

Instruction Manual

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Crookes Tube with Electrode Deflecting Plate IE-A Page 1
(Hot Cathode Type)

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Crookes Tube with Electrode Deflecting Plate (Hot Cathode Type)

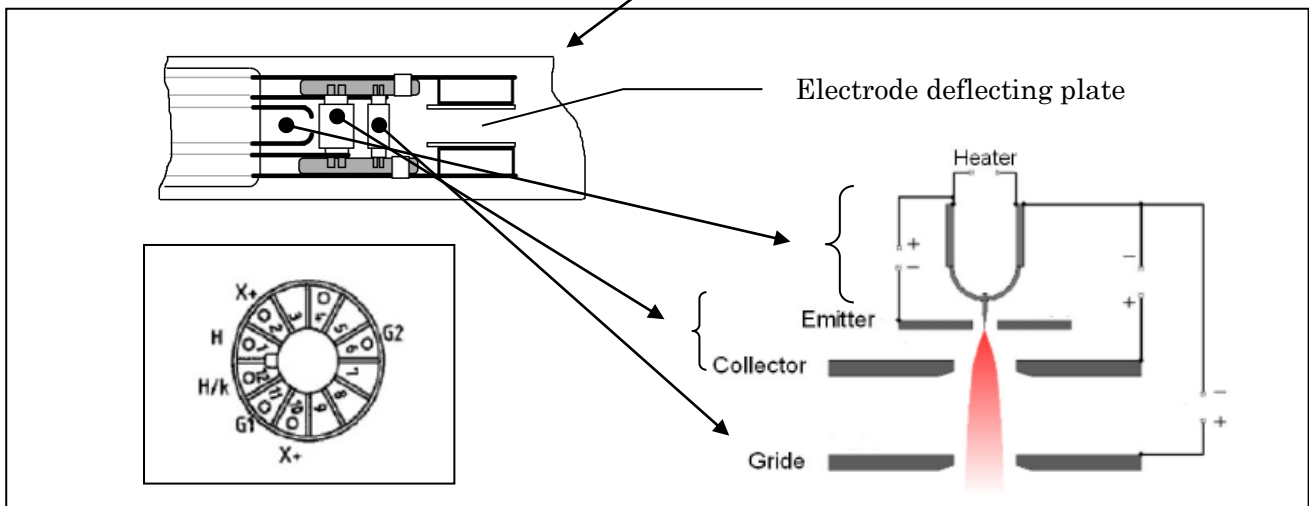
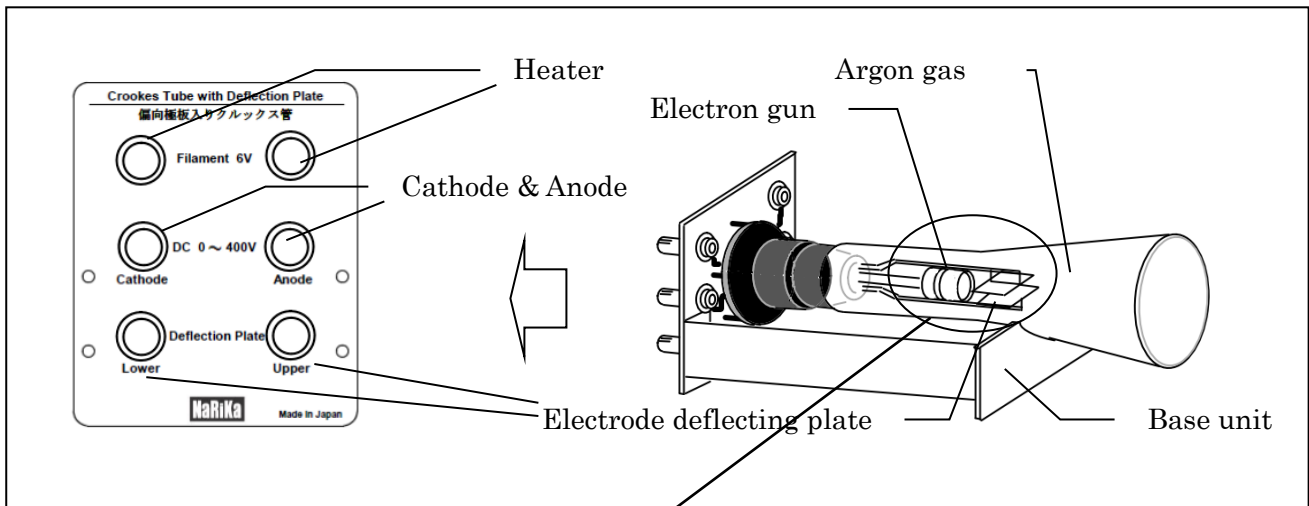
Instruction Manual

