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(54) **ALARM SYSTEM**

ALARMSYSTEM

SYSTEME D'ALARME

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Description

[0001] This invention relates to an alarm system. In particular, it relates to a two-wire alarm system.

[0002] Conventional fire alarm systems were based on four-wire systems in which detection zones were provided with detectors such as smoke detectors or heat detectors, and which used two wires to provide power to the detectors and for the detectors to indicate a fire condition by switching in a load across the detection line. The remaining two wires were used to power sounders when an alarm condition occurred. The line was normally held in a first polarity that was blocked by a diode in each sounder to allow a control panel to monitor current via an end of line resistor. When the control panel went into an alarm situation, the polarity was reversed, the blocking diodes were then forward biased and the sounders operated.

[0003] This type of system involved running two separate cables around most buildings and terminating at many different points. This could be expensive and labour intensive.

[0004] More recently, two-wire systems have been developed (see for instance GB-A-2293257 and GB-A-2281995). On these, both sounders and detectors are mounted on the same pair of wires and various methods for control have been used. In some of these, different voltage thresholds have been used to power one type of device without powering the other one, or reverse polarity has been used where detectors may work on one or both polarities but the sounders only work on one polarity. This latter method requires a different method of line monitoring which is often a voltage threshold based system.

[0005] The two-wire systems known up to now have disadvantages in that they tend to require additional electronics in sounders and detectors and also require the panel to be a compatible product. That is, the panel needs to be designed specifically for the technology being used.

[0006] The present invention arose in an attempt to provide an improved alarm system.

[0007] According to the present invention there is provided a two-wire alarm apparatus, comprising a control panel; a first plurality of detectors; a second plurality of alarm indicating devices; means at the control panel for sensing an alarm condition and subsequently applying a predetermined pattern of power pulses to the wires at a level sufficient to power the alarm indicating devices; and means associated with each alarm indication device for causing the alarm indication device to begin generation of its alarm indication upon receiving the power pulses.

[0008] The panel may be a conventional one, with the addition of the means for applying the power pulse pattern, which means may be provided in a discrete module and preferably include a large reservoir capacitor.

[0009] The alarm indication devices are preferably sounders but they may alternatively be warning lights, eg. strobe lights, combined sounders/lights or other means.

[0010] According to the present invention there is further provided a method of operating an alarm system comprising a control panel, a first plurality of detectors and a second plurality of alarm indicating devices mounted upon a common pair of wires, the method comprising the generation by one or more detectors of an alarm signal; the generation of a predetermined power pulse pattern at the control panel at a level sufficient to power the alarm indicating devices and causing the alarm indicating devices to commence alarm indication upon receiving the power pulses.

[0011] According to the present invention there is further provided an alarm system or method comprising any one or more of the novel features or steps hereinbefore described.

[0012] Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 shows schematically a two-wire alarm system;
Figure 2 shows schematically a power pulse pattern output by an alarm module;
Figure 3 shows a control panel with interface modules for controlling two detection/alarm zones; and
Figure 4 shows one embodiment of a control module circuit.

[0013] Referring to Figure 1, an alarm system comprises a control panel 1 to which is connected two control/power lines 2, 3. A first plurality of detectors 4 are mounted to the two wires and these detectors may be, for example, fire detectors, smoke detectors, heat detectors, or any other type of detector. The invention is not limited for use in fire alarm systems and the detectors may be intruder detectors (eg. infrared) or may have other uses.

[0014] A further plurality of alarm indicating devices such as sounders 5 are also mounted to the two-wire bus. Other indicating devices such as lights, combined sounders/lights or other means may be alternatively or additionally supplied. At their ends remote from the control panel 1, the wires 2 and 3 are joined by an end of line (EOL) resistor or module 6.

[0015] Control panel 1 is provided with a main panel printed circuit board (PCB) 7 in conventional fashion.

[0016] In preferred embodiments of the invention, an existing system comprising a control unit and main panel PCB, two-wire bus and detectors and sounders may be used, with the addition of a control module 8 containing specific electronics for performing the invention. This is the embodiment shown in Figure 1 which enables a conventional system to be modified by the simple addition of a dedicated control module 8 and using sounders that have been designed to work with the module. Alter-

natively, the control module 8 may be integrated with the main panel PCB or other electronics 7 in other embodiments of the invention. The control module 8 in the embodiment of Figure 1 is connected to the main panel PCB and the two-wire bus 2, 3 is taken from the control module. An additional, dummy, end of line unit 9 is also connected to the control module. The control module is positioned in the bus lines 2, 3 between the main panel PCB and the zone wiring and comprises control electronics and a large reservoir capacitor C.

[0017] Each sounder includes electronic circuitry for generating required sounds when the sounder is in an alarm state.

