AN APPARATUS FOR PROCESSING VIDEO SIGNALS

BACKGROUND OF THE INVENTION

(1) Field of the invention

The present invention relates to an apparatus for processing a video signal. The video signal processing apparatus can be used in a color television receiver capable of displaying images on the basis of the video signals separated into a luminance signal and chromatic signal and which can be adapted to a function of superimposing computer images on the images of the video signals.

(2) Background of the art

Color television receivers capable of displaying images of video signals derived from an external computer superimposed on those derived from a VTR (VIdeo Tape Recorder) have been proposed.

For the transmission and reception of the computer images, an RGB (Red, Green, and Blue) signal is normally used.

As a representative interface, RGB multi-pin connectors (21 pins) are extensively adopted in character broadcastings, videotex, and personal computers.

The RGB multi-pin connector installed on the television receiver includes a first terminal through which a video signal derived from the VTR (including a synchronization signal) is outputted to the computer in order to synchronize between those video signals when the computer images are superimposed on the VTR images (RGB multi-pin connector video output terminal), a second terminal through which the synthesized video signal to be synthesized so as to superimpose on the VTR images is inputted to the television receiver (RGB multi-pin connector video input terminal), and a third terminal (RGB input terminal) through which the computer images are inputted to the television

receiver. It is noted that the video signals inputted and outputted through the RGB multi-pin connector are composite signals (composite picture signals).

A previously proposed switching circuit for the video signal includes a first switch for selecting either of a television signal or a composite video signal from a video equipment such as the VTR and a second switch for selecting either of the selected input signal via the first switch or the video signal inputted via the computer to be superimposed on the television signal or VTR video signal.

The selected input of the first switch is supplied to the computer as an output video signal (RGB multi-pin connector video output signal). After the supplied input is used for the synchronization processing of the computer image with the VTR or television signal, the synchronized computer video signal is inputted to the second switch as an input video signal (RGB multi-pin connector video input signal) to subject to the superimpose on the VTR or television signal. The first switch and second switch are changed over in response to a command from an operation switch installed on a front or rear surface of the television receiver.

That is to say, a portion of a movable contact of the first switch is placed at an input contact receiving the television signal when no video switching signal is present. When the video switching signal is present, the position of the movable contact of the first switch is placed at the other input contact receiving the composite video signal. On the other hand, a movable contact position of the second switch is placed at the first switch contact side when no RGB switching signal is present. When the RGB switching signal is present, the movable contact position of the second switch is placed at the RGB

multi-pin connector video input contact side.

The previously proposed television receiver carries out the image display with the composite video signal separated into the luminance signal and chromatic signal by means of a comb filter. Recently, however, a new television receiver has been proposed having a, so called, S terminal input through which the video signal derived from the VTR is already separated into the luminance signal and chromatic signal to make a further improvement of a picture quality of the television receiver.

However, the following problems arise in the switching circuit of the video signal for the latter proposed television receiver.

(1) Since it is necessary to include the synchronization signal in the video output signal outputted via the RGB multi-pin connector video output terminal to carry out the superimpose of the video signal derived from an external computer on the S terminal input of the S terminal input, the RGB multi-pin connector video signal is only the luminance signal derived from the S input terminal. Therefore, the superimposed image of the VTR or television is merely a monochrome image.

(2) To solve the problem of (1), a circuit for synthesizing the luminance signal and chromatic signal which are separated in the television receiver to produce a video composite output signal for the RGB multi-pin connector used to superimpose the images derived from the VTR and so on. However, such a circuit as described above is complex in circuit construction and is therefore expensive.

(3) To solve the above-described problem of (1), the composite video signal which has normally been prepared in the VTR together with the separated video signal for the S terminal is utilized to make an

superimpose. At this time, means for rewiring the connections and switching the connections has been considered. However, the operation for the rewiring and switching means becomes troublesome.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide an apparatus for processing video signals which can be adapted to a function of, e.g., a television receiver for superposing images on different images and can provide a good operability in a simple circuit construction when superimposing on the images of the video signals separated into the luminance signal and chromatic signal on different images.

