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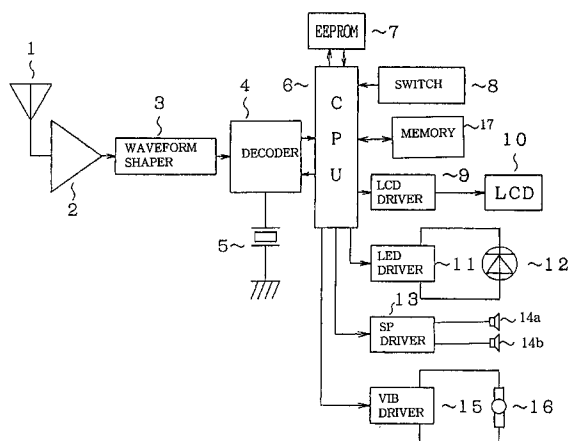
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D-81675 München (DE)(54) **Selective calling receiver with selectable alerting means and method of setting modes therefor.**

(57) A selective calling receiver with selectable alerting means has a plurality of alerting means (9-16) for indicating an incoming call, a setting unit (8) for setting at least one of the alerting means to operate in response to an incoming call and a period of time for which the alerting means is to operate, a memory (17) for storing a setting made by the setting unit, and a control unit (6,7) for referring to the setting stored by the memory when an incoming call arrives and operating the alerting device based on the setting.

Fig. 2

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The present invention relates to a selective calling receiver with selectable alerting means, and more particularly to a selective calling receiver with selectable alerting means for reliably alerting the user of an incoming call.

Heretofore, selective calling receivers with selectable alerting means have generally had an alerting device for acoustically alerting the user of an incoming call. Recently, there have been proposed selective calling receivers that inform the user of an incoming call through vibration or light to allow the user to recognize the incoming call reliably or to meet different conditions in which the user carries the receiver. For example, a selective calling receiver provides a choice of a buzzer sound, vibration, or light for indicating an incoming call, and the user may select one of these mediums in advance as a call indicator. When an incoming call arrives, the selective calling receiver informs the user of the incoming call through the selected medium. In this way, the incoming call is indicated by the medium desired by the user, with the result that the user can detect an incoming call with high reliability.

Japanese laid-open patent publication No. 2-27936 discloses a selective calling receiver having an acoustic alerting device for effectively alerting the user of an incoming call in a desired alerting pattern.

However, since conventional selective calling receivers are arranged to selectively operate the alerting device, the user may fail to recognize an incoming call. For example, if the user selects vibration as the call indicating medium, the user will fail to detect an incoming call if the user places the selective calling receiver in a pocket of a jacket and then carry the jacket by hand, or if the user selects a buzzer sound as the call indicator, the user may not hear the buzzer sound due to surrounding noise.

Generally, receivers of the type described above have a display unit for displaying the message of an incoming call when such an incoming call arrives, so that the user can visually confirm the incoming call. When the user forgets to confirm the incoming call, however, the message of the incoming call remains unread for a long period of time, with the result that the user cannot reliably detect an incoming call.

It is therefore an object of the present invention to provide a selective calling receiver with selectable alerting means for allowing the user to detect an incoming call with increased probability.

Another object of the present invention is to provide a method of setting modes in a selective calling receiver with selectable alerting means.

To achieve the above object, there is provided in accordance with the present invention a selective

calling receiver with selectable alerting means comprising a plurality of alerting means for indicating an incoming call, setting means for setting at any time at least one of the alerting means to operate in response to an incoming call and a period of time during which the alerting means is to operate, memory means for storing a setting made by the setting means, and control means for referring to the setting stored by the memory means when an incoming call arrives, and operating the alerting means based on the setting.

The setting means may comprise means for making a setting for selectively operating a single alerting device, a setting for selecting simultaneous operation of a plurality of alerting devices, and a setting for selecting successive operation of a plurality of alerting devices.

The alerting means may include an alerting means that informs of an incoming call with emitted light, an alerting means that informs of an incoming call with a buzzer sound, an alerting means that informs of an incoming call with a melodic sound, and an alerting means that informs of an incoming call with vibration.

