

It is known to control electrical devices such as radio receivers for example, television receivers and video recorders with a wirelessly transmitting remote control unit. The remote control unit therefor includes for example a directed radiating infra red or ultra sound transmitter, which transmits signals, coded in accordance with the individual functions, to an infra red or ultrasound receiver located in the device. In this way different functions of the device such as switching on and off, selecting a channel, volume, brightness and tape run functions of a video recorder may be remotely controlled.

These remote control units require a certain expertise and familiarity from the operator. In particular, with novice users a key press will often have to be repeated several times, until the device which is to be controlled reacts accordingly. The main reason for this is that the remote control unit has to be kept in the correct position and direction with respect to the device to be controlled because of the direction characteristics of the infra red or ultra sound transmitter and receiver. The operator may not readily recognise whether the command fed into the remote control unit is able to reach the device at all, particularly if an indication acknowledging receipt of the command is not present at the device or can only be recognised poorly by the user at that distance. The user is therefore virtually forced, before each use of the remote control unit, to consider his previous experience with the remote control and to use the experience to examine whether, from his current location, with the present alignment of the remote control unit with respect to the device which is to be controlled, in the current environment and with the current battery condition it is at all sensible to use the remote control. Moreover, after each actuation of a remote control element of the remote control unit he must examine whether the desired reaction is really at the device to be controlled. If it is not then he must repeat the process described with another location or another alignment or at a shorter distance from the device.

The objective underlying the invention is to simplify manipulation of this type of remote control unit in the sense that the operator is better able to recognise the ability of the remote control to function.

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This objective is achieved by the invention described in Claim 1. Advantageous further refinements of the invention are described in the dependent claims.

In fact, a wireless remote control system is known (European Patent A2-0 075 317), in which a signal confirming reception is passed back to the remote control unit by a device controlled by the remote control unit. This signal does not however serve in the remote control unit to switch on said unit only when the remote control unit is capable of communicating with the device which is to be controlled, nor does it make known the said signal to the user at the remote control unit.

It is also known (GB A-2 005 114) to indicate the operating state of a device in a base station together with an audio signal in the form of a special burst signal of a remote control station operating the base station. There however there is no remote control system, as forms the basis of the present invention. Nor is there any provision for automatic switch-on of a remote control unit by a controlled device when there is the ability to communicate.

With the invention, the operator is informed at the remote control unit itself, i.e. in its immediate vicinity, as to whether he is able to operate the device to be controlled at all with the remote control unit or which device out of a plurality of devices operable with the remote control unit he is able to operate currently. The remote control unit is only activated by a signal ("stand-by signal") received from the device at regular time intervals and is not capable of functioning without such a signal. The operator therefore recognises either from a missing indication or from an explicit indication, e.g. "cannot function", that momentarily it is not possible to remotely control an associated device. This may be the case, if the remote control unit is not aligned to a device, if the device or the remote control unit are defective or if the device is switched off completely and therefore cannot react to remote control signals.

With a plurality of devices, which may be operated with the same remote control unit, the transmitters of the individual devices preferably transmit differently coded stand-by signals. It is then possible to indicate on the remote control unit which device, e.g. "video recorder" may be operated at that moment. The transmitter provided in the device transmits a remote control signal, which is periodically repeated, when the device is on function stand-by, and from this remote control signal the receiver contained in the remote control unit recognises the function stand-by of the device which is to be controlled. Only when this stand-by signal of the device to be controlled is received in the remote control unit, does the remote control unit itself go into function stand-by. Only then are actuations of operating elements of the remote control unit converted into correspondingly command coded remote control signals.

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The solution in accordance with the invention of testing the respective existence of the transmission channel from the remote control unit to the device and automatically the existence of the channel in the reverse direction from the device to the remote control unit, operates particularly well if the direction characteristics of all of the transmission parts is the same and if the direction characteristics of all of the reception parts is also the same. The transmission power of the transmitter in the device may be controlled advantageously proportionally to the respective transmission power of the remote control unit which depends on the condition of the battery. For this purpose a coded signal indicating the transmitting power of the remote control unit may be transmitted by the remote control unit which controls the transmission power of the transmitter in the device proportional to the respective transmission power of the remote control unit.

The invention is described using the drawings by way of example of remote control of a video recorder.

Fig. 1 shows the cooperation between the remote control unit and a device in function stand-by,

Fig. 2 shows the remote control unit without function stand-by

Fig. 3 shows in principle a circuit diagram for remote control with reception and evaluation of a function stand-by signal transmitted by the device and

Fig. 4 shows in principle a circuit diagram of the transmitter provided in the device.

In Fig. 1 the video recorder 1 may be remote controlled in its various functions by the remote control unit 2. The remote control unit 2 therefore includes an infra red transmitter 3, which transmits signals coded with the direction characteristic 4 to the infra red receiver 5 in the recorder 1. The recorder 1 also includes a transmitter 6 which with the direction characteristic 7 transmits a function stand-by signal to the receiver 8 in the remote control unit 2. Only on reception of this function stand-by signal from the transmitter 6 is the remote control unit 2 activated. It is then indicated on electronic indicator units that the video recorder VTR may be operated by the remote control unit 2.

