

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Colour Television Receivers

We, TELEFUNKEN PATENTVERWERTUNGSGESELLSCHAFT MIT BESCHRÄNKTER HAF-
TUNG, a company organised under the laws
of Germany, of Elisabethenstrasse 3, Ulm/
Donau, Germany, 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 parti-
cularly described in and by the following
statement:—

This invention relates to colour television
receivers.

In receivers for the SECAM (Registered
Trade Mark) or PAL systems a line fre-
quency switch is required to adapt the
receiver to the changing composition of
the colour signal received in successive
lines. Such a switch can be synchronised in
frequency by line frequency pulses but it is
further necessary to control the phase of
said switch. It has been proposed to change
the phase of the colour synchronising
signals in alternate lines to provide an
identification signal, so that the correct
phasing of said switch can be determined.

It is an object of the invention to provide
an improved circuit arrangement for syn-
chronising such a line frequency switch.

According to the invention there is pro-
vided for a receiver for colour television
signals which include colour synchronising
signals which are changed in phase for
alternate line periods and line synchronising
pulses, a circuit arrangement for synchro-
nising a line frequency switch including a
half line frequency waveform generator for
controlling said switch, comprising means
for synchronising said generator in fre-
quency with line frequency pulses, a phase
discriminator for comparing the phase of a
signal dependent on the phase of said
colour synchronising signals with that of
said generator, and means for causing the
output of said discriminator to allow or

cause the phase of said generator to vary
if the phase of said generator is incorrect in
relation to the phase of said dependent
signal and to leave the phase of said
generator undisturbed if it is correct in re-
lation to the phase of said dependent signal.

In order that the invention may be clearly
understood and readily carried into effect
it will now be described by way of example
with reference to the accompanying draw-
ings in which:—

Figure 1 shows in block form a circuit
arrangement according to the invention, and
Figure 2 shows a practical form of the
circuit arrangement shown in Figure 1.

Referring to Figure 1, an oscillator 1
supplies a half-line frequency control vol-
tage 2 for a half-line frequency switch 3,
and is synchronised by line frequency
pulses 6 applied via a terminal 4 and a gate
5. Said pulses 6 may be derived, for example,
from the line deflection circuit of the re-
ceiver. Colour synchronising signals 7,
which are switched in phase during alter-
nate line periods, are applied to a dis-
criminator 9 via a terminal 8 and then
compared with a datum carrier oscillation
of constant phase generated by an oscillator
10. The discriminator 9 generates the
control voltage for a reactance stage of the
oscillator 10 via a time constant network
11 having a time constant large compared
to the line duration, and also on a con-
ductor 12 a half-line frequency identifica-
tion signal 13 which is produced by the
phase changes of the colour synchronising
signal 7. The identification signal 13 and
the output signal from oscillator 1 are com-
pared with one another in a phase dis-
criminator 14 whose output acts on gate
5, and also on a gate 15 in the path F-F
of the colour channel. Said gate 15 operates
as a colour killer.

As the oscillator 1 generates an oscilla-

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tion of half-line frequency and is synchronised by line frequency pulses, its output voltage 2 can have two phase positions, namely 0° and 180° , with respect to the identification signal 13. One phase position is correct and the other incorrect.

If the oscillator 1 generates a control voltage 2 with the correct phase, the phase discriminator 14 produces an output voltage such as to keep the gate 5 open so that the oscillator 1 continues to be synchronised by the pulses 6. At the same time the discriminator output voltage is also such as to keep the gate 15 open. Operation in this way has the advantage that the identification signals 13, which are influenced by disturbances in the received signals, exert no influence on the oscillator 1, and the oscillator 1 is synchronised by the pulses 6 which are not liable to interference, since they are preferably obtained via a flywheel synchronised deflection circuit.

If the oscillator 1 generates a control voltage 2 with the incorrect phase, the phase discriminator 14 produces an output voltage such as to keep the gate 5 closed so that the oscillator is no longer synchronised. Owing to the absence of synchronising the phase of the control voltage 2 varies until this control voltage has the correct phase, when the phase discriminator 14 causes the gate 5 to become open and the oscillator is again synchronised by the pulses 6 in the correct phase. Moreover the output voltage from the discriminator 14 when the phase is incorrect is such as to keep the gate 15 in the colour channel closed, thus blocking the colour channel.

