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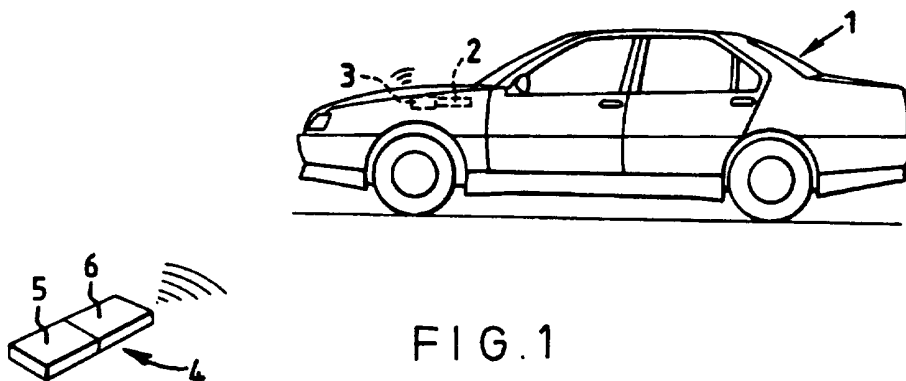
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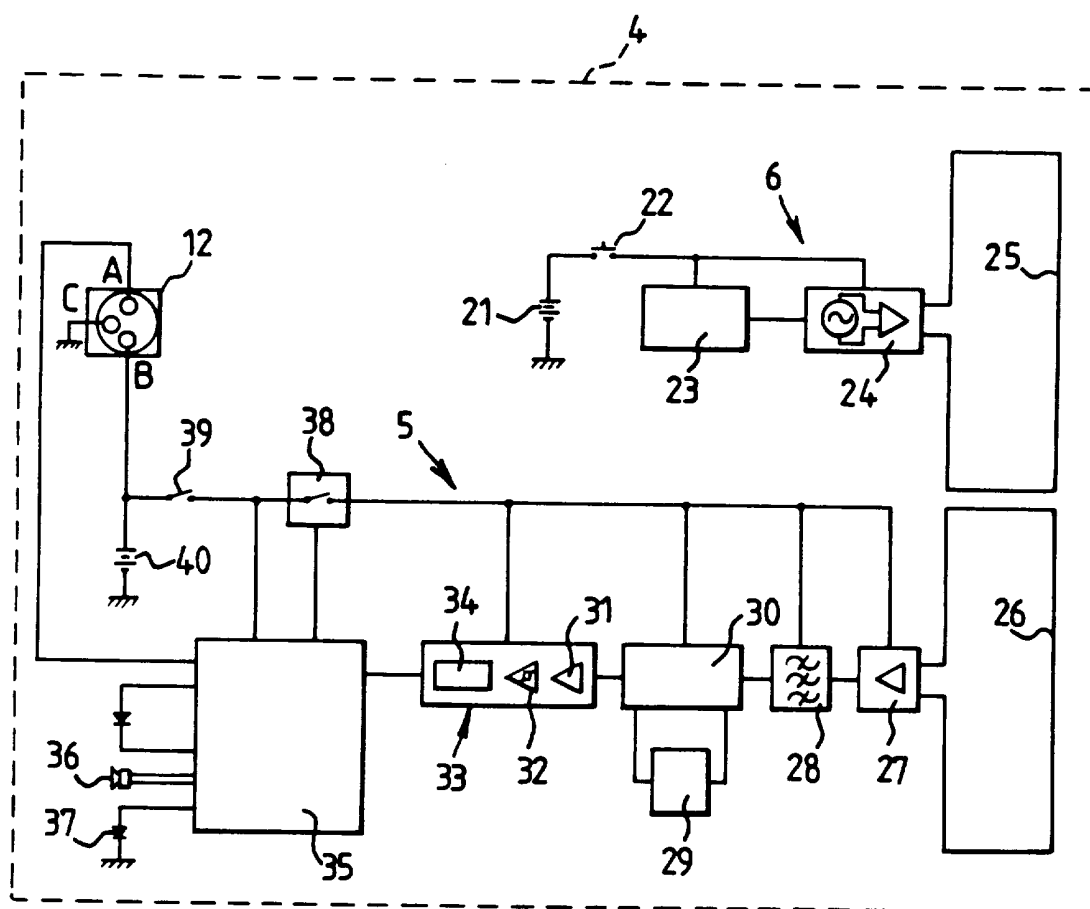
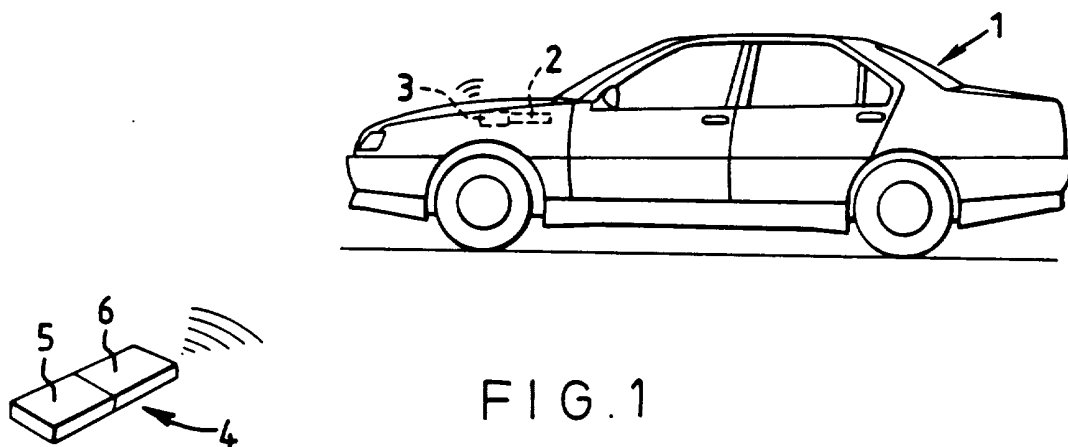
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(54) **Bi-directional communication device for burglar alarm**

