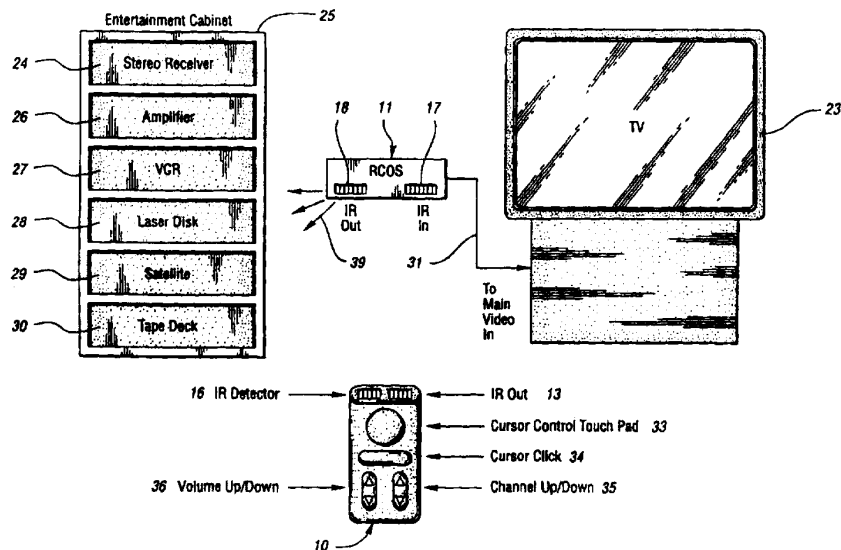




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |                                                                                                                                                                                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (51) International Patent Classification <sup>6</sup> :<br><b>H04Q 1/00</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>A1</b> | (11) International Publication Number: <b>WO 97/25821</b><br>(43) International Publication Date: 17 July 1997 (17.07.97)                                                                                                                                                                                                            |
| (21) International Application Number: PCT/US97/00317<br>(22) International Filing Date: 6 January 1997 (06.01.97)<br>(30) Priority Data:<br>582,669                      4 January 1996 (04.01.96)                      US<br>(71) Applicant: INTERLINK ELECTRONICS, INC. [US/US]; 546 Flynn Road, Camarillo, CA 93012 (US).<br>(72) Inventor: SHILKOFF, Larry, S.; 7009 Rubio Avenue, Van Nuys, CA 91406 (US).<br>(74) Agents: SCHWARTZ, Paul, M. et al.; Brooks & Kushman, 22nd floor, 1000 Town Center, Southfield, MI 48075 (US). |           | (81) Designated States: CA, JP, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).<br><br><b>Published</b><br><i>With international search report.</i><br><i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> |

(54) Title: COMMUNICATION SYSTEM USING A TRANSMITTER AND TRANSCEIVER FOR USE WITH MULTIPLE RECEIVERS



## (57) Abstract

A communication system including a transmitter (10) and a transceiver (11) for controlling the operation of multiple receivers (24-30). The transmitter sends data packages as an IR signal and also has a receiver (16) for sensing the transmission of IR packages from a transceiver. The transceiver receives the IR packages from the transmitter and transmits IR packages from the transmitter to any one or more of the multiple receivers. When the transmitter sends a stop signal (15) this is not transmitted or received by the transceiver until the transceiver is a space mode between data packages. This permits for coordinated transmission between the transmitter and transceiver and ensures that signals from the transmitter do not overlap transceiver output signals.

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## COMMUNICATION SYSTEM USING A TRANSMITTER AND TRANSCEIVER FOR USE WITH MULTIPLE RECEIVERS

### Background Of The Invention

5           Obtaining an effective universal remote control to regulate the operation of multiple different receivers in a home entertainment system is valuable.

          This invention relates to a communication system. In particular, it relates to a system permit-  
10       ting for the development of a universal remote control, particularly to operate one or more units, for instance in a home entertainment system. Such a system can include, for instance, a receiver, stereo, amplifier, VCR, laser disk, satellite, tape deck or TV.

15           Conventionally different components in a home entertainment center each has its own control unit. Each of these control units comes provided with board of buttons, switches and controls and its own menu of operations. It is difficult, particularly when there  
20       are multiple components in a home entertainment system to ensure that the correct remote control effectively operates the correct unit. The learning curve for users of each of these units to effectively operate these remote controls is also unduly complicated.

25           There is a need to provide for a universal remote control whereby through a single hand-held device it is possible to control multiple units easily and effectively.

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Different techniques have been attempted to achieve such an objective but they have been found to still be unduly complicated. In particular, the control and menus to be provided in the hand-held remote are  
5 complex to operate, require complicated menus, difficult programming and multiple control buttons and switches.

