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(54) CHROMINANCE CHANNEL CIRCUIT FOR ADJUSTING THE RATIO BETWEEN THE TRANSMISSION FACTORS OF THE CHANNEL FOR A PICTURE CONTENT SIGNAL AND A BURST SIGNAL

(71) We, PHILIPS ELECTRONIC AND ASSOCIATED INDUSTRIES LIMITED, of Abacus House, 33 Gutter Lane, London, E.C.2, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a circuit for inclusion in a colour television receiver chrominance signal channel for adjusting the ratio between the transmission factor of said channel for a picture content signal component of a chrominance signal and the transmission factor of said channel for a burst signal component of said chrominance signal, said ratio being substantially independent of the amplitude of the burst signal.

A circuit of this kind is known from the Patent Specification 1,183,496. In this known circuit an attenuation circuit is arranged between a chrominance signal input and an output, this attenuation circuit having an attenuation dependent on an output of a combination circuit supplied with pulses during the occurrences of the burst signal and with a ratio-adjusting signal. The attenuation circuit includes a resonant circuit damped by a diode. The attenuation of the circuit is dependent on the conductance of the diode and this is determined by the output of the combination circuit. During the occurrences of the burst signal the diode is blocked by the aforesaid pulse.

This known circuit is not very suitable for construction as an integrated circuit due to the use of a tuned circuit.

An object of the present invention is to provide an adjusting circuit which is suitable for construction as an integrated circuit.

According to one aspect the invention provides a circuit for inclusion in a colour television receiver chrominance signal channel for adjusting the ratio between the transmission factor of said channel for a picture content signal component of a chrominance signal and the transmission factor of said channel for a burst signal component of said chrominance signal, said ratio being substantially independent of the amplitude of the burst signal, said circuit comprising first, second and third transistors with the emitter of the third transistor coupled to a voltage supply terminal, the collector of the third transistor coupled to the emitters of the first transistor and the second transistor, the collector of the first transistor connected through a load impedance to a voltage supply terminal, and the collector of the second transistor also coupled to a voltage supply terminal, said circuit having a chrominance signal input coupled to the base of the third transistor,

mission factor of said channel for a picture content signal component of a chrominance signal and the transmission factor of said channel for a burst signal component of said chrominance signal, said ratio being substantially independent of the amplitude of the burst signal, said circuit comprising a long-tailed pair of first and second transistors with the output current path of a third transistor in the tail, a load impedance connected to the output electrode of the first transistor, a chrominance signal input coupled to a control electrode of the third transistor, a pulse signal input coupled to a control electrode of the first and/or second transistor and to which is coupled an output of a generator for producing a pulse during the occurrence of each burst in the chrominance signal, a ratio-adjusting signal input coupled to a control electrode of the first and/or second transistor, and a chrominance signal output to which is coupled the output electrode of the first transistor.

According to another aspect the invention provides a circuit for inclusion in a colour television receiver chrominance signal channel for adjusting the ratio between the transmission factor of said channel for a picture content signal component of a chrominance signal and the transmission factor of said channel for a burst signal component of said chrominance signal, said ratio being substantially independent of the amplitude of the burst signal, said circuit comprising first, second and third transistors with the emitter of the third transistor coupled to a voltage supply terminal, the collector of the third transistor coupled to the emitters of the first transistor and the second transistor, the collector of the first transistor connected through a load impedance to a voltage supply terminal, and the collector of the second transistor also coupled to a voltage supply terminal, said circuit having a chrominance signal input coupled to the base of the third transistor,

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a pulse signal input coupled to the base of the first and/or second transistor and to which is coupled an output of a generator for producing a pulse during the occurrence of each burst in the chrominance signal, a ratio-adjusting signal input coupled to the base of the first and/or second transistor, and a chrominance signal output to which is coupled the collector of the first transistor.

In order that the invention may be readily carried into effect, an embodiment thereof will now be described in detail, by way of example, with reference to the accompanying diagrammatic drawing.

The drawing is a block diagram of a colour television receiver including an adjusting circuit shown in greater detail.

An RF, IF and detection section 1 of the receiver has an aerial input 3, an output 5 for a luminance signal Y, an output 7 for a chrominance signal Chr and an output 9 for a synchronizing signal S.

