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METHOD AND SYSTEM FOR VISUALLY CONVEYING ALARM INFORMATION

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References Cited

UNITED STATES PATENTS

2,707,749 5/1955 Mueller..............................340/190 UX


3,663,313 5/1972 Trent..............................340/167

3,683,352 8/1972 West et al......................340/189 X

3,697,941 10/1972 Christ.............................250/199 X

3,710,122 1/1973 Burcher et al.....................250/199

3,588,858 6/1971 Demuth............................340/224

3,713,125 1/1973 Miller............................340/224

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ABSTRACT

Disclosed is a method and a system for conveying alarm information wherein a visual alarm signal is transmitted from a first location in response to the occurrence of a preselected event thereabout. A preselected observer at a different location observes the visual alarm signal and relays notice of the receipt of the signal to proper authorities for response. A plurality of transmitters is utilized, each at a different location, and each transmitter encodes its signal with information indicating its location and further information indicative of which one of a group of preselected events has occurred. The observer, upon visually observing a signal, focuses a receiving device on the source of the signal. The receiving device decodes the signal to extract the coded information therefrom and furthermore rejects improperly coded or noncoded signals.

21 Claims, 9 Drawing Figures
Fig. 1.
Figure 2

- Master Light Pulse
- Alarm Status
- Fourth Blade Code Digit
- Third Blade Code Digit
- Second Blade Code Digit
- First Blade Code Digit
- Start Pulse
- Ready Pulse
- Master Light Pulse
Fig. 3.
Fig. 4.
METHOD AND SYSTEM FOR VISUALLY CONVEYING ALARM INFORMATION

BACKGROUND OF THE INVENTION

This invention relates to signalling devices and, more particularly, to devices for relaying alarm signals such as fire or burglar alarms.

Conveying alarm information rapidly may be more important now than at any time in our society's history. This is so because we now possess equipment to effectively respond to emergency situations if notice of the emergency is received rapidly enough.

Consider, for example, the vast improvements that have taken place in fire fighting equipment. Trucks are now available to rapidly convey equipment and personnel to the scene of a fire. New fire extinguishing systems are now at the disposal of firemen to aid in the rapid extinguishment of virtually any type of fire and new life saving equipment is now in use. However, if there is a delay between ignition and the receipt of the alarm by the fire department, the effectiveness of the new, sophisticated equipment is severely diminished or nullified.

In the event of a burglary in progress, a prompt notification to the police can permit the affected area to be effectively surrounded thus vastly increasing the chances of apprehending the burglar at the scene. If there is a delay in conveying a burglar alarm, the burglar has greater time in which he can flee the scene of his crime drastically reducing the chances of his capture. In addition to the greater amount of time and police effort needed to apprehend the burglar if he escapes the immediate area due to a delay in the relay of the alarm, consider the effect on the burglary victim. If the burglar is captured fleeing the crime, he is almost certain to still have possession of the stolen goods. However, as the time span between the crime and the capture increases, the probability of recovering the stolen goods decreases.

Conventional alarm systems have serious shortcomings. Audio alarms cannot be heard well in closed cars. Inasmuch as most persons on the street at night during the winter are in closed cars, there is a substantial risk that an audio alarm will then be unheard. Furthermore, if an audio alarm is heard, its source is hard to precisely locate.

Perhaps the most rapid way to relay emergency information today is by telephone. However, police switchboards are often so deluged with calls that it requires a substantial period of time to separate those calls requiring immediate response from those not. Furthermore, there is always the possibility that accomplishing a burglar will attempt to divert police by reporting false alarms indicating burglaries at locations remote from the scene of the actual planned crime.

The object of this invention, therefore, is to provide a system to rapidly convey significant alarm signals that is not subject to confusion by false alarms.

