

This invention relates to a PAL-SECAM identification arrangement for use in a multi-standard colour TV receiver.

Television receivers which are equipped to receive both PAL and SECAM system transmissions are often provided with some automatically operating means for recognising whether received signals are PAL or SECAM signals and for setting the colour processing circuits accordingly.

The above means comprises so-called identification circuits located in the PAL and SECAM chroma decoding circuits. Usually the PAL identification circuit inhibits the operation of the PAL chroma circuit unless PAL system transmissions are recognised and likewise the SECAM identification circuit inhibits the operation of the SECAM chroma circuit unless SECAM system transmissions are recognised.

In both PAL and SECAM systems it is necessary to provide a commutation of the colour decoding circuits at half the horizontal scan frequency in phase synchronism with a commutation of the encoding at the transmitter.

For example, as is well known, in the SECAM system, in one horizontal line the signal R-Y is transmitted whilst in the next line the signal B-Y is transmitted. In the PAL system both R-Y and B-Y signals are transmitted during each horizontal scan line, but the phase of one of the signals, (R-Y) is reversed each line.

The colour decoding circuits must in the case of SECAM transmission be adapted to be in the correct state to decode the R-Y signal when that appears and, the B-Y signal when that appears. In the case of PAL transmissions the decoding circuits need to be in the correct state to match the phase of the phase alternating signal.

The identification circuits operate in response to transmitted identification signals which are alternated to give the required phase information. The identification signals are transmitted at the beginning of each line and in the case of SECAM transmissions during the frame interval.

The PAL and SECAM identification circuits decode the transmitted identification signals and adapt the colour decoding circuits accordingly. One method of adapting the decoding circuits is to use the output of the identification circuits to set a bistable in the decoding circuits.

Identification circuits as described above are known and available in integrated circuit form as part of Motorola TDA 3300 in the case of the PAL system and as part of the Motorola TDA 3030 in the case of the SECAM system.

Problems can occur in television receivers fitted with the above described identification circuits because of deficiencies in the received television signal, or in the receiver itself. Such deficiencies may result in a SECAM identification circuit responding to a PAL signal and vice versa.

It is possible that the spurious response of the identification circuit may be sufficient to cause the circuit completely to misidentify the signal. Misidentification may be particularly likely where the commutation of the correct decoding circuit happens to be initially in antiphase with that of the signal, or if, for some reason, priority to operation in one or other broadcast system had been assigned.

Known multistandard television receivers are prone to misidentification of received signals as it is usual to compare the output of an identification circuit with a reference level to evaluate a received signal. Since the identification circuit has to recognise very degraded and weak correct signals it may readily respond to slightly degraded but strong incorrect signals.

This invention seeks to provide a PAL-SECAM identification arrangement in which the problem of signal misidentification associated with the above described known circuits is mitigated.

In accordance with the present invention there is provided a PAL - SECAM identification arrangement for a multistandard colour TV receiver comprising first identification means responsive to a received PAL encoded signal and having an output for providing an output signal of a first sense when PAL colour decoding means is commutated in a desired phase relationship with the commutation of the received PAL encoded signal and of a second sense when the commutation of the PAL colour decoding means is

incorrectly phased; second identification means responsive to a received SECAM encoded signal and having an output for providing an output signal of the second sense when SECAM colour decoding means is commutated in a desired phase relationship with the commutation of the received SECAM encoded signal and of the first sense when the commutation of the SECAM colour decoding means is incorrectly phased; common integrating means coupled to the outputs of the first and second identification means and having an output for providing a signal representative of the sum of the output signals of the first and second identification means; means for applying a bias potential to the output of the integrating means; first, second, third and fourth comparators each coupled to compare a resultant potential fed from the output of the integrating means with a respective reference potential, the first and second comparators being arranged to provide outputs in response to excursions in a first sense, by first and second amounts respectively, of the resultant potential from the bias potential, the second amount being smaller than the first amount; the third and fourth comparators being arranged to provide outputs in response to excursions in a second sense, by third and fourth amounts respectively, of the resultant potential, from the bias potential, the third amount being smaller than the fourth amount and wherein the outputs from the first, second, third and fourth comparators provide respective signals for indicating reception of a correctly phased PAL encoded signal, for inverting the phase of the commutation of the SECAM colour decoding means, for inverting the phase of the commutation of the PAL colour decoding means and for indicating reception of a correctly phased SECAM encoded signal.

In one embodiment of the invention each of the first, second, third and fourth comparators has first and second inputs, the first inputs of the first and second comparators and the second inputs of the third and fourth comparators being coupled to the output of the common integrating means, and the second inputs of the first and second comparator and the first inputs of the third and fourth comparator being coupled to means for supplying respective reference potentials.

