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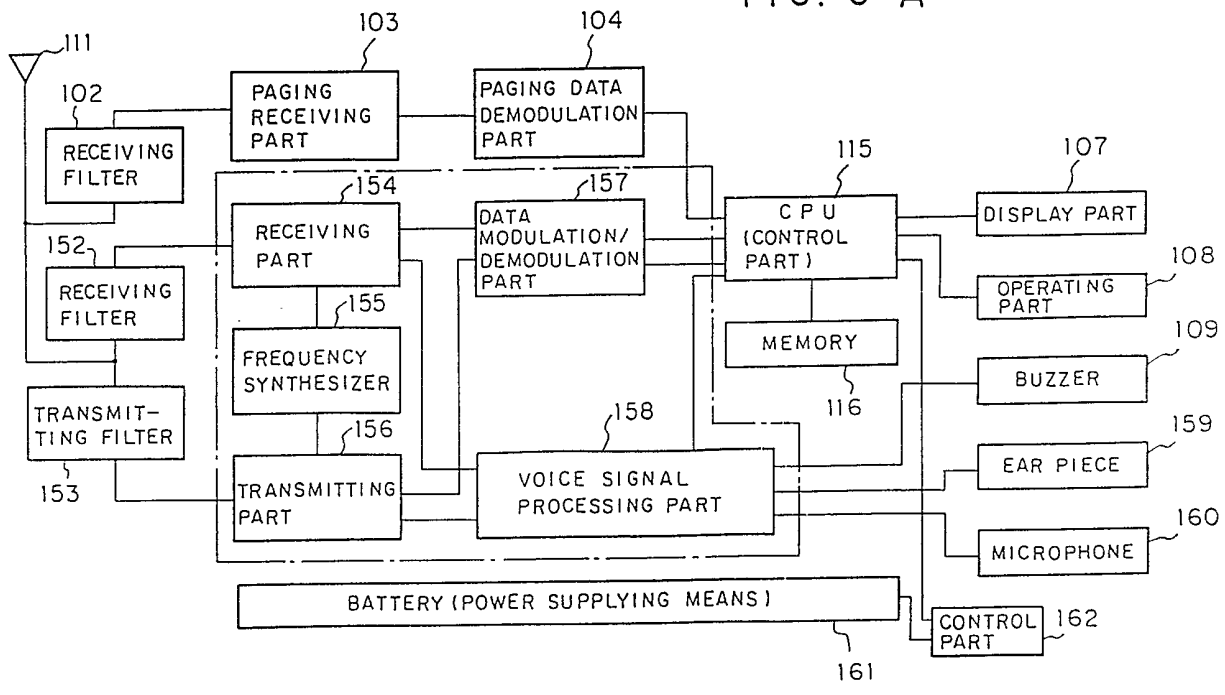
(54) Mobile telephones

(57) A mobile telephone device comprises a separate paging signal channel in addition to the conventional transceiver channels which process voice signals. The paging signal channel has a lower power consumption level than the transceiver channels. A power supply control device shuts off power to the conventional transceiver channels when in a standby mode, i.e. when waiting for an incoming call, and applies power to the paging signal channel instead. Therefore, power consumption is reduced in the standby mode and consequently, the operating time of the battery is extended. Power is applied to the transceiver channels during voice communication periods. A calling party's telephone number received in the paging signal channel is stored and displayed. A control unit has the capability of immediately returning the calling party's call from the telephone number so stored and displayed.

FIG. 5 A



GB 2 267 797 A

FIG. 3

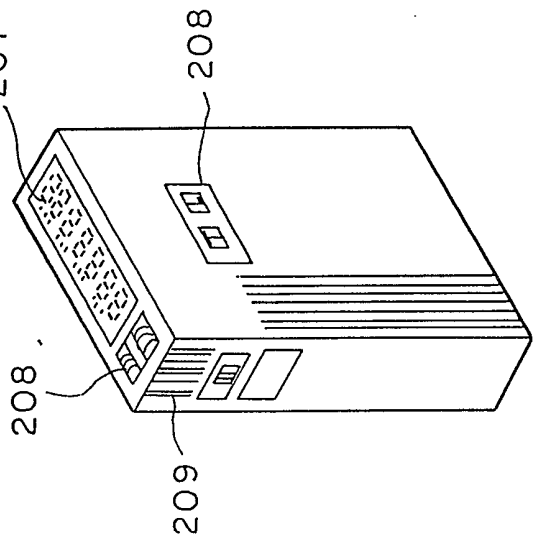


FIG. 1

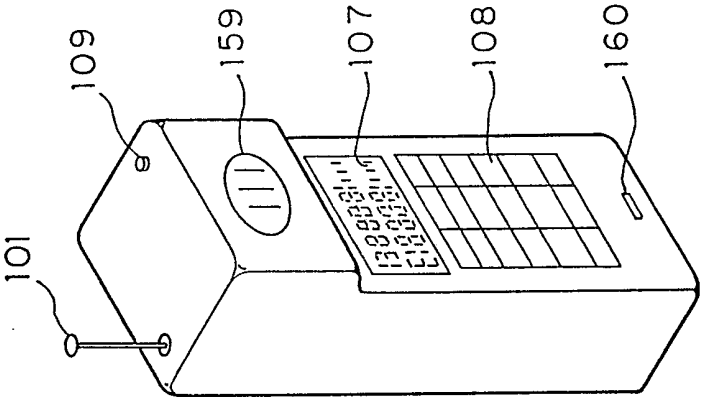


FIG. 2

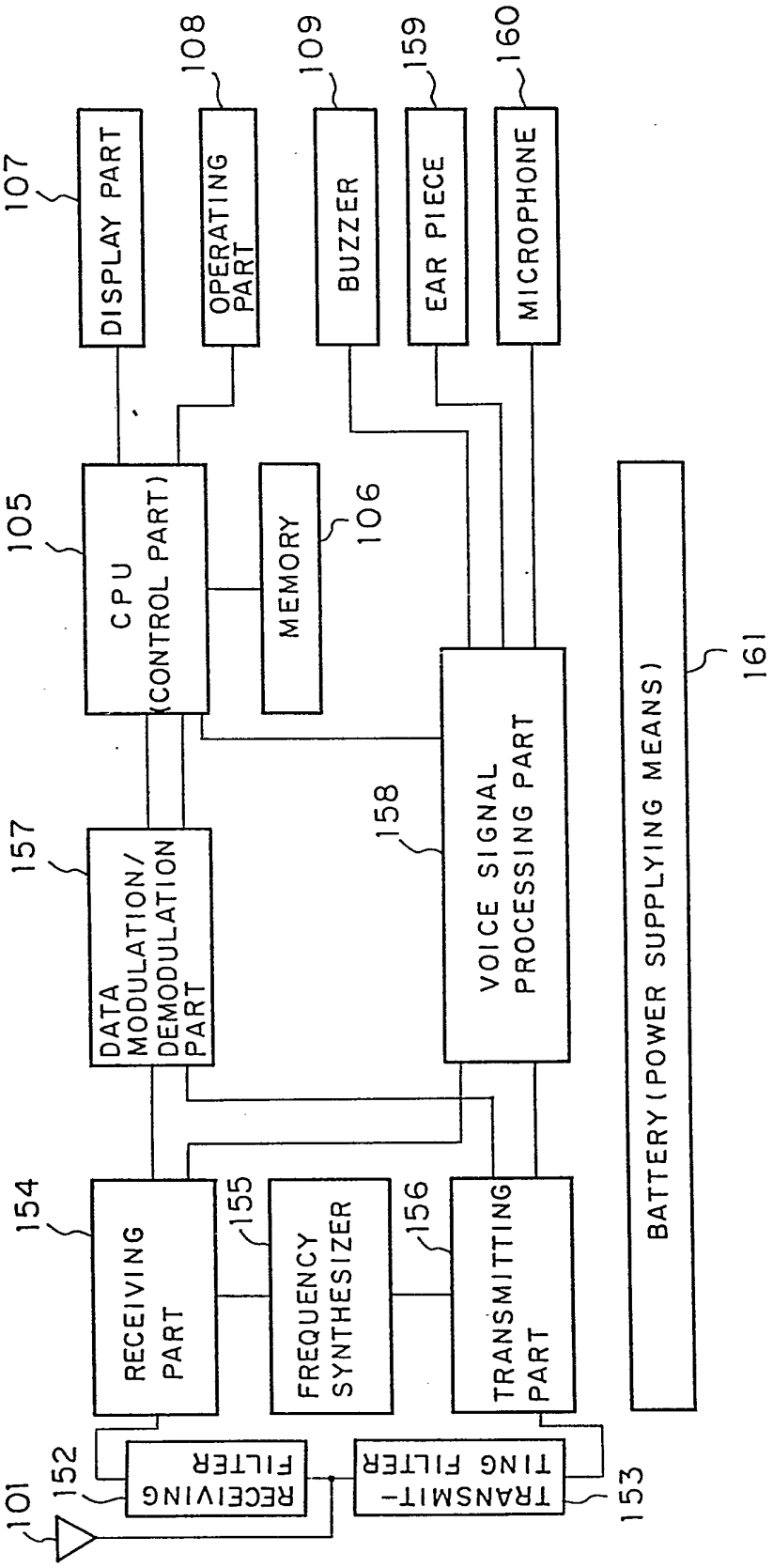

101
152
RECEIVING FILTER
TRANSMITTING FILTER
153
154
RECEIVING PART
155
FREQUENCY SYNTHESIZER
156
TRANSMITTING PART
157
DATA MODULATION/ DEMODULATION PART
158
VOICE SIGNAL PROCESSING PART
161
BATTERY (POWER SUPPLYING MEANS)
105
CPU (CONTROL PART)
106
MEMORY
107
DISPLAY PART
108
OPERATING PART
109
BUZZER
159
EAR PIECE
160
MICROPHONE

FIG. 4

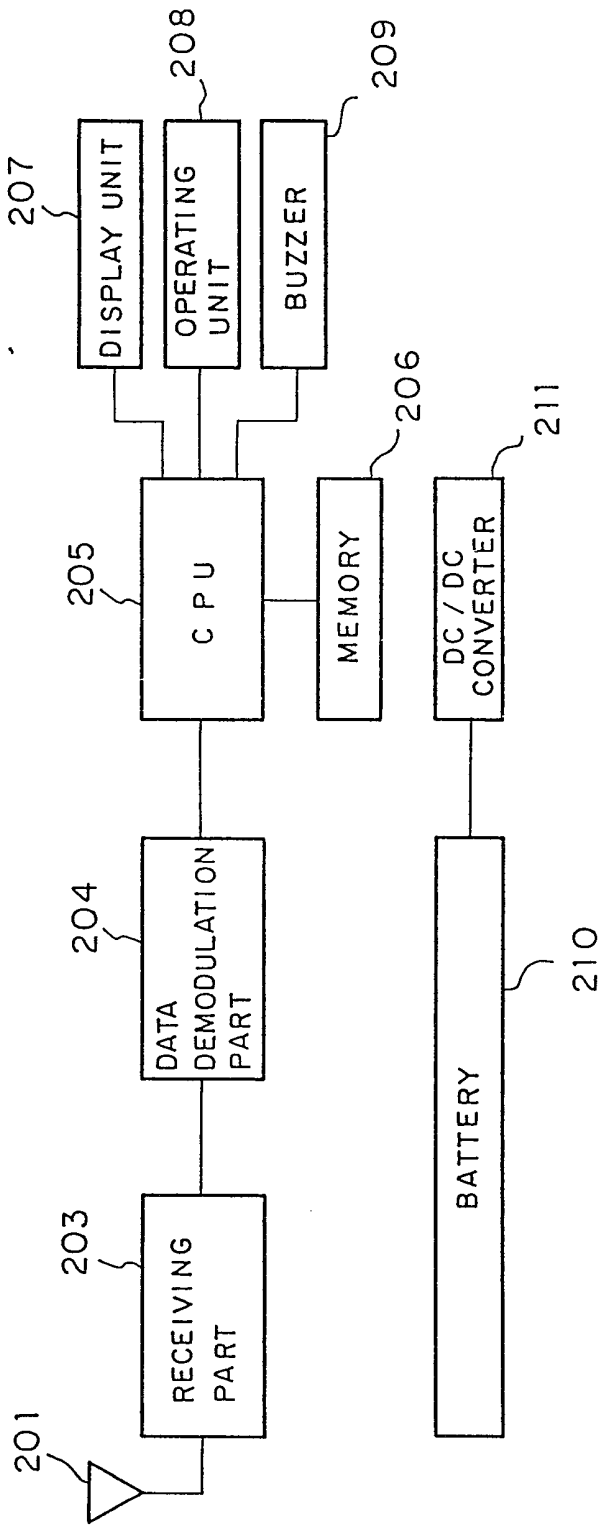

201
RECEIVING PART
203
DATA DEMODULATION PART
204
CPU
205
MEMORY
206
DISPLAY UNIT
207
OPERATING UNIT
208
BUZZER
209
BATTERY
210
DC / DC CONVERTER
211

