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(54) Title: SYSTEM AND METHOD FOR TRANSFERRING INFORMATION
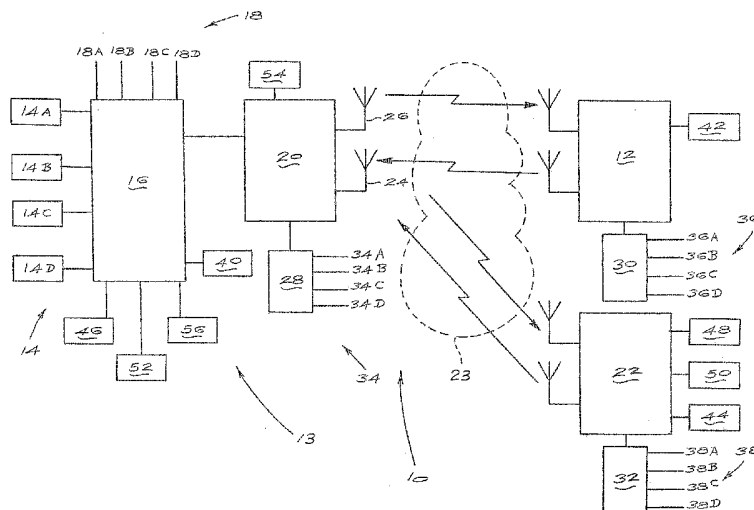
(57) Abstract: ABSTRACT: A system (10) for transferring information between a master unit (12) and a remote unit (13) is disclosed. The remote unit (13) comprises a plurality of slave units (14) that are used to control peripheral devices, the slave units (14) being controlled by a microcontroller (16). A plurality of inputs (18) is connected to the microcontroller (16), the inputs (18) in turn being connected to sensing or measuring devices. The microcontroller (16) is fitted with a GSM radio device (20) that allows the microcontroller (16) to communicate with the master unit (12) via a GSM cellular network (23). The basic principle of the present invention is that when a calling unit calls a receiving unit and the receiving unit identifies the call as originating from the calling unit, using identification means of the network (23), then a pre-defined meaning is attached to that call. The pre-defined meaning is either an instruction that needs to be carried out by one of the slave units (14), or an alert that is sent from the remote unit (13)

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SYSTEM AND METHOD FOR TRANSFERRING INFORMATION

BACKGROUND OF THE INVENTION

THIS invention relates to a system for and method of transferring information.

At present, there are numerous systems available that allow information to be transferred, including radio communications, land line communications and SMS messaging via mobile or cellular telephones.

Although each of these systems has its advantages and disadvantages, these systems are in general relatively costly to set up and/or maintain and/or use. This becomes a factor when the information that is to be transferred is relatively simple, such as reporting a triggered event, especially when the event is one of a plurality of pre-defined events, and, conversely, receiving one of a plurality of pre-defined instructions. A further disadvantage of these systems, and in particular SMS messaging, is that it is generally cumbersome and time-consuming to send or transfer the required information. Furthermore, the SMS message is subject to queue buffering, which typically means that the message can take anything from a few minutes up to 6 hours to be received, which in some situations could prove to be truly detrimental.

It would therefore be desirable to provide a system for and method of transferring information that addresses the above problems. In particular, every household has a limited budget, and bearing this in mind it would be desirable to provide a system that requires little or no maintenance, at a cost that is negligible to the user.

SUMMARY OF THE INVENTION

According to a first aspect of the invention there is provided a system for transferring information between at least one master unit and at least one remote unit, wherein:

each of the at least one master unit comprises:

at least one master contact number for allowing the master unit to identify one of a plurality of pre-defined inputs detected by one of the at least one remote unit;

each of the at least one remote unit comprises:

a controller having a plurality of inputs and a plurality of outputs, the inputs being arranged to detect one of the plurality of pre-defined inputs and the outputs being arranged to drive one of a plurality of slave units when instructed to do so by one of the at least one master unit; and

at least one slave contact number for allowing the controller to identify which one of the plurality of slave units is to be driven by the controller;

a communications network extends between the at least one master unit and the at least one remote unit, for allowing the at least one master unit to send one of a plurality of pre-defined instructions to the at least one remote unit and for allowing the at least one remote unit to send one of a plurality of pre-defined inputs to the at least one master unit, the communications network including:

first identification means for allowing the at least one master unit
to identify the at least one remote unit; and

second identification means for allowing the at least one remote
unit to determine the identify of a party sending one of the
plurality of pre-defined instructions to the at least one remote
unit, with the instruction only being carried out by the controller
in the event of the party being an authorised instructor.

Conveniently, the communications network is a GSM cellular network, with the
at least one remote unit and the at least one master unit being fitted with
cellular modems for facilitating the GSM communications.

Preferably, the information is transferred between the least one master unit
and the at least one remote unit by means of a cellular telephone call being
made from the one unit to the other, with the first and second identification
means being arranged to identify the at least one remote unit and the party
sending one of the plurality of pre-defined instructions, respectively, prior to the
telephone call being answered by the unit receiving the telephone call.

Conveniently, the controller of the at least one remote unit is arranged to
determine which one of the at least one master contact number is to be used
by the controller for transferring information to the at least one master unit
when one of the plurality of pre-defined inputs is detected.

In one version of the invention, a plurality of master contact numbers is
provided, each master contact number being uniquely associated with one of
the inputs of the controller, so that when an alert is sensed, the controller of the
at least one remote unit selects the master contact number corresponding to
that alert and makes a call to the at least one master unit using the selected
master contact number.

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Preferably, a plurality of master contact numbers is provided, with each master contact number having a plurality of time slots associated therewith, wherein each input of the controller of the at least one remote unit is uniquely identified by a combination of one of the master contact numbers and one of the time slots within the one master contact number, so that when an alert is sensed, the controller selects the master contact number and time slot corresponding to that alert and makes a call to the at least one master unit using the selected master contact number and allows the call to ring for a period of time corresponding to the time slot for that alert.

Advantageously, the at least one master unit includes the plurality of master contact numbers and time slots, and associated controller inputs, the at least one master unit further including timer means for allowing the at least one master unit to determine the period of time that the at least one remote unit allowed the call to ring for, so that when the at least one master unit receives a call from the at least one remote unit, the at least one master unit can determine which one of the pre-defined alerts has been sensed by the inputs of the controller of the at least one remote unit.

In a second version of the invention, the at least one master unit is arranged to determine which one of the at least one slave contact number is to be used by the at least one master unit for transferring information to the at least one remote unit when one of the plurality of pre-defined instructions is to be carried out by the at least one remote unit.

Typically, in this second version of the invention, a plurality of slave contact numbers is provided, each slave contact number being uniquely associated with one of the slave unit outputs of the controller of the at least one remote unit, so that when an instruction is to be carried out by the at least one remote unit, the at least one master unit selects the slave contact number

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corresponding to that instruction and makes a call to the at least one remote unit using the selected slave contact number.

In this second version, a plurality of slave contact numbers is provided, with each slave contact number having a plurality of time slots associated therewith, wherein each output of the controller of the at least one remote unit is uniquely identified by a combination of one of the slave contact numbers and one of the time slots within the one slave contact number, so that when an instruction is to be carried out, the at least one master unit selects the slave contact number and time slot corresponding to that instruction and makes a call to the at least one remote unit using the selected slave contact number and allows the call to ring for a period of time corresponding to the time slot for that instruction.

Advantageously, in this second version, the controller of the at least one remote unit includes the plurality of slave contact numbers and time slots, and associated controller outputs, the at least one remote unit further including timer means for allowing the at least one remote unit to determine the period of time that the at least one master unit allowed the call to ring for, so that when the at least one remote unit receives a call from the at least one master unit, the at least one remote unit can determine which one of the pre-defined instructions is to be carried out.

Preferably, each of the at least one remote unit comprises a list of pre-authorized telephone numbers that belong to authorised instructors.

In a third version of the invention, the information as to which one of the plurality of pre-defined instructions is to be carried out by the at least one remote unit is stored in a data string that immediately precedes the call being made to the at least one remote unit.

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Conveniently, the master unit and the remote unit have terminating means for terminating a call that has been received.

Typically, the slave units are relay switches, with the controller of the at least one remote unit being programmed to control the time period that each relay switch is opened and closed.

Preferably, the system further includes a base station that is in communication with the at least one remote unit, for allowing information to be transferred between the base station and the at least one remote unit.

Typically, the base station includes at least one base contact number for allowing the base station to also identify one of a plurality of pre-defined inputs detected by one of the at least one remote unit.

