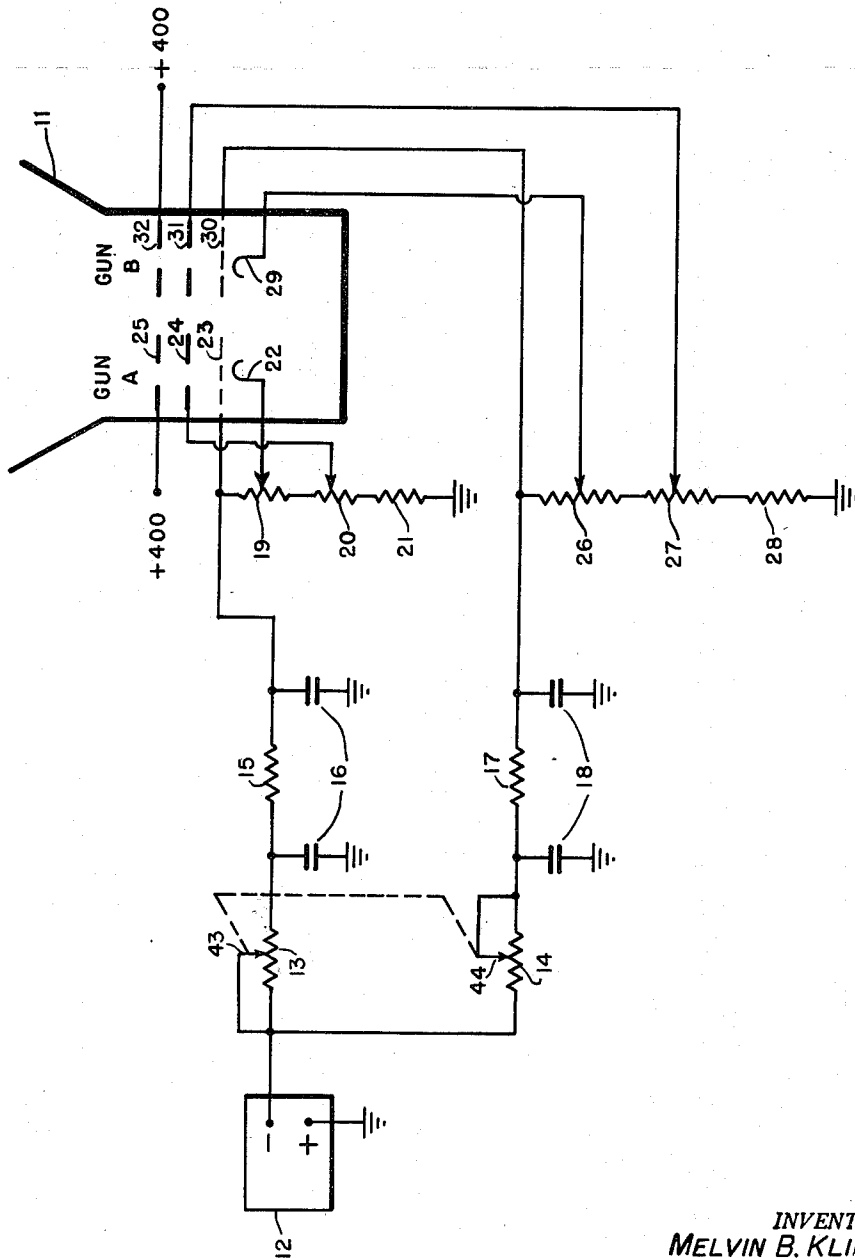


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CATHODE-RAY TUBE DEFLECTION SENSITIVITY
CORRECTION CIRCUIT
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CATHODE-RAY TUBE DEFLECTION SENSITIVITY CORRECTION CIRCUIT

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This invention relates to cathode ray tube circuits and to means for adjusting the electron beam deflection sensitivity, particularly of a multiple gun cathode ray tube.

In using a multiple gun cathode ray tube it is often desirable to superimpose two or more phenomena on the screen so that they may be compared. It is also desirable to operate a multiplicity of beams from the same source of time-base voltage in order that comparisons may be made between the input and output of amplifiers as to phase shift and distortion, for instance. In order to accomplish this it is necessary that the deflection sensitivities of the guns be identical.

Since the deflection sensitivity of a cathode ray gun is a function of the mechanical structure of the gun as well as a function of the voltages impressed thereon, it requires extremely close manufacturing tolerances to achieve the same sensitivities in two or more structures operating at the same voltage. It is both costly and time consuming to meet such tolerances.

Accordingly, it is an object of this invention to provide means for electrically adjusting the deflection sensitivity of each of a multiple of electron guns, thus allowing greater mechanical tolerances in the fabrication of multiple gun tubes.

It is a further object of this invention to provide means whereby the deflection sensitivity of a single gun cathode ray tube may be adjusted electrically as desired within limits.

The invention may be understood from the description in connection with the drawing wherein there is shown a circuit diagram of connections used in a preferred embodiment of the invention.

