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Reitmeier

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[54] **REMOTE CONTROL SYSTEM WITH KEY FUNCTION DISPLAY PROVISIONS**

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[51] **Int. Cl.**[4] **H04Q 1/00;** H04Q 7/00

[52] **U.S. Cl.** ..... **340/825.56;** 340/825.54; 340/825.69; 340/825.72; 340/696; 340/365 VL; 340/712; 358/194.1

[58] **Field of Search** ..... 340/365 VL, 365 R, 711, 340/712, 696, 825.55, 825.56, 825.69, 825.72, 825.54; 358/194.1; 455/151, 353, 603, 352

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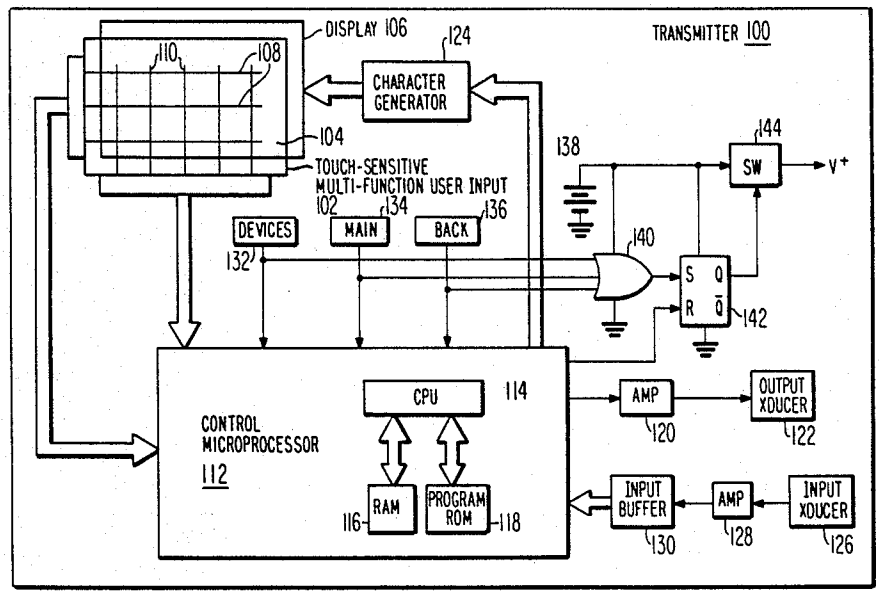
[57] **ABSTRACT**

A transmitter unit of a remote control system includes a key function display unit for identifying the function of key elements of the transmitter unit at various steps of a control sequence for one or more controlled devices. The memory for storing character-representative information for identifying the functions of the key elements of the transmitter and corresponding function control instructions is contained in the controlled devices rather than in the transmitter unit. This allows for the addition of new controlled device without modification of the transmitter units.

