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MULTIPLE ALARM SYSTEM

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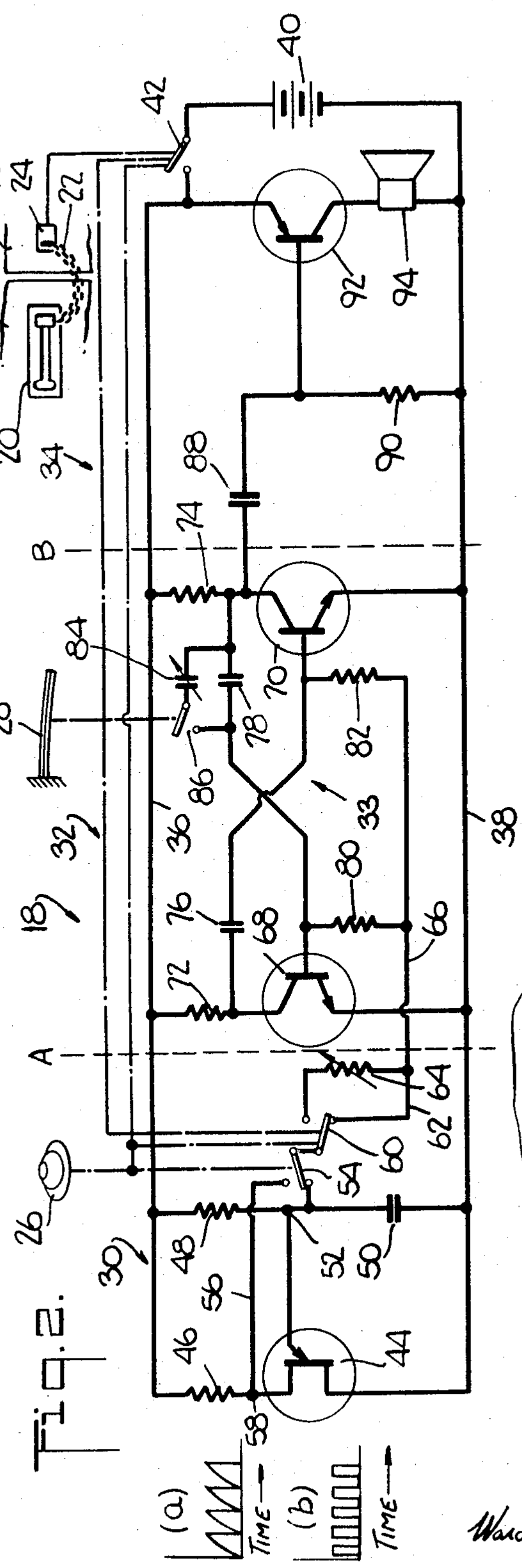

