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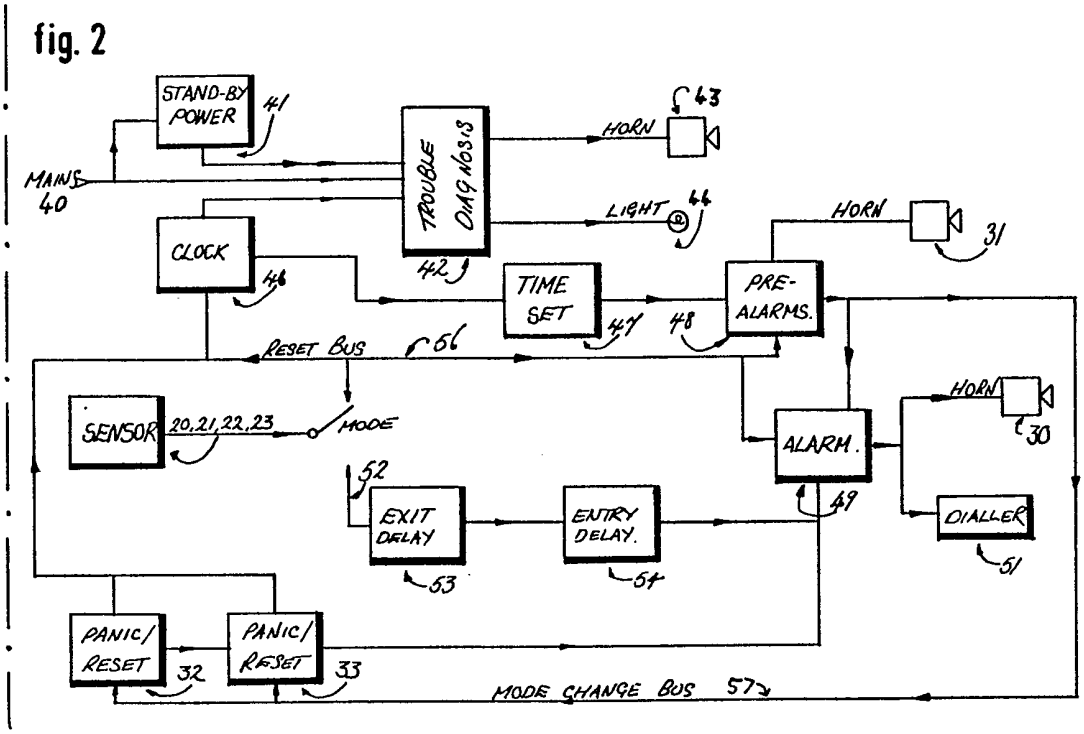
(54) Activity monitoring apparatus

(57) The apparatus is particularly for use of old persons, for monitoring movement of a person within a predetermined area, such as their home. The apparatus includes a device for detecting movement of the person and timing means whereby if movement is not detected within a predetermined period of time, then an alarm operates automatically. The predetermined period of time may be variable with time and may, for example, be longer at night than during the day. A short period before the alarm is operated, an initial warning may be given so that a person may operate a reset device to prevent the alarm being operated. An automatic telephone dialler may be provided. The movement detector may be an infra red detector, a pressure mat, an ultrasonic detector or a door switch. A panic button may also be provided. Fire detectors may also be connected in the apparatus.

fig. 2



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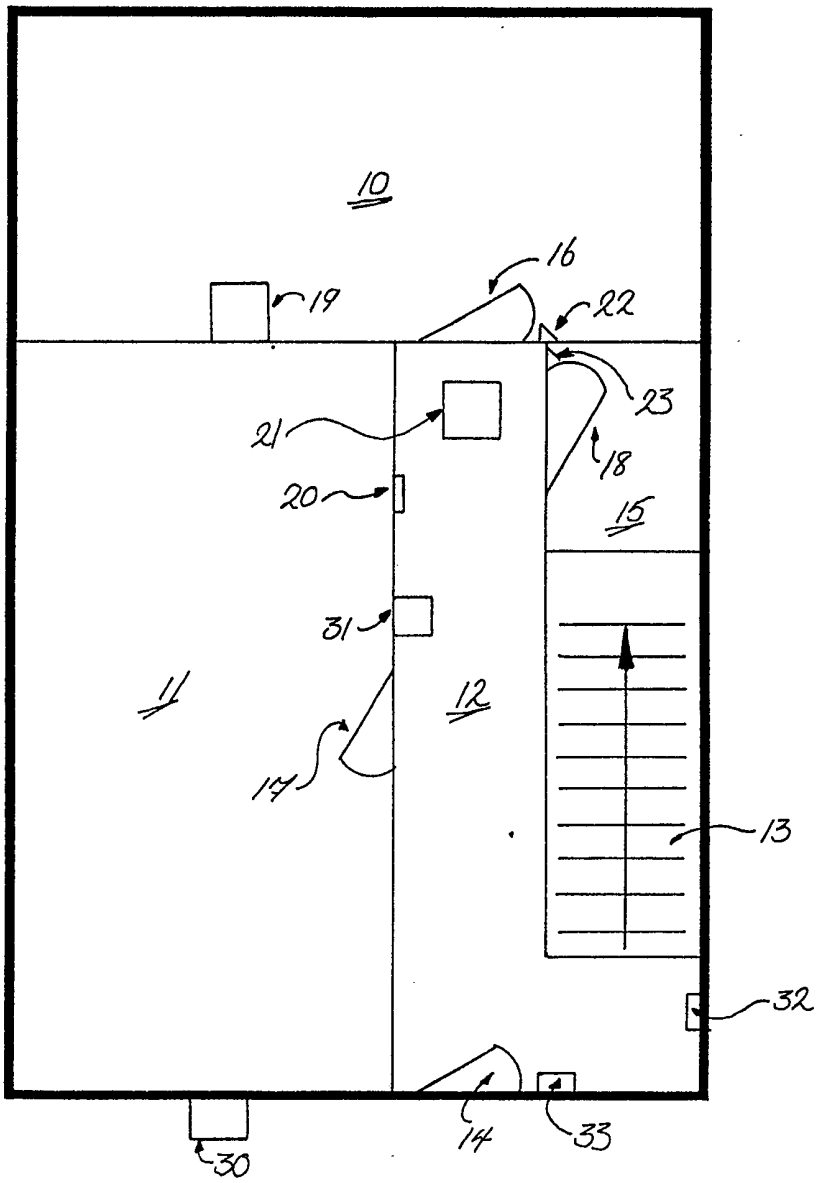
The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