Conveniently, the outputs of the controller of the at least one remote unit are also arranged to drive one of a plurality of slave units when instructed to do so by the base station.

Advantageously, the communications network also extends between the base station and the at least one remote unit, for allowing the base station to send one of a plurality of pre-defined instructions to the at least one remote unit and for allowing the at least one remote unit to send one of a plurality of pre-defined inputs to the base station.

Typically, the first identification means is arranged to allow the base station to identify the at least one remote unit.

According to a second aspect of the invention there is provided a system for allowing at least one remote unit to inform at least one master unit when one of

a plurality of pre-defined inputs is detected by one of the at least one remote unit, wherein:

each of the at least one master unit comprises:

at least one master contact number for allowing the master unit to identify the input detected by one of the at least one remote unit;

each of the at least one remote unit comprises:

a controller having a plurality of inputs that are arranged to detect one of the plurality of pre-defined inputs; ·

a communications network extends between the at least one master unit and the at least one remote unit, for allowing the at least one remote unit to send one of a plurality of pre-defined inputs to the at least one master unit, the communications network including:

first identification means for allowing the at least one master unit to identify the at least one remote unit.

According to a third aspect of the invention there is provided a system for allowing at least one master unit to instruct at least one remote unit to drive one of a plurality of slave units, wherein:

each of the at least one remote unit comprises:

a controller having a plurality of outputs, the outputs being arranged to drive one of the plurality of slave units when instructed to do so by one of the at least one master unit; and

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at least one slave contact number for allowing the controller to identify which one of the plurality of slave units is to be driven by the controller;

a communications network extends between the at least one master unit and the at least one remote unit, for allowing the at least one master unit to send one of the plurality of pre-defined instructions to the at least one remote unit, the communications network including:

second identification means for allowing the at least one remote unit to determine the identify of a party sending one of the plurality of pre-defined instructions to the at least one remote unit, with the instruction only being carried out by the controller in the event of the party being an authorised instructor.

According to a fourth aspect of the invention there is provided a method of allowing at least one remote unit to inform at least one master unit when one of a plurality of pre-defined inputs is detected by one of the at least one remote unit, the method including the steps of:

providing the at least one master unit with at least one master contact number for allowing the master unit to identify the input detected by one of the at least one remote unit;

providing the at least one remote unit with a controller having a plurality of inputs that are arranged to detect one of the plurality of pre-defined inputs;

allowing the at least one remote unit to send one of a plurality of pre-defined inputs to the at least one master unit; and

allowing the master unit to identify the at least one remote unit.

Typically, the step of allowing the at least one remote unit to send one of a plurality of pre-defined inputs to the at least one master unit includes the step of the remote unit making a cellular telephone call to the master unit, with the step of allowing the master unit to identify the at least one remote unit occurring prior to the telephone call being answered by the master unit.

Preferably, the method includes the step of determining which one of the at least one master contact number is to be used by the controller for transferring information to the at least one master unit when one of the plurality of pre-defined inputs is detected.

Conveniently, the method includes the step of providing a plurality of master contact numbers, each master contact number being uniquely associated with one of the inputs of the controller, so that when an alert is sensed, the method includes the further steps of:

    selecting the master contact number corresponding to that alert; and

    making a call to the at least one master unit using the selected master contact number.

Advantageously, the method includes the step of providing a plurality of master contact numbers and, for with each master contact number, providing a plurality of time slots, so that each input of the controller of the at least one remote unit is uniquely identified by a combination of one of the master contact numbers and one of the time slots within the one master contact number, with the method including the further steps of, when an alert is sensed,:

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allowing the controller to select the master contact number and time slot corresponding to that alert;

making a call to the at least one master unit using the selected master contact number; and

allowing the call to ring for a period of time corresponding to the time slot for that alert.

Typically, the method includes the further step of allowing the at least one master unit to determine the period of time that the at least one remote unit allowed the call to ring for, so that when the at least one master unit receives a call from the at least one remote unit, the at least one master unit can determine which one of the pre-defined alerts has been sensed by the inputs of the controller of the at least one remote unit.

According to a fifth aspect of the invention there is provided a method of allowing at least one master unit to instruct at least one remote unit to drive one of a plurality of slave units, the method including the steps of:

provide the at least one remote unit with a controller having a plurality of outputs, the outputs being arranged to drive one of the plurality of slave units when instructed to do so by one of the at least one master unit;

providing at least one slave contact number for allowing the controller to identify which one of the plurality of slave units is to be driven by the controller;

allowing the at least one master unit to send one of the plurality of pre-defined instructions to the at least one remote unit; and

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allowing the at least one remote unit to determine the identify of a party sending one of the plurality of pre-defined instructions to the at least one remote unit, with the instruction only being carried out by the controller in the event of the party being an authorised instructor.

Typically, the step of allowing the at least one master unit to send one of the plurality of pre-defined instructions to the at least one remote unit includes the step of the master unit making a cellular telephone call to the remote unit, with the step of allowing the at least one remote unit to determine the identify of a party sending one of the plurality of pre-defined instructions to the at least one remote unit occurring prior to the telephone call being answered by the remote unit.

Preferably, the method includes the step of determining which one of the at least one slave contact number is to be used by the at least one master unit for transferring information to the at least one remote unit when one of the plurality of pre-defined instructions is to be carried out by the at least one remote unit.

Conveniently, the method includes the step of providing a plurality of slave contact numbers, each slave contact number being uniquely associated with one of the slave unit outputs of the controller of the at least one remote unit, so that when an instruction is to be carried out by the at least one remote unit, the method includes the further steps of:

  selecting the slave contact number corresponding to that instruction; and

  making a call to the at least one remote unit using the selected slave contact number.

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Typically, the method includes the step of providing a plurality of slave contact numbers and, for each slave contact number, providing a plurality of time slots so that each output of the controller of the at least one remote unit is uniquely identified by a combination of one of the slave contact numbers and one of the time slots within the one slave contact number, with the method including the further steps of, when an instruction is to be carried out,:

allowing the at least one master unit to select the slave contact number and time slot corresponding to that instruction;

making a call to the at least one remote unit using the selected slave contact number; and

allowing the call to ring for a period of time corresponding to the time slot for that instruction.

Conveniently, the method includes the further step of allowing the at least one remote unit to determine the period of time that the at least one master unit allowed the call to ring for, so that when the at least one remote unit receives a call from the at least one master unit, the at least one remote unit can determine which one of the pre-defined instructions is to be carried out.

Advantageously, the method includes the step of storing the information as to which one of the plurality of pre-defined instructions is to be carried out by the at least one remote unit in a data string that immediately precedes the call being made to the at least one remote unit.

BRIEF DESCRIPTION OF THE DRAWING

The only figure shows a schematic block diagram of a system for and method of transferring information according to the present invention.

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DESCRIPTION OF EMBODIMENTS

Referring to the only figure, a system 10 is shown for transferring information between a master unit 12 and a remote unit 13. The remote unit comprises a plurality of slave units 14, and in particular slave units 14A, 14B, 14C and 14D. The slave units 14 are controlled by a microcontroller 16, the slave units 14 defining outputs of the microcontroller 16. A plurality of inputs 18, such as inputs 18A, 18B, 18C and 18D, is connected to the microcontroller 16, the inputs 18 in turn typically being connected to sensing or measuring devices.

The microcontroller 16 is fitted with a GSM radio device 20, also known as a cellular modem, that allows the microcontroller 16, and in particular the inputs 18 and outputs 14 of the microcontroller 16, to communicate with the master unit 12. Depending on the type of information to be transferred, the microcontroller 16 is also designed to communicate with a base station 22. The cellular modem 20 is connected to the microcontroller 16 via a serial port, so as define a basic information transfer system.

The slave units 14 of the microcontroller 16 are used to control peripheral devices, and thus typically take the form of relay switches. In particular, the microcontroller 16 is programmed to control the time period that each relay switch 14A to 14D is opened and closed. To achieve this, a number between 0 and 9999 is assigned to each switch 14A to 14D. The number 0 corresponds to the switch simply toggling between on and off conditions when activated, whereas a non-zero number indicates the length of time that that particular switch remains on, upon activation, before switching itself off. In this manner, the user can program each individual output 14A to 14D of the microcontroller 16 to suit his or her requirements.