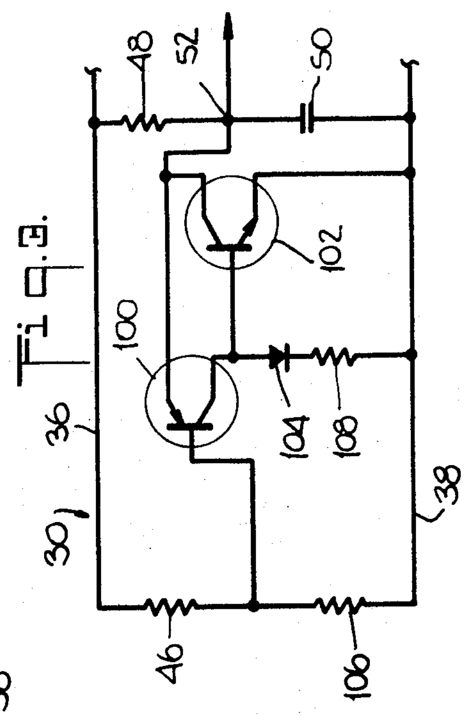

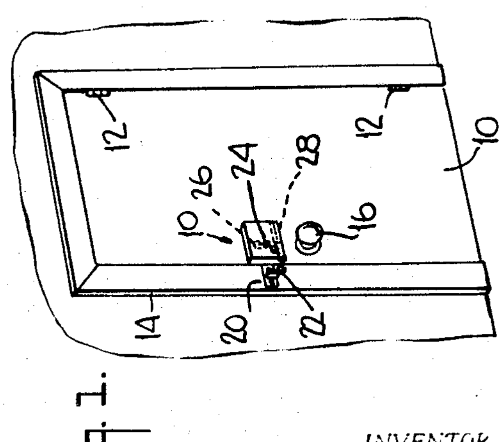

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MULTIPLE ALARM SYSTEM

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ABSTRACT OF THE DISCLOSURE

Multiple acoustical alarm system for producing different types of alarm signals according to occurrence of different conditions, including free running tone signal generator for producing signals at audible basic frequency, free running control generator connected to shift output frequency of tone signal generator at subaudible basic frequency, and switch and control means arranged in connection with said generators to establish different basic frequency combinations according to manner in which switch means are operated.

This invention relates to acoustical alarms and more particularly it concerns an electrically operated multiple alarm system.

The present invention is particularly useful as a multipurpose alarm arrangement which can be activated by any of several types of disturbance. For example, it is often beneficial to provide an alarm which will sound not only in response to an attempted burglary but which will also sound in response to the pressing of an emergency or doorbell button, and which further will sound in response to the presence of fire or excessive heat.

It is important to identify by various sounds the different conditions which produce actuation of the alarm. Thus, a bell sound could indicate the pressing of a doorbell or emergency button, while a buzzer or horn sound could indicate the occurrence of a fire, and a siren sound could indicate the occurrence of an attempted burglary.

In the past, it was necessary to provide a different sound producing mechanism for each of the several types of alarm sounds sought to be produced. These multiple mechanisms, even those of the electrical variety, were expensive and bulky; and they required rather large power sources.

The present invention overcomes all of these difficulties. According to the present invention there is provided, in a single package, a novel alarm system which operates to produce various types of alarm sounds including bells, buzzers or horns, and sirens. This novel alarm system requires very little power; and it may be made extremely small, so small in fact, that the entire system, including the power supply, may be mounted as a self contained unit on a door or other closure.

In an illustrative embodiment, the alarm system of the present invention provides different alarm sounds in response to different situations which may take place at a doorway. The system, which is completely packaged in a single self contained unit is attached to a door. The unit is interconnected with a doorbell button, a thermostatic heat detector, and a force sensitive switch means. Operation of any of these elements will cause the system to emit a different type of sound at a high volume. Thus, the doorbell button, when pushed, causes the system to ring in the manner of a doorbell. The thermostatic heat detector on the other hand, when actuated by excessive heat, will cause the system to buzz or sound as a horn. Further, the force sensitive switch means, when operated, will cause the system to emit a siren sound. This siren sound, as will be seen, is especially

effective in calling attention to an attempted breaking into the closure, for it varies in frequency in a particular manner which conveys and maintains a sense of urgency.

The present invention achieves the above described results by means of a novel circuit arrangement including a free running or astable tone signal generator having an audible basic frequency. There is additionally provided a free running control generator which is connected to shift the output frequency of the tone signal generator at a subaudible basic frequency. Switch means are arranged in connection with the generators to establish different basic frequency combinations according to the manner in which the switch means are operated. Transducer means, such as a loudspeaker, is connected to convert the output of the tone signal generator to acoustical signals.

As illustratively embodied, the tone signal generator comprises an astable multivibrator circuit including a pair of transistors, with cross coupled time delay circuits. The control generator comprises a resistance-capacitance time delay circuit and a voltage responsive breakdown means, such as a unijunction transistor or the equivalent thereof, connected to produce a recurrent sawtooth waveform. Means are provided to couple the time delay circuits of the multivibrator into the control generator so that the time delay action of the timing circuits is varied by the impedance changes which occur during the operation of the control generator. The coupling means additionally includes switching means which introduce different basic impedances between the control generator and the tone signal generator to change the basic frequencies of each of these generators.

The switching means, according to another aspect of the invention, serves to change the output of the control generator so that the impedance changes produced by it will follow either a rectangular pulse or a sawtooth waveform pattern according to the operation of the switching means. By properly controlling the operation of the switching means, the system can be made to produce an insistent siren type sound, a ringing bell sound or a horn or buzzer sound.