(57) A remote device for a vehicle theft alarm comprised a transmitter 6 for activating and deactivating the alarm and a receiver 5 for confirming activation and deactivation of the alarm and warning when an intrusion has occurred. The alarm transmitter 3 on the vehicle is part of a circuit which activates the vehicles indicators. The remote device is charged at a point inside the vehicle; if the driver forgets to take the remote with him when leaving the vehicle a warning signal is given.



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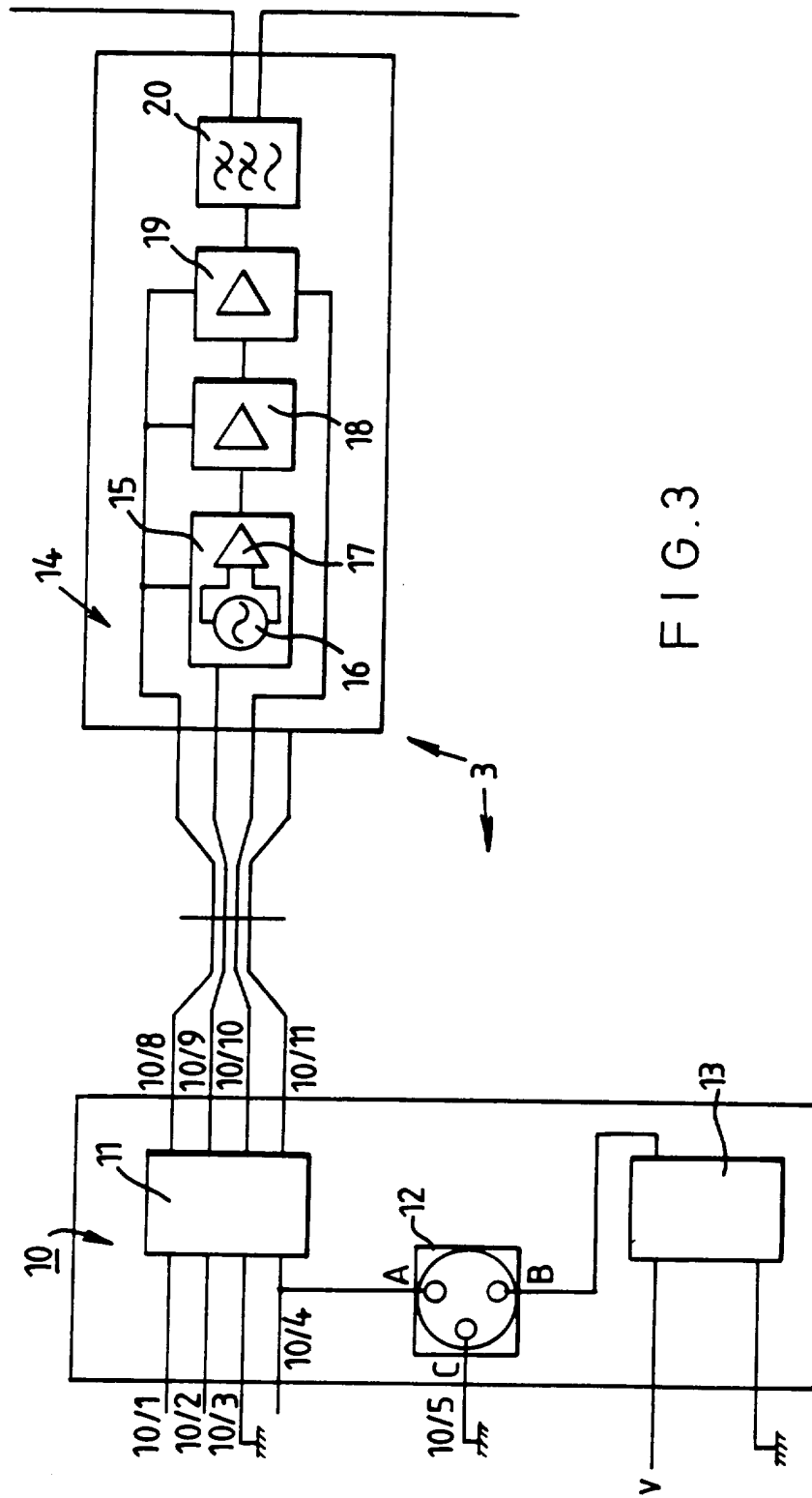