[0018] During a normal detection mode, the detectors 4 are functioning but the sounders 5 are not; taking no or minimal current. The voltage on the line is a detection voltage of, say, 18-20V, although this may vary with different systems of course. When the detector senses a fire or other emergency situation, the main panel PCB 1 senses this by a changed voltage on the two-wire bus 2, 3 and detector wires W_1, and sends an appropriate signal along alarm output wires W_2. The control module 8 is then arranged to supply additional pulses of power, as shown in Figure 2, along the two-wire bus 2, 3 at a selected duty cycle so that in a time period T the additional pulses of power are supplied only for a proportion t of that time. These 'sounder' pulses may be at, say, 6A for example and the period T may be, eg half a second so that a power pulse of 6V is supplied for only a proportion of each half second time interval. The proportion of time t in some embodiments may be between 6 to 12%, preferably 8% so that in each one second time period the 'sounder' voltage signal is supplied for one tenth of a second. However, the proportion t may be less than 6% or greater than 12% in some embodiments. Time period T may of course be any period, not necessarily half a second.

[0019] The sounders are arranged to respond to each power pulse so that when a power pulse is detected, the sounders are put into a sounding mode and begin to sound either immediately or after receiving a predetermined number of pulses. The sounders are powered by the additional voltage supplied with the power pulse but current reservoir means, such as a reservoir capacitor, is also included in each sounder so that the reservoir is charged by the respective pulses to keep on powering the sounders during the remainder of the time period T when the power pulse is not supplied. Once the emergency situation finishes, the power along the two-wire bus returns to its normal or other selected level and the sounders discontinue.

[0020] The power pulses are generated at the module 8 from the reservoir capacitor. (This is charged from the control unit and is arranged to supply the high current pulses, of perhaps 6A at 28V, required to operate the sounders, at a repetition rate and duty cycle.

[0021] During detection mode, the module 8 is effectively transparent and therefore allows the standard detector line monitoring method to operate as usual. When an alarm condition occurs, the alarm circuit output triggers the module, and the module begins to provide the power pulses to communicate with, and drive, the sounders as shown in Figure 2.

[0022] The pattern of pulses may act as a code for controlling the sounders. For example, the pulse P1 provided to the sounder sets it into alarm mode and provides power to each sounder in the circuit. The second pulse P2 resets a microcontroller in each sounder (one example is shown at 10) and continues to provide power. The third pulse P3 and all consecutive pulses tell the microcontroller to begin sounding and also provide power to the sounders. Thus, detection of the third current (power) pulse commands the sounders to turn on and emit a pre-programmed tone in one embodiment. Other pulse patterns may be introduced, and other codes may be used.

[0023] During alarm, the sounders 5 are preferably only drawing current from the module 8 for less than 10% of the time. Therefore, the panel continues to monitor the detection lines (at the normal detection voltage, say 18-20V) for, eg, further fires, faults and detector removals from the remaining 90% or more of the time (T-t). A change-over relay may be used to connect the fire panel detector monitoring circuitry during said 90% or more of the time.

[0024] Upon the cessation of alarm conditions, the alarm output from the panel 8 ceases. The module 8 then stops generating pulses and the sounders stop sounding.

[0025] The power pulses output by the module 8 may be positive or negative going pulses. The current supplied from the module is sourced from the alarm circuit, which is used to charge reservoir capacitor C to a level sufficient to provide the high current pulses required to power all the sounders in the circuit. The means for charging and switching the capacitor C, or other reservoir means, will be apparent. The capacitor may be charged via a resistor for example. The switching between supply of the high current pulses and normal detection voltage may be achieved by the relay as described above, or by other means.

[0026] Referring to Figure 4, one exemplary embodiment of a control module 8 is shown. Terminals T_1 and T_2 are connected to the control panel's field zonal detector loop terminals. These are fed transparently through relay RL1 on to terminals T_9 and T_{10} for connection to field detectors and sounders. Terminals T_3 and T_6 are connected to the control panel's bell circuit (terminal 3 is positive in the alarm condition). Terminals T_4 and T_5 are for terminating the above bell circuit's EOL resistor. Terminals T_7 and T_8 are connected to the fire panels AUX supply (20 in Figure 3).

[0027] As stated earlier, in the quiescent (ie detection) state RL1 is not energised and so terminals T_1 and T_2 are transparently fed through to terminals T_9 and T_{10}. This enables the panel to operate as a conventional

panel, detecting fire and fault conditions in the normal manner on the detector loop. An AUX supply at terminals T_7 and T_8 energises the fault relay RL2 which connects in circuit the bell circuit's EOL resistor and terminal T_2 to T_{10}. The status of the AUX supply is indicated by a light emitting diode LD3.

[0028] When the fire alarm panel is set into a fire condition, the polarity on the bell circuit inputs are reversed and a diode D2 conducts. The alarm condition is indicated by LD1. Capacitor C4 (6800 μF) charges via resistor R6 to supply the high current pulses (approximately 6Amp) needed to operate the sounders. OPT 2a then signals the modules controller ICI (eg a PIC 16C55) to imitate an alarm sequence. A 1 KHz even mark/space ratio sequence is emitted by pin 18 of this, which is buffered by transistors Q5 and Q6. These transistors also modulate the voltage across C4. From pin 17 of the controller a 2 Hz 8% pulse train is sent out to switch RL1 via Q3, sending the high current power pulses to the sounders/detectors. The other circuitry shown in Figure 4 is for fault testing and other purposes.

[0029] The above circuit is by way of example only.