According to a still further aspect of the invention, the switching means can be arranged additionally to shift the symmetry, or duty cycle of the astable signal generator so as to simulate more realistically certain tones.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent constructions as do not depart from the spirit and scope of the invention.

Specific embodiments of the invention have been chosen for purposes of illustration and description, and are shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is a fragmentary perspective view illustrating one embodiment of the present invention arranged in conjunction with an entranceway;

FIG. 2 is a circuit diagram and schematic mechanical representation of the embodiment of FIG. 1; together with illustrative waveforms shown at selected locations throughout the system; and

FIG. 3 is an electrical schematic illustrating a modification of one portion of the circuit of FIG. 2.

The entranceway shown in FIG. 1 includes a door **10** which is mounted in the usual manner by means of hinges **12** to one side of a door casing **14**. The door **10** is provided with a conventional latch mechanism (not shown) which secures the door in closed position as shown and which is released upon turning a knob **16**, so that the door can be opened.

A multiple alarm unit **18**, forming one embodiment of the present invention, is mounted on the inside surface of the door **10** just above the knob **16**. The multiple alarm unit **18**, as shown, takes the form of a small rectangular box and is completely self contained except for certain external mechanical connections to be described.

As shown in FIG. 1 there is provided a chain lock plate **20** on the casing **14** in close relation to the alarm unit **18**. A locking chain **22** may be engaged at one end to the plate **20**. The other end of the chain **22** is affixed to a chain anchor **24** on the multiple alarm unit **18**. The plate **20**, the chain **22** and the anchor **24** cooperate to provide a chain lock mechanism which, when engaged, permits the door **10** to be opened slightly, but which prevents further opening movement of the door.

A door bell button **26** is mounted on the outside surface of the door **10** and is connected mechanically to switching means within the multiple alarm unit **18** in a manner to be described.

There is additionally provided a bi-metallic thermostatic element **28** which is mounted inside the multiple alarm unit **18**. The element **28** is arranged to bend in response to the surrounding temperature exceeding certain prescribed limits, and thus to actuate certain switching means in the system.

The multiple alarm unit **18**, as will be described becomes actuated in response to either (a) excessive tension on the locking chain **22**, (b) pressing of the doorbell button **26**, or (c) bending of the bi-metallic thermostatic element **28**. Each of these situations will cause the multiple alarm unit **18** to emit a different type of sound. That is, excessive tension on the locking chain **22** will cause the unit **18** to emit a siren sound having a particularly urgent characteristic; the pressing of the doorbell button **26** will cause the unit **18** to emit a ringing bell sound; and the bending of the bi-metallic thermostatic element **28** will cause the unit **18** to emit a horn or buzzer sound. Thus, the single unit **18** will respond in different ways to different situations, thus enabling a person in the vicinity immediately to assess the particular situation based upon the type of sound he hears without having first to go to the doorway to see what has caused the disturbance.

As represented in the diagram of FIG. 2, the electrical circuits making up the multiple alarm unit **18** are divided by means of heavy dashed lines A and B into three separate sections in which are contained respectively a control generator **30**, a tone generator **32**, and a power and output circuit **34**. Each of the sections is supplied by a common positive voltage supply line **36** and a common negative voltage supply line **38**. These supply lines extend through the system from batteries **40** located in the power and output circuit **34**. A normally opened main switch **42** is positioned in series with the batteries **40** and serves to connect them with the positive voltage supply line **36**. The normally opened switch **42** may be closed in various ways as will be explained more fully hereinafter.

The control generator **30** includes a uni-junction transistor **44** having one base terminal connected to the negative voltage supply line **38** and the other base terminal connected via a uni-junction resistor **46** to the positive voltage supply line **36**. A sweep generator circuit is also provided in the control generator section **30**. This sweep generator circuit comprises a sweep resistor **48** and a sweep capacitor **50** connected in series between the positive and negative voltage supply lines **36** and **38**. The emitter terminal of the uni-junction terminal transistor **44** is connected to a junction point **52** between the sweep resistor **48** and the sweep capacitor **50**.