FIG. 3

Bi-directional communication device for burglar alarm

DESCRIPTION

This invention relates to a bi-directional device for burglar alarm substantially formed by one only housing wherein there is installed a traditional remote control transmission circuit of the alarm system for the activation and deactivation and a receiving circuit of alarm given, which besides such function, has the task of signalling the activation and disactivation change or status of the alarm system.

The burglar alarm system which is installed on vehicles or mobile means in general, can be remote-activated by means of an activation, transmitter using a radio-frequency or infra-red type of linking. The same housing is provided also with a receiver which is in contact with the alarm transmitter installed on vehicles or mobile means.

On the activation of the system, by the transmitter of the remote control, the burglar alarm unit, after placing itself in status of activation, gives a signal to the alarm transmitter also present on that same vehicle, which, in its turn, transmits the type of same signal to the receiver comprised in said remote-control.

In case of alarm, the burglar alarm system of the vehicle indirectly sends the signal to the remote-control by means of an alarm transmitter, warning about the attempted breaking.

The present devices of burglar alarm utilized on mobile means in general, such as vehicles, are generally and preferably based on the activation method of the systems by

means of light or sound signals that confirm the change from the deactivated to the activated state or vice versa.

At the same time, there are also sold particular devices which, once they are suitably connected to the burglar alarm of the vehicle, can send signals to small receivers which the owners of the same vehicles generally carry with themselves.

Object of this invention is to couple in one only personal portable housing suitable to be easily kept in a pocket, both the transmitter of the alarm system for the activation and deactivation, and the receiver of alarm given, which has also the function of signalling the activation or deactivation process or status of the same system.

The invention is described in detail in a non limitative embodiment, with reference to the attached drawing, wherein:

Fig. 1 is a diagram of the complete system vehicle-remote control;

Fig. 2 is the electric-electronic general diagram of a configuration of the remote transmitting activation circuit and the receiving circuit, comprised in the same housing of the so-called remote-control; and

Fig. 3 is the electric-electronic general diagram of a configuration of the alarm transmitting circuit installed on vehicles, coupled to the traditional burglar alarm unit.

The figures show a bi-directional communication device utilizable on mobile means in general, such as vehicles, which consists substantially in the combination in one only housing of a transmitting circuit for the activation and deactivation of the burglar alarm, and a receiving circuit of a possible alarm given, which, besides this function, has also the task of signalling the activation and deactivation processor status of the same system.

By way of non limitative example, a particular application referred to a motor car (1) is illustrated and described hereunder.

The burglar-alarm system (2) installed on vehicle (1) may be activated by means of an activation transmitter (6) which may be of the radio-frequency type or the infra-red ray type.