The output 5 is connected to an input 11 of a luminance signal amplifier 13, an output 15 of which is connected to an input 17 of a picture display section 19. A control signal input 21 of the luminance signal amplifier 13 is supplied from an output 23 of a combination circuit 25. An input 27 of this combination circuit 25 is connected to a contrast adjusting circuit 29 and an input 31 thereof is supplied from an output 33 of a deflection current and EHT generator 35, an input 37 of which is connected to the output 9 of the section 1.

The generator 35 provides a beam current limiting voltage at its output 33 for limiting the beam current in a display tube in the section 19. It also provides vertical and horizontal deflection currents for the picture display section 19 and pulses to two outputs 39 and 41 which will be further referred to hereinafter.

The chrominance signal output 7 of the section 1 is connected to an input 43 of an adjusting circuit 45.

The adjusting circuit 45 has an output 47 which is connected to an input 49 of an amplifier 51, amplifier 51 and circuit 45 together forming a chrominance signal channel between terminals 43 and 53. The output 53 of this amplifier is connected to an input 55 of a demodulation and matrix circuit 57, and to an input 59 of a burst gate 61.

The burst gate 61 has an input 63 which is fed with gating pulses from the output 39 of the generator 35. The burst gate 61 conducts during the occurrence of the gating pulses and supplies a burst signal at an output 65. The output 65 is connected to an input 67 of a rectifier circuit 69 which converts the burst signals passed by the gate 61 into a direct voltage which appears

at an output 71. The output 71 is connected to a control signal input 73 of the adjusting circuit 45 in such a sense as to tend to maintain the amplitude of the burst signal at the output 53 of the amplifier 51 constant.

The adjusting circuit 45 includes transistors 75, 79, 83, 95, and 97 connected as shown. The emitter of transistor 75 is connected to earth via a resistor 77. The collector of transistor 79 is connected to a positive voltage supply via a load resistor 81 and its base is connected to a voltage supply V_1 . The base of transistor 83 is connected to an output 85 of a second combination circuit 87 and its collector is connected to a positive voltage supply.

The second combination circuit 87 has an input 89 which is a first adjusting signal input of the adjusting circuit 45 and is fed from the output 23 of the combination circuit 25, with a voltage which is dependent on the contrast adjustment and the beam current. A second input 91 of the combination circuit 87 is a pulse signal input of the adjusting circuit 45 and is fed from the output 41 of the generator 35. A third input 93 of the second combination circuit 87 is a second adjusting signal input of the adjusting circuit 45 and is fed from a saturation adjusting circuit 99.

The base of transistor 95 is connected to a supply voltage V_2 . The collector of transistor 97 is connected to a positive supply voltage.

The operation of adjusting circuit 45 is as follows:

A chrominance signal applied from 7 to the base of transistor 75 and containing burst and picture content signals appears in an amplified form at its collector and is applied to the emitters of transistors 95 and 97. The current distribution between these transistors is controlled by the control signal at the control signal input 73. The portion of the current flowing through transistor 95 is applied via the collector thereof to the emitters of transistors 79 and 83.

The current distribution between the transistors 79 and 83 is determined by the voltage difference between the bases of these transistors. As a result of the pulse signal applied to the input 91 of the combination circuit during the occurrences of the burst signal, this voltage difference is always such that the transistor 83 is cut-off during these times and the entire current supplied by the transistor 95 then flows to the transistor 79 and provides a burst output signal across the load resistor 81. This burst output signal is independent of the settings of the contrast and saturation adjusting circuits 29 and 99 respectively.

During the occurrence of the picture signal at output 7 the voltage difference be-

between the bases of the transistors 79, 83 is influenced by the contrast adjusting circuit 29, the saturation adjusting circuit 99 and the beam current limiting voltage originating from the output 33 of the generator 35. A part (which depends on this voltage difference) of the current supplied by transistor 95 then flows through the transistor 79 and produces a signal voltage across load resistor 81 which is dependent on said voltage difference.