The above-described object can be achieved by providing an apparatus for processing video signals comprising; (a) a first terminal for inputting a first video signal which is separated into a luminance signal and a chromatic signal; (b) a second terminal for inputting the first video signal as a composite signal; (c) a third terminal for inputting a second video signal; (d) a first switching means for selecting either a signal from the first terminal or a signal from the second terminal; and (e) controlling means for controlling the first switching means so as to select the signal from the second terminal when a signal from the third terminal is combined with the first video signal.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a circuit block diagram of a video signal processing apparatus in a preferred embodiment according to the present invention.

Fig. 2 is a logic circuit diagram for switching an essential part of the video signal processing apparatus shown in Fig. 1.

Fig. 3 is a logic table for the logic circuit shown in Fig. 2.

Fig. 4 is a output logic table for a switching circuit shown in Fig. 1.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will hereinafter be made to the drawings in order to facilitate understanding of the present invention.

Fig. 1 shows a circuit block diagram of a video signal processing apparatus in a preferred embodiment according to the present invention.

In the preferred embodiment, the video signal processing apparatus is applied to a television receiver.

The video signal processing apparatus shown in Fig. 1 includes (a) a first switch 1 for selectively switching either television signal TV input E or a composite video signal Video input F, (b) a second switch 2 for selectively switching either the selected output C from the first switch 1 or a video input D derived from an RGB multi-pin connector terminal 7, and (c) a third switch 3 for selectively switching either the selected output B from the switch 2 or an S terminal input A. Each switch 1, 2, 3 is provided with a driving port 1a, 2a, 3a. Each switch 1, 2, 3 is switched to either of the two inputs depending on whether a signal inputted to the corresponding driving port 1a, 2a, 3a is at a high level (H) or at a low level (L).

For example, when the driving port 1a of the first switch 1 receives the high level input signal (H), the first switch 1 selects one connection side E of the television signal TV. When the driving port 1a receives the low level input signal (L), the first switch 1 selects the other connection side F connected to the composite video signal input terminal 5. On the other hand, when the driving port 2a receives the high level input signal (H), the second switch 2 selects one connection side C connected to the selected output side

of the first switch 1. When the driving port 2a receives the low level input signal (L), the second switch 2 selects the other connection side D connected to the video input terminal 7 of the RGB multi-pin connector. Furthermore, when the input signal of the driving port 3a is at the high level (H), the third switch 3 selects one connection side B connected to the selected output side of the second switch 2. When the driving port 3a receives the low level signal (L), the third switch 3 selects the other connection side A connected to the S terminal input side to provide a image display input for the television receiver. Each switch 1, 2, 3 is constituted by, e.g.,an analog switch.

An external input/output terminal of the video signal processing apparatus for the television receiver in the preferred embodiment includes a separation input terminal 4 (so called, S terminal) of the video signal separated into a luminance signal and chromatic signal which is supplied from the VTR (not shown), a composite video signal input terminal 5 through which a composite signal of the video signal supplied from the VTR is inputted, a video output terminal 6 on the RGB multi-pin connector through which the video signal is outputted to synchronize with the other video signal and a video input terminal 7 on the RGB multi-pin connector through which the video signal from the other video equipment to be superimposed is inputted. The input sides of the respective terminals 4, 5, 6, and 7 are connected to the respective switches 1, 2, 3 as shown in Fig. 1. The video output terminal 6 on the RGB multi-pin connector receives the selected output of the first switch 1 supplied to the second switch 2. The television signal TV is supplied to a terminal, i.e., the TV INPUT side as shown in Fig. 1 from an internal circuit of the television receiver,

the television signal TV being a normal television signal supplied, e.g., from an antenna. The above-described S terminal 4 constitutes a first input terminal according to the present invention and the above-described composite video input terminal 5 constitutes a second input terminal.

Furthermore, the video signal processing apparatus in the preferred embodiment includes: an RGB input terminal 8 on the RGB multi-pin connector as a third input terminal and RGB switching part 9. Upon receipt of the RGB input signal from the RGB input terminal 8 and the image displaying input signal passed through the third switch 3, the video signal processing apparatus carries out a series of the switching processings in such a way that the RGB input signal from the RGB input terminal 8 is directly displayed (RGB mode, no superimpose),the image display input is directly displayed (TV mode, composite Video mode, S input mode) and the RGB input is synthesized to the composite signal for the image display (RGB mode, superimpose is present). These display mode switchings are carried out in response to commands derived from a logic circuit (not shown in Fig. 1). The switching commands derived from the logic circuit are determined on the basis of instructions derived from operation input switches installed on front or rear surface of the television receiver or on a remotely operated switch, or alternatively derived from the computer (not shown).

