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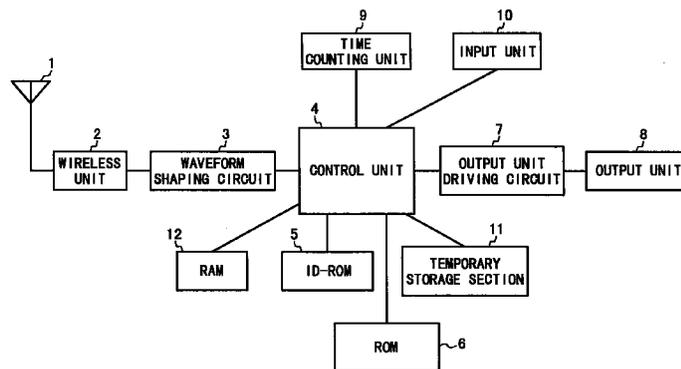
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(54) Wireless selective call receiver which time can be adjusted based on service area

(57) In a wireless selective call receiver, an input section manually inputs a current service area in which the wireless selective call receiver is located. A first storage section stores a plurality of sets of area identification information and selective call number data respectively corresponding to service areas. A second storage section stores a plurality of time data respectively corresponding to service areas. A clock section measures a time. A control section selects one of the

plurality of sets of area identification information and selective call number data in response to the input of the current service area. The control unit also selects one of the plurality of function change data in response to the input of the current service area. The control unit changes the time of the clock section based on the selected time data.

Fig. 1



Description

The present invention relates to a wireless selective call receiver, and more particularly, to a wireless selective call receiver having a function to carry out an calculation of a correct current time corresponding to the service area where the wireless selective call receiver is located.

There is conventionally known a wireless selective call receivers in which an area identification code of the service area where the wireless selective call receiver is located is received together with a call signal, and calculation is performed based on a data corresponding to the area identification code. Such a wireless selective call receiver is disclosed in, e.g. JP-A-6-188814. In the conventional wireless selective call receiver, an area identification code is received and time can be corrected even if the user moves in a wide range over service areas.

That is, in the conventional wireless selective call receiver, an area identification (ID) code corresponding to the receiver located service area where the wireless selective call receiver is located is stored in a read only memory (ROM). When a new area identification code is received, the new area identification code is compared with the stored area identification code. If the new area identification code is not coincident with the stored area identification code, the area identification code stored in the read only memory is replaced by the new area identification code.

Also, at the same time, the time is corrected to fit to that of the service area corresponding to the new area identification code. Thus, the correction of the time difference because of movement over the areas is automatically performed.

However, in the above mentioned conventional wireless selective call receiver, in order to achieve the calculation function to fit the current time to that of the receiver located service area, it is necessary to receive the area identification code together with the call signal. For this reason, there is a problem in that the base station must transmit to the call signal including the area identification code.

The present invention is accomplished in the view of the circumstances described above. An object of the present invention is to provide a wireless selective call receiver which can correct time of a clock section based on a receiver located service area without receiving an area identification code.

Another object of the present invention is to provide a method of adjusting time of a clock section in a wireless selective call receiver without receiving an area identification code.

In order to achieve an aspect of the present invention, a wireless selective call receiver includes an input section for manually inputting a current service area in which the wireless selective call receiver is located, a first storage section for storing a plurality of sets of area

identification information and selective call number data respectively corresponding to service areas, a second storage section for storing a plurality of time data respectively corresponding to service areas, a clock section for measuring a time, and a control section for selecting one of the plurality of sets of area identification information and selective call number data in response to the input of the current service area, for selecting one of the plurality of function change data in response to the input of the current service area, and for changing the time of the clock section based on the selected time data.

In this case, the control section includes a section for holding a previous time data, for calculating a time difference between the selected time data and the previous time data, for changing the time of the clock section based on the calculated time difference, and for holding the selected time data as the previous time data.

The wireless selective call receiver may further includes a message data storage section for storing message data, a call number storage section for storing selective call number data, and a wireless section for receiving a wireless signal to extract a transmitted selective call number data and a message data which includes an alarm time. In this case, the control section further includes a section for storing the selective call number data of the selected set in the call number storage section, for comparing the transmitted selective call number data and the stored selective call number data, and for storing the extracted message data in the message data storage section when the transmitted selective call number data is coincident with the stored selective call number data.

The control section may further include an alarm time changing section for changing the alarm time of each of the message data stored in the message data storage section based on the changed time of the clock section. When the wireless selective call receiver further includes an alarm output section for outputting an alarm, the control section may further include a section for searching the message data storage section for one of the message data which has the changed alarm time equal to the changed time of the clock section, and for driving the alarm output section for the searched message data.

In order to achieve another aspect of the present invention, a method of adjusting a time of a clock section in a wireless selective call receiver, includes the steps of:

- designating a current service area in which the wireless selective call receiver is located;
- selecting one of a plurality of sets of area identification information, selective call number data and time data in response to the designation of the current service area;
- changing a time of a clock section based on the

selected time data.

