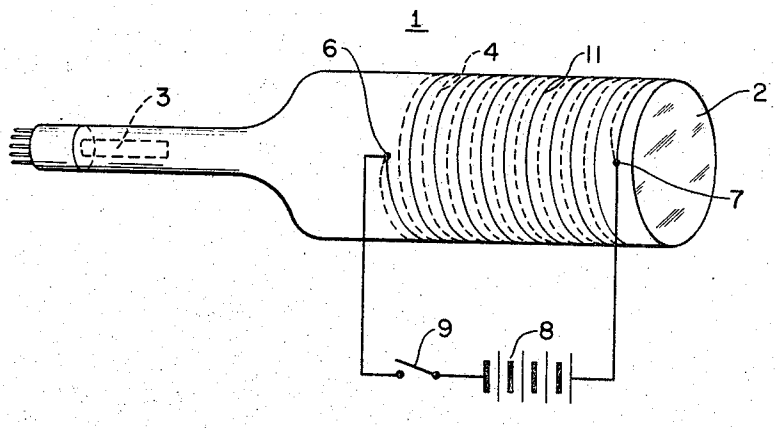
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CATHODE RAY TUBE CONTROL CIRCUITRY UTILIZING TWO ACCELERATING WINDINGS

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CATHODE RAY TUBE CONTROL CIRCUITRY UTILIZING TWO ACCELERATING WINDINGS

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ABSTRACT OF THE DISCLOSURE

A cathode ray tube having an inner helical accelerating electrode and an outer helical electrode connected in parallel therewith to a source of high voltage for establishing equal voltage gradients on the inside and outside of said tube. This arrangement of two parallel accelerating electrodes produces faster stabilization of the accelerating potential gradient when a new cathode ray tube is inserted into the system.

The present invention relates to cathode ray tube control circuitry and, more particularly, to cathode ray tube control circuitry for reducing the time required for establishing linearity in the voltage gradient of the electrostatic accelerating field set up within the tube.

A helical resistive accelerating electrode is often applied to the inside surface of a cathode ray tube for producing an electrostatic field substantially parallel with the longitudinal axis of the tube, which field accelerates and directs an electron stream within the tube. In order to have uniform acceleration of the electron stream along the longitudinal axis of the tube, the electrostatic voltage gradient should be linear; that is, the rate of change of the field voltage with respect to distance along the length of the tube should be constant. However, when a tube is first installed into a system, it sometimes takes as long as several hours for the potential gradient between helix turns to stabilize and become linear due to random charge effects upon the outside surface of the tube.

The portions of the glass envelope in between the turns of the aforementioned helical resistive electrode has a very low electrical conductivity, and, accordingly, considerable time may be required for these portions of a newly installled tube to manifest the voltage gradient which tends to be set up due to the voltages applied to the inside tube surface by the helical electrode. In other words, random charge effects on the outside tube surface tend to create electrostatic voltages which must be nullified by the voltages set up by the helical electrode. However, this process may take considerable time owing to the extremely low electrical conductivity of the glass envelope. During this stabilization period, the electron beam is moved about in an undesirable and sometimes unpredictable manner by the changing charge pattern on the external surface of the tube.

Accordingly, it is the principal object of the present invention to provide a new and improved device for making it possible to replace a cathode ray tube in a precision display data readout system and attain the desired accuracy within a few minutes thereby to sharply reduce the mean repair time of such systems.

Other objects and advantages of the invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of the invention, reference

may be had to the sole figure which discloses a preferred embodiment of the present invention.

The figure discloses a cathode ray tube **1** having a display screen **2** situated at one end of the tube and having an electron gun **3** situated at the other end of the tube. Helical accelerating electrode **4** is applied to the inside wall of the tube and is connected to terminals **6** and **7**, which in turn are connected to power supply **8** and switch **9**, as shown. As power supply **8** may produce a voltage in the order of a few thousand volts and as the helical electrode **4** is composed of resistive material, a linear electrostatic voltage gradient is eventually set up within the tube which is capable of accelerating the electron beam produced by electron gun **3** and for directing it down the longitudinal axis of the tube. As explained hereinabove, when a cathode ray tube is first installed, random charge effects occur on the outside wall of the tube which prevent the establishment of the linear electrostatic voltage gradient.

