

Multimeter

- **It is also known as Electronic VOM or AVO meter**
- **Used to measure current, voltage and resistance both for AC and DC quantity, for a number of ranges**
- **Some multimeter provide the facilities of measuring inductance, capacitance, temperature**
- **Two type _ Analog AVO meter
_ Digital AVO meter**

Multimeter/AVO meter

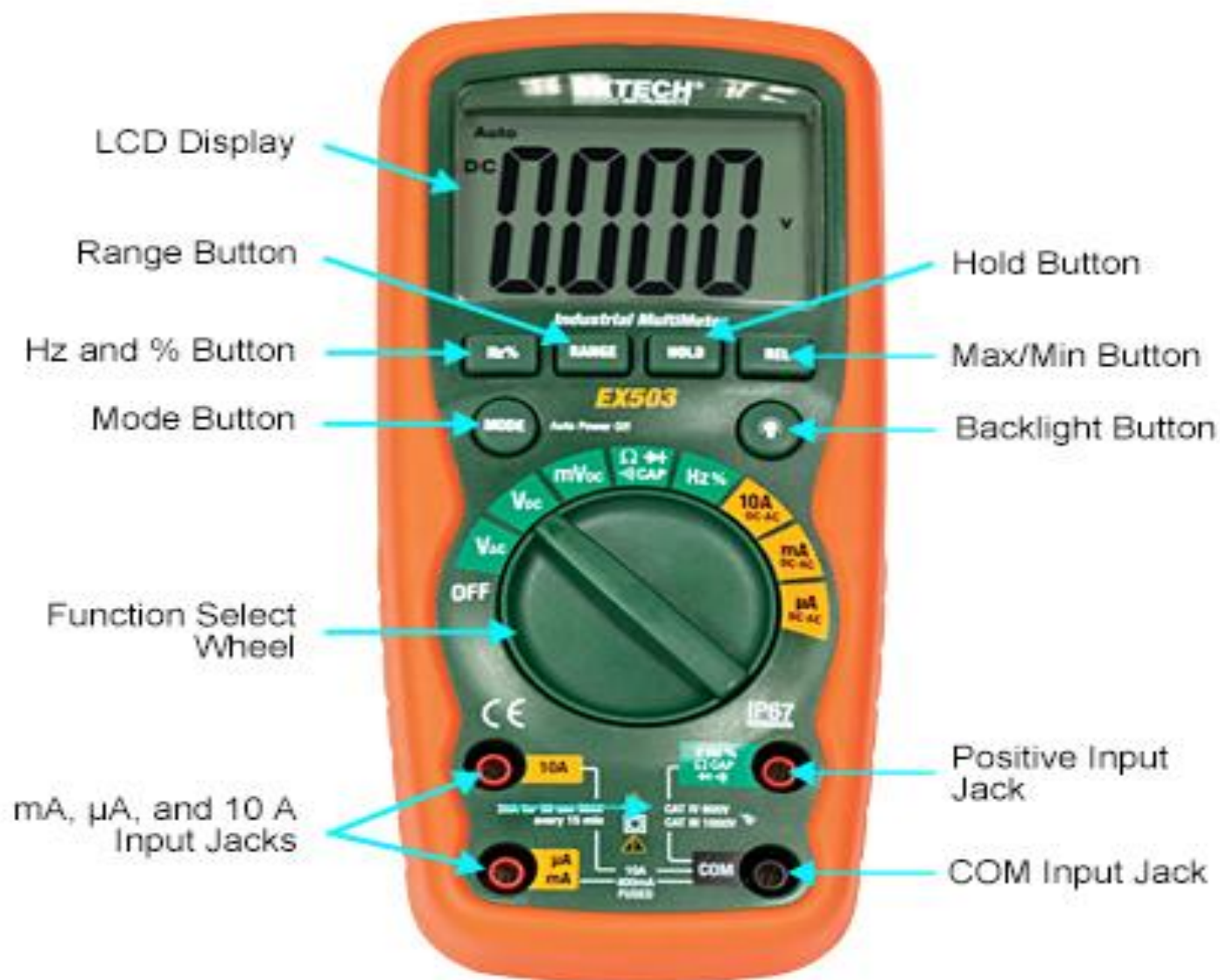
A **multimeter** is a device used to measure voltage, resistance and current in electronics & electrical equipment.

It is also used to test continuity between to 2 points to verify if there is any breaks in circuit or line.

There are two types of multimeter Analog & Digital

- Analog has a needle style gauge
- Digital has a LCD display







SIGNAL GENERATOR



A signal generator is piece of test equipment that produces an electrical signal in the form of a wave.