Fig. 1 is a block diagram illustrating the structure of a wireless selective call receiver according to a first embodiment of the present invention;

Fig. 2 is a block diagram illustrating the structure of the wireless selective call receiver according to a second embodiment of the present invention;

Fig. 3 is a block diagram illustrating the structure of the wireless selective call receiver according to a third embodiment of the present invention;

Fig. 4 is a flow chart illustrating the operation of the wireless selective call receiver of the present invention in a service area change mode;

Fig. 5 is a flow chart illustrating the operation of the wireless selective call receiver of the present invention in a time difference calculation mode;

Fig. 6A is a flow chart illustrating the operation of the wireless selective call receiver of the present invention in an alarm time change mode;

Fig. 6B is a flow chart illustrating the operation of the wireless selective call receiver of the present invention in an alarm mode;

Fig. 7 is a diagram illustrating the format of a received signal;

Fig. 8 is a diagram illustrating an area identification code table stored in an ID-ROM;

Fig. 9 is a diagram illustrating a time data table stored in a ROM;

Figs. 10A to 10F are diagrams illustrating the operation of the wireless selective call receiver of the present invention in the service area change mode; and

Figs. 11A and 11B are diagrams illustrating the operation of the wireless selective call receiver of the present invention in the alarm time change mode.

Next, the wireless selective call receiver of the present invention will be described below with reference to the accompanying drawings.

Fig. 1 is a block diagram illustrating the structure of the wireless selective call receiver according to the first embodiment of the present invention. Referring to Fig. 1, the wireless selective call receiver in the first embodiment is composed of an antenna 1, a wireless unit 2, a waveform shaping circuit 3, a control unit 4, an ID-ROM 5, a ROM 6, an output unit driving circuit 7, an output unit 8, a time counting unit 9, an input unit 10, a temporary storage section 11 and a RAM 12.

The antenna 1 receives a transmission radio signal and a wireless unit 2 amplifies and demodulates the radio signal received by the antenna 1. The waveform shaping circuit 3 shapes the demodulated signal in waveform to convert into a digital form. The control unit 4 controls the whole operation of the wireless selective call receiver. The ID-ROM 5 stores an area identification code table which stores a plurality of data sets of selec-

tive call number (address), group code and area identification (ID) code for respective service areas, as shown in Fig. 8. The plurality of data sets are previously written by a manufacturer. The ROM 6 stores a time data table which stores a plurality of time data for respective area identification codes, as shown in Fig. 9. Each of the plurality of time data is a value predetermined based on a reference time. For example, the time at the international date line is adopted as the reference time. The time data tables are common to all the wireless selective call receivers. Therefore, it is not necessary to individually write the time data in the wireless selective call receivers in an extra process.

The time counting unit 9 counts a clock signal. The input unit 10 includes switches, as shown in Fig. 10A, and is used to input an instruction and data by a user. The temporary storage section 11 holds a current selective call number and a current area identification code corresponding to a current service area. Also, the temporary storage section 11 stores a previous time data. The RAM 12 stores a plurality of message data. Some of the plurality of message data have alarm times designated.

Fig. 2 is a block diagram illustrating the structure of the wireless selective call receiver according to the second embodiment of the invention. In the wireless selective call receiver, the time counting unit 9 in the above first embodiment is replaced by a clock section 19. Also, the output unit 8 and the output unit driving circuit 7 are replaced by an LCD 18 and an LCD driver 17, respectively. The other sections are the same as in the above first embodiment.

Fig. 3 is a block diagram illustrating the structure of the wireless selective call receiver according to the third embodiment of the invention. In the wireless selective call receiver, the LCD 18 and the LCD driver 17 in the above second embodiment are replaced by an alarmphone 28 and an alarmphone driver 27, respectively. The other sections are the same as in the above second embodiment. Note that an LED may be used in addition to the LCD 18 and/or alarmphone.

Next, the operation of the wireless selective call receiver of the present invention will be described below. In this case, the address or selective call number of "000001", the group code of "12345" and the area identification code of "054" for the service area A are stored in the temporary storage section 11. Also, the time data of 17 for the service area A is stored in the temporary storage section 11.

First, a transmission signal having the format shown in Fig. 7 is received by the antenna 1. The format is composed of the field SC for bit synchronization/frame synchronization, the field Gr for a group code which is used for battery saving, the field A/M for address/message data identifying bits, and the field End for an end identification. 32 address fields or data fields are provided between the field A/M and the field End. Whether each of the 32 fields is the address field or the

data field is designated based on the corresponding bit of the field A/M.

The wireless unit 2 receives one of the address fields and one of the data fields under the control of the control unit 4 and the waveform shaping circuit 3 shapes the received data signal in waveform and converts into a digital form. Then, the control unit 4 compares the selective call number stored in the temporary storage section 11 and the received address, i.e., the received selective call number. When both are coincident with each other, the control unit 4 stores the message data in the RAM 12. Also, the control unit 4 outputs a drive instruction signal to the output apparatus drive circuit 7 such as the LCD driver 17 or the alarmphone driver 27 such that the drive circuit 7 drives the output apparatus 8 such as the LCD 18 or the alarmphone 28.