FIG. 5 A

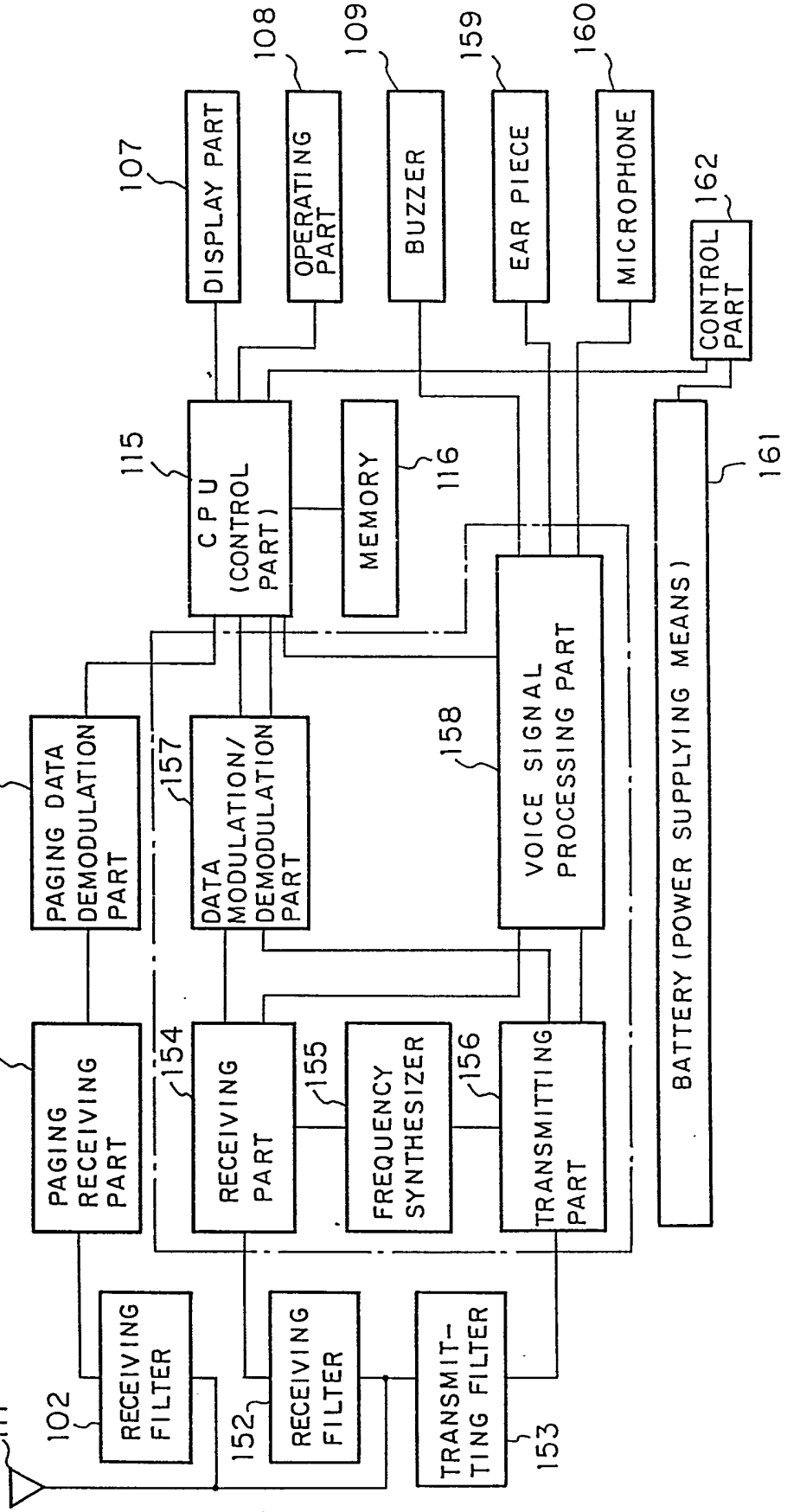

111
102
RECEIVING FILTER
152
RECEIVING FILTER
TRANSMIT-TING FILTER
153
103
PAGING RECEIVING PART
154
RECEIVING PART
155
FREQUENCY SYNTHESIZER
156
TRANSMITTING PART
104
PAGING DATA DEMODULATION PART
157
DATA MODULATION/ DEMODULATION PART
158
VOICE SIGNAL PROCESSING PART
115
CPU (CONTROL PART)
116
MEMORY
161
BATTERY (POWER SUPPLYING MEANS)
107
DISPLAY PART
108
OPERATING PART
109
BUZZER
159
EAR PIECE
160
MICROPHONE
162
CONTROL PART

FIG. 5 B

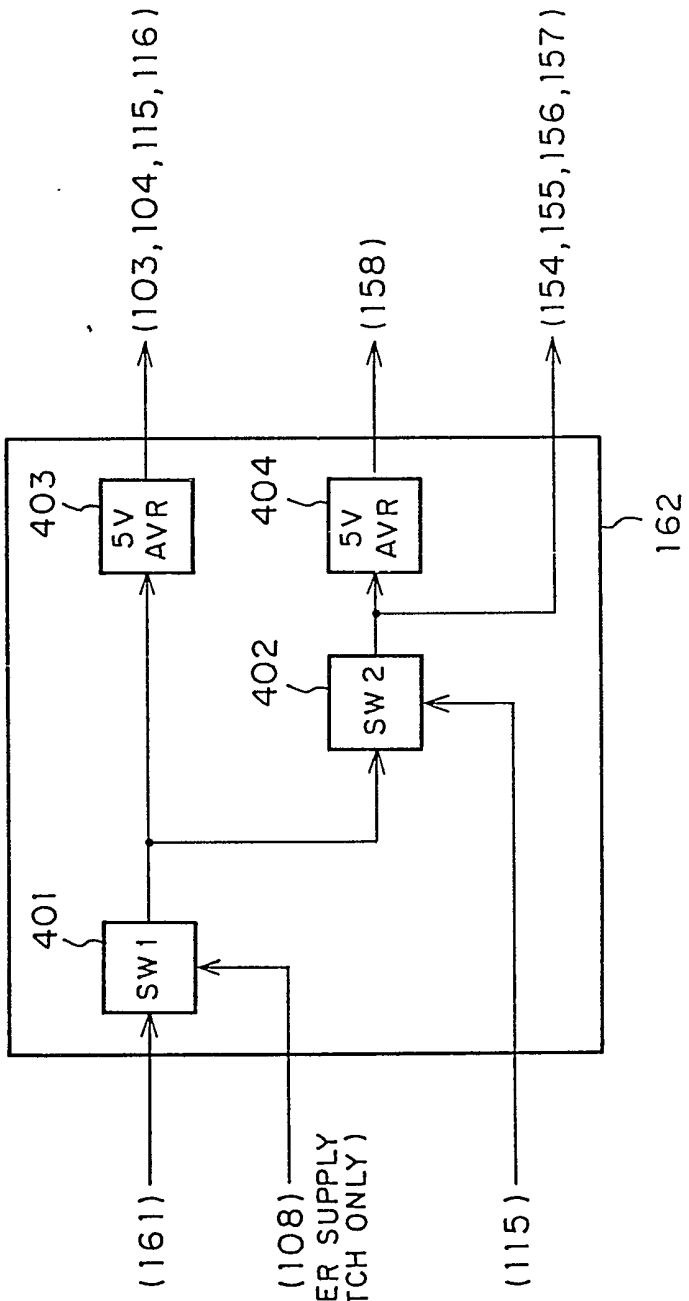

(103, 104, 115, 116)
(158)
(154, 155, 156, 157)
403
5V AVR
404
5V AVR
162
402
SW 2
401
SW 1
(161)
(108)
(POWER SUPPLY SWITCH ONLY)
(115)

FIG. 6

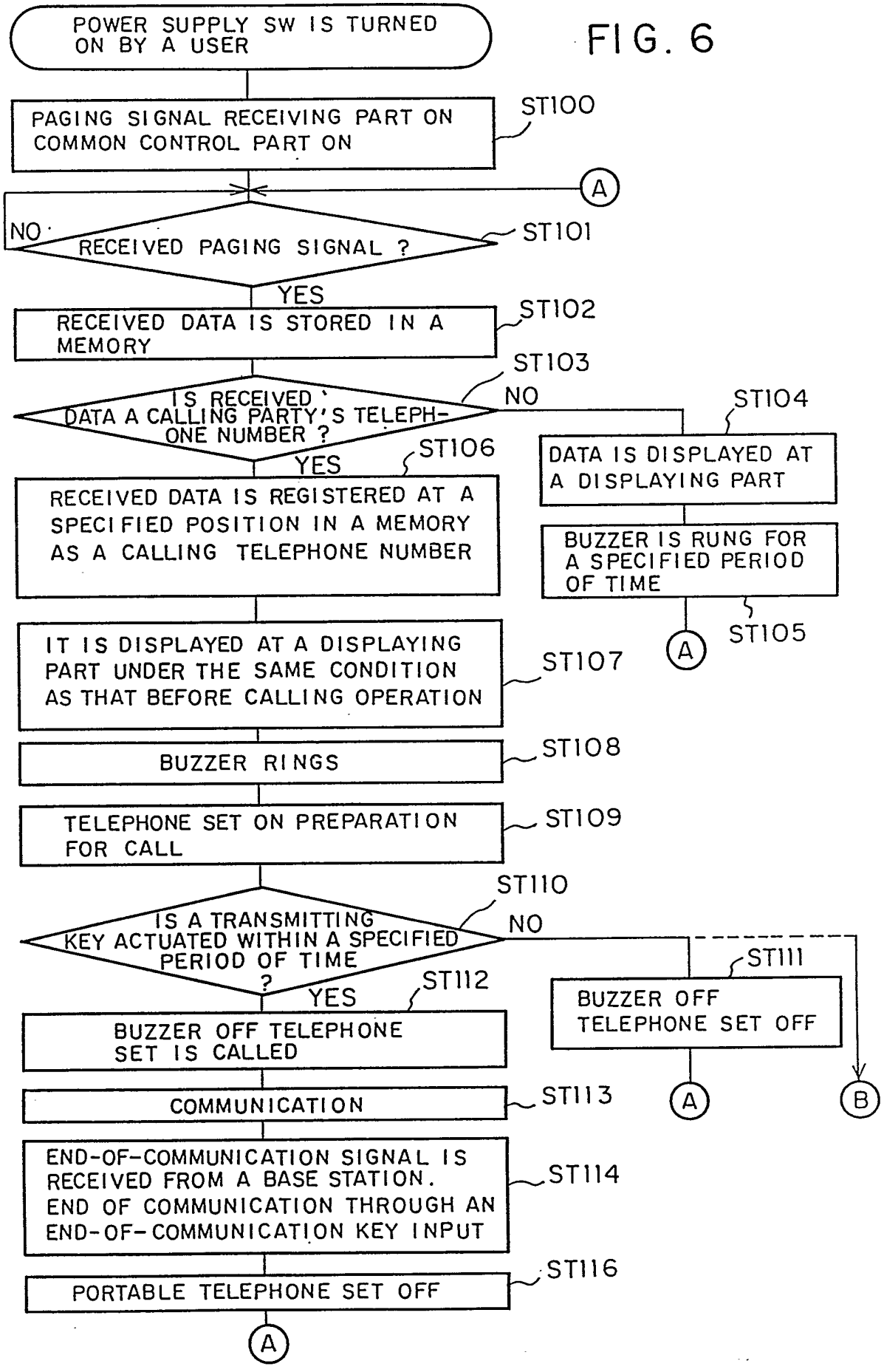

POWER SUPPLY SW IS TURNED ON BY A USER
PAGING SIGNAL RECEIVING PART ON COMMON CONTROL PART ON
ST100
A
NO
RECEIVED PAGING SIGNAL ?
ST101
YES
RECEIVED DATA IS STORED IN A MEMORY
ST102
ST103
IS RECEIVED DATA A CALLING PARTY'S TELEPHONE NUMBER ?
NO
ST104
YES
ST106
RECEIVED DATA IS REGISTERED AT A SPECIFIED POSITION IN A MEMORY AS A CALLING TELEPHONE NUMBER
DATA IS DISPLAYED AT A DISPLAYING PART
BUZZER IS RUNG FOR A SPECIFIED PERIOD OF TIME
ST105
A
IT IS DISPLAYED AT A DISPLAYING PART UNDER THE SAME CONDITION AS THAT BEFORE CALLING OPERATION
ST107
BUZZER RINGS
ST108
TELEPHONE SET ON PREPARATION FOR CALL
ST109
ST110
IS A TRANSMITTING KEY ACTUATED WITHIN A SPECIFIED PERIOD OF TIME ?
NO
ST111
YES
ST112
BUZZER OFF TELEPHONE SET IS CALLED
BUZZER OFF TELEPHONE SET OFF
COMMUNICATION
ST113
A
B
END-OF-COMMUNICATION SIGNAL IS RECEIVED FROM A BASE STATION. END OF COMMUNICATION THROUGH AN END-OF-COMMUNICATION KEY INPUT
ST114
PORTABLE TELEPHONE SET OFF
ST116
A