Fig. 2 shows a circuit wiring diagram of the logic circuit for switching the second and third switches 2 and 3.

Input terminals denoted by 10a, 10b are connected to logic outputs of , e.g., the computer or the manually operated input switches. A peripheral circuit including a transistor Tr1 constitutes an

inverter receiving an input signal derived via the input terminal 10a. Two diodes D_1 and D_2, transistor Tr2, and resistors R_1, R_2, R_3, and R_4 constitute an OR circuit receiving the output signal of the inverter and input (2) derived from the input terminal 10b. A collector of the transistor Tr2 is connected to a bias supply +Vcc via a resistor R_3, an emitter thereof being grounded via a resistor R_4 and being connected to cathodes of the diodes D_1 and D_2. An anode of the diode D_1 is connected to an inverted output of the inverter and the anode of the diode D_2 is connected to the input (2). A base of the transistor Tr2 receives the bias voltage through a division circuit constituted by resistors R_1 and R_2. The bias level, i.e., resistance values of the resistors R_1 and R_2 are set such that when a point (A) of the emitter of the transistor Tr2 is at a low level (L), the base potential of the transistor Tr2 is higher by a base-emitter voltage V_{BE} and when the point (A) is at a high level (H), the base potential becomes lower by the base-emitter voltage V_{BE}. Resistance values of the resistors R_3 and R_4 are determined so that a level change of the collector output of the transistor Tr2 rises or lowers through the thresold voltage of the driving port 3a of the third switch 3 to change over the third switch 3. It is noted that the input signal (1) is directly separated to the driving port 2a of the second switch 2 and the OR circuit output signal (,i.e., collector output signal of the transistor T_{r2}) is supplied to the driving port 3a of the third switch 3.

Fig. 3 shows a logic table of the logic circuit described above.

Since the input signal denoted by (1) is supplied to the driving port 2a and the driving port 3a receives input (1)+ input (2), the driving port 3a indicates the L level only when input signal (1) and

input signal (2) =L. The driving port 3a becomes at the high level (H) in the other cases. Consequently, each switch 2 and 3 selects the input contact side A, B, C and D shown in the table of Fig. 3.

The high level of the input signal (1) is defined as S input mode, the low level of the input (1) is defined as TV mode or Video mode, the high level of the input (2) is defined as RGB mode, and the low level of the input (2) is defined as non-RGB mode. The third switch 3 is always switched to TV mode or Video mode irrespective of S input mode (i.e., the input level of the inverter is high) when RGB mode is selected. In the S input mode and RGB mode, the superimpose of the image on the same image as in the S input mode (non-RGB mode) through the composite signal is possible if the driving port 1a of the first switch 1 automatically receives (or manually through the operation switch) the low level (L) to select the video input side.

Fig. 4 shows an output logic table for the input for displaying the images to be outputted from the switch circuit shown in Fig. 1.

The first switch 1 determines whether the TV mode (television TV signal selection) or Video mode (composite video signal selection). The switching to the S input mode (S input selection) has a higher priority than the switching of the first switch 1 to the TV mode or Video mode. Furthermore, in the RGB mode which has a higher priority than the S input mode, either the television TV signal or composite video signal is selected according to a switched state of the first switch as the video input signal derived from the RGB multi-pin connector so that the superimpose of the image is enabled.

As described above, when the RGB mode is entered during the S input mode, the composite signal of the video signal derived from the S input terminal 4

is automatically selectable as the RGB multi-pin connector input signal. The operability during the RGB mode switching is improved.

It is noted that although the switching logic circuits are not limited to those in the preferred embodiment, various types of the circuits can be used. In addition, the number of terminals used for the S input and composite video signal input may be plural or alternatively may be one if they are suitably switched and selected. The video signal processing apparatus according to the present invention is not limited to the apparatus incorporated into the television receiver but is applicable to a no-television signal receiver such as a monitor receiver and furthermore is applicable as an independent apparatus.

