Sampling Oscilloscopes :-

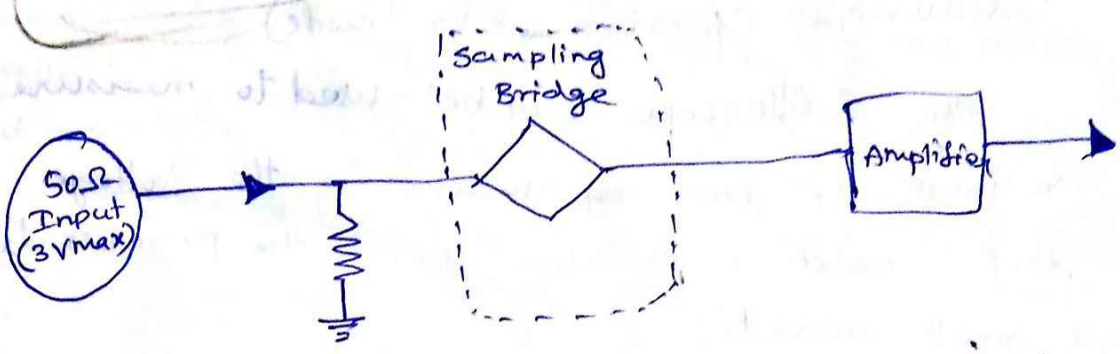
⇒ When measuring high frequency signals, the Oscilloscope may not be able to collect enough samples in one sweep.

⇒ A digital sampling Oscilloscope is an ideal tool for accurately capturing signal whose frequency components are much higher than the Oscilloscope's sample rate.

⇒ This Oscilloscope is capable of measuring signals of up to an order of magnitude faster than any other Oscilloscope

⇒ It can achieve band width and high speed time ten times higher than other Oscilloscopes for repetitive signals.

⇒ Sequential equivalent time sampling Oscilloscopes are available with bandwidths to 80 GHz.



⇒ The digital Sampling Oscilloscope reverse the position of the attenuator/amplifier and the sampling bridge.

⇒ The input signal is sampled before any attenuation or amplification is performed.

⇒ A low bandwidth amplifier can then be utilized after the sampling bridge because the signal has been converted to a lower frequency by the sampling gate, resulting in a much higher bandwidth instrument.

⇒ There is no attenuator/amplifier in front of the sampling gate. there is no facility to scale the input.

⇒ The sampling bridge must be able to handle the full dynamic range of the input at the time.

⇒ The dynamic range of most sampling oscilloscope is limited to about 1V peak-to-peak.

⇒ Digital storage and digital phosphor Oscilloscopes on the other hand can handle 50 to 100 Vo

and In addition, protection diodes cannot be used in front of the sampling bridge as this

would limit the bandwidth.
⇒ This reduces the safe input voltage for a Sampling Oscilloscope to about 3V as compared to 500V available on other oscilloscopes.

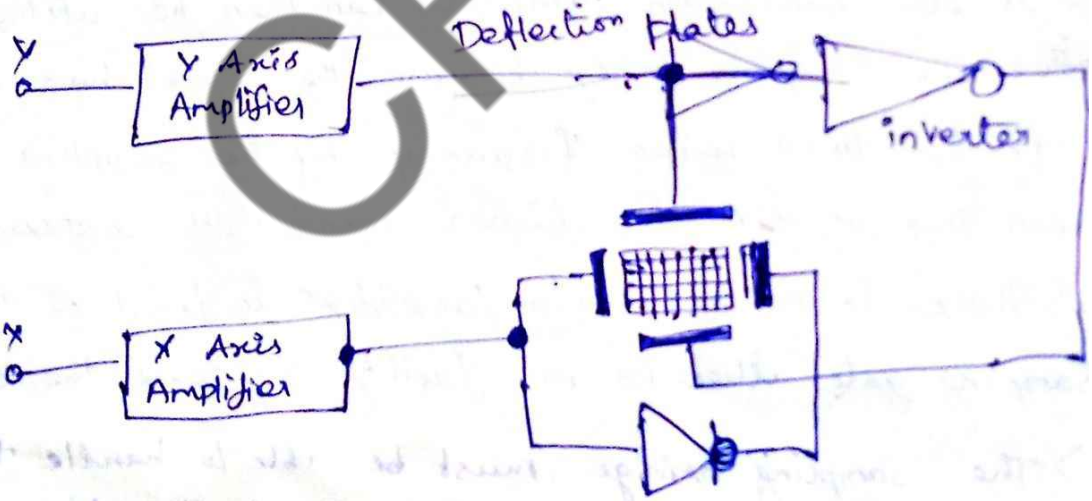
The Oscilloscope : Operation and Application

Oscilloscope Operation (X vs Y mode)

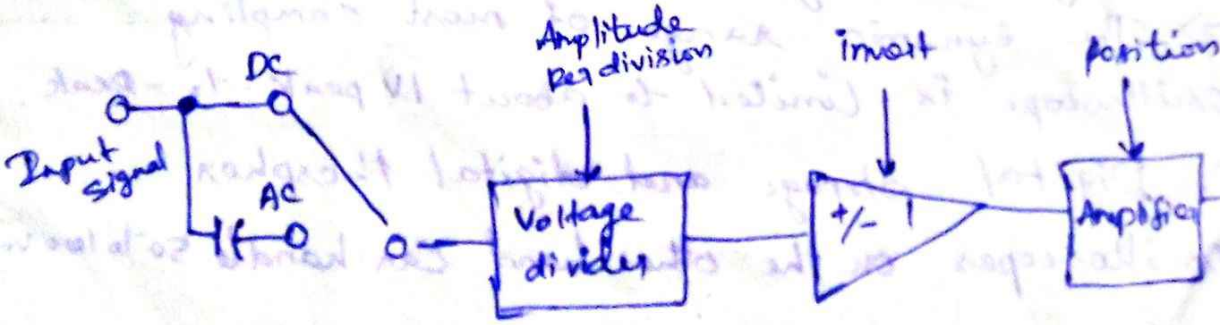
An Oscilloscope can be used to measure voltage. It does by measuring the voltage drop across a resistor and is the process drawing a small current.

⇒ The voltage drop is amplified and used to deflect an electron beam in either the x (horizontal) or Y (vertical) axis using an electric field.

⇒ The electron beam created a bright dot on the face of the cathode ray Tube (CRT) where it hits the phosphoron



X vs Y deflection of CRT Driverter



Amplifier Block diagram.

Frequency response.

⇒ Bandwidth is not enough to ensure that an Oscilloscope can accurately capture a high frequency signal.

⇒ The Oscilloscope design is a specific type of frequency response.

⇒ A frequency response of this type delivers excellent pulse fidelity with minimum overshoot and ringing.

⇒ A digital oscilloscope is composed of real amplifiers, attenuators, ADCs, interconnects, and relays, MFED response [Maximally Flat Envelope Delay) is a can only be approached.

⇒ pulse fidelity varies considerably with model and manufacturer)