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MEANS AND METHOD FOR PROTECTING KINESCOPE SCREENS

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Fig. 1

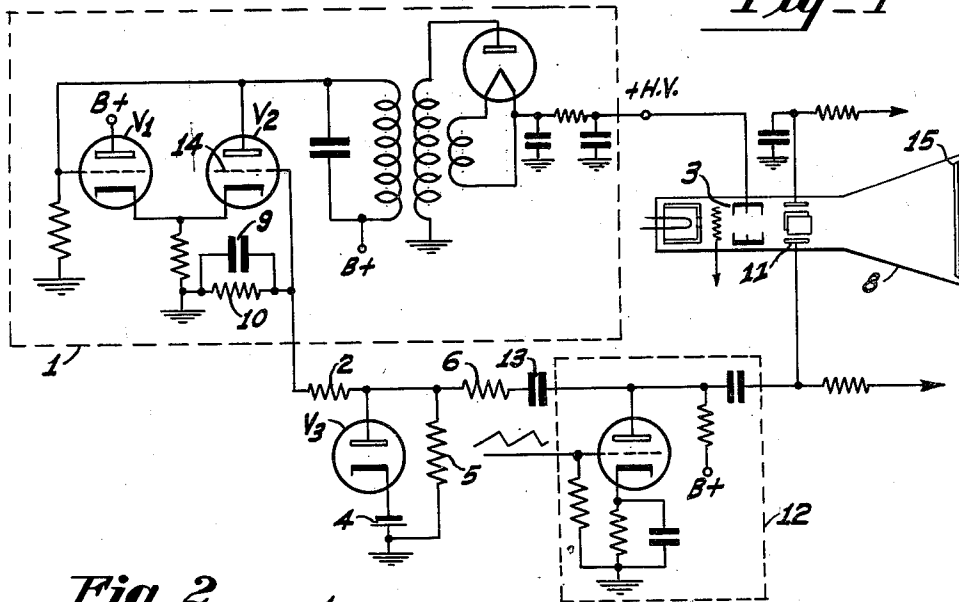
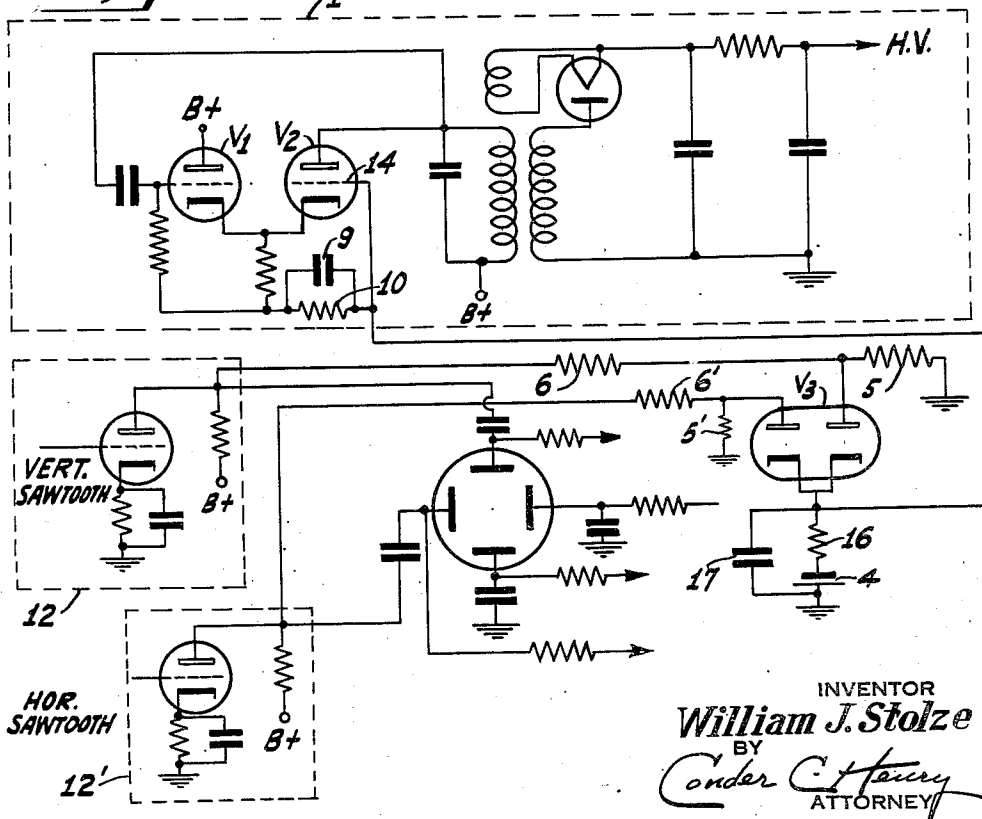


Fig. 2



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MEANS AND METHOD FOR PROTECTING
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My present invention relates to power supply circuits for kinescopes and more particularly it relates to means and method for protecting the fluorescent screen of a kinescope using an R. F. power supply when the deflecting voltage fails.

