

The invention relates to a remote control system for electrical and electronic devices, in particular for home entertainment electronic devices as described in the preamble of Claim 1.

It is known to control electrical devices, such as for example radio receivers, television receivers and video recorders, with a remote control unit operating by wireless transmission. The remote control unit comprises for this purpose, for example, a directional infrared- or ultrasonic transmitter which transmits signals, coded in accordance with the individual functions, to an infrared- or ultrasonic receiver provided in the device. In this way different functions of the device, such as switching on and off, channel selection, volume, brightness and tape operation functions of a video recorder can be remote-controlled,

From the magazine "Funkschau" No. 13, June 1984, pages 51 - 52 a system of the type described in the introduction is known, although no explicit disclosure is made of the features described in the following and contained in the preamble of Claim 1 and as a consequence of which, following the reception of a command transmitted from the remote control unit in the device data items are generated which, according to the status of the device brought about by the command, contain information relating to current operating states and/or setting-up states prevailing in the device. Measures which allow the device to remain in an operable state even in the case of data transmission with pauses from the device to the control unit, are not disclosed in this publication.

Such measures are also not mentioned in the document EP-A-0 320 439 which has disclosed a bidirectional remote control system which is provided in particular for motor vehicles and therefore attempts in particular to take into

consideration the problems of vehicle safety arising in such cases.

Remote control units require a certain know-how and familiarization on the part of the operator. The operator cannot readily recognise whether the command input in the remote control unit actually reaches the device, in particular when a display on the device acknowledging the reception of the command is difficult for the user to detect at a distance. In practice the user is thus compelled to check, after every operation of a remote control element, whether the desired reaction is actually occurring on the device which is to be controlled.

The document EP-B-0 129 794 has disclosed a bidirectional system with a remote control unit and a plurality of devices to be controlled by said remote control unit, wherein additionally a transmitter is provided in the devices and a receiver is provided in the remote control unit. In this system, in order to verify the remote control functions, which of the devices is ready to receive is displayed on the remote control unit, referred to in the following as RC unit. No further items of data are transmitted.

The aim of the invention is to organise the timing of the data exchange in a system of the type referred to in the introduction between the corresponding transmitters and receivers.

This aim is fulfilled, in accordance with the invention, by the features described in Claim 1. Advantageous further developments of the invention are characterised in the sub-claims.

In principle, displays which for example in the case of commercially available video recorders provide information

on the front side of the device concerning different operating- and setting-up states, are transmitted from the device to the RC unit wherein they can be visualised on a display field. Thus in extreme cases a display on the device itself could be dispensed with, particularly since in many cases the device is set up at a distance of several meters from the operator so that the displays on the device are undetectable or detectable only with difficulty. The transmission of the data from the device to the RC unit is carried out by a transmitter which is arranged in the device and which is associated with a receiver in the RC unit. The current items of operating and setting-up data are cyclically called up in the device by a control logic circuit and likewise cyclically transmitted with interposed pauses. To avoid incorrect control and incorrect displays, the respective receiver both in the device and in the RC unit is inhibited during a data transmission of the associated transmitter. The transmitter in the RC unit is given a priority status in that the device transmits the items of data with interposed pauses so that in each pause the receiver in the device is activated.

Since in the case of command transmissions from the RC unit to the device the receiver in the RC unit is inhibited, in the RC unit a store is provided for already received items of data so that also in this phase displays can be made on the display field of the RC unit. In addition to these displays, the respective command output can also be displayed for example. To ensure conformity between a clock arranged in the device and the time display on the remote control unit, the clock time can be directly displayed or a clock provided in the RC unit can be synchronised by the device clock.

Conceivable display possibilities on the RC unit will be discussed in the form of an example of a video recorder:

A Operating States:

On, off, rec, play, stop, channel etc.

B Drive Unit Data:

Tape count, remaining operating time of tape etc.

C Status Data:

Clock time, date, timer and store contents etc.

D Special Operation Data:

VPS, REC, quick start, search operation etc.

