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Automatic control of a characteristic of a signal channel

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(73) Proprietors
RCA Corporation
(USA-Delaware)
30 Rockefeller Plaza
City and State of New York
10020
United States of America

(72) Inventor
James Charles Tallant

(74) Agent and/or
Address for Service
Richard W. Pratt,
C/o RCA International Limited,
Norfolk House,
31 St James's Square,
London SW1Y 4JR

Fig.1
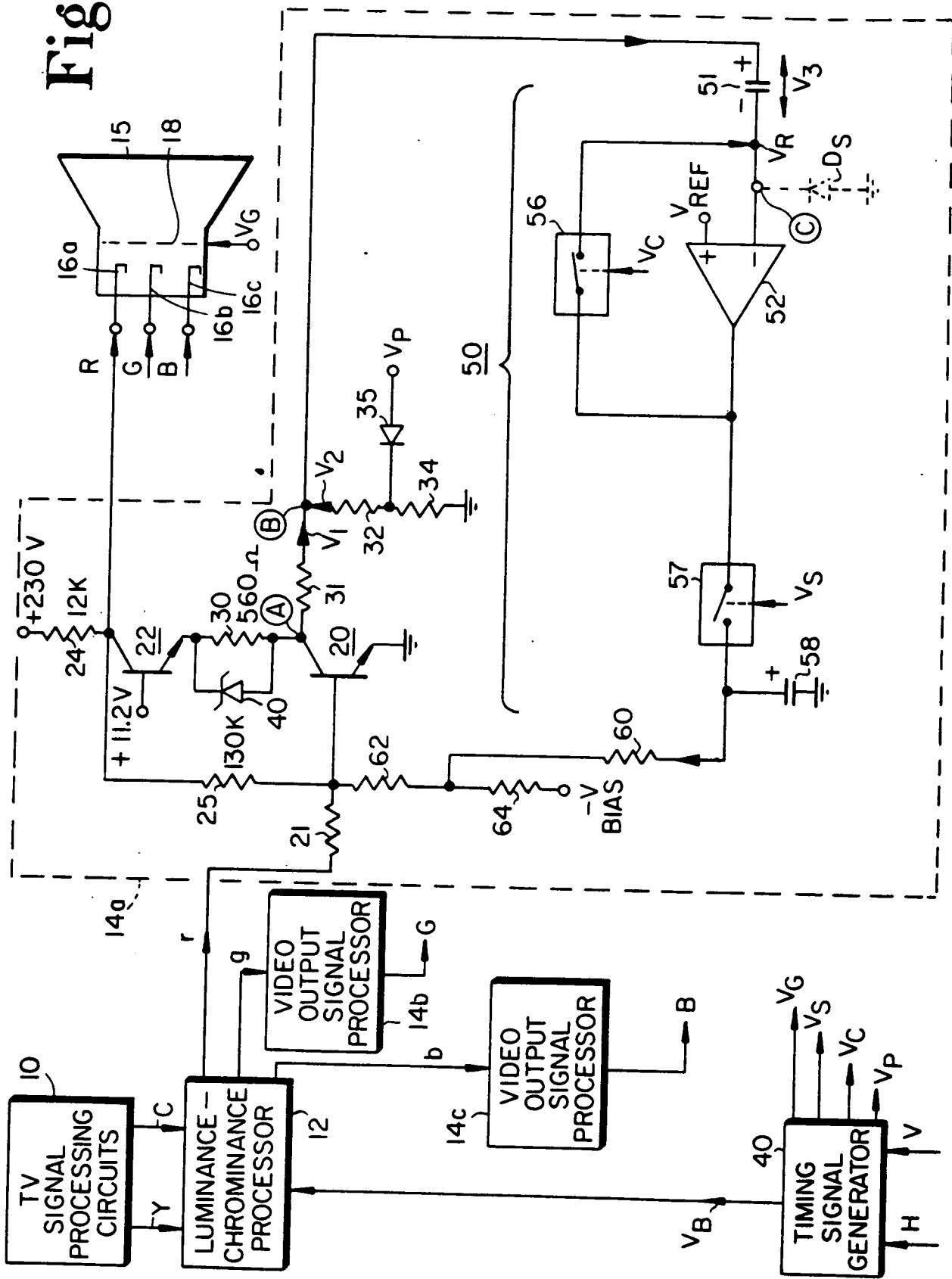
Fig.2
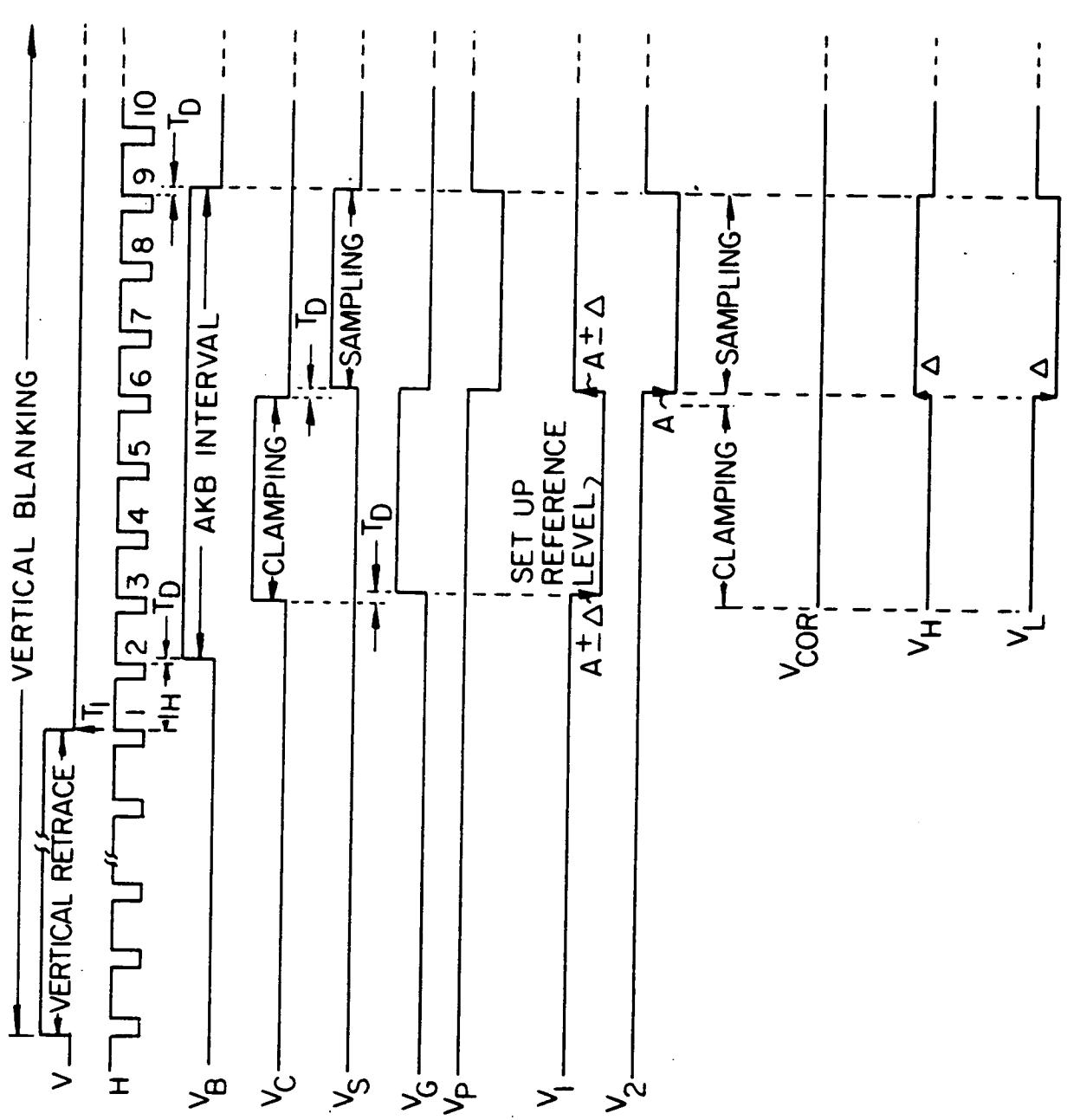
AUTOMATIC CONTROL OF A