In the preferred embodiment of the present invention, helical resistive electrode **11** is evaporated or otherwise mounted on the outside surface of the tube in non-overlapping relationship with accelerating electrode **4**, as shown, and is connected to terminals **6** and **7**. As a result, an electrostatic voltage gradient is set up on the outside surface of the tube which is substantially identical with the voltage gradient which tends to be set up by helical electrode **4** on the inside of the tube. Accordingly, the aforesaid random charge effects are quickly nullified and the stabilization period is cut down from several hours to merely a few minutes.

It should be understood that helical is used herein in in the broad sense, that is, for describing a three-dimensional curve with one or more turns about an axis. The turns need not have a constant slope and the diameters of the turns may vary in an irregular manner.

While there has been shown and described a specific embodiment of the invention, other modifications will readily occur to those skilled in the art. It is not, therefore, desired that this invention be limited to the specific arrangement shown and described, and it is intended in the appended claims to cover all modifications within the spirit and scope of the invention.

What is claimed is:

1. In a cathode ray tube having a longitudinal axis, a helical resistive accelerating electrode mounted within said tube for providing an electrostatic field generally oriented along the length of said tube, a DC voltage source having a first and second terminal, means for coupling said first terminal to one end of said helical resistive accelerating electrode, means for coupling said second terminal to the other end of said helical resistive accelerating electrode so that a potential gradient is set up inside of said tube substantially parallel with the longitudinal axis of said tube, a resistive stabilizing electrode adjacent with the outside surface of said tube for establishing a voltage gradient on the outside surface of said tube substantially equal to the voltage gradient set up on the inside of said tube by said helical resistive accelerating electrode, and means for applying substantially the same potential across said stabilizing electrode as is applied across said accelerating electrode by said DC voltage source.

2. In a cathode ray tube having a longitudinal axis, a helical resistive accelerating electrode mounted within said tube for providing an electrostatic field generally oriented along the length of said tube, a DC voltage source having a first and second terminal, means for coupling said first terminal to one end of said helical resistive accelerating electrode, means for coupling said second terminal to the other end of said helical resistive accelerating electrode so that a potential gradient is set up inside of said tube substantially parallel with the longitudinal axis of said

tube, a helical resistive stabilizing electrode adjacent with the outside surface of said tube for establishing a voltage gradient on the outside surface of said tube substantially equal to the voltage gradient set up on the inside of said tube by said helical resistive accelerating electrode, and means for applying substantially the same potential across said stabilizing electrode as is applied across said accelerating electrode by said DC voltage source.

3. In a cathode ray tube having a longitudinal axis, a helical resistive accelerating electrode mounted within said tube for providing an electrostatic field generally oriented along the length of said tube, a DC voltage source having a first and second terminal, means for coupling said first terminal to one end of said helical resistive accelerating electrode, means for coupling said second terminal to the other end of said helical resistive accelerating electrode so that a potential gradient is set up inside of said tube substantially parallel with the longitudinal axis of said tube, a helical resistive stabilizing electrode adjacent with the outside surface of said tube for establishing a voltage gradient on the outside surface of said tube substantially equal to the voltage gradient set up on the inside of said tube by said helical resistive accelerating electrode, said helical resistive stabilizing electrode being in non-overlapping relationship with the helical accelerating electrode, and means for applying substantially the same potential across said stabilizing electrode as is applied across said accelerating electrode by said DC voltage source.

4. In a cathode ray tube having an envelope and means for generating and projecting an electron beam along an axis of said envelope, a resistive accelerating electrode wound on the inside of said envelope along at least a portion thereof with at least one turn about said axis, and a resistive stabilizing electrode wound on the outside of said envelope with at least one turn about said axis coordinate with said accelerating electrode over the same portion of said envelope, said accelerating electrode and said stabilizing electrode being connected in parallel for establishing respectively identical voltage gradients at the inside and outside of said envelope.

5. The combination defined in claim 4, wherein said resistive stabilizing electrode is in non-overlapping relationship with said resistive accelerating electrode.

6. In a cathode ray tube having means for generating and projecting an electron beam along an axis thereof, a resistive accelerating electrode wound with at least one turn about said axis within said tube, and a resistive stabilizing electrode wound with at least one turn about said axis outside said tube coordinate with said accelerating electrode and radially disposed with respect thereto, said accelerating electrode and said stabilizing electrode being connected in parallel for establishing respectively identical voltage gradients inside and outside of said tube.

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