

## United States Patent [19]

Kozakai et al.

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## [54] REMOTE CONTROL SYSTEM

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Feb. 12, 1982 [JP] Japan ..... 57-18875[U]  
Feb. 12, 1982 [JP] Japan ..... 57-18876[U]  
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360/79; 455/4

[58] Field of Search ..... 360/33.1, 79, 137;  
358/335, 194.1; 455/603, 352, 344, 4, 353

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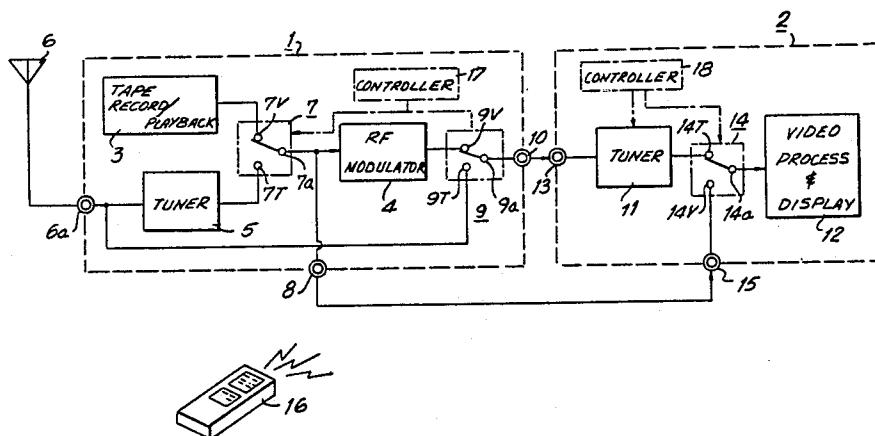
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Sinderbrand

## [57] ABSTRACT

A single, hand held remote control unit produces command signals used to control all operational aspects of a video tape recorder and an associated television receiver, and the video tape recorder and television receiver include switches that upon actuation can provide various interconnections so that all operating modes of the two units are possible. Actuation of the switches is performed by controllers, arranged at the particular units, and which receive the coded command signals from the remote control unit to set the switches in accordance with any of several keys that can be actuated on the remote control unit. In one aspect, depressing a single playback key at the remote control unit will produce coded signals received by the controllers to set the television receiver to an unused channel frequency and cause the video tape recorder to reproduce a prerecorded video tape, with the reproduced signal fed to the television receiver over that unused channel for display.