[0030] The sounders themselves may be provided with charge reservoirs such as capacitors 12 so that each power pulse at a duty cycle of, say 8%, is sufficient to continue powering a sounder (by means of capacitor 12) until the next power burst. Each capacitor 12 is of capacity to take a 'gulp' of current with each power pulse P and the sounder uses the current during the time periods between pulses. The current sunk by the sounder during each current pulse may be 133 mA per sounder. Once a sounder is operating in one embodiment, the loss of a third consecutive power pulse serves to turn off the sounder due to a lack of stored charge.

[0031] In order to eliminate the possibility of false triggering, the pulse pattern may comprise two or more bursts of pulses. The detectors in the zone essentially ignore the pulse pattern on the line.

[0032] Trigger pulses may be repeated at predetermined intervals to ensure that sounders are operating and/or to resynchronise sounders when necessary.

[0033] In some embodiments, the sounders remain in an alarm condition (receiving power pulses) until either the panel is reset, which briefly powers down the line for all products and resets the system back into detection mode, or until a 'silence alarms' option is used (eg. the provision of a silence alarm button 11 on the control panel). The silence alarm option stops power being switched to the alarm control module 8 and thus the alarm line voltage drops below a certain threshold as it would with only a detection circuit voltage applied. This serves to reset the sounders and to put them into a sleep mode again in which they are ready to be woken up by a suitable pulse on detection of a further alarm situation.

[0034] Below around 5 to 6 volts DC most fire detectors lose their alarm state. Thus, in embodiments of the invention where it is required to have a silence alarm condition, the voltage of the line must not drop below about 5 volts DC such that when this occurs the sounders are silenced yet the detectors retain their state. To obtain a complete reset in some embodiments, the line voltage should drop below 2 volts, normally to 0 Volts.

[0035] Figure 3 shows an embodiment in which two separate zones, ZONE 1 and ZONE2 are to be monitored. Each zone comprises a two wire bus with detectors and sounders as before. In this case, two separate interface modules 8a and 8b are provided. The zone monitoring is independent but common alarm output wiring 14 from the control panel PCB to the interface modules 8a and 8b is included. Alternative, separate alarm output wiring may be provided. Each interface module generates independent power pulses on its zonal wires via respective charge reservoirs C_1, C_2 during an alarm mode.

[0036] By adding additional interface modules (or internal circuitry to the control panel) more zones may be added to a system.

[0037] In multi-zone systems it is sometimes a requirement to monitor zones not in alarm even when a first zone has detected a fire or other alarm situation and the alarms are sounding.

[0038] In a system according to the present invention, if it is required to given an alert system to zones not in alarm and an evacuate signal to zones in alarm, the alert signal may be a cadenced alarm, i.e. the alarm devices are turned on and off repeatedly. The control module 8 may be arranged to apply the cadenced signal to zones which are not in alarm, when another zone is in alarm. During sounding of the alert signal the detectors can be monitored during the times the alarm devices are off. If an alarm situation is then detected the zone goes into alarm and the signal changes from alert to evacuate.

[0039] If a system is not required to give an alert signal then the control module 8 may turn off the alarm devices (by silencing the alarm) for a period of time only long enough for the zone detection circuit to respond, typically once every 10 seconds. Detectors which go into an alarm state will then be seen by the control unit which is able to signal the spread of fire or other condition and to operate outputs/signals as required.

[0040] Thus, in the present invention, the sounders are actuated and powered by pulses of power and the detectors are monitored between the pulses.

[0041] During the time in each time period T when the power pulses are not applied, the voltage on the line may revert to a normal detection voltage of 18-20V for example, or to any other voltage.

[0042] Instead of sounders, other types of alarm indicating devices may be used. The control panel preferably includes an auxiliary power supply 20, as shown in Figure 3, which can provide on an alarm circuit output to the interface module or modules.

[0043] Other means for generating power pulses at the module or modules may alternatively be provided within the scope of the invention. Preferably, a module is incorporated with or retrofitted to a conventional or

existing control panel.

Claims

1. A two-wire alarm apparatus, comprising a control panel (1), a first plurality of detectors (4); a second plurality of alarm indicating devices (5); means (8) at the control panel for sensing an alarm condition and subsequently applying a predetermined pattern of power pulses (P_1,P_2,P_3...) to the wires at a level sufficient to power the alarm indicating devices; and means associated with each alarm indication device for causing the alarm indication device to begin generation of its alarm indication upon receiving the power pulses.

2. An alarm apparatus as claimed in Claim 1, wherein the power pulses are supplied from a current reservoir at a predetermined duty cycle.

3. An alarm apparatus as claimed in Claim 2, wherein the reservoir comprises a capacitor.

4. An alarm apparatus as claimed in Claim 1, 2 or 3, wherein during an alarm condition, the alarm indicating devices are powered from the power pulses and the detectors are arranged to continue monitoring the two-wire circuit during periods between the power pulses.

5. An alarm apparatus as claimed in any preceding claim, wherein the means for applying the pulse pattern are part of a discrete module associated with the control panel.

