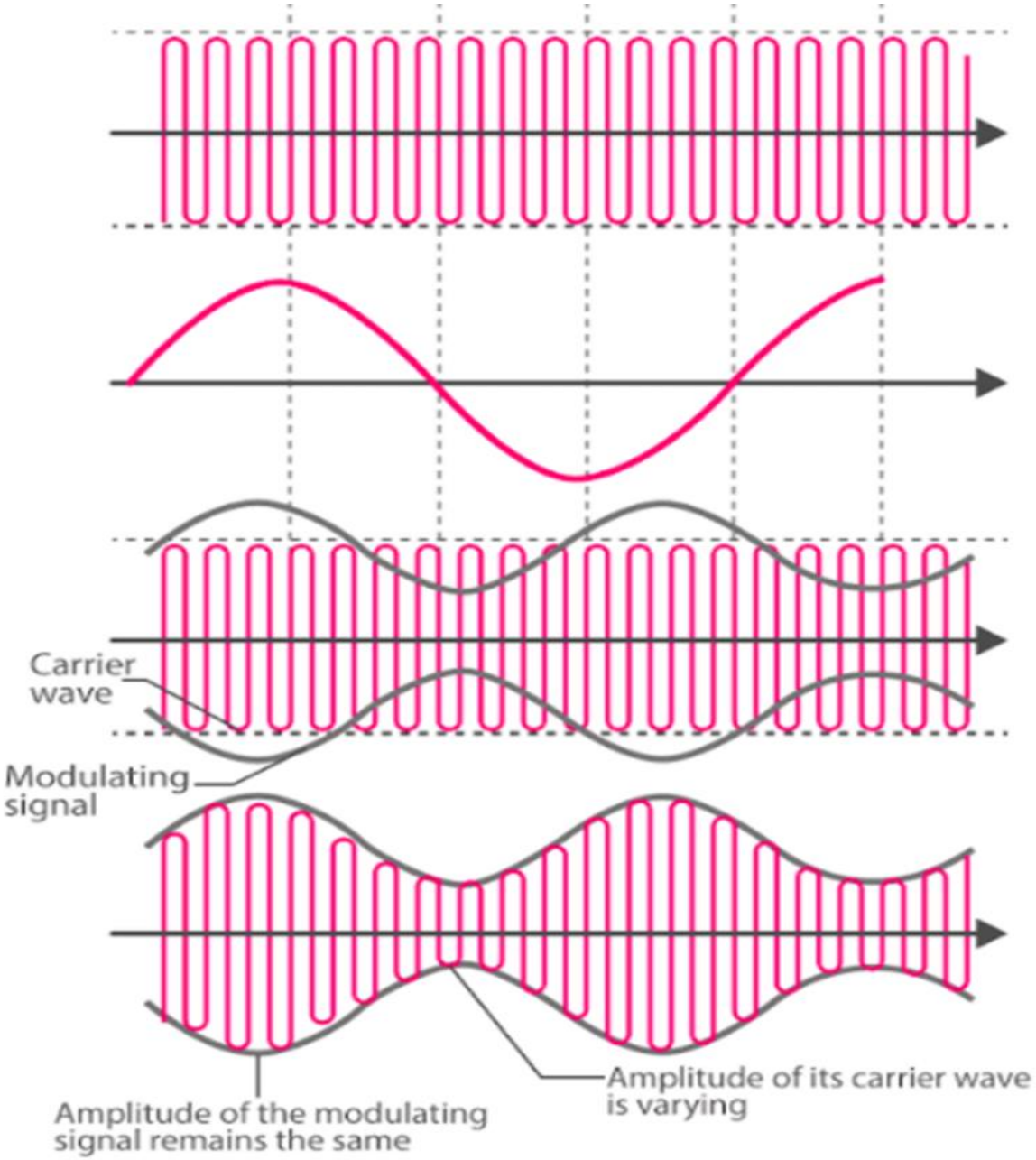

Figure 3. Modulated Waveform (1. Carrier wave, 2. Modulating signal, 3. Superposition of the carrier wave and modulating signal, 4. Amplitude modulated wave)

Part 2/ Demodulation

Demodulation is a key process in the reception of any amplitude-modulated signals whether used for broadcast or two-way radio communication systems.
Demodulation is the process by which the original information-bearing signal, i.e. the modulation is extracted from the incoming overall received signal.

