



Object :- To determine the value of Traveling Wave Tube Trainer

Theory :-

Electrons emitted from the cathode, accelerated by the anode are deflected by the electric field to give a line on the fluorescent screen. The current carrying solenoid which encloses the Cathode Ray Tube provides the necessary magnetic field for focusing if alternating potential is applied to the plates then the electrons shall experience a transverse alternating force. Under the influence of this potential, we shall get a line on the Cathode Ray Tube screen. The length of the line shall depend on the strength of the applied potential. Now if the longitudinal field because of solenoid is applied, the electron describes a circular path. Motion of the electron in circular path is balanced by the centrifugal forces supplied by the magnetic field

This is a popular method to find e/m. in this method, the cathode ray tube is placed inside a solenoid, if B is the magnetic field to make the spot then, and formula used to calculate the value of e/m is

$$B = (4\pi nI / 10L) \cos \theta$$

Where L is the Length of Solenoid

$$\cos \theta = L / \sqrt{D^2 + L^2}$$

(D is the Diameter of the Solenoid)

$$\text{and } e/m = [5 \times 10^7 (L/nI \cos \theta)^2 V / I^2] \text{ e.m.u. /g}$$

Where, L= length of X or Y plate, n = number of turns in the Solenoid, I = Solenoid Current

V = Applied voltage (Acceleration Voltage)

This Apparatus Consists of :

1. A Cathode Ray Tube mounted on two plastic Rings.
2. Solenoid in the interior of which Cathode Ray Tube is placed.

Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.



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3. A Power Supply which consists of :
- (a) Regulated Power Supply to operate the Cathode Ray Tube
 - (b) To provide A.C. Voltage for deflecting plates.
4. Low Voltage D.C. Supply for Solenoid with digital current meter.

Solenoid

The Solenoid is 15 cm. long and the Diameter is 5 cm.

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