A single-pole-double-throw bell switch **54** is arranged to move between a first position, connected as shown to the junction point **52**, and a second position connected to a bell line **56** extending from a junction point **58** between the uni-junction resistor **46** and the uni-junction transistor **44**. The output of the bell switch **54** is connected to the movable element of a single-pole-double-throw horn switch **60** which is movable between a first position connected to a bypass line **62** and a second position connected to one end of a variable impedance resistor **64**. The opposite ends of the bypass line **62** and of the variable impedance resistor **64** are each connected to a tone control line **66** which is coupled into the carrier generator **32**.

The tone generator **32** includes an astable or free running multi-vibrator circuit shown generally at **33**. This circuit includes first and second multi-vibrator transistors **68** and **70** of the NPN variety. The emitters of these two transistors are each connected to the negative voltage supply line **38** while their collectors are connected via associated collector resistors **72** and **74** to the positive voltage supply line **36**. The multivibrator transistors **68** and **70** are cross coupled between their collectors and bases by means of time delay circuits. These time delay circuits include timing capacitors **76** and **78** connected respectively between the base of one transistor and the collector of the other transistors. The timing circuits each further include a timing resistor **80** and **82** which extends between an associated transistor base terminal and the tone control line **66**. The tone control line **66** thus forms a portion of each of the time delay circuits. It will be noted that this line is connected through the control generator **30** to the positive voltage supply line **36**. Operation of the control generator **30** serves to vary the impedance between the tone control line **66** and the voltage supply line **36**. This in turn affects the operating characteristics of the timing circuits and thereby controls the output frequency of the multivibrator circuit **33**.

There is additionally provided a variable duty cycle capacitor **84** and a normally opened duty cycle switch **86** in parallel with the timing capacitor **78**.

Output signals from the multivibrator circuit **33** are taken from the collector terminal of the second transistor **70**, and supplied via a series connected coupling capacitor **88** and a shunt connected output resistor **90** to the base terminal of a power output transistor **92** in the power and output circuit **34**. The power output transistor **92** is of the PNP variety and has its emitter terminal connected to the positive voltage and supply line and its collector terminal connected in series with a loudspeaker **94** to the negative voltage supply line **38**. Thus, the electrical undulations produced in the tone generator **32** are amplified and converted to corresponding acoustical signals.

As shown schematically, the doorbell button **26** is connected to the bell switch **54**, the horn switch **60**, and the normally opened main switch **42**. The bi-metallic thermostatic element **28**, in turn, is connected to the horn switch **60**, the duty cycle switch **86** and the normally opened main switch **42**. The chain anchor **34**, on the other hand, is connected only to the normally opened main switch **42**.

Actuation of either the doorbell button **26**, the bi-metallic thermostatic element **28**, or the chain anchor **24** will cause the various switches to which they are connected to move from their shown unactuated positions to their actuated positions. While the various connections between the various switches and the actuating elements are indicated to be mechanical it will readily be recognized by those skilled in the art that equivalent electronic or electrical means such as silicon controlled rectifiers and the like may be substituted to effect the switching action in response to actuation of the various elements.

Operation of the above described system is initiated upon closing of the normally opened main switch **42** which effectively places the batteries 40 in circuit across the positive and negative voltage supply lines 36 and 38. When this occurs the control generator 30 and the tone generator 32 goes into operation at a certain basic frequency and with a certain wave form characteristic, the frequency and wave form characteristic being established by the particular condition of the various switches in these elements at the time the normally opened main switch is closed. The combination of the waveforms and operating frequencies of these two elements will establish the nature of the sound emitted at the loudspeaker 94.

The basic operation of the tone generator 32 is the same as that of an ordinary multivibrator. That is, the first and second multi-vibrator transistors 68 and 70 conduct during alternate periods, and the initiation of conduction of either of them causes an immediate extinction of the current flowing through the other thus terminating its conduction. The duration of conduction of each transistor lasts only long enough for a charge to be rebuilt across its respective timing capacitor 76 or 78. When this occurs, the voltage bias at the base terminal of the nonconducting transistor then reaches a level sufficient to bring the transistor into conduction. This in turn causes the voltage level at the base terminal of the other transistor to be immediately reduced below the cut off point of that transistor. This alternate conduction proceeds at a rate established by the capacitance value of the timing capacitors 76 and 78 and amount of impedance which exsists between each transistor's base terminal and the positive voltage supply line 36. This, as indicated previously, is varied during operation of the control generator 30.