6. Ana alarm apparatus as claimed in Claim 5, wherein the power pulses are generated at the module.

7. An alarm apparatus as claimed in Claim 5 or 6, wherein the module is fitted to a conventional control panel.

8. An alarm apparatus as claimed in any of Claims 5, 6 or 7, wherein the module includes a reservoir, from which the power pulses are applied.

9. An alarm apparatus as claimed in any preceding claim, wherein the alarm indicating devices are sounders.

10. An alarm apparatus as claimed in any preceding claim, wherein, during an alarm condition, the power pulses are supplied at a duty cycle of 6 to 12% preferably 8%.

11. An apparatus as claimed in any of Claims 1 to 10, wherein each alarm indicating sounder device includes a reservoir which stores current from each pulse and enables continued powering of the alarm indicating device between pulses when an alarm condition prevails.

12. An apparatus as claimed in Claim 11, wherein upon cessation of an alarm condition, the sounders cease sounding by virtue of the sounder reservoirs discharging.

13. A method of operating an alarm system comprising a control panel (1), a first plurality of detectors (4) and a second plurality of alarm indicating devices (5) mounted upon a common pair of wires, the method comprising the generation by one or more detectors of an alarm signal; the generation of a predetermined power pulse pattern (P_1,P_2,P_3 ...) at the control panel at a level sufficient to power the alarm indicating devices and causing the alarm indicating devices to indicate an alarm upon receiving the power pulses.

14. A method as claimed in Claim 11, wherein the power pulses are supplied from a current reservoir at a predetermined duty cycle.

15. A method as claimed in Claim 14, wherein the reservoir is a capacitor.

16. A method as claimed in Claims 13, 14 or 15, wherein, during an alarm condition, the alarm indicating device are powered from the power pulses and the detectors continue monitoring the pair of wires during periods between the power pulses.

17. A method as claimed in any of Claims 13 to 16, wherein, during an alarm condition, the power pulses are applied at a duty cycle of 6 to 12%, preferably 8%.

18. A method as claimed in any of Claims 13 to 17, wherein the pulses also represent a code for controlling the sounders.

Patentansprüche

1. Zwei-Draht-Alarmgerät, umfassend eine Schalttafel (1), eine erste Vielzahl von Detektoren (4), eine zweite Vielzahl von Alarm anzeigenden Vorrichtungen (5), Mittel (8) an der Schalttafel zum Abfühlen eines Alarmzustands und daraufhin Anlegen eines vorbestimmten Musters von Leistungsimpulsen (P_1, P_2, P_3, ...) an die Drähte mit ausreichender Stärke, um die Alarm anzeigenden Vorrichtungen zu betätigen; sowie Mittel, die mit jeder Alarm anzeigenden Vorrichtung verbunden sind, damit die Alarm anzeigende Vorrichtung mit der Alarmanzei-

ge beginnt, wenn sie die Leistungsimpulse erhält.

2. Alarmgerät nach Anspruch 1, worin die Leistungsimpulse mit einem vorbestimmten Arbeitszyklus aus einem Stromspeicher zugeführt werden.

3. Alarmgerät nach Anspruch 2, worin der Speicher einen Kondensator umfasst.

4. Alarmgerät nach Anspruch 1, 2 oder 3, worin während eines Alarmzustands die Alarm anzeigende Vorrichtung von den Leistungsimpulsen angetrieben wird und die Detektoren so angeordnet sind, dass sie die Überwachung der Zwei-Draht-Schaltung während der Zeiträume zwischen den Leistungsimpulsen weiterhin fortsetzen.

5. Alarmgerät nach einem der vorangegangenen Ansprüche, worin das Mittel zum Anlegen des Impulsmusters Teil eines diskreten Moduls ist, das mit der Schalttafel verbunden ist.

6. Alarmgerät nach Anspruch 5, worin die Leistungsimpulse am Modul erzeugt werden.

7. Alarmgerät nach Anspruch 5 oder 6, worin das Modul an einer herkömmlichen Schalttafel angebracht ist.

8. Alarmgerät nach einem der Ansprüche 5, 6 oder 7, worin das Modul einen Speicher umfasst, von dem die Leistungsimpulse angelegt werden.

9. Alarmgerät nach einem der vorangegangenen Ansprüche, worin die Alarm anzeigenden Vorrichtungen tonerzeugende Apparate sind.

10. Alarmgerät nach einem der vorangegangenen Ansprüche, worin während eines Alarmzustands die Leistungsimpulse mit einem Arbeitszyklus von 6 bis 12 %, vorzugsweise 8 %, zugeführt werden.

11. Gerät nach einem der Ansprüche 1 bis 10, worin jeder Alarm anzeigende, tonerzeugende Apparat einen Speicher umfasst, in dem Strom von jedem Impulse gespeichert wird und der kontinuierliches Betreiben der Alarm anzeigenden Vorrichtung zwischen Impulsen ermöglicht, wenn ein Alarmzustand herrscht.

12. Gerät nach Anspruch 11, worin nach dem Enden des Alarmzustands die tonerzeugenden Apparate durch das Entladen der Tonerzeugungsapparat-Speicher zu läuten aufhören.