The setting means may comprise a plurality of switches and means for setting at least one of the alerting means and the period of time with a sequence in which the switches are to be pressed.

According to the present invention, there is also provided a method of establishing a setting in a selective calling receiver with selectable alerting means comprising a plurality of alerting means for indicating an incoming call, setting means comprising a plurality of switches for setting at least one of the alerting means to operate in response to an incoming call and a period of time for which the alerting means is to operate, memory means for storing a setting made by the setting means, and control means for referring to the setting stored by the memory means when an incoming call arrives, and operating the alerting means based on the setting, the method comprising the step of setting at least one of the alerting means and the period of time with a sequence in which the switches are to be pressed.

The above and other objects, features, and advantages of the present invention will become apparent from the following description when taken in conjunction with the accompanying drawings which illustrate a preferred embodiment of the present invention by way of example.

Fig. 1 is a perspective view of a selective calling receiver with selectable alerting means according to the present invention;

Fig. 2 is a block diagram of the selective calling receiver with selectable alerting means;

Fig. 3 is a flowchart of a sequence for establishing an alerting process; and

Figs. 4(a) and 4(b) are timing charts of alerting processes.

As shown in Fig. 1, a selective calling receiver with selectable alerting means 100 according to the present invention has a power supply switch 101, a shift switch 102, a select switch 103, and a mode switch 104 for establishing modes and operation processes, a display unit 105 for displaying the message of a calling signal which has been received, a position indicator 106 for indicating the status of the power supply switch 101, and a light-emitting diode (LED) 107 for indicating a received condition of the calling signal.

The power supply switch 101 comprises a three-state slide switch for selecting an OFF state, an ON state in a mute mode, and an ON state in a sound generating mode, and also doubles as a push switch for establishing a setting determined by the shift switch 102, the select switch 103, and the mode switch 104.

The selective calling receiver with selectable alerting means 100 has an electric circuit arrangement as shown in Fig. 2. As shown in Fig. 2, the selective calling receiver with selectable alerting means 100 comprises an antenna 1, a radio signal circuit 2, a waveform shaper 3, a decoder 4, a quartz oscillator 5, a central processing unit (CPU) 6, an electrically erasable programmable read-only memory (EEPROM) 7, a switch 8, a liquid crystal display (LCD) driver 9 for energizing an LCD 10 which serves as the display unit 105 shown in Fig. 1, an LED driver 11 for energizing an LED 12 which serves as the LED 107 shown in Fig. 1, a loudspeaker (SP) driver 13 for energizing loudspeakers 14a, 14b, a vibrator (VIB) driver 15 for energizing a vibrator 16, and a memory 17.

The switch 8 is composed of the power supply switch 101, the shift switch 102, the select switch 103, and the mode switch 104. Settings inputted through these switches are stored in the memory 17 through the CPU 6. The CPU 6 controls operation of the selective calling receiver with selectable alerting means 100 according to a control sequence and the settings stored in the memory 17. Specifically, the CPU 6 controls operation of the LED 10, the LED 12, the loudspeakers 14a, 14b, and the vibrator 16, respectively, through the LCD driver 9, the LED driver 11, the loudspeaker driver 13, and the vibrator driver 15 depending on data which are received by the antenna 1 and transmitted through the radio signal circuit 2, the waveform shaper 3, and the decoder 4 and also on settings inputted to the switch 8.

Operation of the selective calling receiver with selectable alerting means 100 to receive a signal will be described below.

A radio signal (calling signal) received by the antenna 1 is amplified and demodulated by the

radio signal circuit 2.

The demodulated signal is converted by the waveform shaper 3 into a digital signal having a waveform that can be read by the decoder 4. The decoder 4 receives the digital signal in synchronism with a reference clock generated by the quartz oscillator 5. The address number of the selective calling receiver with selectable alerting means 100 has been stored in the EEPROM 7, and sent to the decoder 4 through the CPU 6. The decoder 4 compares the address number of the selective calling receiver with selectable alerting means 100 from the CPU 6 and the digital signal from the waveform shaper 3. If the digital signal agrees with the address number of the selective calling receiver with selectable alerting means 100, then, since the calling signal is addressed to the selective calling receiver with selectable alerting means 100, the decoder 4 receives a message signal following the calling signal, and transmits the message signal to the CPU 6.

