

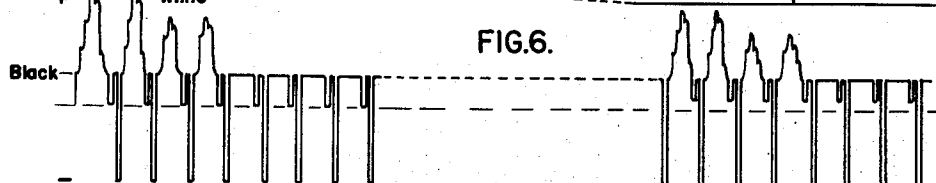
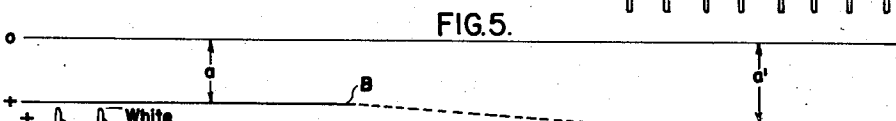
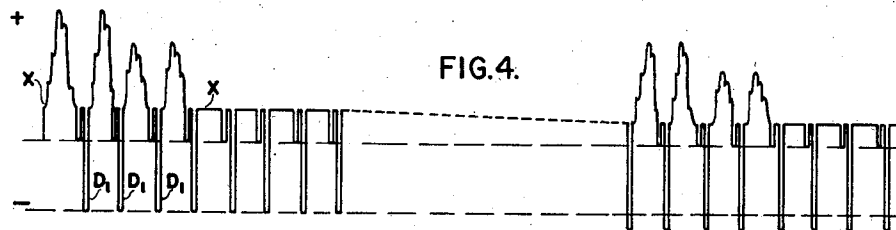
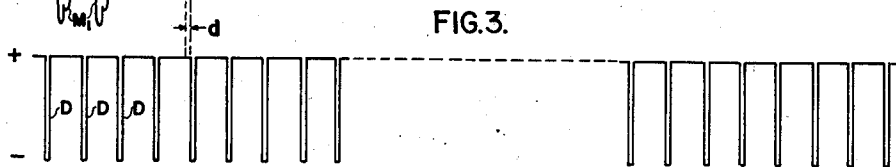
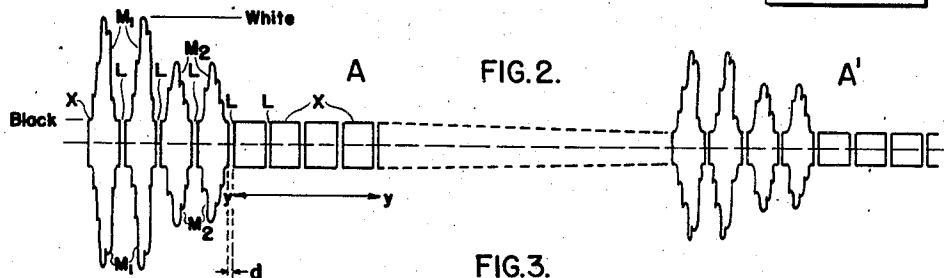
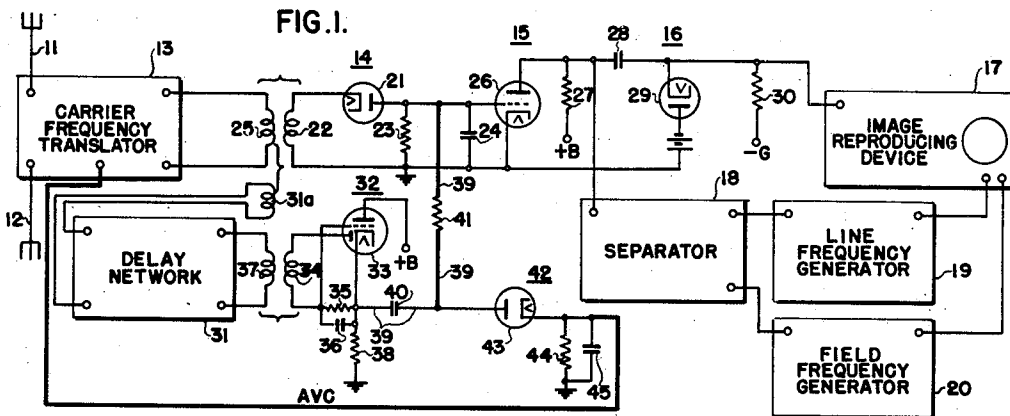
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2,214,847

AUTOMATIC AMPLIFICATION AND BLACK LEVEL CONTROL FOR TELEVISION RECEIVERS

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AUTOMATIC AMPLIFICATION AND BLACK
LEVEL CONTROL FOR TELEVISION RE-
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This invention relates to television receiving systems and more particularly to arrangements for automatically controlling one or more operating characteristics of such systems. The invention is especially directed to an improved automatic amplification control and black level setting system for television receivers.