5 Claims, 3 Drawing Sheets



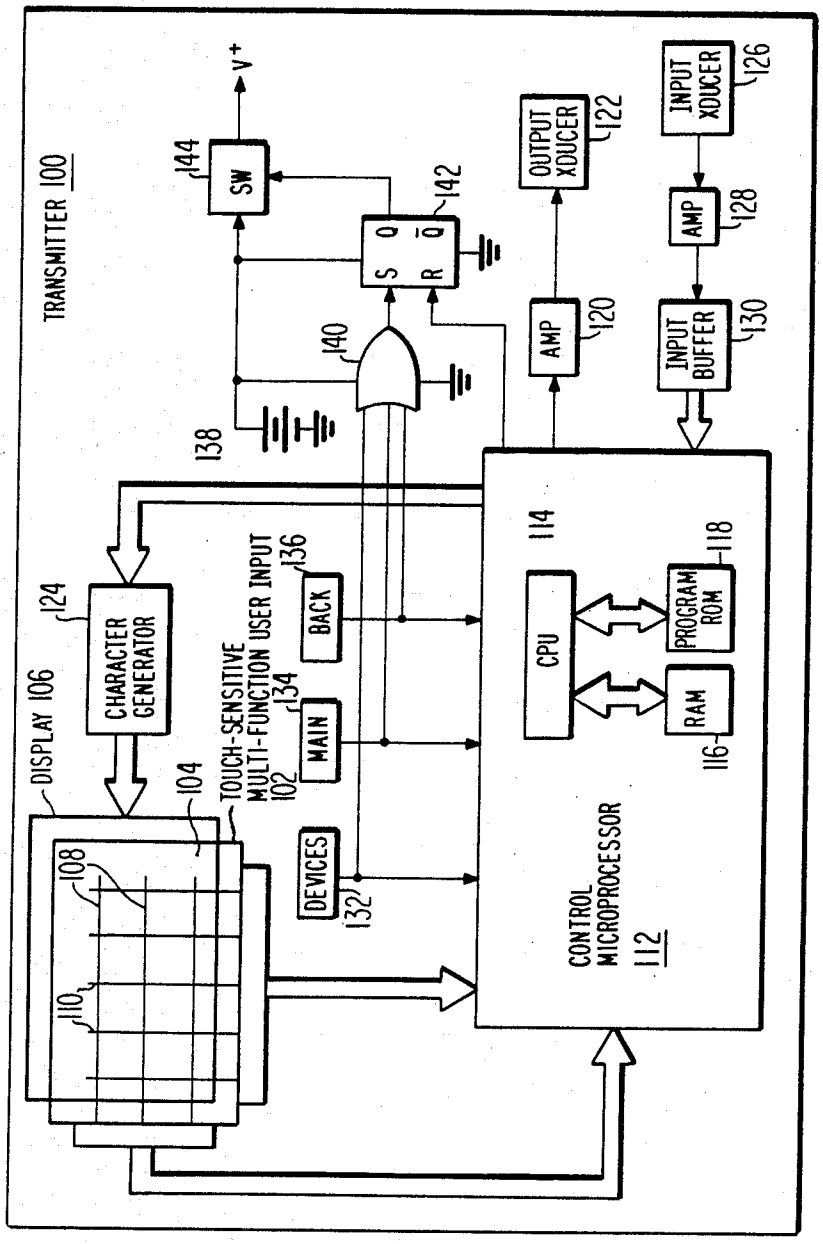


Fig. 1

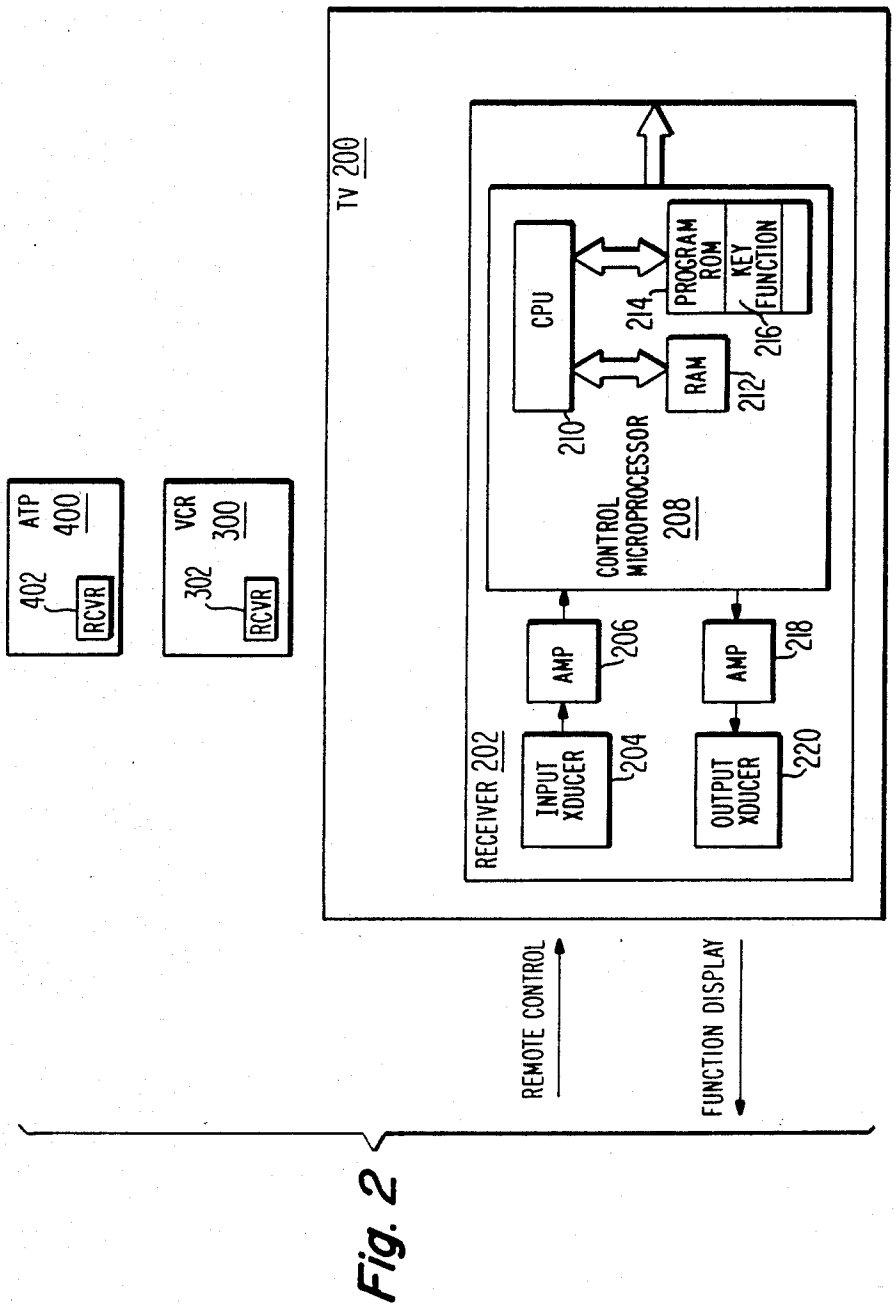


Fig. 2

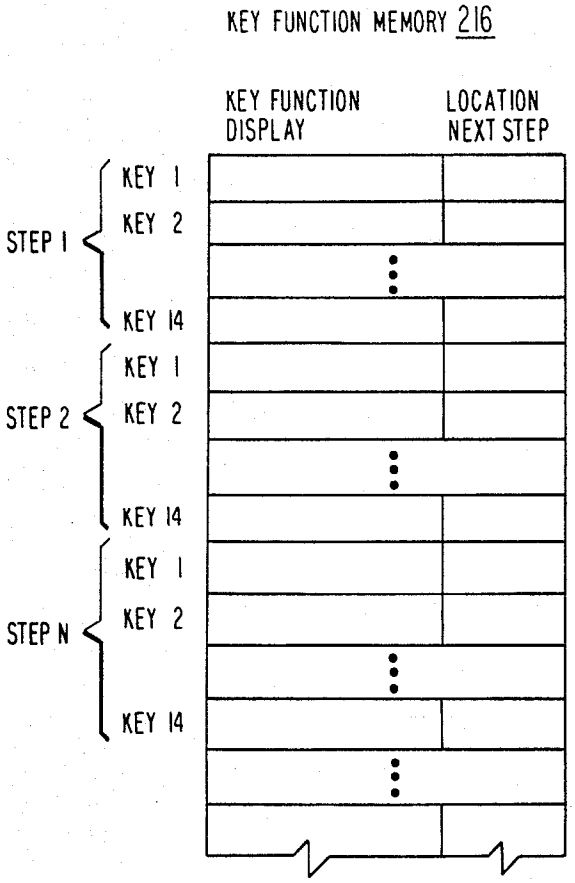


Fig. 3

REMOTE CONTROL SYSTEM WITH KEY FUNCTION DISPLAY PROVISIONS

FIELD OF THE INVENTION

The present invention concerns a remote control system.

BACKGROUND OF THE INVENTION

Remote control systems are used to allow a controlled device to be controlled from a remote location. For example, many consumer electronic products such a television receivers, video cassette recorders (VCRs), audio record and cassette players, have associated hand-held remote control transmitter units for controlling various functions from a viewing or listening position.

