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SELECTION OF FIRST INTERRUPTION PULSES FOR SYNCHRONIZATION OF VERTICAL SWEEP GENERATORS

2,519,911

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2 Sheets-Sheet 1

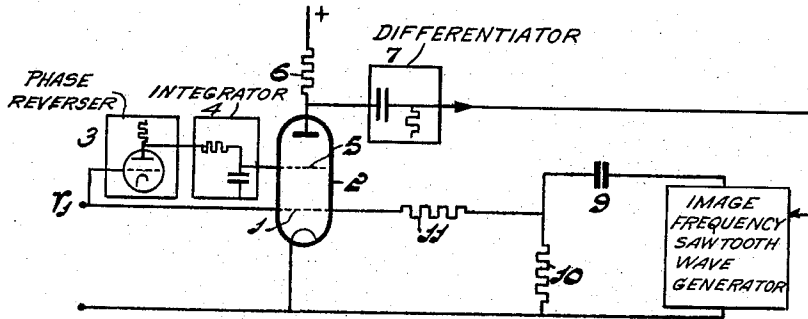


Fig. 1

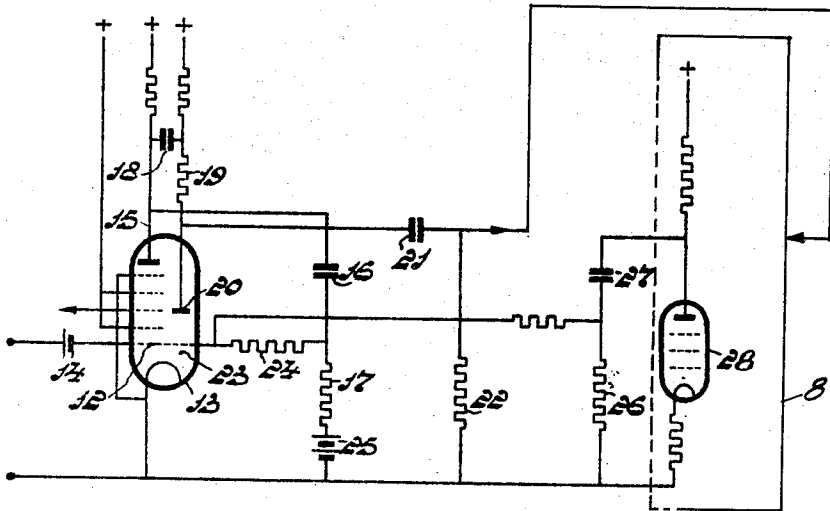


Fig. 3

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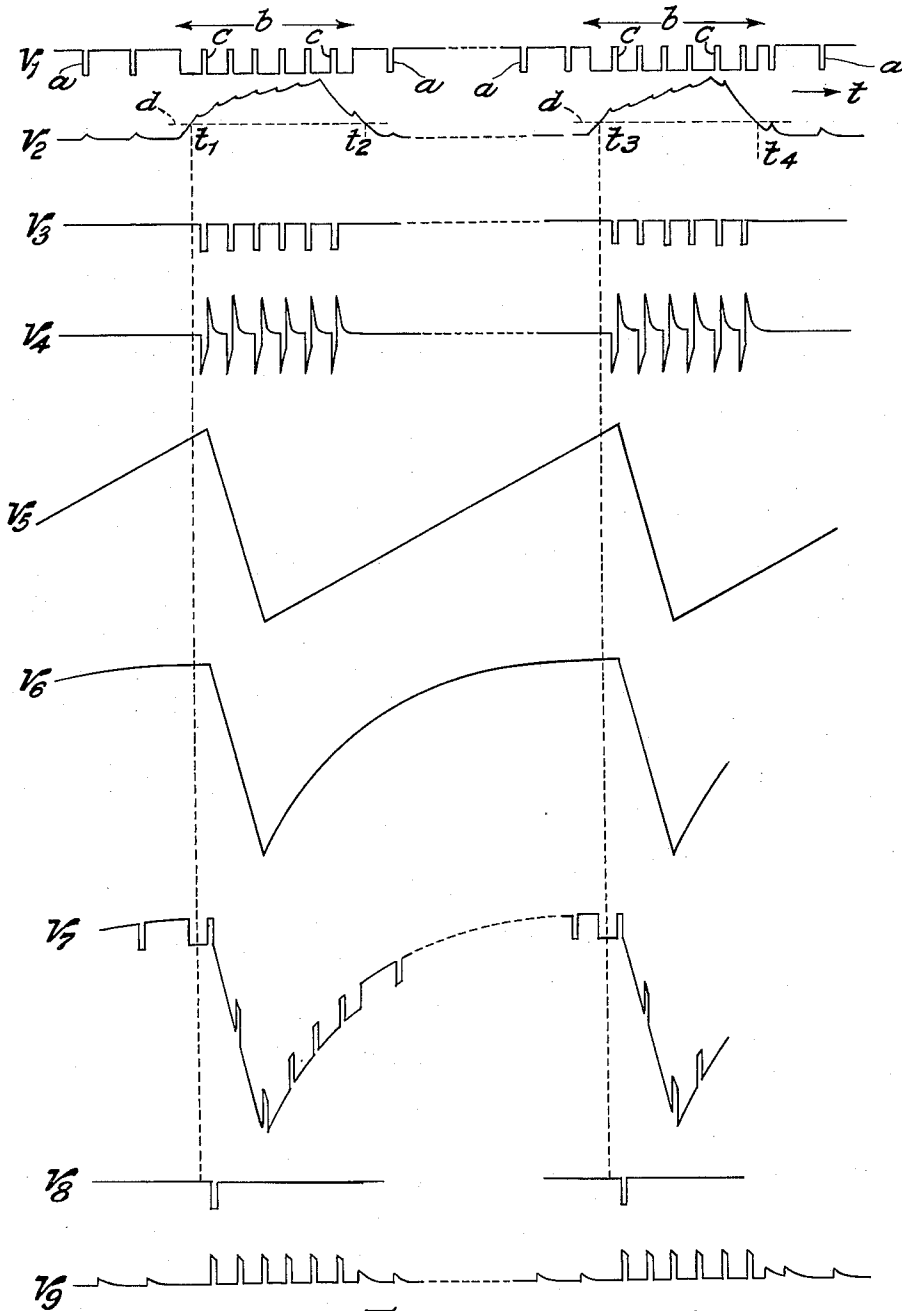


Fig. 2

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SELECTION OF FIRST INTERRUPTION PULSE
FOR SYNCHRONIZATION OF VERTICAL
SWEEP GENERATORS

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In the Netherlands July 15, 1946

6 Claims. (Cl. 178-7.3)

1

My copending U. S. patent application, Serial No. 727,468, filed February 8, 1947, now Patent No. 2,493,353, issued January 3, 1950, describes a circuit-arrangement for synchronizing the image time-base generator in a receiver for stationary or moving images. In this arrangement there is received, together with the image signal, a mixture of line synchronizing pulses and image synchronizing pulses interrupted by interrupting impulses. This mixture is supplied, after the image signal is cut off, to an integrating network, the output voltage of which is fed to a control electrode of a discharge system and the signal voltage being supplied, if necessary after the image signal is cut off, to the same or to another control electrode of this system, the output electrode of the discharge system having taken from it a voltage, with the aid of which the image is synchronized.

The above described circuit-arrangement has the disadvantage that the selected signal for the synchronisation of the image time-base generator is built up from a series of impulses which are derived from the series of interrupting impulses. It is, in general, desirable that for synchronisation purposes only one interrupting impulse should be used, since a plurality of impulses may give rise to interference. Thus, for example, if the image time-base generator comprises a gas-filled discharge tube, it may be possible for this tube to be opened at all impulses of the series after the first impulse of this series has already brought about the discharge of the condenser included in the sawtooth generator. The beginning of the image sawtooth voltage is, in this case, governed by the last impulse of the series, which for example in the case of interlaced reproduction, may lead to irregularities.