In accordance with proposed television practice, a transmitted signal comprises a carrier wave modulated during successive intervals or trace periods by high-frequency and unidirectional components representative of variations in light over successively scanned areas of an image being transmitted and of its average background illumination, respectively. The carrier wave is unmodulated by light signal components during retrace periods, ordinarily providing a level during this period which has a fixed relation to black, but is modulated during retrace intervals by synchronizing pulses which correspond to initiations of successive lines and fields in the scanning of the image.

At the receiver a beam is so deflected as to scan and illuminate a target in a series of fields of parallel lines. The synchronizing components of the received signal are utilized to control the scanning apparatus of the receiver so as to synchronize its operation with that of similar apparatus utilized at the transmitter in developing the signal. The intensity of the beam is controlled by the light-modulated components, thereby to reconstruct the image.

In certain proposed television systems, the video-frequency modulated signal developed from the image is so impressed on the carrier that increases in the carrier amplitude correspond to increases in brightness of the image, this being termed "positive modulation". In such systems background illumination is transmitted directly, that is, by variation of the average carrier intensity during trace intervals directly in accordance with the low-frequency or steady background light components. Between the trace periods, the blanking signal or level, as stated above, is transmitted which level corresponds in amplitude to black or a fixed value with respect thereto which is blacker than black. The synchronizing pulses are impressed on the carrier during the blanking intervals in an opposite sense to that of the light-modulation signals, ordinarily periodically reducing the carrier amplitude to zero.

While systems utilizing the type of signal just mentioned have, in general, given satisfactory results, certain difficulties are incident to their use.

For example, it has been found difficult to provide satisfactory automatic control of operating characteristics of the system in accordance with the average received carrier amplitude and independent of light modulation, for example, automatic amplification control. More particularly, since the average intensity of the carrier is varied at the transmitter in accordance with the background light-modulation components, neither this average nor the peak carrier intensity of such a signal can be utilized to effect satisfactory automatic amplification control in accordance with conventional arrangements, since such a control requires a controlling effect which is dependent solely upon the average carrier intensity as determined by the power of the transmission station, its distance, fading, etc., and independent of the degree of modulation. Nor can the amplitude of the synchronizing pulses of such a signal be made readily available for this purpose, as it can in the case of negative modulation where these pulses are transmitted on outward peaks of modulation at a relatively fixed amplitude, since, in positive modulation systems, the synchronizing pulses are ordinarily transmitted as inward peaks of modulation corresponding to a small, or substantially to zero, amplitude of the carrier wave. While various arrangements have heretofore been devised for providing automatic amplification control in a positive modulation television receiving system, such arrangements have, in general, been objectionable in that their operation was highly critical, complicated, or otherwise left something to be desired.

A further important consideration in providing the proper operation of a television receiver is the stabilization of the modulation signal, whether derived from a positively or negatively modulated carrier, with respect to its black level. That is, a fixed level for all of the components of the modulation signal corresponding to black must be established in order that all of such components will be represented by black in the reproduced signal and the light gradations from black to white represented by the various video-frequency signal components will be properly represented in the reproduced scene. It will be appreciated that stabilization with respect to the peak values of the synchronizing components, as has been done in systems of the prior art, provides not a precise but only at best an approximate stabilization with respect to the black level of the signal.

It is an object, therefore, of the present invention to provide a television receiver including im-

proved means for automatically controlling certain operating characteristics of the receiver in accordance with characteristics of the received modulated-carrier signals.

It is a further object of the invention to provide a television receiver including improved means for automatically controlling one or more operating characteristics of the receiver in accordance with the average intensity of a received modulated-carrier signal and independently of light-modulation components of such signals.

It is a further object to provide an improved automatic amplification control system for television receivers adapted for the reception of modulated television signals including background and high-frequency light-modulation components.

It is a further object of the invention to provide a television receiver including improved means for automatically establishing a fixed signal level for the components corresponding to black in a received signal.

It is a further object of the invention to provide a television receiver embodying improved control means for effecting both automatic amplification control and establishment of a fixed signal level for the components corresponding to black in a received signal.