fig. 1



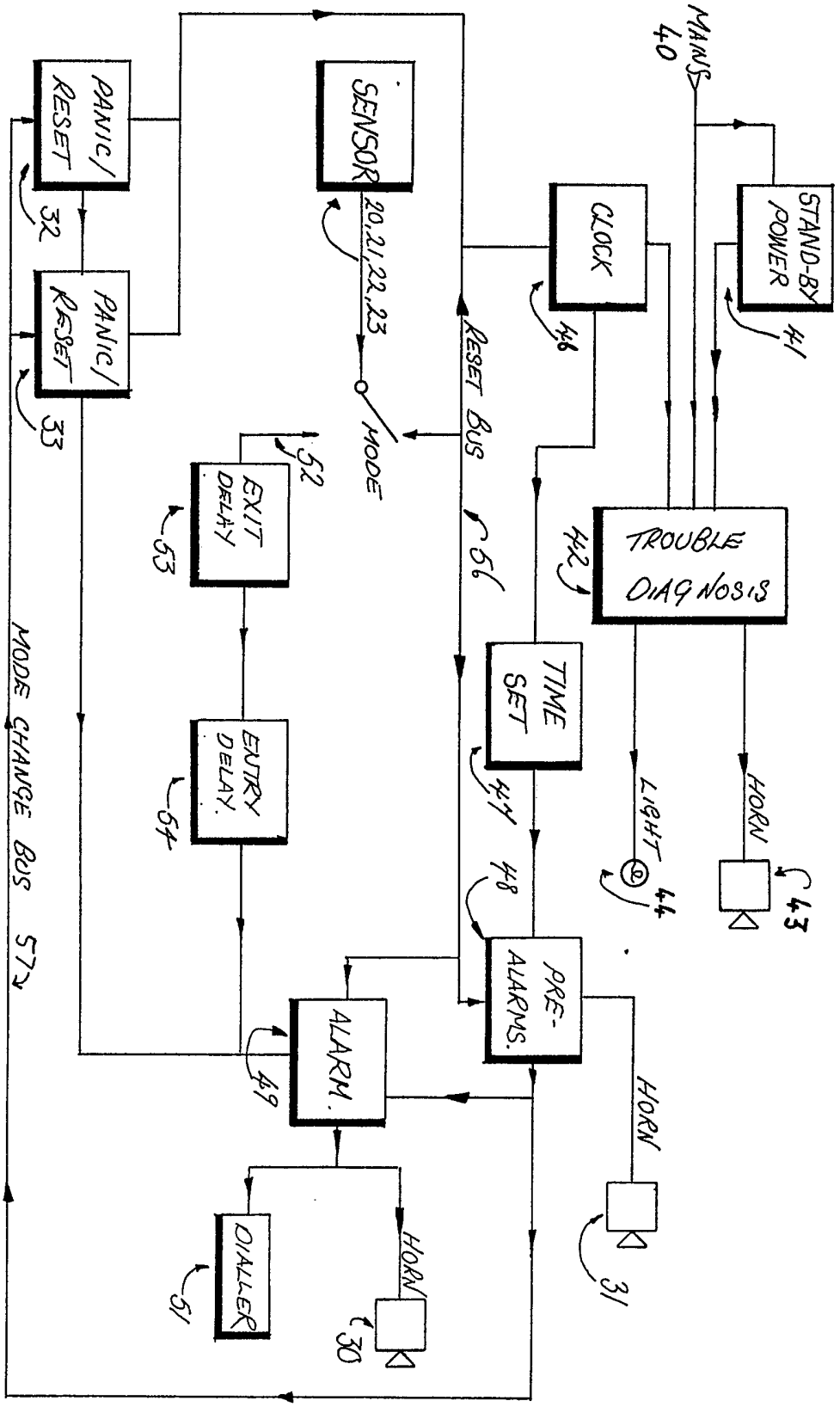

MAINS
40
STAND-BY POWER
41
CLOCK
46
SENSOR
20, 21, 22, 23
MODE
RESET BUS
56
PANIC/ RESET
32
PANIC/ RESET
33
EXIT DELAY
53
52
ENTRY DELAY
54
MODE CHANGE BUS
57
TROUBLE DIAGNOSIS
42
TIME SET
47
PRE-ALARMS
48
ALARM
49
LIGHT
44
HORN
43
HORN
31
HORN
30
DIALLER
51

fig. 2

fig. 3

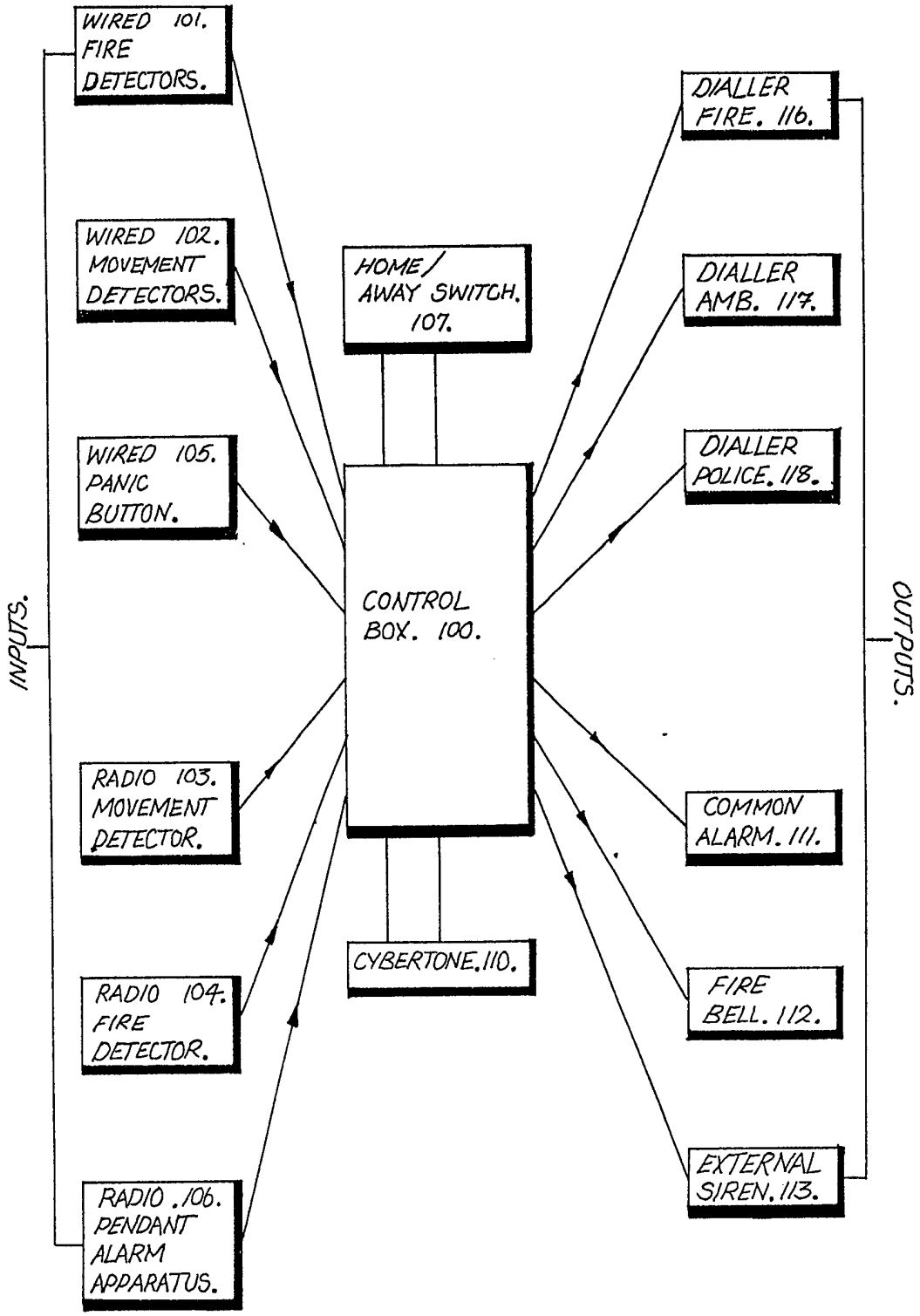

WIRED 101. FIRE DETECTORS.
WIRED 102. MOVEMENT DETECTORS.
WIRED 105. PANIC BUTTON.
RADIO 103. MOVEMENT DETECTOR.
RADIO 104. FIRE DETECTOR.
RADIO .106. PENDANT ALARM APPARATUS.
INPUTS.
HOME/ AWAY SWITCH. 107.
CONTROL BOX. 100.
CYBERTONE. 110.
DIALLER FIRE. 116.
DIALLER AMB. 117.
DIALLER POLICE. 118.
COMMON ALARM. 111.
FIRE BELL. 112.
EXTERNAL SIREN. 113.
OUTPUTS.