There is a need to provide a simplified universal remote control which minimizes these problems.

### **Summary Of The Invention**

10 By this invention, there is provided a communication system which minimizes the disadvantages of universal remote controllers. The invention provides substantial advantages of known techniques of communication.

15 According to the invention, there is provided a communication system comprising a transmitter and a transceiver. The transmitter includes a device for transmitting signals and a device for receiving signals, and means to generate a start signal and a stop signal.  
20 The transceiver includes a device for receiving transceiver control signals and a device for transmitting transceiver control signals to multiple selected receivers.

The system of the invention is directed to  
25 minimizing a problem of overlapping signals. Should an overlap occur, then the operation of the different receivers can be impaired. The different receivers do not understand the different codes and the messages being transmitted through the signal system is garbled.

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As such the invention seeks to ensure that signals from a transmitter are prevented from overlapping signals which are being transmitted or broadcast by a transceiver to control the operation of different receivers.

The invented system seeks to ensure that a stop signal is not transmitted by the transceiver during the time that the transceiver is transmitting signals to other receivers.

The transmitter includes a sensor for sensing the transmission of transceiver control signals by the transceiver such that a stop signal is inhibited from transmission to the transceiver or reception by the transceiver when the transceiver is transmitting signals to any one of the receivers.

In a preferred form of the invention, the sensor is included in the transmitter. Preferably, the signals are IR signals. In this manner, a sensor for sensing the transmission of IR signals operates with the transceiver. A transmitter is inhibited from transmitting a stop IR signal when the transceiver is transmitting an IR transceiver control signal.

In further preferred forms of the invention, the transceiver transmits IR transceiver control signals to one of multiple receivers, which receivers can selectively be at least one of the units particularly in a home entertainment center. Such receivers can be a receiver, an amplifier, a stereo, VCR, laser disk, satellite, tape deck or TV.

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In the preferred form of the invention, the signals are transmitted as data packets. There is a space between the data packets. One data packet would represent a start packet and a different data packet  
5 would represent a stop data packet.

The sensor of the transmitter acts, after activation, to sense a space in data packets namely, control signals transmitted by the transceivers. When a space is sensed, the transmitter transmits the stop  
10 data. There is thus no overlap with data transmission from the transceiver.

In this manner, it is possible to coordinate transmissions from the transmitter and from the transceiver in a manner that they do not overlap.

15 The invention covers the communication system, the transmitter, the transceiver, and the method of communication in this non-overlapping manner.

The invention is further described with reference to the accompanying drawings.

20

### **Brief Description Of The Drawings**

FIGURE 1 represents diagrammatically, the components which are the subject of communication in the system. There is a transmitter, transceiver or repeater, a TV unit and an entertainment cabinet with  
25 multiple different entertainment receiver components.

FIGURE 2 is an alternative configuration to the system illustrated in Figure 1.

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FIGURE 3A is a representation of a top view of a transmitter.

FIGURE 3B is a representation of a side view of a transmitter.

5           FIGURE 4 is a perspective view of a transceiver cooperative with the transmitter and for cooperation with different receivers.

10           FIGURE 5 is a graphical representation showing data packets and spaces between the packets as transmitted, respectively, by the transmitter and the transceiver.

### **Description Of The Preferred Embodiment**

15           The communication system uses a hand-held transmitter 10, and a television set top transceiver 11. Both the transmitter and the transceiver include a receiving device and a transmitting device.

20           The communication system works with the transmission of data packets in the infra red (IR) frequency range. The transceiver also uses IR as a transmission medium between itself and different receivers.

25           The different receiver components can, for instance, be a TV 23, a receiver or amplifier 24 in an entertainment cabinet 25. Other receivers are a stereo amplifier 26, a VCR 27, a laser disk 28, a satellite control 29, and a tape deck 30. Other different

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receiver elements or components can be the subject of this control through the transceiver 11.

As shown in Figures 1 and 2, the transmitter 10 includes an IR LED 13, a cursor control touch pad 33, a cursor click control 34, a channel up/down switch 35, a volume up/down switch 36.

The hand-held transmitter 10 includes a trigger button 12 which, when depressed, emits an IR data packet from an IR LED 13. This is a start signal. When the trigger 12 is released, another IR data packet is emitted from the LED 13. This is a stop signal. In Figure 5, the start packet is depicted as 14 and the stop packet is depicted as 15.

The transmitter 10 also includes an IR detector 16 which can detect when an IR transceiver control signal is being emitted from the transceiver 11.