Next, the operation of the wireless selective call receiver of the present invention in a service area change mode will be described with reference to Fig. 4. It is assumed that the user moved from the service area A to the service area B.

First, in a step S101, the user of the wireless selective call receiver operates the input unit 10 and selects one of the functions of the wireless selective call receiver. Referring to Fig. 10A, the user pushes a switch A of the input unit 10. At that time, a display unit (not shown in Fig. 1) displays modes as shown in Fig. 10B. A set time mode is blinked at this time. Because the service area change mode is to be selected, the user pushes a switch C shown in Fig. 10A, the display is changed as shown in Fig. 10C and the change area is blinked. Then, the user pushes the switch A. Thus, the service area change mode is set.

In a step S102, whether or not the service area change mode is set is determined. If the service area change mode is not set, the processing is ended. In this example, since the service area change mode is set, a step S103 is executed.

In the step S103, the user operates the input unit 10 to change the service area from the area A to the area B. That is, after the service area change mode is set by pushing the switch A, the display is changed as shown in Fig. 10D. Because the area identification code of "054" is not the area identification code of the service area B, the user pushes the switch C to change the display from the state shown in Fig. 10D to the state shown in Fig. 10E. Then, the user pushes the switch A. In this manner, the service area B is designated. Also, a message data of "area change is ended" is displayed.

In a step S104, the control unit 4 reads the selective call number (address), the group code and the area identification code for the service area B from the ID-ROM 5 and stores them in the temporary storage section 11. Hereinafter, the transmission signal is received based on the newly set selective call number in the temporary storage section 11.

Next, the operation of the wireless selective call receiver of the present invention in a time difference cal-

ulation mode will be described with reference to Fig. 5.

In a step S201, one of the functions of the wireless selective call receiver is selected in the same manner as described with reference to Fig. 4.

In a step S202, whether or not the time difference calculation mode is set is determined. If the time difference calculation mode is not set, the processing is ended. In this example, since the time difference calculation mode is set, a step S203 is executed.

In the step S203, the time difference is calculated based on the two time data. That is, the time data of "20" for the area identification code of "045" corresponding to the service area B is read out from the ROM 6. Then, the control unit 4 subtracts the time data of "17" for the service area A stored in the temporary storage section 11 from the read out time data of "20" to obtain the time difference of "3".

In a step S204, the control unit 4 adds the time difference of "3" to the current time of the clock section 19. In this manner, the correct time in the service area B can be displayed. Subsequently, the time data of "20" is stored in the temporary storage section 11 in place of the time data of "17".

Next, the operation of the wireless selective call receiver of the present invention in an alarm time change mode will be described with reference to Fig. 6A.

In a step S301, one of the functions of the wireless selective call receiver is selected in the same manner as described with reference to Fig. 4.

In a step S302, whether or not the alarm time change mode is set is determined. If the alarm time change mode is not set, the processing is ended. In this example, since the alarm time change mode is set, a step S303 is executed.

In the step S303, whether the alarm time of a current message data is to be changed is determined. If the user does not want to change the alarm time of the current message data, a step S305 is executed next. If the user wants to change the alarm time of the current message data, a step S304 is executed next.

In the step S304, the alarm time of the current message data is changed. That is, the time difference of "3" is subtracted from the currently set alarm time. In this manner, for example, the currently set alarm time of "12:45 PM" shown in Fig. 11A is changed into "9:45 AM", as shown in Fig. 11B. Then, the step S305 is executed.

In the step S305, whether the alarm time change processing is ended to all the message data is determined. When the alarm time change processing is not ended to all the message data, the step S303 is executed again. When the alarm time change processing is ended to all the message data, the alarm time change processing is ended.

Next, the operation of the wireless selective call receiver of the present invention in an alarm mode will be described with reference to Fig. 6B.

In a step S401, the current time of the clock section 19 is coincident with the alarm time of any of the message data stored in the RAM 12. That is, the control unit 4 searches the RAM 12 for any message data having the same alarm time as the current time of the clock section 19. 5

In a step S402, when there is any message data having the same alarm time as the current time of the clock section 19, the control unit 4 drives the drivers 7, 17 and/or 27 such that alarm is output from the alarm unit 8, 18 and/or 28. 10

As described above, according to the wireless selective call receiver of the present invention, the user selects a service area in which the wireless selective call receiver is located. Thus, the area identifying code corresponding to the selected service area is automatically set. Also, the time difference calculation can be performed. 15