FIG. 7

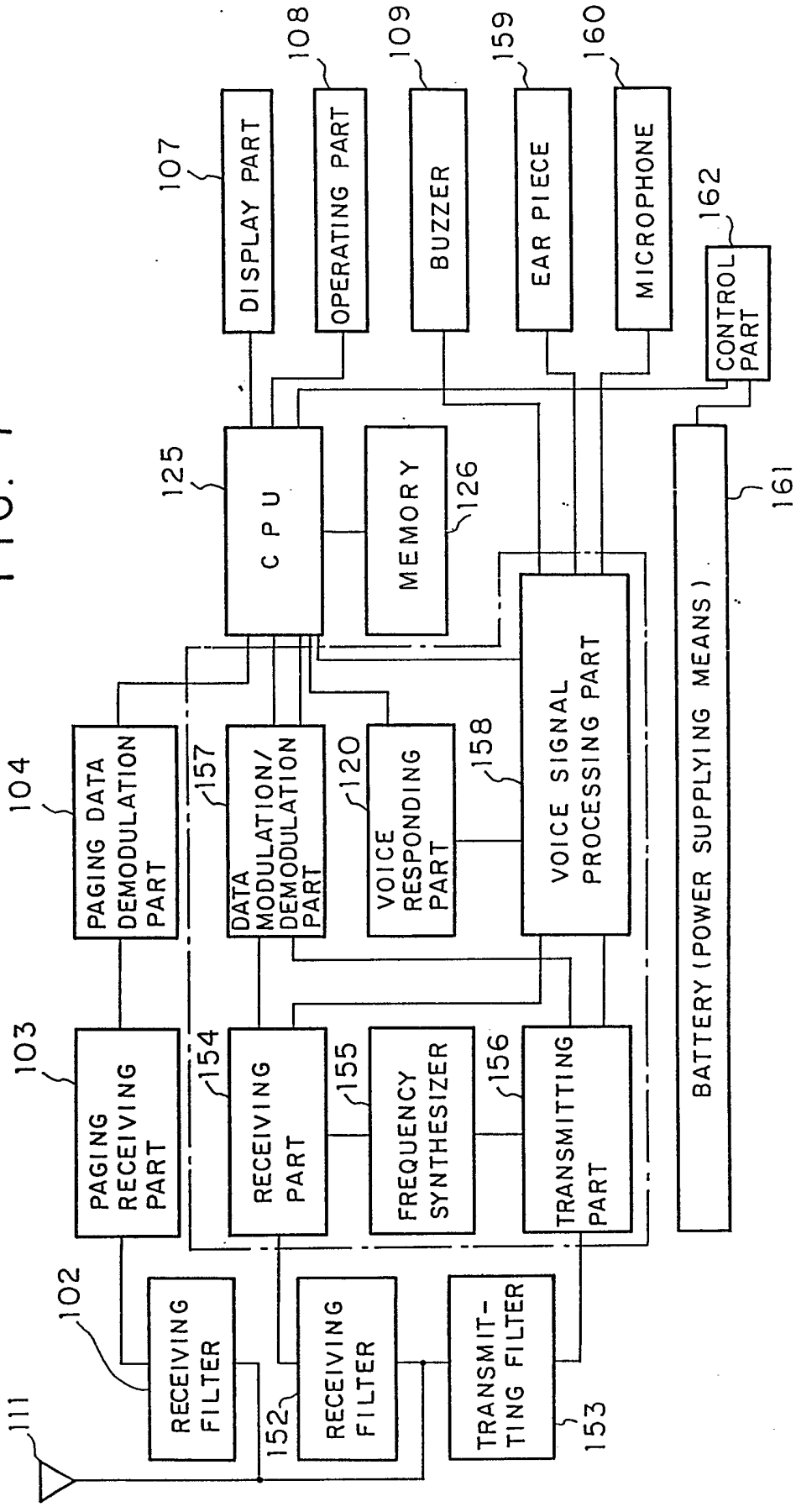

111
102
RECEIVING FILTER
152
RECEIVING FILTER
TRANSMIT-TING FILTER
153
103
PAGING RECEIVING PART
154
RECEIVING PART
155
FREQUENCY SYNTHESIZER
156
TRANSMITTING PART
104
PAGING DATA DEMODULATION PART
157
DATA MODULATION/ DEMODULATION PART
120
VOICE RESPONDING PART
158
VOICE SIGNAL PROCESSING PART
125
C P U
MEMORY
126
107
DISPLAY PART
108
OPERATING PART
109
BUZZER
159
EAR PIECE
160
MICROPHONE
162
CONTROL PART
161
BATTERY (POWER SUPPLYING MEANS)

FIG. 8

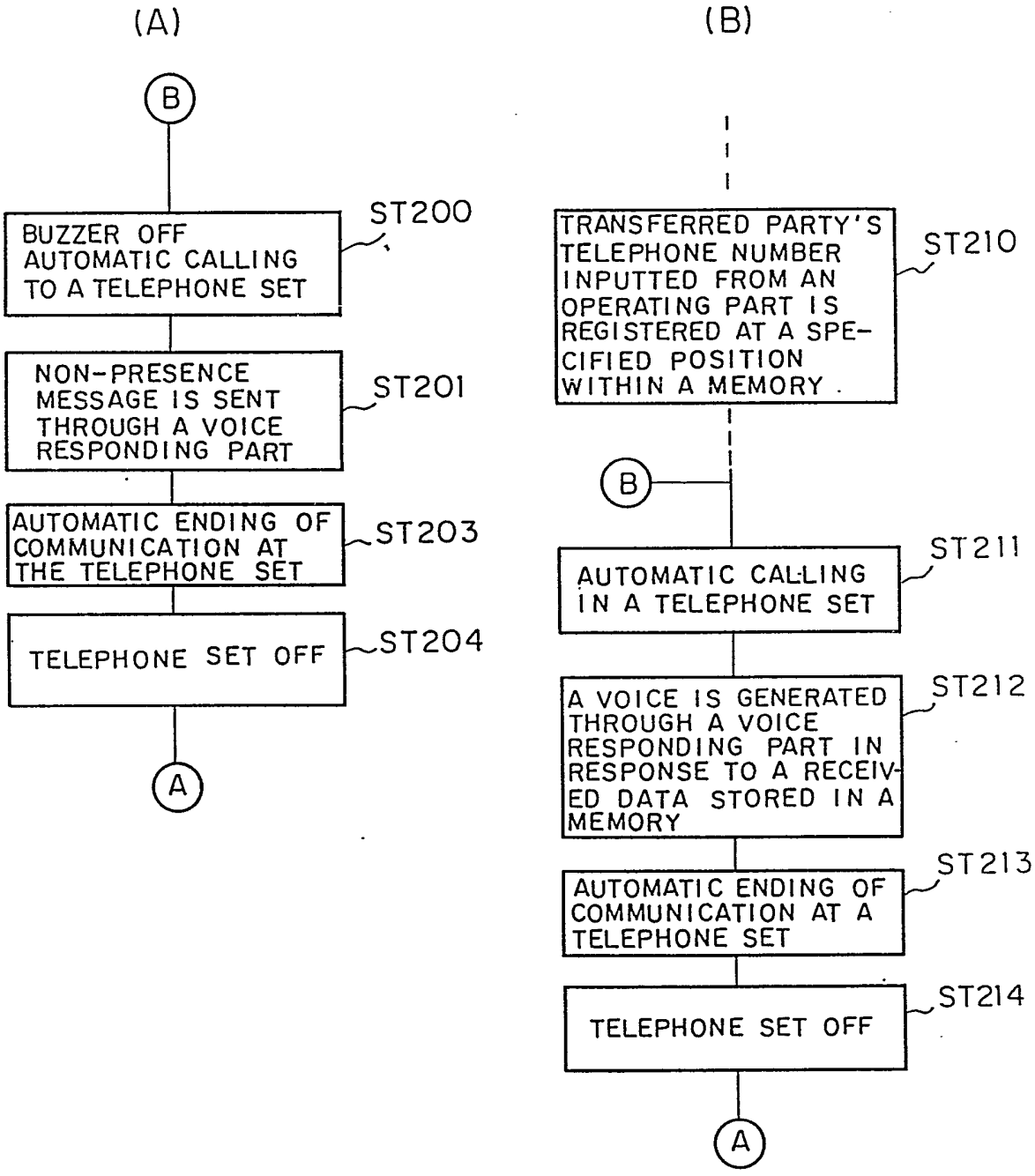

(A)
B
BUZZER OFF AUTOMATIC CALLING TO A TELEPHONE SET
ST200
NON-PRESENCE MESSAGE IS SENT THROUGH A VOICE RESPONDING PART
ST201
AUTOMATIC ENDING OF COMMUNICATION AT THE TELEPHONE SET
ST203
TELEPHONE SET OFF
ST204
A
(B)
TRANSFERRED PARTY'S TELEPHONE NUMBER INPUTTED FROM AN OPERATING PART IS REGISTERED AT A SPECIFIED POSITION WITHIN A MEMORY
ST210
B
AUTOMATIC CALLING IN A TELEPHONE SET
ST211
A VOICE IS GENERATED THROUGH A VOICE RESPONDING PART IN RESPONSE TO A RECEIVED DATA STORED IN A MEMORY
ST212
AUTOMATIC ENDING OF COMMUNICATION AT A TELEPHONE SET
ST213
TELEPHONE SET OFF
ST214
A

FIG. 9

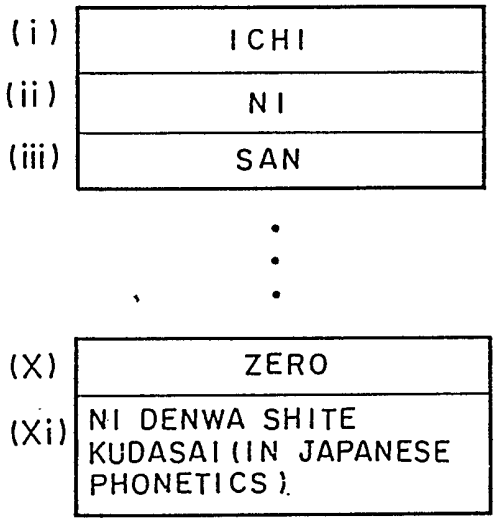

(i)
ICHI
(ii)
NI
(iii)
SAN
(X)
ZERO
(Xi)
NI DENWA SHITE KUDASAI (IN JAPANESE PHONETICS)

FIG. 11

(B)

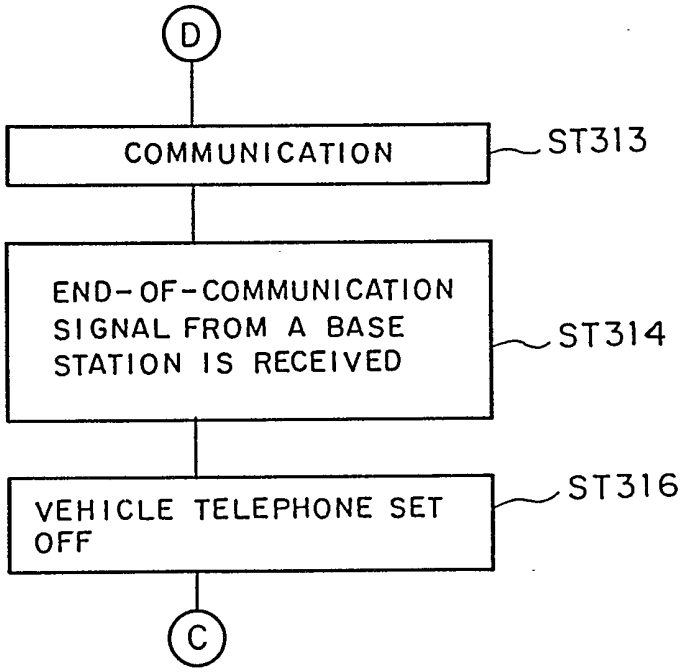

D
COMMUNICATION
ST313
END-OF-COMMUNICATION SIGNAL FROM A BASE STATION IS RECEIVED
ST314
VEHICLE TELEPHONE SET OFF
ST316
C

