

TIMEBASE CIRCUIT

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FIELD OF INVENTION

The present invention relates to a timebase circuit suitable for use in a television receiver. The invention relates more particularly to a vertical (field) timebase
10 circuit.

BACKGROUND ART

In its simplest form the waveform generated by a
15 vertical timebase circuit comprises a linear sawtooth waveform. This waveform is typically generated by charging and periodically discharging a ramp capacitor.

In practice problems arise in utilising a linear ramp current. The external driver circuit which applies the
20 generated ramp current to the vertical deflection coils is non-linear. Secondly the picture tube may not have a linear deflection versus current characteristic.

This invention seeks to provide a timebase circuit in which the above mentioned problems are mitigated.

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BRIEF DESCRIPTION OF INVENTION

In accordance with the invention there is provided a timebase circuit suitable for a television picture tube,
30 comprising current source means for providing a first current for charging a capacitor to produce a ramp voltage; means for deriving a correction current whose value is continuously dependent upon the instantaneous ramp voltage excluding components of non-linearity and means for adding
35 the correction current to the first current to provide a dynamic linearity correction, during the generation of the ramp voltage.

In a preferred embodiment a current proportional to the difference between the instantaneous ramp voltage and ..

the average, centre screen ramp voltage is multiplied by a reference current to provide the linearity control current.

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BRIEF DESCRIPTION OF DRAWINGS

10 An exemplary embodiment of the invention will now be described with reference to the single figure drawing which illustrates schematically a preferred embodiment of a timebase circuit in accordance with the present invention.

DETAILED DESCRIPTION OF INVENTION

15 The vertical timebase circuit illustrated comprises current sources 1, 2 and 3 which feed current to a terminal 4 to charge a capacitor 5 connected in operation between the terminal 4 and a reference terminal 6 which is typically an earth terminal.

20 The combined current fed to the terminal 4 forms on the capacitor the vertical ramp current and the timebase sawtooth waveform is derived by periodically discharging the capacitor 5 by means of a switch 7 connected across the capacitor 5 between the terminal 4 and the earth
25 terminal 6.

The current generator 1 provides a fixed reference current typically of the order of 6 micro amps. The current source 2 provides an adjustable current of value typically between 0 and 3 micro amps and forms a factory
30 preset picture height adjustment. The current source 3 is a compensation current which forms a subject of a copending application.

In accordance with the present invention and in order to compensate for the non linearity of external components

a linearity control correction current is fed to the terminal 4 over line 8 where it is added to the other
5 currents fed to the terminal 4.

The main nonlinearity term introduced by the external components is generally symmetrical about the centre of the vertical scan and is second order in time. In the preferred embodiment of the invention the linearity control correction
10 current provides a correction to the ramp current which is also symmetrical about centre of the vertical scan and is second order in time when integrated on the capacitor 5.

To generate the linearity control correction current the ramp voltage at the terminal 4 is fed over a line 9 to
15 an input 10 of a differential amplifier 11 which has a transconductance G . A second input 12 of the comparator 11 receives a reference voltage $V_h/2$ which is half the maximum ramp voltage ie is the ramp voltage at the centre screen position when the tube beam is undeflected vertically.

20 Output current provided by the comparator 11 is fed to a first input 13 of a multiplier 14. A second input 15 of the multiplier 14 receives a reference current $IDAC$ which is typically supplied from the output of a digital to analogue converter. The current $IDAC$ is produced in response to a
25 preselected digital code chosen in accordance with the characteristics of external components to give a satisfactory control current.

The resulting control current IL which is the multiple of the output current I' of the comparator 11 and the
30 reference current $IDAC$ is linear w.r.t. time. This current is integrated on the capacitor 5 in order to produce a component of the ramp voltage which is second order in time. The current IL adjusts the linearity without changing the height of the picture because the current I' is
35 symmetrical about zero, ie about a centre

screen value. Any change in the value of I' due to temperature, or any change in the value of I_{DAC} will not effect the resulting overall picture height.

5 The invention is particularly applicable to manufacture as part of an integrated circuit and in the illustrated embodiment all those components with the exception of the external ramp capacitor 5 would be integrated.

10 The invention has been described by way of example and modifications may be made without departing from the scope of the invention. For example although the invention has been described with particular reference to a domestic television receiver the invention is also
15 equally applicable the control of linearity in any television type display such as a monitor a computer display or a graphics display. Also as illustrated the current I_{DAC} has been illustrated as being derived from the output of a digital to analogue converter. This
20 facilitates the incorporation of the invention as part of a microprocessor controlled television signal processing circuit. However the reference current I_{DAC} could be provided by any convenient means.

CLAIMS

- 5 1. A timebase circuit suitable for a television picture tube, comprising current source means for providing a first current for charging a capacitor to produce a ramp voltage; means for deriving a correction current whose value is continuously dependent upon the instantaneous ramp voltage
10 excluding components of non-linearity and means for adding the correction current to the first current to provide a dynamic linearity correction, during the generation of the ramp voltage.
- 15 2. The circuit of claim 1 wherein the correction current is symmetrical about the centre of the ramp voltage.
3. The circuit of claim 2 wherein the means for providing the correction current includes means for producing a
20 difference current proportional to the difference between the instantaneous and the average ramp voltages.
4. The circuit of claim 3 wherein the means for producing a difference current comprises a differential amplifier.
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5. The circuit of claim 3 or 4 and further including means for multiplying the difference current by a reference current to provide the correction current.
- 30 6. The timebase circuit as claimed in claim 5 including a digital to analogue converter for providing the reference current in response to a predetermined digital code.



7. The timebase circuit of any preceding claim and fabricated in integrated circuit form.

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8. A television receiver vertical timebase circuit incorporating a timebase circuit as claimed in any preceding claim.

10 9. A television receiver including a timebase circuit as claimed in any preceding claim.

10. A timebase circuit substantially as herein described with reference to and as illustrated in the drawing.

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