Claims 20

1. A wireless selective call receiver comprising:

input means (10) for manually inputting a current service area in which said wireless selective call receiver is located; 25
 first storage means (5) for storing a plurality of sets of area identification information and selective call number data respectively corresponding to service areas; 30
 second storage means (6) for storing a plurality of time data respectively corresponding to service areas; 35
 a clock section (9, 19) for measuring a time; and 40
 control means (4) for selecting one of said plurality of sets of area identification information and selective call number data in response to the input of said current service area, for selecting one of said plurality of function change data in response to the input of said current service area, and for changing said time of said clock section based on said selected time data. 45

2. A wireless selective call receiver according to claim 1, wherein said control means includes holds a previous time data, calculates a time difference between said selected time data and said previous time data, changes said time of said clock section based on said calculated time difference, and holds said selected time data as said previous time data. 50

3. A wireless selective call receiver according to claim 1 or 2, further comprising: 55

message storage means (12) for storing messages;

call number storage means (11) for storing selective call number data; and
 a wireless section (1, 2, 3) for receiving a wireless signal to extract a transmitted selective call number data and a message which includes an alarm time, and

wherein said control means further stores said selective call number data of said selected set in said call number storage means, compares said transmitted selective call number data and said stored selective call number data, and stores the extracted message in said message storage means when said transmitted selective call number data is coincident with said stored selective call number data.

4. A wireless selective call receiver according to claim 3, wherein said control means further changes said alarm time of each of said messages stored in said message storage means based on said changed time of said clock section.

5. A wireless selective call receiver according to claim 4, further comprising alarm output means (7, 8; 17, 18; 27, 28) for outputting an alarm, and
 wherein said control means further searches said message storage means for one of said messages which has the changed alarm time equal to said changed time of said clock section, and activates said alarm output means for the searched message.

6. A method of adjusting a time of a clock section in a wireless selective call receiver, comprising the steps of:

designating a current service area in which said wireless selective call receiver is located; selecting one of a plurality of sets of area identification information, selective call number data and time data in response to said designation of said current service area; changing a time of a clock section based on said selected time data.

7. A method according to claim 6, wherein said changing step includes:

holding a previous time data; calculating a time difference between said selected time data and said previous time data; adjusting said time of said clock section based on said calculated time difference; and setting said selected time data as said previous time data.

8. A method according to claim 7, further comprising

the steps of:

receiving a wireless signal to extract a transmitted selective call number data and a message which includes an alarm time; 5
 storing said selective call number data of said selected set in a call number storage section; comparing said transmitted selective call number data and said stored selective call number data; and 10
 storing the extracted message in a message storage section when said transmitted selective call number data is coincident with said stored selective call number data. 15

9. A method according to claim 8, further comprising the step of:

changing said alarm time of each of said messages stored in said message storage section based on said time difference. 20

10. A method according to claim 9, further comprising the steps of:

searching said message storage means for one of said messages which has the changed alarm time equal to said changed time of said clock section; and 25
 driving an alarm output section for the searched message to inform the changed alarm time to a user. 30