In accordance with the present invention, there is provided a television receiver which is adapted for the reception of a signal-carrier wave modulated during trace periods by background and video-frequency light components, having a predetermined blanking level, unmodulated by light components during retrace periods and modulated by synchronizing-pulse components and blanking-level components during portions of such retrace periods. The receiver comprises means for deriving from a received signal-carrier wave its modulated signal stabilized with respect to the peaks of the synchronizing-pulse components, that is, with such peaks at a fixed level. Means are further provided for deriving auxiliary pulses of a predetermined amplitude, corresponding in frequency but displaced in time, with respect to said synchronizing-pulse components in the derived modulated signal by an amount such that at least portions of the derived pulse components correspond in time with the blanking-level components, together with means for adding the displaced components to the derived modulation signal during the retrace periods, for example, subsequent to the synchronizing-pulse components. Means are further provided for developing a controlling effect in response to variations in the peak values of the added pulses in the combined signal and for utilizing such controlling effect to adjust an operating characteristic of the receiver, for example, for effecting automatic amplification control.

Further, in accordance with the present invention, the receiver comprises means for automatically setting the black level of the modulation signal. With respect to this feature, the received signal may be either positively or negatively modulated. For this purpose there is provided means for first deriving from the received signal carrier the modulation signal stabilized with respect to the peaks of the synchronizing-pulse components and means for deriving and adding the fixed amplitude components to the derived stabilized modulation signal, as explained above. A second stabilizing means is provided for stabilizing the resultant signal with

respect to the peaks of the added pulses, thereby to establish a fixed level for the signal components corresponding to black. Means are further provided for utilizing the resultant signal with its fixed blanking level to reproduce the transmitted light-modulation components. In a preferred embodiment of the invention, both the amplification and the black level setting controls utilize certain circuits in common.

For a better understanding of the present invention, together with other and further objects thereof, reference is had to the following description taken in connection with the accompanying drawing, and its scope will be pointed out in the appended claims.

In the accompanying drawing, Fig. 1 is a circuit diagram, partially schematic, of a television receiving system including circuits embodying the present invention; while Figs. 2-6, inclusive, are curves representing the wave forms of the signals as developed at different points in the receiver of Fig. 1.

Referring more particularly to the drawing, the system there illustrated comprises a television receiver which may be of either the tuned radio-frequency or superheterodyne type and including, in cascade, an antenna system 11, 12, a carrier-frequency translator 13, a detector 14, a video-frequency amplifier 15, a stabilizer 16, and an image-reproducing device 17, such as a cathode-ray signal-reproducing tube. Where the receiver is of the superheterodyne type the conventional frequency changer and intermediate-frequency amplifier are included in the translator 13.

There is also connected to the output circuit of the video-frequency amplifier 15 a synchronizing signal separator 18 to which is coupled a line-frequency scanning-wave generator 19 and a field-frequency scanning-wave generator 20 which, in turn, are connected to the scanning elements of the reproducing device 17 in a conventional manner. The parts of the receiver illustrated in detail are constructed in accordance with the present invention and will be hereinafter further described. Those parts of the system illustrated schematically may be conventional in construction and operation.

The system of Fig. 1, as described above, thus includes all the conventional circuits of a television receiver. The circuits being, in general, well understood in the art, a detailed description of their general operation is unnecessary. Briefly, however, vision-modulated carrier waves are intercepted by the antenna 11, 12 and selectively amplified in the carrier-frequency translator 13. Where the receiver is of the superheterodyne type, the signals are impressed on a frequency changer in the translator 13 where they are converted into intermediate-frequency signals and thereupon further selectively amplified. The amplified signal output of the translator 13 is delivered to the detector 14 wherein the modulation-frequency components including video-frequency and synchronizing components are derived. The modulation-frequency components are thereupon supplied to the video-frequency amplifier 15 where they are amplified and supplied, by way of the stabilizer 16, the operation of which will be later explained, to a control electrode of the device 17.

The modulation signal is also supplied from the output circuit of the video-frequency amplifier 15 to the separator 18, wherein the line-frequency synchronizing-pulse components and

the field-frequency synchronizing-pulse components are separated from the video-frequency components and from each other. The separated synchronizing components are then applied to the generators 19 and 20, respectively, to synchronize the operations thereof.

The intensity of the scanning beam of the device 17 is thus controlled in accordance with the video-frequency voltages impressed upon a control element of the reproducing device in the usual manner. Saw-tooth scanning waves developed by the generators 19 and 20 under the control of the synchronizing-pulse components are utilized in the conventional manner to produce electric fields of saw-tooth wave form to deflect the scanning beam in two directions normal to each other, thereby to trace the desired scanning pattern upon the screen of the device 17 and to reconstruct the transmitted picture.