SUMMARY OF THE INVENTION

This invention is characterized by a method and a system for visually conveying alarm information wherein a signalling device at a first location provides a visual alarm signal in response to the occurrence of a preselected event. A preselected observer, upon observation of the visual alarm signal, relays notice of the receipt of the signal to proper authorities for response to the event that has occurred. For example, the signalling device can be automatically responsive to a burglar alarm or a fire alarm. The preselected observer would, in response to those signals, notify the police department or fire department respectively. The signalling device can be manually operated if so desired. A preferred signalling device disclosed herein can be operated automatically or manually by any of a plurality of actuating switches that are connected according to the wishes of the user.

A feature of the invention is the positioning of the observer in an aircraft. An observer in an aircraft such as a helicopter hovering over a city will have a relatively unobstructed view thereof and spot visual alarm signals even in inclement weather. Furthermore, above the city the location of the signalling device will be easy to identify. Further utility of a helicopter as an observation post is evident upon consideration of a burglar alarm. After the relay of the burglar alarm to the police the helicopter can proceed to the scene of the burglary and illuminate the ground therearound with spotlights thus rendering the escape of the burglar far more difficult.

Yet another feature of the invention is the inclusion of a plurality of signalling devices and an intermediate receiver. The intermediate receiver is situated to observe visual alarm signals from any of the plurality of signalling devices and, upon the receipt of an alarm signal, the intermediate receiver mimics or rebroadcasts it. The observer remains in view of the intermediate location. While the view of the observer in the helicopter of the activated signalling device may be obstructed, the intermediate receiver notifies him immediately that one of the signalling devices has been activated. Thus, the helicopter can quickly proceed to a point at which the observer can identify the activated device.

Still a further feature of the invention is the inclusion of encoding devices in the signalling devices and the provision of a decoding receiving device for the observer. The encoder in each transmitter encodes on the signal information indicative of which sending device has been activated and further information indicative of which of a plurality of preselected events has taken place. When the observer notices a visual alarm signal, he aims his receiving device at the source thereof and the receiving device decodes the signal and provides the observer with the location of the activated signalling device and notice of which of the preselected events has taken place. Furthermore, the decoding device rejects improperly coded and noncoded signals thus preventing burglars from sending out false alarms at points remote from the location of their contemplated crime. Inasmuch as the intermediate receiver mimics the signals it receives, the coded information is also impressed on the signal transmitted from the intermediate location.

DESCRIPTION OF THE DRAWINGS

These and other features and objects of the present invention will become more apparent upon a perusal of the following description taken in conjunction with the accompanying drawings wherein:

FIG. 1 shows a portion of a city skyline wherein several of the buildings are equipped with the subject alarm relay system;
FIG. 2 (a) shows the format of a coded alarm signal;

FIG. 2 (b) shows a typical alarm signal in accordance with the format depicted in FIG. 2 (a);
FIG. 3 is a diagram of an alarm encoding device;
FIG. 4 is a schematic diagram of another encoding device that identifies the signalling device used in conjunction therewith;
FIG. 5 is a diagram of a preferred signalling device;

FIG. 6 is a schematic representation of a multiplexer similar to the multiplexer incorporated in the sending device shown in FIG. 5;
FIG. 7 is a diagram of a pistol grip receiving apparatus; and
FIG. 8 is a schematic diagram of a preferred receiver.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIG. 1 there is shown a system 21 for visually conveying alarm information. A portion of a city skyline 22 includes the tops of four buildings 23, 24, 25 and 26. A helicopter 27 is flying above the city. Disposed on the top of the tallest building 25 is a tower 28 with a strobe light 29 on the top thereof. Connected to the strobe light 29 by an auxiliary receiver 31 is a light sensitive receiver 32. The auxiliary receiver 31 controls the strobe 29 in such a manner that the strobe 29 follows, or mimics the light received by the auxiliary light receiver 32. On the top of the building 23 is a signalling device 33 and another signalling device 34 is disposed on the top of the building 26. The signalling devices 33 and 34 will be described in detail below.