1. Purpose

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

2. Construction and Principles

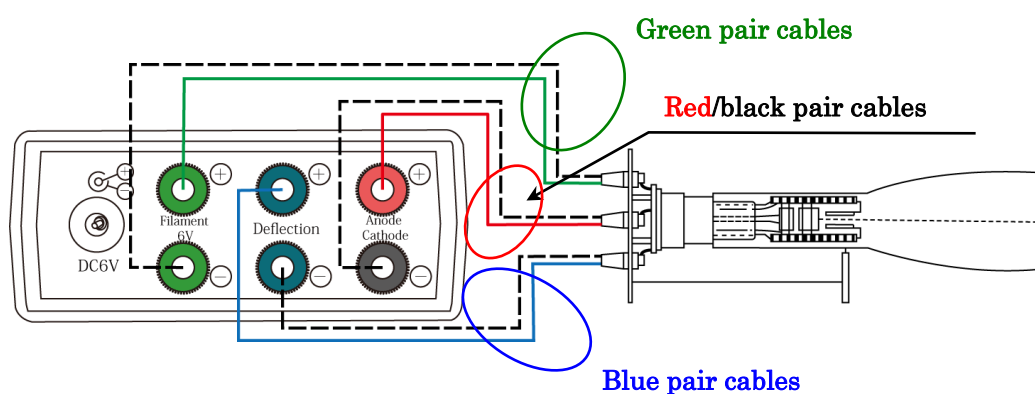
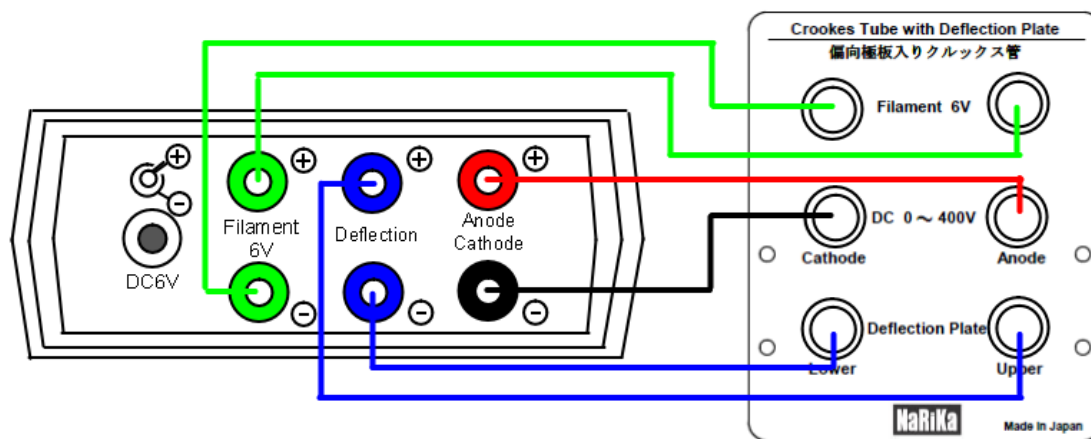
An electron gun consisting of a cylindrical plate, a cathode, and a heater is attached along with an electrode deflecting plate inside a CRT-type Crookes tube filled with argon gas. An electron is propelled from the cathode into the cylindrical plate. Voltage applied on the plate accelerates the speed of 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.