In the following the invention is to be explained in detail in the form of an example making reference to a Figure:

The Figure illustrates a remote-controllable device 1 and an associated RC unit 2. The device 1 is equipped with a transmitter 6 and a receiver 5. Similarly, the RC unit 2 comprises a transmitter 4 and a receiver 7. In the RC unit 2 a keyboard 12 is provided which is connected via the line L3 to a control logic circuit 11, which can be designed as μP or μC . If commands which control the operation of the device 1 are input by means of the keyboard 12, these commands are fed as data items via the line L2 to the transmitter 4. At the same time, via the line L7 the control logic circuit 11 emits a command which inhibits the receiver 7 in the RC unit 2 in order to prevent incorrect inputs by the data commands emitted from the transmitter 4. For monitoring purposes, the transmitted commands can be fed via the line L1 to the display field 3 for display thereon.

The command which is transmitted for example via a data-modulated IR beam is received by the receiver 5 present in the device 1, demodulated, and fed as data stream via the line L9 to the control logic circuit 13 (μP or μC). From the control logic circuit the commands pass via the lines

L13 - LX to the device for the execution of the commands in the thus actuated circuit components (not shown in the drawing). Additionally, necessary displays can be visualised on the display field 14 via the line L11. The control logic circuit 13 is designed such that the output of data items fed cyclically via the line 10 to the transmitter 6 is provided with interposed pauses.

These pauses have the following function:

On the transmission of data items modulated on a carrier via the device transmitter 6, the associated receiver 5 is inhibited by means of the control logic circuit 13 via the line L12 in order to avoid incorrect settings by these data items. As, however, a command emitted from the RC unit 2 is to be immediately executed, the receiver 5 must not be inhibited when a command arrives. If, however, the transmission of data is clock controlled, i.e. provided with pauses, the receiver 5 is activated during each pause. If a command is received during the activation phase, the latter is processed in the control logic circuit 13. At the same time, for the duration of incoming signals the emission of device-related data items via the line L10 to the transmitter 6 is inhibited by the control logic circuit 13. By the selection of the timing of the pauses it must be ensured that a command input into the keyboard 12 by the operator reliably falls in a "pause" of the device.

The data items transmitted by the device 1 pass from the receiver 7 in the RC unit 2 via the line L8 to a decoder circuit 8, are demodulated therein, and are fed from the latter via the line L6 to a store 9 and to a clock module 10 to trigger the clock time set in the device 1. From the store 9 the current items of operating and setting-up data pass from the device 1 via the line L5 to the control logic circuit 11, from which, via the line L1, the displays on the display field 3 are controlled. The items of clock-time

information are also fed from the clock module 10 via the line L4 to the control logic circuit 11 for display on the display field 3.



Claims

1. A remote control system for electrical and electronic devices (1), in particular for home entertainment electronic devices, wherein the remote control unit (2) comprises an electronically controllable display field (3) and a command transmitter (4) and the device (1) comprises a command receiver (5), and additionally the device (1) comprises a transmitter (6) and the remote control unit (2) comprises a receiver (7) associated with said transmitter, wherein on the reception of a command transmitted from the remote control unit (2) in the device (1) data items are generated which, according to the status of the device (1) brought about by the command, contain information relating to current operating states and/or setting-up states prevailing in the device (1), and wherein these data items are conveyed from the transmitter (6) arranged in the device (1) to the associated receiver (7) in the remote control unit (2), are prepared in the remote control unit (2) and visualised in the form of a display on the display field (3), characterised in that on the activation of one of the transmitters (4, 6) the associated receiver (7, 5) is inhibited from receiving by a control logic circuit (11, 13) and that the data items containing the current operating states and/or setting-up states are transmitted from the device (1) with interposed pauses, where the receiver (5) arranged in the device (1) is ready to receive during the pauses.

2. A system as claimed in Claim 1, characterised in that in the remote control unit (2) a data store (9) is provided for already received data items which are visualised on the display field (3) when called up and/or continuously.

3. A system as claimed in Claim 1 or 2, characterised in that in the remote control unit (2) a clock module (10) is



provided which can be adjusted by items of time data from the device (1).

4. A system as claimed in one of the preceding claims, characterised in that the timing of the interposed pauses is selected such that a command input into a keyboard (12) of the remote control unit (2) reliably falls in a pause.