The CPU 6 receives the message signal from the decoder 4, and causes the LCD driver 9 to display the information of the message signal on the LCD 10. At the same time, the CPU 6 energizes a call indicator to indicate the incoming call.

According to the present invention, the call indicator comprises a plurality of alerting devices. In the illustrated embodiment, specifically, the alerting devices include the LED 12 energizable by the LED driver 11 for indicating an incoming call with a flashing light, the loudspeakers 14a, 14b energizable by the loudspeaker driver 13 for generating a buzzer sound and a melodic sound, and the vibrator 16 energizable by the vibrator driver 15 for generating vibration. The LED 12 is energized by the LED driver 11 to indicate an incoming call at all times. However, the loudspeakers 14a, 14b and the vibrator 16 are either selectively or simultaneously energized according to a setting inputted through the switch 8. The loudspeakers 14a, 14b indicate an incoming call either selectively or simultaneously through a buzzer sound and a melodic sound. It is possible to select a period of time for which an incoming call is to be indicated, with a setting inputted to the switch 8. The settings made through the switch 8 are stored in the memory 17. The CPU 6 refers to the data stored in the memory 17, and determines which and how to operate the alerting devices.

A process of inputting settings through the switch 8 will be described below. Operation of various components of the selective calling receiver with selectable alerting means 100 in such a process of inputting settings is also controlled by the CPU 6 according to the control sequence stored in the memory 17.

A reception mode is established when no signal is being received. After the user of the selective calling receiver with selectable alerting means 100 confirms a reception standby condition with the position indicator 106 shown in Fig. 1, the user presses the mode switch 104 while pressing the power supply switch 101. In response to an input signal from the mode switch 104, the CPU 6 displays a selected mode on the LCD 10.

Modes that can be established include an alerting type setting mode for confirming whether an incoming call is to be indicated by a plurality of alerting devices, and, if so, whether an incoming call is to be indicated by a plurality of alerting devices simultaneously, a channel setting mode for selecting a channel indicative of whether an incoming call is to be indicated by a buzzer sound, melodic sound, or vibration, a date and time setting mode for setting a date and a time, and an alarm time setting mode for setting a period of time for which an incoming call is to be indicated. When the mode switch 104 is pressed while the power supply switch 101 is being pressed, the LCD 10 displays the channel setting mode in a flashing fashion. Each time the mode switch 104 is subsequently pressed while the power supply switch 101 is being released, the flashing display on the LCD 10 switches from one mode to another. When the shift switch 102 is pressed while one of the modes is being displayed in a flashing fashion on the LCD 10, the selective calling receiver with selectable alerting means 100 enters a status for establishing the mode that is being displayed in a flashing fashion.

Specific processes for establishing the respective modes will be described below.

In the alerting type setting mode, the display unit 105 displays "SINGLE ALERT" in a flashing manner. Each time the shift switch 102 is subsequently pressed, the display unit 105 successively displays "SIMULTANEOUS MULTIPLE ALERT" and "NON-SIMULTANEOUS MULTIPLE ALERT" in a flashing manner. When the user presses the power supply switch 101 while a desired alerting type is being displayed, the displayed alerting type is established.

In the channel setting mode, the display unit 105 displays "CH-1: BUZZER SOUND OUTPUT". Each time the shift switch 102 is subsequently pressed, the display unit 105 successively displays "CH-2: MELODIC SOUND OUTPUT" and "CH-3: VIBRATOR" in a flashing fashion. When the user presses the power supply switch 101 while a desired channel is being displayed, the displayed channel is established. If "CH-1: BUZZER SOUND OUTPUT" is established, then the display unit 105 subsequently displays prompts for selective inputs such as of "SOUND PATTERN", "SOUND PITCH",

etc. If "CH-2: MELODIC SOUND OUTPUT" is selected, then the display unit 105 subsequently displays a prompt for a selective input of "MELODY TYPE" and selectable alternatives. By moving a display cursor to a desired one of the selectable alternatives and pressing the power supply switch 101, the desired alternative is established.