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Fig. 1

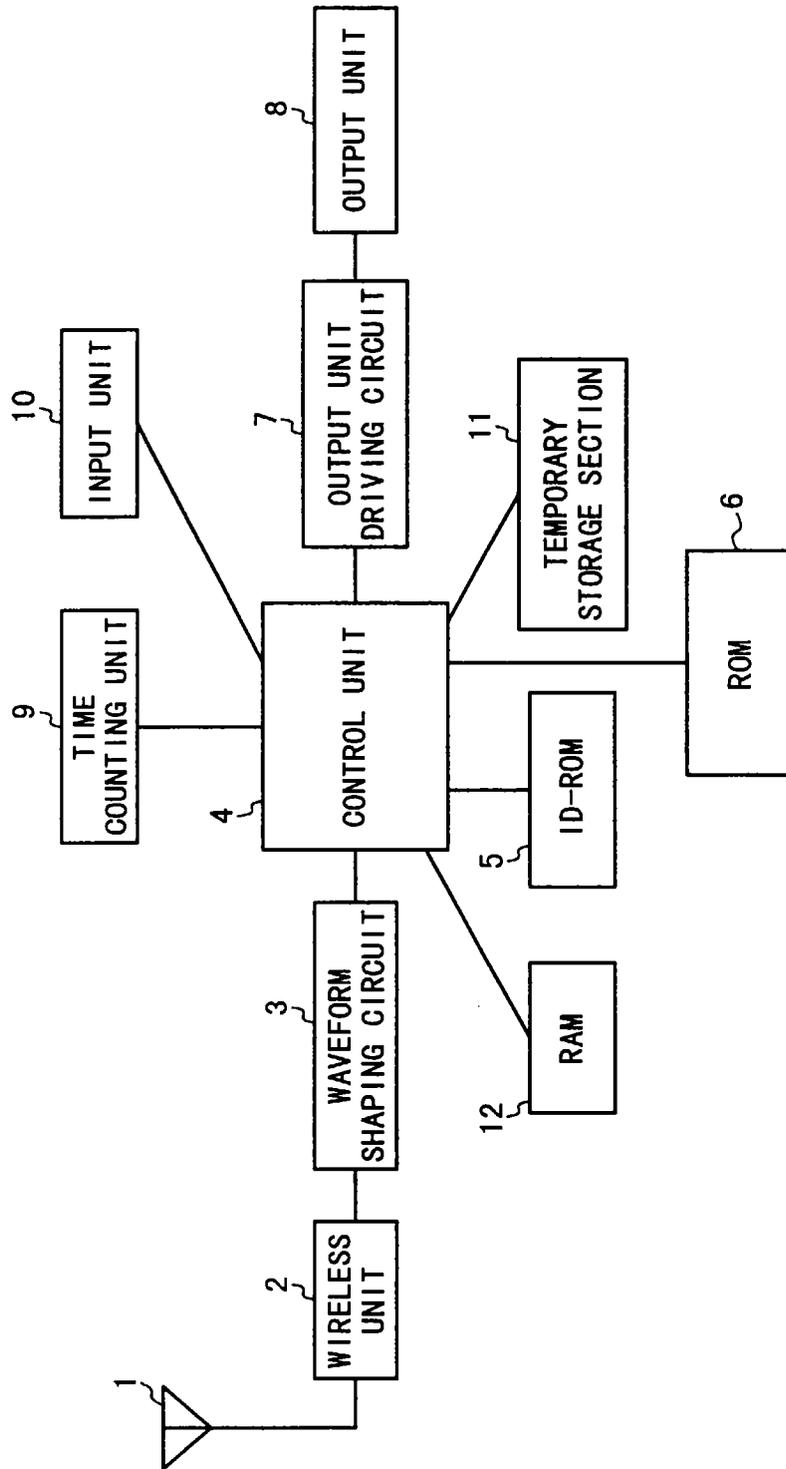


Fig. 2

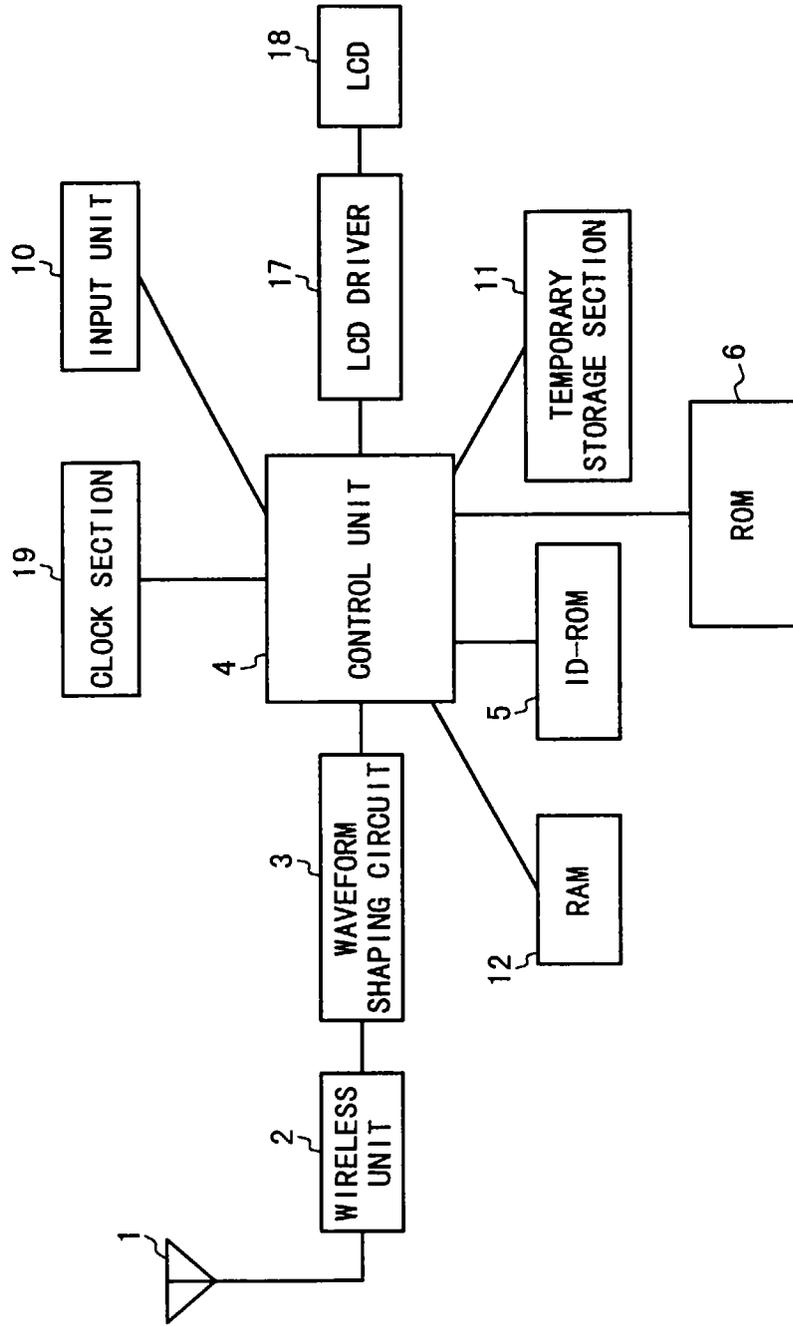


Fig. 3

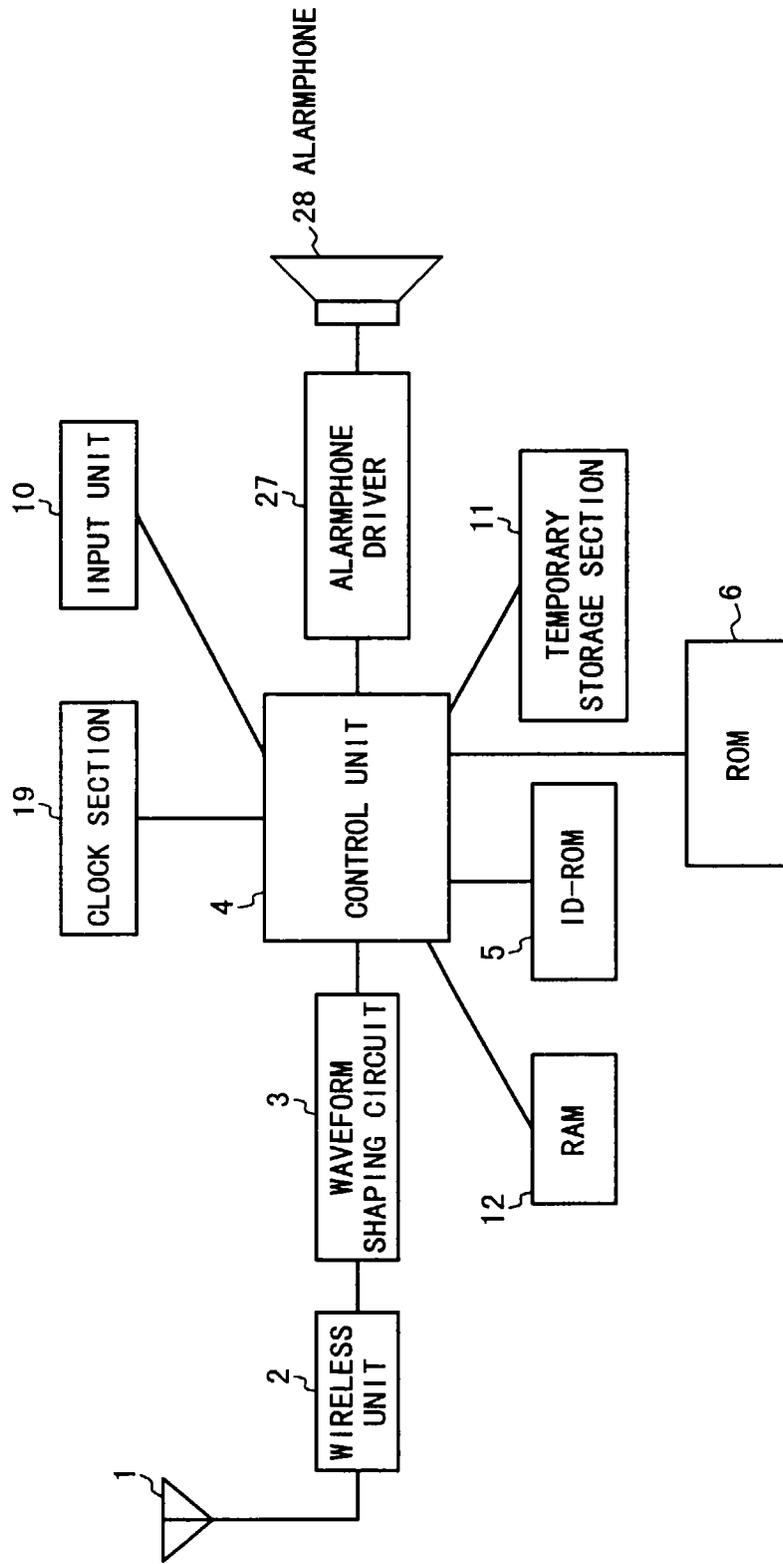


Fig. 4

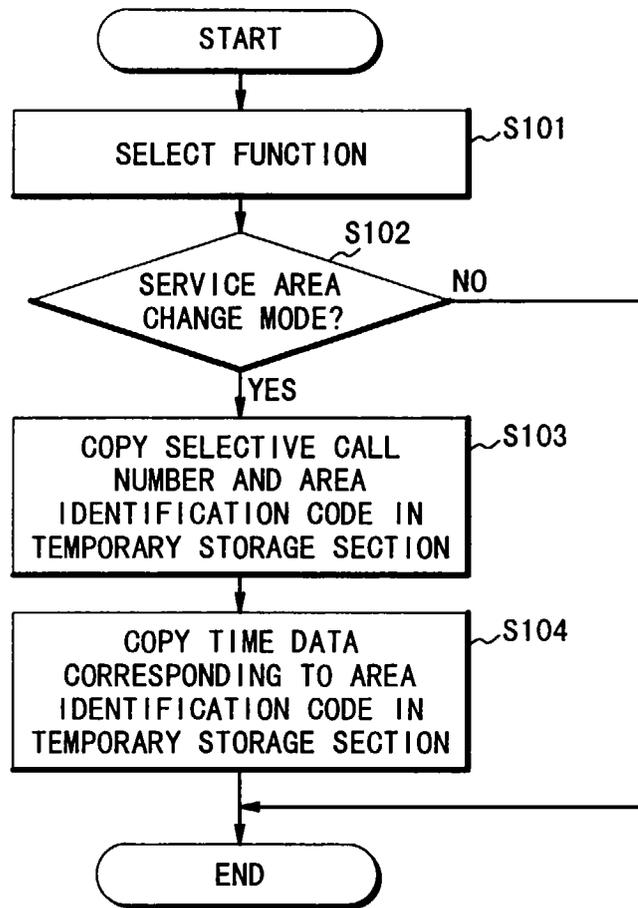


Fig. 5