Referring now more particularly to the portion of the system of Fig. 1 embodying the present invention, the detector 14 comprises a diode 21 fed from an inductance element 22 coupled to an inductance element 25 included in the output circuit of the carrier-frequency translator and provided with a load circuit including a resistor 23 and condenser 24 in parallel. The amplifier 15 may comprise a conventional triode tube 26 having its input circuit connected across the load circuit 23, 24 and having a load resistor 27 included in its anode circuit. Operating potential may be applied to the anode of the tube 26 by way of the resistor 27 from a suitable source, indicated at +B.

The diode 21 operates in a conventional manner to detect the modulation voltages from the signal and these voltages are impressed upon the control grid of the tube 26, which also operates conventionally to amplify these voltages. The control element of the device 17 is connected across the resistor 27 of the amplifier 15 by way of a coupling condenser 28. For the purpose of stabilizing the modulation signal with respect to its blanking level or the components thereof corresponding to black, the stabilizer 16 comprises a diode 29, having a parallel load resistor 30, connected across the input circuit of the cathode-ray tube, as shown. A fixed-biasing potential may be applied to the input control element of the reproducing device by way of the resistor 30 from a suitable source, indicated at -G. Preferably this fixed-bias voltage corresponds to black in the signal to be reproduced.

For the purpose of deriving from the received signal-carrier wave auxiliary pulses of a fixed amplitude which correspond in frequency to the synchronizing pulses, but are displaced in time with respect to the synchronizing pulses by an amount such that at least portions of the auxiliary or derived pulses correspond in time with the blanking-level components of the received signal, there is provided a delay network 31 and a combined detector and separator 32. The delay network may be of any suitable filter design operable to delay for a predetermined period the signal voltages applied thereto and to repeat the delayed signal in its output circuit. The input circuit of the delay network includes an inductance element 31a coupled to the inductance element 25 in the output circuit of the translator 13. The detector and separator 32 comprises a vacuum tube 33 of the diode-triode type, or equivalent. The diode section is fed from an inductance element 34 and provided with a load circuit including a resistor 35 and condenser 36 in parallel.

The inductance element 34 is coupled to an inductance element 37 in the output circuit of the delay network 31, whereby the delayed signal delivered from the translator 13 is impressed across the diode and its load circuit. The negative end of the load resistor 35 is connected directly to the control grid of the triode section of the tube 33. A load resistor 38 is included in the cathode circuit of the tube 33 while an operating potential may be applied to the anode of the tube from a suitable source, indicated at +B.

The diode section of the tube operates as a conventional peak detector to develop across its load circuit 35, 36 the modulation voltages of the delayed signal. The tube 32 is so biased and its grid-voltage plate current characteristic is such that, with modulation voltages of normal amplitudes supplied by the diode, the triode or amplifier portion of the tube operates beyond its cutoff limits so that only the synchronizing pulses of the detected modulation signal are passed by this amplifier and developed with a predetermined fixed amplitude across its load resistor 38; that is, the auxiliary synchronizing-pulse components are derived with a predetermined fixed amplitude from the video-frequency components. The output circuit of the detector and separator 32 is connected by way of a suitable lead 39 including a coupling condenser 40 and resistor 41 to the control grid of the video-frequency amplifier tube 26. The auxiliary delayed synchronizing-pulse components are thus added to the modulation signal so that the combined modulation signal including the added or auxiliary components is developed in the output circuit of the amplifier 15.

For the purpose of developing a unidirectional-bias voltage for effecting automatic amplification control, a rectifier indicated generally at 42 is provided. The rectifier comprises a diode 43 having a load circuit including a resistor 44 and condenser 45 in parallel. The diode and its load circuit are effectively connected across the cathode load resistor 38 of the tube 33, as well as across the load circuit 23, 24 of the detector 14 by way of resistor 41. Both the modulation signal developed by the detector 14 and the auxiliary delayed synchronizing-pulse components developed by the detector separator 32 or, in other words, the combined signal referred to above, are thus supplied to the rectifier 42. The diode 43 operates as a peak detector to develop a unidirectional-bias voltage proportional to the peaks of the added auxiliary synchronizing-pulse components in the combined signal, as will presently be further explained.