Significantly, the communications between the remote unit 13, and in particular the cellular modem 20, and the master unit 12 and base station 22 takes place

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by means of a GSM cellular network 23. In essence, the cellular modem 20 therefore takes the form of a basic transceiver unit comprising a receiver 24 and a transmitter 26, and basic associated circuitry that allows communication to occur. Although the master unit 12 can also take the form of a basic transceiver unit, it is typically a conventional cellular telephone, which can thus also be used by a user or operator to control the slave units 14.

The GSM cellular network 23 provides identification means, by means of its standard conventional call line identification (CLI) protocols, for allowing the unit that is receiving a call to identify the unit that is making the call. In particular, the network 23 provides a first identification means for allowing the master unit 12 to identify the remote unit 13, when the remote unit 13 transfers information to the master unit 12. In addition, the network 23 provides a second identification means for allowing the remote unit 13 to identify the master unit 12 and/or base station 22 that has instructed one of the slave units 14A, 14B, 14C and 14D to be actuated. In particular, by identifying the telephone number of the dialling unit, the microcontroller 16 is able, by comparing the telephone number to a list of pre-authorized telephone numbers, to determine whether the dialling unit has permission to instruct one of the slave units 14A, 14B, 14C and 14D to be actuated.

The basic principle of the present invention is that when a calling unit calls a receiving unit and the receiving unit identifies the call as originating from the calling unit, using the identification means of the network 23, then a pre-defined meaning is attached to that call. In other words, without the receiving unit having to answer the telephone information has in effect been transferred from the calling unit to the receiving unit. Thus, by simply making a call, allowing the receiving unit's telephone to ring, and then hanging up, the receiving unit will link this dropped call to a pre-defined action or meaning, such as a loved one having reached his or her destination, a task having been completed, etc.

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The cellular modem 20, the master unit 12 and the base station 22 all have SIM cards 28, 30 and 32, respectively, associated with them. At present, a SIM card has four numbers or channels allocated to it, namely Voice, modem 1, modem 2 and Fax. In typical GSM communications, only one of these channels is used to conduct a conversation between two parties.

SIM card 28 provides four slave contact numbers or channels 34, namely numbers 34A, 34B, 34C and 34D, each slave contact number 34A to 34D being associated with one of the four slave units 14A to 14D. Similarly, SIM card 30 provides four master contact numbers or channels 36, namely numbers 36A, 36B, 36C and 36D, and SIM card 32 provides four base contact numbers or channels 38, namely numbers 38A, 38B, 38C and 38D.

SIM card 28 has the four master contact numbers 36 and the four base contact numbers 38 stored thereon, which the microcontroller 16 can use to determine which one of the master contact channels 36 and/or base contact channels 38 is to be used by the remote unit 13 when one of the plurality of pre-defined alerts or inputs18 is sensed.

Similarly, SIM cards 30 and 32 both have the four slave contact numbers or channels 34 stored thereon, which the master unit 12 and the base station 22 can use to determine which one of the slave units 14A, 14B, 14C and 14D is to be actuated when one of the plurality of pre-defined instructions is to be carried out by the remote unit 13.

Each contact number 34A to 34D, 36A to 36D and 38A to 38D has a specific meaning, task or function. In this manner, information can be transferred between the master unit 12 and/or the base station 22 and the remote unit 13. In particular, when one of the plurality of pre-defined alerts or inputs 18 is sensed or triggered, the master unit 12 and/or the base station 22 will be

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informed. In addition, the slave units 14, on instructions received from the master unit 12 and/or the base station 22, can perform one of a pre-defined set of actions. Clearly, these contact numbers may be changed at any time, via either a dedicated keypad, such as keypads 40, 42 and 44 fitted to the microcontroller 16, the base station 12 and the base station 22, respectively, or a programming device, such as a standard GSM cellular telephone.

The broad concept of the present invention will now be described by means of an example. If the present invention is applied to a home security system, the following four alerts could, for example, be allocated to the four master contact numbers 36:

Voice number 36A to an alert such as BREAK IN;

Modem 1 number 36B to an alert such as POWER FAILURE;

Modem 2 number 36C to an alert such as LOW BATTERY; and

Fax number 36D to an alert such as PANIC or, alternatively, an ALL WELL condition.

Typically, the same four alerts would be assigned to the four base contact numbers 38.

The microcontroller 16 is fitted with a memory module 46 that comprises information relevant to the master unit 12 and base station 22, such as the name of the user utilising the master unit 12, the address and additional emergency contact numbers for the user, and other relevant information. The memory module 46 of the microcontroller 16 further comprises the list of pre-authorized telephone numbers, which are telephone numbers that have been given permission to instruct one of the slave units 14. Advantageously, this feature of the present invention allows a plurality of master units to instruct the remote unit, and not only one master unit as indicated in the attached drawing.

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Similarly, and referring back to the home security system example, the following four tasks or instructions could, for example, be allocated to the four slave contact numbers:

Voice number 34A to an instruction such as ALARM ACTIVATE /DEACTIVATE, which would typically only be allocated to the master unit 12;

Modem 1 number 34B to an instruction such as ACTIVATE LIGHTS, which would typically be allocated to both the master unit 12 and the base station 22;

Modem 2 number 34C to an instruction such as DEACTIVATE LIGHTS, which would typically be allocated to both the master unit 12 and the base station 22; and

Fax number 34D to an instruction such as GATE OPEN/CLOSE, which would typically be allocated to the master unit 12 only.

The broad concept of the present invention will now be described with reference to five scenarios within the home security system example, but, clearly these examples are not to be construed as limiting the present invention. The first two examples illustrate what happens when the microcontroller 16 detects a condition or alarm on one of the inputs 18. Examples 3 and 4 describe the system when the master unit 12 instructs one of the slave units 14 to carry out a particular function or task. Finally, Example 5 is a combination of an alarm condition being detected and reported, with the master unit 12 in turn sending through instructions based on the detected alarm condition.

Example 1 - Alarm triggered
In the event of one of the sensors of the home security system being triggered, indicating the presence of an intruder, one of the inputs 18, such as input 18A, connected to both the security system and to the microcontroller 16, activates

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the microcontroller 16.   A telephone call is made to the base station 22, using the BREAK IN voice number or channel 38A for the base station 22 stored in SIM card 28. The cellular modem 20 is then instructed to drop the call after a predetermined period of time, and, significantly, prior to the base station 22 actually answering the call.

Significantly, by simply dialling the BREAK IN voice number 38A for the base station 22, the base station 22 is aware that a break in has taken place. In other words, information has been transferred without the base station 22 actually communicating with the microcontroller 16. In addition, the base station 22, upon receiving the telephone call, identifies the incoming telephone number, using the GSM network's CLI protocols, as discussed above, and searches a database 48 in order to obtain the particulars of the incoming number. The base station 22 can then decide on the best course of action.

In addition, a telephone call is also made to the master unit 12, which as indicated above typically corresponds to the user's cellular telephone, using the BREAK IN voice number 36A for the master unit 12 stored in SIM card 28. Upon receiving and identifying the incoming telephone number, the user will be informed that a break in has taken place at the remote unit 13, and he can similarly also decide on the best course of action.

Example 2 - Panic call

If a user is in a panic situation, then a panic button is pressed. Another one of the inputs, such as input 18B, extending between the panic button and the microcontroller 16, triggers the microcontroller 16 to dial the base station 22 using the PANIC fax number 38A stored in SIM card 28. The base station 22 will retrieve the necessary information associated with the incoming telephone call and decide on appropriate action, such as calling a security company or the police. Again, since the incoming telephone call is immediately identified using the CLI protocols of the GMS system, and by virtue of the fact that the

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PANIC fax number 38A has been dialled, the exact nature and location of the alert is determined automatically.

Alternatively, the security system can be configured to call the fax number every few hours to inform the base station 22 that all is well, and that the system is fully operational. If the base station 22 within a predetermined time does not receive such a call, the assumption is made that the system has failed, and requires attention. This particular application could be used in a high level security environment, where tighter security control can be achieved, at relatively low cost.

Example 3 - Gate opener

As indicated above, Example 3 is the first of two examples in which the master unit 12 instructs one of the slave units 14 to carry out a particular function. In this example, this will be explained with reference to the user wishing to open an electric gate, which would normally be opened by means of a dedicated RF activation device. The user, wishing to open the gate, dials the fax slave contact number 34D, which corresponds to GATE OPEN/CLOSE, and which is stored on the SIM card 30.

The microcontroller 16 will first identify the incoming telephone number, and check the memory module to confirm that the incoming number is one of the pre-authorised telephone numbers. Assuming that there is a match, the microcontroller 16 will then activate the appropriate slave unit that corresponds to the slave contact number 34D that has been dialled, such as slave unit 14A. The slave unit 14A will be connected to the mechanism for controlling the opening and closing of the gate, so that upon the slave unit 14A being activated, the gate will open.