The set top transceiver 11 includes an IR detector 17 which receives and interprets the IR data package emitted from the transmitter 10. It also includes an IR LED transmitter element 18 which acts as a transmitting device.

In the embodiment of Figure 1, when the transceiver 11, receives the start packet 14, it begins sending a progression of IR data packets, namely, transceiver control signals, as indicated by lines 39. These packets are collectively illustrated as 19, 20, 21, and 22 in Figure 5 to control one or other receiver component.

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As illustrated in Figure 2, the receiver 24 is dedicated to receive the main video signal from the transceiver 11. This is then retransmitted to other dedicated receiver components 26 through 30 as selected. The transceiver 11 is also connected through a line 31 to the TV 23 and is the main video input to the TV 23. The main video input 32 connects the receiver 24 with the transceiver 11. Particular signals from the transceiver 11 are arranged to operate particular receiver components.

When a particular component in the entertainment cabinet 25 is to be controlled, a menu is brought up whereby an appropriate display is shown on the screen 37 of the TV 23. The display 38 would be appropriate for starting a VCR or starting a laser controlling the channels and volumes as is necessary. A suitable on/off switch for the laser, VCR, or other elements of the components is provided in this manner. The controls are displayed on the TV screen 37. The user selects the desired operations by moving the remote control switch on the transmitter 10.

Clicking an appropriate selector button 12 on the remote control transmitter 10 can activate the transmitter 10 to transmit the start package and control package to the transceiver 11.

Once the start data package is transmitted, the transceiver 11 continues to operate step by step until an effective stop data package from the transmitter 10 is received.

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The data packages can according to the selection of the particular operation either select up-channel or down-channel, up-volume or down-volume, on or off of the receiver component as desired.

5                   The menu and display on the TV panel 37 is preset according to the components and makes of the components being used in this communication system. Different characteristics of sound and sight, channel and station can be selected as desired through this  
10                   universal remote control system employing the transmitter 10 with the transceiver 11. The interaction of the TV screen 37 provides a menu which can be easily read by the operator.

                  The operator would activate the transmitter  
15                   10 by touching the pad or one of the buttons. A code is sent to the transceiver 11 as necessary. A graphic is then sent from the transceiver 11 to the television 23 to depict on the screen 37 the conditions for control. A cursor can be moved for location of a desired  
20                   button that the user wishes to operate. The user clicks the cursor click button 34. The location where the cursor is clicked is received by the transceiver 11 at which point the transceiver determines which IR code or macroset is to be executed and this is  
25                   effected along line 31 to the TV 23.

                  As illustrated in Figure 1, the IR out from element 18 operates on any one of the selected components. Particular IR signals, namely, transceiver control signals from the transceiver 11, are arranged  
30                   to operate particular receiver components 24 to 30 through IR signals as indicated by lines 39.

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In the embodiment of Figure 2, the transmitter also includes an IR mirror or blaster, namely a detector 16. As illustrated in Figure 2, the IR code is sent from the transceiver 11 to the IR mirror  
5 blaster 16 as indicated by line 37. The IR mirror/blaster reflects the IR command or macrosequence back to the equipment as indicated by lines 38. Particular IR signals from the transceiver 11 are arranged to operate particular receiver components.  
10

The user in this manner controls the basic volume and channel buttons directly on the transmitter 10 without having to engage an on-screen display.

In other situations instead of line 31 connecting the set top box 11 with the TV 23 by hard  
15 wire, there may be another form of communication connection with the TV 23.

Each of the data packets 14, 15, 19, 20 and 22 can vary in length between 20 milliseconds to a 150  
20 milliseconds. The space 40 between the data packets 19, 20, 21, and 22 can vary in length as off-periods between 10 or more milliseconds.

Particularly, when using IR as the transmission medium, there should only be one transmission  
25 source operating during a given period of time. A receiver component 24 through 30 would receive IR data from a transmission source 11 and will be unable to "see" the data without error if another source, such as the transmitter 10 were operating at the same time.

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This is since it is not possible to differentiate the two sources because they mix together.

When implementing the repeater system with the transceiver 11, the transmission of the IR signal from transmitter 10 and the IR signal from transceiver 11 does not occur at the same time. The signals transmitted each of the transmitter and transceiver is coordinated so they do not overlap.

By having a transmitter with both an IR transmitter 13 and an IR detector 16 and a transceiver with an IR transmitter 13 and with an IR detector 17, it is possible to use a half-duplex transmission sequence without overlapping the IR signals.