18 Claims, 4 Drawing Figures



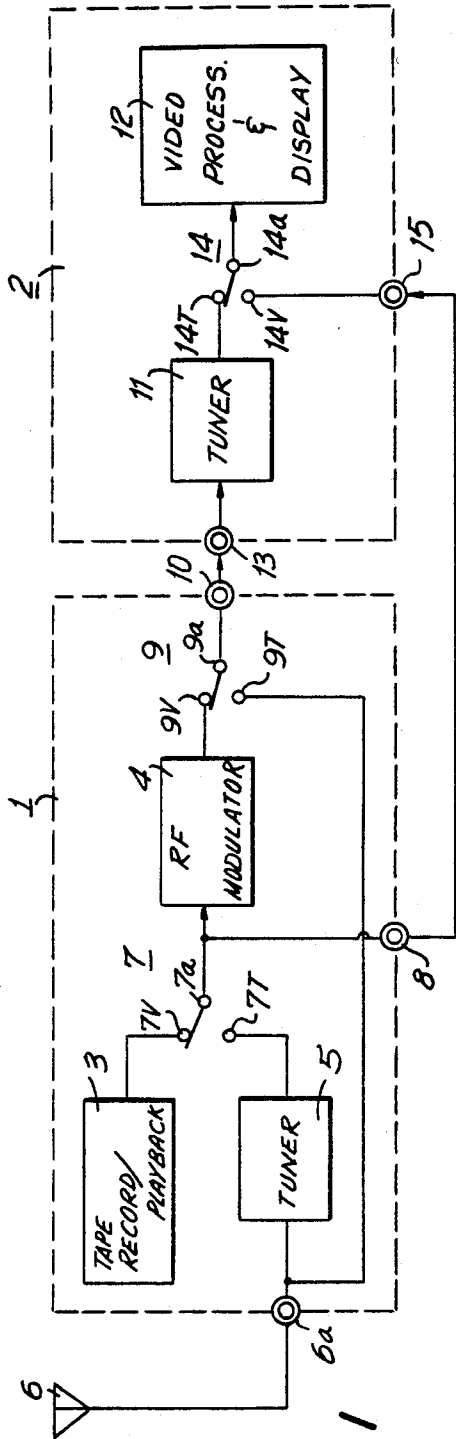


FIG. 1

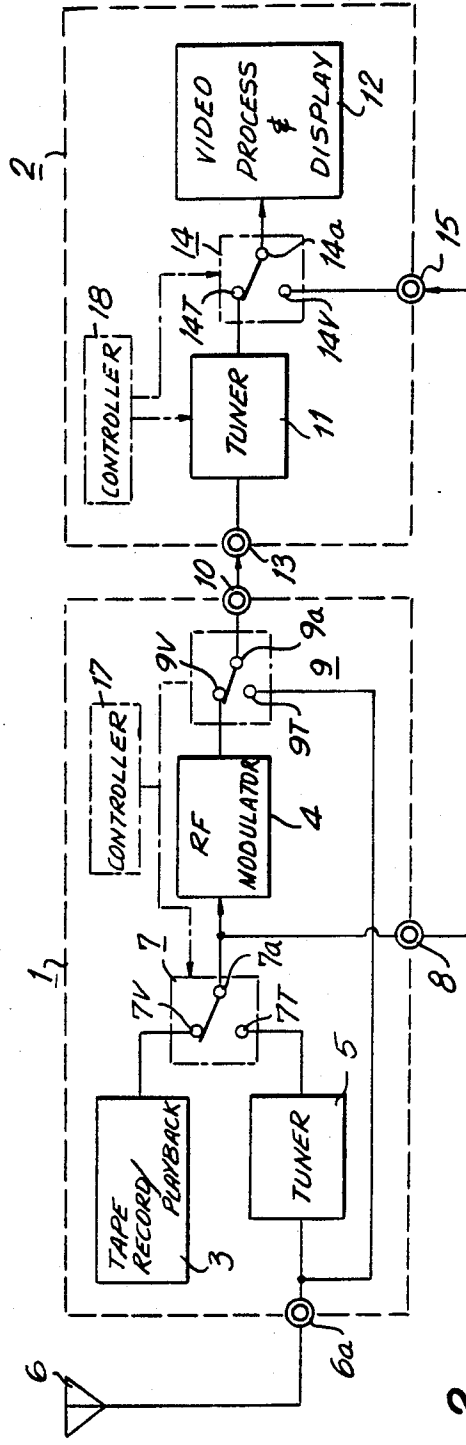


FIG. 2

FIG. 4

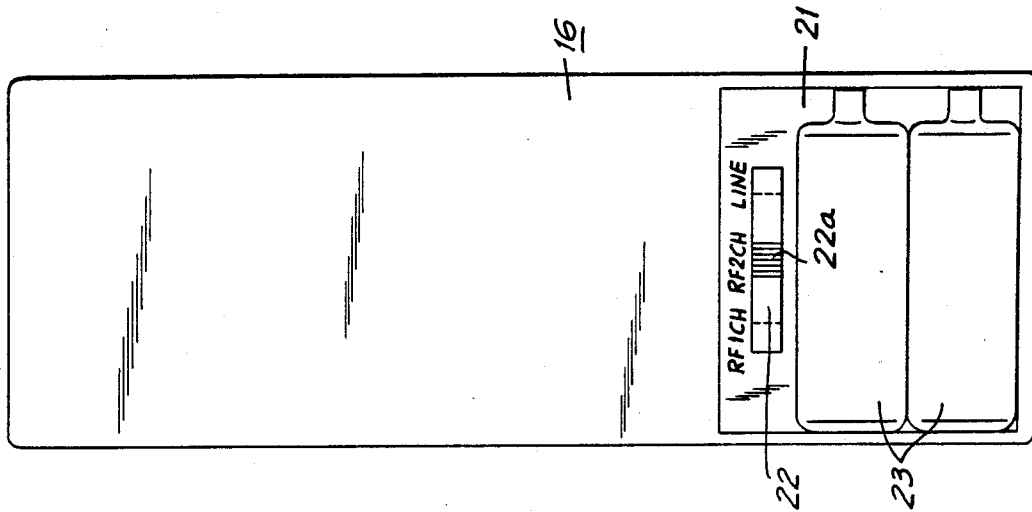
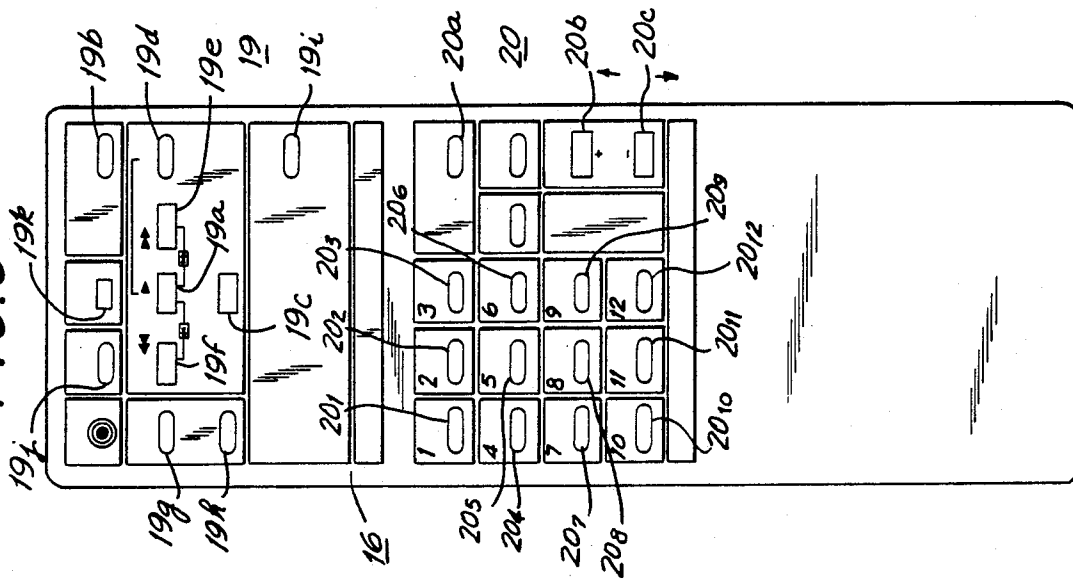


FIG. 3



## REMOTE CONTROL SYSTEM

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

This invention relates generally to apparatus for remote control of the operation of a television receiver and a video tape recorder and, more particularly, is directed to apparatus to control the operation of a television receiver and a video tape recorder using a single wireless remote control unit.

#### 2. Description of the Prior Art

In the use of a video tape recorder, according to the prior art, a conventional receiver must be connected by cables or wires to the video tape recorder in order to display the reproduced signals. The video tape recorder has connected to it the television antenna or leased video cable line, which provide the video programming source to be recorded. The television receiver is usually connected to the antenna or cable through the video tape recorder, so that the television receiver can receive and display programs independently of the video tape recorder.

The video tape recorder typically has its own twelve channel tuner and a selector switch that permits recording of one television channel signal, while passing a different television channel signal to the television receiver for viewing. When displaying recorded program material from the video tape recorder, the reproduced signal is modulated up to a high frequency of a standard television channel that has been selected beforehand, the channel selector of the television receiver is tuned to that channel, and the reproduced signal is processed and displayed in the conventional fashion. The channel that is selected for the high frequency modulation of the reproduced video signal, and to which the channel selector of the television receiver is set, is one that is a "dead" channel in that particular locale. That is, in order to avoid inter-channel interference a blank or unused channel is usually provided between the assigned television broadcast channels. The channel selector is set to one of these dead channels to receive the reproduced video from the video tape recorder. In the United States either channel 2 or 3 is selected as the dead channel, and in some foreign countries either channel 1 or 2 is selected. The high-frequency modulator of the video tape recorder usually can be selected to modulate the reproduced video signal to a high frequency corresponding to both of these two dead channels.