13. Verfahren zum Betätigen eines Alarmsystems, das eine Schalttafel (1), eine erste Vielzahl von Detektoren (4) und eine zweite Vielzahl von Alarm anzeigenden Vorrichtungen (5) umfasst, die auf einem gemeinsamen Drähtepaar montiert sind, wobei das Verfahren die Erzeugung eines Alarmsignals durch einen oder mehrere Detektoren, die Erzeugung eines vorbestimmten Musters von Leistungsimpulsen (P_1, P_2, P_3, ...) an der Schalttafel in ausreichender Stärke, um die Alarm anzeigenden Vorrichtungen zu betätigen und sie so zu veranlassen, einen Alarm anzuzeigen, wenn sie die Leistungsimpulse erhalten haben.

14. Verfahren nach Anspruch 11, worin die Leistungsimpulse mit einem vorbestimmten Arbeitszyklus aus einem Stromspeicher zugeführt werden.

15. Verfahren nach Anspruch 14, worin der Speicher ein Kondensator ist.

16. Verfahren nach einem der Ansprüche 13, 14 oder 15, worin während eines Alarmzustands die Alarm anzeigenden Vorrichtungen aus den Leistungsimpulsen betrieben werden und die Detektoren das Drähtepaar während der Zeiträume zwischen den Leistungsimpulsen weiterhin überwachen.

17. Verfahren nach einem der Ansprüche 13 bis 16, worin während eines Alarmzustands die Leistungsimpulse mit einem Arbeitszyklus von 6 bis 12 %, vorzugsweise 8 %, angelegt werden.

18. Verfahren nach einem der Ansprüche 13 bis 17, worin die Impulse auch einen Code zur Steuerung der Tonerzeugungsapparate darstellen.

Revendications

1. Un dispositif d'alarme à deux fils, comprenant un panneau de commande (1); une première pluralité de détecteurs (4); une deuxième pluralité de dispositifs indicateurs d'alarme (5); des moyens (8) sur le panneau de commande pour appréhender un état d'alarme et subséquemment appliquer un motif prédéterminé d'impulsions de puissance (P1, P2, P3...) sur les fils, à un niveau différent, pour alimenter les dispositifs indicateurs d'alarme; et des moyens associés à chaque dispositif indicateur d'alarme, pour provoquer le début de la génération par le dispositif indicateur d'alarme de son indication d'alarme, à réception des impulsions de puissance.

2. Un dispositif d'alarme selon la revendication 1, dans lequel les impulsions de puissance sont fournies depuis un réservoir de courant électrique, sous un cyclisme prédéterminé.

3. Un dispositif d'alarme selon la revendication 2, dans

lequel le réservoir éléctrique comprend un condensateur électrique.

4. Un dispositif d'alarme selon la revendication 1, 2 ou 3 dans lequel, durant un état d'alarme, les dispositifs indicateurs d'alarme sont alimentés depuis les impulsions de puissance et les détecteurs sont agencés pour continuer la surveillance du circuit à deux fils durant les périodes de temps intermédiaires aux impulsions de puissance.

5. Un dispositif d'alarme selon l'une quelconque des revendications précédentes, dans lequel les moyens pour appliquer le motif d'impulsions font partie d'un module discret associé au panneau de commande.

6. Un dispositif d'alarme selon la revendication 5, dans lequel les impulsions de puissance sont générées au niveau du module.

7. Un dispositif d'alarme selon les revendications 5 ou 6, dans lequel le module est monté sur un panneau de commande classique.

8. Un dispositif d'alarme selon l'une quelconque des revendications 5, 6 ou 7, dans lequel le module comprend un réservoir d'où les impulsions de puissance sont appliquées.

9. Un dispositif d'alarme selon l'une quelconque des revendications précédentes, dans lequel les dispositifs d'indication d'alarme sont des émetteurs sonores.

10. Un dispositif d'alarme selon l'une quelconque des revendications précédentes, dans lequel, durant un état d'alarme, les impulsions de puissance sont fournies sous un cyclisme de 6 à 12 %, de préférence 8%.

11. Un dispositif d'alarme selon l'une quelconque des revendications 1 à 10, dans lequel chaque dispositif émetteur sonore indiquant une alarme comprend un réservoir électrique qui stocke du courant depuis chaque impulsion et permet d'avoir une alimentation continue du dispositif indicateur d'alarme entre des impulsions, lorsqu'on est en état d'alarme.

12. Un dispositif d'alarme selon la revendication 11, dans lequel, à la cessation d'un état d'alarme; les émetteurs sonores cessent de fonctionner par le biais de la décharge des réservoirs alimentant les émetteurs sonores.

13. Un procédé de fonctionnement d'un système d'alarme comprenant un panneau de commande (1) une première pluralité de détecteurs (4) et une deuxième pluralité de dispositifs indicateurs d'alarme (5) montés sur une paire commune de fils; le procédé comprenant la génération par un ou plusieurs détecteurs d'un signal d'alarme, la génération d'un motif pulsatoire de puissance (P1, P2, P3, ...) prédéterminée sur le panneau de commande, à un niveau suffisant pour alimenter les dispositifs indicateurs d'alarme et rovoquer l'indication, par les dispostifs d'indicateurs d'alarme, d'une alarme à réception des impulsions de puissance.