The principal object of the invention is to provide a circuit arrangement in which these disadvantages are obviated.

It exhibits the feature that a voltage derived from a saw-tooth voltage produced by the image time-base generator is fed to a control electrode of the discharge system in such manner that only the first interrupting impulse of each image synchronizing impulse occurs in the output circuit of this system.

In order that the invention may be more clearly understood and readily carried into effect, it will now be explained more fully with reference to the accompanying drawing in which:

Figure 1 is a schematic diagram of a circuit arrangement according to the invention,

Fig. 2 are graphs illustrating the wave form of

2

the voltages at various portions of the circuit arrangement according to the invention, and

Fig. 3 is a schematic diagram of a circuit arrangement in accordance with another embodiment of the invention.

Fig. 1 shows, partly in block diagram, one embodiment of the circuit-arrangement according to the invention. There is fed to a control electrode 1 of a discharge tube 2 a voltage V_1 and, in addition, a fixed bias voltage. Voltage V_1 , as a function of time, is illustrated in Fig. 2.

The voltage V_1 is formed from the incoming television signal by cutting off the image signal and, consequently, merely consists of a mixture of synchronizing impulses, viz. line synchronizing pulses a , image synchronizing pulses b and interrupting impulses c . In the present television transmitting systems these interrupting impulses have double the frequency of the line synchronizing pulses.

Fig. 2 illustrates two image synchronizing impulses, one of which is associated with the even image raster, the other with the odd image raster.

Voltage V_1 has derived from it, with the aid of a phase-reversing device 3 and an integrating network 4, a voltage V_2 , which, so far as it exceeds a threshold voltage which has also been applied and the value of which is shown in Fig. 2 by a dotted line d , is fed to a control electrode 5 of the discharge tube. Due to the said applied voltage, the discharge tube 2 will conduct only for the time periods t_1 to t_2 or t_3 to t_4 respectively, so that across the anode resistance 6 is set up a voltage V_3 in which only the interrupting impulses occur. This voltage is converted, with the aid of a differentiating network 7, into a voltage having a shape V_4 . Voltage V_4 is fed to the image saw-tooth generator 8. If this generator is responsive to positive impulses, synchronisation consequently occurs in principle on the rear front of the first interrupting impulse. However, it may be seen from Fig. 2 that impulses of the voltage V_4 are of the same value for each interrupting impulse, which may be responsible for the aforesaid disadvantages. In order to obviate these disadvantages, there is derived from the image time-base generator 8 a voltage having a shape V_5 which is supplied to the control electrode 1 through the intermediary of a resistance 11 and via a network consisting of a condenser 9 and a resistance 10.

The voltage set up across the resistance 10 has a shape V_6 , the maximum voltage occurring being consequently reached more gradually, i. e. with a smaller slope than in the case of voltage V_5 . On the control electrode 1 there is now set up a total

3

voltage of the shape V_7 which is substantially equal to the sum of the voltages V_1 and V_6 . Owing to the smaller slope of the variation characteristic curve of voltage V_6 in the neighbourhood of the maximum value, the shape of the first interrupting impulse is not deformed to any appreciable extent. This is in contradistinction to the second interrupting impulse, for example, which falls within the fly-back time of the time-base generator and is thus superimposed on a very steep portion of the curve. When the first interrupting impulse occurs, voltage V_2 exceeds the threshold value and the voltage on the control electrode 1 is sufficiently high so that the tube is alive and the first interrupting impulse occurs in the output circuit. When the second and subsequent interrupting pulses occur, the voltage V_2 still exceeds the threshold value, it is true, but the voltage on the control electrode 1 has decreased to an extent such that the tube does not conduct and hence these impulses are not allowed to pass as a result, a voltage having a shape V_8 is set up across the anode resistance 6. This voltage is fed via the differentiating network 7 to the image saw-tooth generator, which is, consequently, synchronized with the aid of the first interrupting impulse, without the subsequent interrupting impulses being capable of acting upon the image time-base generator.