3. Operation with Crookes Tube Power Supply (B10-2483-W0)

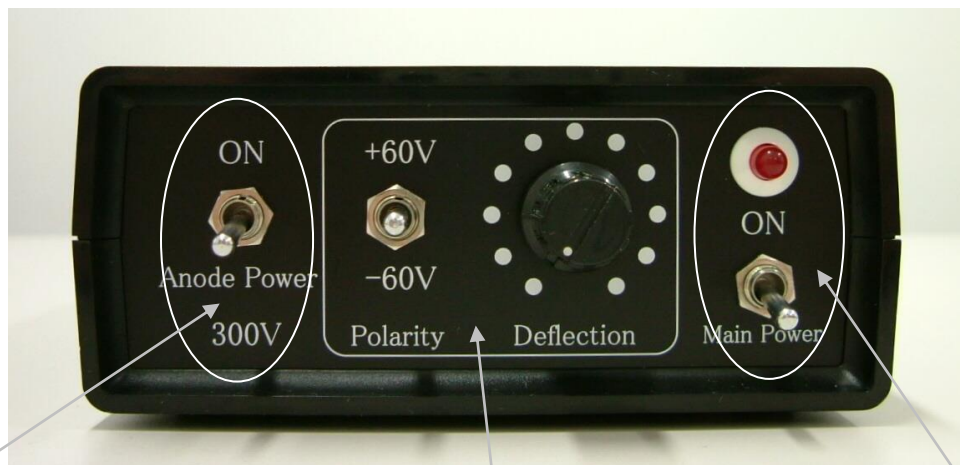
● Connection

- ◎ Connect the terminals on the black base plate attached to the Crookes tube holder marked with the green terminals on the power supply rear panel (for filament). Connect the terminals on the plate marked (Deflection Plate Upper/Lower) with blue terminals of the power supply (marked “Deflection”), and connect the Anode terminal and Cathode terminal on the plate with the red terminal (anode) and the black terminal (cathode) of the power supply, respectively. Use the following diagram as a reference.



- * No polarity applies for green cables (for filament)
- * The (+) and (-) connectors of the blue terminals (for deflection) must be connected to the deflection plate terminals of the Crookes tube socket indicated (Upper) and (Lower), respectively.

● **Front Panel of the Power Supply and Functions of Switches and a Dial**



Accelerating Voltage Switch

The switch used to apply 300 V accelerating voltage to the anode of the Crookes tube. Make sure this switch is at OFF before turning the Main Power Switch to ON.

Voltage Control applied on Deflection Plates

When this (Polarity) switch is at UP position, deflection voltage 0–60 V can be applied to the deflection plates. When this switch is at the center position, deflection plates are at neutral position disconnected from the power supply. Deflection voltage is 0 V when the Deflection dial is turned to extreme left and it gradually increases as the dial is turned to the right.

Main Power Switch

The LED pilot lamp illuminates when this switch is turned ON.

● **Operation Method**

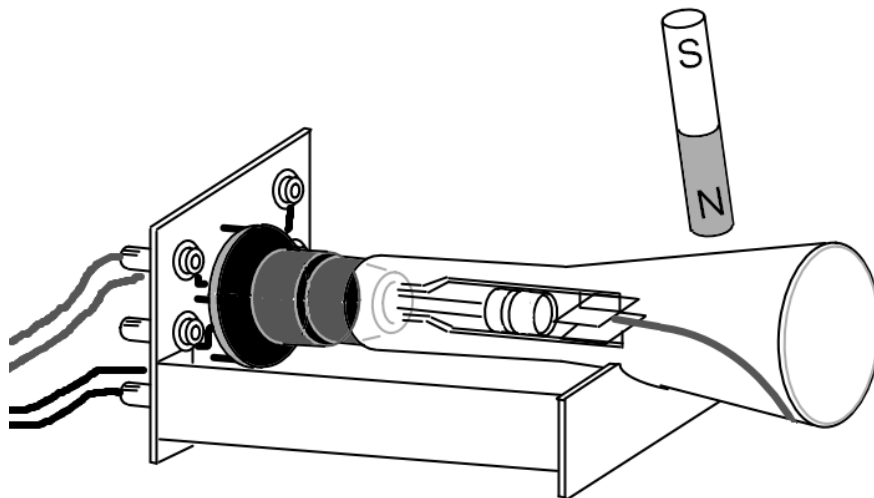
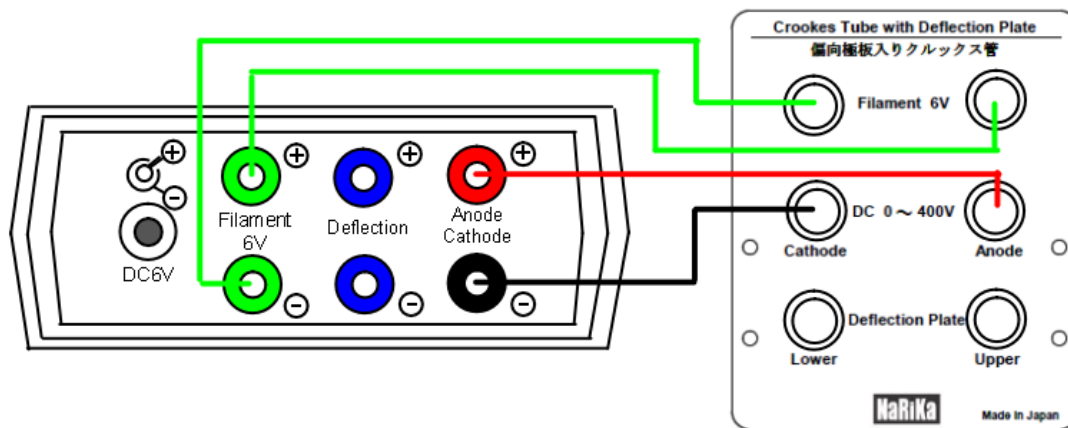
- (i) Set both the Main Power Switch and Anode Power Switch (accelerating voltage switch) to OFF, turn the Deflection Dial (deflection voltage adjusting dial) to extreme left, and set the Polarity Switch at the center, and connect the AC adapter.
- (ii) Turn the Main Power Switch to ON (the pilot lamp illuminates).
- (iii) Wait until the cathode becomes red-hot (30 seconds to 1 minute) and then turn the Anode Power Switch (acceleration voltage switch) to ON. Emission of the electron beam starts and stabilizes after a while.
- (iv) When the Crookes tube with the deflection plates is used, check the deflection of the electron beam by turning the Deflection Dial (deflection voltage adjusting dial) and orientation of the beam by switching the Polarity Switch up and down.