A SIGNAL GENERATOR IS AN ELECTRONIC DEVICE THAT GENERATES REPEATING OR NON-REPEATING ELECTRONIC SIGNALS IN EITHER THE ANALOG OR THE DIGITAL DOMAIN.

Signal generator is a kind of equipment that can provide all kinds of frequency, waveform and output electric signal.

Signal generator, also known as signal source or oscillator, has a wide range of applications in the field of production practice and science and technology.

The most basic signal created from a signal generator is the continuous wave (CW) signal, or sine wave, which has no modulation and is produced by a basic signal source.

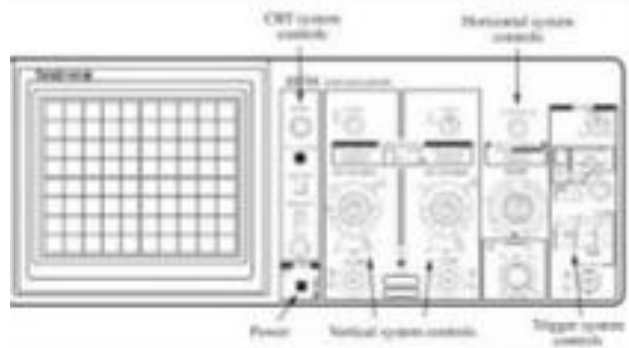
Varying the sine wave's amplitude achieves AM and pulse modulation. Varying the sine wave's frequency or phase generates FM and Φ M, respectively.


Requirements of signal generator


the requirements are common to all the types

- 1. The output frequency of signal generator should be very stable**
- 2. The amplitude of output signal of signal generator should be controllable from low values to relatively large values**
- 3. The amplitude of output signal must be stable.**

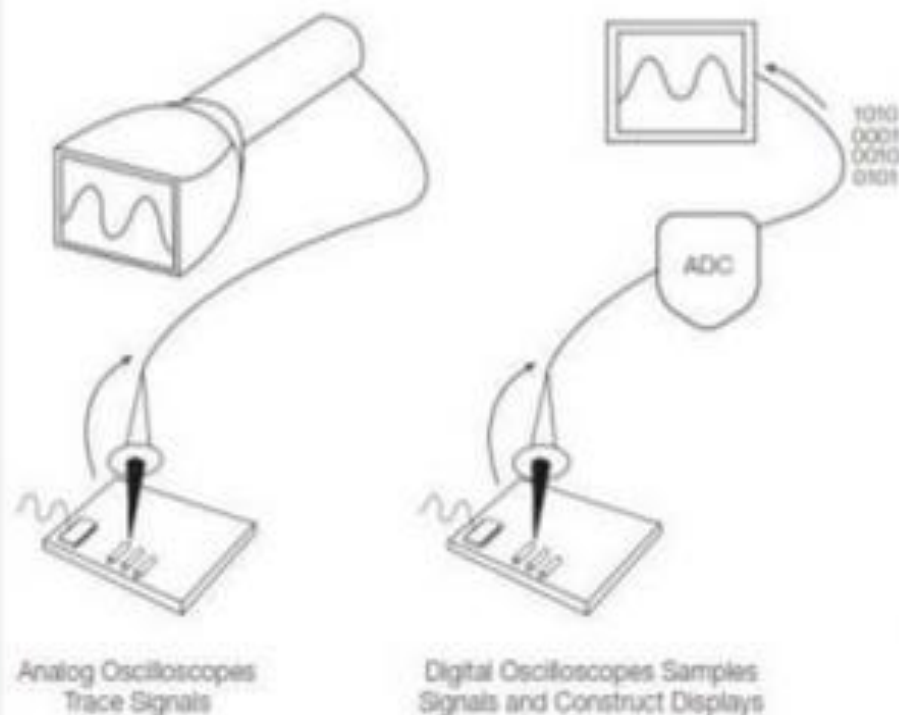
Introduction



 **Oscilloscope** (**scope**) is a visual voltmeter with a timer (**clock**) that shows when a voltage changes.

 An analog scope uses a **cathode ray tube (CRT)** similar to a television screen to display voltage patterns.

