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(54) **Reception/management system for digital signals from electronic devices, capable of learning the zone configuration data, in particular for alarm systems**

(57) Adopting a bifilar digital bus (18) for connecting electronic devices (20, 30, 40, 50) in an alarm system (60) allows a high degree of installation flexibility to be accomplished while simultaneously preventing any operations of attribution of a determined zone to be carried out on an individual electronic device (40) conse-

quently reducing the otherways necessary long wait times and error possibilities.

The operation of zone attribution is carried out automatically by the system following the selection of the electronic device (40) and of the associated zone, by the installer.

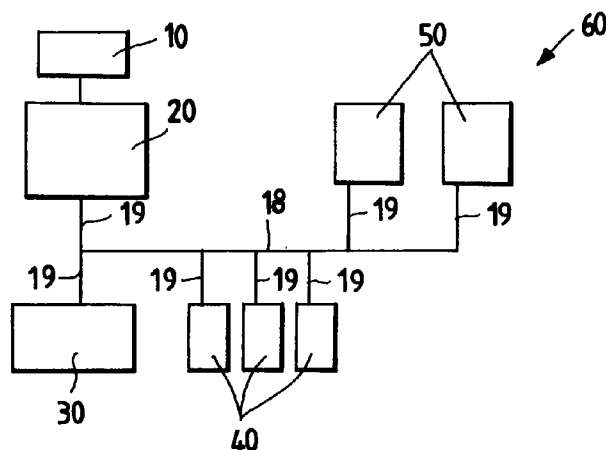


Fig. 1

Description

The present invention relates to a reception/management system for digital signals from electronic devices used, in particular, for alarm systems.

The present alarm systems, either of anti-intrusion type, or of technical type (for fires, gas leakages, water seepage), generally comprise an electronic control unit (referred to in the following, by the more common term "central unit"), alarm devices (such as sirens, warning horns, blinkers), specific sensors to the installed system type, telephone diallers, stabilized power supply units, which take the voltage from electrical power distribution mains, enabling or disabling devices, actuators or driver devices for motor units.

During the past years, such alarm systems have been installed with increasing frequency using, for the necessary connections, connecting lines of digital type (referred to in the following, as "buses"), which perform the main functions of transferring data and signals from device to device inside the system.

In particular, the installer must subdivide the area controlled by the alarm system into several zones each of which can be excluded from control independently from the other zones.

Such a configuration is normally accomplished by means of digital signals reception/management systems of traditional type, by connecting the central unit with one or more electrical networks constituted by sensor elements, other electronic devices for auxiliary functions and sound signalling devices (which start operating in the event of a fire) by means of a star-like connection pattern, using purposely designed point-to-point lines, i.e., one line per each zone.

In the reception/management systems for digital signals based on bus connection, the individual sensor element is suitably configured by setting purposely provided setting means said sensor element is equipped with (by acting, for example, on "DIP switches", rotary selectors, resistors).

In that way, each sensor element is defined as belonging to a well determined zone and an univocal correspondence is established between the sensor element and the zone it belongs to ("belonging zone").

In a similar way, the sensor elements can be supplied as already provided with an univocal code of their own in order to identify the zone they belong to.

The association between code and belonging zone is then carried out in the central unit by means of suitable application software commands.

One from the main drawback of the reception/management system for digital signals as disclosed above consists in the lack of flexibility of the connections and of the device installations. The sensor element connected with the connecting line of a determined zone can be re-assigned to another zone only by means of a direct electrical connection with the corresponding peripheral unit.

In those systems which are based on locally obtained zone configuration (i.e., directly carried out on the sensor element), the major difficulty consists in that the installer must be supplied with complete information as to the operations to be performed, with the consequent and unavoidable possibilities of error in system setting (due to misunderstanding, information mistakes, staff absence) and long implementation times.

Furthermore, the confidentiality of such operations cannot be secured.