The manner in which the control generator section 30 operates to vary the timing action of the multivibrator 33 is as follows: In order for the timing capacitors 76 and 78 to achieve a sufficient charge to effect switching of their respective multi-vibrator transistors 68 and 70, it is necessary for current to flow into these capacitors via their respective timing resistors 80 and 82. This current is obtained from the tone control line 66 which ultimately is connected through the control generator 30 to the positive voltage supply line 36. The control generator 30 varies the impedance between the positive voltage supply line 36 and the tone control line 66 and thus varies the rate at which the timing capacitors 76 and 78 achieve their respective charges after each occurrence of transistor switching. Thus, the variations in impedance produced by the control generator serve to control the frequency produced by the tone generator 32.

During operation of the control generator 30, current flows from the positive voltage supply line 36, through the sweep resistor 48 and into the sweep capacitor 50 so that the voltage at the junction point 52 gradually increases in magnitude. The rate at which this voltage increase takes place depends, of course, upon the resistance and capacitance values of these two elements. When the voltage at the junction point 52 exceeds a given threshold level, depending upon the particular characteristics of the unijunction transistor 44, a breakdown occurs which drastically reduces the impedance between the emitter and lower base terminals of the transistor 44 so that the sweep capacitor 50 discharges immediately via the transistor 44 to the negative voltage supply line 38. When the capacitor 50 has discharged, the emitter to base impedance of the unijunction transistor 44 is immediately reestablished and current flowing down through the sweep resistor 48 is again directed into the sweep capacitor 50 so that the capacitor begins to recharge at a relatively slow rate. As illustrated in the waveform diagram (a), the voltage at the junction point 52 thus follows a sawtooth pattern, rising relatively gradually to a given threshold level and then dropping abruptly to a lower level. The rate or frequency at which this occurs depends of course upon the respective values of the sweep resistor 48 and the sweep capacitor 50 and also upon the threshold or break down voltage of the unijunction transistor 44. For purposes of the present invention, the frequency rate is set to a sub-audible level.

OPERATION AS A SIREN ALARM

As stated above, operation of the alarm unit 18 to provide a siren effect occurs when excessive tension is produced upon the locking chain 22. Because of the connection between the chain anchor 24 and the normally opened main switch 42, the switch 42 is closed upon excessive pull upon the locking chain 22. This places a voltage across the positive and negative voltage supply lines 36 and 38 thus placing both the control generator 30 and the carrier generator 32 into operation. During this time, the bell switch 54, the horn switch 60 and the duty cycle switch 86 remain in their positions as shown in the diagram. Thus, the tone control line 66 is connected through the bypas line 62, to the junction point 52. As a result, the sawtooth voltage fluctuations at that junction provide corresponding impedance fluctuations to the tone control line 66. This, in turn, in cooperation with the low impedance path through the bypass line 62, and the various other system parameters serves to cause the multi-vibrator to oscillate between about 1200 and about 1800 cycles per second. This variation, of course, follows a sawtooth pattern, as illustrated by the waveform and takes place at less than 1 cycle per second. The resulting acoustical signal produced at the loudspeaker 94 is a siren sound which varies in such a manner that a special sense of urgency is conveyed. Moreover, it has been found that this sense of urgency does not diminish with time, since it is not a type of sound which is easily accommodated by the human ear.