14. Un procédé selon la revendication 11, dans lequel les impulsions de puissance sont fournies depuis un réservoir de courant, sous un cyclisme prédéterminé.

15. Un procédé selon la revendication 14, dans lequel le réservoir est un condensateur électrique.

16. Un procé dé selon les revendications 13, 14 ou 15 dans lequel, durant un état d'alarme, les dispositifs indicateurs d'alarme sont alimentés depuis les impulsions de puissances et les détecteurs continuent à surveiller la paire de fils durant les périodes intermédiaires aux impulsions de puissance.

17. Un procédé selon l'une quelconque des revendication 13 à 16, dans lequel, durant un état d'alarme, les impulsions de puissance sont appliquées sous un cyclisme de 6 à 12%, de préférence de 8%.

18. Un procédé selon l'une quelconque des revendications 13 à 16, dans lequel les impulsions représentent également un code permettant de commander les émetteurs sonores.

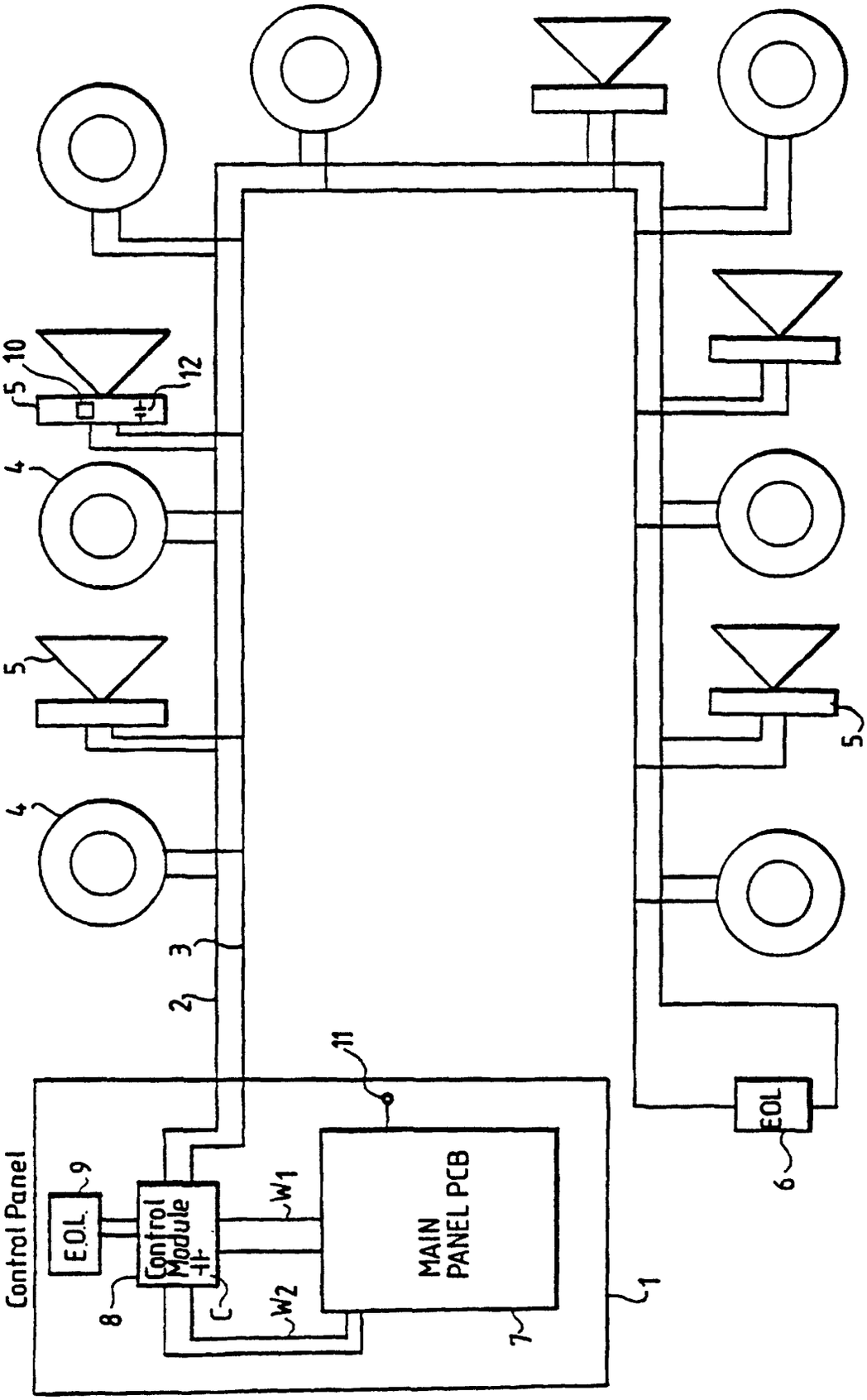
Control Panel
E.O.L.
9
Control Module
8
C
W1
W2
MAIN PANEL PCB
7
1
11
2
3
4
5
10
12
EOL
6

Fig.1.