The date and time setting mode will next be described. In the date and time setting mode, it is possible to establish items including "MONTH", "DATE", and "MINUTE". When the shift switch 102 is pressed after the selective calling receiver with selectable alerting means 100 has entered the date and time setting mode, the display unit 105 displays present setting numerical values and the items of "MONTH", "DATE", and "MINUTE" successively in a flashing manner. When the select switch 103 is pressed while a numerical value to be altered is being displayed in a flashing fashion, the numerical value is incremented and altered. When the power supply switch 101 is pressed after all items have been set, the altered numerical values are fixed and the date and time setting mode is ended. If a date and a time have already been established, the presently set time is displayed, and the date and time setting mode is ended simply by pressing the power supply switch 101.

The process for establishing the alarm time setting mode varies depending on the setting in the alerting type setting mode. If "SINGLE ALERT" or "SIMULTANEOUS MULTIPLE ALERT" is established in the alerting type setting mode, then the display unit 105 displays "ALERTING TIME" in the alarm time setting mode. When the select switch 103 is then pressed, the numerical value is incremented and altered, and when the power supply switch 101 is thereafter pressed, the altered numerical value is fixed, and the alarm time setting mode is ended.

If "NON-SIMULTANEOUS MULTIPLE ALERT" is established in the alerting type setting mode, the display unit 105 displays "__ SECONDS AFTER STARTING TIME" from the signal reception. When the shift switch 102 is pressed, the display unit 105 displays "ALERTING TIME". Each of starting and alerting times can be established by pressing the select switch 103 to increment the numerical value during the display, and then pressing the power supply switch 101.

A manipulating process carried out by the user for making settings for the alerting devices in the selective calling receiver with selectable alerting means 100 will be described below with reference to Fig. 3.

Any manipulating steps in the manipulating process are effected by applying input signals through the power supply switch 101, the shift switch 102, the select switch 103, and the mode

switch 104.

First, the alerting type setting mode is established, and any one of "SINGLE ALERT", "SIMULTANEOUS MULTIPLE ALERT", and "NON-SIMULTANEOUS MULTIPLE ALERT" is established in a step S101.

If "SINGLE ALERT" is established, then the selective calling receiver with selectable alerting means 100 enters the channel setting mode in which any of the buzzer sound or the melodic sound produced by the loudspeakers 14a 14b and the vibration produced by the vibrator 16 is selected in a step S102. If the buzzer sound is selected, then a sound pattern and a sound pitch (frequency) are selected. If the melodic sound is selected, then a melody title is selected. Thereafter, an alerting time is established in a step S103.

If "SIMULTANEOUS MULTIPLE ALERT" is established in step S101, then any of the buzzer sound or the melodic sound produced by the loudspeakers 14a, 14b and the vibration produced by the vibrator 16 is selected in a step S105. Thereafter, a step S106 determines whether a next alerting device is to be established. If a next alerting device is to be established, then a second alerting device is selected from the remaining alerting devices and established in step S105. In this embodiment, the buzzer sound and the melodic sound produced by the loudspeakers 14a, 14b and the vibration produced by the vibrator 16 are available to be established, and a maximum of two of these alerting devices can be established. An informing time is then established in a step S107.

If "NON-SIMULTANEOUS MULTIPLE ALERT" is established in step S101, a plurality of alerting devices are successively operated. With this setting, a first alerting device is established in a step S108, and an alerting starting time and an alerting time are established in a step S109. Thereafter, a step S110 determines whether a next alerting device is to be established. If a next alerting device is to be established, then a second alerting device is selected from the remaining alerting devices, and established in step S108. Thereafter, an alerting time is established in step S109. The second alerting time is a period of time after the alerting by the first alerting device is finished. Thereafter, a third alerting device and an alerting time are established in a similar manner.

For example, if a melodic sound and a vibration are set to be produced simultaneously to indicate an incoming call, then the melodic sound and the vibration are simultaneously generated for 20 seconds, as shown in Fig. 4(a). It is possible to indicate an incoming call with a buzzer sound and a vibration which are simultaneously produced. Since both the buzzer sound and the melody are acoustic indicators, only one of them is generally

selected.