CHARACTERISTIC OF A SIGNAL CHANNEL

This invention concerns a system for
automatically controlling a characteristic of a signal

5   channel. An illustrative application of this invention
concerns a system for sensing and automatically
controlling the black image current conducted by a video
signal image reproducing device.

10

Color television receivers sometimes employ an
automatic kinescope bias (AKB) control system for
automatically establishing proper black image

15   representative current levels for each electron gun of a
color kinescope associated with the receiver. As a result
of this operation, pictures reproduced by the kinescope
are prevented from being adversely affected by variations
of kinescope operating parameters (e.g., due to aging and

20   temperature effects).

An AKB system typically operates during image
blanking intervals, at which time each electron gun of the
kinescope conducts a small black image representative
blanking current in response to a reference voltage

25   representative of black video signal information. This
current is processed by the AKB system to generate a
signal which is representative of the currents conducted
during the blanking intervals, and which is used to
maintain a desired black current level.

30   In one type of AKB system control circuits
respond to a periodically derived pulse signal with a
magnitude representative of the cathode black current
level. The derived signal is processed by control
circuits including clamping and sampling networks for

35   developing a kinescope bias correction signal which
increases or decreases in magnitude and is coupled to the
kinescope for maintaining a correct black current level.
The clamping network includes a clamping capacitor for

establishing a reference condition for the signal information to be sampled. The reference condition is established by applying a reference voltage to the clamping capacitor which is coupled to the sampling

5   network during the clamping interval. An AKB system of this type is described in U. S. Patent 4,331,981 of R. P. Parker, for example.

In an illustrative automatic control system disclosed herein with reference to the drawings, a bias representative signal is

10   derived at a sensing point during video signal blanking intervals. The sensing point exhibits voltage variations related to amplitude variations of the video signal during video signal image intervals when signal processing circuits of the control system are inactive. It is herein

15   recognised that the presence of large amplitude video signals at the sensing point can have a disruptive effect on the operation of the signal processing circuits of the illustrative control system, particularly when such circuits are constructed in the form of an

20   integrated circuit. Accordingly, the illustrative control system disclosed herein includes means for attenuating large video signal amplitude components which can appear at the control system sensing point during video signal picture intervals when the signal processing circuits of the

25   control system are inactive.

In the drawing:

FIGURE 1 shows a portion of a color television receiver with an automatic kinescope bias control system including a sensing circuit according to the principles of

30   the present invention; and

FIGURE 2 illustrates signal waveforms associated with the operation of the system in FIGURE 1.

In FIGURE 1, television signal processing circuits 10 provide separated luminance (Y) and

35   chrominance (C) components of a composite color television signal to a luminance-chrominance signal processing network 12. Processor 12 includes luminance and chrominance gain control circuits, DC level setting

circuits (e.g., comprising keyed black level clamping
circuits), color demodulators for developing r-y, g-y and
b-y color difference signals, and matrix amplifiers for
combining the latter signals with processed luminance
5   signals to provide low level color image representative
signals r, g and b. These signals, are amplified and
otherwise processed by circuits, within video output signal
processing networks 14a, 14b and 14c, respectively, which
supply high level amplified color image signals R, G and B
10   to respective cathode intensity control electrodes 16a,
16b and 16c of a color kinescope 15. Networks 14a, 14b
and 14c also perform functions related to the automatic
kinescope bias (AKB) control function, as will be
discussed. Kinescope 15 is of the self-converging in-line
15   gun type with a commonly energized control grid 18
associated with each of the electron guns comprising
cathode electrodes 16a, 16b and 16c.

        Since output signal processors 14a, 14b and 14c
are similar in this embodiment, the following discussion
20   of the operation of processor 14a also applies to
processors 14b and 14c.

        Processor 14a includes a kinescope driver stage
comprising an input transistor 20 configured as a common
emitter amplifier which receives video signal r from
25   processor 12 via an input resistor 21, and an output high
voltage transistor 22 configured as a common base
amplifier which together with transistor 20 forms a
cascode video driver amplifier. High level video signal
R, suitable for driving kinescope cathode 16a, is
30   developed across a load resistor 24 in the collector
output circuit of transistor 22. Direct current negative
feedback for driver 20, 22 is provided by means of a
resistor 25. The signal gain of cascode amplifier 20, 22
is primarily determined by the ratio of the value of
35   feedback resistor 25 to the value of input resistor 21.

        A sensing resistor 30 DC coupled in series with
and between the collector-emitter paths of transistor 20,
22 serves to develop a voltage, at a relatively low

voltage sensing node A, representing the level of kinescope cathode black current conducted during kinescope blanking intervals. A normally non-conductive Zener Diode 40 is coupled across sensing resistor 30. Resistor 30 and
5   Zener Diode 40 operate in conjunction with the AKB system of the receiver, which will now be described.

A timing signal generator 40 containing combinational and sequential logic control circuits as well as level shifting circuits responds to periodic
10   horizontal synchronizing rate signals (H) and to periodic vertical synchronizing rate signals (V), both derived from deflection circuits of the receiver for generating timing signals V_B, V_S, V_C, V_P and V_G which control the operation of the AKB function during periodic AKB intervals. Each
15   AKB interval begins shortly after the end of the vertical retrace interval within the vertical blanking interval, and encompasses several horizontal line intervals also within the vertical blanking interval and during which video signal image information is absent. These timing
20   signals are illustrated by the waveforms in FIGURE 2.