* In the case of a Crookes tube with the deflection plates, the end of the cathode rays projected from the cathode to the glass screen may be split into two until the cathode is adequately heated.

The cathode rays will be focused in one spot more than 3 minutes after the Main Power Switch is turned ON, so you must wait with the acceleration voltage applied even if such phenomenon is observed.

4. Experiment on beam deflection by a magnetic field

Follow the procedures given in the “3. Operation” section to allow observation of a beam. Deflection of the beam can be seen when you a magnet is brought near to it.



The curved beam by magnetic field

5. Capability of Crookes tube (with deflection plate, cross plate)

Narika Crookes tube is good enough capability to accomplish those two purposes in the demonstration, although it has some deviation of vacuum degree, tube size, intensity of beam, diameter of beam because Crookes tube is made by hands.

However, this Crookes tube is not suitable and acceptable, useful to accomplish other purposes than above mentioned purpose of beyond specification. Narika do not give you any warranty in this case.

Cat. No. B10-2483-W0

Crookes Tube Power Supply C-HC (Hot Cathode Type)

We thank you for selecting the power supply exclusively designed for the hot cathode type Crookes tube. This power supply operates with the attached 6 V, 2.5-2.8 A AC adapter. Care must be taken not to lose the adapter nor should you use other AC adapters. Because high voltage is generated, you must carefully read this Instruction Manual and must use the power supply as instructed.

Precautions in Use

(i) This power supply is powered by the separate AC adapter. You can only use the attached AC adapter of DC 6 V, 2.5-2.8A output capacity or more. We request that you always keep the AC adapter under your control so that it will not be lost.

Caution! (If an AC adapter other than the attached one is used, the adapter may be damaged.)

(ii) Do not open the enclosure of the power supply nor modify internal circuits, because it could cause a risk of electrical shock. The power supply incorporates 300 V high voltage generator circuit.

Warning! (Injury or even death may be caused due to electrical shock by a high voltage circuit.)

(iii) This power supply is a sensitive instrument. Care must be taken to avoid severe impacts, such as dropping the power supply.

Caution! (Wiring inside the power supply may become loose, and may cause a short circuit etc.)

1. Product Outline

● Power Supply Unit

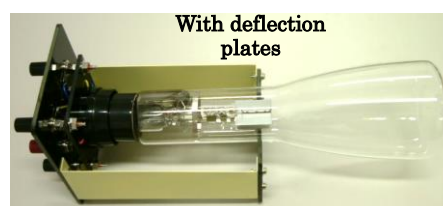
Front Panel



Rear Panel



Crookes Tube to be Used



The package includes the following items.