With further reference to the representation in Figure 5, it can be seen that when the trigger button 12 operates on the transmitter 10 an IR start packet 14 is sent as is indicated by line A. The transceiver 11 receives the start packet 14 and immediately begins to send a series of data packets to the targeted component 24 through 30. During the off period, namely space 40, the transceiver 11 monitors its IR detector 17 for the presence of an IR signal. A detected IR signal would originate from the IR output 13 of transmitter 10.

The sequence to stop the transceiver 11 is effected as follows:

The trigger button 12 on the transmitter 10 is released. This causes the transmitter 10 to monitor its IR detector 16. If the transmitter 10 detects

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incoming IR signals it transmits no further signal until the detected incoming IR signals ceases. The detected IR through the receiver 16 would originate transmissions from output 18 of the transceiver 11.

5 This point of release of the trigger 12 of the transmitter 10 and the beginning of sensing for IR will be in conformity with line B in Figure 5.

When the IR detector 16 detects no IR, namely the data packet 22 is completed, the transmitter 10

10 transmits an IR stop packet 15. This is conformity with position C in Figure 5. The IR stop packet 15 is detected by the transceiver 11 which ceases its packet transmissions 19, 20, 21 and 22, and the packets which would otherwise normally follow. The ongoing transmission of data packets to operate the receiver ceases.

15 Thus a VCR volume change or channel selection change stops after receipt of the stop signal.

In this manner, the transmitter 10 is able to ensure that the stop packet 15 is not transmitted

20 while the transceiver is transmitting IR signals. By this protocol, it is possible to avoid confusing signals and overlapping signals reaching the receivers 24, 26, 27, 28, 29, 30 or 23.

Many other forms of the invention exist each

25 different from the other in matters of detail only.

While the invention has been described with reference to IR signals, there can be situations where it is desirable to use this protocol for signals in other frequency domains, for instance RF or a combination of different frequency domains.

30

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In other situations, there may also be different signals being transmitted by the transmitter 10 between the start signal and the stop signal 15.

5 In yet other forms of the invention, instead of having the transmitter have an IR sensor to detect the transmission or otherwise of IR signals from the transceiver, there could be a device with the transmitter and/or receiver 11 to prevent, jam or inhibit the transmission of transmitter IR signals, and/or the  
10 reception of IR signals by the transceiver or other receiver components. Different systems and protocols exist for blocking the transmission of IR signals from the transmitter thereby to avoid overlap of IR signals.

15 Further, although the invention has been described with reference to operating receiving components in a home entertainment system, the communication system could equally be applicable to other configurations and arrangements where there are different  
20 components for control by a universal remote control.

For example, different lighting configurations can be controlled in this manner. Similarly, it is possible, in different configurations, to dispense with the TV monitor to provide the menu for operating  
25 the different components. The menu and its display could be contained with or on a suitable monitor in the transmitter or the receiver units.

The invention is to be determined solely by the following claims.

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**What Is Claimed Is:**

1. A communication system comprising:  
a transmitter including a device for transmitting signals, a device for receiving signals, and  
5 means for transmitting a start signal and a stop signal;  
a transceiver including a device for receiving signals, and a device for transmitting transceiver control signals; and  
10 a sensor for sensing the transmission of transceiver control signals by the transceiver such that the stop signal is inhibited when the transceiver is transmitting a signal.

2. A system as claimed in claim 1 including  
15 at least one receiver, and wherein the transceiver is arranged to communicate with the receiver.

3. A system as claimed in claim 2 wherein  
the transceiver is arranged to receive signals from the transmitter and is to transmit transceiver control  
20 signals to multiple receivers, each receiver being selected to receive a dedicated transceiver control signal from the transceiver.

4. A system as claimed in claim 3 wherein  
the receiver is selectively at least one of a VCR, TV,  
25 stereo, laser disk, satellite dish receiver, amplifier, or a tape deck.

5. A communication system as claimed in claim 2 wherein the transmitter includes a control for

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volume, channel selection and on/off switching in a receiver.

6. A communication system as claimed in claim 4 wherein the transmitter includes a control for  
5 volume, channel selection and on/off switching.

7. A communication system as claimed in claim 1 wherein the transmitter signals are transmitted as data packets, the transmitter data packets including a start packet and a stop packet and wherein  
10 there is a space between respective data packets, and wherein the transceiver control signals are transmitted as data packets with respective spaces between the data packets.

8. A communication system as claimed in  
15 claim 7 wherein, after activation to transmit a stop packet, the sensor first senses a space between data packets transmitted by the transceiver and then transmit the stop data package.

9. A communication system as claimed in  
20 claim 1 wherein the transmitter includes the sensor for sensing the transmission of transceiver control signals.