The signalling devices 33 and 34 are actuated in response to predetermined events occurring therearound. A high intensity strobe light in each signalling device 33 and 34 sends visual signals when the devices are energized. A visual alarm signal 35 from the device 34 can be received directly by an observer in the helicopter 27 or, if the activated signalling device is shielded from the helicopter as is the device 33, the light beam 36 will be relayed from the intermediate location at the top of the building 25 by the intermediate receiver 31 as an alarm signal beam 37 which will be received by the observer. The alarm signal beams 35, 36 and 37 are coded to indicate to the receiver in the helicopter 27 which device 33 or 34 is activated. Furthermore, the beam can be coded (as will be described in more detail below) to indicate which of several preselected events has taken place. The observer in the helicopter 27 relays notice of the receipt of the alarm signal to preselected proper authorities for response thereto. The relay is by conventional apparatus, such as radio. For example, if the beams 36 and 37 are indicating a burglar alarm has been set off in the building 23, the police will be notified by the observer. If the alarm signal beam 35 is coded to indicate that a fire alarm has been activated in the building 26, the fire department is so notified. Furthermore, in the event of actuation of a burglar alarm at night, the helicopter 27 will proceed to the affected building and illuminate the ground around the building with bright search lights 38 located on the lower side of the helicopter. Thus escape of the burglar is made more difficult.

It will be clear that the intermediate receiver 31 can be eliminated if the preselected observer in the helicop-

ter 27 can be assured of a reasonably unobstructed view of the entire city at all times. It will also be appreciated that the preselected observer can be stationed on a walk way on top of the building 25 or a nearby hill if that affords an unobstructed view of the city. However the ability to rapidly respond to a burglar alarm and illuminate the location of the burglary with the search light 38 is then lost.

Referring now to FIG. 2 (a) there is shown diagrammatically the format of the coded visual alarm signal that is broadcast by the activated signalling devices 33 and 34 shown in FIG. 1. Initially, a bright master light pulse is sent and a ready pulse follows one quarter of a second later. The master light pulse attracts the attention of the observer and, as will be explained below, is an aid in decoding the signal. During the two seconds subsequent the ready pulse, a start pulse is sent followed by the information indicating the number of the signalling device that has been activated and indicating what preselected event has taken place. Code numbers assigned to the individual signalling devices 33 and 34 comprise four digits thus providing a maximum system capacity of 9,999 signalling devices. The various preselected events are given numbers ranging from 1 to 9. First following the start pulse is the first bit of the first digit. The first digit is then completed, followed by the second, third and fourth digits and the alarm status. A preselected time span during the two second data transmission is allotted to each bit and a pulse in the first half of the time span indicates the value of that bit zero and a pulse during the second half of the time span indicates that the value of the bit is one. Following the last bit of the alarm status digit there is a quarter of a second pause until another master light pulse is sent and the cycle begins anew.

Shown by way of example in FIG. 2 (b) is a typical alarm signal. The particular signal shown represents the response of a signalling device 0911 to an alarm number 5. Receipt of this signal by the preselected observer in the helicopter 27 notifies him that the event for which the alarm number 5 has been assigned (this may be, for example, activation of a burglar alarm) has occurred in the building with the signalling device number 0911. A chart carried in the helicopter 27 indicates the location of the affected building. The information is quickly relayed to the proper authorities and the helicopter 27 further responds by proceeding to the scene.

Referring now to FIG. 3 there is shown an alarm encoding apparatus 41. Positive power is supplied by a line 42 to a plurality of switches 43. One of the switches will close in response to the occurrence of any of the preselected events. For example, a switch 44 is coupled to a push button 45 and is manually operated. A switch 46 is a fire alarm automatic actuator relay and a switch 47 is a burglar alarm automatic actuator relay. The remaining switches are automatic or manual sensors as the user sees fit. When any of the switches 43 is closed, a circuit is completed to supply an alarm output signal one a line 48. For example, when the switch 44 is closed, power is carried through a diode 49 to a line 51 and thence to the line 48. Power is returned to a negative terminal of the power supply through a resistor 53. When any of the other switches 43 is activated, power flows to the line 51 through one of a plurality of diodes 54. Thus, a signal on the line 48 indicates that one of the sensor switches 43 has been closed.
An alarm code signal is provided on a cable 55 that includes a one bit line 56, a two bit line 57, a four bit line 58 and an eight bit line 59. One end of each of the lines 56-59 is coupled to ground through resistors 61. To understand operation of the apparatus 41, assume that the switch 47 closes. A line 62 carries power to a diode matrix 63 coupled to the alarm code cable 55. A diode 64 couples power to the one bit line 56 and a diode 65 couples power to the two bit line 57. Current then flows through the resistors 61 coupled to the one bit line 56 and the two bit line 57. Thus a high signal appears on the one and two bit lines 56 and 57. Low states remain on the four bit 58 and eight bit 59 lines. The resulting signal on the alarm code cable 55 is, of course, the binary number 3, and it will be noted that the switch 47 is coupled to the third alarm device.