Advantageously, by recognising the telephone number of the incoming call, and only acting on the incoming instruction in the event of the number

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corresponding to an authorised number, it is impossible for an unauthorised party to open the gate by dialling the fax slave contact number.

Furthermore, this application can easily be employed in residential complexes, comprising a plurality of apartments or flats and a single gate allowing access into the complex. In this case, each resident's telephone number is captured and stored in SiM card 28, and is thus stored as an authorised number. Related advantages include the fact that every time a resident vacates the complex, his or her telephone number is simply removed from the SIM card 28, thereby effectively barring entry into the complex for that person. Conversely, new residents will easily be provided access into the complex by simply storing their telephone numbers in the SIM card 28 of the cellular modem 20. This, it is envisaged, will greatly facilitate the management of access into the complex.

Example 4 - Activating and deactivating lights
One of the slave units, such as slave unit 14B, could be set up to operate selected lights. In use, when the user wishes to remotely activate the selected lights, in order to create an impression that a person is at home to deter would-be burglars, the user simply dials the Modem 1 slave contact number 34B, corresponding to ACTIVATE LIGHTS. The microcontroller 16 will then recognise the incoming call as being an instruction to turn the selected lights on and, after confirming that the incoming telephone number is a pre-authorized number, will then activate the slave unit 14B that controls that particular operation.

A similar process is followed should the user wish to turn the selected lights off, save that the Modem 2 number 34C, corresponding to DEACTIVATE LIGHTS, is dialled by the user.

As indicated above, the Modem 1 and Modem 2 numbers can also be provided to a base station 22, which will then be responsible for switching the selected

lights on and off. As indicated above, in order for the microcontroller 16 to recognise the call coming from the base station 22, which would tacitly provide permission for the base station 22 to instruct that particular slave unit, the number of the base station 22 needs to be entered into the SIM card 28.

Example 5 - Power failure or low battery

When a power failure occurs for more than, say, 15 minutes, the home security system is programmed to dial the Modem 1 master contact number 36B, corresponding to POWER FAILURE. The base station 22 upon receiving the call will, as indicated above, extract the identity of the calling party, using the CLI protocols, and then terminate the call. All the relevant information for that particular number is then retrieved and displayed on a screen 50 at the base station 22. The base station 22 will then decide on a course of action, such as contacting the user and informing him or her of the relevant problem.

The user can then contact someone who has access to the premises to investigate the power failure. Upon arrival at the premises, a call is made by the investigating person to the user stating that they are at the user's premises. The user then dials the ALARM ACTIVATE/DEACTIVATE slave contact number 34A. The microcontroller 16 then extracts the identification of the incoming telephone call, drops or terminates the call, compares this number to the numbers stored in the SIM card 28, and upon recognizing the number, de-activates the alarm. The person investigating the premises can then rectify the problem. Upon completion of the task, the investigating person can then dial the user and inform him or her of the action taken. The user will then dial the ALARM ACTIVATE/DEACTIVATE slave voice number 34A again, in order to re-activate the alarm.

Clearly the above process can be used in response to any input being detected that requires a person to go and investigate the user's premises.

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Although the broad aspect of the present invention has been described above with reference to a home security system, it should be clear that the invention can be applied to any situation in which one of a number of pre-defined actions is required to be carried out at a remote location, and/or in which the remote station needs to report an event or alert to master unit and/or base station. Additional applications that are presently envisaged include:

> Remote control of pumps
> Remote control of doors and gates
> Remote control of motors, lights and vehicles
> Remote control of alarms
> Remote control of a process in a hazardous area
> Safe monitoring in a hazardous area
> Indication of liquid levels,
> Indication of a specific site problem
> Indication of over pressure
> Indication of over or under temperature
> Indication of over or under load trip
> Indication of failure to start a process, a motor or a pump
> Remote signalling.

In the most basic version of the invention, referred to as System 1, information is transferred by simply dialling a number. In the two additional embodiments of the invention, referred to as Systems 2 and 3, respectively, the functionality of System 1 is expanded with the addition of a timer device and using the string identifier facility of GSM telephone calls, respectively.

In all three systems, a series of initialisation steps is first carried out to check the integrity and operation of the system. On power up, the microcontroller 16 checks if the cellular modem 20 is enabled. In the case that the cellular modem 20 is enabled, the microcontroller 16 switches the modem off. The reason for this is that, as the modem 20 is in the enabled state, it could be non-responsive to serial port instructions, since, for example, on power up the

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modem 20 was enabled under suspicious circumstances. The cellular modem 20 is then switched back on by the microcontroller 16.

Once the microcontroller 16 toggles the cellular modem 20 off and then on, the microcontroller 16 monitors the modem peripheral supply line. When the modem 20 powers up, a supply line is available to power up peripheral devices. This arrangement ensures that low power is consumed by all electronics when the system is in a standby state. Once the modem 20 is powered, it is ready to receive instructions from the microcontroller 16.

The first instruction sent to the modem is a request for the Manufacturer Identification. When the microcontroller 16 receives the answer from the cellular modem 20, the number is compared to the correct number stored in the memory module 46 of the microcontroller 16. If there is a match, an "OK" message is displayed on an LCD display 52 connected to the microcontroller 16. If, however, the number received from the cellular modem 20 is incorrect, an error message is shown on the display 52, and the modem 20 is shut down. This typically means that the cellular modem 20 has been changed, or that the modem itself has failed.

Thereafter, the microcontroller 16 consecutively prompts the cellular modem 20 to provide the microcontroller 16 with the Model Identification Number, Revision Identification Number, Serial Number and SIM card PIN Number. After receiving the information from the cellular modem 20, the microcontroller 16 compares the received information to the corresponding, correct information stored in the memory module 46, in order to authenticate the validity of the cellular modem 20. Again, any deviation yields an error message that is shown on the display 52, with the modem 20 simultaneously being shut down.

Upon acceptance of the PIN number, the modem 20 will attempt to log onto the GSM network. Once the modem is registered with the network, the

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microcontroller 16 finishes setting up the modem 20 by disabling echo commands and enabling the caller identification command, which, as indicated above, allows the microcontroller 16 to confirm that an incoming call is emanating from a party authorised to instruct the microcontroller 16.

This concludes the setting up of the microcontroller 16 and the cellular modem 20, with the cellular modem 20 now being ready to receive and make calls.

In System 1, when a call is received by the cellular modem 20, the modem 20 immediately informs the microcontroller 16 via the serial port that a ring is taking place. The telephone number of the calling party is extracted from the incoming call and passed onto the microcontroller 16. The microcontroller 16 stores the number and displays the incoming number on the LCD screen 52.

Modems typically have a ring indicator as part of the Serial Port, which goes low when a ring of an incoming call is detected. The ring detector of the cellular modem 20 controls a buzzer 54, the buzzer 54 being arranged to provide an audible indication that an incoming call has been received, the buzzer 54 reacting to the length of the ring of the call.

After the first ring, during which the identity of the incoming call is established, the microcontroller 16 allows another two rings to take place, and then issues a command for the cellular modem 20 to terminate the call. Although the incoming call can be terminated as soon as the identification of the caller is determined, the additional two rings advantageously indicates to the calling party that the incoming call has been safely received. Furthermore, in the event that a person incorrectly dials the cellular modem 20, that person will get an indication that the call went through but that the receiving party simply does not wish to answer the call. In other words, if the call had to be terminated immediately, the calling party would have no feedback on the success of his or

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her call, and could well think that the number was engaged, which would typically result in that person redialling the incorrect number indefinitely.

Once the call has been dropped, the microcontroller 16 requests the modem 20 to send one number at a time from the list of pre-authorized numbers stored in the SIM card 28. The microcontroller 16 then compares the number of the received call with this list of pre-authorized numbers. If a match is not found, an error message is sent to the LCD display 52, and the microcontroller 16 waits for the modem 20 to receive another call.

Should, however, there be a match in the numbers, the associated slave unit 14A to 14D corresponding to the slave contact number 34 that was dialled, is activated. Depending on how the switching of that particular slave unit 14A to 14D has been programmed into the microcontroller 16, the slave unit 14A to 14D will either toggle between on and off states or remain active for a pre-specified period of time, and then be released.