If a television signal is received which lacks a colour synchronising signal which changes in phase in alternate lines, the output voltage of phase discriminator 14 becomes zero. This controls the gate 15 to be closed because otherwise the receiver would furnish an unsatisfactory picture. It also controls the gate 5 to be open so as to keep the oscillator 1 synchronised by the pulses 6.

The oscillator 1 is synchronised by the line frequency pulses 6, which are preferably line flyback pulses, in such a way that the zero transits of the control voltage 2 fall during the line flyback period.

In the practical form of the circuit shown in Figure 2, which has been tested experimentally under working conditions parts which correspond to parts in Figure 1 are given the same reference numeral. The oscillator 1 includes a transistor 16 and a resonant circuit 17 tuned to half-line frequency. Its output sine voltage is transformed by a diode 18 into the control voltage 2. When the switching phase is correct, the output voltage produced by

discriminator 14 and applied to the base of transistor 19 which serves as the gate 5 is such that this transistor is non-conducting and the line synchronising pulses 6 can synchronise the oscillator 1 via the conductor 20. In the event of an incorrect switching phase, a positive voltage appears at the base of transistor 19 which renders it conducting. The pulses 6 are now short-circuited and can no longer reach the base of transistor 16, and the phase position of the control voltage 2 varies in the desired manner until it is again correct and the voltage at the base of transistor 19 becomes negative thereby rendering it non-conducting again. The pulses 6 can then reach the base of transistor 16 again.

In an alternative embodiment of the invention, instead of the gate 5 being used to prevent the line synchronising pulses reaching the oscillator 1 when the phase is incorrect the discriminator output is used to stop the oscillator 1 momentarily. When it resumes oscillation again the process is repeated until it locks in the correct phase.

In a further alternative embodiment of the invention, when the phase is incorrect the discriminator output is used to detune the oscillator to such an extent that its phase varies. When its phase is correct the tuning is allowed to revert to its proper value.

WHAT WE CLAIM IS:—

1. For a receiver for colour television signals which include colour synchronising signals which are changed in phase for alternate line periods and line synchronising pulses, a circuit arrangement for synchronising a line frequency switch including a half-line frequency waveform generator for controlling said switch, comprising means for synchronising said generator in frequency with line frequency pulses, a phase discriminator for comparing the phase of a signal dependent on the phase of said colour synchronising signals with that of said generator and means for causing the output of said discriminator to allow or cause the phase of said generator to vary if the phase of said generator is incorrect in relation to the phase of said dependent signal and to leave the phase of said generator undisturbed if it is correct in relation to the phase of said dependent signal.

2. A circuit arrangement according to Claim 1 in which in operation said dependent signal is produced by a discriminator to which are applied said colour synchronising signals and the oscillations produced by a reference oscillator the phase of which is controlled to the mean phase of said colour synchronising signals.

3. A circuit arrangement according to

tion of half-line frequency and is synchronised by line frequency pulses, its output voltage 2 can have two phase positions, namely 0° and 180° , with respect to 5 identification signal 13. One phase position is correct and the other incorrect.

If the oscillator 1 generates a control voltage 2 with the correct phase, the phase discriminator 14 produces an output voltage such as to keep the gate 5 open so 10 that the oscillator 1 continues to be synchronised by the pulses 6. At the same time the discriminator output voltage is also such as to keep the gate 15 open. Operation 15 in this way has the advantage that the identification signals 13, which are influenced by disturbances in the received signals, exert no influence on the oscillator 1, and the oscillator 1 is synchronised by 20 the pulses 6 which are not liable to interference, since they are preferably obtained via a flywheel synchronised deflection circuit.

If the oscillator 1 generates a control 25 voltage 2 with the incorrect phase, the phase discriminator 14 produces an output voltage such as to keep the gate 5 closed so that the oscillator is no longer synchronised. Owing to the absence of synchronising the phase of the control voltage 2 varies 30 until this control voltage has the correct phase, when the phase discriminator 14 causes the gate 5 to become open and the oscillator is again synchronised by the 35 pulses 6 in the correct phase. Moreover the output voltage from the discriminator 14 when the phase is incorrect is such as to keep the gate 15 in the colour channel closed, thus blocking the colour channel.