In those systems which are based on central unit programming the above drawbacks are avoided, but the difficulty remains of associating the codes (which define the sensor elements) with the belonging zone; also in this case, in fact, skill and care are necessary in code attribution operations, consequently resulting in long wait times and high error probability.

The purpose of the present invention is of providing a reception/management system for digital signals capable of learning the zone configuration data which solves the above cited problems, with a coordinated and flexible whole of the various electronic zone devices and a management methodology for the latter being provided.

Another purpose of the present invention is of providing a reception/management system for digital signals which is capable of learning the zone configuration data, using standard electric/electronic technologies, communication methodologies and univocal electrical solutions which allow the amount and size of connecting harness to be reduced and the devices to be installed and integrated with a high flexibility degree, with higher functionality of code/zone association and learning accuracy being accomplished as compared to the solution known from the prior art.

A not least purpose of the invention is of providing a reception/management system for digital signals which is easy and cheap to be manufactured, without having to resort to either complex or expensive technologies.

These, and still other purposes, are achieved by a system for receiving and managing digital signals coming from electronic devices and used in particular for alarm systems, according to Claim 1.

Advantageously, the system for receiving and managing digital signals according to the present invention uses one single bifilar digital bus with which the central unit, electronic devices, sound signalling devices and zone actuator apparatuses are connected.

In particular, using one single digital bifilar bus for connecting the electronic devices of an alarm system allows the amount of connecting harness to be substantially reduced and flexibility to be accomplished when installing said devices, which can be assigned to different zones of the system with no need for being electrically connected with the corresponding connecting line.

The expansion of the system is secured within the limits provided by bus capacity, it being enough, for installing further electronic devices, that both bus wires are accessed at a whatever point along the line.

Furthermore, no operations are required of zone attribution to be carried out on the individual electronic device with time wastes and error possibilities being thus avoided.

Finally, inside the central unit, the associations of each electronic device with its belonging zone are carried out automatically; therefore, for the installer it will be enough that (s)he selects the learning state operating mode and zone associations.

Further purposes and advantages of the present invention will be clear from the following disclosure and from the accompanying drawings, supplied for merely explanatory, exemplifying, non-limitative purposes, in which:

- Figure 1 displays a block diagram of an alarm system based on a system for receiving/managing digital signals coming from electronic devices and capable of learning the zone configuration data, according to the present invention;
- Figure 2 shows a schematic front view of the central unit provided in the alarm system of Figure 1, according to the present invention;
- Figure 3 illustrates a block diagram of one of sensor elements, which are connected with other auxiliary electronic devices of the alarm system of Figure 1, according to the present invention.

Referring to Figure 1, the reference numeral (60) generally indicates the alarm system as a whole, which comprises: a power supply unit (20), which feeds the system with a direct voltage comprised within the range of from 20 to 30 volts, encased inside a modular case for flush mount in accordance with the applicable DIN provisions and connected, at the one side, with the electrical power distribution mains (10) and, at its other side, with a bifilar bus (18), through a connection line (19); sensor element (40), appended to other auxiliary electronic devices, actuator and motor units and connected with the bus (18) through connecting lines (19), which acquire and transmit data and information through digital signals of communication with a central unit (30) of the system (60); a central unit (30), connected with the bus (18) through one of said connecting lines (19) and designed to encode the sensor elements (40) assigned to the different zones and to learn said associations; devices for sound signalling (50) connected with the bus (18) through connection line (19), which start operating following commands issued by the central unit (30), in the event of an alarm.

The central unit (30), the sensor elements (40) connected with the auxiliary electronic devices, the actuator devices and the motor units, the power supply unit (20) and the sound signalling devices (50) are all provided with terminals for connection with the bifilar bus (18) through the lines (19), and with mechanical elements for fastening to frames/brackets which are used to contain electrical devices for use in civil environment, of modular type for flush mount.

