

**CATHODE RAY OSCILLOSCOPE**

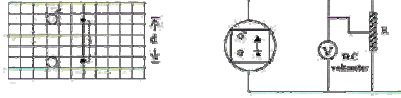
**Purpose :** To illustrate various uses of the cathode ray oscilloscope .

- 1- measurement of D.C. voltage .
- 2- measurement of A.C. voltage .

**Apparatus :** 1-Power supply . 2-Rheostat . 3- A.C. Voltmeter . 4-D.C. Voltmeter

**EXP : (1) Measurement of D.C. Voltage .**

- 1- Switch on the circuit .
- 2- A stationary spot of light (Green spot ) will appear on the screen .
- 3- Adjust spot of light on the screen .The point (0) represent the spot on C.R.O when the reading of D.C. voltmeter =zero .
- 4- By using rheostat ; apply the D.C. voltage to the plates of oscilloscope .The spot of light will move to position (0) on the screen .
- 5- Measurement the deflection d (mm) on the screen. The distance between 0 and 0 = deflection (d) .
- 6- Repeat steps 4 and 5 for different values of (V) .



**Reading :**

**Calculation :**

Deflection d (mm)	Voltage D.C.

- 1- Plot a graph with values of d (mm) as ordinates against the corresponding values of applied voltage as abscissa .
- 2- The straight line obtained confirms that the deflection is proportional to the voltage applied .
- 3- From the slope ,calculate the deflection sensitivity in (mm / volt) .

**EXP : (2) Measurement of A.C. Voltage .**

- 1- Replace the A.C. supply by a variable D.C. supply .
- 2- Replace the D.C. Voltmeter by an A.C. voltmeter .
- 3- Repeat the procedure of experiment 1 .
- 4- Note that the length of the vertical line (GREEN LINE) .
- 5- Traced out by the spot of light correspond to the peak value of the applied voltage
- 6- Plot a graph .
- 7- Find the slope of the graph .

**Medical Application :**

The ECG signal must be displayed . When a routine diagnostic ECG is taken, a permanent record is required for analysis and a pen recorder is usually used . In some recorders ink fed through a small capillary tube writes on ordinary paper . Other recorders have a heated stylus that melts off a thin ,white wax coating that is on black paper ,thus producing a black trace on a white background .

Such a permanent record is impractical for continuous monitoring of a heart attack patient . In a short time the paper would fill up the patients room ,and even if it could be stored no one would have time to examine it .A more convenient approach is to use the ECG oscilloscope to continually monitor a patient . It shows one to two cycles of the ECG ,which is enough for a doctor to assess the patients condition .The viewing screen on the monitoring oscilloscope is coated with a phosphor that glows for several seconds . Most laboratory oscilloscope do not use such a long-persistence phosphor and are not useful for ECG monitoring. Modern monitors use a microcomputer to store the ECG information and use it to continually refresh the trace .The trace units (ICUs) several patients are monitored by the use of multiple traces on a single large oscilloscope ,a short section is taken on a pen recorder and placed in each patients medical records .

**References :**

John R . Cameron . Medical Physics .