The activation transmitter (6) is contained in the housing (4), together with the receiving circuit (5), coupled to the alarm transmitting circuit (3) installed on the vehicle (1).

On the activation of the system through the so-called remote-control activation transmitter (6), the burglar alarm unit (2) installed on the vehicle (1), besides changing its state, sends a signal to the alarm transmitter (3) which, in its turn, transmits by radio the same type of signal to the receiver (5).

In this way, the user carrying the so-called remote control (4) containing both the receiver (5) and deactivation transmitter (6) receives a remote confirmation of the correct activation or deactivation process of the burglar alarm unit (2).

In this way, in case of alarm, burglar alarm unit (2) sends through the alarm transmitter (3) a remote signal to the owner of the device (4), warning him acoustically of the attempted breaking.

In order to prevent confusions, the signals of activation of the system and of alarm may be differentiated by using different sound rhythms levels or tones.

According to the functional logics of the above described circuit, the alarm transmission takes place according to prefixed pause periods, so as to allow, during said intervals, the reception of possible deactivation signals by the activation and deactivation transmitter (6).

In order to ensure the remote-reception, it is possible to prepare the alarm transmitting circuit (3) in such a way as to periodically send, at regular and suitably spaced time intervals, further signals to the receiver (5), allowing the user to know at every moment if he is or is not within the action range of the alarm transmitter (3) and, as a consequence, to receive correctly a possible alarm signal; in addition, such signal omitted at regular intervals allows to test if the system has a correct reception.

Usually, burglar alarm signal users their state of connected/disconnected alarm through prefixed sequences of blinkings of the turn indicators.

BAD ORIGINAL

By exploiting these already available signals it is therefore possible to couple the alarm transmitting device (3) to any type of burglar alarm, without having to make changes in the existing installation.

The receiver-transmitter (4) inclusive of the activation transmitter (6) and the receiver (5) is provided with internal cells, preferably rechargeable, which can be subject to recharge by means of chargers located in the inside of the same vehicles (1) or through cell-chargers for houses.

In order to prevent users from leaving inadvertently the receiver-transmitter (4) inserted in the call-charger in the vehicles (1) the same device may be provided with a sound alarm which, when the engine of the vehicle is cut off, cutting off at the same time the dash-board feeding, warns users about their forgetfulness.

In this way a very useful anti-inattention device is obtained. If the device subject matter of the intention should be used with burglar alarms provided with devices of sound signal exclusion on vehicles to limit the noise pollution of the environment, such signal is all the same kept active, obviously with lower sound levels, in the remote-signalling device of alarm given formed by the receiver (5).

DESCRIPTION OF BLOCK DIAGRAMS

Fig. 3

Logic Control, Code Generator and Battery Charger Module 10

The signals are anti-theft activation and deactivation and alarm function which are codified with a sequence of direction indicator blinking, are taken into the unit by the signal at point 10/2 originating from the anti-theft central unit. It enters the Logic Control and Code Generator unit 11 which itself distinguishes between the various signals. The signal is then connected to point 10/1 by means of a diode separating circuit which in turn is connected to the vehicle's direction indicator circuitry.

Signal 10/4 "+12 from the ignition key" activates two functions:

- 1) When the car engine is switched off and the device (Fig. 1 device 4) is in the battery charger connector 12, the +12V signal at point A is deactivated and the internal

logic control (Fig. 1 device 4) emits an intermittent buzzing sound so as not to forget the device inside the vehicle.

2. By consecutively turning the ignition key three times and then activating the anti-theft unit using the remote control to be found inside the device itself (Fig. 1 device 4), the Logic Control and Code Generator 11 activates a test function and the generates a code which in turn activates the transmitter through connections 10/8, 10/9 and 10/10. The test sequence is then transmitted intermittently for 4 minutes to enable you to control the range of the device.

Signal 10/6 "+12V" is the supply voltage for the device and is taken from the vehicle battery's +12V.

Power Supply and Battery Charger 13

This comes in the form of two voltage regulators. The first generates an 8V voltage which feeds the Logic Control and Code Generator 11 and the second produces a 10mA limited, 5.6V voltage which feeds the "receiver battery" charger incorporated inside device 4 of Fig. 1 through point B of the "battery charger connector" 12. This is possible when the device is inserted inside the latter.

Points 10/3 and 10/6 (10/5?) are earth connections (to be made to the bare car chassis) corresponding to the battery negative terminal.