The operation and results obtained by the system of Fig. 1 may best be understood by reference to the curves of Figs. 2-6, inclusive, which illustrate the wave forms of the signal as developed at various points in the system. In Fig. 2 is illustrated the wave form of portions of the complete modulation envelope or signal of a television carrier wave of the positively modulated type, such as may be developed in the output circuit of the carrier-frequency translator 13. The portion of the curve of Fig. 2 shown at A represents a wave of relatively large amplitude while that at A' represents a similar wave different only in that it is of lesser amplitude, such as might be caused by occasional fading. The blanking level of the wave is indicated at X. The portions of the wave during the blanking intervals when the carrier amplitude is reduced to zero, certain of which are indicated at L, represent

resent line-retrace periods including the synchronizing pulses. The portions between the blanking intervals correspond to the trace portions of successive lines, being modulated, as indicated at M_1 and M_2 , by the high-frequency and background light components except during field block-out periods. A part of one of the field block-out intervals is indicated at $Y-Y$. The amplitude of the wave during the block-out intervals is independent of light modulation. The field block-out intervals ordinarily include the line-synchronizing pulses as well as a group of additional broad pulses, not shown, which together may constitute collectively a field-synchronizing pulse. Ordinarily, the blanking level of the wave, indicated at X , which appears during each of the line-retrace and field-retrace or block-out intervals, corresponds to black in the scene being transmitted, or to a fixed value relative thereto which is blacker than black, and may be termed the black level of the signal.

It is well known that, with the positive type of modulation, such as is represented in Fig. 2, increases of the light intensity of the image being scanned are represented by increases in the amplitude of the carrier wave and the average intensity of the signal is varied in accordance with the low-frequency or unidirectional background-illumination components of the image. Thus, in the particular portions of the wave shown, during the line-trace modulation periods represented at M_1 , the amplitude of the carrier is such that it reaches the white level, whereas this does not occur during the modulation periods represented at M_2 . Since the average intensity of the carrier is thus varied in accordance with the background-illumination variations, these carrier variations cannot be used for the purpose of automatic amplification control. Nor, as stated above, are there in this type of wave any line-synchronizing pulses which could be utilized for the purpose in question, since the signal is reduced to zero for the duration of the line-synchronizing pulses. However, the modulation envelope does include a certain representative level, the blanking level, at which the signal represents black, or a predetermined value with respect thereto which is blacker than black, and which appears in the signal not only for black pictures, when the blanking level represents black, but also during the retrace periods. This level, therefore, affords a measure of the intensity of the carrier wave which is independent of light modulation and of other signal characteristics, such as its periodicity or synchronization, and this level may, therefore, be utilized for automatically controlling a characteristic of the receiver, such as its amplification.

In the operation of the present invention, therefore, the modulated-carrier wave is detected by the diode detector 14 to derive a voltage across its load resistor 23 corresponding to half of the modulation envelope (for example, the upper half of Fig. 2) which voltage is impressed upon the control electrode of the amplifier tube 26 and the input circuit of the rectifier 42. Since the connections between the diode 21 and the amplifier 15 and rectifier 42 are direct ones, the modulation signal as applied to the amplifier 26 and rectifier 42 is naturally stabilized with respect to its synchronizing pulses; that is, it has the unidirectional component present; that is, the peaks of the synchronizing pulses are maintained at a substantially fixed level. Were the

connections referred to not direct, but, for example, by way of a coupling condenser, the unidirectional component of the modulation signal would be lost, and this signal would tend to establish itself about its neutral axis, so that the peaks of the synchronizing pulses would assume different levels; that is, the signal would not be stabilized with respect to these pulses. This could be overcome by stabilization after the condenser coupling.

The delay network 31 operates in conventional manner to delay the signal impressed thereon from the translator 13 and the rectifier and limiter 32 operates, as explained above, to detect the delayed signal delivered from the network 31 and to limit and amplify the detected delayed modulation signal, thereby to develop the recurring auxiliary synchronizing-pulse components of predetermined fixed amplitude across the load resistor 38. The wave form of this signal is illustrated in Fig. 3, the delayed pulses being indicated at D . These delayed pulses or components are applied to the control electrode of the amplifier 15 as well as across the diode 42 and its load circuit.

Since the modulation signal delivered by the detector 14 is also supplied to the amplifier 15 and rectifier 42, as explained above, the combined modulation signal and the added auxiliary delayed synchronizing-pulse components are, in effect, impressed upon both the amplifier 15 and rectifier 42. The wave form of this combined signal is as illustrated in Fig. 4, the auxiliary synchronizing-pulse components being added to the modulation signal with such a time displacement that at least portions of the auxiliary or derived components correspond in time with the blanking-level components as indicated at D_1 . It will be noted that the blanking level X still corresponds to its level in the original signal as illustrated in Fig. 2, that is, the modulation signal is still stabilized with respect to the peaks of the original synchronizing pulses.