FIG. 10

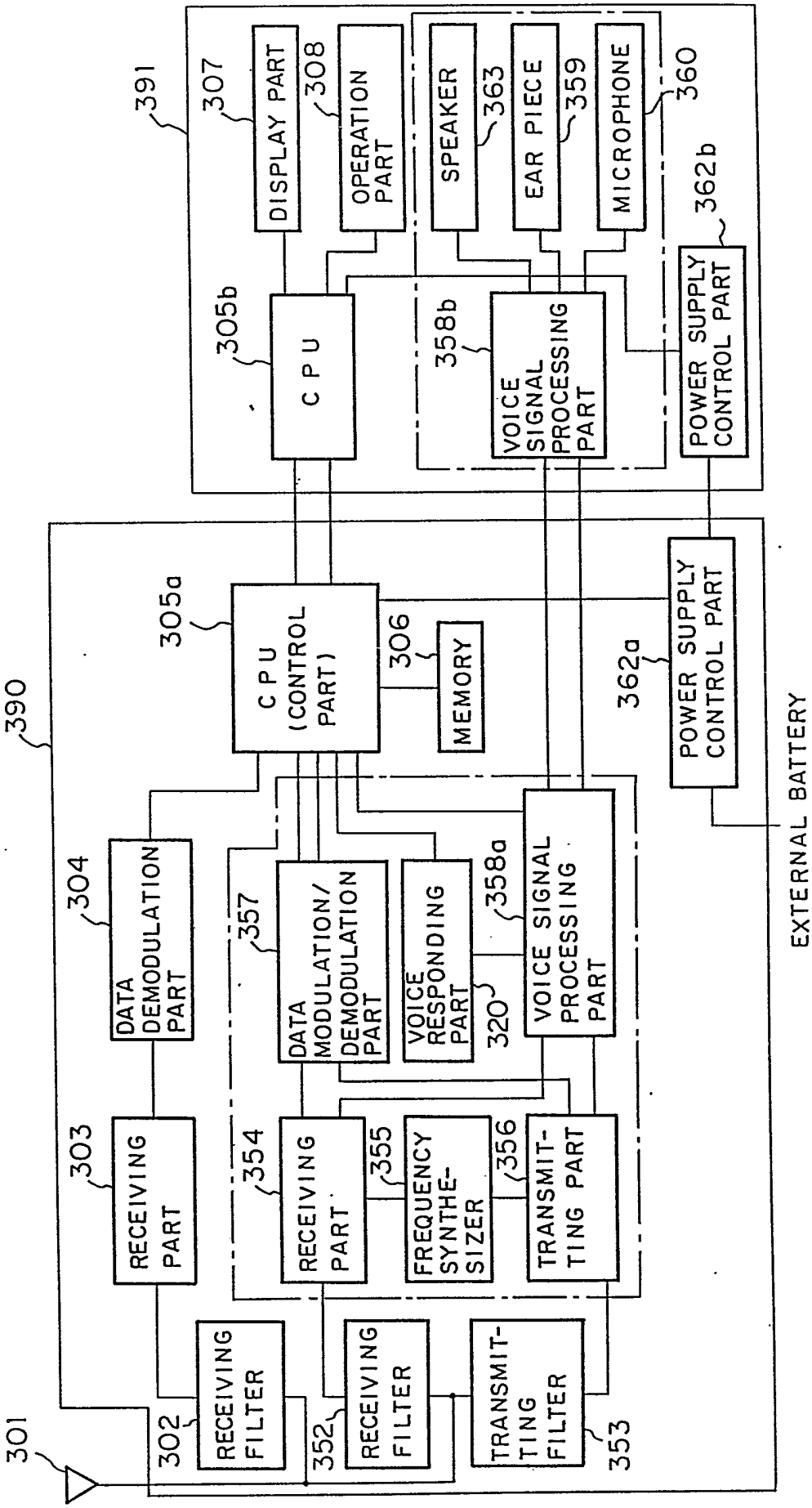

391
307
DISPLAY PART
308
OPERATION PART
SPEAKER
363
EAR PIECE
359
MICROPHONE
360
362b
POWER SUPPLY CONTROL PART
305b
CPU
358b
VOICE SIGNAL PROCESSING PART
390
305a
CPU (CONTROL PART)
306
MEMORY
362a
POWER SUPPLY CONTROL PART
EXTERNAL BATTERY
304
DATA DEMODULATION PART
357
DATA MODULATION/ DEMODULATION PART
VOICE RESPONDING PART
320
358a
VOICE SIGNAL PROCESSING PART
303
RECEIVING PART
354
RECEIVING PART
355
FREQUENCY SYNTHE-SIZER
356
TRANSMIT-TING PART
301
302
RECEIVING FILTER
352
RECEIVING FILTER
TRANSMIT-TING FILTER
353

FIG. 11

(A)

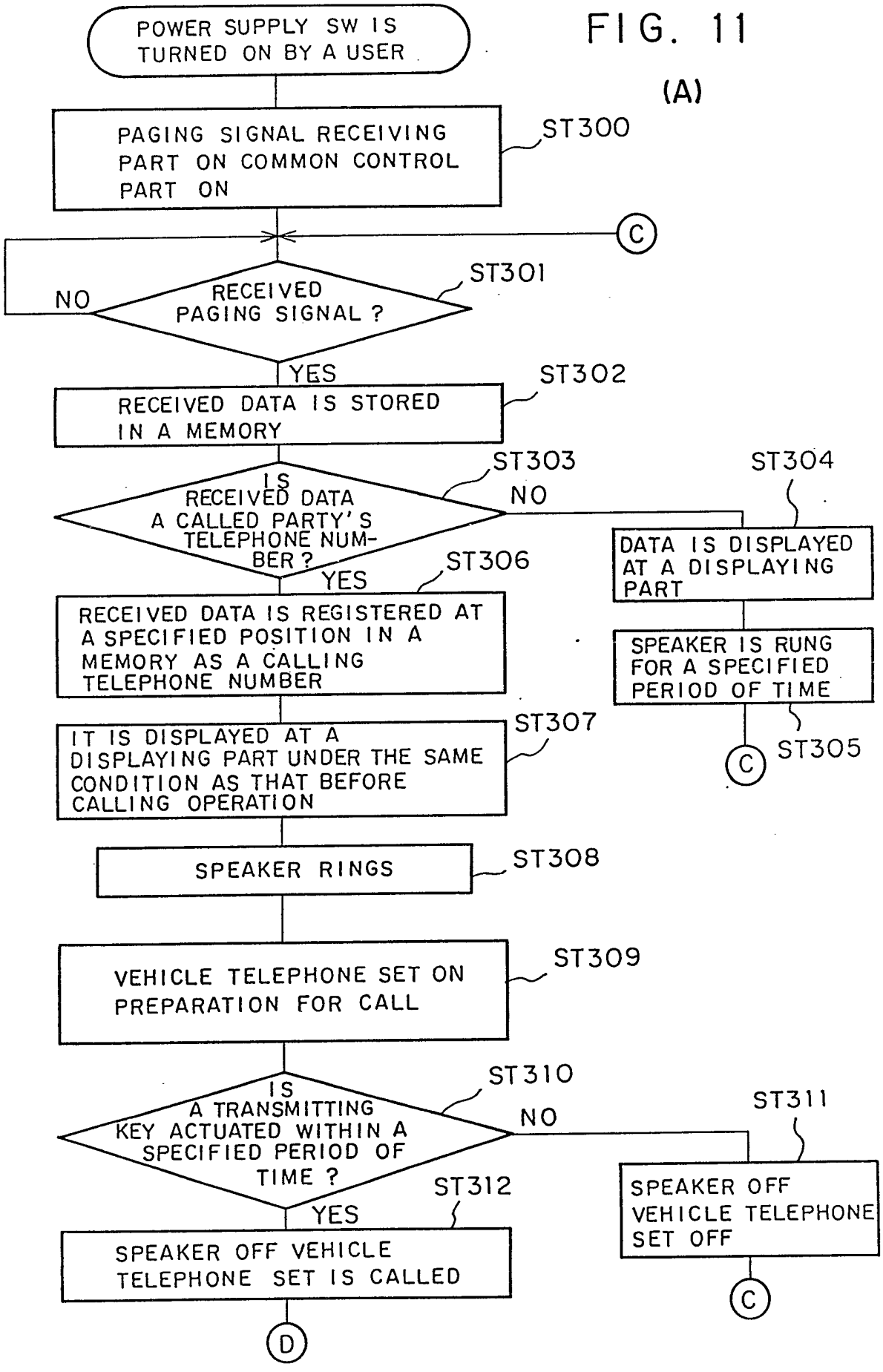

POWER SUPPLY SW IS TURNED ON BY A USER
PAGING SIGNAL RECEIVING PART ON COMMON CONTROL PART ON
ST300
C
RECEIVED PAGING SIGNAL ?
ST301
NO
YES
RECEIVED DATA IS STORED IN A MEMORY
ST302
IS RECEIVED DATA A CALLED PARTY'S TELEPHONE NUMBER ?
ST303
NO
YES
ST304
DATA IS DISPLAYED AT A DISPLAYING PART
SPEAKER IS RUNG FOR A SPECIFIED PERIOD OF TIME
ST305
C
ST306
RECEIVED DATA IS REGISTERED AT A SPECIFIED POSITION IN A MEMORY AS A CALLING TELEPHONE NUMBER
IT IS DISPLAYED AT A DISPLAYING PART UNDER THE SAME CONDITION AS THAT BEFORE CALLING OPERATION
ST307
SPEAKER RINGS
ST308
VEHICLE TELEPHONE SET ON PREPARATION FOR CALL
ST309
IS A TRANSMITTING KEY ACTUATED WITHIN A SPECIFIED PERIOD OF TIME ?
ST310
NO
YES
ST311
SPEAKER OFF VEHICLE TELEPHONE SET OFF
C
ST312
SPEAKER OFF VEHICLE TELEPHONE SET IS CALLED
D