If a melodic sound, a buzzer sound, and a vibration are to be produced successively to indicate an incoming call, vibration is first generated for 10 seconds by the vibrator, then the melodic sound is generated for 10 seconds, and thereafter the buzzer sound is generated for 20 seconds, as shown in Fig. 4(b).

Consequently, the user of the selective calling receiver with selectable alerting means 100 can select an alerting device for operation in a desired mode depending on how the user carries the selective calling receiver with selectable alerting means 100. For example, if a sound to be produced by the loudspeaker 14a, 14b and vibration to be produced by the vibrator 16 are set to be simultaneously produced to inform the user of an incoming call as shown in Fig. 4(a), then when the user carries the selective calling receiver with selectable alerting modes 100 in the pocket of a jacket, the user can detect an incoming call with a buzzer sound even if the user happens to be carrying the jacket by hand. If a vibration, a melodic sound, and a buzzer sound are set to be successively produced to inform the user of an incoming call as shown in Fig. 4(b), then since the vibration is first produced by the vibrator 16, the user alone will be able to detect an incoming call without disturbing other people. Even if the user should take off the jacket with the selective calling receiver with selectable alerting means 100 in a pocket thereof, the user will be able to detect an incoming call by the melody sound which follows the vibration without disturbing other people. Even if the user puts the jacket away with the selective calling receiver with selectable alerting means 100 in a pocket thereof, the user will still be able to subsequently detect an incoming call by the buzzer sound. In this case, however, the buzzer sound may be heard by other people.

Therefore, when the user of the selective calling receiver with selectable alerting means 100 has selected an alerting device for operation in a desired mode depending on how the user is carrying the selective calling receiver with selectable alerting means 100, the user can detect an incoming call with high reliability. The capability of the selective calling receiver with selectable alerting means 100 to alert the user of an incoming call is thus increased, making the selective calling receiver with selectable alerting means 100 highly useful.

Settings for combinations of the alerting devices are not limited to the examples shown in Figs. 4(a) and 4(b). Furthermore, the alerting devices may be set to be used in various other combinations.

In the above embodiment, the user is informed of incoming calls by the LED 107 at all times.

However, the user may be informed of incoming calls by the LCD 10, and the LED 107 may be set to display an incoming call.

With the arrangement of the present invention as described above, at least one of a plurality of alerting devices is selected, and a period of time for which the selected alerting device operates is established to inform the user of an incoming call. Therefore, the alerting devices may be selected and operated in any desired combination to inform the user of an incoming call. The user can thus make a suitable setting depending on how the user is carrying the selective calling receiver with selectable alerting means 100, and the user is consequently able to detect an incoming call with high probability, with the result that the selective calling receiver with selectable alerting means 100 can be made highly useful.

Particularly, the selective calling receiver with selectable alerting means 100 allows the user to make any one of a setting for selectively operating a single alerting device, a setting for selecting simultaneous operation of a plurality of alerting devices, and a setting for selecting successive operation of a plurality of alerting devices. The selective calling receiver with selectable alerting means 100 can therefore alert the user of an incoming call in an optimum manner for any one of various patterns in which the user carries the selective calling receiver with selectable alerting means 100, thereby effectively permitting the user to detect an incoming call.

Although a certain preferred embodiment of the present invention has been shown and described in detail, it should be understood that various changes and modifications may be made therein without departing from the scope of the appended claims.

Claims

1. A selective calling receiver with selectable alerting means comprising:
 - a plurality of alerting means for indicating an incoming call;
 - setting means for setting at any time at least one of said alerting means to operate in response to an incoming call and a period of time for which the alerting means is to operate;
 - memory means for storing a setting made by said setting means; and
 - control means for referring to the setting stored by said memory means when an incoming call arrives, and operating the alerting means based on the setting.
2. A selective calling receiver with selectable alerting means according to claim 1, wherein said setting means comprises means for mak-

ing a setting for selectively operating a single alerting device, a setting for selecting simultaneous operation of a plurality of alerting devices, and a setting for selecting successive operation of a plurality of alerting devices.