OPERATION AS A HORN ALARM

Operation of the system as a horn alarm is initiated by the bending of the bi-metallic thermostatic element 28 in response to the ambient temperature exceeding a given preset value, such as would occur as a result of a fire in the vicinity of the door. When the element 28 bends, it causes the normally opened main switch 42 and the duty cycle switch 86 both to close, and it further causes switching of the horn switch 60. When this occurs, the batteries 40 become connected across the positive and negative voltage supply lines 36 and 38 as above described so that the control generator 30 and the tone generator 32 are placed into operation. The switching of the horn switch 60 in the control generator 30 has the effect of placing the variable impedance resistor 64 into circuit between the tone control line 66 and the positive voltage supply line 36. The result of this added impedance is that it effectively increases the operating frequency of the control generator 30 and simultaneously decreases the basic operational frequency of the tone generator 32. The parameters or values of the various elements in the control generator section 30 and tone generator 32 are such that the imposition of the variable impedance resistor 64 results in an increase in the control generator frequency to approximately 30 cycles per second and a decrease in the basic operating frequency of the tone generator 32 to between 400 and 600 cycles per second. The resulting signal output causes the loadspeaker 94 to emit a deep throated horn type sound of considerable volume.

The quality and authenticity of the horn sound is improved by the closing of the duty cycle switch 86. This places the duty cycle capacitor 84 into the timing circuit connected to the base terminal of the first multivibrator transistor 68, and effectively changes the timing characteristics on one side of the multi-vibrator so that one transistor conducts for a greater length of time than the other. This changes the duty cycle of the multi-vibrator circuit and serves to enhance the horn type sound produced by the system.

OPERATION AS A BELL ALARM

When the doorbell button **26** is pressed, it closes the main switch **42** and at the same time switches the position of the bell switch **54** and the horn switch **60**. As indicated previously, closing of the main switch **42** operates to connect the batteries **40** across the positive and negative supply lines **36** and **38** so that the control generator **30** and the tone generator **32** are placed in operation. The variation in impedance between the carrier frequency control line **66** and the positive voltage supply line **36** however does not follow the sawtooth waveform which occurs at the junction point **52** in the control generator **30**. Instead, the bell switch **54** places the tone control line **66** into communication with the bell line **56** and thus with the junction **58** between the junction resistor **46** and the uni-junction transistor **44**. As shown in the waveform (b), the impedance variation produced by this connection follows a square wave pattern. As a result of this, the tone generator is shocked into different operating conditions as the impedance on the tone control line **66** is abruptly changed. This sudden shocking of a resonant member, such as the tone generator **32**, from one condition to the other, simulates the striking of a bell; and in fact has been found to produce a bell sound at the loudspeaker **94**. The quality of the bell sound is improved by the simultaneous operation of the horn switch **60** to place the variable impedance resistor **64** into circuit between the control generator **30** and the tone generator **32**. As with operation as a horn, bell sounds are rendered more authentic by this operation since it simultaneously increases the basic operating frequency of the control generator **30** and decreases the basic operating frequency of the tone generator **32**. The variable impedance resistor **64** and the variable duty cycle capacitor **86** are both shown to be adjustable. Means may be provided to factory set the values of these elements to obtain a particular tonal quality for operation both as a horn and as a bell, or, if desired, any of several well known means may be provided for allowing the user to make his own adjustments in accordance with his individual needs or desires.

As regards the other elements of the system, the following values have provided an especially satisfactory arrangement:

Unijunction resistor **46**	ohms	1.2K
Sweep resistor **48**	do	3.0K
Collector resistors **72, 74**	do	1.0K
Timing resistors **80, 82**	do	12.0K
Output resistor **90**	do	1.2K
Variable impedance resistor **64** (variable)		5.0K
Sweep capacitor **50**	mfd	100
Timing capacitors **76, 78**	pf	47,000
Coupling capacitor **88**	mfd	10
Unijunction transistor **44**		2N2646
Multivibrator transistors **68, 70**		2N1308
Batteries **40**	volts	6
Loudspeaker **94**	ohms	8

FIG. 3 shows a modification of the control generator **30** wherein a PNP type transistor **100**, an NPN type transistor **102**, and a diode **104** are substituted for the unijunction transistor **44**; and an added resistor **106** is connected between the uni-junction resistor **46** and the negative voltage supply line **38**. The base of the PNP transistor **100** is connected to a junction between the resistors **46** and **106**, and its emitter is connected to the junction point **52** between sweep resistor **48** and the sweep capacitor **50**. When the junction point voltage causes the base to emitter potential of the PNP transistor **100** to rise above its cut-off point, the transistor begins to conduct and allow current to flow through the diode **104** and a collector connected resistor **108** to the negative voltage supply line **38**. The base of the NPN transistor **102** is connected to the emitter of the PNP transistor **100** and thus experiences a voltage increase when the PNP transistor begins to conduct. The collector and emitter of the NPN transistor **102** are connected between the junction point **52** and the negative voltage supply line **38**; so that when the base terminal potential is raised above cut-off, the transistor **102** immediately allows the sweep capacitor **50** to discharge.