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Fig. 4 Ξ

FIG. 4 (1)	FIG. 4 (2)	FIG. 4 (3)	FIG. 4 (4)	FIG. 4 (5)	FIG. 4 (6)

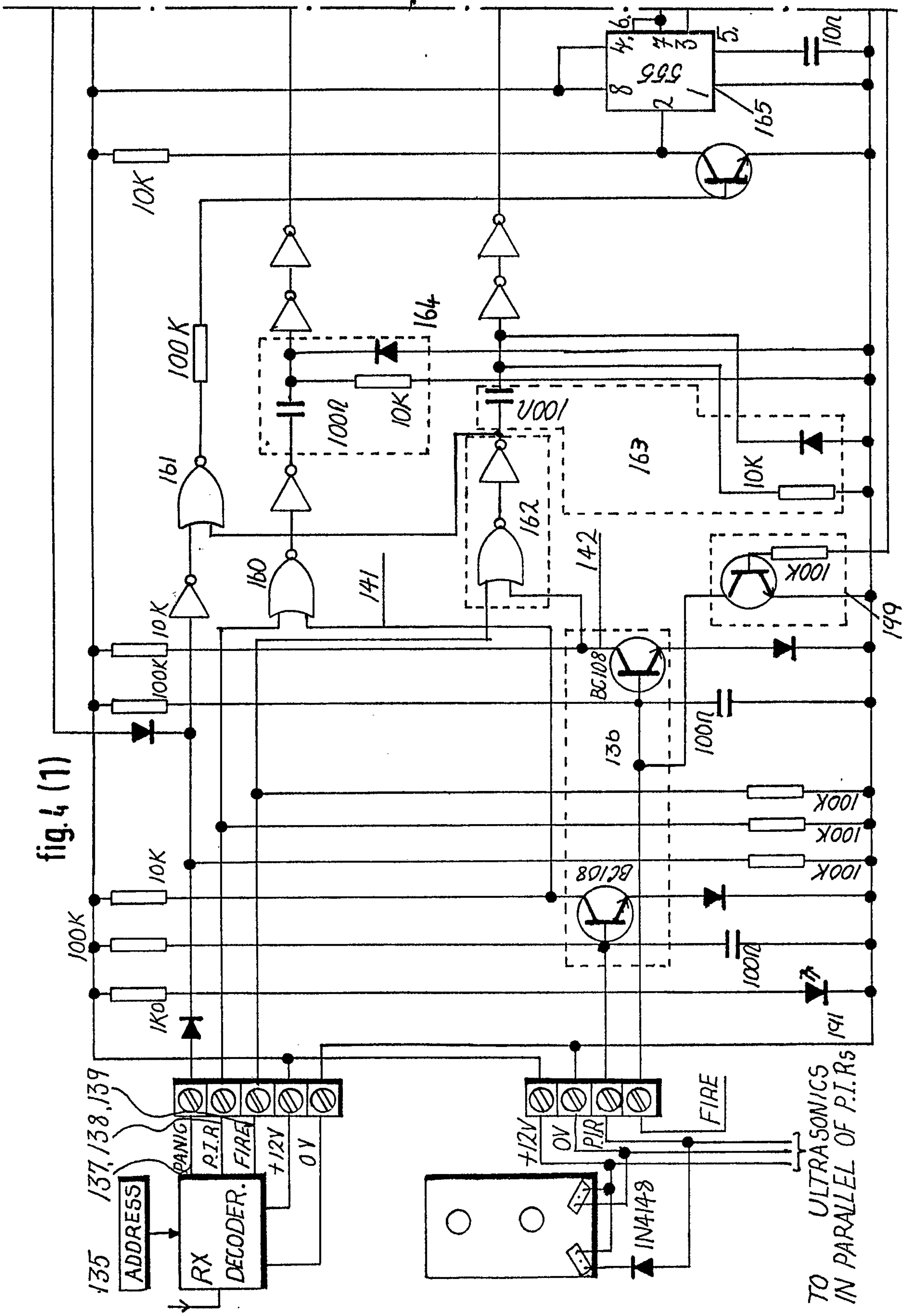
555
165
10n
10K
100K
161
164
100Ω
10K
100Ω
162
163
10K
160
141
142
100K
199
BC108
136
100Ω
100K
100K
100K
10K
100K
BC108
100Ω
1KΩ
191
135
ADDRESS
137,138,139
RX DECODER.
PANIC
P.I.R
FIRE
+12V
0V
+12V
0V
P.I.R
FIRE
IN4148
TO ULTRASONICS IN PARALLEL OF P.I.Rs

fig. 4 (1)

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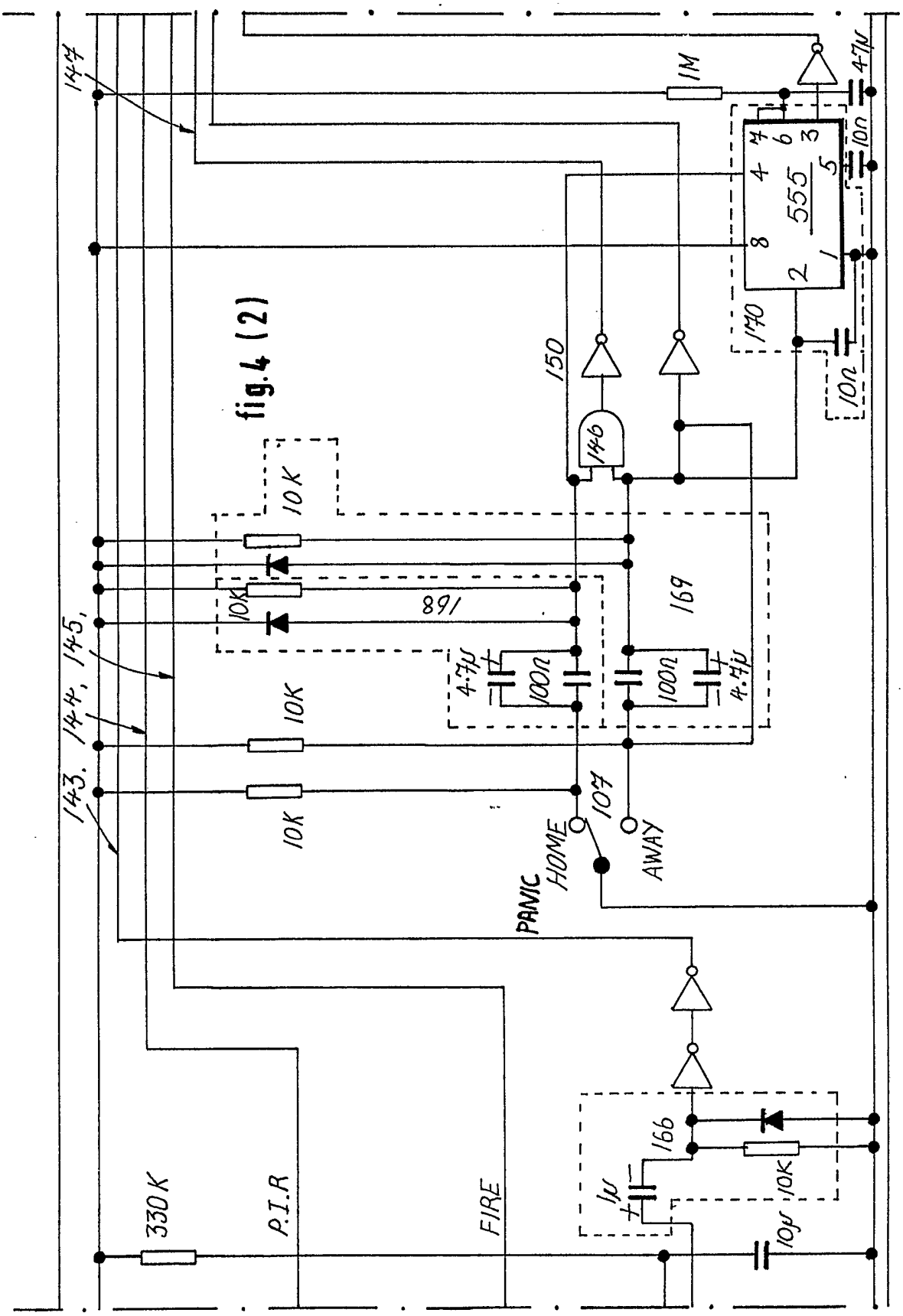

fig.4 (2)