The microcontroller 16 scans the inputs 18 continuously, waiting for a change. When one of the inputs 18A to 18D is triggered in System 1, the microcontroller 16 reacts by identifying which input has been triggered. This is achieved by the microcontroller 16 polling each input line 18A to 18D. The system has four inputs 18A to 18D, each input being linked to one of the four master contact numbers 36, the four master contact numbers 36 being stored in the SIM card 28. As indicated above, each input 18A to 18D can also be linked to one of the four base contact numbers 38, the four base contact numbers 38 also being stored in the SIM card 28. When one of the inputs 18A to 18D is triggered, the corresponding master or base contact number is retrieved from the SIM card 28. The number is then dialed, and the microcontroller 16 simultaneously resets a seconds counter or timer 56. The microcontroller 16 then monitors the serial port.

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As soon as the modem 20 responds with a message indicating that the line is busy, the microcontroller 16 recalls the time from the point of dialing until a busy signal is received. The period between making a call and receiving feedback that the called line is ringing takes approximately 9 seconds. Thus, if the time is less than 9 seconds, then the number called is assumed to be busy. In this case, the microcontroller 16 waits a while and attempts to redial the number. The microcontroller 16 will continue to redial until a busy signal is received between 10 and 15 seconds. If there is no activity from the modem for more than 30 seconds, it is assumed that the number being dialed is off the air, and the unit will attempt to redial the number after a short period of time. This will continue until the called is answered.

Once the call is answered by either the master unit 12 or the base station 22, the receiving party terminates the call. A flag is set to inform the microcontroller 16 not to dial again. Only when the triggered input 18A to 18D is reset, does the microcontroller 16 reset the already dialed flag. Again, and as discussed above, the call from the microcontroller 16 to the receiving party is allowed to ring three times. This advantageously allows the microcontroller 16 to decide whether the receiving party was busy when the call was made, in which case the alert did not get through, or whether the call was dropped by the receiving line, in which case the alert did get through to the master unit 12 or the base station 22.

After the master unit 12 and/or the base station 22 has terminated the call from the cellular modem 20, the identity of the remote unit 13 is established by means of the first identification means. This information informs the master unit 12 and/or base station 22 where the alert has been triggered, which, in combination with the contact numbers 36A to 36D and/or 38A to 38D that was dialled by the cellular modem 20, provides the master unit 12 and/or the base station 22 with the two pieces of information that will allow the master unit 12 and/or the base station 22 to take necessary steps.

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System 2 is substantially similar to System 1, save that, by utilising the counter or timing device 56, a time response feature is provided that allows more than four outputs, or slave units 14, to be actuated and, similarly, more than four inputs 18 to be sensed.

In particular, for the outputs, the identification of which slave unit 14 to trigger is linked to the length that an incoming call from either the master unit 12 or the base station 22 rings for. As indicated above, from the time that a call is made to the time that the receiving modem 20 detects a ring, takes approximately 9 seconds. Thus, in System 2 when the cellular modem 20 receives a call, the microcontroller 16 starts the counter or timer 56. When the calling party terminates the call, the cellular modem 20 stops the timer and calculates the length of time that the cellular modem 20 rang for. From this time period, a pre-assigned one of the slave units 14 is activated. Significantly, since the maximum time allowed for ringing is 120 seconds and if a time base of 5 seconds is set for each output or slave unit 14, each of the four slave contact numbers 34 could effectively control 60 outputs. In other words, in System 2, the master unit 12 and base station 22 can control up to 240 outputs.

As indicated above, the numbers that will call the cellular modem 20 will be entered on the SIM card phone book 28 prior to inserting the card into the SIM card holder of the cellular modem 20. Clearly, each of the 240 outputs that will be utilised by the user needs to be programmed or assigned with a corresponding period of time that will activate that particular output, and stored in SIM card 28. Similarly, the 240 possible inputs, 60 for each of the four master and base contact numbers, are programmed and stored in the SIM cards 30 and 32, respectively.

In use, in System 2, when the cellular modem 20 receives a call from the master unit 12 or the base station 22, the modem immediately informs the

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microcontroller 16 via the serial port that a ring is taking place. The incoming telephone number is identified and passed onto the microcontroller 16, with the microcontroller 16 then storing the number. The microcontroller 16 then clears the timer 56 and begins counting seconds, and waits for the modem 20 to issue a command that the call has been dropped by the calling party. Once this command has been received by the modem, the microcontroller 16 then determines the output or slave unit 14 to switch on, based on the time that the call took.

As indicated above, the microcontroller 16 requests the modem to send one number at a time from the phone book in the SIM card 28. The microcontroller 16 then compares the received number with the numbers in the phone book. If a match is not found, an error message is sent to the screen, and the microcontroller 16 waits for the modem to receive another call. In the case the number in the phone book matches the number of the incoming call, the respective slave unit 14 is activated.

It is envisaged that, for the transmitting modem of the master unit 12 or the base station 22 to be sure that the receiving modem received the call, and completed the output task, the receiving modem will call the transmitting modem, with the transmitting modem terminating the call upon as soon as the incoming check call is identified.

Conversely, when one of the 240 inputs is triggered in System 2, the microcontroller 16 reacts by identifying which input has been triggered. Each of the 240 inputs is linked to one of the four master and/or base contact numbers and an associated ring time, which, in combination, uniquely identifies that particular input. As soon as the appropriate contact number is dialled, the microcontroller 16 resets the seconds counter. The microcontroller 16 then monitors the serial port and waits for the pre-programmed time to time out, at which point the microcontroller 16 instructs the cellular modem 20 to

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drop the call and waits for confirmation from the receiving modem at the master unit 12 or base station 22.

Systems 1 and 2 can be implemented using most types of cellular modems. Certain cellular modems, however, have the so-called "String Identifier Header" functionality, which will be utilised in System 3.

To explain the "String Identifier Header" functionality, when a call is made using the GSM system, a complete string of data is first built up, containing the calling party number, the number being dialed, and other information. Part of this data string, or header, is a block of information that may or may not contain user information. This block of information can contain up to 32 bytes of information. Each byte is known as an octet.

In the first octet, the number of lines used is stated, simply so that the receiving modem knows where the data is in the stream, and can synchronize the remainder of the header. In other words, if no information is sent, the first octet will contain a value of "1". The receiving modem will then know that there is no data in the header, as the value of "1" is for the first octet itself.

Significantly, the data in the remaining octets may be any type of binary data, such as ASCII, hex data, or simply bits set according to the user's requirement. This is significant because the type of information in this header is of no consequence to the calling and receiving parties, but will conveniently be used to transfer information between the slave units and the master unit 12 and base station 22.

The process of entering the data into the header is strictly performed by the cellular modem 20, in terms of rules prescribed by the manufacturer of the cellular modem 20. Thus, the sender of the information provides the data that is to be inserted into the header to the cellular modem via the cellular modem's

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serial port. The cellular modem then, in terms of GSM specifications, formats the data and sends the string to the GSM service provider, which then passes the header to the receiving GSM modem. The modem then extracts this information from the header, and passes the information to the microprocessor using manufacturer specific commands.

In use, when the cellular modem 20 receives a call, the modem immediately informs the microcontroller 16 via the serial port that a call has been received and sends through the number of the incoming telephone call. The microcontroller 16 stores the number and extracts the message from the received header. As described above, the microcontroller 16 allows three rings to take place, and then issues a command for the cellular modem 20 to terminate the call.

Once the call has been dropped, the microcontroller 16 requests the modem to send one number at a time from the phone book in the SIM card. The microcontroller 16 then compares the received number with the numbers in the phone book. If a match is not found, an error message is sent to the screen, and the microcontroller 16 waits for the modem to receive another call. In the case the number in the phone book matches the number of the incoming call, the message or data string in the header is then decoded.

Depending on the type of information sent, this could be to switch a respective output on or off. It could be a value from which a process control could make decisions in a process control, or any other type of action.

Conversely, when one of the inputs is triggered, microcontroller 16 reacts by first identifying which input has been triggered, and then requests the number from the SIM phone book. The required information to be sent is either collected from a serial port, or from latching on a parallel port, and analogue to digital converter, or a time based information transfers, or simply just to inform

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the other modem that a specific input has changed state. The information is sent to the modem via the serial port. The number is dialed, and simultaneously the microcontroller 16 resets a seconds counter. The microcontroller 16 then monitors the serial port. The moment the modem responds with a message saying the line is busy, the microcontroller 16 recalls the time from the point of dialing until a busy signal is received. If the time is less than 9 seconds, then the number called is assumed to be busy, so the microcontroller 16 waits a while and attempts to redial the number. This process has already been documented earlier in the specification with reference to Systems 1 and 2, and will thus not be repeated here.