From the above example and an examination of the circuit shown in FIG. 3, it will be obvious that when any of the switches 43 closes, an alarm signal appears on the line 48 and the binary representation of the number of the closed switch appears on the alarm code cable 55. Both the alarm line 48 and the alarm code cable 55 are coupled to a transmitter in the signalling devices 33 and 34 that will be described in greater detail below.

Referring now to FIG. 4 there is shown an encoding matrix 71 that is used for programming the transmitter multiplexer (to be described more fully below) to transmit the proper signal device code number. Positive power is supplied by a line 72 to a group of resistors 73 and thence to a group of switches 74. The switches 74 selectively couple the resistors 73 to another group of resistors 75 and four encoder output cables 76, 77, 78 and 79 that are coupled to the associated transmitter. The four cables 76-79 correspond to the four digits that comprise the signalling code. Each cable 76-79 is made up of four lines. It is seen that if a switch 74 is closed, the associated line is at a high state and if a switch 74 is open the associated line displays a low state signal. For example, the apparatus 71 is programmed with the code 0911 that was depicted in FIG. 2(b). When a signalling device is installed in a building, the switches 74 are set manually and permanently in accordance with the code number assigned to that signalling device.

Referring now to FIG. 5 there is shown a diagram of a transmitter 81 such as is included in the signalling devices 33 and 34. The alarm signal line 48 is connected to the set terminal 82 of an alarm flip flop 83. The high output 84 of the alarm flip flop 83 energizes a clock 85. The output of the clock 85 is coupled by a line 86 to one input 87 of AND gate 88, an input 89 of another AND gate 91, an input 92 of still another AND gate 93 and an input 94 of yet another AND gate 95. The output of the gate 88 is coupled to a counter 96. Upon reaching a predetermined count, the counter 96 supplies a pulse to the set terminal 97 of a master light flip flop 98. When the master light flip flop 98 is set, it supplies a high pulse to a monostable circuit 99 which provides an output to an amplifier 101 that powers a master light strobe 102. The high output of the master light flip flop 98 is also coupled by a line 103 to an input 104 of an AND gate 105 and, through an inverter 107, to the other input 106 of the gate 88. Thus, it is seen that when the output of the flip flop 98 is low, the gate 88 is held open by the inverter 107 to pass clock pulses to the counter 96. However, when the output of the flip flop 98 is high the gate 88 is closed.

The other input 108 of the gate 105 is coupled by an inverter 109 and a line 111 to the high output 112 of a flip flop 113. The flip flop 113 is initially in its reset state and thus the output 111 is low and the input 108 is high so the gate 105 is open. Thus the gate 105 produces an output on a line 114 when the master light flip flop 98 is in its set mode and produces no output when the flip flop 98 is in its reset mode. The line 114 is coupled to the other input 115 of the gate 91, thus permitting the clock pulses on the line 86 to pass on a line 116 to a counter 117 when the master light flip flop 98 switches to its set mode. When the counter 117 has reached a preselected count, a pulse is supplied on a line 118 to the set terminal 119 of the flip flop 113, thus raising the output 112 to the high state. Consequently, the gate 105 closes and the clock pulses are no longer supplied to the counter 117. The output of the flip flop 113, on the line 111, is also carried to a monostable multivibrator 121 that supplies a pulse on a ready light line 122 to a diode 123 and thence to an amplifier 124 to illuminate a data light strobe 125.