10. A communication system comprising:  
a transmitter including a device for transmitting IR signals, a device for receiving IR signals,  
25 and means for transmitting a start IR signal and a stop IR signal;

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a transceiver including a device for receiving IR signals, and for transmitting IR transceiver control signals; and

5 a sensor for sensing the transmission of transceiver control signals by the transceiver such that the stop signal is inhibited when the transceiver is transmitting a signal.

11. A system as claimed in claim 10 wherein the transceiver is dedicated to receiver IR signals  
10 from the transmitter and is adapted to transmit IR transceiver control signals to multiple receivers, each receiver being selected to receive a dedicated IR transceiver control signal from the transceiver.

12. A system as claimed in claim 11 wherein  
15 the receiver is selectively at least one of a VCR, TV, stereo, laser disk, satellite dish receiver, amplifier or a tape deck.

13. A communication system as claimed in claim 12 wherein the transmitter includes a control  
20 for volume, channel selection and on/off switching.

14. A communication system as claimed in claim 10 wherein the transmitter signals are transmitted as data packets, the transmitter data packets including a start packet and a stop packet and wherein  
25 there is a space between respective data packets, and wherein the transceiver control signals are transmitted as data packets with respective spaces between the data packets.

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15. A communication system as claimed in claim 14 wherein, after activation to transmit a stop packet, the sensor first senses a space between data packets transmitted by the transceiver and then transmit the stop data package.

16. A communication system as claimed in claim 10 wherein the transmitter includes the sensor.

17. A transmitter for a communication system, the communication system including the transmitter, a transceiver and a receiver, wherein the transmitter comprises a device for transmitting signals, a device for receiving signals, and means for transmitting a start signal and a stop signal, and a control for regulating, through the transceiver, the operation of at least one receiver.

18. A transmitter as claimed in claim 17 including means for transmitting signals as IR signals of data packets, and wherein there is a space between respective data packets, and the control is at least one of volume, channel selection and on/off switching of a receiver.

19. A transmitter as claimed in claim 18 wherein the transmitter includes a sensor for sensing transmission of the IR transceiver control signals by the transceiver such that the stop IR signal is inhibited from transmission when the transceiver is transmitting an IR transceiver control signal.

20. A transmitter as claimed in claim 19 wherein the data includes a start packet and a stop

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packet and wherein there is a space between respective data packets, and wherein the transceiver control signals are transmitted as data packets with respective spaces between the data packets.

5                   21. A transceiver for operation with a communication system comprising a transmitter, a transceiver and multiple receiver, the transceiver comprising a device for receiving signals, including start and stop signals, from the transmitter, and a  
10       device for transmitting transceiver control signals to a selected receiver of the multiple receivers such that a stop signal from the transmitter is prevented from impacting transceiver control signals while being transmitted by the transceiver.

15                   22. A transceiver as claimed in claim 21 wherein the transceiver control signals are IR data package signals, the signals being received from the transmitter as data packages with spaces between them, and wherein the transceiver transmits data packages  
20       with a respective space between them.

                  23. A transceiver as claimed in claim 22 wherein the receiver is selectively at least one of a VCR, TV, stereo, laser disk, satellite dish receiver, amplifier, or a tape deck, and the transceiver  
25       includes means for transmitting data packages to the multiple receivers.

                  24. A transceiver as claimed in claim 21 wherein the transceiver includes means to prevent the reception of a stop signal while the transceiver

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transmits a transceiver control signal to one of the receivers.

25. A method of communicating using a transmitter, a transceiver and a receiver comprising:

5           transmitting from a transmitter a signal, the transmitted signal from the transmitter including a start signal and a stop signal;

              receiving in the transmitter a transceiver control signal from a transceiver;

10           receiving in the transceiver start signal from the transmitter;

              transmitting by the transceiver, transceiver control signals to a selected receiver; and

              the transceiver receiving a stop signal from

15           the transmitter, and the stop signal being received in a manner when the transceiver is not transmitting transceiver control signals to a receiver.

26. A method as claimed in claim 25 including sensing in the transmitter the transmission of

20           transceiver control signals from the transceiver, and delaying the transmission of the stop signal to a time when there is no transmission of a transceiver control signal from the transceiver.

27. A method as claimed in claim 26 wherein

25           receipt of a stop signal by the transceiver stops further transmission of signals from the transceiver.

28. A method as claimed in claim 25 wherein the signals are in an IR frequency domain.

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29. A method as claimed in claim 25 wherein the receiver is at least one selected component in an entertainment system.