Point 10/5 (10/6?) carries the general negative signal to device 4 of Fig. 1 through pole C (B?) of the "battery charger connector". This is possible when the device is inserted inside the latter.

Logic Control and Code Generator 12

This is a microprocessor control circuit which interprets the sequence of signals coming from points 10/2 and 10/4 (which have already been described) and basing itself on these signals, produces a 24 bit transmission code at point 10/9 "data" and generates the control signals at 10/8 and 10/10 which control the "transmitter module 14" transmitter.

Of the 24 bit generated code, the first 20 bits enable you to distinguish the various devices produced thus enabling over 1 million possible combinations. The remaining 4 bits distinguish the 4 events to be communicated to device 4 at Fig. 1:

- a) -Anti-theft activation signal
- b) -Anti-theft deactivation signal
- c) -Anti-theft alarm signal
- d) -Test signal

A transistor static switch is to be found inside the “Logic Control and Code Generator” which only feeds the “transmitter module” circuits through connector 10/8 when the latter has transmit signal codes (four events mentioned above).

Signal 10/10 is used to lower the transmitter power and thus its range when signalling one of the first two events (B&B). The reason for the weaker signal is that in these cases device 4 of fig. 1 is very close to the vehicle.

Point 10/11 is a negative connection for the “transmitter module 14”.

Transmitter Module 14

PLL oscillator and separation amplifier 15

The module 15 has an internal PLL (phase locked loop) carrier frequency generator 16 which consists of a VCO (voltage controlled oscillator) which is maintained at a desired frequency of 433,92 MHz by using a 6MHz reference frequency produced by a quartz oscillator. The module 15 also contains a transistor high frequency amplifier circuit 17 which increases the VCO amplifier separation. The “data” signal which produces a narrow band FM modulation (+/- 5KHz) also goes to the VCO.

Buffer 18

This is a high frequency amplifier transistor which increases the signal level.

Amplifier 19

This is also a high frequency amplifier transistor which generates the desired power.

Low Pass Filter 20

This is a passive circuit consisting of inductors and capacitors forming a low pass filter which lower the harmonic frequency levels to maintain them within legal limits. The filter output is connected to the antenna ($\lambda/2$ dipole central feed antenna).

Fig. 2

The schematics contain a transmitter 6 consisting of the following blocks: transmitter battery 21, remote control car alarm push button 22, encoder 23, SAW oscillator 24, transmitting loop antenna 25 and a receiver consisting of the other blocks.

Transmitter (6)Transmitter Battery 21

Consists of two lithium 3V batteries connected in series.

Remote Control Car Alarm Push Button 22

This activates and deactivates the transmitter and allows anti-theft activation and deactivation in "toggle" mode.

Encoder 23

This is a "custom" circuit which generates the corresponding codes of the various activation and deactivation combinations of the anti-theft unit (more than 4 million possible combinations). When activated it generates a digital signal which controls the SAW oscillator.

SAW OSCILLATOR 24

This oscillator is frequency controlled by a surface acoustic wave device and consists of a circuit transistor which acts as a low power transmitter at the frequency of 433,92 MHz.

Transmitting Loop Antenna 25

This antenna consists in a ring placed on the oscillator printed circuit which transmits the high frequency signal from the SAW Oscillator 24.

Receiver (5)

This receives and signals the codes transmitted by the transmitting device in Fig. 3.

Receiver Loop Antenna 26

A small loop antenna on the printed circuit.

Low Noise Amplifier 27

A low noise transistor stage which increases the receiver sensitiveness. The amplified signal is connected to the "Band Pass Filter" input.

Band Pass Filter 28

A narrow band hellicoidal filter which eliminates undesired spurious signals from the receiver input.

Local Oscillator 29

This is a 70.5386 MHz quartz oscillator consisting of a transistor "Colpitts" circuit, a frequency multiplier with a tuned circuit selecting the sixth harmonic. The output frequency is 423.22 MHz.

Receiver 30

This is an integrated circuit which becomes a complete FM receiver when a few external components are added to it, the main one being a 10.7 MHz medium frequency ceramic filter. The demodulated signal which contains the code to be interpreted is to be found at the receiver output.

Amplifiers 31, 32

The amplifier module 33 is made of two low frequency amplifiers 31, 32 which amplify, filter and clip the received signal and take it to the necessary “decoder” module logic level.