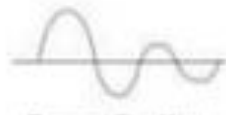
Analog and digital scope



Waves types



Sine Wave



Damped Sine Wave



Square Wave



Rectangular Wave



Sawtooth Wave



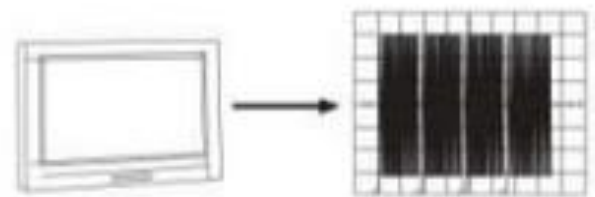
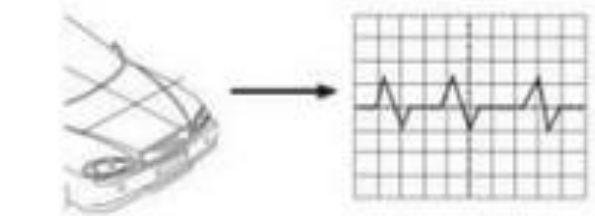
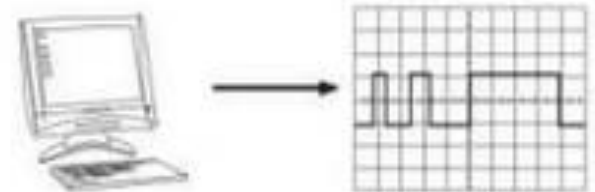
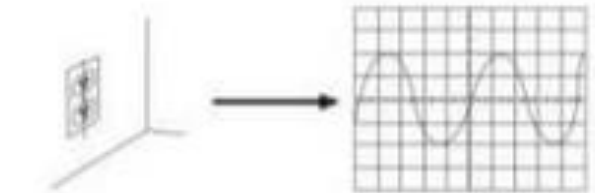
Triangle Wave



Step



Pulse



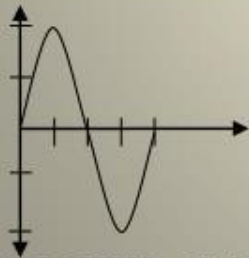
What is the purpose of an oscilloscope

- The purpose of an oscilloscope is to measure a voltage that changes with time and show it in a graphical format

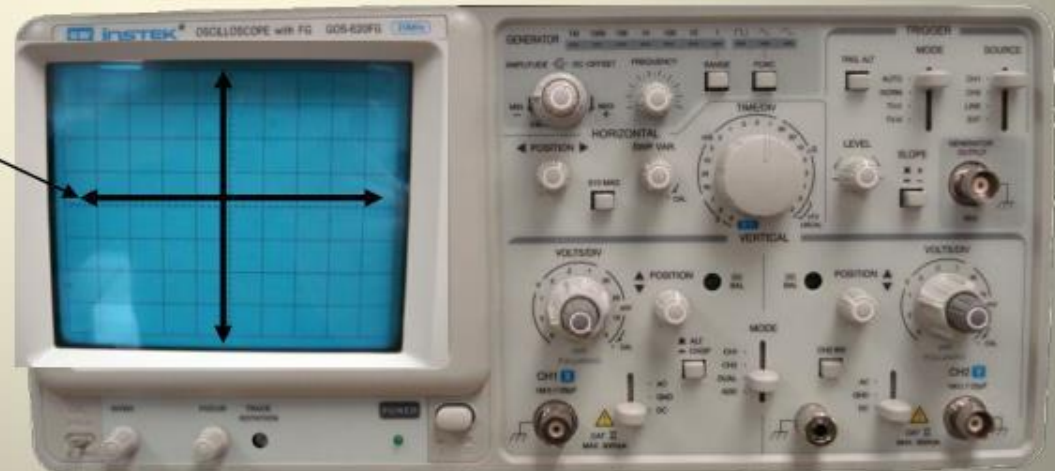
1) Here is the oscilloscope in our lab

-Notice the X-Y axes

2) Here is our alternating voltage signal from before



3) If we measure our signal with the scope, it would look like this!