Fig. 3 shows a further embodiment of the circuit-arrangement according to the invention.

A grid 12 of the hexode part of the discharge system of a tube 13 has fed to it, via a bias voltage supply battery 14, a voltage the shape of which is similar to that of V_1 illustrated in Fig. 2, but which is of opposite polarity. This voltage is reversed in sense with the aid of the hexode part of the discharge system and integrated, because anode 15 is practically earthed through condenser 16, resistance 17 being small, so that the voltage set up across it is negligible relatively to that set up across condenser 16. The integrated voltage is supplied through a condenser 18 and a resistance 19 to the anode 20 of the triode part of the discharge system which anode operates as a control electrode. The integrated voltage is transferred at the same time by means of the coupling condenser 21 and resistance 22 to the output circuit, if the triode part is not conductive. The control-grid 23 is connected through resistances 24 and 17 to the bias voltage battery 25. The resistance 17 forms part of the anode circuit of the hexode part and is not shunted by a condenser, so that there is set up at the control-grid a voltage of the shape V_1 . As soon as the grid voltage becomes negative, under the influence of voltage V_1 , to an extent such that the triode part is no longer conductive, the voltage V_2 set up on the anode is transmitted to the output, the output is short-circuited. Consequently, a voltage of the shape V_9 occurs across the output circuit. This voltage may be fed to one of the grids of a gasfilled discharge tube which forms part of an image sawtooth generator known. In this case synchronisation occurs on the front flanks of the interrupting impulses.

In order to eliminate any interference produced by the further interrupting impulses, part of the anode voltage of tube 28, in this case the final pentode of the image time-base generator, is supplied through a differentiating network consisting of a condenser 27 and a resistance 26 to the control-grid of the triode part of the tube 13, said part being of the same shape as the volt-

4

age V_6 , but of opposite polarity. The voltage on this control-grid will, consequently, become positive directly upon the occurrence of the first interrupting impulse at which synchronisation is effected, so that the output circuit is short-circuited by the triode part and the subsequent interrupting impulses are suppressed.

What I claim is:

1. A synchronizing circuit arrangement for a television receiver responsive to signals comprising line synchronizing pulses and image synchronizing pulses comprising a plurality of interruption impulses occurring within the period of said image synchronizing pulses and appearing in fixed time relationship with respect to said line synchronizing pulses, comprising a normally closed transmission path, means to apply said signals to said transmission path, means to reverse the phase of said signals, means to integrate said reversed phase signals to produce a first control voltage, means to apply said first control voltage to said transmission path to open same thereby to transmit said interruption impulses only, means to differentiate said transmitted interruption impulses, means to apply said differentiated interruption impulses to an image sawtooth generator to produce a sawtooth voltage, means to derive a second control voltage from said sawtooth voltage, and means to apply said second control voltage to said transmission path to transmit only the first of said interruption impulses.

2. A synchronizing circuit arrangement for a television receiver responsive to signals comprising line synchronizing pulses and image synchronizing pulses comprising a plurality of interruption impulses occurring within the period of said image synchronizing pulses and appearing in fixed time relationship with respect to said line synchronizing pulses, comprising a normally closed transmission path, means to apply said signals to said transmission path, means to reverse the phase of said signals, means to integrate said reversed phase signals to produce a first control voltage, means to apply said first control voltage to said transmission path to open same thereby to transmit said interruption impulses only, means to differentiate said transmitted interruption impulses, means to apply said differentiated interruption impulses to an image sawtooth generator to produce a sawtooth voltage, means to differentiate said sawtooth voltage to derive a second control voltage from said sawtooth generator, and means to apply said second control voltage to said transmission path to transmit only the first of said interruption impulses.