A line 126 carries the output of the flip flop 113 to the other input 127 of the gate 93 thus opening the gate to pass pulses from the clock 85 to still another counter 128. When the counter 128 has reached a preselected count, a pulse is passed to an input 129 of an AND gate 131. The output of the gate 131 is coupled to the set input 132 of a flip flop 133. The high output 134 of the flip flop 133 is coupled to a monostable circuit 135. A start pulse line 136 and a diode 137 couple the output of the monostable 135 to the amplifier 124. The output 134 of the flip flop 133 is also coupled by a line 138 to an input 139 of the gate 95 and, through an inverter 141, to the other input of the gate 131. The output of the flip flop 133 is normally low and thus the output of the inverter 141 is normally high. Consequently, the counter output pulse is passed to the flip flop 133. The pulse sets the flip flop 133, thus raising the output 134 to close the gate 131. Simultaneously the input 139 of the gate 95 is raised to the high level, thus allowing the gate 95 to pass pulses from the clock 85.

The clock pulses passed by the gate 95 are coupled by a line 142 to a multiplexer 143, one input 144 of the gate 145, a gate 146 wired as an inverter and a counter 154. The output of the inverter 146 is connected to an input 147 of another gate 148. The outputs of the gates 145 and 148 are coupled by diodes 149 and 151, respectively, to a delay circuit 152. The output of the delay circuit 152 is coupled to the amplifier 124. The multiplexer 143 also receives the alarm code cable 55 and the encoder cables 76-79. The output of the multiplexer 143 is coupled to a line 155 to an input 156 of the gate 145 and an inverter 157 that is coupled to an input 158 of the gate 148. (The operation of the multiplexer 143 will be explained below.) Inasmuch as the clock pulses are a series of alternate high and low signals delivered to the gate 95, the effect of the inverter 146 is that the gates 145 and 148 opened on alternate half cycles of the clock signal. In addition, due to the inverter 157, it is seen that only one of the gates 145 or 148 will at any given time receive a high pulse to its input 156 or 158, respectively.

When the counter 154 has reached a predetermined count, a reset signal is supplied on a line 161 that resets all the flip flops 83, 113, 133 and 98. Upon resetting, the flip flop 83 provides, on a line 163 from its low out-
put 162, a clear signal that clears the counters 96, 117, 128 and 154 and the multiplexer 143. Referring now to FIG. 6 there is shown a diagram of a multiplexer 143a that is similar to the multiplexer 143. The difference is merely one in size and not in operation. An understanding of the multiplexer 143a provides an understanding of the structure and operation of the multiplexer 143. The smaller multiplexer 143a is illustrated only to preserve clarity. A one's flip flop 171, a two's flip flop 172 and a four's flip flop 173 are wired to form a counter and are coupled to a clock 85 by lines 86 and 142. Eight input lines 174 are coupled to eight resistors 175 in the multiplexer 143a. The other ends of the resistors 175 are coupled to eight diodes 176 and thence to a common output line 177. A first output 178 of the one's flip flop 171 is coupled to a line 179 and a second output 181 is coupled to a line 182. A first output 183 of the two's flip flop 172 is coupled to a line 184 and a second output 185 is coupled to a line 186. A first output 187 of the four's flip flop 173 is coupled to a line 188 and a second output 191 is coupled to a line 192. A reset line 193 is coupled to all the flip flops 171-173.