In some television receivers switched connections are provided that permit the video signals received at the video tape recorder to be tuned to a desired channel using the video tape recorder tuner, then by-pass the tuner of the television receiver, and have the tuned video signal processed and displayed by the television receiver in the normal manner.

It is also known, according to the prior art, to use a remote control unit to control the operation of a television receiver. Similarly, remote control units are known to control the video tape recorders. These remote control units are frequently termed remote commanders. Early remote control units were connected by a cable to the unit under control, however, more recent units are wireless and transmit signals, such as infrared signals or ultrasonic signals. The remote control unit associated with a television receiver can usually select channels, raise or lower the audio volume, mute the audio, and

turn the power to the receiver on or off. Similarly, the remote control unit associated with the video tape recorder can usually select a channel in the tuner, operate the various controls associated with a tape recorder, such as record, play, and rewind, and turn the power to the video tape recorder on or off.

The video tape recorder and the television receiver are electrically interconnected so as to permit them to function in all modes, and at least two or three individual selector switches must be operated in order to set both units in the proper state for the particularly desired operating mode. Manual operation of these switches is very commonplace, but the use of remote control units has become more and more popular. Thus, for remote control of a video tape recorder and its associated television receiver it is necessary to use two individual hand-held remote control units, each having its full complement of controls, and each operating independently. The use of two individual hand-held remote control units is very inconvenient, requiring the manipulation of two sets of controls arranged on two separate individual units. Not only is handling the two units unwieldy but using all the various switches becomes complicated to the point where the average consumer simply chooses not to use both individual remote control units.

### OBJECTS AND SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide apparatus for controlling the operation of a video tape recorder and a television receiver employing a single remote control unit.

It is another object of this invention to provide a wireless, hand-held, remote control unit for operating a video tape recorder and an associated television receiver to perform all functions of which both units are capable.

It is still another object of this invention to provide a wireless, hand-held, remote control unit for a video tape recorder and an associated television receiver that operates in conjunction with a control system to operate switches located at the video tape recorder and television receiver, respectively.

The present invention in one aspect provides a unitary wireless hand-held, remote control unit having two groups of function keys or switches that act to control the operation of the video tape recorder and its associated television receiver, respectively. The inventive apparatus includes control units to control selector switches located at interconnection nodes between sub-assemblies and at inputs and outputs in the video tape recorder and the television receiver, thereby interconnecting the various subassemblies of the video tape recorder and television receiver for operating in all various modes. For example, in one operating mode the inventive apparatus connects a program source derived from a prerecorded video tape to be fed through a high-frequency(radio-frequency) modulator to the tuner of the television receiver that has been tuned to a dead or empty channel, and then the video program signal is processed and displayed by the television receiver. In another mode, using the present invention the video tape recorder program source may be fed directly to the signal processing and display subsystem of the television receiver. In still another mode using the present invention the program source is derived from the televi-

sion antenna input of the video tape recorder and fed to the tuner of the television receiver, where the video signal is processed and displayed.

The above, and other objects, features, and advantages of the present invention, will be apparent from the following detailed description of an illustrative embodiment that is to be read in conjunction with the accompanying drawings, in which the same reference numerals identify the corresponding elements and parts in the several views.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic block diagram illustrating a video tape recorder and an associated television receiver in which the remote control apparatus of this invention may be advantageously employed;

FIG. 2 is a schematic block diagram illustrating a video tape recorder and an associated television receiver interconnected according to an embodiment of this invention for remote control operation;

FIG. 3 is a top plan view of a hand-held remote control unit according to an embodiment of this invention; and

FIG. 4 is a bottom plan view of the hand-held remote control unit of FIG. 3.