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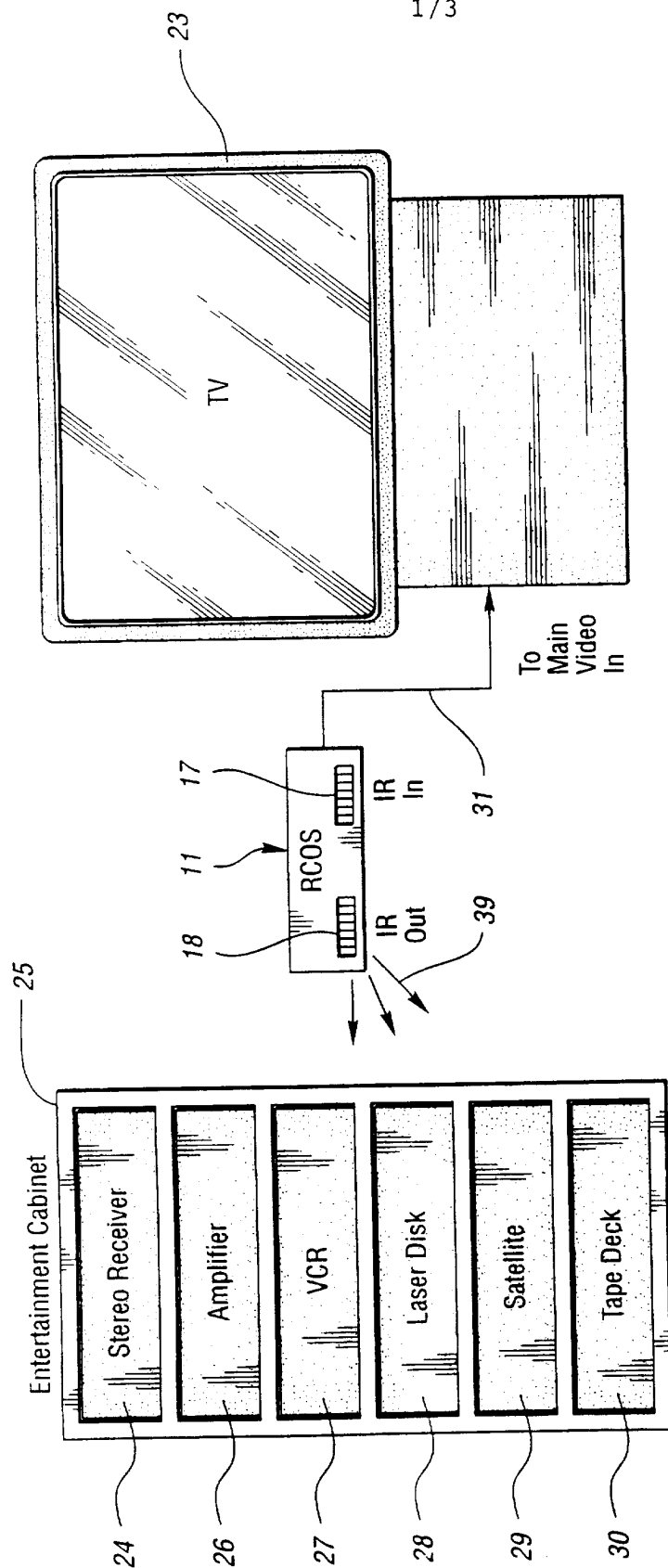
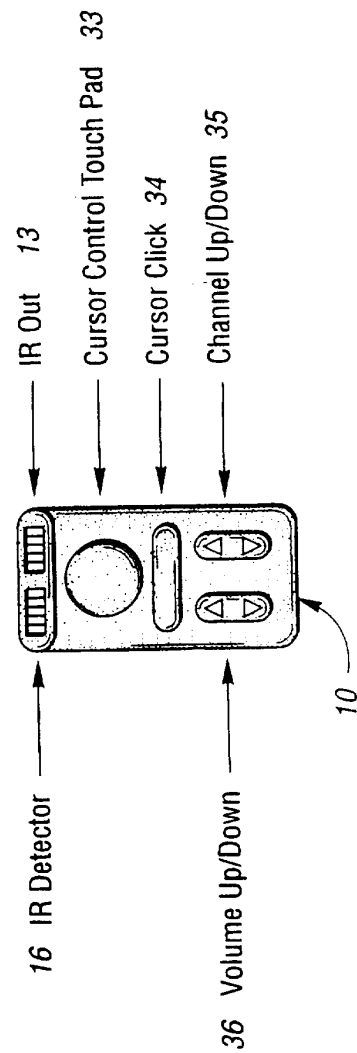