Since the added auxiliary delayed pulses D_1 are of a fixed amplitude and added directly to the blanking level, their peak values or level vary directly in accordance with the blanking level. This peak value of the added components, therefore, is a measure of the average amplitude of the carrier and independent of light-modulation components so that it can be used for effecting control of an operating characteristic of the receiver in accordance therewith, for example, for automatic amplification control. To this end the rectifier 42 detects the peak value in the black direction of the combined signal delivered from the detector and limiter 32 and the rectifier 14 and, hence, develops a control-bias voltage such as illustrated by the curve B of Fig. 5, the variations in its value for signals of different intensities being indicated at a and a' . Thus, this bias voltage varies in accordance with a predetermined level of the modulation envelope, in the present case the blanking level, and independent of other characteristics thereof. The control-bias voltage developed by peak rectifier 42 is applied negatively, that is, it is less positive with increasing signal strength, by way of the lead indicated $A. V. C.$, to the control electrode of one or more of the tubes in the translator 13 which have sufficient initial negative-bias voltage to overcome the positive control-bias voltage. The control voltage thus controls the amplification in these tubes inversely in accordance with variations of the average carrier intensity and inde-

pendently of light-modulation components. A suitable conventional filter (not shown) may be included in the A. V. C. lead for the purpose of removing residual fluctuations in the bias voltage. Thus, the output signal intensity of the channel of the translator is maintained within a relatively narrow range for a wide range of received signal intensities.

As explained above, the signal developed in the output circuit of the amplifier 15 is applied by way of the coupling condenser 28 to the device 17. For the purpose of properly fixing the level of black in the signal, as applied to the input control electrode of the cathode-ray tube, so that the components of the signal which represent black will all appear as black in the reproduced image and the light gradations from black to white represented by various video-frequency components will be properly represented in the reproduced scene, the diode 29 of the stabilizer 16 derives from the output of the amplifier 15 a positive unidirectional voltage corresponding to the peak value of the signal on the black side of its zero axis. That is, this voltage corresponds to peak values of the added auxiliary synchronizing-pulse components and, hence, to the blanking level of the signal. This voltage appears across the resistor 30. The control element of the image-reproducing device is initially negatively biased, by way of the resistor 30, from a suitable source of voltage, indicated at -G and, as explained above, this fixed-bias voltage is preferably such as to correspond approximately to black, that is, to adjust the device 17 so that, in absence of a modulation signal, the screen is black. The unidirectional voltage developed by the diode 29, therefore, is applied in opposition to the fixed-bias voltage and the resultant video signal, as applied to the control element of the device 17, is effectively stabilized with respect to the blanking level of the signal, that is, to a level representing black, or, if desired, a value blacker than black having a fixed value with respect to black. The signal, therefore, as applied to the control grid has a wave form such as illustrated by the curve of Fig. 6. It will be noted that in this signal both the original and the delayed added auxiliary synchronizing pulses are poled in the black direction. Hence these pulses do no harm since they would simply appear as black or blacker than black in the reproduced image. The reproduced signal, therefore, as developed by the device 17, has a wave form which corresponds to the curve of Fig. 6 with a predetermined fixed black level and zero amplitude during synchronizing-pulse periods. Obviously, the invention may be utilized employing auxiliary pulses poled in the white direction, in which case these pulses would preferably be removed from the signal as applied to the reproducing device.

It will thus be seen that the present invention provides a television receiver which includes improved automatic control means for effecting amplification control as well as the setting of the black level of the signal at a proper value for reproduction.

While there has been described what is at present considered to be the preferred embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention, and it is, therefore, aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. A television receiver adapted for the reception of a signal-carrier wave modulated during trace-scanning periods by background and video-frequency light components, having a predetermined blanking level and unmodulated by light components during retrace-scanning periods, and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulation signal with the peaks of the synchronizing-pulse components thereof at a fixed level, means for deriving separate pulse components of a predetermined amplitude and corresponding in frequency but displaced in time with respect to the synchronizing-pulse components in said derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, means responsive to variations in the peak value of the added components in the resultant modulation signal for developing a controlling effect, and means for utilizing said controlling effect to adjust an operating characteristic of the receiver.

2. A television receiver adapted for the reception of a signal-carrier wave modulated during trace-scanning periods by background and video-frequency light components, having a predetermined blanking level and unmodulated by light components during retrace-scanning periods, and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulation signal with the peaks of the synchronizing-pulse components thereof at a fixed level, means for deriving from said received signal pulse components of a predetermined amplitude and corresponding in frequency but displaced in time with respect to the synchronizing-pulse components in said derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, means responsive to variations in the peak value of the added components in the resultant modulation signal for developing a controlling effect, and means for utilizing said controlling effect to adjust an operating characteristic of the receiver.