FIG. 12

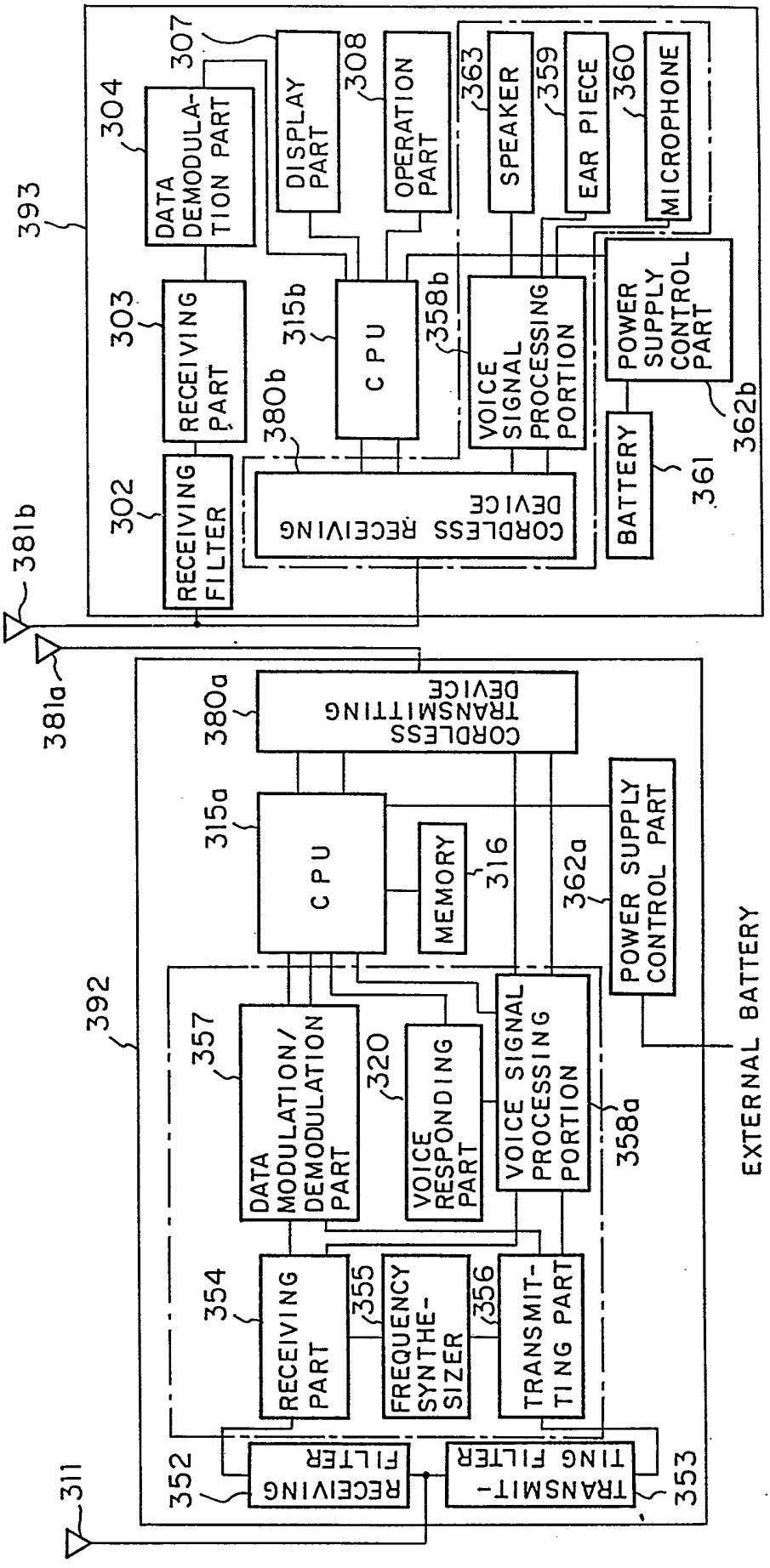
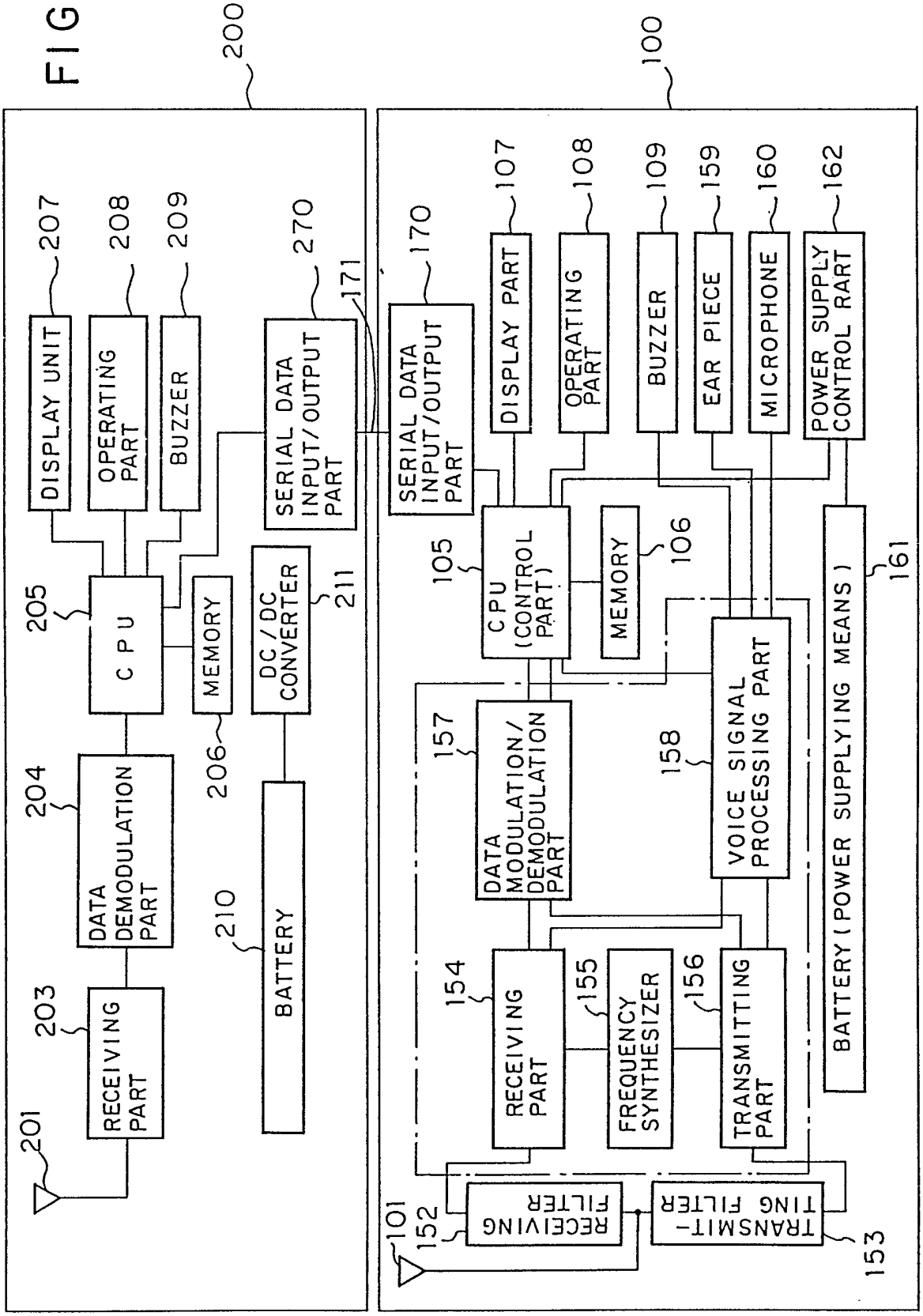

311
352
RECEIVING FILTER
TRANSMITTING FILTER
353
354
RECEIVING PART
355
FREQUENCY SYNTHESIZER
356
TRANSMITTING PART
357
DATA MODULATION/DEMODULATION PART
320
VOICE RESPONDING PART
VOICE SIGNAL PROCESSING PORTION
358a
392
315a
CPU
MEMORY
316
362a
POWER SUPPLY CONTROL PART
EXTERNAL BATTERY
380a
CORDLESS TRANSMITTING DEVICE
381a
381b
302
RECEIVING FILTER
303
RECEIVING PART
304
DATA DEMODULATION PART
307
DISPLAY PART
308
OPERATION PART
363
SPEAKER
359
EAR PIECE
360
MICROPHONE
393
380b
CORDLESS RECEIVING DEVICE
315b
CPU
358b
VOICE SIGNAL PROCESSING PORTION
POWER SUPPLY CONTROL PART
362b
BATTERY
361

FIG. 13


200
DISPLAY UNIT
207
OPERATING PART
208
BUZZER
209
SERIAL DATA INPUT/OUTPUT PART
270
171
205
CPU
MEMORY
DC/DC CONVERTER
211
204
DATA DEMODULATION PART
206
203
RECEIVING PART
210
BATTERY
201
100
SERIAL DATA INPUT/OUTPUT PART
170
DISPLAY PART
107
OPERATING PART
108
BUZZER
109
EAR PIECE
159
MICROPHONE
160
POWER SUPPLY CONTROL RART
162
CPU (CONTROL PART)
105
MEMORY
106
161
157
DATA MODULATION/ DEMODULATION PART
158
VOICE SIGNAL PROCESSING PART
154
RECEIVING PART
155
FREQUENCY SYNTHESIZER
156
TRANSMITTING PART
BATTERY (POWER SUPPLYING MEANS)
101
152
RECEIVING FILTER
TRANSMITTING FILTER
153

Mobile Telephone Device With Low Power Consumption

This invention relates to a mobile telephone device having an incoming call receiving function associated with a paging subsystem thereof.

Fig. 1 is a perspective view showing the external appearance of a conventional type of portable telephone set. Fig. 2 is a block diagram showing a circuit configuration of a conventional type of telephone set. In each of the figures, 101 denotes an antenna for transmitting or receiving an electromagnetic wave, 105 a CPU (a control part) for analyzing received data and controlling each of the blocks, 106, a memory for use with CPU 105, 107 a display part, 108 an operating part such as a keyboard, 109 a buzzer (a ringing element) for informing the presence of an incoming call to an operator, 152, 153 a receiving filter and a transmitting filter, respectively, connected to the antenna 101 for use in blocking a non-required band, 154 a receiving part

for demodulating a high frequency signal to a base band signal, 155 a frequency synthesizer for applying a reference frequency to the receiving part 154 and a transmitting part 156 modulating the base band signal into a high frequency signal, 157 a data modulation/demodulation part for modulating a control signal of the base band signal demodulated by the receiving part 154 into a digital signal and modulating a digital signal to the base band signal, 158 a voice signal processing part for processing a voice signal for communication, 159 an ear piece (a voice output means) to cause an operator to listen sound, 160 a microphone through which an operator may input voice (voice input means), and 161 a battery (a power supplying means) acting as a power supply for each of the blocks.

An example of a mobile telephone device is "Personal Portable Cellular Telephone" Model 900, manufactured by Mitsubishi Electric Corporation.

Fig. 3 is a perspective view showing the external appearance of a conventional type of paging receiving device, and Fig. 4 is a block diagram for showing a circuit configuration of Fig. 3. In the figures, 201 denotes an antenna, 203 a receiving part for demodulating a high frequency signal into a base band signal, 204 a data demodulation part for demodulating a base band signal into a digital signal, 205 a CPU for analyzing the received data of the digital signal, 207 a displaying part, 208 an operating part, 209 a buzzer for informing the presence of a call to an operator, 210 a battery acting as a power supply for each of the blocks, and 211 is a DC/DC converter for converting an output voltage of the battery 210.

An example of a paging device is an "RDS FM pager type FR-50E (for Swedish System)" manufactured by Mitsubishi Electric Corporation.

The operation of each of the circuits of Figs. 2 and 4 will now be described. First, an operation in which a portable telephone set is called up from a base station and the like will be described. A signal containing a call signal transmitted from the base station is received by the antenna 101. A required frequency band is filtered out from this signal by the receiving filter 152. Then, the receiving part 154 may use a tuning frequency supplied from the frequency synthesizer 155 to demodulate the filtered signal into a base band signal and output it to the data modulation/demodulation part 157. The data modulation/demodulation part 157 may demodulate the base band signal into a digital signal and then output it to the CPU 105. The CPU 105 may ring the buzzer 109 to call up the operator upon sensing a call signal in the digital signals.

When the operator acknowledges the sound of buzzer and depresses a transmitting key to the operating part 108, the CPU 105 may acknowledge this depressing action and initiate a return call via the base station. After this operation, the operator may use the microphone 160 and the ear piece 159 to communicate. During this period, the voice signal processing part 158 may process the voice signal, a voice signal inputted from the microphone 160 is outputted as a base band signal and the base band signal input from the receiving part 154 becomes a voice signal and is outputted to the ear piece 159. The transmitting part 156 and the receiving part 154 may perform a modulation and a demodulation between the base band signal and the predetermined frequency signal. The signal modulated at the transmitting part

156 is transmitted from the antenna 101 and the signal received at the antenna 101 is inputted to the receiving part 154. Under a waiting (standby) condition for receiving a call signal, power must be supplied from battery 161 to the receiving part 154, frequency synthesizer 155, data modulation/demodulation part 157, CPU 105, memory 106, displaying part 107, operation part 108 and buzzer 109.

The operation of the paging receiving machine shown in Figs. 3 and 4 will now be described. With respect to the paging receiving machine, an example will be described in which the machine is operated by a voltage having an output voltage of battery 210 converted into a 5 V through DC/DC converter 211. In a similar manner as that of a portable telephone set, a signal sent from a base station, or the like, is passed through the antenna 201, receiving part 203 and data demodulation part 204 and then converted into a digital signal. After receiving the digital signal, the CPU 205 detects a call signal from a calling party and stores a message contained in the call signal into the memory 206, and at the same time, displays it at the display part 207. It further rings the buzzer 209 to call up the operator. The operator acknowledges the sound of the buzzer, looks at a message displayed at the displaying part, and can perform a corresponding countermeasure. For example, in case the message is a telephone number of a calling party, the operator can communicate with the party through another totally separate communication means, such as a public telephone system.

Since the conventional type of portable telephone set is constructed as above in Fig. 2, a power supply must always be supplied to the frequency synthesizer 155 in such a way that the operator can monitor the calling

signal in a standby mode, resulting in substantial consumption of power during the waiting (standby) time, so the charge on battery 161 is depleted, shortening the operating time thereof.

Although the conventional type of paging receiving machine of Fig. 4 has a lower power consumption level and a longer operating time of the battery 210, as compared with that of the portable telephone set of Fig. 2, it has other disadvantages. For example, in the case where communication is required after being called up, a telephone number of called party displayed at the displaying part 207 of the paging receiving machine be manually input into a separate telephone system to perform a communication, resulting in an inconvenience and so a long time passes before the communication is started.