3. A selective calling receiver with selectable alerting means according to claim 1 or 2, wherein said alerting means include an alerting means for alerting an incoming call with emitted light, an alerting means for alerting an incoming call with a buzzer sound, an alerting means for alerting an incoming call with a melodic sound, and an alerting means for alerting an incoming call with vibration.
4. A selective calling receiver with selectable alerting means according to any of claims 1 to 3, wherein said setting means comprises a plurality of switches, and means for setting said at least one of the alerting means and said period of time with a sequence in which said switches are to be pressed.
5. A method of establishing a setting in a selective calling receiver with selectable alerting means comprising a plurality of alerting means for indicating an incoming call, setting means comprising a plurality of switches for setting at least one of said alerting means to operate in response to an incoming call and a period of time for which the alerting means is to operate, memory means for storing a setting made by said setting means, and control means for referring to the setting stored by said memory means when an incoming call arrives and operating the alerting means based on the setting, said method comprising the step of setting said at least one of the alerting means and said period of time with a sequence in which said switches are to be pressed.

Fig. 1

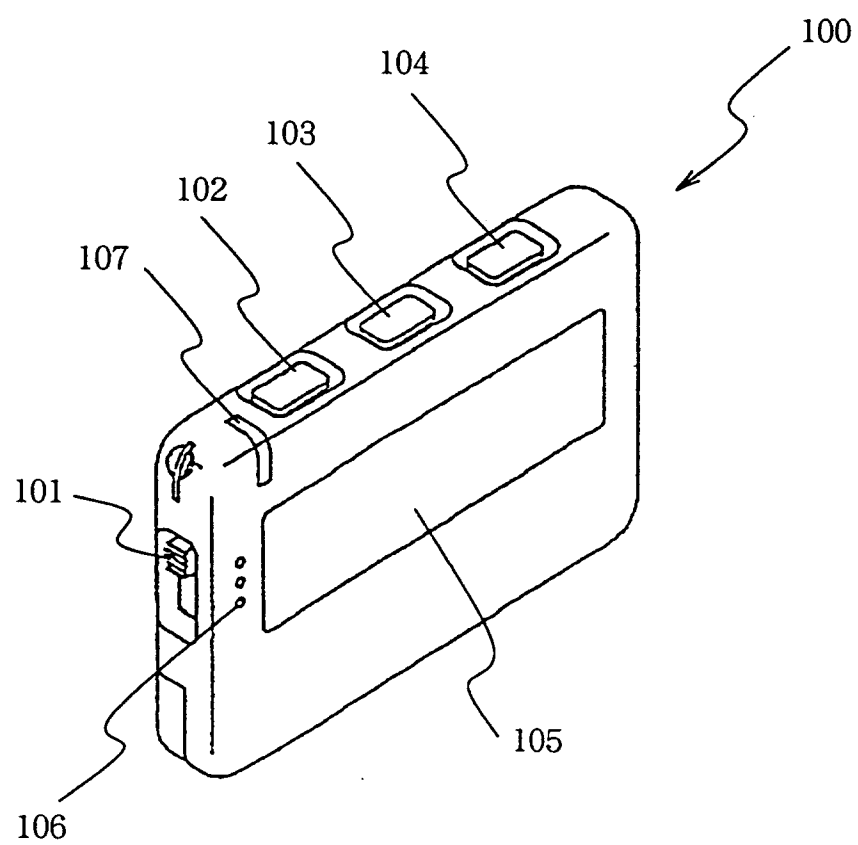


Fig. 2

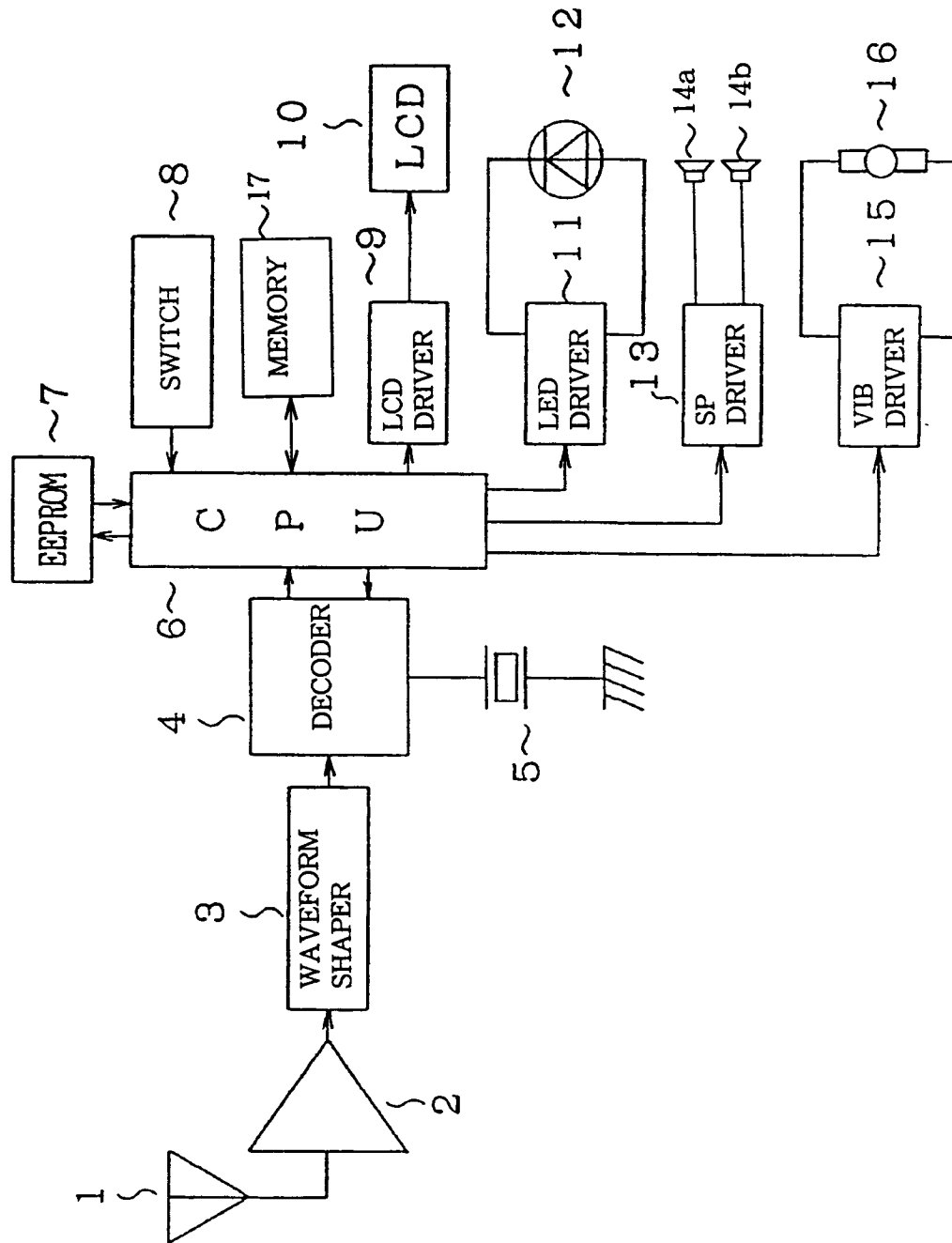


Fig. 3

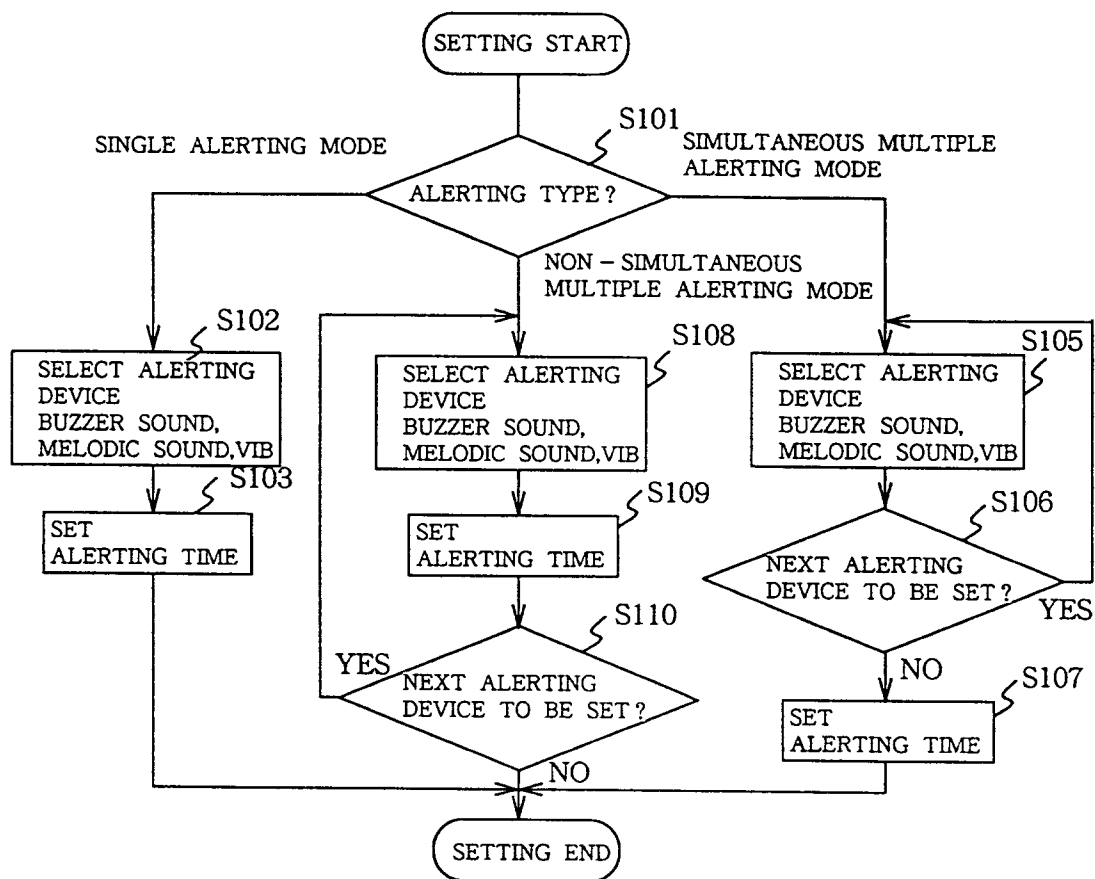


Fig. 4 (a)

EXAMPLE OF SIMULTANEOUS
MULTIPLE ALERTING MODE

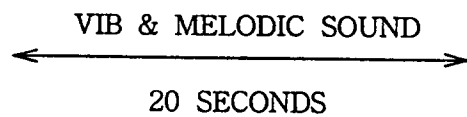