Referring to Figure 2, the reference numeral (21) indicates an electronic device suitable for receiving an identification code (typically, a LED diode sensible to I.R. wavelengths), the reference numeral (22) indicates an optical alarm display, the reference numeral (23) indicates an optical display which displays the operating state of the system applied to the alarm system (60) (i.e., switched on/off), the reference numeral (24) indicates optical indicators which indicate an enabled or selected zone in learning mode, and the reference numerals (26) indicates push-buttons used to enable a zone and for selecting the zone in learning mode.

The reference numeral (27) indicates a push-button which enables the learning mode and other auxiliary functions, (28) indicates an optical indicator signalling that electrical power is being supplied by the electrical power distribution mains, (29) indicates an optical indicator of sabotage alarm, (31) is an optical indicator of technical alarm, (32) is an optical indicator of learning mode or test mode, (33) is an optical indicator of identification codes programming mode.

The reference numeral (34) indicates an enabling push-button to be used for enabling the programming of the identification codes to be sent to the several electronic devices belonging to the system (60) and configured into selected zones.

Referring to Figure 3, (41) is the electronic/optoelectronic circuit of the sensor element (in particular, a movement sensor), (42) is a digital storage element (which is a programmable memory or a reading-only buffer memory), (43) is a LED diode for visual signalling the operating state of the sensor element (40), (46) is a push-button used for sending or requesting the identification codes, (47) is an electronic interface circuit connected with the bifilar bus (18) in order to transmit and/or receive digital signals.

All the devices disclosed hereinabove are connected, by means of connecting lines (19b), with a micro electronic control unit (44), which manages the overall operation of the sensor element (40) of Figure 1.

The step of association of each sensor element (40) with a zone consists in putting the central unit (30) in a particular learning operating state during which the sound signalling devices (50) are disabled.

During this time interval, the zone is selected with which the individual sensor elements (40) making a part of the system (60) must be associated, by acting on the push-buttons (26) for zone enabling selection in learning mode.

Suitable optical indicators (22, 23, 24, 28, 29, 31, 32, 33) (typically, LED diodes) visually indicate the selection and the learning operating state of the central unit (30).

Thereafter, the installer (physically) reaches each sensor element (40) to be associated with the zones of the system and actuates a push-button (46) mechanically sheltered inside said sensor element (40), in order to send an identification code to the central unit (30).

The central unit (30) associates the identification code of the device with the selected zone, storing the data in a digital storage element (42) (which is either non-volatile, or buffer-fed).

The installer repeats the above said operation for all of the devices to be associated with that particular zone and, then, selects another zone, by acting on the push-button (26) of the central unit (30); the process continues as indicated above, for all of the zone devices which the operator wishes to enable.

Instead of actuating the push-button (46), the identification code sending can be triggered, following a procedure of micro electronic control unit (44) resetting, by means of a physical connection of the sensor element (40) and/or the associated electronic devices, with the bifilar bus (18) and consequent supply with power (possibly preceded by a disconnection).

As further alternative operating ways (variants) to the preceding modalities for selection and attribution of identification codes, a manual pressure on push-button (46) or the connection with the bifilar bus (18) can generate on the individual device the transmission of the request for identification code to the central unit (30).

Then, the central unit (30) sends a specific identification code which the device stores inside its storage element (42) together with the indication of the belonging zone, or without such an indication.

The central unit (30) can now store, if so necessary, the association procedure of the generated identification code and the selected zone; such a storage operation takes always place inside the storage element (42).

From the above disclosure, the characteristics and features will be clear of the reception/management system for digital signals coming from electronic devices capable of learning the zone configuration data according to the present invention -- as well as the advantages thereof will be clear.

In particular, they are represented by:

- flexibility of installation of system devices;
- no operations of zone attribution to be performed on individual devices with consequent time saving and decrease in error probability;
- automation of the association procedure on the central unit with consequent simplification of the operations of selection of the learning operating mode and of the zone.

It will be clear that many modifications can be supplied to the reception/management system according to the present invention, without thereby departing from the principles of novelty inhering in the inventive idea, as well as it will be clear that in practically implementing the invention, the materials, shapes and size of the illustrated details can be any, according to the requirements, and the same can be replaced by other, technically equivalent details.

