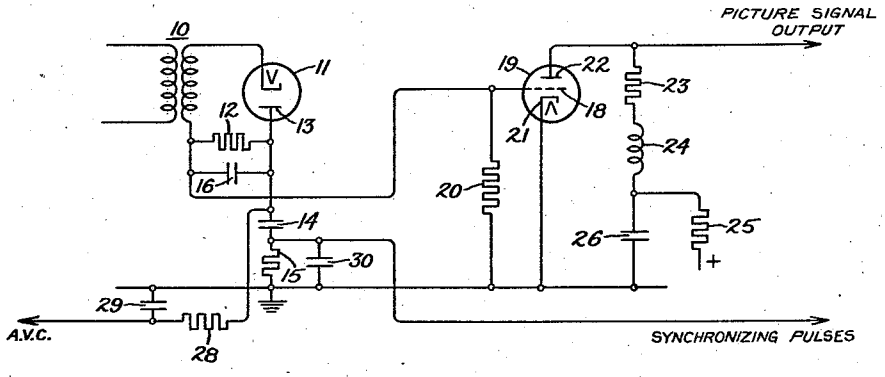
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TELEVISION SIGNAL TRANSLATING CIRCUIT

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Inventor:
Robert B. Dome,
by Harry E. Dunham
His Attorney.

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TELEVISION SIGNAL TRANSLATING CIRCUIT

Robert B. Dome, Bridgeport, Conn., assignor to General Electric Company, a corporation of New York

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5 Claims. (Cl. 178—7.5)

My invention relates to translating circuits for television receivers and the like and particularly to circuits for detecting and amplifying television signals.

It is an object of my invention to provide a translating circuit for television signals including an improved arrangement for providing automatic gain control with a minimum number of circuit components.

It is another object of my invention to provide a translating circuit for television signals including an improved arrangement for securing automatic gain control and separation of synchronizing pulses.

The features of my invention which I believe to be novel are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing, the single figure of which represents diagrammatically one form of signal translating circuit embodying my invention.

Briefly, the circuit illustrated in the accompanying drawing comprises a rectifier having a load resistance across which the television signal is reproduced in a positive sense and an electron discharge device for amplifying the signal. A grid resistor for the electron discharge device is connected in series with the load resistor of the rectifier. The voltages across the two resistors are added to provide a voltage suitable for automatic gain control, the voltage across the load resistor being proportional to the instantaneous strength of the signal, that is, proportional to the instantaneous energy transmitted, and that across the grid resistor being a unidirectional voltage produced by grid rectification and proportional to the excess of intensity of the synchronizing pulses over the instantaneous intensity of the signal. A third resistor connected in series between the grid resistor and the load resistor may be employed for obtaining separation of synchronizing pulses.

Referring now to the drawing, a radio frequency signal modulated by a television signal comprising picture signals and periodically recurring synchronizing impulses is supplied from a suitable source and impressed on the primary of a transformer 10 and the secondary circuit of which is connected to a diode or two-electrode electron discharge device 11 in series with a load resistor 12, the resistor 12 being connected between the plate of the device 11 indicated at 13 and one side of the secondary transformer 10. The plate is connected to ground through a condenser 14 and a resistor 15, the functions of which will be described below. The source of the signals impressed across the primary of the transformer 10 may be the last stage of an intermediate frequency amplifier and a condenser 16 is connected across the resistance 12 to bypass currents at intermediate frequencies. The signal is produced across the resistor 12 and is impressed in a positive sense upon a control electrode or grid 18 of an electron discharge device 19; the signal is impressed on the grid 18 across a grid resistance 20 connected between the grid 18 and the grounded cathode 21 of the tube 19. The tube 19 includes an anode 22 connected to a suitable source of voltage through a resistor 23, an inductance 24 and a resistor 25, the resistor 25 and the source being bypassed for alternating current by a suitable condenser 26. The output of the amplifier may be connected to a suitable utilization device coupled to the anode 22 in the usual manner.

In order to provide automatic gain control and maintain the volume of the output signal substantially constant over a wide range of intensities of the input signal, an arrangement is provided for adding the voltages appearing across the resistances 12 and 20. This arrangement comprises a resistance 28 and a condenser 29 connected as a filter across the condenser 14 and resistance 15 in series, a voltage suitable for automatic volume control being available across the condenser 29. The connections for utilizing the automatic gain control voltage form no part of the present invention and have not been illustrated; the voltage may, of course, be employed in the usual manner by feeding it back to the intermediate amplifier stages in a sense to reduce the amplifications thereof in response to increase in the received signal intensity.

The voltage or signal appearing across the resistance 12 is proportional to the instantaneous intensity of the input signal and is relatively high for a black picture and low for a white picture. The condenser 14 and the resistance 20 operate as a grid condenser and leak and produce a direct current bias voltage for the grid 18 due to grid rectification, the current being drawn by the grid 18 on the peaks of the signal. The peaks of the television signals are the synchronizing impulses at the tops of the blanking signals. The time constant of the resistance 20 and condenser 14 is selected so that it is long with respect

to the interval between the synchronizing impulses so that a steady voltage is built up across the resistance 20 which is proportional to the difference between the instantaneous intensity of the signal and the intensity of the synchronizing impulses. For a black picture this voltage is relatively low and for a white picture relatively high. It will thus be apparent that by adding the instantaneous voltages across the resistance 20 and across the resistance 12 a voltage is provided, the sum of which is proportional to the intensity of the peak of the input signal and is suitable for automatic gain control. The time constant of the resistance 28 and condenser 29 are selected to smooth out residual variations due, for example, to varying picture content in the sum of the voltages across the resistances 12 and 20. It will thus be apparent that I have provided an arrangement for securing an automatic volume control voltage without the necessity of including an additional rectifier tube and circuit.

