

TELEVISION RECEIVER WITH AUXILIARY VIDEO CLAMP

5 This invention relates to television receivers generally and particularly receivers having auxiliary inputs and provisions for clamping the auxiliary signals.

10 In television receivers having both RF and auxiliary (baseband) video inputs it is common practice to clamp the detected and auxiliary signals to similar levels to avoid picture flashing when switching between different video sources. Filliman et al., for example, in US Pat. 4660084 entitled TELEVISION RECEIVER WITH SELECTABLE VIDEO INPUT SIGNALS describes a system in which both the RF video source and the auxiliary video source are stripped of their original DC values and clamped to new DC reference voltage.
15 This arrangement prevents picture flashing when changing between sources but employs a pair of feedback controlled keyed clamps which are relatively costly and complex to implement.

FIGURE 2 herein shows an arrangement which is exemplary of a prior art arrangement that is relatively simple in that
20 the auxiliary input signal is clamped via a sync tip clamp to approximately the DC level of the detected video input signal. As shown, the system includes an IF input terminal 201 which receives an IF signal from the receiver tuner. Terminal 201 is connected to an IF AGC loop comprising an IF amplifier 202, a video detector 204 an AGC amplifier 206, an AGC smoothing capacitor 208 and an AGC
25 reference voltage source 207. The AGC loop adjusts the gain of the IF amplifier the DC level of the video detector output equals the AGC reference voltage provided by the reference voltage source (illustrated as a battery) 207. The resultant DC stabilized video signal
30 is supplied to one input of a video switch 212 which receives the auxiliary video input signal via capacitor 214 and supplies a selected video output signal. The auxiliary video input signal is clamped by means of a clamp diode 216 and another reference voltage source 218 that is selected to be a level approximating the DC level of the
35 detected video output signal.

The prior art system described above has an advantage of relative simplicity over the more complicated keyed synchronous



clamping arrangement of Filliman et al. However, it has been found that certain problems can arise with regard to "picture flashing" in the system of Fig. 2 and particularly in the case where the receiver IF circuitry is in one integrated circuit and the auxiliary video clamp is either in another integrated circuit or is designed with discrete components. It has been found that the "picture flashing" problems arise due to the independence of the reference voltage for the AGC loop and the reference voltage for the auxiliary input clamp circuit. Any drift of these two reference voltages relative to each other will result in a blanking level mismatch when switching between video sources and "picture flashing" necessarily will result.

In accordance with the invention, the problem of "picture flashing" is solved by placing the video switch, IF, AGC and auxiliary input clamp in one integrated circuit with the auxiliary video signal clamp voltage and the AGC reference voltage being derived from a single common bias source. In this way tolerances due to production variables as well as temperature variations will track to minimize the sync tip voltage of the internal and external signals at the switch inputs. In this way picture flashing will be minimized for all except cases of non-standard blanking to sync amplitude of the IF detected signals (e.g., sync suppressed scrambled signals).

In accordance with the invention, a clamp system for use in a television receiver having tuner and auxiliary video sources, comprises an IF AGC and video detector circuit having an AGC reference voltage input and an auxiliary video input signal clamp circuit having a reference voltage input. The detector circuit and the clamp circuit are each formed on a common integrated circuit along with a video switch for selecting video signals provided by said detector and clamp circuits. The integrated circuit further includes a reference voltage source and a bias generator for deriving the AGC reference voltage and the auxiliary input signal clamp voltage from the common source.

The foregoing and further features of the invention are shown in the accompanying drawing wherein:

FIGURE 1 is a block diagram of a television receiver including an auxiliary video clamp embodying the invention; and

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FIGURE 2 is a block diagram of a prior art auxiliary video clamp circuit.