Claims

1. System for receiving and managing digital signals coming from electronic devices, of the type used in alarm systems (60) and capable of learning the zone configuration data, comprising:

- at least one electrical power supply unit (20), designed for connection with the power distribution mains (10);
- a plurality of sensor elements (40) associated with other auxiliary electronic devices and/or enabling/disabling apparatuses and/or actuation/drive apparatuses, with each of said sensor elements (40) being provided with a univocal identification code of its own or being locally configured by means of devices provided on the same sensor element (40), so that said element (40) can be associated with (i.e., belongs to) a zone (the "belonging zone") of the alarm system (60) controlled by the reception/management system;
- an electronic control unit (30), which manages said system and associates said identification code of each sensor element (4) with a belonging zone by means of application software commands;
- a plurality of sound signalling devices (50) which start operating on an alarm event occurring,

characterized in that said power supply unit (20), said sensor elements (40), said electronic control unit (30) and said sound signalling devices (50) are connected, through a plurality of connection lines (19), with one single bifilar bus (18) which secures the transmission of the digital signals between all above mentioned devices of the system and supplies them with power, and

characterized in that said electronic control unit (30) is capable of predisposing in a state of selection of at least one zone of the alarm system (60) controlled by the reception/management system and in a learning state for learning the association of said identification code of at least one of said sensor elements (40) with said selected zone.

2. System for receiving/managing digital signals coming from electronic devices, of the type used in alarm systems (60) and capable of learning the zone configuration data, comprising:

- at least one electrical power supply unit (20), designed for connection with the power distribution mains (10);
- a plurality of sensor elements (40) associated with other auxiliary electronic devices and/or enabling/disabling apparatuses and/or actuation/drive apparatuses, with each of said

sensor elements (40) being provided with a univocal identification code of its own or being locally configured by means of devices provided on the same sensor element (40), so that said element (40) can be associated with (i.e., belongs to) a zone (the "belonging zone") of the alarm system (60) controlled by the reception/management system;

-- an electronic control unit (30), which manages said system and associates said identification code of each sensor element (4) with a belonging zone by means of application software commands;

-- a plurality of sound signalling devices (50) which start operating on an alarm event occurring,

characterized in that said power supply unit (20), said sensor elements (40), said electronic control unit (30) and said sound signalling devices (50) are connected, through a plurality of connection lines (19), with one single bifilar bus (18) which secures the transmission of the digital signals between all of the above mentioned devices of the system and supplies them with power, and characterized in that said electronic control unit (30) is capable of prearranging in a state of selection of at least one zone of the alarm system (60) of said system and a programming state such that, following digital signals coming from said bifilar bus (18), above said electronic control unit (30) generates said identification codes designed for said sensor elements (40) accompanied, or not ; by a signal which supplies an indication of the selected zone.

3. System for receiving and managing digital signals according to Claims 1 or 2, characterized in that said electronic control unit (30) comprises at least one receiver device (21), a plurality of push-buttons (26, 27) for the selection (26) of at least one zone of the alarm system (60) and for learning (27) the association between the identification codes and said selected zone, a plurality of means (22, 23, 24, 28, 29, 31, 32) for the visual signalling of the selection (24) of said zone, of the learning (32) of the association between identification codes and said selected zone, of the alarm situations (22, 29, 31), of system (23) switching on, of the presence of electrical energy (28) at electrical power distribution mains (10).

4. System for receiving/managing digital signals according to Claims 1 or 3, characterized in that said sensor element (40) comprises a micro electronic control unit (44) with which through a plurality of connection lines (19b) there are connected an electronic and/or opto-electronic circuit (41), a non-volatile or buffered storage element (42), a visual signalling device (43), a push-button (46) suitable

for sending at least one identification code to said electronic control unit (30), an electronic interface circuit (47) for transmitting/receiving the digital signals on said bifilar bus (18), an electronic circuit (48) for resetting said micro electronic control unit (44) and for power supply from said bifilar bus (18).