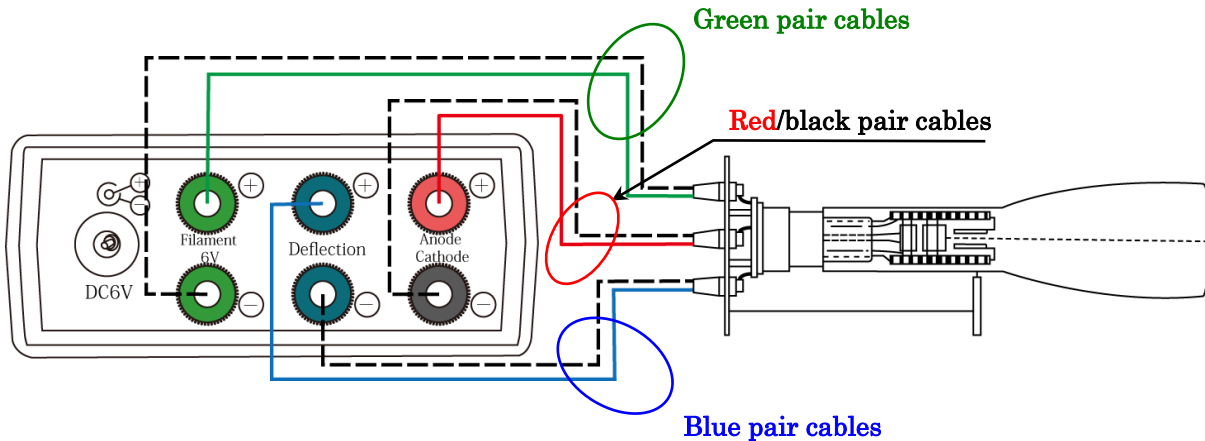
- | | |
|---|---------------|
| 1. Power Supply Unit for Crookes Tube | 1 |
| Heater Voltage: | DC 6 V |
| Anode Voltage: | DC 300 V |
| Deflection Voltage: | DC ± 60 V |
| 2. Cables with Banana Plug | |
| Green cable | 2 |
| Blue cable | 2 |
| Red cable | 1 |
| Black cable | 1 |
| 3. AC Adapter 6 V, 2.5-2.8 A (Serge Current : more than 4A) | 1 |
| 4. Instruction Manual (This booklet) | 1 |

2. Method of Use

● **Connection between the Crookes Tube and Power Supply**

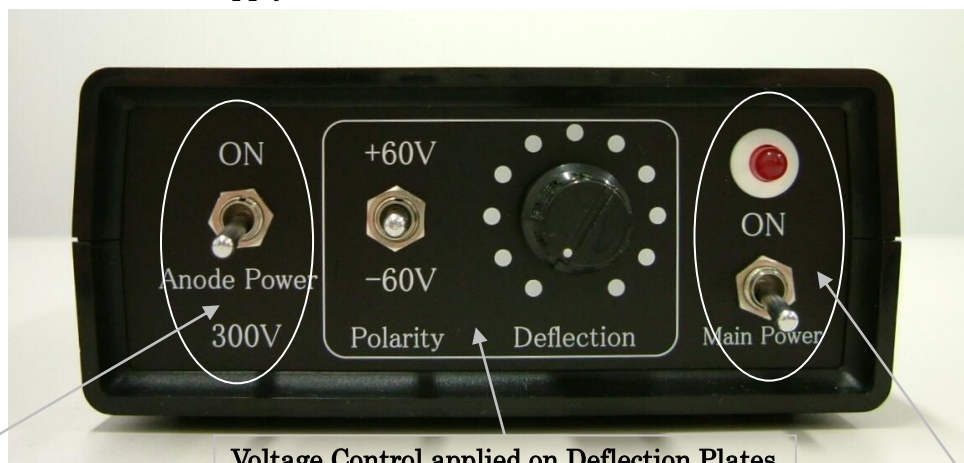
[For the tube with deflection plates]

◎ Connect the terminals on the black base plate attached to the Crookes tube holder marked Filament 6V with the green terminals on the power supply rear panel (for filament). Connect the terminals on the plate marked (Deflection Plate Upper/Lower) with blue terminals of the power supply (marked “Deflection”), and connect the Anode terminal and Cathode terminal on the plate with the red terminal (anode) and the black terminal (cathode) of the power supply, respectively. Use the following diagram as a reference.



- * No polarity applies for green cables (for filament)
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Main Power Switch
The LED pilot lamp illuminates when this switch is turned ON.

● Operation Method

- (1) Set both the Main Power Switch and Anode Power Switch (accelerating voltage switch) to OFF, turn the Deflection Dial (deflection voltage adjusting dial) to extreme left, and set the Polarity Switch at the center, and connect the AC adapter.
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