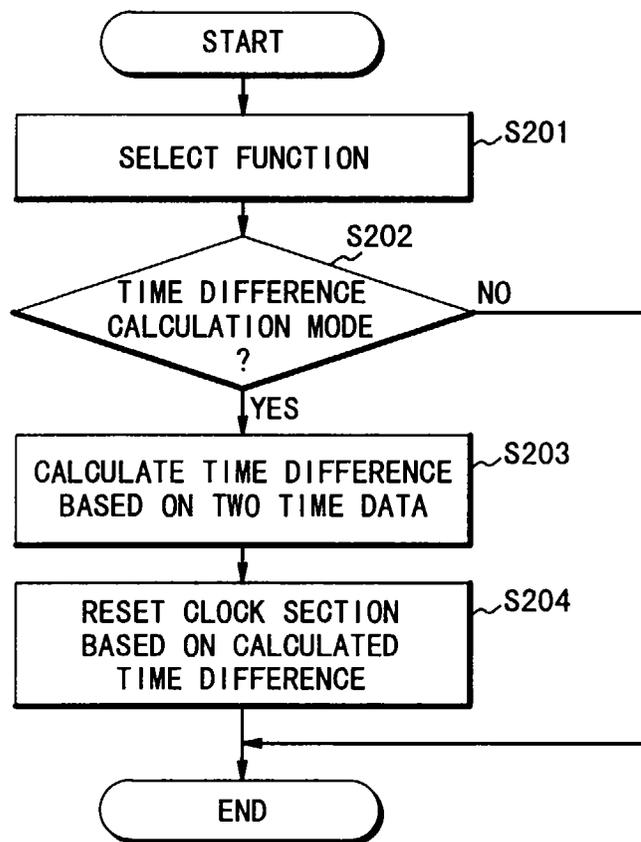


Fig. 6A

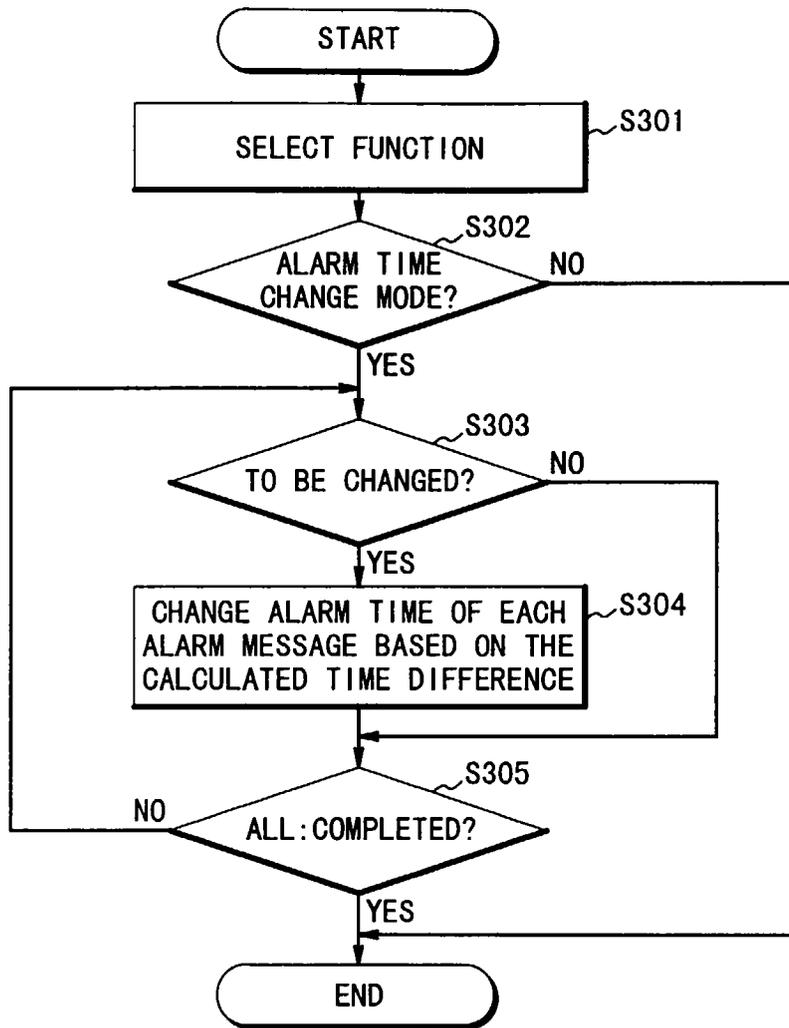


Fig. 6B

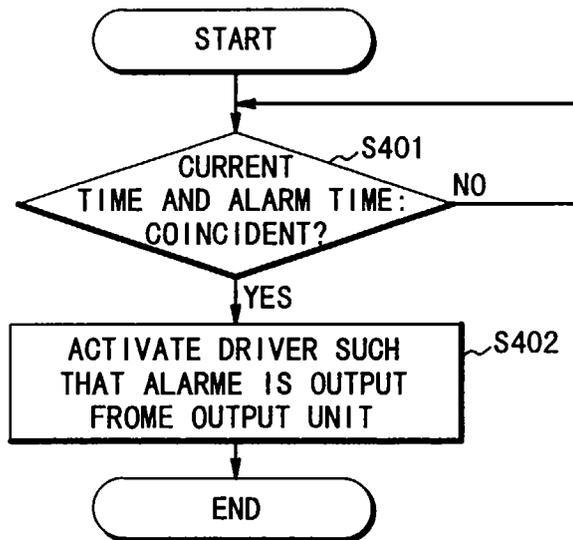


Fig. 7

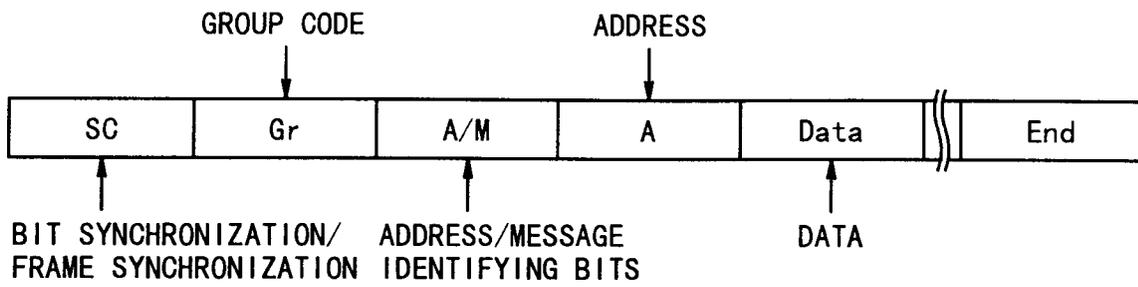


Fig. 8

AREA	ADDRESS	GROUP CODE	AREA ID CODE
NEW YORK	000001	12345	054
LOS ANGELSE	000002	23456	045