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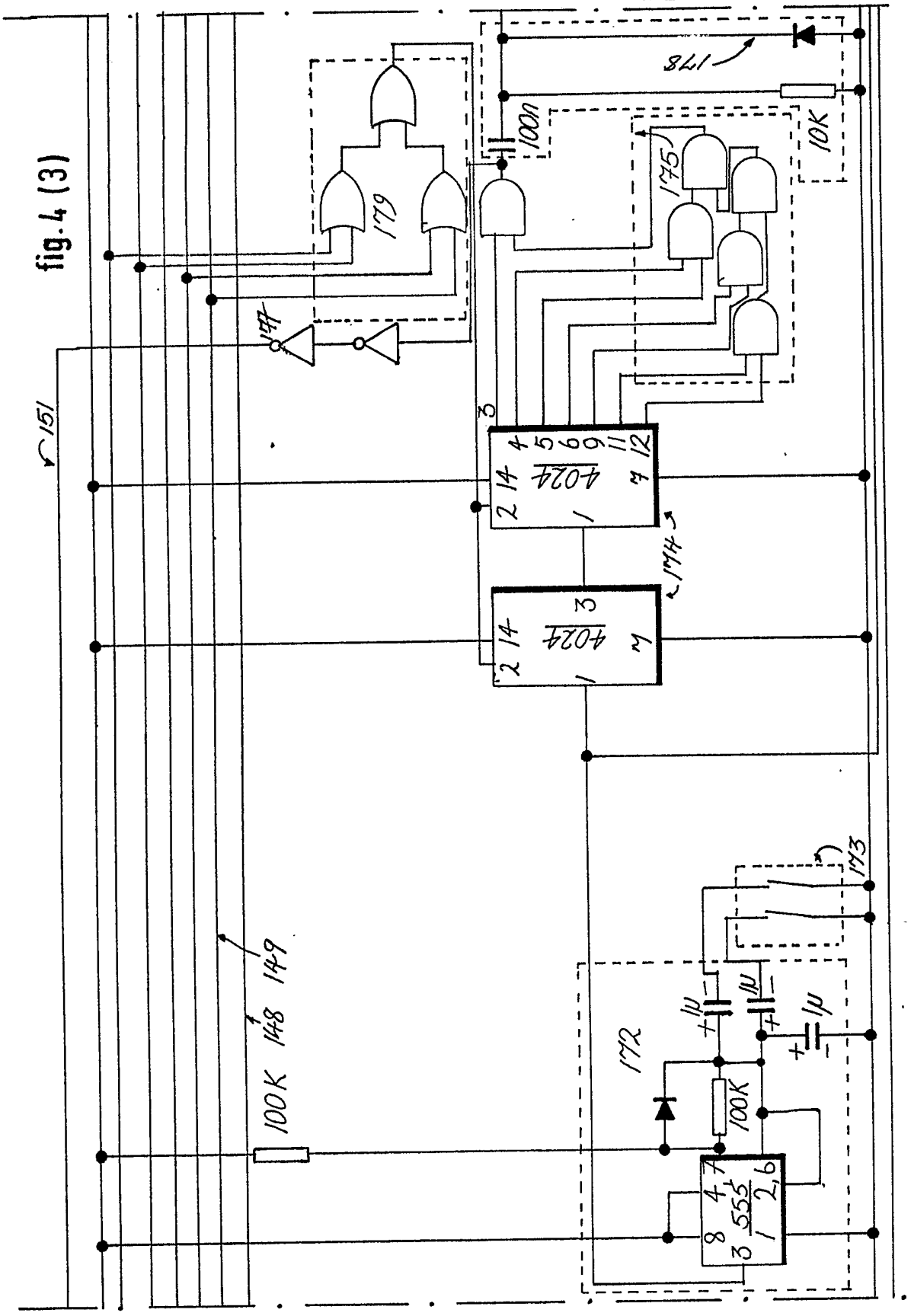
fig.4 (3)



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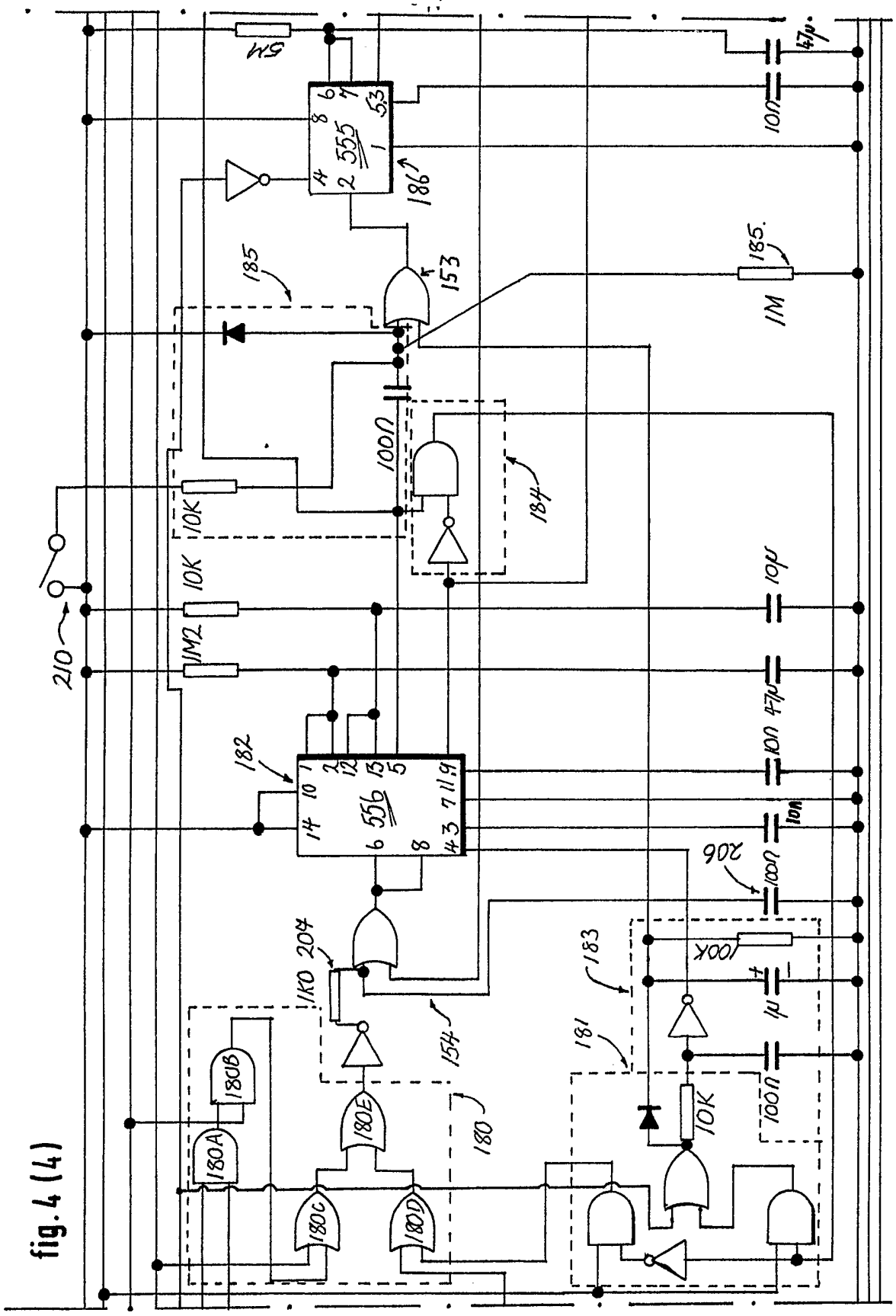

fig. 4 (4)