5. System for receiving/managing digital signals according to Claims 1 or 3, characterized in that said sensor element (40) is suitable for sending at least one identification code to said electronic control unit (30) after said sensor element (40) being physically connected with said bifilar bus (18) and characterized in that said sensor element (40) comprises a micro electronic control unit (44) with which there are connected, through a plurality of connecting lines (19b), an electronic and/or optoelectronic circuit (41), a non-volatile or buffered storage element (42), a visual signalling device (43), an electronic interface circuit (47) with the bifilar bus (18) for transmitting/receiving digital signals on said bifilar bus (18), an electronic circuit (48) which resets said micro electronic control unit (44) and for power feed of said sensor element (40) by said bifilar bus (18).

6. System for receiving/managing digital signals according to Claim 2 or 3, characterized in that said sensor element (40) comprises a micro electronic control unit (44) with which there are connected, through a plurality of connecting lines (19b), an electronic and/or optoelectronic circuit (41), a visual signalling device (43), a push-button (46) suitable for sending digital signals for requesting at least one identification code to said electronic control unit (30), an electronic circuit (47) which constitutes an interface with said bifilar bus (18) for transmitting/receiving said digital signals on said bifilar bus (18), an electronic circuit (48) for resetting said micro electronic control unit (44) and for power supply by said bifilar bus (18), a non-volatile, or buffered storage element (42) for storing said digital signals, which are accompanied, or not , by a signal which supplies an indication of the selected zone.

7. System for receiving/managing digital signals according to Claims 2 or 3, characterized in that said sensor element (40) is suitable for sending digital signals for requesting at least one identification code to said electronic control unit (30), during a time period following a physical connection of said sensor element (40) with said bifilar bus (18) and characterized in that said sensor element (40) comprises a micro electronic control unit (44) with which there are connected, through a plurality of connecting lines (19b), an electronic and/or optoelectronic circuit (41), a visual signalling device (43), an electronic circuit which constitutes an interface (47) with the bifilar bus (18) for transmitting/receiving said

digital signals on said bifilar bus (18), an electronic circuit (48) which resets said micro electronic control unit (44) and feeds said sensor element (40) with power through said bifilar bus (18), a non-volatile, or buffered, storage element (42) for storing
5 said digital signals, which are accompanied, or not, by a signal which supplies an indication of the selected zone.

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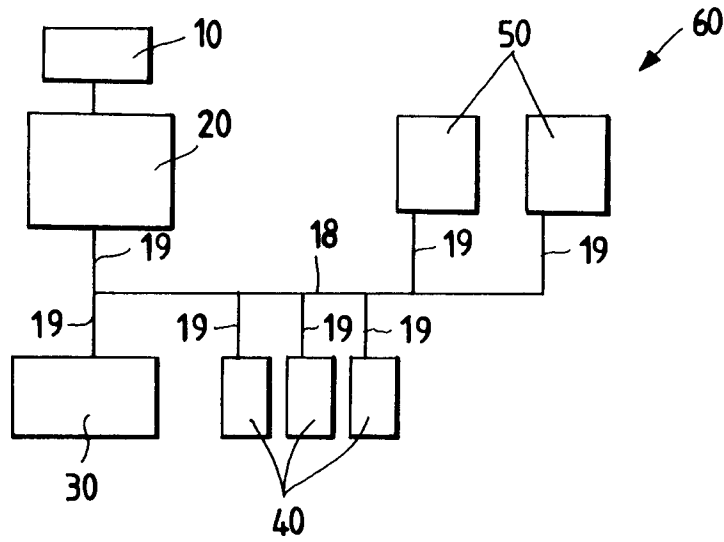