The action thus produced by the two transistor arrangement is thus the same as that produced by the unijunction transistor arrangement of FIG. 2. In some situations the two transistor arrangement is more economical in spite of the fact that it requires more elements, since the elements used are more conventional and may be produced at a lower cost.

The following values for the various elements in the two transistor arrangement of FIG. 3 have been found to give satisfactory performance with a system whose elements otherwise have the values tabulated above:

Added resistor **106**	ohms	4.7
Sweep resistor **48**	do	3.3K
Collector connector resistor **108**	do	470
PNP transistor **100**		2N461
NPN transistor **102**		2N1308
Diode **104**		1N461

It will be appreciated that the system of the present invention, while employing a minimum of elements, is extremely versatile and is capable of responding to any of several situations or conditions. The elements used in the system moreover may be packed very compactly so that the entire unit may be incorporated in a very small container. Moreover, the solid state elements used in this system require very low driving power so that small pen-light type batteries may be packaged with the system to make a completely independent self supporting unit which can be mounted at locations remote from available electrical power sources.

What is claimed and desired to be secured by Letters Patent is:

1. A multiple acoustical alarm system for producing different types of alarm signals according to the occurrence of different conditions, said system comprising a tone signal generator for generating electrical signals which vary at an audible rate, transducer means for converting said electrical signals to corresponding acoustical signals, a control generator for controlling the output frequency of said tone signal generator, said control generator being operable to vary at a basic frequency, and according to a given wave pattern, the output frequency of said tone signal generator, switch means arranged in circuit with said tone signal generator and said control generator to cause said generators to operate at different basic frequencies according to the condition of said switch means, said switch means being arranged to change the basic frequencies of said generators in mutually opposite directions, and means for operating said switch means according to a condition to be represented whereby said system produces a different characteristic sound for each condition to be represented.

2. An alarm system as in claim **1** wherein said switch means further includes means for switching said control generator in a manner to produce control signals of different waveshapes.

3. An alarm system as in claim **1** wherein said switch means further includes means for changing the operational symmetry of said tone signal generator.

4. A multiple acoustical alarm system for producing different types of alarm signals according to the occurrence of different conditions comprising, a tone signal generator including an astable multivibrator circuit having cross coupled timing circuits, and having a basic operational frequency within the audible range, a free running control generator having a basic operational frequency below the audible range, said control generator including variable impedance means arranged to be connected into said timing circuits of said tone signal generator for changing the output frequency of said tone signal generator in accordance with the operation of said control generator, a plurality of coupling means having different fixed impedance characteristics, at least one of said coupling means being constructed to simultaneously vary the basic frequencies of said tone signal generator and said control generator, switch means operable to connect different ones of said coupling means between said control generator and said timing circuits according to different conditions to be indicated, whereby the basic operational frequencies of said tone signal generator and said control generator are established by the existence or absence of said conditions, and transducer means for producing acoustical signals in response to output signals from said tone signal generator.

5. An alarm system as in claim **4** wherein said control signal generator includes a sweep voltage charging circuit and a voltage responsive trigger discharge circuit.

6. An alarm system as in claim **5** wherein said switch means includes means for switching said coupling means alternately between said sweep voltage charging circuit and said trigger discharge circuit.

7. An alarm system as in claim **4** wherein said switch means includes means for changing the relative timing characteristic of said timing circuits.

8. An alarm system as in claim **5** wherein said switch means is operable in response to a first condition to connect a first impedance coupling means between said timing circuits and said sweep voltage charging circuit, and is operable in a second condition to connect a second impedance coupling means, higher than said first impedance coupling means, between said timing circuits and said sweep voltage charging circuit, and is operable in a third condition to connect a third impedance coupling means, higher than said first impedance coupling means, between said timing circuits and said trigger discharge circuits.