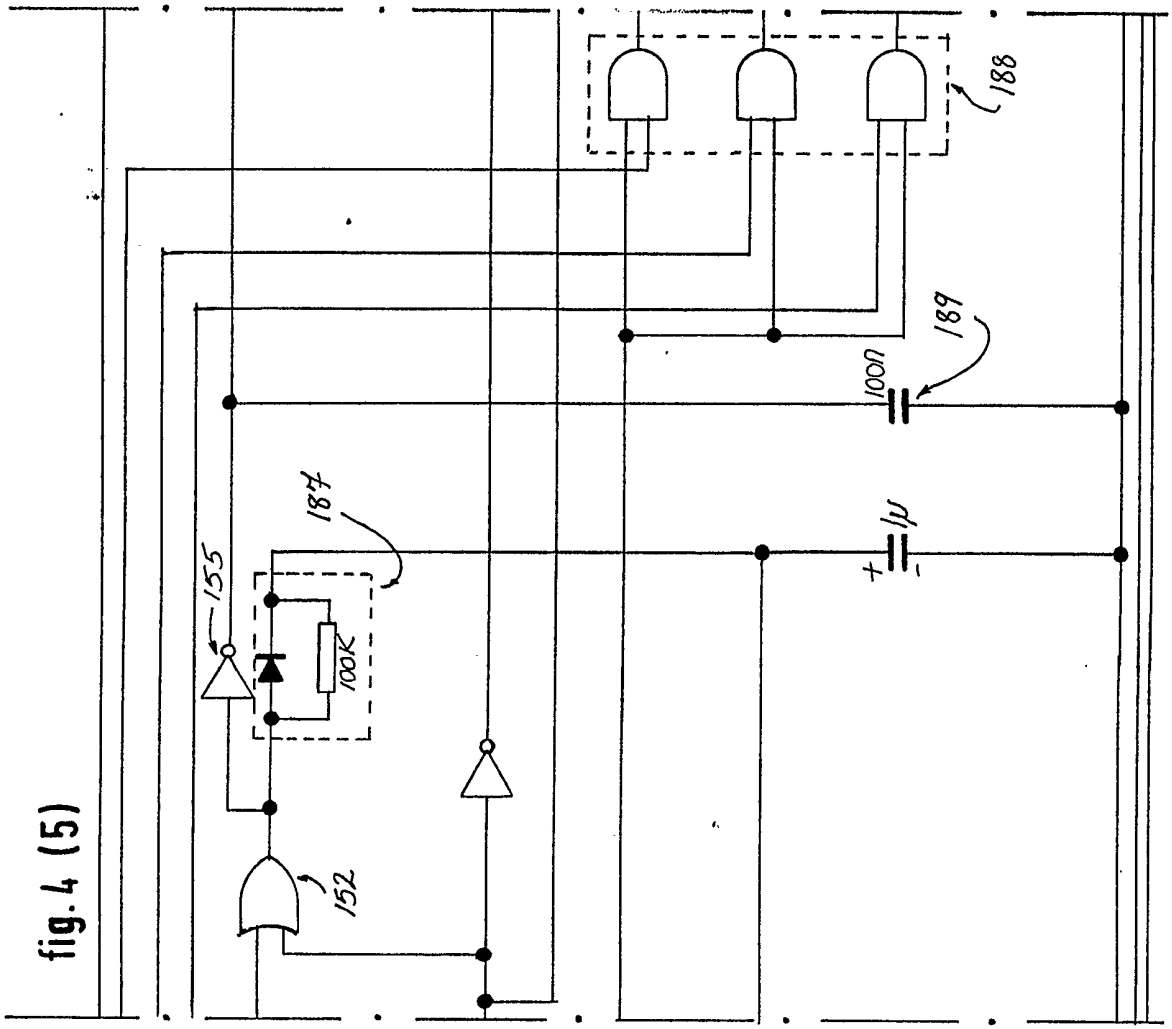

fig. 4 (5)

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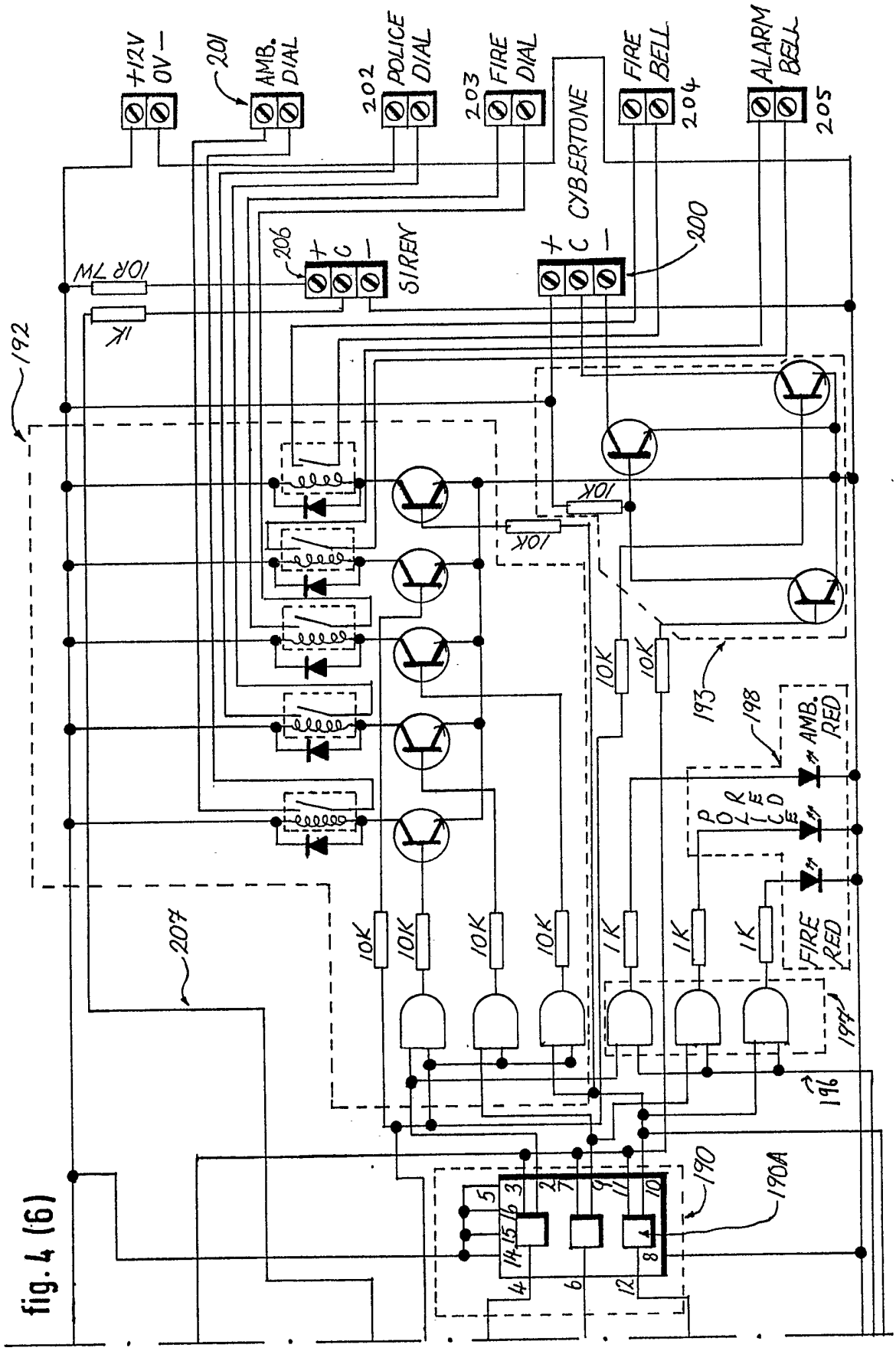

fig. 4 (6)

SPECIFICATION

Monitor apparatus and method particularly for old persons

The present invention relates to monitor apparatus and method particular for old persons. Many older people live alone and it is a relatively common place occurrence for such an older person to have a fall within their home or, perhaps, become unconscious for other reasons, and for help not to be summoned for a considerable length of time. In many cases, indeed, old people have died of hypothermia, as a result of falling when, if assistance had been rendered sufficiently early, they could have been saved.

The present invention provides a method and apparatus to alleviate this problem.

The apparatus comprises means to detect movement of a person within a predetermined area, said means providing an output signal and control means to receive said output signal, said control means including timing means to calculate the time since the receipt of the previous output signal, said timing means including a preset time delay so that when the time from the receipt of the preceeding output signal is greater than the preset time limit an alarm or other indication is provided.

The preset period may be a single preset period, for example, twelve hours (which takes into account the possibility of the person being detected being in bed and asleep for twelve hours) or may have different preset periods depending upon the time of day so that the preset period may be longer during the night than it is during the day.

The means to detect the movement of the person may comprise an infra red detector placed in a central position in the person's home, for example, close to the kitchen door, a pressure mat, an ultrasonic detector similarly arranged, or a door switch, for example, on a kitchen or lavatory door.

The alarm indication may be in the form of a horn, a bell, or an automatic dialler arranged to dial an ambulance, the police, or a relative.

In a preferred arrangement panic buttons may be provided at other parts of the home, for example at the bottom of stairs, so that if an old person falls down the stairs they may press the panic button which will automatically operate the alarm.

In a preferred arrangement ten minutes before the end of the predetermined period, an internal alarm may sound warning the inhabitant so that if by any chance the inhabitant is asleep or dozing they may reset the apparatus.

There may also be provided means to switch off the apparatus when the person is not present in the home.