The common integrating means may comprise capacitive means coupled between the outputs of the first and second identification means and a supply terminal.

In accordance with a second aspect of this invention there is provided a PAL-SECAM identification arrangement for a multistandard colour TV receiver comprising first identification means responsive to a received PAL encoded signal and having an output for providing an output signal of a first sense when PAL colour decoding means is commutated in a desired phase relationship with the commutation of the received PAL encoded signal and of a second sense when the commutation of the PAL colour decoding means is incorrectly phased; second identification means responsive to a received SECAM encoded signal and having an output for providing an output signal of the second sense when SECAM colour decoding means is commutated in a desired phase relationship with the commutation of the received SECAM encoded signal and of a first sense when the commutation of the SECAM colour decoding means is incorrectly phased; common integrating means coupled to the outputs of the first and second identification means and having an output for providing a signal representative of the sum of the output signals of the first and second identification means and comparative means for comparing a potential fed from the output of the common integrating means with a plurality of reference potentials and for providing output signals for indicating reception of a correctly phased PAL encoded signal, for inverting the phase of the commutation of the SECAM colour decoding means, for inverting the phase of the commutation of the PAL colour decoding means and for indicating reception of a correctly phased SECAM encoded signal.

The comparative means may comprise four comparators, each for comparing the potential fed from the output of the common integrating means with a respective reference potential and for providing a respective one of the output signals of the comparative means.

Means may be provided for applying a bias potential to the output of the common integrating means whereby in the absence of output signals from the first and second identification means none of the four comparators provides an output signal.

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An exemplary embodiment of the invention will now be described with reference to the drawings in which;

Figure 1 shows a schematic illustration of a PAL-SECAM identification arrangement in accordance with the present invention and

Figure 2 is an explanatory waveform diagram illustrating the operation of the arrangement of Figure 1.

Referring now to Figure 1 the illustrated arrangement includes a PAL identification circuit 1 and a SECAM identification circuit 2. The PAL identification circuit 1 has an input 3 for receiving a colour television signal and an output 4. The SECAM identification circuit has an input 5 for receiving a colour television signal and an output 6. Both the PAL and SECAM identification circuits have other inputs (not shown) for gating and timing signals etc. These inputs play no part in the present invention. The identification circuits 1 and 2 may be of the type previously mentioned and commercially available as part of the Motorola TDA3300 and 3030 integrated circuits respectively. The outputs 4 and 6 of the PAL and SECAM identification circuits 1 and 2 respectively are coupled together at a node 7 and to one terminal of integrating means in the form of a capacitor 8 whose second terminal is connected to a supply terminal 9, typically an earth terminal.

The node 7 which also forms the output of the integrating means is coupled to comparative means provided by four comparators 9, 10, 11 and 12. The comparators 9 and 10 have their first and non-inverting inputs coupled to the node 7 whilst the comparators 11 and 12 have their second and inverting inputs coupled to the node 7. Reference potentials for the comparators 9, 10, 11 and 12 are provided by a potential divider chain formed by resistors 13, 14, 15, 16 and 17 which are connected in series between a supply terminal 18 and the earth terminal 9.

The second and inverting input of the comparator 9 is coupled to the potential divider chain at a terminal 19 between the resistors 13 and 14.

The second and inverting input of the comparator 10 is coupled to the potential divider chain at a terminal 20 between the resistors 14 and 15. The first and non-inverting input of the comparator 11 is coupled to the potential divider chain at a terminal 21 between the resistors 15 and 16 whilst the first and non-inverting input of the comparator 12 is coupled to the potential divider chain at a terminal 22 between the resistors 16 and 17. The comparators 9, 10, 11 and 12 have output terminals 23, 24, 25 and 26 respectively.

In operation a potential V_6 is applied to the potential divider chain at the terminal 18 and a potential V_1 will appear at the terminal 22 a potential V_2 at the terminal 21, a potential V_4 at the terminal 20 and a potential V_5 at the terminal 19. A further supply terminal 27 is coupled to the node 7 via a resistor 28 and a potential V_3 which lies between the values of the potentials V_2 and V_4 is applied to the terminal 27 so that in a quiescent condition i.e. in the absence of any output signals at the output terminals 4 and 6 of the identification circuits 1 and 2 respectively, the node 7 will also acquire the potential V_3 .