When the grid 18 draws current, the device 19 constitutes substantially a short circuit across the resistance 20 and, consequently, a substantial part of the voltage across the load resistor 12 is impressed across the resistance 15. Since the grid 18 draws current only during the peaks of the signal, that is, during the synchonizing impulses, these pulses may be taken off by an output connected across the resistance 15. The separation of synchronizing impulses and picture signals is thus obtained without the necessity of providing an additional clipper circuit. A condenser 30 may be connected across the resistor 15 to bypass high frequency components to ground; it being evident that picture signal components must pass through the resistance 15 in operation of the circuit; however, only the highest frequency components of the picture signal may be objectional in the synchronizing pulse circuit, and the condenser 30 may not be desirable in every application. The resistance 15 and condenser 30 may, of course, be omitted if it is desired to provide other circuits for securing the synchronizing impulses because the resistance 15 and condenser 30 are not necessary to the operation of the automatic volume control feature.

It will be apparent from the foregoing that I have provided a simple and effective arrangement for securing automatic volume control and synchronizing pulse separation in a video frequency detector and amplifier system without the necessity of providing separate electron discharge devices and circuits for performing these additional functions.

Although I have illustrated one embodiment of my invention employing a diode detector and a three-electrode amplifier tube, other modifications will readily occur to those skilled in the art. I do not, therefore, desire my invention to be limited to the particular circuit arrangement disclosed herein, and I intend by the appended claims to cover all modifications which fall within the spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A signal translating circuit for a television receiver or the like comprising means for the reception of a composite signal comprising picture signals and periodically recurring synchronizing impulses, the synchronizing impulses having greater amplitude than the picture signals of the same polarity, means for rectifying said signal and including a circuit element across which is produced a voltage proportional to the instantaneous intensity of the rectified signal, means for amplifying the rectified signal and including a circuit element across which is produced a voltage proportional to the excess of the intensity of the synchronizing impulses over the instantaneous intensity of the signal, and means for adding said voltages to produce a voltage proportional to the peak strength of the received signal and suitable for controlling the gain of the receiver.

2. A signal translating circuit for a television receiver or the like comprising means for the reception of a composite signal comprising picture signals and periodically recurring synchronizing impulses, the synchronizing impulses having greater amplitude than the picture signals of the same polarity, means including a first electron discharge device connected to rectify the received signal, means including a second electron discharge device having an anode and a cathode and a control electrode for amplifying the rectified signal, a resistance and capacitance load circuit associated with said first device to provide a voltage proportional to the instantaneous intensity of the received signal, a resistance and capacitance circuit associated with said second device for providing a voltage proportional to the excess of the intensity of the synchronizing impulses above the instantaneous intensity of the signal, and means for adding said voltages for providing a voltage proportional to the peak strength of the received signal and which is suitable for controlling the gain of the receiver.

3. A signal translating circuit for a television receiver or the like, comprising means for the reception of a composite signal comprising picture signals and periodically recurring synchronizing impulses, the synchronizing impulses having greater amplitude than the picture signals of the same polarity, means including a first electron discharge device and a load resistance therefor for rectifying the received signal, a voltage proportional to the instantaneous intensity of the received signal appearing across said resistance, means including a second electron discharge device having an anode and a cathode and a control electrode coupled to said resistance for amplifying the rectified signal, a resistance and capacitance circuit associated with said second device and dependent upon the drawing of current by said control electrode for providing a voltage proportional to the excess of the intensity of the synchronizing impulses above the instantaneous intensity of the rectified signal, and means for adding said voltages to provide a voltage proportional to the peak strength of the received signal and which is suitable for controlling the gain of the receiver.

4. A signal translating circuit for a television receiver or the like comprising means for the reception of a composite signal comprising picture signals and periodically recurring synchronizing impulses having greater amplitude than the electrode signals of the same polarity, a diode and a load resistance therefor for rectifying the signal, means including an electron discharge device having an anode and a cathode and a control grid coupled to said load resistance for amplifying the rectified signal, said last mentioned means including a grid resistance connected between said grid and said cathode, a third resistance connected between said cathode and said load resistance whereby said three resistances are connected in a closed series circuit, and an

output connected across said third resistance for providing synchronizing impulses separated from the picture signal, said synchronizing impulses being produced when current is drawn by said grid.

5. A signal translating circuit for a television receiver or the like comprising means for the reception of a composite signal comprising picture signals and periodically recurring synchronizing impulses having greater amplitude than the picture signals of the same polarity, a diode and a load resistance therefor for rectifying the signal, means including an electron discharge device having an anode and a cathode and a control grid connected to said resistance for amplifying the rectified signal, means including a second resistance connected between said grid and said cathode for providing a voltage proportional to the excess of the intensity of the synchronizing impulses above the instantaneous intensity of the rectified signal, a third resistance connected between said cathode and said load resistance whereby said three resistances are connected in a closed series circuit, an output connected across said third resistance for providing synchronizing impulses separated from the picture signal, said synchronizing impulses being produced when current is drawn by said grid, and means for adding the voltages across said load resistor and said second resistor for providing a voltage proportional to the peak strength of the received signal and which is suitable for controlling the gain of the receiver.

ROBERT B. DOME.