In particular, the determination as to which one of the inputs has been triggered is made by using the timer feature described with reference to System 2. Thus, depending on the time that the microcontroller allows the call to the master unit and/or base station to ring for, the receiving party determines which input has been triggered and reacts accordingly. This aspect has been described with reference to System 2, and will thus not be repeated here.

Although the present invention has been described with reference to one microcontroller receiving instructions from a master unit and/or base station, typically a plurality of microcontrollers will be fitted at geographically spaced apart locations to control slave units located at these locations. Clearly, to achieve this, the slave contact numbers of all the slave units of the microcontrollers are stored in the phone books of the SIM cards 30 and 32 of the master unit and the base station, respectively. To illustrate this particular aspect of the invention, consider a typical system for water purification.

In such a system, there could easily be 10 dam sites situated over an area of approximately 30 km^2. Each dam site has a pump house with a number of pumps, these pumps being used to pump water outwardly into a main system pipeline, and to pump water inwardly from other dams or reservoirs further

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away from the dam. Each pump house typically has online water testing equipment, a water level detector and an inline filter mechanism. Each piece of equipment is connected to the GSM system as an input or as an output.

All the dams are connected via a piping system to a network of control points, which can be a town or a city, for supplying water to residential areas and to industrial areas. In the city, there is typically a pressure measuring device, a flow rate monitor and a central control system, which monitors the water consumption, water pressure and the time of day. The time of day is measured since water usage is linked to periods of the day where the consumption goes up or down. The central control system, which can be compared to the base station described above, receives signals from each control point. When water is needed in the city, the central control system decides which dam is best to deliver the required water based on factors such as the quantity and the pH of water in the dams. The central system then sends a signal to the pump house of the selected dam to start pumping water into the main system pipeline.

The operation of the water purification system so far is in accordance with the examples and systems described earlier in the specification, and has thus not been described in much detail. The significant feature about this system is that each dam has water testing equipment, which will attempt to maintain the water at a required pH level. However, the central control system can override any steps taken by the water testing equipment in that particular. For example, if the central control system is aware of another dam that has water that when mixed with water from the first dam will ultimately yield the correct pH. Thus, in this example, both the central control system and the pump house operate in tandem to control water purification. In another example, under normal conditions, a dam will not pump water inwardly, in order to fill itself, until the dam detects, via the water level detector, that its water level is low. However,

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the central control system can force the dam to pump water inwardly, if, for example, the expected water consumption requires that this be done.

In other words, the both the dam site and the central control system has command, but with the command of the central control system overriding the command of the dam site in the event of there being a conflict. Ultimately, the central control system will only command according to immediate requirements, while the dams will control according to its own requirements, which is mainly to keep the dam level between two levels and the water at a certain pH level.

Since the telephone calls made between the various units and stations are never actually answered, the crux of the present invention is thus that information, and in particular one of a plurality of pre-defined instructions or alerts, can be communicated between units and stations at practically zero cost. A particularly significant feature of the present invention is that it is implemented using public domain features of GSM technology, with this public domain technology being free and non-chargeable.

CLAIMS

1.   A system for transferring information between at least one master unit and at least one remote unit, wherein:

each of the at least one master unit comprises:

at least one master contact number for allowing the master unit to identify one of a plurality of pre-defined inputs detected by one of the at least one remote unit;

each of the at least one remote unit comprises:

a controller having a plurality of inputs and a plurality of outputs, the inputs being arranged to detect one of the plurality of pre-defined inputs and the outputs being arranged to drive one of a plurality of slave units when instructed to do so by one of the at least one master unit; and

at least one slave contact number for allowing the controller to identify which one of the plurality of slave units is to be driven by the controller;

a communications network extending between the at least one master unit and the at least one remote unit, for allowing the at least one master unit to send one of a plurality of pre-defined instructions to the at least one remote unit and for allowing the at least one remote unit to send one of a plurality of pre-defined inputs to the at least one master unit, the communications network including:

first identification means for allowing the at least one master unit to identify the at least one remote unit; and

second identification means for allowing the at least one remote unit to determine the identity of a party sending one of the plurality of pre-defined instructions to the at least one remote unit, with the instruction only being carried out by the controller in the event of the party being an authorised instructor.

2.   A system according to claim 1, wherein the communications network is a GSM cellular network, with the at least one remote unit and the at least one master unit being fitted with cellular modems for facilitating the GSM communications.

3.   A system according to claim 2, wherein the information is transferred between the least one master unit and the at least one remote unit by means of a cellular telephone call being made from the one unit to the other, with the first and second identification means being arranged to identify the at least one remote unit and the party sending one of the plurality of pre-defined instructions, respectively, prior to the telephone call being answered by the unit receiving the telephone call.

4.   A system according to 3, wherein the controller of the at least one remote unit is arranged to determine which one of the at least one master contact number is to be used by the controller for transferring information to the at least one master unit when one of the plurality of pre-defined inputs is detected.

5.   A system according to claim 4, wherein a plurality of master contact numbers is provided, each master contact number being uniquely associated with one of the inputs of the controller, so that when an alert is sensed, the controller of the at least one remote unit selects the master contact number corresponding to that alert and makes a call to the at least one master unit using the selected master contact number.

6.   A system according to claim 4, wherein a plurality of master contact numbers is provided, with each master contact number having a plurality of time slots associated therewith, wherein each input of the controller of the at least one remote unit is uniquely identified by a combination of one of the master contact numbers and one of the time slots within the one master contact number, so that when an alert is sensed, the controller selects the master contact number and time slot corresponding to that alert and makes a call to the at least one master unit using the selected master contact number and allows the call to ring for a period of time corresponding to the time slot for that alert.

7.   A system according to claim 6, wherein the at least one master unit includes the plurality of master contact numbers and time slots, and associated controller inputs, the at least one master unit further including timer means for allowing the at least one master unit to determine the period of time that the at least one remote unit allowed the call to ring for, so that when the at least one master unit receives a call from the at least one remote unit, the at least one master unit can determine which one of the pre-defined alerts has been sensed by the inputs of the controller of the at least one remote unit.

8.   A system according to claim 3, wherein the at least one master unit is arranged to determine which one of the at least one slave contact number is to be used by the at least one master unit for transferring

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information to the at least one remote unit when one of the plurality of pre-defined instructions is to be carried out by the at least one remote unit.

9.   A system according to claim 8, wherein a plurality of slave contact numbers is provided, each slave contact number being uniquely associated with one of the slave unit outputs of the controller of the at least one remote unit, so that when an instruction is to be carried out by the at least one remote unit, the at least one master unit selects the slave contact number corresponding to that instruction and makes a call to the at least one remote unit using the selected slave contact number.

10.   A system according to claim 8, wherein a plurality of slave contact numbers is provided, with each slave contact number having a plurality of time slots associated therewith, wherein each output of the controller of the at least one remote unit is uniquely identified by a combination of one of the slave contact numbers and one of the time slots within the one slave contact number, so that when an instruction is to be carried out, the at least one master unit selects the slave contact number and time slot corresponding to that instruction and makes a call to the at least one remote unit using the selected slave contact number and allows the call to ring for a period of time corresponding to the time slot for that instruction.

11.   A system according to claim 10, wherein the controller of the at least one remote unit includes the plurality of slave contact numbers and time slots, and associated controller outputs, the at least one remote unit further including timer means for allowing the at least one remote unit to determine the period of time that the at least one master unit allowed the call to ring for, so that when the at least one remote unit

receives a call from the at least one master unit, the at least one remote unit can determine which one of the pre-defined instructions is to be carried out.

12.   A system according to any one of claims 8 to 11, wherein each of the at least one remote unit comprises a list of pre-authorized telephone numbers that belong to authorised instructors.

13.   A system according to claim 3, wherein the information as to which one of the plurality of pre-defined instructions is to be carried out by the at least one remote unit is stored in a data string that immediately precedes the call being made to the at least one remote unit.

14.   A system according to any one of the preceding claims, wherein the master unit and the remote unit have terminating means for terminating a call that has been received.

15.   A system according to any one of the preceding claims, wherein the slave units are relay switches, with the controller of the at least one remote unit being programmed to control the time period that each relay switch is opened and closed.

16.   A system according to any one of the preceding claims, which further includes a base station that is in communication with the at least one remote unit, for allowing information to be transferred between the base station and the at least one remote unit.

17.   A system according to claim 16, wherein the base station includes at least one base contact number for allowing the base station to also identify one of a plurality of pre-defined inputs detected by one of the at least one remote unit.