The function of the multiplexer 143a is to sequentially connect the eight input lines 174 to the output line 177. Operation of the multiplexer 143a is preceded by a pulse on the reset line 193 to reset all the flip flops 171-3 so that the first outputs 178, 183 and 187 are in a low state and the second outputs 181, 185 and 191 are in a high state. It will be appreciated that each of the eight input resistors 175 is coupled to each of the flip flops 171-3 by a diode. The input resistor 175 on the line marked 1 is coupled to the line 182 by a diode 194 and to the line 186 by a diode 195 and to the line 192 by a diode 196. It will be appreciated that in the initial state, with the flip flops 171-3 reset, the cathodes of the diodes 194, 195 and 196 are held at the high level. Observation will show that the other data lines 174 numbered 2 through 8 are each connected by a diode, to at least one of the lines 179, 184 or 188 that is at a low state. Thus the states of the other lines 174 numbered 2 through 8 do not influence the state of the line 177. Consequently, the state of the line 174 numbered 1 is reflected on the line 177. When the clock 85 delivers a pulse, the one's flip flop 171 switches so that the line 179 is held at the high state and the line 182 is at the low state. Consequently, the diode 194 prevents the first data line 174 from influencing the state of the output line 177. However, it will be seen that the second data line 174 is now coupled to all high states, and thus the state of the second data line is the state of the output line 177. A check of the subsequent settings of the counter will show that as the clock 85 pulses, the eight input lines 174 are sequentially connected to the output line 177. The multiplexer 143 works precisely in this manner, first sequentially connecting the four individual lines of the line 76 to the line 155, followed by the cables 77, 78 and 79 and then the alarm coding cable 55.

Operation of the transmitter 81 is preceded by the resetting of all the flip flops 83, 98, 113 and 153 by the counter 154 through the reset line 161. Immediately following the resetting of the flip flops, the clear signal supplied on the line 163 by the flip flop 83 clears all the counters 96, 117, 128 and 154 and the multiplexer 143. This is a stable condition in which the system 81 remains until one of the switches 43 (FIG. 3) closes, when a signal is delivered on the line 48 to set the flip flop 83. The high signal from the output 84 starts the clock 85. Inasmuch as the signal on the line 103 is low, the inverter 107 supplies a high signal to the input 106 of the gate 88. Consequently, the gate passes the clock pulses to the counter 96. After the counter has reached a predetermined count, corresponding to a one quarter second delay, a signal is delivered to the set input 97 of the flip flop 98. When the flip flop 98 sets, a signal is delivered by the monostable circuit 99 which then strobes the master light 102 through the amplifier 101. The master strobe 102 is considerably brighter and its pulse of a longer duration than the data strobe 125.

Setting of the flip flop 98 puts a high signal on the line 103 thus closing the gate 88. The high signal on the line 103 is applied to the input 104 of the gate 105. Inasmuch as the input 108 of that gate is receiving a high signal, an output is provided on a line 114 to an input 115 of the gate 91. Thus, when the flip flop 98 changes state, the clock pulses are conducted by the gate 81 to a line 116 and thence to another counter 117. When the counter 117 has reached a predetermined count, corresponding to one quarter of a second of counting, a signal is delivered on a line 118 to the set input 119 of the flip flop 113. The high signal then delivered by the output 112 of the flip flop 113 is carried by the line 111 to close the gate 105 thus preventing further pulses from reaching the counter 117. Furthermore, the high signal from the output 112 is delivered to the monostable circuit 121 that produces the ready pulse at the data strobe 125.

The high output signal from the output 112 is carried by the line 126 to open the gate 93 thus permitting the clock pulses to be delivered to the counter 128. The counter 128 is set for a substantially shorter period of time than the counters 96 and 117. When the counter 128 reaches a predetermined count that signifies that the delay time between the ready pulse and start pulse has passed, a signal is delivered to the input 129 of the gate 131. The other input of the gate 131 is normally receiving a high signal. Thus a signal is delivered to the set input of the flip flop 133. Setting of the flip flop 133 produces a high signal at the output 134 thus causing the monostable circuit 135 to produce the start pulse at the data light 125. In addition, the high signal from the output 134 is carried on the line 138 to open the gate 95 to permit the clock pulses to pass therethrough and to close the gate 131. The clock pulses are then delivered by the gate 95 to the counter 154 that times the data transmission.