The present embodiment of the invention will now be described by way of example only and with reference to the accompanying drawings in which:

Figure 1 shows in a diagrammatic form the ground floor plan of a home in which apparatus according to the invention is installed,

Figure 2 is a block diagram of a first embodiment of apparatus according to the invention,

Figure 3 is a diagram of a second embodiment of apparatus of the invention, and,

Figure 4 (in six parts) comprises a circuit diagram of the apparatus of Figure 3.

Referring to Figure 1, the home comprises a kitchen 10, lounge 11, hallway 12, stairs 13, front door 14, and lavatory 15. There is provided a kitchen door 16, lounge door 17 and lavatory door 18. The monitor apparatus comprises a control unit 19 which for convenience may be installed in the kitchen 10 and which is connected to receive signals from a detector unit. The detector unit may comprise an infra red detector 20 placed close to the kitchen door so that movement along the hall will be detected, or a pressure mat 21 adjacent the kitchen door so that movement along the hall 12 into or out of the kitchen 16 will be detected, or an ultrasonic detector arranged similarly to the infra red detector or a door switch 22 attached to the kitchen door 16 or a switch 23 connected to the lavatory door 18 to detect when these doors are opened or closed. The detectors may be connected with the control box 19 by means of wires or by means of radio signals. The wires may be separate or the signals may be passed along the existing electrical wiring in which case the detectors may be conveniently simply plugged into an adjacent electric socket. There is also provided an external alarm 30 and an internal alarm 31. A panic button 32 may be provided adjacent the bottom of the stairs 13 and another panic button 33 may be provided adjacent the front door.

A block diagram of the function of the apparatus is illustrated in Figure 2. Mains power is provided at 40 and there is a standby power unit 41 comprising a battery. A trouble diagnosis unit 42 is provided having an output to an internal horn 43 and a light 44 on the front of the control box. A clock 46 is connected to the trouble diagnosis unit 42, the clock being in the form of an electronic clock producing pulses, and there is provided a time set apparatus 47. There is also provided a pre-alarm time set apparatus 48, an apparatus 49 for driving the external alarm 30 and an automatic dialler 51. There is provided a key switch 52 which may be mounted adjacent the door, an exit delay 53 and entry delay 54. The circuit of Figure 2 also includes the sensors 20, 21, 22, 23 and panic buttons 32, 33. The connections between these components is readily apparent from this diagram.

In use with an old person living in the house

as illustrated, each time the old person passes the detector 20 or opens the doors 22 or 23 or treads on the mat 21 (these detectors may be complementary or alternative to one another) a signal is passed via the switch 52 to the reset bus 56 which resets a clock 46. The clock then starts to count again. If there has been no movement for some time, the clock pulses which are counted by the time set apparatus 47 will reach the predetermined time and at that point the time set apparatus 47 passes a signal along to the pre-alarm apparatus 48. The pre-alarm apparatus 48 sounds the internal alarm 31.

An output signal passes from the pre-alarm apparatus 48 to the alarm 49 and to the mode change bus 57. The alarm 49 has a delay which will delay producing an output signal for, for example, five minutes or ten minutes to allow the person to reset the apparatus. A signal passes along the mode change bus to the panic buttons 32, 33 which sets them into a different mode. Thus in addition to operating one of the sensors 20 to 23 the old person may reset the apparatus by pressing a panic button during this pre-alarm stage, a signal from the panic buttons 32 or 33 passing to the reset bus 56 to reset the clock 46 and pre-alarm 48 and alarm 49. If, however, no signal is received from the panic buttons 32, 33 or from the sensors 20 to 23, after the preset delay the alarm apparatus 49 operates the external horn 30 and, if installed, an automatic dialler 51 which will dial the police, ambulance, a neighbour, or relative as desired. A prerecorded message will be passed down the telephone line to summon help.

If at any time other than during the pre-alarm stage the person presses the panic buttons 32, 33 then an output is passed direct to the alarm 49 which operates the horn 30 and dialler 51. As indicated this can be provided at the bottom of the stairs or adjacent the front door or adjacent the bed or in the bathroom. There is also provided in the hallway or adjacent the front door the key switch 52 so that when the person leaves the house, to go shopping, or for a longer stay, the switch 52 is switched over so that signals from the sensor are passed to the exit delay 53 and entry delay 54 (which allows one to get out of the house or into the house without operating the alarm) and the outputs from the delays 53, 54 are passed to the alarm 49 which operates the horn 30 and/or the dial 51. In this mode the apparatus acts as a conventional burglar alarm.

As is clear from Figure 2 there is provided mains power 40 and also standby battery power 41 for use if the mains fails and there is a trouble diagnosis unit 42 which can operate an internal horn and a light 44 in the control panel.

The apparatus is therefore made as foolproof as possible. Thus, for example, if the old person is asleep for longer than the time set in the apparatus 47 then the internal alarm should wake the person and the apparatus can be reset by simply touching one of the panic buttons or operating one of the sensors 20 to 23. Furthermore, if, during normal operation, the person falls down the stairs or has an accident or is taken ill at other points help can be summoned by pressing buttons 32, 33.

Referring to Figure 3 there is shown an apparatus which generally corresponds to that shown in Figure 2. There is thus provided a control box 100 adapted to receive signals from various detectors including FIRE detectors 101 connected by wire to the control box, movement detectors 102 connected by wire to the control box, one or more wired PANIC buttons 105 movement detectors 103 connected to transmit a radio signal to the control box 100, FIRE detectors 104 adapted to transmit radio signals to the control box 100, and a pendant alarm apparatus 106 which may be in the form of a radio transmitter with PANIC button attached and which may be worn around the neck of the person involved. The control box 100 is controlled by means of a HOME/AWAY switch 107.

Control box 100 provides a series of outputs, firstly controlling a so-called cybertone apparatus 110, a common alarm apparatus 111 in the form of a normal horn, a FIRE bell 112, an external siren 113, and an automatic dialling apparatus which may be a single apparatus with different modes of operation to dial the fire brigade 116, to dial an ambulance 117, or to dial the police 118.

The movement detectors have been generally described above. In addition there is provided a pendant alarm apparatus which may be worn around the neck of the user and pressed to operate the control box 100 to dial an ambulance. In addition to these detectors the new embodiment of the invention incorporates fire detectors either wired 101 or transmitting a radio signal 104 to the control box 100.

The following assumes the "HOME/AWAY" switch 107 to be in the "HOME" position.

The main function of the apparatus is to detect the absence of movement within the home. If this is the case for 12, 16, 20 or 24 hours (a user presetable time) then a pre-alarm (the "cybertone") will sound for a period of one minute before enabling dialler and alarm outputs to operate and summon an ambulance. If, during the pre-alarm the pendant alarm apparatus 100 (a small transmitter kept close to the elderly person) is operated, the system acknowledges that everything is satisfacatory and resets. Thus, if the person is bedridden but well, there is a means to halt the alarm before anyone is informed.

If the person has a fall, or needs help, then the operation of the pendant alarm apparatus

106 will set off the same cycle as above. Again, once in the prealarm stage, operating the pendant alarm apparatus 106 will reset the system. This facility is provided in case it is a false alarm. Radio is used for convenience in case there is difficulty in walking to the panel.

The resetting of the system can also be achieved by changing the HOME/AWAY switch 107 to the alternative position (Note that it is the action of switching from one to the other that resets, not the position). When the system goes into main alarm it dials out to the ambulance, and sets off the common alarm 111. Once in main alarm the only way to rest the system is to manually do this by altering the "HOME/AWAY" switch position. To notify and comfort the person, the cybertone sound alters to a pulse when the main alarm stage is reached. The main alarm is timed for 10 minutes after which the system automatically resets itself.

In addition to these functions, the system doubles as a burglar alarm when the occupant is away. On switching the switch 107 to the "AWAY" position the occupant has one minute to leave the premises, during which time the system is disabled. After this period, anyone entering the premises will be detected by the movement detectors and the police dialled after the usual pre-alarm period. In this mode the pre-alarm period is the entry delay time in which if the occupier is re-entering the premises, he has time to manually reset the system and switch it to the "home" position. Again operating the pendant alarm apparatus 106 during pre-alarm will temporarily reset the system until the next time the movement detector is triggered whilst it is still in "AWAY" mode. In "away" mode the 12/16/20/24 hour timer is disabled so that absence of movement will not cause a false alarm.