The ratio of the signals occurring across the load resistor 81 during the presence of the burst signal and the presence of the picture content signal is independent of the automatic gain control signal applied to the control signal input 73. (Said gain control signal is smoothed so as to be operative during the occurrence of the picture content signal as well). It does however depend on the total bias voltage supplied from the second combination circuit 87. The amplitude of the output burst signal is not influenced by this bias voltage and is maintained substantially constant by said automatic gain control.

Although voltage inputs at terminals 89, 91 and 93 have been described as being all applied to the base of the transistor 83, it is alternatively possible to apply one or more of these voltages to the base of the transistor 79 in an opposite sense or to both in push-pull. Similarly the connections to the bases of transistors 95 and 97 may be interchanged if the control signal is arranged to be applied to input 73 in an opposite sense, or this control signal may be applied to the bases of both transistors in push-pull.

The transistor pairs may, if desired, each be shunted by a direct current compensation pair.

The transistors 95 and 97 may be omitted if the automatic gain control is arranged to operate on a stage preceding or following the adjusting circuit. The collector of the first transistor 75 is then connected to the emitters of the second and third transistors 79 and 83.

The circuit 45 is eminently suitable for construction as an integrated circuit.

WHAT WE CLAIM IS:—

1. A circuit for inclusion in a colour television receiver chrominance signal channel for adjusting the ratio between the transmission factor of said channel for a picture content signal component of a chrominance signal and the transmission factor of said channel for a burst signal component of said chrominance signal, said ratio being substantially independent of the amplitude of the burst signal, said circuit comprising a long-tailed pair of first and second transistors with the output current

path of a third transistor in the tail, a load impedance connected to the output electrode of the first transistor, a chrominance signal input coupled to a control electrode of the third transistor, a pulse signal input coupled to a control electrode of the first and/or second transistor and to which is coupled an output of a generator for producing a pulse during the occurrence of each burst in the chrominance signal, a ratio-adjusting signal input coupled to a control electrode of the first and/or second transistor, and a chrominance signal output to which is coupled the output electrode of the first transistor.

2. A circuit as claimed in Claim 1, including a second long-tailed pair of fourth and fifth transistors with the output current path of the third transistor in its tail and with the output current path of the fourth transistor in the tail of the first long-tailed pair, the circuit having a burst signal amplitude control signal input coupled to a control electrode of the fourth and/or fifth transistor, an output of a burst amplitude control signal source being coupled to said control signal input.

3. A circuit for inclusion in a colour television receiver chrominance signal channel for adjusting the ratio between the transmission factor of said channel for a picture content signal component of a chrominance signal and the transmission factor of said channel for a burst signal component of said chrominance signal, said ratio being substantially independent of the amplitude of the burst signal, said circuit comprising first, second and third transistors with the emitter of the third transistor coupled to a voltage supply terminal, the collector of the third transistor coupled to the emitters of the first transistor and the second transistor, the collector of the first transistor connected through a load impedance to a voltage supply terminal, and the collector of the second transistor also coupled to a voltage supply terminal, said circuit having a chrominance signal input coupled to the base of the third transistor, a pulse signal input coupled to the base of the first and/or second transistor and to which is coupled an output of a generator for producing a pulse during the occurrence of each burst in the chrominance signal, a ratio-adjusting signal input coupled to the base of the first and/or second transistor, and a chrominance signal output to which is coupled the collector of the first transistor.

4. A circuit as claimed in Claim 3 including fourth and fifth transistors, the fourth transistor being connected between the collector of the third transistor and the emitters of the first and second transistors, the emitter of said fourth transistor being connected to the emitter of the fifth transistor.

tween the bases of the transistors 79, 83 is influenced by the contrast adjusting circuit 29, the saturation adjusting circuit 99 and the beam current limiting voltage originating from the output 33 of the generator 35. A part (which depends on this voltage difference) of the current supplied by transistor 95 then flows through the transistor 79 and produces a signal voltage across load resistor 81 which is dependent on said voltage difference.

The ratio of the signals occurring across the load resistor 81 during the presence of the burst signal and the presence of the picture content signal is independent of the automatic gain control signal applied to the control signal input 73. (Said gain control signal is smoothed so as to be operative during the occurrence of the picture content signal as well). It does however depend on the total bias voltage supplied from the second combination circuit 87. The amplitude of the output burst signal is not influenced by this bias voltage and is maintained substantially constant by said automatic gain control.

