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FRAME TIME BASE CIRCUITS

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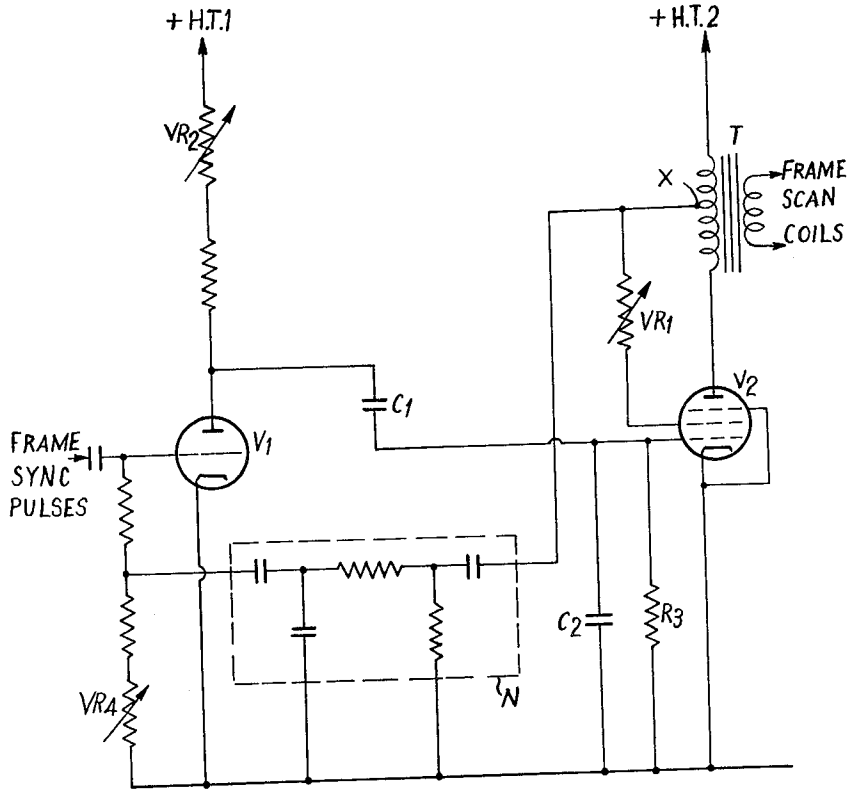

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FRAME TIME BASE CIRCUITS

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The present invention relates to frame time base circuits for television receivers and other television apparatus.

It is an object of the present invention to provide an improved frame time base circuit in which increased scanning current can be obtained without the necessity of using larger valves than are at present normally used in frame time base circuits.

According to the present invention a frame time base circuit has an output stage connected as an ultra-linear amplifier.

It is to be understood that by the expression "ultra-linear amplifier" is meant an amplifier employing a valve having a screen grid which, during operation of the valve, is fed so that its potential varies with variations in the signal at the anode of the valve.

According to a feature of the invention, the frame time base comprises an output stage operating as an ultra-linear amplifier and the output valve is provided with a grid lead bias circuit so arranged that the positive peaks of a driving sawtooth waveform are restored to the cathode potential of the output valve by grid current, and the values of the grid resistor and other grid circuit components of the output valve are so chosen that the amount of clipping which takes place due to grid current is very small.

According to another feature of the invention, the screen grid of the frame time base output valve is fed from a tapping on the primary of the output transformer feeding the frame deflector coils, and a variable resistor is connected in series between the tapping on the frame output transformer and the screen grid, this variable resistor being employed as an amplitude control.

The ultra-linear connected frame output valve may be driven from a previous stage having a variable resistance as part of its anode load which provides a linearity control.

According to another aspect of the invention there is provided a frame time base circuit comprising two valves connected to operate as a relaxation oscillator, one of said valves constituting the frame output valve and operating as an ultra-linear amplifier.

In order that the invention may be more fully understood, reference will now be made to the accompanying drawing which shows a circuit arrangement of a frame time base circuit according to this invention.

Referring to the drawing the frame time base circuit comprises a triode valve V1 and a pentode valve V2, the latter constituting the frame output valve. The two valves are interconnected as a relaxation oscillator which generates the frame sawtooth waveform, frame synchronising pulse being applied to the control grid of triode V1. The frame output transformer T has its primary connected to the anode of the pentode valve V2 and its secondary connected to the frame scanning coils. According to the invention the pentode V2 is arranged to operate as an ultra-linear amplifier and to this end its screen grid is connected to a tapping X on the primary of the frame output transformer T. In this embodiment the tapping may be between one fifth and one half of the primary from the H.T. positive end of the winding. The connection to the screen grid includes a variable resistance

VR1 which is employed as the amplitude control for controlling the amplitude of the output from the frame time base circuit. This variable resistor is set to a high value at the start of the life of V1 to throttle the valve back and is reduced to raise the screen voltage and improve the peak current handling capabilities of the valve as it ages.

The grid leak bias circuit of pentode V2 is so arranged that the positive peaks of the driving sawtooth waveform from valve V1 are restored to the cathode potential of V2 by grid current and the values of grid resistor R3 and the other grid circuit components of V2 are so chosen that the amount of clipping of the sawtooth waveform which takes place due to grid current is very small. The value of the grid leak R3 largely determines the ability of this part of the circuit to avoid clipping of the peak current and a maximum practical value is of the order of 20 megohms owing to considerations such as leakage resistance.