*Fig. 1*



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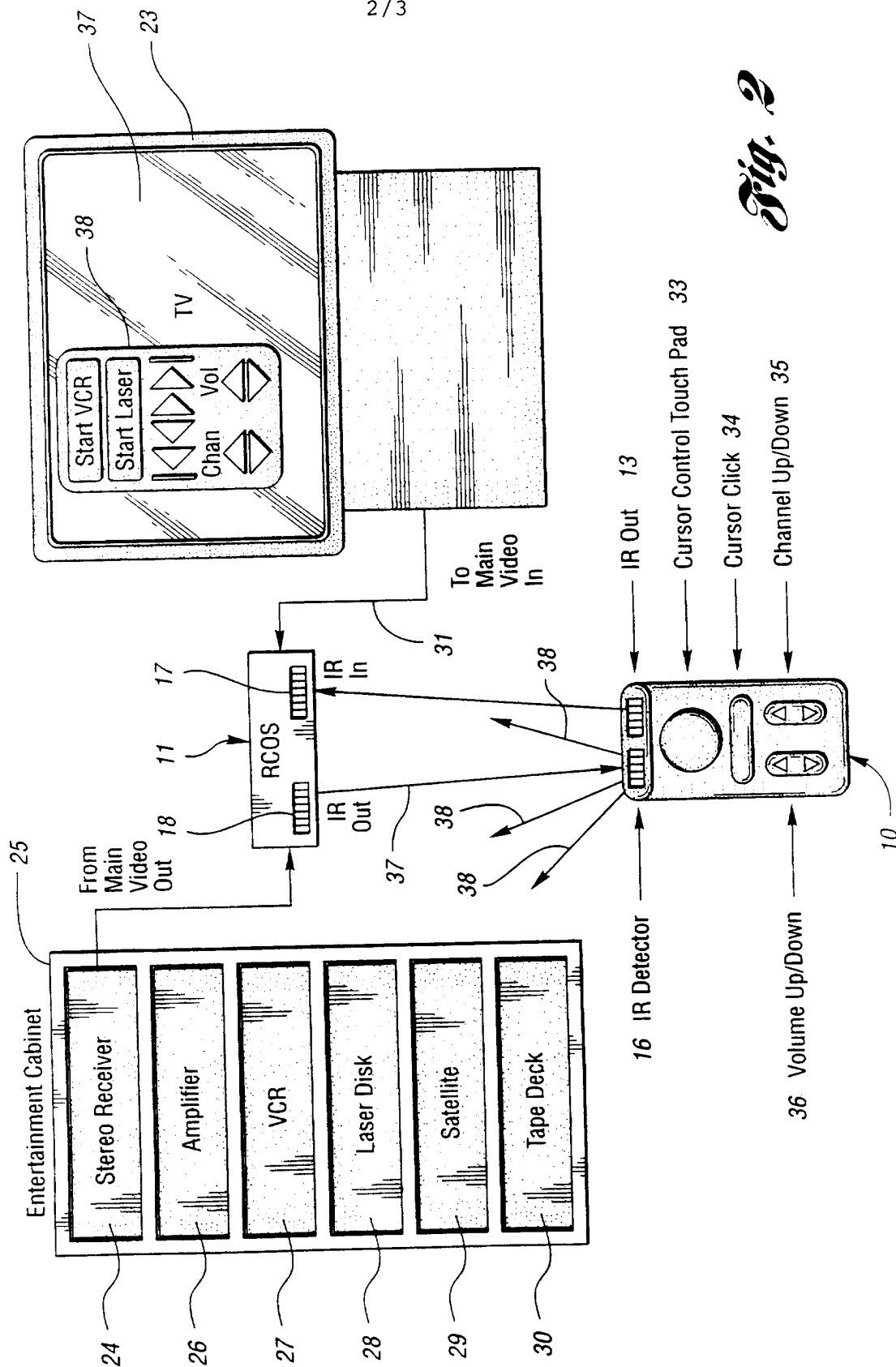