9. An alarm system as in claim **8** wherein said switch means is further operable in response to said second condition to change the timing characteristic of one of said timing circuits with respect to the other.

10. A multiple acoustical alarm system comprising a tone signal generator including a pair of transistors, a pair of associated time delay circuits cross coupled between said transistors to form an astable multivibrator circuit having a basic output frequency within the audible range, a free running solid-state control generator having a basic operational frequency below the audible range, coupling means interconnecting said control generator and said time delay circuits in a manner such that the basic output frequency of said tone signal generator is modulated with the basic frequency of said control generator, said coupling means including means for switching its basic impedance between discrete values for changing the basic operational frequencies of said multivibrator circuit and said control generator, and loudspeaker means connected to be driven in accordance with output signals from said multivibrator circuit and to generate corresponding acoustical signals.

11. An alarm system as in claim **10** wherein said time delay circuits include means for changing the time delay characteristic of one circuit with respect to the other, said last mentioned means being operable by said switch means.

12. An alarm system as in claim **10** where said time delay circuits include capacitors and resistors connected via a common impedance path to a voltage source, said common impedance path including said coupling means and at least a portion of said control generator.

13. An alarm system as in claim **12** wherein said coupling means includes a plurality of alternate paths of different impedances, said paths being selectively connectable into said common impedance path by said switching means.

14. An alarm system as in claim **10** wherein said control generator comprises a resistor and a capacitor connected in series between positive and negative voltage supply lines and a threshold voltage responsive capacitor discharge means connected across said capacitor for effectively discharging same.

15. An alarm system as in claim **14** wherein said discharge means includes resistance means connected between said positive and negative voltage supply lines and a first junction along said resistance means which undergoes a square wave pattern during operation of said control generator while a second junction between said resistor and said capacitor undergoes a sawtooth wave pattern, said switching means further being operative to switch said coupling means alternately between said first and second junctions.

16. In a multiple acoustical alarm system the combination of a tone signal generator whose basic output frequency varies within the audible range in response to applied control generator outputs, a control generator having an output frequency below the audible range, coupling means including a plurality of impedance elements constructed to be connected between the output of said control generator and the input of said tone signal generator, both said tone signal generator and said control generators being constructed to have their basic frequency dependent upon the impedance through said coupling means, said coupling means including switch means operative to produce changes in the impedance value of said coupling means in response to various conditions to be indicated thus to shift the basic frequency of both of said generators, and transducer means connected to the output of said tone signal generator for producing acoustical signals in response to outputs from said tone signal generator.

17. An alarm system as in claim **16** wherein the output frequency of said tone signal generator varies in response to variations in the output impedance of said control generator.

18. An indicator alarm system for indicating the nature of disturbance to a closure, said system comprising a tone signal generator for generating electrical signals having frequencies within the audio range, said tone signal generator being constructed to produce, in a quiescent state, electrical signals which vary at a basic frequency, transducer means for converting said electrical signals to corresponding acoustical signals, a control generator arranged to shift the output frequency of said tone signal generator, said control generator itself having a subaudible basic frequency, impedance means and plural switch means coupling said tone generator and said control generator in such manner that different combinations of the states of such switch means changes the impedance to cause said generators to operate at different basic frequencies, a plurality of disturbance sensing devices each responsive to a different disturbance at said closure, and means connecting said disturbance sensing devices to said switch means in a manner such that each of said sensing devices responds to a different disturbance by producing a different combination of states of said switch means.

19. An indicator alarm system according to claim **18** wherein said control generator is operable to vary a basic frequency of said tone signal generator such that at the occurrence of a first given disturbance, the characteristic sound at said transducer means corresponds to a siren.

20. An indicator alarm system according to claim **18** wherein said control generator is operable to vary a basic frequency of said tone signal generator such that at the occurrence of a second given disturbance the characteristic sound at said transducer means corresponds to a bell.

21. An indicator alarm system according to claim **18** wherein said control generator is operable to vary a basic frequency of said tone signal generator such that at the occurrence of a third given disturbance the characteristic sound at said transducer means corresponds to a horn.

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