Circuits in the prior art have been devised to keep the screen of a cathode ray tube from burning when the ray deflection voltage fails, however these circuits have failed to provide a quick acting system which will completely protect a screen viewing a fast sweep at high intensity levels.

Accordingly, it is an object of my invention to provide a novel means and method for protecting the fluorescent surface of a cathode ray tube.

Another object of my invention is to provide a quick acting means for removing high voltages from a kinescope upon failure of a deflecting or other input voltage.

It is a tertiary object of my invention to provide means to prevent applying high voltages to a kinescope until a predetermined condition is attained.

Means therefore is contemplated by this invention whereby a deflection voltage or other predetermined signal condition is utilized to remove bias voltage from the high voltage R. F. power supply connected to a kinescope.

My invention both as to its organization and its method of operation, together with further objects and advantages, may best be understood by reference to the following description taken in connection with the accompanying drawings in which preferred embodiments of my invention are set out and in which like reference characters designate similar elements:

Fig. 1 is a schematic diagram of a specific embodiment of my invention utilizing a single signal condition to protect the kinescope screen, and

Fig. 2 represents a circuit which may use more than one signal condition to bias off an R. F. power supply.

Referring more particularly to Fig. 1, a radio frequency power supply 1, having oscillator tubes V_1 and V_2 , and a bias circuit comprising a capacitor 9 and a shunted resistor 10 provides high voltage output to the accelerating anode 3 of a kinescope 8.

A deflection circuit 12 is connected to a deflecting electrode 11 of the kinescope 8, and also is connected through a capacitor 13 and resistor 6, to the anode of a diode rectifier V_3 , which has a battery 4 connected between its cathode and ground, and a resistor 5 connected in shunt across the diode and the battery. A resistor 2 is connected between the diode anode and the junction

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tion of the grid 14, of the oscillator tube V_2 , and the bias resistor 10.

In operation the diode V_3 normally conducts providing a D. C. voltage -E at the grid 14 of the oscillator tube V_2 . This D. C. voltage -E is developed across resistor 5 by the conducting current of the diode caused by the battery 4, but the isolating resistor 2 is large enough to effectively stop current flow from the battery through the bias resistor 10. The voltage -E is chosen large enough to block the oscillator circuit and thereby prevent any high voltage output from the R. F. power supply 1. In doing this the accelerating voltage is kept from the kinescope and the cathode ray will not strike the fluorescent screen 15 until the bias voltage -E is overcome thus allowing the oscillator to function.

When a deflection voltage is provided to the kinescope by the deflection circuit 12, a portion of this voltage is applied to the diode anode through the capacitor 13 and resistor 6. When using a sawtooth input voltage the R. C. time constant of the capacitor 13 and resistor 6 should be large with respect to the flyback time of the sawtooth voltage. Then when a negative output is taken from the sweep circuit 12, the capacitor will be charged negatively. Such a charge will apply a negative voltage to the anode of the diode V_3 , interrupting the normal current flow through the diode V_3 , and effectively reducing the voltage applied at the grid 14, of the oscillator tube V_2 , so that normal oscillations will take place and an accelerating voltage will be provided for the kinescope 8. The ratio of resistors 6:5 will determine the amount of deflection voltage at the diode anode and therefore will determine the amount of bias reduction. This resistance ratio is preferably adjusted so that the initial bias -E is just cancelled when the deflection pulses are generated. Filter capacitor 9 should be large enough to eliminate any A. C. component of the pulsing D. C. across resistor 5, resulting when a deflection voltage is applied. In this manner the D. C. bias across the resistor 10 is cancelled and the oscillator is allowed to function. Accordingly a high voltage output from the power supply is provided to the accelerating anode of the kinescope only when a deflection voltage is provided.

It is clear from the foregoing description that an impinging cathode ray cannot strike the kinescope screen until deflection voltage is present, and that there is therefore no danger of the screen burning because of a stationary spot of high intensity such as is present when no deflec-

tion voltage is generated. Some additional advantages of the system are that upon initial use of a kinescope the ray is not generated until a deflection voltage appears, and upon failure of deflection voltage the ray is quickly quenched by wholly electronic means.

In Fig. 2 the system is provided with two deflection generators, 12 and 12', and output from each of which is connected to the respective anodes of a duo-diode V₃; and through respective resistors 5 and 5'; to ground. The cathodes are commonly connected through a series resistor 16 and battery 4 to ground and a capacitor 17 is shunted around them. A connection is made directly from the cathodes of the duo-diode to the junction of the oscillator grid 14 and the bias circuit 9-10.

This circuit operates identically with that previously described except that bias voltage is taken directly from the common cathode resistor of the diode. Thus the battery voltage 4 and the space discharge resistors 16, 5 and 5' may be proportioned such that either one or both of the deflection sources must be operating before the high voltage oscillator is turned on.