Decoder and Control Logic Circuits 34, 35:

The two modules 34, 35 have been separately designed to show the various different functions even though they are both contained in the same microprocessor circuit which continually controls the signal coming from the “amplifiers” module 33 until a valid sequence is found twice in three seconds. Once the sequence has been received it then activates the “buzzer 36” and the LED 37, creating a series of buzzes and flashes which are different for each type of event (anti-theft activation signal, anti-theft deactivation signal, anti-theft alarm signal and test signal).

Electronic Switch 38

This is a MOS static switch which allows to lower the battery consumption by activating the receiver for one second for every five second of pause.

Power Switch 39

This is a slide switch which switches on the part of the circuit relative to the receiver.

Receiver Battery 40

A nickel-cadmium, nominal 4.8V, battery which is recharged through connector point B to be inserted in the corresponding connector 12 (battery charger connector 12) shown in the same way in Fig. 3.

While this invention has been described and illustrate according to an embodiment given only by way of non limitative example, it will be apparent to those skilled in the art that several changes and modifications to the configurations, the details, the structural electric and/or electronic composition of the circuits and the components

utilized for their realisation can be adopted, without falling outside its scope and purpose.

CLAIMS:

1. A bidirectional communication device for burglar alarms applicable to mobile means such as vehicles (1) and the like, characterised in that it comprises in one only container (4), separate from and independent on said vehicles (1) an activation transmitting circuit (6), and of comprising, on said vehicles (1) any electronic burglar alarm (2) coupled to an alarm transmitting circuit (3).
2. The device according to claim 1, characterized in that one only container (4) contains both a activation/deactivation transmitter (6) and a receiver of activation/deactivation alarm signals given (5).
3. The device according to claims 1 and 2, characterized in that the burglar alarm device applied on a vehicle (1) is remote-activable by means of a transmitting circuit (6) contained in a container (4), separate from and independent on the same vehicle, and that such burglar alarm in the activated state is in relation of signal emission of connection made perceivable by an alarm transmitter (3), also located in the vehicle (1), which in its turn is in communication by radio with a receiver (5) located in the same and said container (4), said receiver (5) forming with the signaller of the activation/deactivation/alarm signals. The alarm device (2) and of work start of the same signals by means of sound and/or light signals.
4. The device according to claims 1 through 3, characterized in that the alarm transmitter (3) sends to receiver (5) intermittent signals, with pause periods during which the reception is possible of the deactivation signals by the transmitter (6).
5. The device according to claims 1 through 4, characterized in that the whole radio link is continuously tested as concerns the correct reception relatively to the transmission at regular intervals of the signals transmitted by the alarm transmitter (3).

6. The device according to claims 1 through 5, characterized in that the signals sent by the alarm transmitter (3) are associated to the normal means that activate the turn indicators of vehicles (1), controlled by the original systems of turn indicators which are also coupleable to any burglar alarm (2).

7. The device according to claims 1 through 6, characterized in that the receiver-transmitter (4) wherein the activation circuit (6) and the reception circuit (5) are comprised, is provided with internal rechargeable cells, whose recharge can be obtained by means of conventional cell-chargers for houses, or by means of chargers located inside the vehicles (1); said chargers being provided or not with an acoustic anti-forgetfulness signal device connected to the dash-board feeding of said vehicles.

8. The device according to claim 3 through 6, characterized in that, coupled with burglar alarms provided with a device for the exclusion or pollution with acoustic signals (anti-noise), it keeps active only its remote signalling of alarm given.

9. The device of bi-directional communication for burglar alarm is according to the preceding claims as described, with special reference to the reservation expressed in the last period of the descriptive part, as illustrated by way of example in the attached drawings, and for the purposes specified.



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Claims searched: 1-9

Examiner: Mr Conal Oram
Date of search: 31 July 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G4N (NAFA, NHVX)

Int Cl (Ed.6): B60R (25/10)

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2285704 A (FLOUNDERS) See column 6 lines 15-18.	4
X,Y	GB 2276747 A (STEPHENS) See page 1 lines 20-22 and page 3 lines 11-13.	X: 1 at least. Y: 4.
X,Y	US 4947151 (ROSENBERGER) See figures 2 and 3, column 3 lines 37-41 and 57-64 and column 4 lines 8-11.	X: 1-3 at least. Y: 4
X,Y	US 4905271 (NAMEKAWA) See column 7 lines 17-23.	X: 1 at least. Y: 4

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.