SUMMARY OF THE INVENTION

The present invention eliminates the above-described problems and its object is to provide a mobile telephone device in which operating time for a given battery can be extended, initial communication can be carried out with a paging device which receives a call and a call can be transmitted to a calling party at once after the call signal is received by the paging device.

The objects of the present invention are fulfilled by providing a mobile telephone device comprising:

an antenna for receiving and transmitting high frequency communication signals;

operator input/output means for enabling an operator to input data or voice communications into said telephone device or receive data or voice communications from the device, said input/output means including,

means for generating a standby signal for initiating a call waiting period (standby time) in

which the telephone device can receive incoming calls, and

means for generating a transmit (talk) signal for initiating a voice transmission period (talk time) in which the telephone device can transmit and receive voice and data communications;

control means connected to said operator input/output means for receiving said standby and transmit signals to place said telephone device in either standby or voice transmission (talk) modes, respectively;

first signal processor means for receiving and transmitting voice and data communication signals from and to the antennae, and transporting said voice and data communication signals between the antennae and the control means, said first signal processor means having a first power consumption level when energized by electrical power;

second signal processor means for receiving data communication signals of incoming calls from the antennae and transporting the data communication signals from the antennae to the control means, said second signal processor means having a second power consumption level when energized by electrical power which is lower than the first power consumption level of the first processor means;

power supply means for energizing the telephone device with electrical power; and

power supply control means, responsive to the control means placing the telephone device in the standby mode, for selectively supplying said electrical power only to said operator input/output means, control means and second signal processor means, and responsive to the control means placing the telephone device in a voice

transmission mode, for also supplying said electrical power to said first signal processor means.

The high frequency communication signals received or transmitted by the antenna include first high frequency signals and second high frequency signals of different respective frequencies.

The first processor means is a conventional mobile telephone transceiver and it processes only the first high frequency signals, i.e. the carrier frequency and information modulated thereon of conventional cellular telephone systems.

The second processor means can be a conventional receiver portion of an FM paging device and it processes only the second high frequency signals (paging signals), i.e. the carrier frequency of the FM pager.

The system of the present invention prolongs the operating time of a battery used in a mobile telephone device. The operating time includes the sum of "standby" time and "talk" time. "Standby" time is the time that a mobile telephone device has the power turned on while waiting for an incoming call from a calling party. "Talk" time is the cellular air time, or the time that voice communications are conducted between the mobile device and the calling or called party's telephone. By removing power from a majority of the components of the mobile telephone device, especially the frequency synthesizer, during "standby" time, the operating time of the battery can be extended. The second signal processor means (the FM pager) subsystem makes this possible, since it consumes far less power than the first signal processor means (the telephone transceiver); and, therefore, the FM pager can be used to receive paging signals, including a calling party's telephone number.

For purposes of the following description, the mobile telephone device of the present invention may be considered to be in a "standby mode" during "standby" time, and in a "talk mode" during "talk" time.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing the external appearance of a conventional type of portable telephone set.

Fig. 2 is a block diagram showing the circuit configuration of the conventional type of portable telephone set of Fig. 1.

Fig. 3 is a perspective view showing the external appearance of a conventional type of paging receiver.

Fig. 4 is a block diagram showing a circuit configuration of the conventional type of paging receiver of Fig. 3.

Fig. 5A is a block diagram showing a circuit configuration of a mobile telephone set according to the first preferred embodiment of the present invention.

Fig. 5B is a block diagram showing details of control part 162 of Fig. 5A.

Fig. 6 is a flow chart illustrating the operation of the mobile telephone set shown in Figs. 5A and 5B.

Fig. 7 is a block diagram for showing a circuit configuration of a mobile telephone set according to second and third preferred embodiments of the present invention.

Fig. 8 is a flow chart illustrating the operation of a mobile telephone set according to the second and third preferred embodiments of the present invention of Fig. 7.

Fig. 9 is a diagrammatic view illustrating one example of the contents of a ROM shown in Fig. 7.

Fig. 10 is a block diagram showing a circuit configuration of a mobile telephone set according to a fourth preferred embodiment of the present invention.

Fig. 11 is a flow chart for illustrating an operation of the mobile telephone set shown in Fig. 10.

Fig. 12 is a block diagram for showing a circuit configuration of the mobile telephone set according to the fifth preferred embodiment of the present invention.

Fig. 13 is a block diagram showing a circuit configuration of the mobile telephone set according to a sixth embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

One preferred embodiment of the present invention will be described in reference to the drawings. In Fig. 5, 102 denotes a receiving filter for a paging function for use in passing signals in the frequency range of a paging signal, 103 a paging receiving part for demodulating a high frequency signal of the paging signal into a base band signal, 104 a paging data demodulation part for remodulating the base band signal of the paging signal to a digital signal, 111 an antenna for receiving either a high frequency (a second high frequency wave) associated with a paging function or a voice communication (a first high frequency wave), 115 CPU (a controlling part) including an instantaneous calling means, 116 a memory associated with the CPU 115 and 162 a control part for the power supply 161. Other component elements are designated by the same numerals as those of Fig. 2.

Fig. 5B is a detailed circuit diagram of the power control part 162 in Fig. 5A. Reference numeral 401 depicts a main power switch which is directly controlled by means of a power supply key on the key pad of the operating part 108 and turns on and off the power of the

battery 161. The output of the main power switch 401 is connected to an automatic voltage regulator (AVR) of 5V and a power switch 402 for the automobile telephone transceiver portions of Fig. 5A including parts 154, 155, 156, 157. The AVR 403 generates an output of 5V D.C. and applies power to paging portions 103, 104 and control part 115, 116. Switch 402 is turned on and off by a power supply control line from CPU 115. The output of switch 402 is directly transmitted and supplies the power to the radio transceiver portions 154, 155, 156, 157 of the automobile telephone, and to the voice signal processing part 158 via AVR 404. Switches 401 and 402 may be any suitable type of semiconductor switches known in the art.

The operation of the mobile telephone set of Figs. 5A and 5B will now be described in reference to the flow chart shown in Fig. 6. After a power supply switch on keyboard 108 is turned on, that is, during a waiting (standby) period, power is supplied from the battery 161 via switch 401 and AVR 403 to portions 103, 104, 115, 116 but not to the portions 154, 155, 156, 157 enclosed by the doted line in Fig. 5 (step ST 100). The high frequency signal received at the antenna 111 passes through the paging filter 102 and then is inputted into the paging receiving part 103. The CPU 115 detects a call signal in the digital signal demodulated by the paging receiving part 103 and the paging data demodulation part 104, and stores a message (received data) contained in the call signal in the memory 116. In case that the received data is not a telephone number of a party to be called up, the received data is displayed at the display part 107 (step ST104), rings the buzzer 109 for a specified period of time to inform the operator (step ST105).

In case that the data is a telephone number of a party to be called up in step ST103, the received data is transferred to and registered in a region specified for telephone numbers to be called from the memory 116 (step ST106). When a telephone number is inputted independently of a received call from the operating part 108 (the keyboard) of the mobile telephone set, it is displayed on the display part 107. Likewise, when the telephone number of a party to be called up, received through the paging portions of Fig. 5A is received, it is displayed in the displaying part 107 in a similar fashion (step ST107). In addition, an instruction is applied to the power supply control part 162 and switch 402 therein in such a way that the buzzer 109 may be rung via part 158 (step ST108) and both the transmitting and receiving of voice communications can be performed. Also, the power supply control part 162 via switch 402 connects each of the non-energized blocks 154, 155, 156, 157 with the battery 161 (step ST109).

Under this condition, if the transmitting key ("SEND" key on keyboard 108) is depressed, the CPU 115 will acknowledge this depressing operation and stop the ringing of the buzzer 109. The CPU 115 may then execute an instantaneous calling program, retrieve a telephone number of a party to be called from memory 116 as a digital control signal from the telephone number region thereof and then output it as a digital control signal to the data modulation/demodulation part 157. The telephone number of the party to be called up becomes a base band signal at the data modulation/demodulation part 157. Further, the telephone number of the party to be called up is modulated at the transmitting part 156 as a control signal and then transmitted to the base station of a cellular system from the antenna 111 through a

transmitting filter 153 (step ST112). Thereafter, a conversation may be carried out in the same manner as would be done with a conventional type of mobile telephone set (step ST113), and, thereafter, an "end of conversation" signal is received from the base station, or from depression of an end of conversation key on keyboard 108, and the conversation is terminated (step ST114). Then the CPU 115 may execute an instruction program and give an instruction to the power supply control part 162 and once again shut off the battery 161 from each of the blocks enclosed by the dotted line in Fig. 5A. That is, the system returns to its waiting (standby) condition (step ST116). In case that the transmitting (SEND) key is not depressed at the step ST110 within a specified period of time, CPU 115 may execute the program of storing the telephone number of a party to be called up, display the fact that the call was received at the display part 107, stop the ringing of the buzzer 109, and return to the waiting (standby) condition (step ST111).

Fig. 7 illustrates a mobile telephone device according to a second preferred embodiment in which in addition to the circuit configuration shown in Fig. 5A and 5B, a voice responding part 120 is added and voice responding means is added to the CPU 125. The voice responding part 120 is comprised of ROM in which a predetermined message is coded and a decoding circuit for use in converting the coded data within the ROM into a voice signal. For example, a coding system can be realized through ADPCM (Adaptive Differential Pulse Code Modulation) and a decoding circuit can be realized with a ADPCM decoding LSI, such as a type MSM 6258, ADPCM production/reproduction IC manufactured by Oki Electric Industry Co., Ltd. With this arrangement, a more

effective processing can be realized in the event that the transmitting (SEND) key is not depressed within a specified period of time at step ST110 in Fig. 6.

Referring now to the flow charts of Figs. 6 and 8(A), the operation of the circuit of Fig. 7 will be described. CPU 125 may detect a telephone number of a party to be called and perform each of the functions in steps ST106 to ST109. Thereafter, if the transmitting (SEND) key is not depressed within a specified period of time (step ST110), the circuit of Fig. 7 may perform the processing of Fig. 8A subsequent to the step ST200. At first, CPU 125 may execute the instantaneous call program, retrieve the telephone number of a party to be called out of the region of the telephone numbers in memory 126 to be used for calling, and then output the telephone number of the party to be called up to the transmitting part 156 through the data modulation/demodulation part 157 so as to call the number (step ST200). If the party to be called up responds to the call, CPU 125 may execute the voice responding program therein and output a coded message indicating the absence of a party at the mobile telephone, said message being stored in the ROM of the voice responding part 126 including the ADPCM decoding LSI. The ADPCM decoding LSI converts the coded message into a synthetic voice message and then outputs it to the voice signal processing part 158. In this way, a synthetic voice message indicating the absence of a party at the mobile telephone is sent out to the calling party (step ST201). Upon completion of the sending of the synthetic voice message, it causes the communication to be automatically terminated (step ST203) and the mobile telephone is returned back to its waiting (standby) condition (step ST204). At this time,

the fact that the call was received may be displayed on display 107.

In the above-described preferred embodiment, a system having a voice responding means added within CPU 125 has been described. However, a means for transferring a message to a remote location may also be added to CPU 125 (a third preferred embodiment). That is, as shown in Fig. 9, a ROM at the voice responding part has stored voice messages corresponding to "1" to "0" (that is, "ichi" to "zero" in Japanese phonetics) and voices of proper messages ("...ni denwa o shite kudasai" in Japanese phonetics in Fig. 9) which are coded as data in advance. Further, a transfer telephone number (the number of a remote telephone device to which the message shall be forwarded) inputted from the keyboard 108 is stored in advance in a transfer telephone number region in the memory 126 (step ST210). Under this condition, in the event that a depression of the transmitting (SEND) key could not be detected in step ST110 in Fig. 6 within a specified period of time, CPU 125 may perform operations subsequent to step ST211 indicated in Fig. 8B. At first, CPU 125 may execute the transferring program and output a telephone number to which the message is to be forwarded stored in the transfer telephone number region to the data modulation/demodulation part 157. Then a call is placed in the same manner as that of the first preferred embodiment (step ST211). Then CPU 125 executes the voice responding program and outputs the coded data corresponding to each of the digits of the calling telephone number stored in the calling party's telephone number region in the memory 126 in sequence to the LSI for the decoding ADPCM. Then, it may output a message within the ROM upon completion of the output of the coded

data corresponding to all digits (step ST212). As described above, in this way, it is possible to deliver a voice message of (..ni denwa o shite kudasai (in Japanese phonetics)) in addition to the calling party's telephone number to be called up to an operator who is present at the remote location to which the message is forwarded. Operations after completion of delivering of the voice message (steps ST213 and ST214) are similar to that of the above-described preferred embodiments.