It is to be understood that while my preferred embodiments show specific apparatus the scope of the invention is not to be limited to the particular oscillator used nor to the particular type of signal input voltage, and that other modifications may be made by those skilled in the art without departing from the spirit of my invention. Having thus completely described, and set forth the manner of operation of my invention, I wish to secure by Letters Patent and claim:

1. A kinescope screen protection circuit comprising in combination, a kinescope, deflection voltage for said kinescope, a radio frequency power supply including an oscillator providing accelerating voltage to said kinescope, a cutoff bias voltage connected to the oscillator in said power supply, and a circuit reducing said bias upon generation of said deflection voltage enabling said oscillator and producing an output voltage from said radio frequency power supply.

2. A circuit comprising in combination, a kinescope having a fluorescent screen, a radio frequency power supply having an oscillator, means including said radio frequency power supply directing a ray at said screen, a deflecting circuit for said kinescope deflecting said ray, a cutoff bias voltage for the oscillator in said radio frequency power supply, and means for applying the said deflecting voltage to said bias circuit in such polarity that said bias voltage is reduced in an amount sufficient to provide normal output from said power supply.

3. A circuit comprising in combination; a radio frequency power supply including an oscillator having a control electrode provided with a bypassed bias resistor connected to said electrode so as to provide a bias therefor; a bias circuit comprising a translating device having two electrodes a direct current potential in series with said device, an alternating current signal applied in series with said translating device and said direct current potential, a resistance shunting said translating device and said direct current potential, and a direct current connection between said resistance and said electrode.

4. A circuit according to claim 3 wherein said direct current potential is of such polarity that said translating device normally conducts.

5. A circuit according to claim 4 wherein the

voltage across said resistance is of enough amplitude to bias said oscillator to cutoff.

6. An electronic circuit comprising, in combination, an alternating current signal voltage, a rectifier providing a direct current output voltage from said signal voltage, a radio frequency oscillator, said oscillator being provided with a bias voltage of such magnitude that the oscillator is substantially cutoff and circuit connections adding said direct current voltage to said bias voltage in such a direction that said cutoff is removed.

7. A method of protecting kinescope screens in systems having accelerating voltage taken from a radio frequency power supply, comprising the steps of establishing a bias voltage for said power supply of cutoff magnitude, deriving a direct current voltage from a predetermined signal source, and applying said direct current to said bias in polarity opposing cutoff.

8. Apparatus for protecting kinescope screens comprising in combination, a kinescope having a plurality of deflection electrodes and an accelerating anode, a radio frequency power supply connected to said accelerating anode and, said power supply including an oscillator having a control electrode and a by-passed bias resistor connected to said control electrode so as to provide a bias therefor, a horizontal and a vertical sweep circuit connected to said deflection plates, a signal voltage taken from said horizontal sweep circuit, a signal voltage taken from said vertical sweep circuit, a pair of rectifying devices having a common cathode resistor, a battery connected in said cathode circuit in such polarity that said rectifiers normally conduct, a bypass capacitor shunting said resistor and said battery, an output circuit from said resistor to said electrode, anode circuits completing the discharge paths of said rectifiers, and circuits supplying said signal voltages to said anode circuits in such polarity that normal conduction of said rectifiers is decreased.

9. A circuit according to claim 8 wherein said battery has a voltage of such magnitude that cutoff voltage to said bias resistor will be provided until one of said signal voltages is applied.

10. A circuit according to claim 8 wherein said battery has a voltage of such magnitude that cutoff voltage to said bias resistor will be provided until both of said signal voltages is applied.

11. Apparatus for protecting a kinescope comprising in combination, a radio frequency power supply having an oscillator normally biased to cut off, a predetermined A. C. signal condition, a diode rectifier providing a D. C. voltage from said condition and a circuit applying said D. C. to said oscillator in opposite polarity to its bias voltage.

12. A combination according to claim 11 wherein a plurality of signal conditions provide said D. C. voltage.

13. Apparatus for use in conjunction with radio frequency power supplies comprising in combination an oscillator in the power supply, said oscillator having a control electrode, a bypassed bias resistor connected to said control electrode so as to provide a bias therefor, an A. C. signal voltage source, a normally conducting diode with a bypassed cathode resistor, connections from said cathode resistor providing cutoff bias to said oscillator bias resistor, and connections providing said A. C. signal voltage to said diode so that rectification thereof will decrease said bias.

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14. Apparatus for use in conjunction with radio frequency power supplies comprising in combination an oscillator power supply, said oscillator having a control electrode, a by-passed bias resistor connected to said control electrode so as to provide a bias therefor; a sawtooth signal voltage, a normally conducting diode having an output impedance, connections from said output impedance providing cutoff bias to said bias resistor, a resistor capacitor combination having a long time constant compared with the flyback time of said sawtooth voltage and being connected to said signal voltage, and connections between said combination to said diode in such polarity that conduction is decreased.

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