The output of the multiplexer 143 is coupled to the gates 145 and 148 by the line 155 and the inverter 157. The gate 145 is open during the high cycle of the clock pulses and, due to the inverter 146, the gate 148 is open during the low portion of the clock pulses. As stated above, the multiplexer 143 sequentially connects the lines in the cables 76, 77, 78 and 79 and in the alarm cable 55 to the line 155. Thus, if the line (from the cables 55, 76-9) connected to the output of the multiplexer 143 during a given clock cycle is high, the gate 145 will produce an output during the high portion of the clock pulse and neither the gate 145 nor the gate 148 will produce an output during the low portion of the clock pulse. Conversely, if the multiplexer is sampling a line at the low state, the gate 148 will produce an output during the low portion of the clock pulse and neither gate will produce an output during the high portion of the clock pulse.
the high portion. The outputs of the gates 145 and 148 are fed to the data strobe light 125 through the delay circuit 152. Thus it is seen that the lines in the cable 76–79 and 55 are sequentially connected to the line 155 and that an output will be provided to the delay circuit 152 during the first or second half of each clock cycle, depending on the state of the input line then being sampled by the multiplexer 143. The delay circuit 152 provides a short delay to insure that the pulse of the strobe light 125 occurs during the middle of the appropriate half cycle of the clock pulse. Allowing a preselected time for the pulse and centering the pulse therein reduces the chance of an error caused by the receiver interpreting a pulse near the edge of the time period as belonging to the time period preceding or subsequent to the proper time period.

Simultaneously with the multiplexer 143 completing the sequential connection of all the input cables to the output cable 155, the counter 154 reaches its preselected count and provides the reset signal on the line 161, thus resetting all the flip flops 83, 98, 113 and 133. Upon resetting, the clear signal is provided at the output 162 and clears all the counters 96, 117, 128, 154 and the multiplexer 143.

The preceeding transmission cycle has taken only 2% seconds. Consequently, the switch 43 (FIG. 3) will probably still be closed. Therefore, the signal will remain on the line 48 and the flip flop 83 will be set. Thus the cycle is repeated until the switch 43 is opened.

Referring now to FIG. 7 there is shown a pistol grip sensor 201 that is part of the receiver that the observer uses. Focusing lenses 202 direct incoming light from a narrow beam to a photo responsive diode 203. Aiming sights 204 of the pistol grip sensor 201 is facilitated by aiming sights 204. The output of the photo diode 203 is coupled to a preamplifier 205 thence to a high pass filter 206. The high pass filter 206 is utilized to regulate the wave shape of the signals coming from the preamplifier 205. The output of the high pass filter 206 is coupled to a Schmitt trigger 207 that produces a regulated square pulse on a line 208 in response to light received. A positive DC power source is coupled to a line 209 that supplies power to the preamplifier 205, the filter 206 and the Schmitt trigger 207. The line 209 is also coupled to a trigger microswitch 211 that is operated by a trigger 212. The output of the microswitch 211 is coupled to a trigger line 213. When the trigger 212 is pulled, power is supplied on the trigger output line 213.

Referring now to FIG. 8 there is shown a diagram of a receiver 221 that is utilized by the observer. The trigger line 213 is coupled to the set input 222 of a trigger flip flop 223. The zero output 224 of the flip flop 223 is coupled to a standby light emitting diode 225 and, by a reset line 226, to reset a counter 227. The one output 228 of the trigger flip flop 223 is coupled to an input 229 of an AND gate 231. The output of the AND gate 231 is coupled to a search light emitting diode 232. The output of an inverter 233 is coupled to the other input 234 of the AND gate 231, and the input of the inverter is coupled to a read light emitting diode 235. The one output 228 of the trigger flip flop 223 also supplies an enable signal on a line 236 to a 250 millisecond timer 237 and a clear signal on a line 230 to a shift register 240. The timer 237 begins timing when enabled by a signal on the line 236 but is reset by each pulse deliv-
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passed by the gate 245 to set the data ready flip flops 248.

Setting the data ready flip flop 248 raises the input of the inverter 233 to the high state to extinguish the search light emitting diode 232 and ignite the read light emitting diode 235. Furthermore, the clock 251 is started and the gate 252 is opened. Consequently, the data signals received during the following two seconds are passed to the shift register 240 and recorded therein and displayed by the display 261. Following the two second data reception period, the counter 227 reaches its predetermined count, and the output provided on the reset line 257 resets the flip flops 223 and 248. The data remains in the register 240 since the register is not reset until the trigger 212 is next actuated.