Fig. 10 is a block diagram showing a circuit configuration of a mobile telephone device according to a fourth preferred embodiment of the present invention. This preferred embodiment is an example in which the mobile telephone device is comprised of a main body 390 of a wireless device and a handset 391 and in particular, it is an example of a mobile telephone device to be installed in a vehicle. In the figure, 301 denotes a common antenna for use both in paging and mobile telephone functions, 302 a receiving filter for the paging function, 303 a receiving part for the paging function, 304 a data demodulation part for the paging function, 305a a CPU (a control part) at a main body for controlling the main body 390 of a wireless device, 306 a memory which CPU 305a at the main body uses, 352 and 353 a receiving filter and a transmitting filter, respectively, 354 a receiving part, 355 a frequency synthesizer, 356 a transmitting part, 357 a data modulation/demodulation part, 358a a voice signal processing part at the main body 390 of the wireless device, 362 a power supply control part (similar to part 162 of Fig. 5B) at the main body 390 of the wireless device and 320 a voice responding part. 305b denotes a CPU at the handset for controlling the handset 391 (a control part at the handset), 307 a display part, 308 an

operation part, 358b a voice signal processing part at the handset 391, 359 an ear piece, 360 a microphone, 363 a speaker, and 362b a power supply control part at the handset. The operation of each of the blocks described above is similar to that corresponding to each of the blocks shown in Fig. 7. In Fig. 10, a speaker 363 is arranged as a ringing element in place of the buzzer 109.

The operation of the device will now be described in reference to the flow chart shown in Fig. 11. After turning on the power supply switch (not shown) only the portion outside of the dotted line in Fig. 10 is supplied with electrical power from an external battery (power supply means) through power supply control portions 362a and 362b (step ST300). Then the CPU 305a at the main body detects a calling signal in a digital signal decoded by the paging receiving part 303 and the paging data decoding part 304 (step ST301) and stores the message data (received data) contained in the calling signal in the memory 306 (step ST302). In case that the received data is not a calling party's telephone number (step ST303), the received data is transferred to the handset side CPU 305b. The CPU 305b at the handset displays the received data to the display part 307 (step ST304), rings the speaker 363 for a specified period of time and informs an operator of the calling (step ST305).

In case that at the step ST303, the number is a calling party's telephone number, the received data is transferred to the region specified as a calling telephone number area within the memory 306 (step ST306). Then, the received data is transferred to the CPU 305b at the handset side. In addition, an instruction is applied to the power supply control part 362a and then a power is supplied to each of the blocks within the dotted line of Fig. 10 not yet energized (step ST309).

CPU 305b at the handset may display on part 307 a calling party's telephone number under the same condition as if it was inputted from the keyboard 308 (step ST307). Then, the speaker 363 is rung (step ST308).

Under this condition, as the transmitting (SEND) key at the operation part 308 is depressed, CPU 305b at the handset acknowledges the depressed condition and stops the ringing of the speaker 363. In addition, an instruction is given to the power supply control part 363b to cause the non-energized blocks within the dotted line at the handset 391 to be connected to the external battery so as to supply power thereto (step ST309). In this way, preparation for calling operation is completed for the calling party's telephone number. Thereafter, in the same manner as that of the first preferred embodiment of Fig. 5A, the calling party's telephone number is used to place a call to that party (steps ST310 and ST312), and the operator conducts a conversation (step ST313). After completion of conversation (step ST314), CPU 305a at the main body and CPU 305b at the handset give an instruction to each of the power supply control parts 362a and 362b, respectively, so as to shut off power to the portion of the telephone enclosed by the dotted line in Fig. 10 from the external battery (step ST316).

With the constitution shown in Fig. 10, one having a voice responding part 320 similar to part 120 in Fig. 7 is illustrated. Even if this is not present, it may provide a similar effect.

If the configuration shown in Fig. 10 is used, in the same manner as those of the second and third preferred embodiments, if the transmitting (SEND) key is not depressed at the step ST310 within a specified period of time, more effective processing can be attained. That

is to say, in the same manner as that of the second preferred embodiment, CPU 305a at the main body may execute the instantaneous calling program after an elapse of the specified period of time, the calling party's telephone number is used to call it and then the voice responding program is executed to output a message within the ROM of the voice responding party 320 to the voice signal processing part 358. In addition, in the same manner as that of the third preferred embodiment, transferring means may also be applied to the CPU 305 at the handset and CPU 305a at the main body. In this case, CPU 305b at the handset takes the transferring telephone number from the operation part 308 in advance and transfers it to CPU 305a at the main body. Then, CPU 305a at the main body stores the transferring telephone number in a predetermined region in the memory 306. At the step ST310 in Fig. 11, after a specified period of time elapses, CPU 305a at the main body may execute the transferring program to call up the transferring party and execute a voice responding program, resulting in the calling party's telephone number being sent as a voice message.

Since the mobile telephone device to be installed in a vehicle is operated as described above, even if a period during which the battery is not charged with electrical power is extended for a long period of time, it is possible to minimize consumption of the battery mounted in the vehicle. If either the instantaneous calling means or transferring means is provided, transmitting and receiving of a message can be performed even if an operator is not present.

Fig. 12 illustrates a fifth preferred embodiment in which the main body 392 of the wireless device of the mobile telephone device to be installed in the vehicle

shown in Fig. 11 and the handset 393 are connected by a wireless communication link. In this figure, 315a denotes a CPU at the main body, 316 a memory which CPU 315a at the main body uses, 315b a CPU at the handset, 380a and 380b cordless transmitting and receiving devices (simplified wireless means) for receiving a voice signal between each of the voice signal processing portions 358a and 358b and a control signal between CPU 315a and 315b by using a frequency signal (a third high frequency wave) of the cordless telephone set between CPU 380a and 380b at the handset, 381a an antenna (a simplified wireless antenna) for a cordless telephone frequency (the third high frequency wave) arranged in the main body 392 of the wireless machine, 381b an antenna for receiving a paging frequency signal (a second high frequency wave) arranged in the handset and a cordless telephone frequency (antenna at the handset), and 361 a battery for the handset 393 (a power supplying means at the handset). Other elements are the same as those indicated in Fig. 10 with the same reference numerals. In this preferred embodiment, the paging signal is received at the handset 393.

The operation of the mobile telephone device is the same as that of the mobile telephone device shown in Fig. 10 except that the paging signal is received at the handset 393 and that receiving of the signal between the main body 392 of the wireless device and the handset 393 is carried out in a wireless manner. That is to say, a control can be performed through either the instantaneous calling means or the transferring means in the same manner as that of the fourth preferred embodiment. With such an arrangement described above, it is possible not only to prevent a consumption of the "external battery" of the car and the battery 361, but also to take the

handset 393 out of the vehicle within a range where an electromagnetic wave of the cordless telephone can reach in order to communicate with the main body portion.

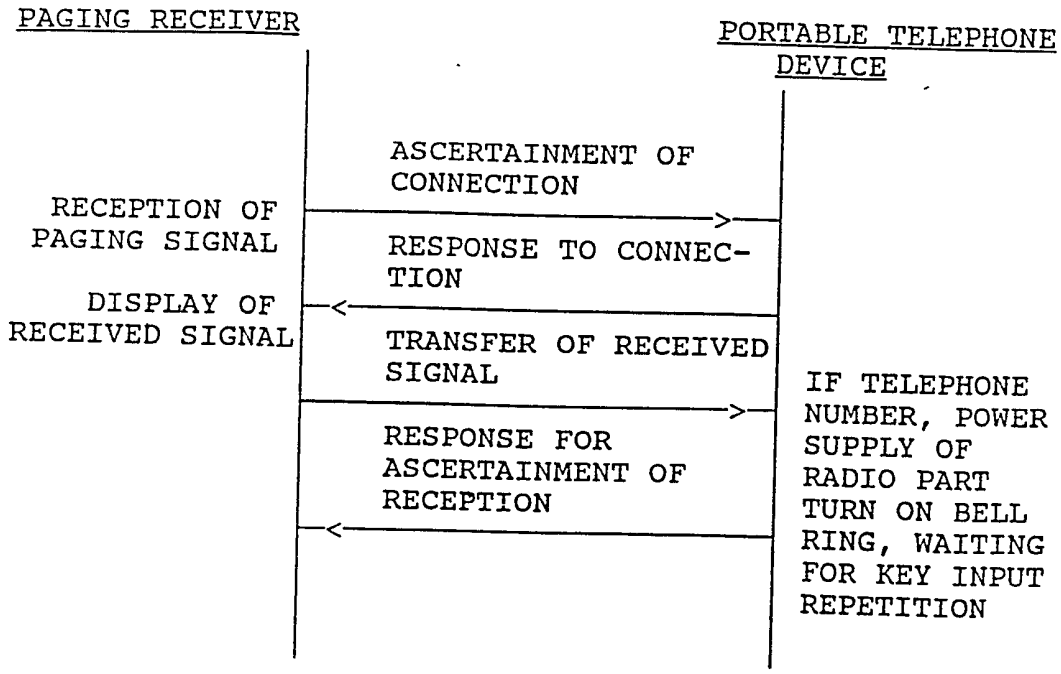
Power supply control part 362a is similar to part 162 of Fig. 5B and selectively applies power to parts 354, 355, 356, 357, 320, 358a during calling (talk) time, but not during standby time. Likewise, part 362b is similar to part 162 of Fig. 5B and selectively applies power to parts 380b, 358b, 359, 360, 363 during calling (talk) time, but not during standby time.

A sixth embodiment of the present invention is illustrated in Fig. 13.

The embodiments in Figs. 5--12 show integrated-type structures, but Fig. 13 shows a separate-type structure. In Fig. 13, reference numeral 100 depicts a portable telephone device and 200 denotes a paging receiver. The main structure of Fig. 13 is similar to that of Figs. 2 and 4, like parts being indicated by like reference numerals, except 162, 170 and 270 are additional parts. Reference numeral 162 illustrates the power control part as shown in Fig. 5B and 170, 270 depict serial data input/output parts, respectively. Further, reference numeral 171 denotes a cable for connecting the serial data input/output parts 170 and 270.

The operation of the device in Fig. 13 will now be described.

The portable telephone device 100 is connected with the paging device 200 via the serial data input/output parts 270, 170 by means of the connecting cable 171 and thereby the power supply turns on and is supplied only to the paging device. The following data communication and control can be performed between the portable telephone device 100 and paging receiver 200 via the serial data input/output parts.



It should be understood that the system of Fig. 13 may also include a voice responding part (synthetic voice generator) within housing 100 connected in the same manner as part 320 of Fig. 12.

The CPUs in all embodiments of the present invention may be one chip 8 bit CPUs, model no. M50747, manufactured by Mitsubishi Electric Corp.

The "voice signal processing" parts of each embodiment may be a digital and analog composite IC-MOS, model no. RKS-5PG6029-001, manufactured by Mitsubishi Electric Corp.

It should be understood that the system of the present invention may be modified as would occur to one of ordinary skill in the art without departing from the spirit and scope of the present invention.

CLAIMS

1. A mobile telephone device comprising:

an antenna for receiving and transmitting high frequency communication signals;

operator input/output means for enabling an operator to input data or voice communications into said telephone device or receive data or voice communications from the device, said input/output means including,

means for generating a standby signal for initiating a call waiting period in which the telephone device can receive incoming calls, and

means for generating a transmit signal for initiating a voice transmission period in which the telephone device can transmit and receive voice and data communications;

control means connected to said operator input/output means for receiving said standby and transmit signals to place said telephone device in either standby or voice transmission modes, respectively;

first signal processor means for receiving and transmitting voice and data communication signals from and to the antenna, and transporting said voice and data communication signals between the antenna and the control means, said first signal processor means having a first power consumption level when energized by electrical power;

second signal processor means for receiving data communication signals of incoming calls from the antennae and transporting the data communication signals from the antennae to the control means, said second signal processor means having a second power consumption level when energized by electrical power which is lower than the first power consumption level of the first processor means;

power supply means for energizing the telephone device with electrical power; and

power supply control means, responsive to the control means placing the telephone device in the standby mode, for selectively supplying said electrical power only to said operator input/output means, control means

and second signal processor means, and responsive to the control means placing the telephone device in a voice transmission mode, for also supplying said electrical power to said first signal processor means.

2. The mobile telephone device of claim 1 wherein said control means includes:

phone number identification means for analyzing the data communication signals of incoming calls processed by said second signal processor means and identifying a telephone number of a calling party that made the incoming call;

memory means for storing the telephone number of the calling party; and

readout means for retrieving the telephone number of the calling party from the memory means, and applying the number to said first signal processor means during the voice transmission mode responsive to the generation of a transmit signal from said operator input/output means in order to initiate a return call to the calling party.