Although voltage inputs at terminals 89, 91 and 93 have been described as being all applied to the base of the transistor 83, it is alternatively possible to apply one or more of these voltages to the base of the transistor 79 in an opposite sense or to both in push-pull. Similarly the connections to the bases of transistors 95 and 97 may be interchanged if the control signal is arranged to be applied to input 73 in an opposite sense, or this control signal may be applied to the bases of both transistors in push-pull.

The transistor pairs may, if desired, each be shunted by a direct current compensation pair.

The transistors 95 and 97 may be omitted if the automatic gain control is arranged to operate on a stage preceding or following the adjusting circuit. The collector of the first transistor 75 is then connected to the emitters of the second and third transistors 79 and 83.

The circuit 45 is eminently suitable for construction as an integrated circuit.

WHAT WE CLAIM IS:—

1. A circuit for inclusion in a colour television receiver chrominance signal channel for adjusting the ratio between the transmission factor of said channel for a picture content signal component of a chrominance signal and the transmission factor of said channel for a burst signal component of said chrominance signal, said ratio being substantially independent of the amplitude of the burst signal, said circuit comprising a long-tailed pair of first and second transistors with the output current

path of a third transistor in the tail, a load impedance connected to the output electrode of the first transistor, a chrominance signal input coupled to a control electrode of the third transistor, a pulse signal input coupled to a control electrode of the first and/or second transistor and to which is coupled an output of a generator for producing a pulse during the occurrence of each burst in the chrominance signal, a ratio-adjusting signal input coupled to a control electrode of the first and/or second transistor, and a chrominance signal output to which is coupled the output electrode of the first transistor.

2. A circuit as claimed in Claim 1, including a second long-tailed pair of fourth and fifth transistors with the output current path of the third transistor in its tail and with the output current path of the fourth transistor in the tail of the first long-tailed pair, the circuit having a burst signal amplitude control signal input coupled to a control electrode of the fourth and/or fifth transistor, an output of a burst amplitude control signal source being coupled to said control signal input.

3. A circuit for inclusion in a colour television receiver chrominance signal channel for adjusting the ratio between the transmission factor of said channel for a picture content signal component of a chrominance signal and the transmission factor of said channel for a burst signal component of said chrominance signal, said ratio being substantially independent of the amplitude of the burst signal, said circuit comprising first, second and third transistors with the emitter of the third transistor coupled to a voltage supply terminal, the collector of the third transistor coupled to the emitters of the first transistor and the second transistor, the collector of the first transistor connected through a load impedance to a voltage supply terminal, and the collector of the second transistor also coupled to a voltage supply terminal, said circuit having a chrominance signal input coupled to the base of the third transistor, a pulse signal input coupled to the base of the first and/or second transistor and to which is coupled an output of a generator for producing a pulse during the occurrence of each burst in the chrominance signal, a ratio-adjusting signal input coupled to the base of the first and/or second transistor, and a chrominance signal output to which is coupled the collector of the first transistor.

4. A circuit as claimed in Claim 3 including fourth and fifth transistors, the fourth transistor being connected between the collector of the third transistor and the emitters of the first and second transistors, the emitter of said fourth transistor being connected to the emitter of the fifth transis-



- tor, the emitters of the fourth and fifth transistors being coupled to the collector of the third transistor, the collector of the fourth transistor being coupled to the emitters of the first and second transistors, and the collector of the fifth transistor being coupled to a voltage supply terminal, the circuit having a burst signal amplitude control signal input coupled to the base of the fourth and/or fifth transistor, an output of a burst amplitude control signal source being coupled to said control signal input.
5. A circuit as claimed in any preceding claim, including a ratio-adjusting signal source having its output coupled to the ratio adjusting signal input.
6. A circuit as claimed in any preceding Claim, wherein said transistors and said load impedance together with the connections

therebetween are constructed as an integrated circuit.

7. A circuit for a colour television receiver chrominance signal channel, substantially as herein described with reference to the accompanying drawing.

8. A colour television receiver including a circuit as claimed in any preceding claim.

9. A colour television receiver substantially as described herein with reference to the accompanying drawing.

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