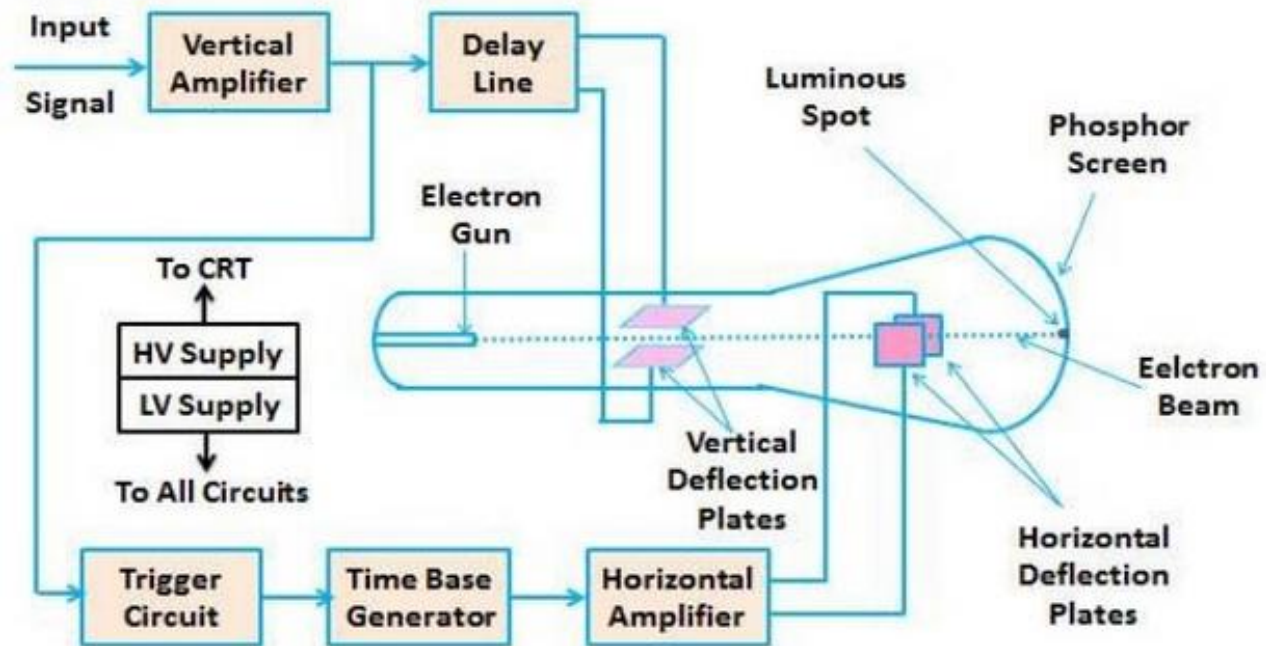
Introduction:

➤ The CRO stands for a cathode ray oscilloscope. In modern electronics, the CRO plays an important role in the electronic circuits. It is typically divided into four sections which are display, vertical controllers, horizontal controllers, and Triggers. Most of the oscilloscopes are used the probes and they are used for the input of any instrument. We can analyze the waveform by plotting amplitude along with the x-axis and y-axis.

What Is A CRO

- The cathode ray oscilloscope is an electronic test instrument.
- It is used to obtain waveforms when the different input signals are given.
- In the early days, it is called as an Oscillograph.
- The oscilloscope observes the changes in the electrical signals over time.

Block Diagram of CRO



Block Diagram of Cathode Ray Oscilloscope (CRO)

Block Diagram of CRO

Block Diagram of CRO

- The CRO recruit the cathode ray tube and acts as a heart of the oscilloscope.
- In an oscilloscope, the CRT produces the electron beam which is accelerated to a high velocity.
- It brings to the focal point on a fluorescent screen.

Block Diagram of CRO

- To complete this task we need various electrical signals and voltages.
- This provides the power supply circuit of the oscilloscope.
- Here we will use high voltage and low voltage.
- The low voltage is used for the heater of the electron gun to generate the electron beam.
- The high voltage is required for the cathode ray tube to speed up the beam.

Horizontal Deflection System

- The vertical and horizontal system consists of horizontal amplifiers to amplify the weak input signals.
- It is different to the vertical deflection system.
- The horizontal deflection plates are penetrated by a sweep voltage that gives a time base.
- By seeing the circuit diagram the sawtooth sweep generator is triggered by the synchronizing amplifier.

Triggered Sweep

- Sometimes the waveform should be observed that it may not be predicted.
- Thus the desired that the sweep circuit remains inoperative .
- The sweep should be initiated by the waveform under the examination.
- In these cases, we will use the triggered sweep.
- A triggered sweep starts at a selected point on the signal, providing a stable display.

Non-Saw Tooth Sweep

- This sweep is used to find the difference between the two voltages.
- By using the non-sawtooth sweep we can compare the frequency of the input voltages.
- Sometimes, non-sawtooth sweep is also used in CRO for some special applications.

Synchronization

- The synchronization is done to produce the stationary pattern.
- The synchronization is between the sweep and the signal should measure.
- There are some sources of synchronization which can be selected by the synchronization selector.

Internal

- In this the signal is measured by the vertical amplifier and the trigger is obtained by the signal.

External

- In the external trigger, the external trigger should be present.

Line

- The line trigger is produced by the power supply.

Applications of CRO

- Voltage measurement
- Current measurement
- Examination of waveform
- Measurement of phase and frequency