3. A synchronizing circuit arrangement for a television receiver responsive to signals comprising line synchronizing pulses and image synchronizing pulses comprising a plurality of interruption impulses occurring within the period of said image synchronizing pulses and appearing in fixed time relationship with respect to said line synchronizing pulses, comprising an electron discharge tube having a cathode, a first control grid, a second control grid and an anode, means to apply said signals to the first control grid of said tube, means to reverse the phase of said signals, means to integrate said reversed phase signals to produce a first control voltage, means to apply said first control voltage to the second control grid of said tube thereby to produce said interruption impulses only at the anode of said tube, means to differentiate said interruption impulses, means to apply said differentiated inter-

5

ruption impulses to an image sawtooth generator to produce a sawtooth voltage, means to differentiate said sawtooth voltage to derive a second control voltage from said sawtooth generator, and means to apply said second control voltage to the first control grid of said tube to produce only the first of said interruption impulses at the anode of said tube.

4. A synchronizing circuit arrangement for a television receiver responsive to signals comprising line synchronizing pulses and image synchronizing pulses comprising a plurality of interruption impulses occurring within the period of said image synchronizing pulses and appearing in fixed time relationship with respect to said line synchronizing pulses, comprising a first electron discharge system having a cathode, a control grid and an anode, a second electron discharge system having a cathode, a control grid coupled to the control grid of said first electron discharge system and an anode, means to apply said signals to the control grids of said first and said second electron discharge systems, means coupled to the anode of said first electron discharge system to produce a signal voltage reversed in phase with respect to said signals, means coupling the anode of said first electron discharge system to the anode of said second electron discharge system, means to integrate said reversed phase signal voltage to produce a first control voltage, means to apply said first control voltage to the control grids of said first and said second electron discharge systems thereby to produce said interruption impulses only at the anode of said second discharge system, means to differentiate said interruption impulses, means to apply said differentiated interruption impulses to an image sawtooth generator to produce a sawtooth voltage, means to differentiate said sawtooth voltage to derive a second control voltage from said sawtooth generator, and means to apply said second control voltage to the control grids of said first and said second electron discharge systems to produce only the first of said interruption impulses at the anode of said second electron discharge system.

5. A synchronizing circuit arrangement for a television receiver responsive to signals comprising line synchronizing pulses and image synchronizing pulses comprising a plurality of interruption impulses occurring within the period of said image synchronizing pulses and appearing in fixed time relationship with respect to said line synchronizing pulses, comprising an electron discharge tube having a first electron discharge system having a first output electrode, a second electron discharge system having a second output electrode, electron emitting means and input electrode means for said first and said second electron discharge systems, means to apply said

6

signals to said input electrode means, means coupling the output electrodes of said electron discharge systems, means coupled to said first output electrode to produce a potential reversed in phase and proportional to said signals, means to integrate said potential to produce a first control voltage, means to apply said first control voltage to said input electrode to produce an output potential on said second output electrode, means to differentiate said output potential to produce a second control voltage, a sawtooth voltage generator, means to apply said second control voltage to said sawtooth generator to produce therefrom a sawtooth output voltage, means to differentiate said sawtooth output voltage to produce a third control voltage, and means to apply said third control voltage to said input electrode means to produce only the first of said interruption impulses on said second output electrode.

6. A synchronizing circuit arrangement for a television receiver responsive to signals comprising line synchronizing pulses and image synchronizing pulses comprising a plurality of interruption impulses occurring within the period of said image synchronizing pulses and appearing in fixed time relationship with respect to said line synchronizing pulses, comprising a first electron discharge system having a first output electrode and screen electrodes, a second electron discharge system having a second output electrode, electron emitting means for said first and said second electron discharge systems, means to apply said signals to said input electrode means, capacitive means coupling said first and said second output electrode, an integrating circuit coupled to said first output electrode and to said input electrode means, a first differentiating circuit coupled to said second output electrode, a sawtooth signal generator having an input circuit coupled to said first differentiating circuit and an output circuit, a second differentiating circuit coupled to the output circuit of said sawtooth signal generator and to said input electrode means thereby to apply only the first of said interruption impulses to the input of said sawtooth signal generator.

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