



## Manual of Operation

### **IMPORTANT!**

**Read the following before using this equipment:**

\* Carefully follow all instructions and observe all precautions given in this manual.

## Purpose

This tube is designed for the experimental observation of deflection phenomena caused by electric and magnetic fields of a cathode ray. It may also be used to demonstrate the principles of a cathode ray tube (CRT).

## Construction and Principles

An electron gun consisting of a cylindrical plate, a cathode, and a heater is attached along with an electrode deflecting plate inside a CRT-type Crookes tube filled with argon gas. An electron is propelled from the cathode into the cylindrical plate. Voltage applied on the plate accelerates the speed of the electron up to a specified velocity by the time the electron is projected through the hole of the plate. The emission resulting from the collision of the electron with the argon gas contained in the tube allows its path to be clearly visible.



## Operation

1. Using the leads, connect the plate, cathode, and heater terminals of the Crookes tube to the (+), (-), and heater terminals, respectively, of Supply B of the vacuum tube power unit.
2. Darken the room and set the power switch of the vacuum tube power supply to the ON position. When a red glow is observed from the heater, slowly rotate the power source knob (vacuum tube power unit) to increase the voltage. At 100V or above, a blue beam will appear.

## Experimental Procedures

1. Experiment on beam deflection by an electric field.

\* Follow the procedures for wiring described in the "Operation" section to connect Supply C of the vacuum tube power unit with the terminal of the electrode deflecting plate.

\* Set the power switch of the vacuum tube power unit to ON. Discharge a beam with Supply B kept within the 200-300V range, then rotate Supply C to increase the voltage on the electrode deflecting plate. The deflection of the beam toward the (+) side of the electrode deflecting plate can be observed. Thus, if the upper and lower electrodes of the electrode deflecting plate are reversed, the beam will be deflected in the opposite direction.

\* Only rotating the "C" knob of the power unit will allow observation of the deflection of the beam in relation to increased voltage applied to the electrode deflection plate. Adjusting the "B" knob without changing the setting of the "C" knob will allow observation of the deflection of the beam in relation to increased plate voltage. Thus, a clearer understanding may be gained on the relation between electron velocity and the strength of an electric field. (**Note**): *A battery may also be used as the power source for the electrode deflecting plate.*

\* To experiment on beam deflection by a magnetic field. Follow the procedures given in the "Operation" section to allow observation of a beam. Deflection of the beam can be seen when a magnet is brought near to it

## Reference

Connect the external (output) terminal of an AC supply or a CR oscillator to the electrode deflecting plate. The beam will appear to widen when viewed the side while appearing as a straight line when viewed from the circular front plate of the tube. This provides a clear demonstration of the sweep-wave principle behind CRT oscilloscopes.

(**Note**): *The deflection of the beam is sensitive enough to be affected by such factors as geomagnetism.*

## Features

POWER SUPPLY:	6.3V/2A AC for heater 0-400V DC for cathode plate -100+100V/5mA DC for deflecting electrode plate
DIMENSION:	Approx. 305x95x110mm
WEIGHT:	350g



- \* Graduated scale arranged within the bulb at right angle to the electron gun assures correct reading of the orbital diameter.
- \* Graduations and numbers are engraved and painted with a fluorescent material, so that they emit light when bombarded by electrons, ensuring clear observation.

Power supply unit for vacuum and storage batteries (DC6-12V) or DC Power Supply Unit B-2635 are used as power source. Storage batteries are used with the coils. Be sure to connect correct power sources. Safety fuse is supplied.