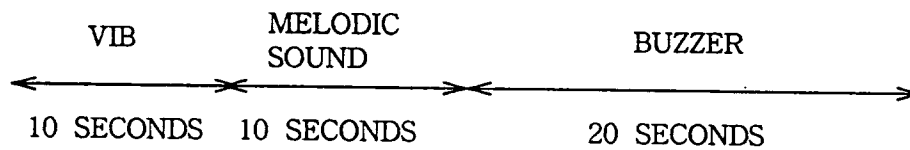


Fig. 4 (b)

EXAMPLE OF NON - SIMULTANEOUS
MULTIPLE ALERTING MODE





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EUROPEAN SEARCH REPORT

Application Number
EP 94 10 9728

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.5)
1 Y	GB-A-2 245 091 (NEC CORP.) * page 1, line 1 - page 5, line 21; figures 1-2 * ---	1-5	G08B3/10
1 Y	GB-A-2 243 507 (NEC CORP.) * page 6, line 8 - line 27; figure 1 * ---	1-5	
1 A	WO-A-92 03891 (MOTOROLA) * page 3, line 1 - page 4, line 36; figures 1-2 * ---	1-5	
1 A	WO-A-90 10359 (MOTOROLA) * page 4, line 13 - line 35; figures 1-2 * -----	1-5	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			G08B
Place of search		Date of completion of the search	Examiner
THE HAGUE		10 October 1994	Sgura, S
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