Circuit diagram and its output:

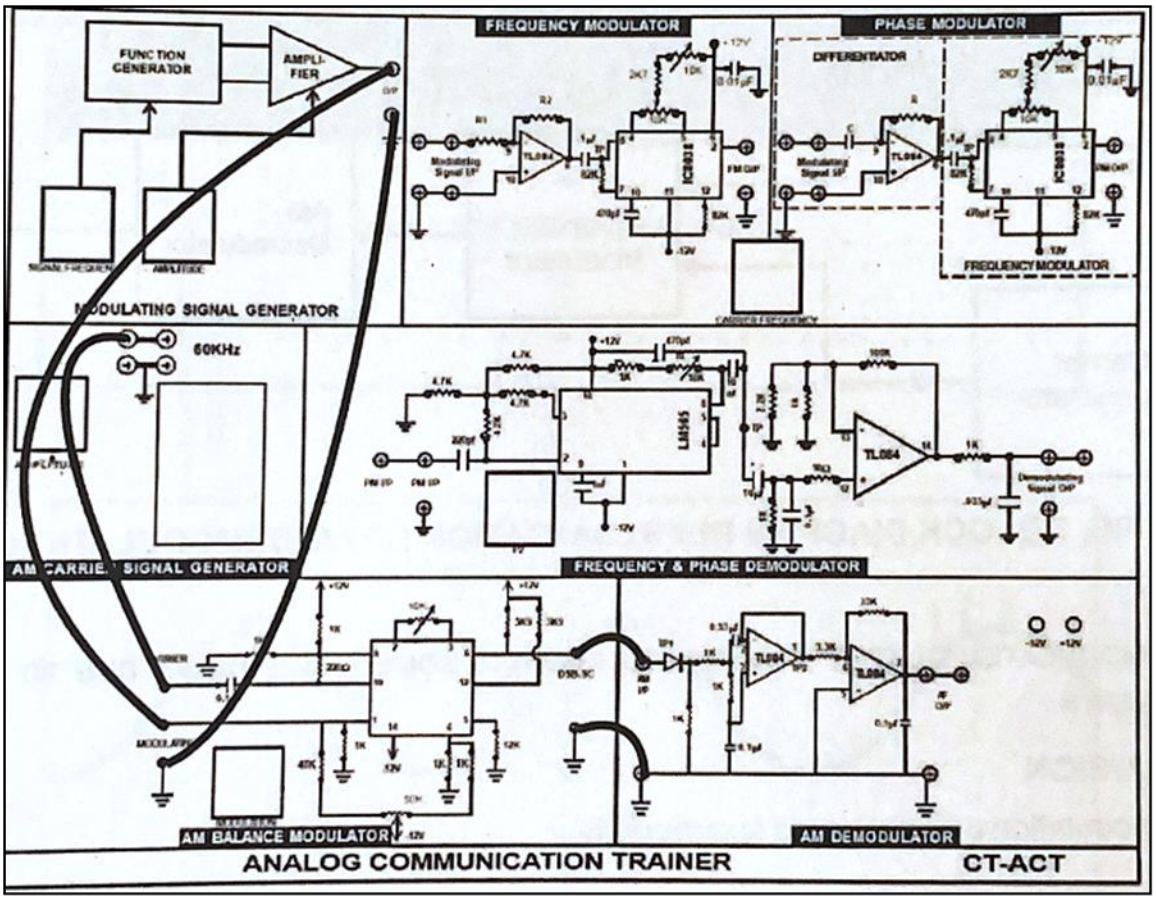

Figure 4. Connection diagram of Amplitude Demodulation.

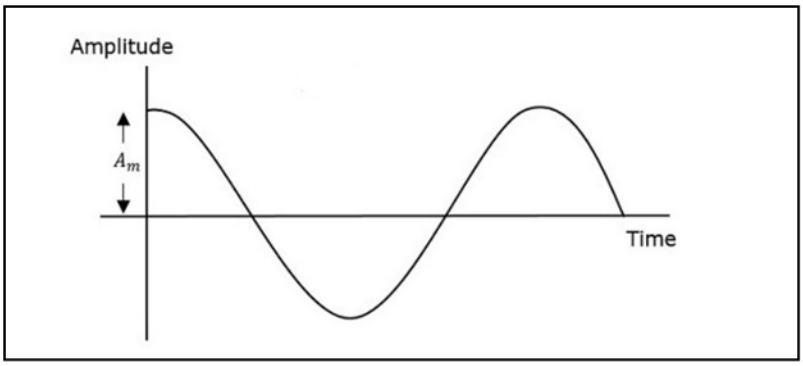

Figure 5. Demodulation Output.