3. A television receiver adapted for the reception of a signal-carrier wave modulated during trace-scanning periods by background and video-frequency light components, having a predetermined blanking level and unmodulated by light components during retrace-scanning periods, and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulation signal with the peaks of the synchronizing-pulse components thereof at a fixed level, means for deriving pulse components of a predetermined amplitude and corresponding in frequency but displaced in time with respect to the synchronizing-pulse components in said derived modulation signal by an amount such that

at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, means responsive to variations in the peak value of the added components in the resultant modulation signal for developing a unidirectional-bias voltage proportional to the average amplitude of the received carrier and independent of light-modulation components, and means for utilizing said voltage to adjust an operating characteristic of the receiver.

4. A television receiver adapted for the reception of a signal-carrier wave modulated during trace-scanning periods by background and video-frequency light components, having a predetermined blanking level and unmodulated by light components during retrace-scanning periods, and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulation signal with the peaks of the synchronizing-pulse components thereof at a fixed level, means for deriving pulse components of a predetermined amplitude and corresponding in frequency but displaced in time with respect to the synchronizing-pulse components in said derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, means for rectifying the resultant modulation signal to derive a unidirectional voltage proportional to the peak value of the added components of said resultant signal, and means for utilizing said bias voltage to adjust an operating characteristic of the receiver.

5. A television receiver adapted for the reception of a signal-carrier wave modulated during trace periods by background and video-frequency light components, having a predetermined blanking level and unmodulated by light components during retrace periods, and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, said carrier having a wide range of signal-input intensities independent of light-modulation components, comprising a signal-translating channel, means for deriving from a received signal-carrier wave its modulation signal with the peaks of the synchronizing-pulse components thereof at a fixed level, means for deriving pulse components of a predetermined amplitude corresponding in frequency but displaced in time with respect to the synchronizing-pulse components in said derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, means responsive to variations in the peak value of the added components in the resultant modulation signal for developing a controlling effect, and means for utilizing said controlling effect to maintain the signal-output intensity of said channel within a relatively narrow range.

6. A television receiver adapted for the reception of a signal-carrier wave modulated during trace periods by background and video-frequen-

cy light components, having a predetermined blanking level and unmodulated by light components during retrace periods, and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, said carrier having a wide range of signal-input intensities independent of light-modulation components, comprising a signal-amplifying channel, means for deriving from a received signal-carrier wave its modulation signal with the peaks of the synchronizing-pulse components thereof at a fixed level, means for deriving pulse components of a predetermined amplitude and corresponding in frequency but displaced in time with respect to the synchronizing-pulse components in said derived modulation signal by an amount that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, means responsive to variations in the peak value of the added components in the resultant modulation signal for developing a controlling effect, and means for utilizing said controlling effect to adjust the amplification in said channel inversely in accordance with the average intensity of the received signal carrier and independent of light-modulation components, thereby to maintain the signal-output intensity of said channel within a relatively narrow range.

7. A television receiver adapted for the reception of a signal-carrier wave modulated during trace periods by background and video-frequency light components, having a predetermined blanking level unmodulated by light components during retrace periods, and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulation signal with the peaks of the synchronizing-pulse components thereof at a fixed level, means for separately deriving from said received signal carrier auxiliary synchronizing-pulse components of an amplitude greater than, and displaced for a predetermined portion of a cycle greater than the duration of said synchronizing-pulse components with respect to, the corresponding components in the derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said auxiliary components to said derived modulation signal, means responsive to variations in the peak value of said auxiliary components in the resultant modulation signal for developing a controlling effect, and means for utilizing said controlling effect to adjust an operating characteristic of the receiver.

8. A television receiver adapted for the reception of a television signal-carrier wave modulated during trace periods by background and video-frequency light components, having a predetermined blanking level during retrace periods, unmodulated by light components during retrace periods and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulation signal stabilized with respect to the peaks of said synchronizing-pulse components, means for deriving pulse components of a predetermined amplitude and corresponding in frequency but

displaced in time with respect to the synchronizing-pulse components in said derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, means for stabilizing the resultant modulation signal with respect to the peaks of said added components, and means for utilizing the last-mentioned stabilized signal to reproduce the transmitted light-modulation components.