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18.   A system according to either one of the preceding claims 16 or 17, wherein the outputs of the controller of the at least one remote unit are also arranged to drive one of a plurality of slave units when instructed to do so by the base station.

19.   A system according to any one of claims 16 to 18, wherein the communications network also extends between the base station and the at least one remote unit, for allowing the base station to send one of a plurality of pre-defined instructions to the at least one remote unit and for allowing the at least one remote unit to send one of a plurality of pre-defined inputs to the base station.

20.   A system according to any one of claims 16 to 19, wherein the first identification means is arranged to allow the base station to identify the at least one remote unit.

21.   A system for allowing at least one remote unit to inform at least one master unit when one of a plurality of pre-defined inputs is detected by one of the at least one remote unit, wherein:

        each of the at least one master unit comprises:

                at least one master contact number for allowing the master unit to identify the input detected by one of the at least one remote unit;

        each of the at least one remote unit comprises:

                a controller having a plurality of inputs that are arranged to detect one of the plurality of pre-defined inputs;

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a communications network extends between the at least one
master unit and the at least one remote unit, for allowing the at
least one remote unit to send one of a plurality of pre-defined
inputs to the at least one master unit, the communications
network including:

first identification means for allowing the at least one
master unit to identify the at least one remote unit.

22.   A system according to claim 21, wherein the communications network
is a GSM cellular network, with the at least one remote unit and the at
least one master unit being fitted with cellular modems for facilitating
the GSM communications.

23.   A system according to claim 22, wherein the information is transferred
between the least one master unit and the at least one remote unit by
means of a cellular telephone call being made from the one unit to the
other, with the first identification means being arranged to identify the at
least one remote unit prior to the telephone call being answered by the
unit receiving the telephone call.

24.   A system according to claim 23, wherein the controller of the at least
one remote unit is arranged to determine which one of the at least one
master contact number is to be used by the controller for transferring
information to the at least one master unit when one of the plurality of
pre-defined inputs is detected.

25.   A system according to claim 24, wherein a plurality of master contact
numbers is provided, each master contact number being uniquely
associated with one of the inputs of the controller, so that when an alert

is sensed, the controller of the at least one remote unit selects the master contact number corresponding to that alert and makes a call to the at least one master unit using the selected master contact number.

26.   A system according to claim 24, wherein a plurality of master contact numbers is provided, with each master contact number having a plurality of time slots associated therewith, wherein each input of the controller of the at least one remote unit is uniquely identified by a combination of one of the master contact numbers and one of the time slots within the one master contact number, so that when an alert is sensed, the controller selects the master contact number and time slot corresponding to that alert and makes a call to the at least one master unit using the selected master contact number and allows the call to ring for a period of time corresponding to the time slot for that alert.

27.   A system according to claim 26, wherein the at least one master unit includes the plurality of master contact numbers and time slots, and associated controller inputs, the at least one master unit further including timer means for allowing the at least one master unit to determine the period of time that the at least one remote unit allowed the call to ring for, so that when the at least one master unit receives a call from the at least one remote unit, the at least one master unit can determine which one of the pre-defined alerts has been sensed by the inputs of the controller of the at least one remote unit.

28.   A system for allowing at least one master unit to instruct at least one remote unit to drive one of a plurality of slave units, wherein:

        each of the at least one remote unit comprises:

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a controller having a plurality of outputs, the outputs being arranged to drive one of the plurality of slave units when instructed to do so by one of the at least one master unit; and

at least one slave contact number for allowing the controller to identify which one of the plurality of slave units is to be driven by the controller;

a communications network extends between the at least one master unit and the at least one remote unit, for allowing the at least one master unit to send one of the plurality of pre-defined instructions to the at least one remote unit, the communications network including:

second identification means for allowing the at least one remote unit to determine the identify of a party sending one of the plurality of pre-defined instructions to the at least one remote unit, with the instruction only being carried out by the controller in the event of the party being an authorised instructor.

29.   A system according to claim 28, wherein the communications network is a GSM cellular network, with the at least one remote unit and the at least one master unit being fitted with cellular modems for facilitating the GSM communications.

30.   A system according to claim 29, wherein the information is transferred between the least one master unit and the at least one remote unit by means of a cellular telephone call being made from the one unit to the other, with the second identification means being arranged to identify

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the party sending one of the plurality of pre-defined instructions, prior to the telephone call being answered by the unit receiving the telephone call.

31. A system according to claim 30, wherein the at least one master unit is arranged to determine which one of the at least one slave contact number is to be used by the at least one master unit for transferring information to the at least one remote unit when one of the plurality of pre-defined instructions is to be carried out by the at least one remote unit.

32. A system according to claim 31, wherein a plurality of slave contact numbers is provided, each slave contact number being uniquely associated with one of the slave unit outputs of the controller of the at least one remote unit, so that when an instruction is to be carried out by the at least one remote unit, the at least one master unit selects the slave contact number corresponding to that instruction and makes a call to the at least one remote unit using the selected slave contact number.

33. A system according to claim 31, wherein a plurality of slave contact numbers is provided, with each slave contact number having a plurality of time slots associated therewith, wherein each output of the controller of the at least one remote unit is uniquely identified by a combination of one of the slave contact numbers and one of the time slots within the one slave contact number, so that when an instruction is to be carried out, the at least one master unit selects the slave contact number and time slot corresponding to that instruction and makes a call to the at least one remote unit using the selected slave contact number and allows the call to ring for a period of time corresponding to the time slot for that instruction.

34.   A system according to claim 33, wherein the controller of the at least
        one remote unit includes the plurality of slave contact numbers and
        time slots, and associated controller outputs, the at least one remote
        unit further including timer means for allowing the at least one remote
        unit to determine the period of time that the at least one master unit
        allowed the call to ring for, so that when the at least one remote unit
        receives a call from the at least one master unit, the at least one remote
        unit can determine which one of the pre-defined instructions is to be
        carried out.

35.   A system according to any one of claims 31 to 34, wherein each of the
        at least one remote unit comprises a list of pre-authorized telephone
        numbers that belong to authorised instructors.

36.   A system according to claim 31, wherein the information as to which
        one of the plurality of pre-defined instructions is to be carried out by the
        at least one remote unit is stored in a data string that immediately
        precedes the call being made to the at least one remote unit.

37.   A method of allowing at least one remote unit to inform at least one
        master unit when one of a plurality of pre-defined inputs is detected by
        one of the at least one remote unit, the method including the steps of:

            providing the at least one master unit with at least one master
            contact number for allowing the master unit to identify the input
            detected by one of the at least one remote unit;

            providing the at least one remote unit with a controller having a
            plurality of inputs that are arranged to detect one of the plurality
            of pre-defined inputs;

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allowing the at least one remote unit to send one of a plurality of pre-defined inputs to the at least one master unit; and

allowing the master unit to identify the at least one remote unit.

38.   A method according to claim 37, wherein the step of allowing the at least one remote unit to send one of a plurality of pre-defined inputs to the at least one master unit includes the step of the remote unit making a cellular telephone call to the master unit, with the step of allowing the master unit to identify the at least one remote unit occurring prior to the telephone call being answered by the master unit.

39.   A method according to claim 38, which includes the step of determining which one of the at least one master contact number is to be used by the controller for transferring information to the at least one master unit when one of the plurality of pre-defined inputs is detected.

40.   A method according to claim 39, which includes the step of providing a plurality of master contact numbers, each master contact number being uniquely associated with one of the inputs of the controller, so that when an alert is sensed, the method includes the further steps of:

        selecting the master contact number corresponding to that alert; and

        making a call to the at least one master unit using the selected master contact number.

41.   A method according to claim 39, which includes the step of providing a plurality of master contact numbers and, for with each master contact

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number, providing a plurality of time slots, so that each input of the controller of the at least one remote unit is uniquely identified by a combination of one of the master contact numbers and one of the time slots within the one master contact number, with the method including the further steps of, when an alert is sensed,:

allowing the controller to select the master contact number and time slot corresponding to that alert;

making a call to the at least one master unit using the selected master contact number; and

allowing the call to ring for a period of time corresponding to the time slot for that alert.

42.   A method according to claim 41, which includes the further step of allowing the at least one master unit to determine the period of time that the at least one remote unit allowed the call to ring for, so that when the at least one master unit receives a call from the at least one remote unit, the at least one master unit can determine which one of the pre-defined alerts has been sensed by the inputs of the controller of the at least one remote unit.