The receiver 10 of FIGURE 1 includes an antenna input terminal 12 for receiving an RF modulated video input signal and an auxiliary input terminal 14 for receiving a baseband composite video input signal provided by an external source. Terminal 12 is applied to a tuner 16 having an output applied to a mixer 18 which provides an IF frequency signal to an IF filter 20. The IF output signal S1 is applied to the input 32 of an auxiliary video clamp unit 30 (outlined in phantom) which has a second input 34 coupled by a clamp capacitor 36 to input 14 for receiving the auxiliary video input signal. Unit 30 also includes a switch having an output 38 providing a tuner detected composite video signal or the auxiliary clamped video signal. The selected video signal from terminal 38 is applied to a picture processing unit 80 that provides a processed video signal to a display unit 82 (e.g., a kinescope) for display. A receiver control unit 86 (e.g., a control microprocessor) supplies a tuning signal to tuner 16 for channel selection and supplies a tuner/auxiliary selection signal to input 40 of unit 30 to control a video switch 42 that selects tuner or auxiliary video. Control unit 86 also sends various control signals to processor 80 for controlling picture parameters such as hue, saturation, brightness and contrast.

The auxiliary clamp circuit 30 (outlined in phantom) is constructed in an integrated circuit and provides the functions of IF AGC control, tuner video detection and auxiliary video clamping and video signal selection. The IF AGC loop 42 includes an IF amplifier which amplifies the signal at terminal 32 and applies it to a video detector 46 that provides a composite video signal to a sound trap and to one input of the AGC comparator 48. This comparator has a current source output connected to pin 52, to which the AGC capacitor 50 is attached (off chip), and connected to the gain control input of the IF amplifier. The reference voltage V2 for the AGC comparator is provided by a bias generator 60. This generator has an input connected to a reference voltage source 61 (illustrated as a battery for simplicity) which generates a master reference voltage V1. The reference voltage V2 is derived from voltage V1 by means of bias generator 60 which also generates two bias voltages V3 and



V4 and a clamp reference voltage V5 for use elsewhere, as will be explained. The closed loop IF AGC system 42 regulates the DC values of the video output signal provided by detector 46 at a value determined by reference voltage V2 and, therefore, in proportion to the main reference voltage V1.

The tuner video signal provided by detector 46 is applied by the sound trap 56 and a video amplifier 64 to one input of the video switch 42. The auxiliary video signal at terminal 34 is clamped to reference voltage V5 by clamp 66 and applied to the other input of switch 42 via a second video amplifier 70. The video amplifiers 64 and 70 receive respective DC bias voltages V3 and V4 provided by the bias generator 60.

In the operation of the system of FIGURE 1, the DC component of the video signal from the tuner will be determined by the bias voltage V2 applied to the IF AGC loop and by the bias V3 applied to the first video amplifier 64. The auxiliary input video signal will have a DC component determined by the clamp reference voltage V5 and by the bias (V4) applied to the second video amplifier 70. Since the IF AGC voltage V2, the video amplifier bias voltages V3 and V4 and the clamp reference voltage V5 are all derived from the same primary reference voltage source 61 (V1), the DC component of the auxiliary input video signal can be made essentially equal to that of the tuner supplied video signal and these two signals will track each other for changes in temperature, signal level and IC processing tolerances. Accordingly, switching transients are minimized when switching between internal and external video sources and the system performance is not degraded for temperature changes, process tolerances and signal level changes.

Various changes and modifications may be made to the illustrated embodiment of the invention. More inputs may be provided, for example, for additional auxiliary video sources. It will be appreciated that the reference voltage source 62 may comprise a precision reference (a battery is illustrated only for simplicity). The bias generator 60 may be implemented either as a potential divider type or as a current divider type for a given circuit implementation. What is important to the present invention is that the bias for the two video amplifiers, for the AGC reference and for the auxiliary



clamp be derived from a common source and that the circuit be formed (with the exception of capacitors) in an integrated circuit.

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CLAIM:

1. A clamp system for use in a television receiver having tuner and auxiliary video sources, comprising:

5 an IF AGC and video detector circuit (43) having an AGC reference voltage input (REF V2); and

an auxiliary video input signal clamp circuit (66) having a reference voltage input (REF V5); characterized in that

10 said detector circuit and said clamp circuit being formed on a common integrated circuit (30) along with a video switch (42) for selecting video signals provided by said detector and clamp circuits, said integrated circuit further including a reference voltage source (62) and means (60) for deriving said AGC reference voltage and said auxiliary input signal clamp voltage from said common
15 source.

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