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CONTROL VOLTAGE LIMITER FOR CATHODE RAY TUBE RECEIVERS

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Fig. 1.

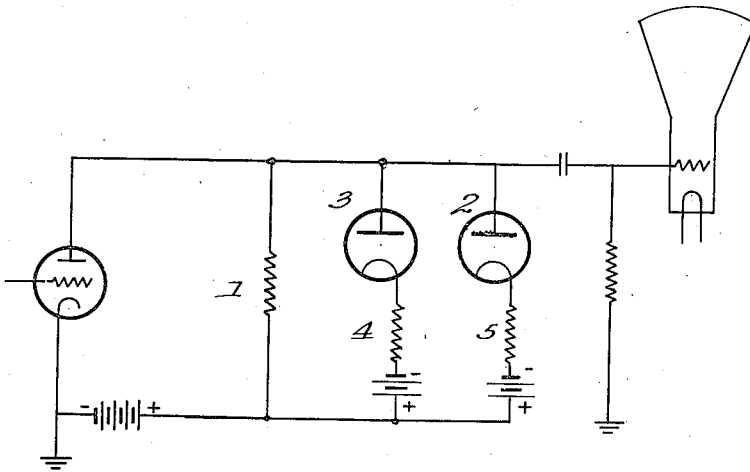
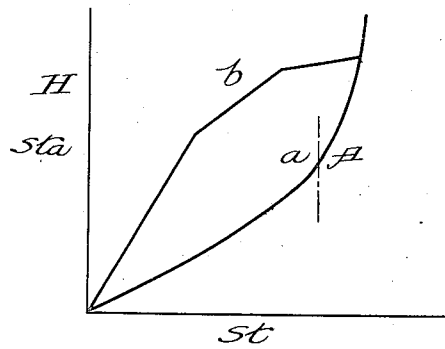


Fig. 2.

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CONTROL VOLTAGE LIMITER FOR CATHODE
RAY TUBE RECEIVERS

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5 Claims. (Cl. 178—7.5)

When very bright images, for instance for projection purposes, are produced by television receivers with cathode ray tubes, the difficulty arises that the light spot radiates very strongly and greatly enlarges its size if the beam current is increased beyond a certain value. The result is that the images are completely blurred in the bright spots. This is especially annoying in interlaced images, that is, transmissions in which the image is divided into two or more partial images. In this case, one partial image will not have exactly the same brilliancy as the other, and if one partial image already shows strong radiation at the bright spots, the other image will, at the same spots, still be below the limit of strong light radiation. In this case a particularly annoying flickering appears.

If the characteristic of such a cathode ray tube is measured, and shows the light intensity H as a function of the control voltage St , a curve of the type indicated by a in Fig. 1 is obtained. Curve a first rises gradually and then very rapidly, that is, a slight increase of the control voltage beyond a certain value of the curve produces a sudden increase of the maximum light intensity. This peculiarity of the characteristic led to the operation in the first region of the characteristic, so that even maximum amplitudes of picture signal still lie below the point A in order to prevent too strong a radiation of the bright spots. The contrast of the image is thereby also reduced to a comparatively small range of light intensity. In order to obtain a characteristic which is approximately linear, a circuit according to the invention is used by which the limitation of the control voltage to values is obtained, which values remain below the point at which excess radiation occurs. The final result is that an exactly or at least approximately linear light intensity characteristic is obtained.

In order to accomplish this, it is possible, for instance, to operate the last amplifier stage in the range of the lower knee, and in this manner to suppress all values of the control voltage exceeding a value determined by the properties of the cathode ray tube. Accordingly, the straightening out of the characteristic is dependent upon the tube characteristic of the final stage and is variable only within small limits by suitable choice of the operating point. Furthermore, the adjustment is very critical because the variation of the operating point simultaneously influences several properties of the receiver so that, for in-

stance, the synchronization must be readjusted and similar rearrangements made.