Referring to FIGURE 2 for the moment, timing signal V_B, used as a video blanking signal, comprises a positive pulse generated soon after the vertical retrace interval ends at time T_1, as indicated by reference to
25   signal waveform V. Blanking signal V_B exists for the duration of the AKB interval and is applied to a blanking control input terminal of luminance-chrominance processor 12 for causing the r, g and b outputs of processor 12 to exhibit a black image representative DC reference level at
30   the signal outputs of processor 12. Timing signal V_G, used as a positive grid drive pulse, encompasses three horizontal line intervals within the vertical blanking interval. Timing signal V_C is used to control the operation of a clamping circuit associated with the signal
35   sampling function of the AKB system. Timing signal V_S, used as a sampling control signal, occurs after signal V_C and serves to time the operation of a sample and hold circuit which develops a DC bias control signal for

controlling the kinescope cathode black current level. Signal V_S encompasses a sampling interval the beginning of which is slightly delayed relative to the end of the clamping interval encompassed by signal V_C, and the end of which substantially coincides with the end of the AKB interval. A negative-going auxiliary pulse V_P coincides with the sampling interval. Signal timing delays T_D indicated in FIGURE 2 are on the order of 200 nanoseconds.

Referring again to FIGURE 1, during the AKB interval positive pulse V_G (e.g., on the order of +10 volts) biases grid 18 of the kinescope for causing the electron gun comprising cathode 16a and grid 18 to increase conduction. At times other than the AKB intervals, signal V_G provides the normal, less positive, bias for grid 18. In response to positive grid pulse V_G, a similarly phased, positive current pulse appears at cathode 16a during the grid pulse interval. The amplitude of the cathode output current pulse so developed is proportional·to the level of cathode black current conduction (typically a few microamperes).

The induced positive cathode output pulse appears at the collector of transistor 22, and is coupled to the base input of transistor 20 via feedback resistor 25, causing the current conduction of transistor 20 to increase proportionally while the cathode pulse is present. The increased current conducted by transistor 20 causes a related voltage to be developed across sensing resistor 30. This voltage is in the form of a negative-going voltage change which appears at sensing node A and which is proportional in magnitude to the magnitude of the black current representative cathode output pulse. The magnitude of the voltage perturbation at node A is determined by the product of the value of resistor 30 times the magnitude of the perturbation current flowing through resistor 30. The operation of sensing resistor 30 in combination with kinescope driver 20, 22 is described in detail in U.K. patent application 8317662 (corresponding to US application Serial No 394,422 of R.P.Parker,

titled "Kinescope Black Level Current Sensing Apparatus"). The voltage change at node A is coupled via a small resistor 31 to a node B at which a voltage change V_1, essentially corresponding to the voltage change at node A, is developed. Node B is coupled to a bias control voltage processing network 50.

Network 50 performs signal clamping and sampling functions. The clamping function is performed during a clamping interval within each AKB interval by means of a feedback clamping network comprising an input AC coupling capacitor 51, an amplifier 52, and an electronic switch 56. The sampling function is performed during a sampling interval, following the clamping interval during each AKB interval, by means of a network comprising amplifier 52, an electronic switch 57, and an average responding charge storage capacitor 58.

A kinescope bias correction voltage is developed across capacitor 58 and is coupled via a translating circuit comprising a resistor network 60, 62, 64 to the kinescope driver via a bias control input at the base of transistor 20. The correction voltage developed across capacitor 58 serves to automatically maintain a desired correct level of kinescope black current conduction. The bias correction voltage developed across storage capacitor 58 is a function of both voltage change V_1 developed at node B during the clamping interval, and a voltage change V_2 developed at node B during the subsequent sampling interval, as will be discussed in greater detail subsequently in connection with the waveforms shown in FIGURE 2.

During the clamping set-up reference interval, switch 56 is rendered conductive in response to clamping control signal V_C. At this time switch 57 is non-conductive so that the charge on storage capacitor 58 remains unaffected during the clamping interval. As a consequence of the feedback action during the clamping interval, the negative terminal (-) of capacitor 51 is reference to (i.e., clamped to) a reference voltage V_R

voltage V_R is a function of a fixed reference voltage V_{REF} applied to an input of amplifier 52, for establishing an input reference bias condition at a signal input of amplifier 52 at a node C. At this time the voltage V_3

5   across input capacitor 51 is a function of the level of voltage change V_1 developed at node B, and the clamping reference voltage V_R provided via the feedback action.

During the following sampling interval when voltage change V_2 is developed at node B, switch 56 is

10   rendered non-conductive. Switch 57 is rendered conductive in response to sampling control signal V_S. The magnitude of voltage change V_2 is indicative of the magnitude of the kinescope black current level, and is sampled by means of amplifier 52 (with respect to reference voltage V_R) to

15   develop a corresponding voltage across storage capacitor 58. Network 50 can include circuits of the types described in US Patent 4,331,981 of R.P.Parker, and in a copending UK application /8327415 (RCA 77495/78010 corresponding to US patent application of P.Filliman Serial No. 437,827 titled "Signal Sampling Network with

20   Reduced Offset Error"). Amplifier 52 is preferably rendered non-conductive during picture intervals when the AKB clamping and sampling functions are not being performed. This can be accomplished by disabling the operating current source of amplifier 52 in response to a

25   keying signal coincident with the picture intervals.