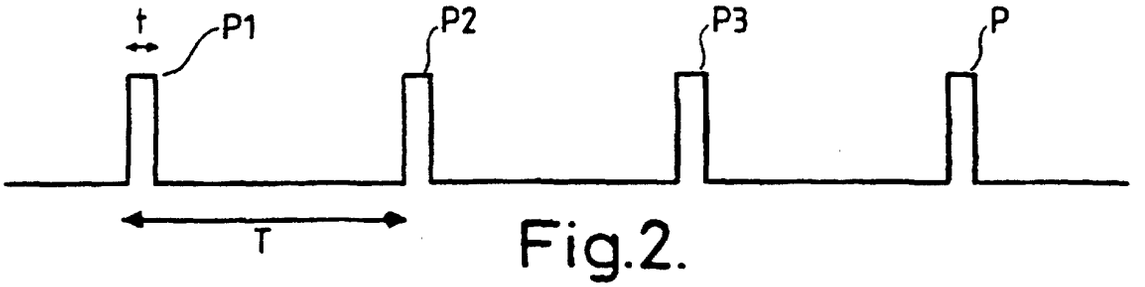
t
P1
P2
P3
P
T

Fig.2.

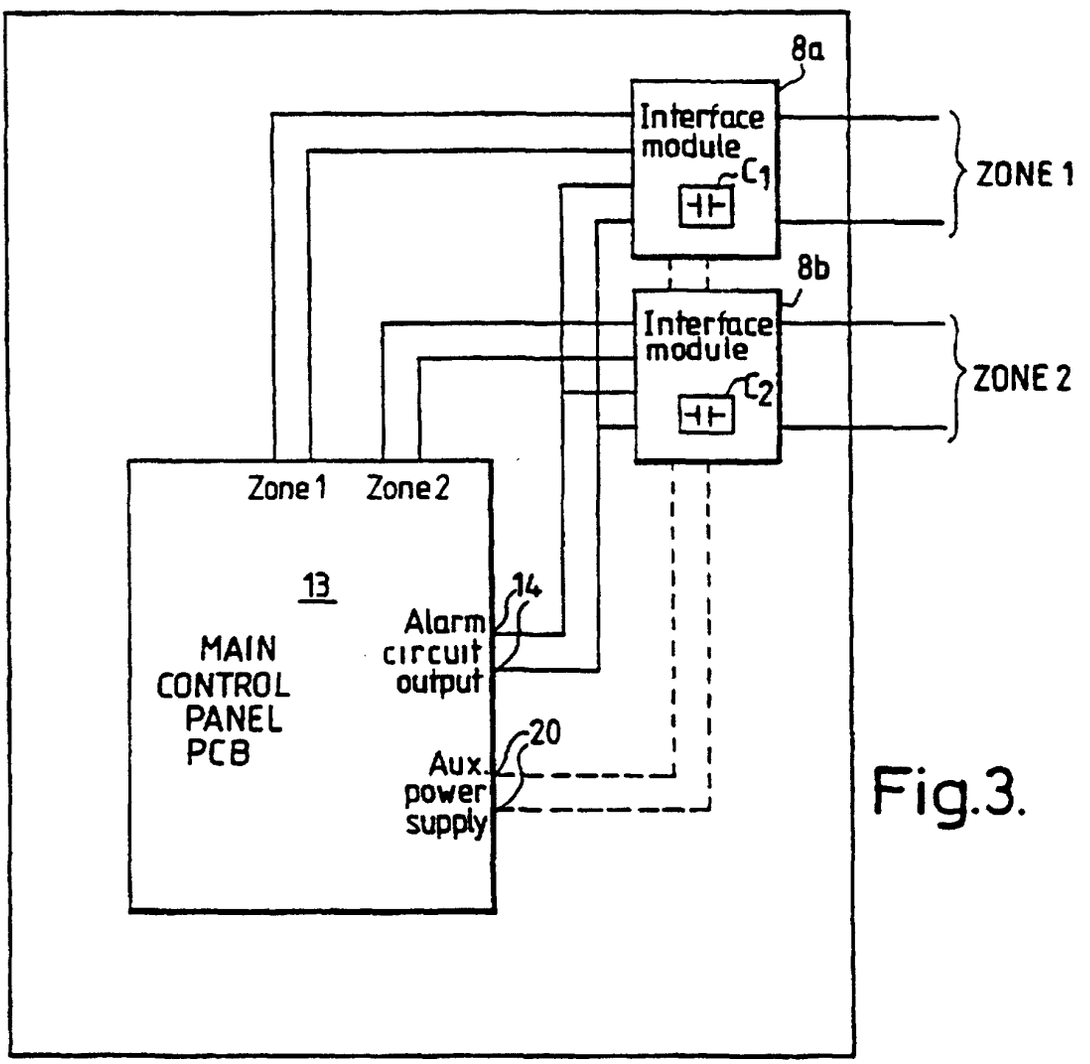
8a
Interface module
C1
ZONE 1
8b
Interface module
C2
ZONE 2
Zone 1
Zone 2
13
14
MAIN CONTROL PANEL PCB
Alarm circuit output
20
Aux. power supply

Fig.3.