In addition to the two modes described there is provision for fire detection. This operates the prealarm and then dials the fire brigade or main alarm. For this function, the pendant alarm apparatus 106 cannot be used to reset the system so the person is forced to go to the panel to reset the system. This is to make sure that if there really is fire, they know about it. A fire bell output is provided which is active immediately upon fire prealarm.

The pendant alarm apparatus 106 operates in the described way in both modes.

Flashing light emitting diodes display which function has been activated. The alarm and siren outputs are common to all alarm conditions. A power LED indicates that the mains supply is on. The system has a battery backup and the siren has its own internal supply. The siren is self-activating if the wires are cut to make sabotage of the burglar mode difficult.

During any one alarm cycle, only one alarm condition can be registered at any one time to avoid confusing the dialler.

The main alarm is timed for 10 minutes after which the system resets itself. Thus no effort is required at all for the absent-minded.

A circuit diagram of the apparatus of Figure 3 is shown in Figure 4. Individual components will not be described in detail as they are drawn in the circuit diagram in standard notation.

The circuit includes a receiver 135 for radio signals from the radio transmitter detectors 103, 104, 106 and a transistor detector circuit 136 for receiving signals from the wired detectors 101, 102.

The receiver 135 provides a series of pulses on respective output lines 137, 138, 139 corresponding to the receipt of signals from the pendant alarm apparatus 106, the movement (PIR) detectors 103 or the FIRE detectors 104 respectively. Similarly the detector circuit 136 provides outputs on lines 141, 142 on receipt of signals from movement (PIR) detectors 102, FIRE detectors 101 respectively.

The outputs on the lines 141, 142 of the detector circuit 136 are passed to respective OR gates 160, 162 which also receive signals from lines 138, 139 respectively, whereby the output from gates 160, 162 provide signals when the radio or hard wired intruder alarms or the FIRE alarms are received. The OR gate 161 is used to inhibit any signals on line 137 if a FIRE signal is received from OR gate 162. Thus a FIRE prealarm signal may not be silenced by the use of the pendant alarm apparatus 106. The signals on lines 137, 138, 139, 141, 142 are pulsed signals.

The signal from line 137 is passed through a monostable 165 which substitutes one six second pulse for the input pulses. This six second pulse is passed to a positive edge detector 166. The use of the monostable 165 prevents the prealarm switching on and off with successive radio pulses from the pendant alarm apparatus 166.

The output from positive edge detector 166 is fed to the PANIC bus 143.

Signals from the output of the OR gate 160 are fed via buffered positive edge switch 164 to an intruder (PIR) bus 144. Similarly the output from OR gate 162 is fed via the buffered positive edge switch 163 to a FIRE bus 145. The buffered positive edge switches 163, 164 are used to balance the various delays concerned with the main timer to be described.

Operation of HOME/AWAY switch 107

The HOME/AWAY switch 107 is arranged to carry out the following features. It provides a reset pulse when switched from one position to another; it provides an output showing which state it is in; and it starts the exit delay timer when switched to "AWAY" mode and resets it again when switched back to

"HOME" mode. The switch 107 interconnects either circuit 168 (when in HOME mode) or circuit 169 (when in AWAY mode) with earth, circuit 168 and 169 being negative edge switches which have their inputs held high via 10 K resistors.

When one or other of the inputs is taken low by the altering of the HOME/AWAY switch position, the resultant negative edge produces a timed negative going pulse. These two outputs are passed to a NAND switch 146 which produces a reset pulse that goes to a reset bus 147.

The pulse produced when the switch 107 is switched to the "AWAY" mode is used to trigger an exit delay timer 170 the output of which is inverted and provides the signal on an exit delay bus 148.

Whilst the switch 107 is in the "AWAY" mode position a signal is passed to an inhibit bus 149. The inhibit bus 149 stops a counter 174 (to be described two paragraphs below) completing its count and providing an "absence of movement" output. It does this by continually resetting the counter 174.

When the switch 107 is switched to the "HOME" mode position, a pulse thereby produced on line 150 is used to reset the exit delay timer 170. The bus 149 inhibits the pIR signal from triggering the alarm whilst the alarm is in the "home" mode.

Absence of movement detector

The means for providing an extended delay during which absence of movement will be noted comprises a free running astable oscillator 172 of a variable oscillatory period and a pair of integrated circuit counters 174. The free running oscillator may have its period varied by means of selection switches 173. The period of oscillation of the oscillator 172 is also used to flash (switch on and off) the display light emitting diodes (LEDs) 198 (to be described). The output from the oscillator 172 is fed into the input of the first of the counters 174 which comprises a 4024 counter chip and then the 2^7 (divisor) output is fed into another 4024 counter chip. The outputs from the latter (2^1, 2^2, 2^3,....2^7) are passed to a series of AND gates 175. The output of the AND gates 175 is positive edge switched via the circuit 178. The positive edge is used to keep the resultant pulse short when the outputs of the counter are all high.

Thus when the counter 174 has reached its maximum number it sends out a pulse on to line 151 and resets to zero on the next pulse and starts all over again. It can be seen that the frequency of this pulse occurring is dependent upon the frequency of the oscillator 172. Thus switch 173 may be used to set the interval to 12, 15, or 18 hours as required.

The system is supposed to give this "ABSENT" pulse only if no movement is detected for a period of 12, 16, 20 or 24 hours. The resets of both these counters 174 are provided by the output signal from the OR gates 179 which combine the signals from the PANIC, PIR, inhibit, or reset buses 143, 144, 149, 147 respectively. Thus when any of these functions occur the counters are reset to zero and start timing from the beginning of the period again. Thus no pulse is produced and the system is quiescent.

The "ABSENT" pulse on line 177 serves two functions. Firstly it is fed via line 177 to the line 137 where it initiates the "AMBULANCE" sequence of events. Secondly it is also positive edge switched by positive edge switching circuit 178 and used to trigger a prealarm timer circuit 182 directly so that it over-rides a FIRE input signal if there is one (which will normally inhibit any PANIC signal inputs).

Pre-alarm and main alarm timers (182,186)

The pre-alarm timer 182 is in the form of an integrated circuit which has two outputs, a 0.2 second timer from pin 9 and a one minute timer from pin 5. The one minute timer output on line 5 provides the pre-alarm period and the 0.2 second timer signal provides a window during which data may be loaded into latches 190. Main alarm timer 186 is in the form of an integrated circuit timer.

During normal operation the one minute and 0.2 second timers are simultaneously triggered. The 0.2 second timer enables the inputs via AND gates 188 from lines 143, 144, 145 to set the relevant latch in the latches 190. When the one minute timer from pin 5 times out, it is negative edge switched by switch circuit 185 and triggers the main alarm timer 186. The outputs from the one minute timer (pin 5, timer 182) and ten minute timer (main timer 186) are combined in an OR gate 152 and fed back to inhibit any further triggering of the 0.2 second and one minute timers via 187. The purpose of circuit 187 and its associated 1 microfarad capacitor is to provide instant inhibition of the aforementioned inputs and delayed re-enablement of them (this stops more than one input being accepted as the latches are not enabled as the 0.2 second timer cannot trigger, thus the telephone dialler is not confused).

When inhibiting, a diode 187 is forward biased and so feeds back instantaneously, whereas when both timers have timed out, a charge is stored in the 1 mf capacitor and hence the diode is reversed biased and the discharge is via the 100 K resistor in circuit 187. This delay is necessary to inhibit re-triggering of the one minute and 0.2 second timers whilst the reset resistor/capacitor nets stabilise.