Fig. 9

AREA ID CODE	TIME DATA
054	17
045	20

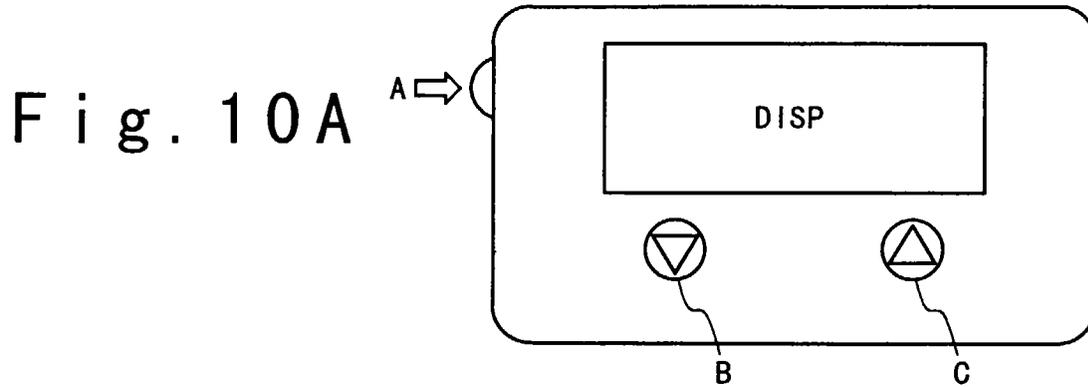


Fig. 11A

ALARM TIME	MESSAGE
12:45 PM	PLEASE CALL 111-222-3333
⋮	⋮

Fig. 11B

ALARM TIME	MESSAGE
9:45 AM	PLEASE CALL 111-222-3333
⋮	⋮



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 11 3751

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.6)
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The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 December 1997	Examiner Exelmans, U
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