Zener diode 40 serves to attenuate large amplitude video signal components, and particularly video signal peaking components, which otherwise appear with significant magnitude at sensing node A during field

30   scanning picture information intervals. In the absence of the attenuation provided by Zener diode 40, large amplitude video signals appearing at sensing node A can ultimately disrupt the AKB signal processing function. This is particularly true with respect to the development

35   of clamping reference voltage V_R, when the AKB signal processor including amplifier 52 is constructed in the form of an integrated circuit with an input at node C, as follows.

Sensing node A and node B exhibit a nominal DC voltage (V_{DC}) of approximately +8.8 volts for black video signal conditions during picture intervals, as well as during AKB intervals (except when voltage change V_2 is generated during AKB sampling intervals as will be discussed subsequently). At the end of the AKB clamping reference interval, voltage V_3 across clamp capacitor 51 is equal to $V_{DC} - V_R$, where V_{DC} is the nominal black level voltage (+8.8 volts) and V_R is the reference voltage (e.g., +6 volts) developed at the negative terminal of capacitor 51 during the clamping interval.

During the field scanning picture interval which begins at the end of the vertical blanking interval, video signals applied to kinescope driver 20, 22 can cause large voltage transitions to be developed at the collector output of driver transistor 22 and at the kinescope cathode. A large video input signal r (e.g., a 100 IRE peak white signal) can cause the collector output voltage of driver transistor 22 to decrease by about 130 volts. A heavily peaked video signal with accentuated white-going amplitude transitions can increase the effective video signal peak white level by 20%, causing the collector output voltage of driver transistor 22 to decrease by an additional 20%. The effective peak white level of the video signal can be increased by more than 20% in receivers which do not include circuits for automatically limiting the amount of peaking present in the video signal.

A version of such peak white amplitude transitions appears at AKB sense point A, and can cause a significant and potentially troublesome negative-going transient decrease in the voltage at sense point A. This transient voltage decrease can be as great as 7.28 volts (or even greater in receivers without peak limiting circuits) according to the expression

$$\Delta V_A = \frac{R_{30}}{R_{24}} \, (\Delta V_K)$$

where

ΔV_A corresponds to the transient voltage decrease at sensing point A;

R_{30} and R_{24} correspond to the values of resistors 30 and 24, respectively; and

ΔV_K corresponds to the amount by which the kinescope cathode voltage decreases in response to large white-going video signal amplitude transitions including peaking effects (e.g., 130 volts x 1.2).

The voltage at input node C of the AKB signal processor is given by $V_A - V_3$, where V_A is the voltage at sense point A and V_3 is the voltage across capacitor 51. More specifically, the voltage at input node C is given by

$$(V_{DC} - \Delta V_A) - (V_{DC} - V_R)$$

where

V_{DC} is the nominal black level voltage at sense point A (+8.8 volts);

ΔV_A is the transient voltage at sense point A; and

V_R is the clamping reference voltage developed on and stored at the negative terminal of capacitor 51 (+6.0 volts).

Thus in this instance large white-going video signal amplitude transitions can cause a negative voltage of -1.28 volts to appear at input node C of the AKB signal processor.

This negative voltage at node C is large enough to forward bias the integrated circuit substrate-to-ground semiconductor junction at the input of the AKB signal processor. A diode D_S represents the substrate-to-ground semiconductor junction, and is forward biased into conduction since the -1.28 volt negative voltage transient at node C exceeds the threshold conduction level (0.7 volts) of substrate diode D_S. If this were to occur, the voltage at node C would be clamped to -0.7 volts and the negative terminal of clamp capacitor 51 would rapidly discharge to a distorted reference level which might impair the subsequent AKB clamping and sampling functions. This condition could be difficult to recover from during

succeeding AKB operating intervals, and the distorted reference level could persist for a relatively long time, depending on the nature of the video signal picture information, its peaking content and duration. As a

5 consequence, proper AKB operation could be disrupted such that an abnormally high kinescope black current level would result with an associated unwanted visible increase in picture brightness.

Zener diode 40 prevents the described

10 objectionable effects caused by large amplitude video signals during the picture interval. Specifically, the action of diode 40 prevents clamping reference voltage V_R from being disturbed from one AKB interval to another, by preventing picture interval video signal amplitude

15 excursions of significant magnitude from being developed at AKB sensing point A, as follows.