Fig. 2

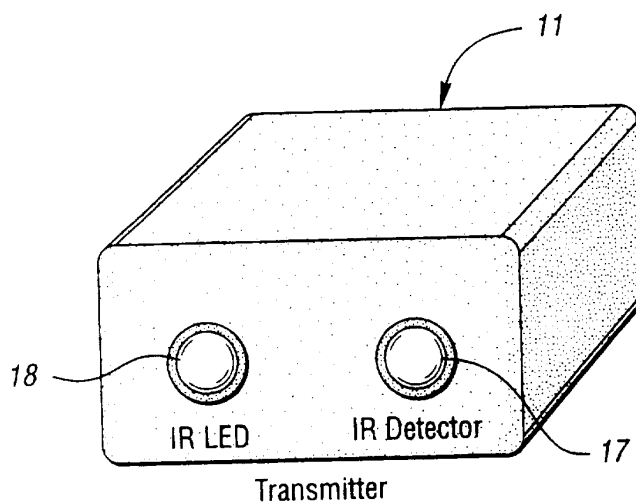
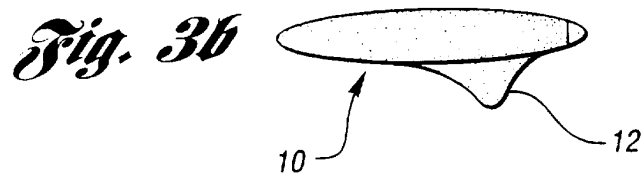
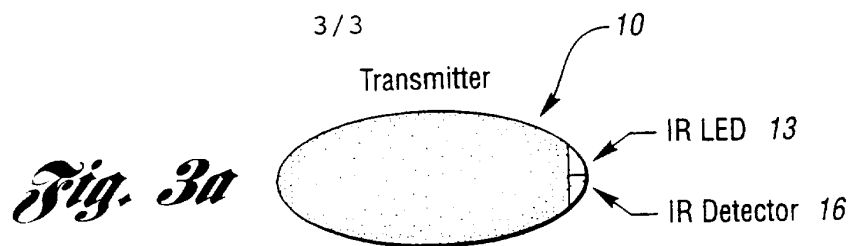
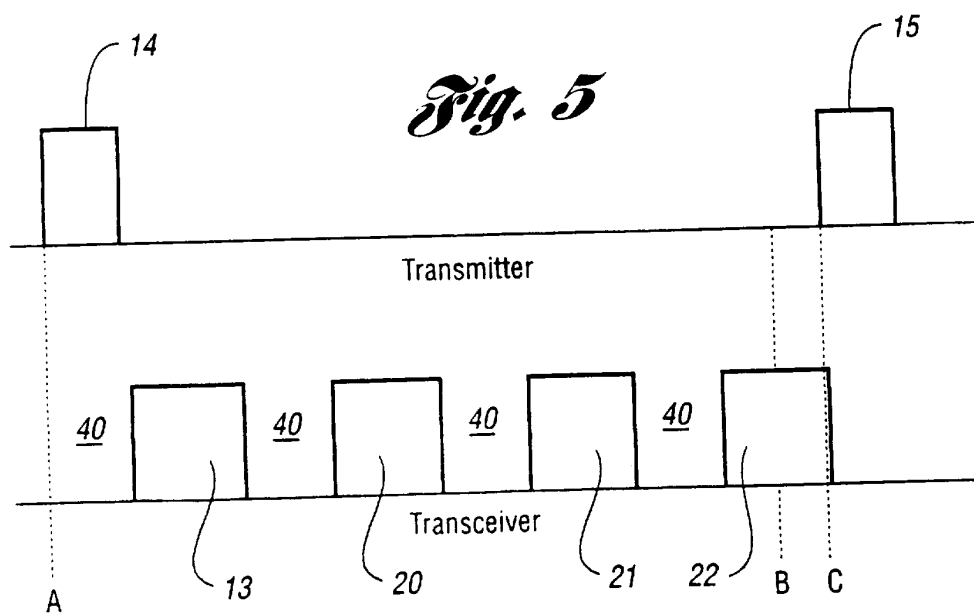


*Fig. 4*



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US97/00317

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(6) : H04Q 1/00

US CL : 340/825.69, 825.72; 348/734

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 340/825.69, 825.72, 825.5, 825.2, 825.22; 348/734

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category*     | Citation of document, with indication, where appropriate, of the relevant passages                       | Relevant to claim No.      |
|---------------|----------------------------------------------------------------------------------------------------------|----------------------------|
| X<br>---<br>Y | US 5,307,193 A (VANZEELAND ET AL) 26 April 1994, Figure 1 and Abstract as well as col. 1 through col. 3. | 21<br>---<br>1-20, 22-29   |
| Y             | US 5,089,974 A (DEMEYER ET AL) 18 February 1992, col. 6 lines 12-35                                      | 1-29                       |
| Y             | US 5,109,222 A (WELTY) 28 April 1992, description of Figure 5.                                           | 3-6, 11-13, 18, 19, 23, 29 |



Further documents are listed in the continuation of Box C.



See patent family annex.

|                                                                                                                                                                         |                                                                                                                                                                                                                                                  |
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Date of the actual completion of the international search

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