The driver valve V1 is provided with an anode load constituted partly by the variable resistance VR2, which varies the amplitude of the driving sawtooth and therefore provides an effective linearity control. It has this effect because the positive peaks of the sawtooth at the end of the scan are fixed by the restoring action, and variation of the driving sawtooth amplitude therefore has the effect of moving the negative peaks which may approach cut-off and therefore alter the working range of the valve V2 to the appropriate part of the valve characteristic, which is inherently more curved with grid leak bias.

The grid of the triode V1 is coupled to the tapping X on the output transformer T through a network N which is necessary to filter out line frequency components which are present in the frame output circuit, although their amplitude is reduced by taking the feedback from the tapping on the output transformer. The frequency of the oscillator is controlled by the feedback time constant which may be varied by the variable resistor VR4 connected in the control grid circuit of triode V1. This triode is also coupled to the pentode by a large value coupling condenser C1 which forms a reservoir in conjunction with the further condenser C2 connected to chassis potential. The arrangement of the charge condensers in the sawtooth generator circuit ensures good interlacing as the triode anode is allowed to "bottom" and the condensers are effectively discharged during the flyback period.

The positive supply HT1 to the anode of V1 is preferably, but not essentially of higher potential than the supply HT2 to the anode of V2.

Valves V1 and V2 may be in a common envelope, in which case a triode-pentode valve of the type PCL 82 may be used.

The circuit arrangements according to this invention may be advantageously employed for producing the frame deflecting waveform for cathode-ray tubes requiring a wide angle of scanning i.e. of the order of 110 degrees. With such cathode-ray tubes the current required at the peak of the sawtooth becomes considerable and the circuit arrangements according to this invention enable the current to be obtained without necessitating the use of larger frame output valves than are employed in television receivers at the present time and thus a standard frame output pentode may be used.

The circuit arrangements also provide for simple and efficient control of the frame time base circuit and minimises undesirable effects due to ageing or the changing of valves in the frame time base circuit.

I claim:

1. A frame time base circuit for television apparatus comprising an output valve operating as an ultra-linear amplifier, a grid leak bias circuit for said output valve ar-

ranged so that the positive peaks of a sawtooth waveform fed to the grid of said output valve are restored to the cathode potential of the output valve by grid current, said grid leak bias circuit including a grid resistor which together with the other components of the grid circuit of the output valve is chosen so that the amount of clipping which takes place due to grid current is small, an output transformer connected to the anode of the output valve and a direct current connection between the screen grid of the output valve and a tapping on the primary of the output transformer.

2. A frame time base circuit for television apparatus comprising a first valve and a second valve, said second valve constituting an output valve operating as an ultra-linear amplifier, a grid leak bias circuit for said output valve arranged so that the positive peaks of a sawtooth waveform fed from said first valve are restored to the cathode potential of the output valve by grid current, said grid leak bias circuit including a grid resistor which together with the other components of the grid circuit of the output valve is chosen so that the amount of clipping which takes place due to grid current is small, an output transformer connected to the anode of the output valve and a direct current connection between the screen grid of the output valve and a tapping on the primary of the output transformer including a variable resistor serving as an amplitude control.

3. A frame time base circuit for television apparatus comprising a first valve and a second valve connected to operate as a relaxation oscillator and said second valve constituting an output valve operating as an ultra-linear amplifier, a grid leak bias circuit for said output valve arranged so that the positive peaks of a sawtooth waveform fed from said first valve are restored to the cathode potential of the output valve by grid current, said grid leak bias circuit including a grid resistor which together with the other components of the grid circuit of the output valve is chosen so that the amount of clipping which takes place due to grid current is small, an output transformer connected to the anode of the output valve, a direct current connection between the screen grid of the output valve and a tapping on the primary of the output transformer including a variable resistor serving as an amplitude control and an anode load for said first valve including a variable resistance acting as a linearity control.

4. A frame time base circuit for television apparatus comprising a first valve and a second valve connected to operate as a relaxation oscillator and said second valve constituting an output valve operating as an ultra-linear amplifier, a grid leak bias circuit for said output valve arranged so that the positive peaks of a sawtooth waveform fed from said first valve are restored to the cathode potential of the output valve by grid current, said grid leak bias circuit including a grid resistor which together with the other components of the grid circuit of the output valve is chosen so that the amount of clipping which takes place due to grid current is small, an output transformer connected to the anode of the output valve, a direct current connection between the screen grid of the output valve and a tapping on the primary of the output transformer including a variable resistor serving as an amplitude control, an anode load for said first valve including a variable resistance acting as a linearity control and a feedback network between the tapping on the output transformer and the grid of the first valve to filter out line frequency components.

5. A frame time base as claimed in claim 4, wherein said feedback network includes a variable resistor to control the frequency of the frame time base circuit.

References Cited in the file of this patent

UNITED STATES PATENTS

2,284,378	Dome	May 26, 1942
2,577,461	Greefkes	Dec. 4, 1951
2,603,750	Newman	July 15, 1952
2,627,588	Knight	Feb. 3, 1953
2,713,651	Coffey	July 19, 1955
2,841,744	Chass	July 1, 1958
2,924,746	Claypool	Feb. 9, 1960
2,932,765	Messina	Apr. 12, 1960