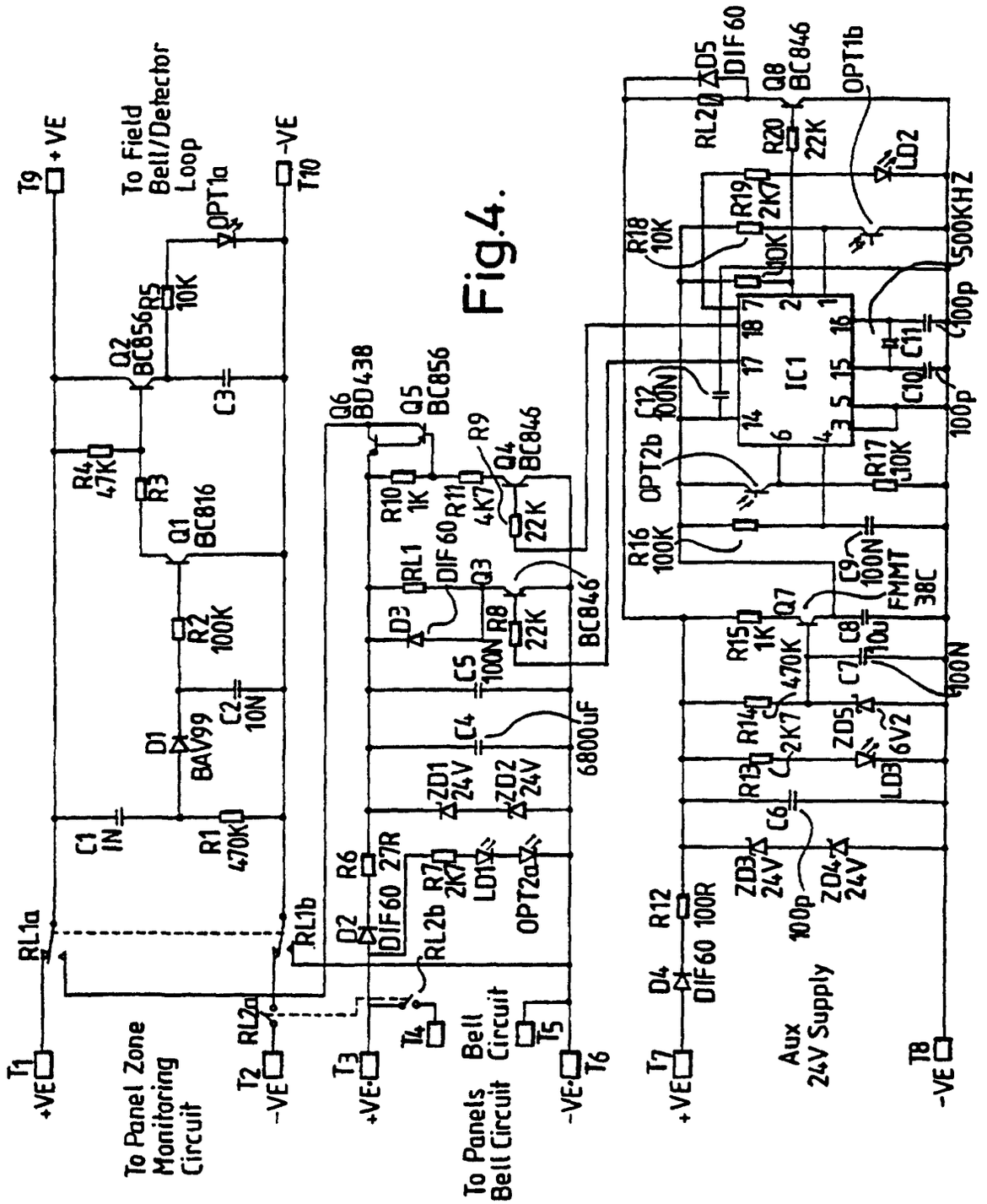
T9 +VE
To Field Bell/Detector Loop
OPT1a
-VE T10
Q2 BC856
R5 10K
C3
R4 47K
R3
Q1 BC816
R2 100K
C2 10N
D1 BAV99
C1 IN
R1 470K
RL1a
RL1b
RL2a
T1 +VE
T2 -VE
To Panel Zone Monitoring Circuit
T3 +VE
T4
T5
T6 -VE
To Panels Bell Circuit
Bell Circuit
D2 DIF60
R6 27R
RL2b
R7 2K7
LD1
OPT2a
ZD1 24V
ZD2 24V
C4 6800uF
C5 100N
D3
RL1 DIF60
Q3
R8 22K
BC846
Q6 BD438
Q5 BC856
R10 1K
R11 4K7
R9
Q4 BC846
22K
D4 DIF60
R12 100R
T7 +VE
T8 -VE
Aux 24V Supply
ZD3 24V
ZD4 24V
C6 100p
R13
R14 2K7
C7
ZD5 6V2
LD3
R15 1K
Q7
C8 10uF
470K
C9 100N FMMT 38C
R16 100K
OPT2b
R17 10K
C10
C11 100p
C12 100N
IC1
14 17 18 7 2 1 16 15 5 3 6 4
R18 10K
R19 2K7
10K
R20 22K
RL2
D5 DIF60
Q8 BC846
OPT1b
LD2
500KHZ
100N

Fig.4.