The emitter voltage of driver transistor 22 is substantially constant (+10.5 volts), and is equal to the fixed base bias voltage of transistor 22 (+11.2 volts)

20 minus the base-emitter junction voltage drop of transistor 22 (+0.7 volts). During AKB intervals, the collector voltage of transistor 20 and thereby the voltage at sense point A vary in response to the perturbation current conducted to the base of video signal amplifier transistor

25 20 via feedback resistor 25, as a function of the induced kinescope output current pulse developed as discussed previously. The voltage across sense resistor 30 changes with variations in the current conduction of transistor 20 during both AKB intervals and video information picture

30 intervals.

Zener diode 40 is normally non-conductive, but conducts whenever the conduction of transistor 20 causes the voltage across sense resistor 30 to exceed the Zener threshold conduction voltage of diode 40. When Zener

35 diode 40 conducts, the collector current of transistor 20 flows through Zener diode 40 rather than through sense resistor 30. At this time the voltage across resistor 30 is clamped to the fixed voltage developed across

conductive Zener diode 40, whereby the voltage across resistor 30 and the voltage at sense point A do not change. Accordingly, the amount by which the voltage at sense point A can decrease in response to a large

5 amplitude white-going video signal is limited as a function of the voltage developed across diode 40 when conducting.

The lowest voltage capable of being developed at sense point A is equal to the substantially fixed emitter

10 voltage of transistor 22 (+10.5 volts), minus the substantially fixed Zener voltage drop across diode 40. When diode 40 exhibits a +6.2 volt Zener voltage, the maximum voltage decrease at point A (i.e., the most negative-going transient voltage ΔV_A) is limited to +4.3

15 volts. In such case the voltage at input node C of the AKB signal processor exhibits a corresponding minimum voltage of +1.7 volts, whereby the input substrate to ground semiconductor junction represented by diode D_S is prevented from becoming forward biased. Accordingly,

20 reference voltage V_R and the AKB signal processing function remain undisturbed in the presence of large peak white video signal amplitude transitions during picture intervals.

The video output signal developed at the output

25 of driver transistor 22 and coupled to the kinescope advantageously is not disturbed when Zener diode 40 conducts during picture intervals. This results because the emitter current of driver transistor 22 does not change when diode 40 conducts. When diode 40 conducts,

30 the signal current which would otherwise flow through resistor 30 flows instead through conductive diode 40.

Other embodiments of the disclosed invention can be developed. For example, an electronic switch can be coupled across resistor 30 and keyed such that the switch

35 is conductive during picture intervals and non-conductive during AKB intervals.

Following is a more detailed discussion of the clamping and sampling operation of network 50, made with reference to the waveforms of FIGURE 2.

Auxiliary signal V_P is applied to circuit node B in FIGURE 1 via a diode 35 and a voltage translating impedance network comprising resistors 32 and 34. Signal V_P exhibits a given positive DC level at all times except during the AKB sampling interval, for maintaining diode 35 conductive so that a DC bias voltage is developed at node B. When the positive DC component of signal V_P is present, the junction of resistors 32 and 34 is clamped to a voltage equal to the positive DC component of signal V_P, minus the voltage drop across diode 35. Signal V_P manifests a negative-going, less positive fixed amplitude pulse component during the AKB sampling interval. Diode 35 is rendered non-conductive in response to negative pulse V_P, whereby the junction of resistors 32 and 34 is unclamped. Resistor 31 causes insignificant attenuation of the voltage change (V_1) developed at node B since the value of resistor 31 is small relative to the values of resistors 32 and 34.

Prior to the clamping interval but during the AKB interval, the pre-existing nominal DC voltage (V_{DC}) appearing at node B charges the positive terminal of capacitor 51. During the clamping interval when grid drive pulse V_G is developed, the voltage at node A decreases in response to pulse V_G by an amount representative of the black current level. This causes the voltage at node B to decrease to a level substantially equal to $V_{DC} - V_1$. Also during the clamping interval, timing signal V_C renders clamping switch 56 conductive, whereby via feedback action reference voltage V_R is developed at the negative terminal of clamp capacitor 51 as discussed. During the clamping interval, voltage V_3 across capacitor 51 is a function of reference set-up voltage V_R at the negative terminal of capacitor 51, and a voltage at the positive terminal of capacitor 51 corresponding to the difference between the described

pre-existing nominal DC level (V_{DC}) at node B and voltage change V_1 developed at node B during the clamping interval. Thus voltage V_3 across capacitor 51 during the clamping reference interval is a function of the level of

5   black current representative voltage change V_1, which may vary. Voltage V_3 can be expressed as (V_{DC} - V_1) - V_R.