#### DESCRIPTION OF A PREFERRED EMBODIMENT

Referring to the drawings in detail and, initially, to FIG. 1 thereof, it can be seen that video tape recorder 1 is operably connected to television receiver 2. Video tape recorder 1 has main video tape record and reproduction unit 3 that includes all of the electro-mechanical elements necessary to record and reproduce video signals on a magnetic tape. Video tape recorder 1 also includes high-frequency modulator 4 that converts a received raw video signal, as might be supplied from tape reproduction unit 3, into a modulated signal at radio frequency (RF) of an arbitrary channel, preferably a dead channel such as channel 2 or 3 in the United States or channel 1 or 2, elsewhere. Video tape recorder 1 also includes tuner section 5 which is substantially identical to a conventional television receiver tuner and has all the well-known elements thereof. The signal input to tuner 5 is supplied by television antenna 6 connected at antenna input terminal 6a. Selector switch 7 is provided to select the program source and, in that regard, operating switch 7 connects switch output terminal 7a to a composite video signal as provided from video tape reproduction unit 3 at terminal 7V or from television tuner 5 at terminal 7T. Thus, by action of switch 7, composite video signals from one of two sources are fed to RF modulator 4 and are also fed to video-out terminal 8. A second selector switch 9 is provided in video tape recorder 1 that feeds signals to output terminal 10, to which television receiver 2 is connected. More specifically, in a first position the output from RF modulator 4 at terminal 9V is connected to switch terminal 9a to provide a radio-frequency modulated signal at output terminal 10 at a frequency of a selected local dead channel. In a second position of selector switch 9, terminal 9a is connected to terminal 9T that is directly connected to television antenna 6. Thus, by operation of switch 9, it is possible to have either a radio-frequency modulated composite video signal or a raw video signal, as might be received from television antenna 6, connected directly to output terminal 10 of video recorder 1.

Television receiver 2 comprises the typical subsystems and controls and includes television tuner 11, as well as video processing circuitry and cathode ray tube display, shown generally at 12. For utilizing television receiver 2 with video tape recorder 1, switch 14 is provided to select either the video output signal from conventional tuner 11, as connected through terminals 14a and 14T of switch 14, or to connect, through terminals 14V and 14a, the video signals available at video-in terminal 15, which is connected to video-out terminal 8 of video tape recorder 1.

In the system shown in FIG. 1 of the operably interconnected video tape recorder 1 and television receiver 2, when a viewer wishes to watch a program reproduced by the tape reproduction subsystem 3 it is necessary to connect output terminal 7a of switch 7 to input terminal 7V and also to connect output terminal 9a to input terminal 9V. Switch 14 on television receiver 2 must also be operated to connect output terminal 14a to input terminal 14T and television tuner 11 must be operated to select a dead channel, for example, channel 2. Note that in the United States, typically either channel 2 or channel 3 will be a dead channel in almost all regions due to frequency spacing requirements of the FCC that are intended to preclude use of adjacent channels where possible and that, although not used in the United States, channel 1 is used in other countries around the world.

From the above it may be seen that it is quite inconvenient manually to make all the necessary connections involved in the several modes using the various selector switches and tuner switches. While use of the remote control units would eliminate manual operation of the various switches and controls, two separate unit is required for the video tape recorder and the television receiver, respectively. Manipulation of two separate remote control units is both cumbersome and problematic from the standpoint of keeping both units at hand.

Another mode of operation of the combined units shown in FIG. 1 is one in which it is desired to view a program on a video tape without passing the video through the tuner 11 of television receiver 2. In such case, the selector switches would be operated to set switch 7 to select the reproduced video signal at terminal 7V and switch 14 to terminal 14V to select this composite video signal, provided from video-out terminal 8 to video-in terminal 15. In a still different mode of operation, when a viewer desires to view a television program received by antenna 6, selector switches 9 and 14 on the video tape recorder must be operated to make the appropriate interconnections as described above. These various modes of operation all require actuation of switches on both of the units and if the switching is desired to be done remotely, then the two separate remote control units are required.

A remote control system according to one aspect of the present invention is shown in FIGS. 2 and 3, in which elements common to the system of FIG. 1 have like reference numerals. The present invention provides a single wireless, hand-held, remote control unit 16 that operates to control both video tape recorder 1 and television receiver 2, simultaneously, by pressing only switches or buttons located on remote control unit 16. Remote control unit 16 produces and transmits control signals received by control unit 17 to control selector switches 7 and 9 of the video tape recorder 1, and remote control unit 16 also produces and transmits control signals received by control unit 18 to control selec-



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