40 If a television signal is received which lacks a colour synchronising signal which changes in phase in alternate lines, the output voltage of phase discriminator 14 becomes zero. This controls the gate 15 to 45 be closed because otherwise the receiver would furnish an unsatisfactory picture. It also controls the gate 5 to be open so as to keep the oscillator 1 synchronised by the pulses 6.

50 The oscillator 1 is synchronised by the line frequency pulses 6, which are preferably line flyback pulses, in such a way that the zero transits of the control voltage 2 fall during the line flyback period.

55 In the practical form of the circuit shown in Figure 2, which has been tested experimentally under working conditions parts which correspond to parts in Figure 1 are given the same reference numeral. The 60 oscillator 1 includes a transistor 16 and a resonant circuit 17 tuned to half-line frequency. Its output sine voltage is transformed by a diode 18 into the control voltage 2. When the switching phase is 65 correct, the output voltage produced by

discriminator 14 and applied to the base of transistor 19 which serves as the gate 5 is such that this transistor is non-conducting and the line synchronising pulses 6 can synchronise the oscillator 1 via the con- 70 ductor 20. In the event of an incorrect switching phase, a positive voltage appears at the base of transistor 19 which renders it conducting. The pulses 6 are now short-circuited and can no longer reach the base 75 of transistor 16, and the phase position of the control voltage 2 varies in the desired manner until it is again correct and the voltage at the base of transistor 19 becomes negative thereby rendering it non-conduct- 80 ing again. The pulses 6 can then reach the base of transistor 16 again.

In an alternative embodiment of the invention, instead of the gate 5 being used to prevent the line synchronising pulses 85 reaching the oscillator 1 when the phase is incorrect the discriminator output is used to stop the oscillator 1 momentarily. When it resumes oscillation again the process is repeated until it locks in the correct phase. 90

In a further alternative embodiment of the invention, when the phase is incorrect the discriminator output is used to detune the oscillator to such an extent that its 95 phase varies. When its phase is correct the tuning is allowed to revert to its proper value.

WHAT WE CLAIM IS:—

1. For a receiver for colour television 100 signals which include colour synchronising signals which are changed in phase for alternate line periods and line synchronising pulses, a circuit arrangement for synchronising a line frequency waveform generator for 105 controlling said switch, comprising means for synchronising said generator in frequency with line frequency pulses, a phase discriminator for comparing the phase of 110 a signal dependent on the phase of said colour synchronising signals with that of said generator and means for causing the output of said discriminator to allow or 115 cause the phase of said generator to vary if the phase of said generator is incorrect in relation to the phase of said dependent signal and to leave the phase of said generator undisturbed if it is correct in 120 relation to the phase of said dependent signal.

2. A circuit arrangement according to Claim 1 in which in operation said dependent signal is produced by a discriminator to which are applied said colour synchronising signals and the oscillations produced by a reference oscillator the phase of which 125 is controlled to the mean phase of said colour synchronising signals.

3. A circuit arrangement according to 130



- Claim 1 or 2 in which said generator is a half-line frequency oscillator and in operation the output of the first mentioned discriminator is utilised to prevent line frequency pulses reaching the generator when the phase of said generator is incorrect in relation to the phase of said dependent signal.
4. A circuit arrangement according to Claim 1 or 2 in which the output of the first mentioned discriminator is utilised to stop the generator momentarily when the phase of said generator is incorrect in relation to the phase of said dependent signal.
5. A circuit arrangement according to Claim 1 or 2 in which said generator is a half line frequency oscillator and in operation the output of the first mentioned discriminator is utilised to detune said half line frequency oscillator when the phase of said half line frequency oscillator is incorrect in relation to the phase of said dependent signal.
6. A circuit arrangement according to any preceding claim in which said generator is a sine-wave oscillator.
7. A circuit arrangement according to any preceding claim in which in operation the output of the first mentioned discriminator is utilised also to block the colour channel of said receiver when colour synchronising signals which are changed in phase for alternate line periods are not present or when the phase of said generator is incorrect in relation to the phase of said dependent signal.
8. A circuit arrangement according to any preceding claim in which the line frequency pulses for synchronising the generator are line flyback pulses obtained from a flywheel synchronised deflection circuit.
9. A circuit arrangement substantially as herein described with reference to the accompanying drawings.
10. A colour television receiver including a circuit arrangement according to any preceding claim.
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