If no television signal is present, the first switch 1 is not required. The composite video input signal may be inputted to the second switch 2 and may be outputted as the video output signal on the RGB multi-pin connector. The switching circuit, logic circuit shown in Fig. 2, and RGB switching part shown in Fig. 1 are examples of controlling means according to the present invention. The logic circuit and RGB switching part may be installed externally.

As described hereinabove, the video signal processing apparatus according to the present invention, when the different image is superimposed on the image of the video signal which is separated into the luminance signal and the chromatic signal, can cope with the superposition function of the image with good operability in a simple circuit construction.

CLAIMS:

1. An apparatus for processing video signals comprising:

(a) a first terminal for inputting a first video signal which is separated into a luminance signal and a chromatic signal;

(b) a second terminal for inputting said first video signal as a composite signal;

(c) a third terminal for inputting a second video signal;

(d) first switching means for selecting either of a signal from said first terminal or a signal from said second terminal;

(e) controlling means for controlling said first switching means so as to select said signal from said second terminal when the signal from said third terminal is combined into said first video signal.

2. An apparatus as set forth in claim 1, which further comprises second switching means having a fourth input terminal to which a normal television signal is supplied for selecting the signal from the fourth input terminal and said composite signal to utilize the superimpose.

3. An apparatus as set forth in claim 2, wherein the signal including a synchronization signal outputted from the second switching means is outputted from the first input terminal to a peripheral equipment to utilize a synchronization with an image of the second video signal.

4. An apparatus as set forth in claim 3, wherein the signal utilized for the synchronization is again inputted to the fifth input terminal and utilized for the superimpose on said image signal.

5. An apparatus as set forth in claim 4, which further comprises third switching means for selecting the signal inputted through the fifth input terminal

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and output signal derived from the second switching means and for supplying the selected signal to the first switching means.

6. An apparatus as set forth in claim 5, wherein said first switching means selects either one of the input signal derived from the first input terminal or the output signal derived from the third switching means.

7. An apparatus as set forth in claim 6, which further comprises a synthesization circuit to which the output signal from the third switching means and the image signal are inputted.

8. An apparatus as set forth in claim 7, wherein the synthesization circuit carries out the superimpose.

9. An apparatus as set forth in claim 3, wherein the third input terminal, first output terminal, and fifth input terminal are installed on the RGB multi-pin connector.

10. An apparatus as set forth in claim 8, wherein the synthesization circuit is provided with a control signal input terminal, a control signal inputted to the control signal input terminal being utilized to select either of the signals inputted to the synthesization circuit.

11. An apparatus as set forth in claim 10, wherein the control signal inputted to the synthesization circuit has a first mode outputting only the output signal of the first switching means, a second mode outputting only the image signal, and a third mode outputting with the image signal superimposed on the output signal of the third switching means.

12. An apparatus as set forth in claim 11, wherein each switching means is controlled in such a way that when the third mode is selected, the signal inputted through the fifth input terminal is the output

signal from the first switching means.

13. An apparatus as set forth in claim 1, wherein the image signal is a signal indicating an image derived from a computer.

14. An apparatus as set forth in claim 1, wherein the image signal is the RGB signal.

15. An apparatus as set forth in claim 1, wherein the first and second input terminals are connected to the VTR.

16. An apparatus as set forth in claim 1, wherein the video signal processing apparatus is included in a television receiver.

17. An apparatus as set forth in claim 1, wherein the video signal processing apparatus is included in a VTR (Video Tape Recorder).

18. An apparatus for processing video signals for a television receiver, comprising:

(a) a first terminal passing a first video signal derived from a magnetic tape recording and reproducing apparatus the first video signal being separated into a luminance signal or chromatic signal;

(b) a second terminal passing the first video signal as a composite signal;

(c) a third terminal passing a second video signal derived from a computer;

(d) first means for selecting either of a signal from the first terminal or a signal from the second terminal; and

(e) second means for controlling the first switching means so as to select the signal from the second terminal when the signal from the third terminal is superimposed on the first video signal.

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19. Apparatus for processing video signals constructed and arranged to operate substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.