Resetting the timers 182,186

A feature of the apparatus is the remote use of the pendant alarm apparatus 106 to

carry out various functions, namely, disarm the apparatus whilst in the burglar mode, reset the apparatus during the pre-alarm period, and cause a PANIC signal when the system is quiescent. Some form of switching is required to cause the circuit either to switch off or to go into alarm. This switching is carried out by gates 181. The one minute output from pin 5 is delayed by the 0.2 second output from line 9 to ensure stability by gates 184 and the output from gates 184 is fed back to gates 181. The gates 181 enable either one or the other AND gate (by means of an invertor). Each of these AND gates is also fed from the PANIC bus 143. Thus depending upon whether the system is in the pre-alarm period or not, the signal from the PANIC bus, if received, is diverted either one way or the other. If the system is quiescent, the signal from the PANIC bus is diverted to trigger the 0.2 second (182 pin 9) and one minute (182/pin 5) timers. If the system is in pre-alarm mode, (during the pre-alarm period), then no signal is passed to the trigger input but the signal from the PANIC bus is passed to the adjacent OR gate 181. The other input to this OR gate is from the reset bus 147. Thus the output from this OR gate is a pulse from either the PANIC bus 143 during the prealarm period or from a manual resetting of the system by the charging of the position of the HOME/AWAY switch 107.

During resetting, the falling edge from the one minute timer (182/pin 5) must not trigger the 10 minute main alarm timer 186 so the diode in circuit 181 feeds into an inhibiting OR gate 153 at the input of the 10 minute timer 186 (i.e. it only resets the pre-alarm timer and not the main alarm timer). Thus an input from the PANIC bus 143 will not reset the system whilst it is in main alarm mode. To give a time delay to allow for this inhibition to take place before the 1 minute timer is reset, a small RC net 183 of 10 K and 100 n is used to delay the resetting (via 182 pin 4) of the one minute timer (182/pin 5). The only way to reset the main alarm is manually at the HOME/AWAY switch 107. This is from the inverted reset bus 147 fed to pin 4 of timer 186. The one minute timer (I82/pin 5) is reset at pin 4 of timer 182 via the time delay mentioned above after buffering with an invertor. The period of the 0.2 second (182 pin 9) timer is so short that it is allowed to time out rather than being reset.

From the inhibition of the 10 minute timer, a time delay is incorporated on the re-enablement, but is instantaneous on inhibition via the forward biased diode in circuit 181 This is to make sure that when the reset pulse has finished, the system has time to stabilise before there is a chance of the 10 minute timer 186 being retriggered. inhibit feed back loop from 187 to circuit 154 is given time to set up before any subsequent trigger can take effect by incorporating a time delay on the other input of circuit 187 by means of an RC net 206/207. This also reduces the possibility of false alarms as the trigger must be of sufficient length to charge up the RC net.

Triggering of timers in timer 182

We now turn to the trigger circuitry 180. Signals from buses 148, 149, 145 and 143 are gated together by the circuit 180 to provide the trigger signals. The output from the first two AND gates 180A and 180B is ORed in OR gate 180C with the input on line 147 and via OR gate 180D and 180E ORed with signals from circuit 178 and 181.

So, to summarise, the system will trigger if:

a) in AWAY mode (i.e. switch 107 switch to "AWAY"), the exit delay has timed out, on receipt of a PIR signal,

b) in any mode, on receipt of a FIRE signal or a PANIC signal if the system is quiescent,

c) in HOME mode, the ABSENCE signal.

Latches 190

It has already been explained how the data is put onto the latches.

There is one latch each for FIRE, PIR, PANIC which in general terms respond to calling the FIRE, the POLICE, or AMBULANCE respectively.

The outputs from the one minute and 10 minute timers (pin 5 of timer 182, and timer 186) are ORed and inverted by invertor 155 and smoothed by capacitor 189 to smooth out the pulse caused by the transition between the one minute timer turning off and the resultant triggering of the 10 minute timer. The resultant signal is fed to the reset terminals of latches 190 so that they may only latch during the main alarm mode or during the pre-alarm period. Thus they are automatically cleared upon a reset or the timers 182 pin 5 and 186 timing out. The signal is also fed to circuit 193 which produces an output on terminal 200 which operates the cybertone 110.

The output from the FIRE latch 190A is fed back to transistor circuit 199 where it simulates a FIRE input by holding the input line low by turning on the transistor. The signal on FIRE line 142 is then fed to OR gate 161 where it inhibits any further signals from line 137 (PANIC signals) passing through so that the pre-alarm cannot be silenced except with the manual operation of the key switch 107. This is to ensure that the person using the alarm checks that there is no fire before the apparatus is switched off with the switch 107.

The outputs from each latch 190 are ANDed with signals from the oscillator 172 along line 96 by AND gates 197 and the output from gates 197 are fed to respective light emitting diodes 198 that form the display panel along with a green power LED 191 that

is only on when electric mains are connected.

Tamper Switch 210

Description—A tamper switch 210 is to stop unauthorised access to the control box 100. It comprises a magnetic reed switch that is normally closed when next to a magnet and opens when the magnet is removed. In practice the electronics are in the door of the control box 100 and the magnet on the lip of the rest of the housing—thus when the door is opened, the switch will open. It can be seen that when opened, the 10K resistor of switch circuit 185 becomes disconnected so that the 1M resistor 185A holds the input to 153 low which triggers the 10 minute main alarm timer 186 and subsequently immediately triggers the external siren, cybertone and common alarm outputs. No diallers are activated as the latches 190 contain no information; thus also no display is given. The main alarm timer 186, as before, can only be reset with the keyswitch (HOME/AWAY switch 107).

The outputs

The cybertone 110 is turned on as already explained by ORing the 10 minute and one minute timer outputs, the cybertone output signal being provided on terminal 200. Its pitch is changed during main alarm via a transistor circuit 193 through which the signal to terminal 200 is fed. The input to the transistor circuit 193 is directed from the output of the 10 minute timer 186. Thus after the pre-alarm period has expired the cybertone pitch changes for the period of the main alarm. When all the timers have been timed out the system is ready for another signal.

An output terminal 206 is provided for the siren 113. The siren 113 only requires a control signal "high hold off" (i.e. whilst the control is high, the siren is quiet). This control signal is provided by the inverted output of the 10 minute timer 186 via line 207.

Output terminal 204 operates the FIRE bell 112 which will ring as soon as the FIRE signal is picked up, even during the pre-alarm period. This is because it is driven directly from the FIRE latch 190A.

The alarm bell 111 is connected to the alarm bell terminal 205 and is driven directly from the 10 minute timer 186 and will operate during main alarm for all alarm conditions.

Three dialler output terminals 201, 202, 203 are provided to respectively telephone via diallers 117, 118 and 116 the ambulance service, police service and fire service. They are all operated by the main alarm timer 186. The dialler relays are illustrated at 192, and the AND gates allow the outputs of the latches 190 to operate the dialler relays for the duration of the main alarm.

CLAIMS

1. Monitor aparatus comprising means for detecting movement of a person within a predetermined area, said means providing an output signal in response to detection of movement, and control means to receive said output signal, said control means including timing means to calculate the time since the receipt of the previous output signal, said timing means including a preset time delay and means to provide an output signal when the time from the receipt of the preceeding output signal is greater than the preset time limit.

2. Apparatus as claimed in claim 1 in which said timing means includes means to vary said preset period depending upon the time of day.

3. Apparatus as claimed in claim 1 or 2 in which said means to detect the movement of the person comprises a detector placed in a central position in the persons home.

4. Apparatus as claimed in claim 3 in which the detector comprises an infra red detector.

5. Apparatus as claimed in claim 3 in which the detector comprises a pressure mat.

6. Apparatus as claimed in claim 3 in which the detector comprises an ultrasonic detector.

7. Apparatus as claimed in claim 3 in which the detector comprises a door switch.

8. Apparatus as claimed in any of claims 1 to 7 in which said timing means is connected to an alarm means whereby the output signal from the timing means operates the alarm means.

9. Apparatus as claimed in claim 8 in which the alarm means comprises a horn.

10. Apparatus as claimed in claim 8 or 9 in which the alarm means comprises a bell.

11. Apparatus as claimed in any of claims 8 to 10 in which the alarm means comprises an automatic telephone dialler.

12. Apparatus as claimed in any of claims 1 to 11 in which, in addition, there is provided panic buttons to provide a signal to said control means.

13. Apparatus as claimed in any of claims 1 to 12 in which said timing means includes means whereby, before said output signal is produced by said timing means, an initial output signal is provided by said timing means, and reset means is provided to be operated to prevent the subsequent output signal from the timing means.

14. Monitor apparatus as claimed in claim substantially as hereinbefore described with reference to Figures 1 and 2, or 3 and 4 of the accompanying drawings.

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