An arrangement which allows a change and any desired adjustment of the characteristic without making further adjustments of the receiver, consists in the application of a circuit which switches one or several resistors in parallel with the control-grid resistor if the control voltage exceeds a certain predetermined value. Such a circuit may contain, for instance, one or several diode tubes, as shown in Fig. 2. Parallel to the plate resistor 1 of a video amplifier are two diode tubes 2 and 3 , which are held at different bias and each of which is connected in series with resistors 4 and 5 , respectively. As soon as the voltage produced across the resistor 1 is less than the rectifier bias, an additional current flows through the diode tubes, the magnitude of which is substantially determined by the resistors 4 and 5 . Thus, an additional load is put on to the preceding amplifier stage so that the voltage at the upper end of resistor 1 increases more slowly because of the parallel connection of the resistors 4 and 5 , if the picture signal voltage exceeds a certain value. The characteristic of such a circuit, which shows the output voltage Sta as a function of the input voltage St , is shown by the curve b of Fig. 1. This characteristic has two knees which correspond to the bias values of the diode tubes. The slope of the curve is predetermined by the value of the resistors 4 and 5 .

The bias voltages and the resistors are adjusted to such values, according to the invention, that the voltage at the Wehnelt cylinder of the cathode ray tube does not exceed the value at which excess radiation occurs, even for the greatest input voltage. The device is adjusted for good gradation for the dark spots of the image, and by changing the bias and the resistance in the diode circuits the characteristic is influenced in such a manner that it possesses the characteristic b . With such an adjustment, the light intensity becomes a substantially linear function of the input voltage.

The circuit can also be made to operate with only one diode tube, or with other circuit components operating in a corresponding manner.

Having thus described our invention, we claim:

1. A signal translating system for a cathode ray image receiver wherein the luminescence effect of the cathode ray on a screen is a non-linear function of the signal potentials impressed on a control electrode of said receiver, comprising an amplifier having an output circuit in-

cluding a resistor from which signals are derived for application to a control electrode of said cathode ray image receiver, and a circuit shunting said resistor including a rectifier and resistor in series, said rectifier being biased in opposition to signal potentials developed across said first-mentioned resistor and at a value rendering said diode non-conductive up to a predetermined value of signal potential developed across said first-mentioned resistor, to compensate for the non-linear luminescence characteristic of said cathode ray image receiver.

2. A signal translating system for a cathode ray image receiver wherein the luminescence effect of the cathode ray on a screen is a non-linear function of the signal potentials impressed on a control electrode of said receiver, comprising an amplifier having an output circuit including a resistor from which signals are derived for application to a control electrode of said cathode ray image receiver, and a diode rectifier and resistor in series and shunting said first-mentioned resistor, said diode being biased negatively to a value rendering said diode incapable of passing current until the signal voltage across said first-mentioned resistor reaches a predetermined value, whereby said diode will become conductive at and above said predetermined value of signal to reduce the effectiveness of said first-mentioned resistor.

3. A signal translating system for a cathode ray image receiver wherein the intensity of the cathode ray is a function of the potential applied to a control electrode of said receiver, compris-

ing means for deriving across a resistor in an amplifier output circuit signals for application to said control electrode, and means connected in circuit with said resistor and responsive to said signals for automatically changing the effective value of said resistor inversely in accordance with the amplitude of said signals.

4. A signal translating system for a cathode ray image receiver wherein the intensity of the cathode ray is a function of the potential applied to a control electrode of said receiver, comprising means for deriving across a resistor in an amplifier output circuit signals for application to said control electrode, and means connected in circuit with said resistor and responsive to said signals for automatically changing the effective value of said resistor in steps inversely in accordance with the amplitude of said signals.

5. A signal translating system for a cathode ray image receiver wherein the intensity of the cathode ray is a function of the potential applied to a control electrode of said receiver, comprising means for deriving across a resistor in an amplifier output circuit signals for application to said control electrode, and means comprising a plurality of networks, each including a series-connected diode rectifier, a source of potential and a resistor, in shunt with said first-mentioned resistor for automatically changing the effective value of said first-mentioned resistor inversely in accordance with the amplitude of said signals.

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