At the same time the individual keys are inscribed with the typical video recorder operating functions. This solution is described in more detail in earlier patent application German A-33 10 580.4. The video recorder 1 may now be operated by the individual keys of the remote control unit 2.

In Fig. 2 the receiver 8 lies outside the direction characteristic 7 of the transmitter 6 in the device 1 which is to be remote controlled. Thus the receiver 5 is also outside the

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range of the transmitter 3, so that remote control signals from the remote control unit 2 are not able physically to reach the device 1 which is to be remote controlled. The remote control unit is not now able to function. There is no indication on the fields of the remote control unit 2 from which the operator could recognise this inability to function. There may also be explicit indication, for example "unable to function". The same relationships apply to the remote control unit, when the remote control unit 2 is aligned to the device 1 as in Fig. 1, but the device 1 is not switched on or there is some other error which prevents the function stand-by signal being sent out regularly by transmitter 6.

Fig. 3 shows the construction of the circuit in the remote control unit 2 in principle. The function stand-by signal from a device is received by the receiver 8, in the form of an infra red receiving diode, and is passed via the demodulator 9 to the microprocessor 10, to which are connected a ROM store 11 and a RAM store 12. In addition the key inscription field 13 and the key field 14 provided for manual operation are connected to the microprocessor 10. The microprocessor 10 passes a signal, in accordance with the command fed into the key field 14, to the modulator 15 which transmits the coded remote control signal via the transmitter 3, in the form of an infrared transmitting diode, to the device 1. The whole of the circuit is only able to function, if a function stand-by signal is received by the receiver 8 from a device. The key inscription field 13 indicates, among other things, from which device the respective function stand-by signal is being received.

Fig. 4 shows in principle the construction of the transmitter 6 for producing the function stand-by signal. The generator 16 for the time clock of the periodic repetition controls the modulator 17 which irradiates the function stand-by signal via the transmitter 6, in the form of an infrared transmitting diode. When the device is on function stand-by, the switch 18 is connected.

The remote control unit 2 is driven by a battery or an accumulator, since it is not practicable to connect such a remote control unit up to the mains. In order to protect the battery or accumulator, the stand-by signal from the devices 1 is not checked for reception constantly, but is only triggered by the user switching on the remote control unit or actuating a special operating element on the remote control unit. A sensor key may be arranged on the remote control unit, and this sensor key is automatically touched, when taking hold of the remote control unit 2 and switches on the remote control unit 2 to check reception of the stand-by signal. Several or large-area sensor elements may be provided, so that as mentioned switch-on takes place safely, when the remote control unit 2 is held by the human hand.

PATENT CLAIMS

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1. A remote control system for electrical and electronic equipment (1), more particularly for electronic equipment for entertainment, in which the remote control unit (2) has an instruction transmitter (3) and the equipment (1) has an instruction receiver (5) and in addition the equipment (1) has a second transmitter (6) and the remote control unit (2) has a second receiver (8) associated therewith, characterised in that a stand-by signal identifying the equipment (1) is applied to the control input of the second transmitter (6) and a circuit is connected to the second receiver (8), said circuit switching on the remote control unit (2) for controlling the equipment (1) only when the stand-by signal is received, that an indication (VTR) for the resulting switch on of the remote control unit (2) is triggered in the remote control unit (2) and that the second transmitter (6) and the second receiver (8) are so adapted in their direction characteristics and position to the instruction transmitter (3) and the instruction receiver (5), that largely regardless of the spatial relationships between the equipment (1) and the remote control unit (2) signals from the instruction transmitter (3) may be received by the instruction receiver (5) on receipt of signals from the second transmitter (6) in the second receiver (8).
2. A system according to claim 1, characterised in that the indication includes an identification (VTR) of the equipment (1) which triggers switch on.
3. A system according to claim 1, characterised in that the second transmitter (6) only sends the stand-by signal, if the equipment (1) is operational and has not been blocked from operation by the remote control unit (2) due to its priority use by some other remote control unit.
4. A system according to claim 1, characterised in that if no stand-by signal is received from the second transmitter (6) of the equipment (1), then in the remote control unit (2) there results an indication for the momentary incapacity of the remote control unit (2) with regard to the equipment (1).
5. A system according to claim 1, characterised in that the direction characteristics of the instruction transmitter (3) and of the second transmitter (6) and the direction characteristics of the instruction receiver (5) and the second receiver (8) are the same.
6. A system according to claim 1, characterised in that the transmission power of the second transmitter (6) is controlled so as to be proportional to the transmission power of the instruction transmitter (3).
7. A system according to claim 1 characterised in that the second transmitter (6) sends the stand-by signal only at periodically repeated time intervals.
8. A system according to claim 1, characterised in that in a plurality of pieces of equipment (1) associated with the remote



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control unit (2) the second transmitters (6) of the equipment (1) transmit different coded stand-by signals.

9. A system according to claim 1, characterised in that the checking of the reception of the stand-by signals is not continuous but is triggered by the user by switching on the remote control unit (2) or by actuating an operating element on the remote control unit (2).