It will be appreciated that the decoding section of the receiver 221 (the monostable circuits 238 and 243 and the associated gates) not only decodes the information contained in the alarm signal, but, by requiring a 250 millisecond pause followed by two rapid pulses prior to data transmission, it rejects most noncoded or improperly signals. This is important inasmuch as a thief with knowledge of the basic system operation may set up a flashing strobe light remote from the location at which he plans to commit his theft as a diversionary tactic. Such a randomly flashing or improperly coded signal will be rejected by the receiver.

Obviously, many modifications and variations of the present invention are possible in light of the above teachings. It is to be understood, therefore, that the invention can be practiced otherwise than as specifically described.

What is claimed is:

1. A method for conveying alarm information comprising the steps of:
   providing high intensity omni-directional visual alarm signal generating devices in a plurality of different alarm locations;
   activating said signal generating means to produce an omnidirectional visual alarm signal at a first location of said plurality in response to a preselected event;
   encoding said visual alarm signal to indicate the position of said first location;
   positioning in a receiver location remote from said plurality of alarm locations a directional receiver for producing an encoded electrical output signal representing said encoded visual alarm signal;
   decoding said directional receiver at said first location; and
   decoding said electrical output signal to determine the position of said first location.

2. A method according to claim 1 wherein said activating step comprises manually energizing said signaling device in response to the occurrence of said preselected event near said first location.

3. A method according to claim 1 wherein said activating step comprises automatically energizing said signaling device in response to the occurrence of said preselected event near said first location.

4. A method according to claim 3 wherein said energizing step comprises the step of automatically responding to a fire alarm.

5. A method according to claim 3 wherein said energizing step comprises the step of automatically responding to a burglar alarm.

6. A method according to claim 1 wherein said directing step comprises visually observing the visual alarm signal.

7. A method according to claim 6 wherein said step of visually observing the alarm signal comprises visually observing the alarm signal from an elevated position.

8. A method according to claim 6 wherein said step of visually observing the alarm signal comprises a step of visually observing the alarm signal from an aircraft.

9. A method according to claim 1 wherein said decoding step comprises rejecting improperly coded and noncoded alarm signals.

10. A method according to claim 6 wherein said observing step comprises observing the alarm signal at an intermediate location and visually relaying the alarm signal for observation at the different location.

11. A method according to claim 10 wherein said step of observing the alarm signal comprises a step of visually observing the alarm signal by the preselected observer from an aircraft.

12. A system for conveying alarm information and comprising:
   signalling means for producing high intensity omnidirectional visual alarm signals at any of a plurality of locations in response to the occurrence of a preselected event therefor;
   encoding means for uniquely encoding the visual alarm signal at each said location;
   mobile directional receiving means for producing encoded electrical output signals in response to the visual alarm signals received from any of said locations; and
   decoding means for decoding said electrical output signals to indicate the position of the location at which the corresponding visual signal originated.

13. A system according to claim 12 wherein said signaling means comprises a high intensity strobe light.

14. A system according to claim 13 wherein said signaling means comprises automatic actuator means for automatically activating said signalling means upon the occurrence of the preselected event.

15. A system according to claim 14 wherein said automatic actuator means comprises a burglar alarm.

16. A system according to claim 14 wherein said automatic actuator means comprises a fire alarm.

17. A system according to claim 12 wherein said decoding means further comprises selective means for rendering said receiving means nonresponsive to improperly coded and noncoded alarm signals.

18. A system according to claim 17 wherein said receiving means comprises focus means for providing directional sensitivity in said receiving means.

19. A system according to claim 12 wherein said receiving means comprises a manually orientable, directional receiving portion that can be selectively aligned with any of said plurality of locations.

20. A system according to claim 19 wherein said receiving portion comprises aiming means for facilitating proper orientation thereof.

21. A system according to claim 20 wherein each of said signalling means comprises high power master light means for providing high intensity visual signals to aid in operation of said aiming means.

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