A typical remote control transmitter unit has a keyboard with a plurality of keys or buttons corresponding to the functions to be controlled. Usually the more functions that have to be controlled, the greater the number of keys that have to be provided. Since modern consumer electronic products have a very large number of control functions, the keyboard of remote control transmitter units of such products are often cluttered with keys. Some manufacturers provide a single, unified remote control unit for several controlled devices, such as a television receiver and a VCR which are intended to be operated together. The keyboards of such unified remote control transmitter units, therefore, may contain even more keys than dedicated remote control units for individual controlled devices.

Remote control transmitter units with a large number of keys tend to be cumbersome to use and expensive to manufacture. Accordingly, there is a desire in the art to reduce the number of keys of remote control transmitter units.

There have been attempts to reduce the number of keys by assigning multiple functions to at least some keys. The particular function of a key at any time can be determined by a mode switch or by the sequence of prior key operations. To guide users, labels on the keyboard identifying the various functions of the keys may be employed. It is also possible in a television system with a viewing screen, to use the viewing screen to display information indicating the functions of the keys of the remote control transmitter during various modes of operation. However, such prior approaches are indirect and, therefore, may be confusing.

To avoid the confusion that may result from the indirect key function identification technique described above, it has been proposed in European Patent Application Publication No. 0 120 345 to provide a display arrangement on the remote control transmitter unit itself to identify the particular functions of keys at various steps of a control operation. The display arrangement may take the form of individual display devices located near respective keys or of individual display elements underlying transparent keys. Each display device is capable of displaying characters designating the function of the associated key. The information for the key function display arrangement is stored in a display memory contained in the remote control transmitter unit. For expansion, display memories for additional devices that may be controlled by the remote control transmitter unit may be added to the remote control transmitter unit.

While the type of remote control system described in the European patent application is useful, the provisions for expanding its capability to control new devices by adding display memories may be troublesome to users and may limit the number of devices that can be controlled due to wiring and size constraints of the remote control transmitter unit.

SUMMARY OF THE INVENTION

A remote control system constructed in accordance with the present invention comprises a transmitter unit including a multi-function user entry device with key elements and a display unit for identifying the functions of the key elements at various steps of a control algorithm or sequence. The receiver unit of the remote control system, in addition to generating control signals for an associated controlled device in response to remote control messages received from the transmitter unit, includes a key function and display memory for storing information indicative of the functions of key elements of the transmitter unit. During various steps of the control algorithm, character representative data is retrieved from the key function and display memory and transmitted from the receiver unit to the transmitter unit. In response to the received character representative signals, the display unit displays information identifying the functions of the key elements.

Since the key function and display memory is contained in the receiver unit of the remote control system, rather than in the transmitter unit, the same transmitter unit can be used without modification for additional controlled devices. Also, there is no limit on the number of new controlled devices that may be controlled by the transmitter unit.

In a preferred embodiment of the invention, the key elements comprise areas on a touch-sensitive transparent or translucent membrane which overlays a display panel such as a liquid crystal device (LCD).

These and other features of the present invention will be explained in the following description with respect to the accompanying Drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIGS. **1** and **2** show, in block diagram form, the transmitter and receiver units of a remote control system constructed in accordance with the present invention; and

FIG. **3** indicates the contents of a key function and display memory included with the receiver unit of the remote control system shown in FIGS. **1** and **2**.

DETAILED DESCRIPTION OF THE DRAWING

Before describing the embodiment of the remote control system shown in FIGS. **1**, **2** and **3** in detail, a brief summary of some of its features is provided.

In the present remote control system shown in FIGS. **1**, **2** and **3**, a single remote control transmitter controls several controlled devices, such as a television receiver (TV), video cassette recorder (VCR) and audio tape player (ATP). Each controlled device has a relatively large number of functions to be controlled. In order to reduce the clutter and cost associated with fixed or dedicated function arrangements, the keys of the remote control transmitter have multiple functions. A display unit is provided on the remote control transmitter itself to identify the various functions of the keys.

The control process or algorithm provided by the remote control system shown in FIGS. **1**, **2** and **3**, occurs sequentially in steps of increasing levels of specific-

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