During the immediately following sampling interval, positive grid drive pulse V_G is absent, causing the voltage at node B to increase positively to the

10   pre-existing nominal DC level V_{DC} that appeared prior to the clamping interval. Simultaneously, negative pulse V_P appears, reverse biasing diode 35 and perturbing (i.e., momentarily changing) the normal voltage translating and coupling action of resistors 32, 34 such that the voltage

15   at node B is reduced by an amount V_2 as indicated in FIGURE 2. At the same time, clamping switch 56 is rendered non-conductive at the end of clamping pulse V_C. Switch 57 conducts in response to signal V_S.

Thus during the sampling interval the voltage

20   applied to the signal input of amplifier 52 is equal to the difference between the voltage at node B and voltage V_3 across input capacitor 51. The input voltage applied to amplifier 52 is a function of the magnitude of voltage change V_1, which can vary with changes in the kinescope

25   black current level.

The voltage on output storage capacitor 58 remains unchanged during the sampling interval when the magnitude of voltage change V_1 developed during the clamping interval equals the magnitude of voltage change

30   V_2 developed during the sampling interval, indicating a correct kinescope black current level. This results because during the sampling interval, voltage change V_1 at node B increases in a positive direction (from the clamping set-up reference level) when the grid drive pulse

35   is removed, and voltage change V_2 causes a simultaneous negative-going voltage perturbation at node B. When kinescope bias is correct, positive-going voltage change V_1 and negative-going voltage change V_2 exhibit equal

magnitudes whereby these voltage changes mutually cancel during the sampling interval, leaving the voltage at node B unchanged.

5   When the magnitude of voltage change V_1 is less than the magnitude of voltage change V_2, amplifier 52 proportionally charges storage capacitor 58 via switch 57 in a direction for increasing cathode black current conduction. Conversely, amplifier 52 proportionally discharges storage capacitor 58 via switch 57 for causing 10 decreased cathode black current conduction when the magnitude of voltage change V_1 is greater than the magnitude of voltage change V_2.

        As more specifically shown by the waveforms of FIGURE 2, the amplitude "A" of voltage change V_1 is 15 assumed to be approximately three millivolts when the cathode black current level is correct, and varies over a range of a few millivolts ($\pm\Delta$) as the cathode black current level increases and decreases relative to the correct level as the operating characteristics of the 20 kinescope change. Thus the clamping interval set-up reference voltage across capacitor 51 varies with changes in the magnitude of voltage V_1 as the cathode black current level changes. Voltage change V_2 at node B exhibits an amplitude "A" of approximately three 25 millivolts, which corresponds to amplitude "A" associated with voltage change V_1,when the black current level is correct.

        As indicated by waveform V_{COR} in FIGURE 2, corresponding to a condition of correct kinescope bias, 30 the voltage at the signal input of amplifier 52 remains unchanged during the sampling interval when voltages V_1 and V_2 are both of amplitude "A". However, as indicated by waveform V_H, the signal input voltage of amplifier 52 increases by an amount Δ when voltage change V_1 exhibits 35 amplitude "A + Δ", corresponding to a high black current level. In this event output storage capacitor 58 is discharged so that the bias control voltage applied to the base of transistor 20 causes the collector voltage of

transistor 22 to increase, whereby the cathode black current decreases toward the correct level.

Conversely, and as indicated by waveform V_L, the signal input voltage of amplifier 52 decreases by an

5 amount Δ during the sampling interval when voltage change V_1 exhibits amplitude "A - Δ", corresponding to a low black current level. In this case output storage capacitor 58 charges, causing the collector voltage of transistor 22 to decrease whereby the cathode black

10 current increases toward the correct level. In either case, several sampling intervals may be required to achieve the correct black current level.

The described combined-pulse sampling technique employing voltage changes V_1 and V_2 is discussed in greater

15 detail in a copending UK application/(RCA 7658.3/78.456 corresponding to US patent application Serial No 434,314 of R.P.Parker titled "Signal Processing Network For An Automatic Kinescope Bias Control System"). This copending application also discloses additional information concerning the arrangement

20 including auxiliary control signal V_p, as well as disclosing a suitable arrangement for timing signal generator 40.

CLAIMS

1. In a system including a video signal channel for processing video signals including image and blanking intervals, apparatus comprising

means coupled to a sensing point in said video channel for deriving a signal representative of an operating characteristic of said video channel during image blanking intervals;

signal processing means responsive to said derived representative signal for providing a control signal to said video channel for maintaining a desired condition of said operating characteristic; and

means for attenuating amplitude excursions manifested by video signals at said sensing point during image intervals when said amplitude excursions exceed a given threshold level.

2. Apparatus according to claim 1 having an image display device and wherein the said deriving means derives a signal representative of the magnitude of black image current conducted by the display device during image blanking intervals, and the control signal is a bias control signal for said image display device for maintaining a desired level of current.

3. Apparatus according to claim 2, wherein the signal processing means comprises an integrated circuit having an input at which a substrate-to-ground semiconductor junction is present, and a clamping capacitor coupled to the input.