9. A television receiver adapted for the reception of a television signal-carrier wave modulated during trace periods by background and video-frequency light components, having a predetermined blanking level during retrace periods, unmodulated by light components during retrace periods and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulation signal stabilized with respect to the peaks of said synchronizing-pulse components, means for deriving from said received signal synchronizing-pulse components of a predetermined amplitude and corresponding in frequency but displaced in time with respect to corresponding synchronizing-pulse components in said derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, means for stabilizing the resultant modulation signal with respect to the peaks of said added components, and means for utilizing the last-mentioned stabilized signal to reproduce the transmitted light-modulation components.

10. A television receiver adapted for the reception of a television signal-carrier wave modulated during trace periods by background and video-frequency light components, having a predetermined blanking level during retrace periods, unmodulated by light components during retrace periods and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulation signal stabilized with respect to the peaks of said synchronizing-pulse components, means for delaying the received signal for a predetermined portion of a period between synchronizing pulses by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for detecting and limiting said delayed signal for deriving synchronizing-pulse components of a predetermined amplitude and corresponding in frequency but displaced in time with respect to corresponding synchronizing-pulse components in said derived modulation signal, means for adding said displaced components to said derived modulation signal during said retrace periods, means for stabilizing the resultant modulation signal with respect to the peaks of said added components, and means for utilizing the last-mentioned stabilized signal to reproduce the transmitted light-modulation components.

11. A television receiver adapted for the reception of a television signal-carrier wave modulated during trace periods by background and

video-frequency light components, having a predetermined blanking level during retrace periods, unmodulated by light components during retrace periods and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulated signal stabilized with respect to the peaks of said synchronizing-pulse components, means for deriving synchronizing-pulse components of a predetermined amplitude greater than, and corresponding in frequency but displaced in time with respect to, the corresponding synchronizing-pulse components in said derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, a diode rectifier for deriving from the resultant derived unstabilized signal a positive-bias voltage proportional to the peak value of the added components thereof, means for utilizing said bias voltage for stabilizing said resultant derived signal with respect to said blanking level, and means for utilizing the blanking-level stabilized signal to reproduce the transmitted light-modulation components.

12. A television receiver adapted for the reception of a television signal-carrier wave modulated during trace periods by background and video-frequency light components having a predetermined blanking level during retrace periods, unmodulated by light components during retrace periods and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulation signal stabilized with respect to the peaks of said synchronizing-pulse components, means for deriving synchronizing-pulse components of a predetermined amplitude and corresponding in frequency but displaced in time with respect to corresponding synchronizing-pulse components in said derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, a source of negative-bias voltage having a fixed value with respect to black, means for deriving from the unstabilized resultant derived signal with said added components a positive control-bias voltage proportional to the peak value of said added components, means for utilizing the resultant of said two bias voltages to stabilize the resultant signal with respect to said blanking level, and means for utilizing the resultant signal to reproduce the transmitted light-modulation components.

13. A television receiver adapted for the reception of a television signal-carrier wave modulated during trace periods by background and video-frequency light components having a predetermined blanking level during retrace periods, unmodulated by light components during retrace periods and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, comprising means for deriving from a received signal-carrier wave its modulation signal stabilized with respect to the peaks of said synchronizing pulses, means for deriving synchronizing-pulse components of a predetermined amplitude and corresponding in

frequency but displaced in time with respect to corresponding synchronizing-pulse components in said derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, means responsive to variations in the peak value of said added components in the resultant modulation signal for developing a controlling effect, means for utilizing said controlling effect to adjust an operating characteristic of the receiver, means for stabilizing said resultant derived signal with respect to said peak value of said added components in said resultant modulation signal, and means for utilizing the last-mentioned stabilized resultant signal to reproduce the transmitted light-modulation components.

14. A television receiver adapted for the reception of a television signal-carrier wave modulated during trace periods by background and video-frequency light components having a predetermined blanking level during retrace periods and modulated by synchronizing-pulse components and blanking-level components during portions of said retrace periods, said carrier having a wide range of signal-input intensities inde-

pendent of its modulation, comprising means for deriving from a received signal-carrier wave its modulation signal stabilized with respect to the peaks of said synchronizing pulses, means for deriving synchronizing-pulse components of a predetermined amplitude and corresponding in frequency but displaced in time with respect to corresponding synchronizing-pulse components in said derived modulation signal by an amount such that at least portions of said derived pulse components correspond in time with said blanking-level components, means for adding said displaced components to said derived modulation signal during said retrace periods, means responsive to variations in the peak value of said added components in the resultant modulation signal for developing a controlling effect, means for utilizing said controlling effect to maintain the signal-output intensity of the receiver within a relatively narrow range, means for stabilizing said resultant derived signal with respect to said peak value of said added components in said resultant modulation signal, and means for utilizing the last-mentioned stabilized resultant signal to reproduce the transmitted light-modulation components.

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