Fig.1

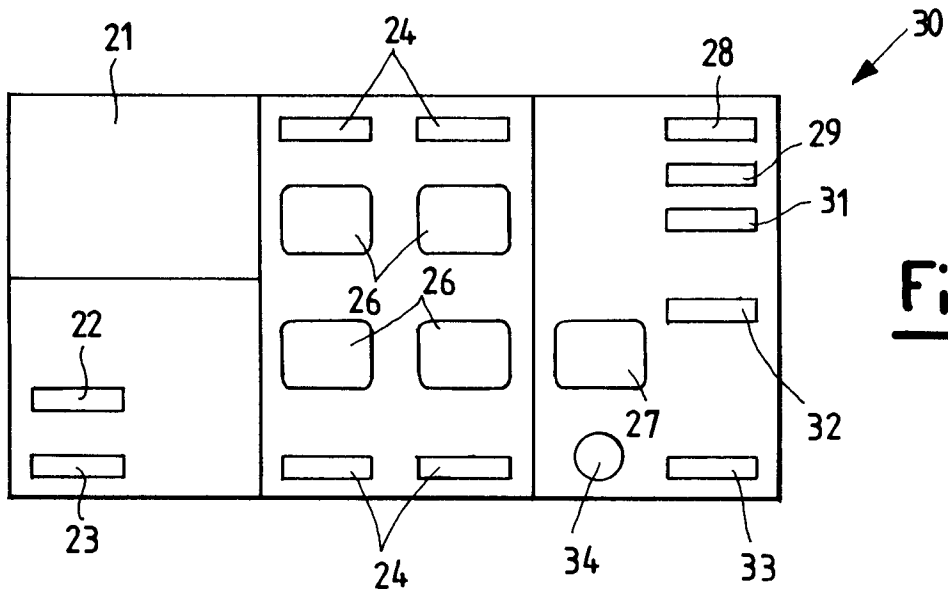


Fig.2

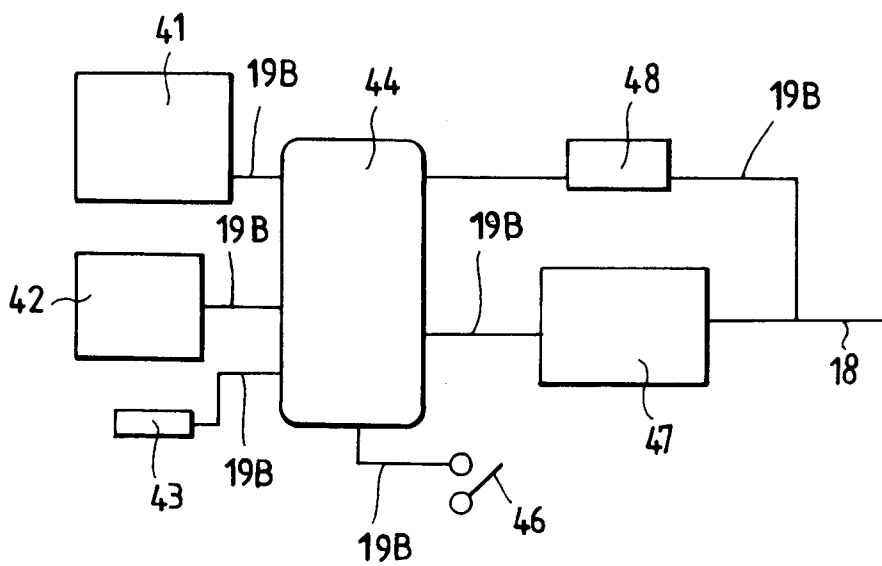


Fig.3



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EUROPEAN SEARCH REPORT

Application Number
EP 96 20 0768

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 485 878 (ESSER SICHERHEITSTECHNIK) * page 5, line 1 - page 11, line 27 * ---	1-7	G08B26/00
A	US-A-4 701 878 (SIEMENS) * abstract * ---	1,2	
A	EP-A-0 296 022 (DURANTON R.) * abstract * ---	1,2	
A	WO-A-88 02527 (SHEPHERD INTELLIGENCE SYSTEMS) * abstract * -----	1,2	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			G08B G06F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 1 July 1996	Examiner Sgura, S
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