4. Apparatus according to claim 2 or 3, wherein the video signal channel includes a video signal amplifier having a main conduction path, and the deriving means includes a sensing impedance in that main conduction path for deriving the said representative signal, and

1   the attenuating means is connected across the
sensing impedance.

          5. Apparatus according to claim 4 wherein
5   the attenuating means comprises a Zener diode.

          6. **Apparatus according to Claim 1,** 2,3,4 or 5
10   wherein
          said video signal amplitude excursions exceeding
said threshold level are within a range of normally
expected video signal amplitude excursions.

15

          7. **Apparatus according to Claim 1,** 2,3,4 or 5
wherein
          said attenuating means includes switching means
          for providing selective attenuation of said video
20   **signal amplitude excursions at said sensing point during**
image intervals.

          8. **Apparatus according to Claim 1,**
25   wherein
          said signal deriving means comprises an
impedance   coupled to said video signal channel, said
impedance exhibiting a voltage thereacross which is
related to amplitude excursions of said video signals
30   during image intervals, and which is related to said
operating characteristic of said video channel during said
image blanking intervals; and
          said attenuating means   . limits the voltage
developed across said impedance in response to said video
35   signal amplitude excursions exceeding said threshold level
during said image intervals.

9. Apparatus according to Claim 8 wherein
said attenuating means comprises switching means coupled to said impedance.

10. Apparatus according to Claim 9, wherein
said switching means is coupled across said impedance .

11. Apparatus according to Claim 10, wherein
said switching means comprises a normally non-conductive diode subject to being rendered conductive in response to said video signal amplitude excursions during image intervals.

12. Apparatus as claimed in Claim 3 having an image display device and wherein
said video signal channel includes a video signal amplifier , for providing video signals including image and blanking intervals to said image display device ; said signal deriving means derives
a signal representative of the magnitude of black image current conducted by said image display device during image blanking intervals; and
said control signal is
a bias control signal to said image display device for maintaining a desired level of black current.

13. Apparatus according to Claim 12 wherein

said impedance is included in a signal conduction path of said video amplifier.

14. Apparatus according to Claim 13 wherein

said video amplifier corresponds to a driver amplifier for supplying video output signals to said image display device.

15. Apparatus according to Claim 12, wherein

said video amplifier corresponds to a driver amplifier for supplying video output signals to said image display device, the video amplifier comprising

a first terminal for receiving video signals to be amplified,

a second terminal coupled to an intensity control electrode of said image display device for supplying amplified video signals thereto,

a third terminal coupled to a reference potential, a main current conduction path of said video amplifier between the second and third terminals, and

feedback means coupled from said first terminal of said video amplfier; and wherein said impedance includes

a sensing impedance for receiving, via said feedback means, current variations representative of black current variations manifested at said second terminal of said amplifier means so that said impedance develops a voltage thereacross representative of black current variations.

16. Apparatus according to Claim 15, wherein said video amplifier comprises a cascode amplifier including:

a first transistor with a first electrode for receiving video signals to be amplified, a second electrode, and a third electrode coupled to a reference potential;

a second transistor with a first electrode coupled to a bias voltage, a second electrode coupled to an operating voltage supply via a load impedance and coupled to an intensity control electrode of said image display device for supplying amplified video signals thereto, and a third electrode coupled to said second electrode of said first transistor; and wherein said feedback means is coupled from said second electrode of said second transistor to said first electrode of said first transistor; and wherein said sensing impedance is coupled between said second electrode of said first transistor and said third electrode of said second transistor.

17. A video signal processing system substantially as hereinbefore described with reference to Figures 1 and 2 of the drawings.

13. A color television receiver including a video signal processing system according to any preceding claim.

THE PATENT OFFICE

State House 66-71 High Holborn London WC1R 4TP

Switchboard 01-831 2525

RENEWAL DETAILS

PATENT No 2130046

RENEWAL DATE .... 13 · 10 · 1983

RENEWAL FEE PAID FOR .... 5th .... YEAR ON due 13/10/87

....
FOR THE COMPTROLLER

NOTE: RENEWALS FILED WITHIN THE LAST FEW DAYS MAY NOT APPEAR
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Patent Granted:

WITH EFFECT FROM
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Priority claimed:
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Title:
Automatic control of a characteristic of a signal channel

Applicant:
RCA Corporation (USA-Delaware), 30 Rockefeller Plaza, City and State of New York 10020,
United States of America.

Inventor:
James Charles Tallant, 11715 Rush Drive, Indianapolis, Indiana 46060,
United States of America.

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Address for Service:
Richard W Pratt, C/o RCA International Limited, Norfolk House, 31 St James's Square,
London SW1Y 4JR.