43.   A method of allowing at least one master unit to instruct at least one remote unit to drive one of a plurality of slave units, the method including the steps of:

providing the at least one remote unit with a controller having a plurality of outputs, the outputs being arranged to drive one of the plurality of slave units when instructed to do so by one of the at least one master unit;

providing at least one slave contact number for allowing the controller to identify which one of the plurality of slave units is to be driven by the controller;

allowing the at least one master unit to send one of the plurality of pre-defined instructions to the at least one remote unit; and

allowing the at least one remote unit to determine the identify of a party sending one of the plurality of pre-defined instructions to the at least one remote unit, with the instruction only being carried out by the controller in the event of the party being an authorised instructor.

44.   A method according to claim 43, wherein the step of allowing the at least one master unit to send one of the plurality of pre-defined instructions to the at least one remote unit includes the step of the master unit making a cellular telephone call to the remote unit, with the step of allowing the at least one remote unit to determine the identify of a party sending one of the plurality of pre-defined instructions to the at least one remote unit occurring prior to the telephone call being answered by the remote unit.

45.   A method according to claim 44, which includes the step of determining which one of the at least one slave contact number is to be used by the at least one master unit for transferring information to the at least one remote unit when one of the plurality of pre-defined instructions is to be carried out by the at least one remote unit.

46.   A method according to claim 45, which includes the step of providing a plurality of slave contact numbers, each slave contact number being

uniquely associated with one of the slave unit outputs of the controller of the at least one remote unit, so that when an instruction is to be carried out by the at least one remote unit, the method includes the further steps of:

selecting the slave contact number corresponding to that instruction; and

making a call to the at least one remote unit using the selected slave contact number.

47. A method according to claim 45, which includes the step of providing a plurality of slave contact numbers and, for each slave contact number, providing a plurality of time slots so that each output of the controller of the at least one remote unit is uniquely identified by a combination of one of the slave contact numbers and one of the time slots within the one slave contact number, with the method including the further steps of, when an instruction is to be carried out,:

allowing the at least one master unit to select the slave contact number and time slot corresponding to that instruction;

making a call to the at least one remote unit using the selected slave contact number; and

allowing the call to ring for a period of time corresponding to the time slot for that instruction.

48. A method according to claim 47, which includes the further step of allowing the at least one remote unit to determine the period of time that the at least one master unit allowed the call to ring for, so that

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when the at least one remote unit receives a call from the at least one master unit, the at least one remote unit can determine which one of the pre-defined instructions is to be carried out.

49.   A method according to claim 45, which includes the step of storing the information as to which one of the plurality of pre-defined instructions is to be carried out by the at least one remote unit in a data string that immediately precedes the call being made to the at least one remote unit.
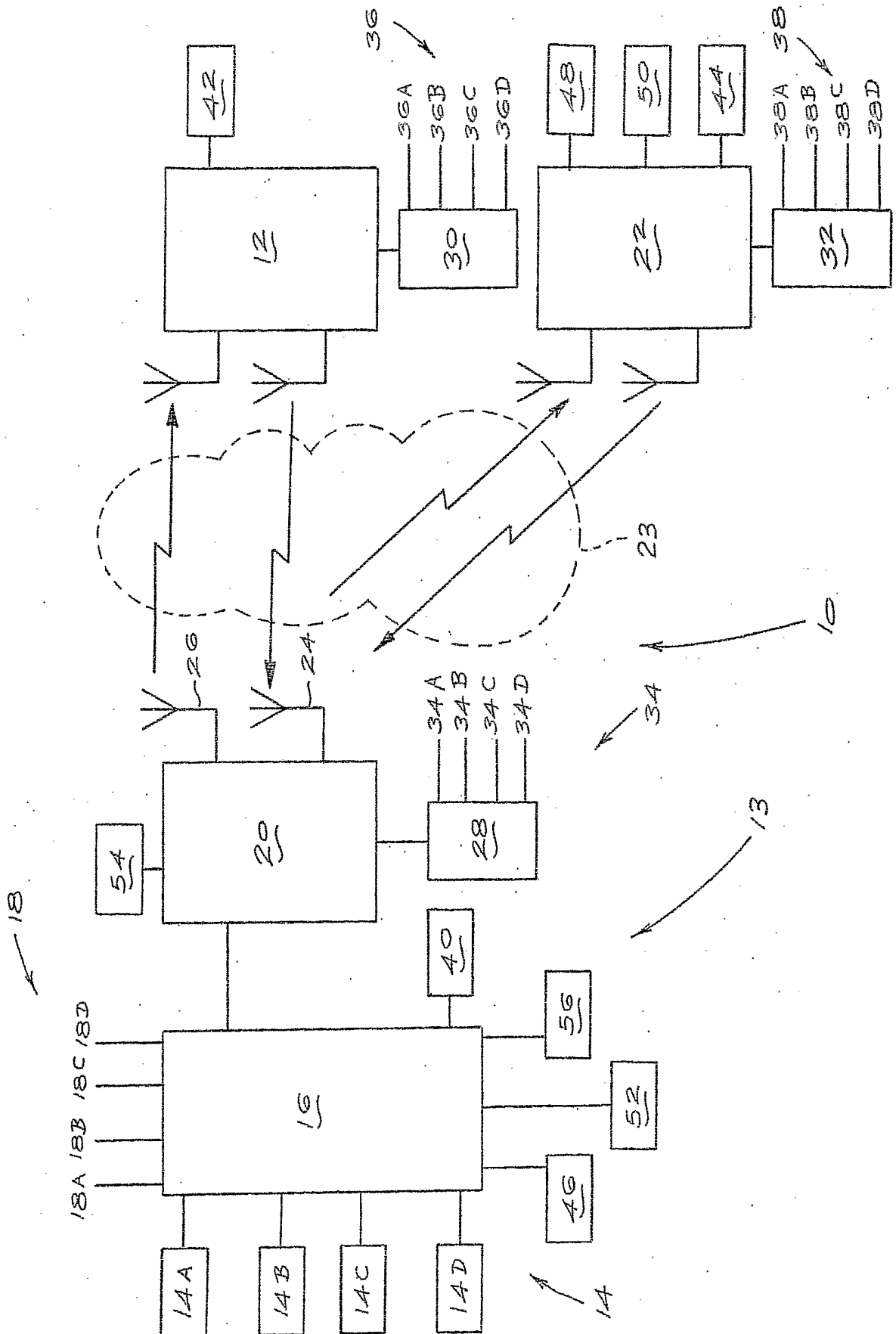
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7   H04M11/00

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)

IPC 7   H04M   G08C   H04Q

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 practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02 09404 A (ELET3 S R L ;LORENZI MARCO (IT); SALVATERRA MARIANO (IT)) 31 January 2002 (2002-01-31)	28-32, 35,43-46
Y	page 5, line 11 -page 11, line 2	1-12,14, 16-20, 33,34, 47,48
	page 12, line 1 -page 13, line 21 ---	
X	GB 2 374 755 A (BOX TELEMATICS LTD) 23 October 2002 (2002-10-23)	21-27, 37-42
Y	page 2, line 7 -page 3, line 21	1-12,14, 16-20, 33,34, 47,48
	page 5, line 18 -page 6, line 3 page 8, line 1 - line 15 ---	
	-/--	

X	Further documents are listed in the continuation of box C.	X	Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 February 2004	18/02/2004

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02 47369 A (EBAC LTD ;SMITH ANDREW (GB); WALTON PHILIP ANDREW (GB)) 13 June 2002 (2002-06-13) page 5, line 20 -page 6, line 20 ___	21-25, 37-40
X	US 6 529 591 B1 (LADHA NIZAR ET AL) 4 March 2003 (2003-03-04) column 5, line 10 -column 7, line 17 _____	21-25, 37-40

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IB 03/01454

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
WO 0209404	A	31-01-2002	IT	PN20000044 A1	21-01-2002
			AU	7634001 A	05-02-2002
			CN	1439219 T	27-08-2003
			WO	0209404 A1	31-01-2002
			EP	1302063 A1	16-04-2003
GB 2374755	A	23-10-2002	NONE		
WO 0247369	A	13-06-2002	AU	2213202 A	18-06-2002
			WO	0247369 A1	13-06-2002
US 6529591	B1	04-03-2003	CA	2242272 A1	31-01-2000
			CA	2249711 A1	20-04-2000
			AU	5022599 A	28-02-2000
			CA	2338429 A1	17-02-2000
			WO	0008839 A1	17-02-2000
			EP	1131947 A1	12-09-2001
			ZA	200101610 A	18-09-2001