Assume that in response to a PAL encoded signal applied at the input terminal 3, the PAL identification circuit 1 will produce at its output 4 an output signal in the form of unidirectional current pulses having a first sense when the PAL colour decoder and the received PAL encoded signal are commutated in correct phase synchronism with one another and in a second sense e.g. opposite to the first sense when the PAL colour decoder is not commutated in correct phase synchronism with the received PAL encoded signals.

It is also assumed that in response to a SECAM encoded signal applied to the input terminal 5 the SECAM identification circuit 2 will produce at its output terminal 6 an output signal in the form of unidirectional current pulses having the second sense when the SECAM colour decoder and the received SECAM encoded signals are commutated in phase synchronism with one another and of the first sense when the SECAM colour decoder is not correctly commutated with respect to the phase of commutation of the received signals.

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In the absence of PAL or SECAM input signals to the identification circuits 1 and 2 no average output current is produced at the output terminals 4 and 6.

Further operation of the arrangement of Figure 1 will now be described in conjunction with the waveform diagram of Figure 2 which shows the potential on the capacitor 8 at the node 7 i.e. the potential at the output of the integrating means as a function of time. The reference potentials V_1 , V_2 , V_3 , V_4 and V_5 are indicated in Figure 2 by horizontal lines.

If an ideal PAL encoded signal with commutation correctly phased with that of the PAL colour decoder, is applied to the input terminal 3 of the PAL identification circuit 1 then output current pulses of the first sense will appear at the output terminal 4 and will be integrated by the capacitor 8 causing the potential at the node 7 to change from the bias value V_3 . For the purposes of explanation it will be assumed that current pulses of the first sense caused the potential at the node 7 to rise.

When the potential at the node 7 rises above that of the threshold potential V_5 applied to the inverting input of the comparator 9, the comparator 9 will provide an output signal at its output terminal 23 indicating the reception of a correctly phased PAL encoded signal. This is illustrated by waveform a in Fig. 2.

If an ideal PAL encoded signal with incorrectly phased commutation is applied to the input terminal 3 of the PAL identification circuit 1 output current pulses of the second sense will appear at the output terminal 4 and after integration by the capacitor 8 the potential at the node 7 will fall from the value V_3 of the bias potential.

When the potential at the node 7 falls below the value of the reference potential V_2 applied to the non-inverting input of the comparator 11, the comparator 11 will provide an output signal at its output terminal 25. This output signal is utilised to invert the phase of the commutation of the PAL colour decoder.

The phases of the commutation of the PAL decoder and the received PAL encoded signal will now be the same so that the output current pulses appearing at the output terminal 4 of the PAL identification circuit 1 will once again flow in the first sense causing the potential at the node 7 to rise. This potential will continue to rise until it reaches the value of the threshold potential V_5 at which time the comparator 9 will once again provide an output signal at its output terminal 23 indicating the reception of a correctly phased PAL encoded signal. This is illustrated by wave form b in Figure 2.

The response of the arrangement of Figure 1 to ideal SECAM encoded signals with correctly and incorrectly phased commutation will be analogous to the operation described for the PAL signals and is represented by the wave forms c and d in Figure 2. The response of the arrangement to a non-ideal incorrectly commutated PAL encoded signal will now be described.

The non-ideal PAL signal is assumed to produce output current pulses from both the PAL identification circuit 1 and the SECAM identification circuit 2. It is further assumed that the output from the SECAM identification circuit 2 is initially in such sense as to cause the potential at the node 7 to fall.

Initially therefore the potential at the node 7 falls due to the integration by the capacitor 8 of the output signals from the PAL and SECAM identification circuits 1 and 2. When the potential at the node 7 has fallen below that of the threshold potential V_2 , the comparator 11 produces an output signal at its output 25 which causes the sense of commutation of the PAL colour decoder to invert.

Assuming that the output signal provided by the PAL identification 1 exceeds that from the SECAM identification circuit 2 the potential at the node 7 will thereafter rise. When the potential at the node 7 exceeds the value of the threshold potential V_4 the comparator 10 will produce an output signal for inverting the phase of commutation of the SECAM decoder.

The rate rise of the potential at the node 7 will then increase because the output currents provided by the PAL and SECAM identification circuits will have the same sense and will be summed by the capacitor 8.

Since the potential at the node 7 however remains above that of the threshold potential V_4 an output signal will continue to be provided by the comparator 10 causing periodic inversion of the phase of commutation of the SECAM colour decoder. The rate of rise of the potential at the node 7 will therefore alternate between the initial and higher values.

The comparator 9 will indicate the reception of a correctly phased PAL encoded signal when the potential at the node 7 rises above that of the threshold potential V_5 . This operation is indicated by the wave form e in Figure 2.