Referring to the drawing, a two-gun cathode ray tube 11, in which the deflection sensitivities are to be made equal, is connected to a source 12 of negative potential for operation of both cathode ray tube guns, bleeders and beam control circuits in the manner well understood by those skilled in the art.

A variable resistor 13 is connected from the source 12, through a filter formed by resistor 15 and capacitors 16 and across suitable bleeder resistors 19, 20 and 21, to the grid 23 of one of the electron guns A of the tube 11. The bleeder resistors furnish operating potentials for the cathode 22, grid 23 and first or accelerating anode 24 of a first electron gun A. The second anode 25 is connected to a fixed positive voltage source. Signals from a suitable source may also be connected to either the grid 23 or cathode 22 to cause the beam to be increased or decreased in intensity as desired.

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In a similar fashion, a second variable resistor 14 is connected from the source 12 through a filter formed by a resistor 17 and capacitors 18 and across another set of bleeder resistors 26, 27 and 28 to the electrodes 29, 30 and 31 constituting the second electron gun B. As before the second anode 32 of gun B may be connected to a fixed positive voltage source.

The sliding contacts on the resistors 13 and 14 may be ganged mechanically to operate together and in such a manner that as the resistance of one is increased to lower the accelerating voltage of one beam, the resistance of the other is decreased to raise the accelerating voltage of the other beam. For instance, as may be seen by referring to the drawing, the tap 43 on the first variable resistor 13 may be connected to the input side of the resistor. The tap 44 on the second variable resistor 14 may be connected to the other side. Thus although the two variable taps may move physically in the same relative direction, electrically one resistance will be increased while the other is decreased. Likewise, it will be apparent that the taps may be connected to the same relative or respective sides of the resistors and be moved physically in opposite directions to produce the same electrical result.

The first anode 24 of the first electron gun A is connected to a variable tap at one of the bleeder resistors 20. Likewise the first anode 31 of the second electron gun B is connected to a variable tap at one of the bleeder resistors 27 in the second group. It will be noted that the ground side of these bleeder resistors in the positive side of the voltage applied to the electrodes of the tubes. These variable resistors 20 and 27 form the focussing control for their respective electron guns. The variation of the input resistors 13 and 14 controls the sensitivity of the two electron guns. Since the deflection sensitivity is dependent on the potential difference between the second anode and the cathode, the small change in voltage produced by this arrangement will enable the deflection sensitivities of the two electron beams to be made equal.

As will be apparent to those skilled in the art, the invention which has been described in a preferred form may be used to adjust the sensitivity of a plurality of guns in a single envelope or in separate envelopes. Other modifications may be apparent without departing from the scope of the invention.

What is claimed is:

1. Apparatus for adjusting the deflection sensitivity of cathode ray tube electron beams com-

prising a cathode ray tube having a plurality of electron gun structures for generating a plurality of electron beams, a plurality of variable resistors connecting respectively the electrodes of each said gun structure to a source of voltage, and connected to be varied in respective inverse relationship to vary inversely the voltage applied to the electrodes of one of said guns with respect to the voltage applied to another of said guns.

2. Cathode ray tube apparatus comprising a cathode ray tube having a plurality of electron guns, a plurality of leads connecting each said gun to a source of voltage, a plurality of resistance circuits connected respectively to each said lead for varying the operating potentials to the electrodes of each said gun, and a variable resistance in each said lead for varying the voltage applied to said electrodes, said variable resistances being connected to be varied in respective inverse electrical relationship to increase the voltage applied to one of said guns and simultaneously decrease the voltage applied to another of said guns.

3. A device for adjusting the deflection sensitivities of the electron beams of a multiple gun cathode ray tube comprising a pair of variable resistors ganged to operate so that as the resistance of one increases, the resistance of the other decreases, said variable resistors being connected in series with the voltage supplied to the electrodes of said guns whereby the deflection sensitivities of said guns may be made equal.

4. Cathode ray tube apparatus for adjusting the deflection sensitivities of the electron beam thereof comprising a cathode ray tube having two electron guns, each of said guns having a plurality of electrodes, two variable resistors connected to a source of voltage and respectively to the electrodes of each of said guns, said resistors

being connected to be varied respectively inversely to increase the voltage applied to one of said guns while decreasing the voltage applied to the other of said guns.

5. Cathode ray tube apparatus for adjusting the deflection sensitivities of electron beams thereof comprising a cathode ray tube having two electron guns each gun having a plurality of electrodes including a first anode, two bleeder resistance circuits for applying operating potentials respectively to the electrodes of each said gun, a source of voltage, two leads connected to said source and respectively to the electrodes of each of said guns for applying voltages thereto, said leads being connected respectively across said bleeder resistance, and two variable resistors one in each said lead, said variable resistors being mechanically ganged to operate in inverse electrical relationship to apply an increasing voltage to electrodes of one of said guns while applying a decreasing voltage to electrodes of the other of said guns thereby equalizing deflecting sensitivities thereof.

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