The arrangement will function in a similar manner in response to a correctly commutated non-ideal PAL signal and also in response to correctly or incorrectly commutated non-ideal SECAM signals.

Correct phasing and identification of received signals will be obtained from the arrangement provided that a received signal produces an output signal from the correct identification circuit which surpasses any produced from the incorrect identification by an amount sufficient to charge the capacitor 8 to a potential which is adequate for providing an output signal from the appropriate comparator 9, 12. The actual value of the output signal required to achieve this result depends upon the values of the threshold potentials V_1 , V_2 , V_4 and V_5 and upon the value of the resistor 28.

The embodiment illustrated in Figure 1 is given by way of example and modifications may be made without departing from the scope of the invention. For example the summation and integration of the output signals of the PAL and SECAM identification circuits and the comparison provided by the four comparators may be implemented in any convenient way and if desired by digital methods.



CLAIMS

1. A PAL-SECAM identification arrangement for a multistandard colour TV receiver comprising first identification means responsive to a received PAL encoded signal and having an output for providing an output signal of a first sense when PAL colour decoding means is commutated in a desired phase relationship with the commutation of the received PAL encoded signal and of a second sense when the commutation of the PAL colour decoding means is incorrectly phased; second identification means responsive to a received SECAM encoded signal and having an output for providing an output signal of the second sense when SECAM colour decoding means is commutated in a desired phase relationship with the commutation of the received SECAM encoded signal and of the first sense when the commutation of the SECAM colour decoding means is incorrectly phased; common integrating means coupled to the outputs of the first and second identification means and having an output for providing a signal representative of the sum of the output signals of the first and second identification means; means for applying a bias potential to the output of the integrating means; first, second, third and fourth comparators each coupled to compare a resultant potential fed from the output of the integrating means with a respective reference potential, the first and second comparators being arranged to provide outputs in response to excursions in a first sense, by first and second amounts respectively, of the resultant potential from the bias potential, the second amount being smaller than the first amount; the third and fourth comparators being arranged to provide outputs in response to excursions in a second sense, by third and fourth amounts respectively, of the resultant potential, from the bias potential, the third amount being smaller than the fourth amount and wherein the outputs of the first, second, third and fourth comparators provide respective signals for indicating reception of a correctly phased PAL encoded signal, for inverting the phase of the commutation of the SECAM colour decoding means, for inverting the phase of the commutation of the PAL colour decoding means and for indicating reception of a correctly phased SECAM encoded signal.



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2. An arrangement as claimed in claim 1 wherein each of the first, second, third and fourth comparators has first and second inputs, the first inputs of the first and second comparators and the second inputs of the third and fourth comparators being coupled to the output of the common integrating means, and the second inputs of the first and second comparators and the first inputs of the third and fourth comparators being coupled to means for supplying respective reference potentials.

3. An arrangement as claimed in claim 1 or 2 wherein the common integrating means comprises capacitive means coupled between the outputs of the first and second identification means and a supply terminal.

4. A PAL-SECAM identification arrangement for a multistandard colour TV receiver comprising first identification means responsive to a received PAL encoded signal and having an output for providing an output signal of a first sense when PAL colour decoding means is commutated in a desired phase relationship with the commutation of the received PAL encoded signal and of a second sense when the commutation of the PAL colour decoding means is incorrectly phased; second identification means responsive to a received SECAM encoded signal and having an output for providing an output signal of the second sense when SECAM colour decoding means is commutated in a desired phase relationship with the commutation of the received SECAM encoded signal and of the first sense when the commutation of the SECAM colour decoding means is incorrectly phased; common integrating means coupled to the outputs of the first and second identification means and having an output for providing a signal representative of the sum of the output signals of the first and second identification means and comparative means for comparing a potential fed from the output of the common integrating means with a plurality of reference potentials and for providing output signals for indicating reception of a correctly phased PAL encoded signal, for inverting the phase of the commutation of the SECAM colour decoding means for inverting the phase of the commutation



of the PAL colour decoding means and for indicating reception of a correctly phased SECAM encoded signal.

5. An arrangement as claimed in claim 4 wherein the comparative means comprises four comparators, each for comparing the potential fed from the output of the common integrating means with a respective reference potential and for providing a respective one of the output signals of the comparative means.

6. An arrangement as claimed in claim 4 or 5 wherein means is provided for applying a bias potential to the output of the common integrating means whereby in the absense of output signals from the first and second identification means none of the four comparators provides an output signal.

7. A PAL-SECAM identification arrangement substantially as herein described with reference to and as illustrated in Figures 1 and 2 of the drawings.