3. The mobile telephone device of claim 2 wherein said operator input/output means includes:

display means for displaying the telephone number of the calling party identified by the control means and stored in the memory means.

4. The mobile telephone device of claim 1 wherein said operator input/output means includes:

display means for displaying message data contained in incoming calls processed by said second signal processor means.

5. The mobile telephone device of claim 1 further comprising:

synthetic voice generator means for generating selected voice messages and applying said messages to said first signal processor means; and

means within the control means for detecting the receipt of an incoming call and automatically outputting a transmit signal from said control means if a transmit signal has not been generated by said operator input/output means within a predetermined time of receipt of an incoming call, said transmit signal output from said control means placing the telephone device in a voice transmission mode and causing the transmission of a selected voice message from the synthetic voice generator means via the first signal processor means to the calling party.

6. The mobile telephone device of claim 2 further comprising:

synthetic voice generator means for generating selected voice messages and applying said messages to said first signal processor means; and

means within the control means for detecting the receipt of an incoming call and automatically outputting a transmit signal from said control means if a transmit signal has not been generated by said operator input/output means within a predetermined time of receipt of an incoming call, said transmit signal output from said control means placing the telephone device in a voice transmission mode and causing the transmission of a selected voice message from the synthetic voice generator means via the first signal processor means to the calling party.

7. The mobile telephone device of claim 1 further comprising:

synthetic voice generator means for generating selected voice messages and applying said messages to said first signal processor means;

said control means including,

phone number identification means for analyzing the data communication signals of incoming calls processed by said second signal processor means and identifying a telephone number of a calling party that made the incoming call;

said operator input/output means including means for inputting a transfer telephone number to which incoming call data can be transferred;

memory means for storing the calling party's telephone number and the transfer telephone number to which said incoming call data can be transferred; and

readout means for retrieving both the calling party and transfer telephone numbers from the memory means;

said control means applying signals retrieved by the readout means related to the calling party's telephone number to said synthetic voice generating means in order to apply synthetic voice signals, capable of enunciating the calling party's telephone number, to said first signal processor means;

said control means also applying signals retrieved by said readout means related to said transfer telephone number to said first signal processor means in order to initiate voice communication to a remote telephone device having said transfer telephone number, said communication including synthetic voice enunciation at the remote telephone device of the calling party's telephone number.

8. The mobile telephone device of claim 7, wherein said control means also causes said synthetic voice generator means to apply selected voice messages in addition to the calling party's telephone number to said first signal processor means.

9. The mobile telephone device of claim 1 wherein the high frequency communication signals received or transmitted by said antenna include first high frequency signals and second high frequency signals of different respective frequencies, said first processor means processing only said first high frequency signals and said second processing means processing only said second high frequency signals.

10. A mobile telephone device according to claim 9 wherein said second signal processor means comprises a filter for extracting the second high frequency signals received by said antenna, means for converting the output signal of the filter to a base band signal and demodulator means for converting said base band signal into a digital signal and outputting said digital signal to said control means.

11. A mobile telephone device according to claims 1 or 9 in which a ringing element connected to said control means is provided and the control means includes ringing means for driving said ringing element either until said transmit signal is inputted or for a specified period of time.

12. A mobile telephone device according to claims 1 or 9 in which the control means includes instructing means for giving an instruction to the power supply control

means to shut off the supply of electrical power to the telephone device upon completion of communication of the voice transmission mode.

13. A mobile telephone device according to claim 5 in which the synthetic voice generating means includes ROM having data coded with a voice message and a demodulation LSI for demodulating the coded data within the ROM into a voice signal.

14. A mobile telephone device according to claims 1 or 9 in which the control means is a microprocessor containing a central processing device and a memory for storing said calling party's telephone number.

15. A communication system comprising:

A mobile telephone device included in a housing containing,

a first antenna for receiving and transmitting high frequency communication signals;

operator input/output means for enabling an operator to input data or voice communications into said telephone device or receive data or voice communications from the device, said input/output means including;

means for generating a standby signal for initiating a call waiting period in which the telephone device can receive incoming calls;

means for generating a transmit signal for initiating a voice transmission period in which the telephone device can transmit and receive voice and data communications;

first control means connected to said operator input/output means for receiving said

standby and transmit signals to place said telephone device in either standby or voice transmission modes, respectively;

first signal processor means for receiving and transmitting voice and data communication signals from and to the first antenna, and transporting said voice and data communication signals between the first antenna and the first control means, said first signal processor means having a first power consumption level when energized by electrical power;

first data input/output means for feeding data into and out of said common housing to and from said first control means;

power supply means for energizing the telephone device with electrical power; and

power supply control means, responsive to the control means placing the telephone device in the standby mode, for selectively supplying said electrical power only to said operator input/output means and control means and responsive to the control means placing the telephone device in a voice transmission mode, for also supplying said electrical power to said first signal processor means;

a separate receiver device housing containing,

a second antenna for receiving high frequency communication signals;

second signal processor means for receiving data communication signals of incoming calls from the second antenna and transporting the data communication signals from the antenna to a second control means in the receiver device housing, said second signal processor means

having a second power consumption level when energized by electrical power which is lower than the first power consumption level of the first processor means;

second power supply means for supplying electrical power to said second signal processor means; and

second data input/output means connected to said first input/output data means and said second control means.

16. The communication system of claim 15 wherein said first and second control means includes:

phone number identification means for analyzing the data communication signals of incoming calls processed by second signal processor means and identifying a telephone number of a calling party that made the incoming call;

memory means for storing the telephone number of the calling party; and

readout means for retrieving the telephone number of the calling party from the memory means, and applying the number to said first signal processor means during the voice transmission mode responsive to the generation of a transmit signal from said operator input/output means in order to initiate a return call to the calling party.

17. The communication system of claim 16 wherein said operator input/output means includes:

display means for displaying the telephone number of the calling party identified by the first control means and stored in the memory means associated therewith.

18. The communication system of claim 15 wherein said operator input/output means includes:

display means for displaying message data contained in incoming calls processed by said second signal processor means.

19. The communication system of claim 15 further comprising:

synthetic voice generator means for generating selected voice messages and applying said messages to said first signal processor means; and

means within the first control means for detecting the receipt of an incoming call and automatically outputting a transmit signal to said control means if a transmit signal has not been generated by said operator input/output means within a predetermined time of receipt of an incoming call, said transmit signal output from said control means placing the telephone device in a voice transmission mode and causing the transmission of a selected voice message from the synthetic voice generator means via the first signal processor means to the calling party.

20. The communication system of claim 16 further comprising:

synthetic voice generator means for generating selected voice messages and applying said messages to said first signal processor means; and

means within the first control means for detecting the receipt of an incoming call and automatically outputting a transmit signal to said control means if a transmit signal has not been generated by said operator input/output means within a predetermined time of receipt

of an incoming call, said transmit signal output from first control means placing the telephone device in a voice transmission mode and causing the transmission of a selected voice message from the synthetic voice generator means via said first signal processor means to the calling party.

21. The communication system of claim 15 further comprising:

synthetic voice generator means for generating selected voice messages and applying said messages to said first signal processor means;

said first control means including,

phone number identification means for analyzing the data communication signals of incoming calls processed by said second signal processor means and identifying a telephone number of a calling party that made the incoming call;

said operator input/output means including means for inputting a telephone number into which incoming call data can be transferred;

memory means for storing the calling party's telephone number and the number to which said incoming call data can be transferred; and

readout means for retrieving both the calling party and transfer telephone numbers from the memory means;

said first control means applying signals retrieved from the readout means related to the calling party's telephone number to said synthetic voice generating means in order to apply synthetic voice signals, capable of

enunciating the calling party's telephone number, to said first signal processor means;

said first control means also applying signals retrieved by said readout means related to said transfer telephone number to said first signal processor means in order to initiate voice communication to a remote telephone device having said transfer telephone number, said communication including synthetic voice enunciation at the remote telephone device of the calling party's telephone number.

22. The communication system of claim 21 wherein said first control means also causes said synthetic voice generator means to apply selected voice messages in addition to the calling party's telephone number to said first signal processor means.

23. The communication system of claim 15 wherein the high frequency communication signals received or transmitted by the respective antenna include first high frequency signals and second high frequency signals of different respective frequencies, said first processor means processing only said first high frequency signals and said second processing means processing only said second high frequency signals.

24. A communication system according to claims 15 or 23 wherein said second signal processing means comprises a filter for extracting the second high frequency signals received by said antenna, means for converting the output signal of the filter to a base band signal and demodulator means for converting said base band signal

into a digital signal and outputting said digital signal to said control means.

25. A communication system according to claims 15 or 17 in which a ringing element connected to said control means is provided and the control means includes ringing means for driving said ringing element either until said transmit signal is inputted or for a specified period of time.

26. A communication system according to claims 15 or 23 in which the first control means includes instructing means for giving an instruction to the power supply control means to shut off the supply of electrical power to the telephone device upon completion of the voice transmission mode.

27. A mobile telephone device according to claim 19 in which the synthetic voice generating means includes ROM having data coded with a voice message and a demodulation LSI for demodulating the coded data within the ROM into LSI for demodulating the coded data within the ROM into a voice signal.

28. A communication system according to claims 15 or 23 in which the control means is a microprocessor containing a central processing device and a memory for storing said calling party's telephone number.

29. A mobile telephone device comprising:

an antenna for receiving and transmitting high frequency communication signals;

control means for processing signals related to the communication signals;

transceiver means for receiving and transmitting voice and data communication signals from and to the antenna, and transporting said voice and data communication signals between the antenna and the control means, said transceiver means having a first power consumption level when energized by electrical power;

receiver means for receiving incoming call data signals from the antenna from a calling party and transporting the data communication signals from the antenna to the control means, said receiver means having a second power consumption level when energized by electrical power which is lower than the first power consumption level of the first processor means;

power supply means for energizing the telephone device with electrical power; and

power supply control means for blocking the supply of electrical power to the transceiver means when waiting for the incoming data communication signals received by said receiver means.

30. The mobile telephone device of claim 29 wherein said control means includes:

phone number identification means for analyzing the data communication signals of incoming calls processed by said receiver means and identifying a telephone number of a calling party that made the incoming call;

memory means for storing the telephone number of the calling party; and

readout means for retrieving the telephone number of the calling party from the memory means, and applying the number to said transceiver means in order to initiate a return call to the calling party.

31. The mobile telephone device of claim 30 wherein said control means includes:

display means for displaying the telephone number of the calling party identified by the control means and stored in the memory means.

32. The mobile telephone device of claim 29 wherein said control means includes:

display means for displaying message data contained in incoming calls processed by said receiver means.

33. The mobile telephone device of claim 29 wherein the high frequency communication signals received or transmitted by said antenna include first high frequency signals and second high frequency signals of different respective frequencies, said transceiver means processing only said first high frequency signals and said receiver means processing only said second high frequency signals.

34. A mobile telephone device according to claim 33 wherein said receiver means comprises a filter for extracting the second high frequency signals received by said antenna, means for converting the output signal of the filter to a base band signal and demodulator means for converting said base band signal into a digital signal and outputting said digital signal to said control means.

35. A mobile telephone device according to claims 29 or 33 in which a ringing element connected to said control means is provided and the control means includes ringing means for driving said ringing element for a specified period of time.

36. A mobile telephone device according to claims 29 or 33 in which the control means includes instructing means for giving an instruction to the power supply control means to shut off the supply of electrical power to the telephone device upon completion of communication with a calling party.

37. A mobile telephone device comprising:

an antenna for receiving and transmitting high frequency communication signals;

control means for processing signals related to the communications signals;

first signal channel means for receiving and transmitting voice and data communication signals from and to the antenna, and transporting said voice and data communication signals between the antenna and the control means, said first signal channel means having a first power consumption level when energized by electrical power;

paging signal channel means for receiving paging signals within incoming calls from the antenna and transporting the data communication signals from the antenna to the control means, said paging signal channel means having a second power consumption level when energized by electrical power which is lower than the first power consumption level of the first signal channel means;

power supply means for energizing the telephone device with electrical power; and

power supply control means for blocking the supply of electrical power to said first signal channel means when waiting for receipt of a paging signal.

38. The mobile telephone device of claim 37 wherein said control means includes:

phone number identification means for analyzing the paging signals of incoming calls received by said paging signal channel means and identifying a telephone number of a calling party that made the incoming call;

memory means for storing the telephone number of the calling party; and

readout means for retrieving the telephone number of the calling party from the memory means and applying the number to said first signal channel means in order to initiate a return call to the calling party.

39. The mobile telephone device of claim 38 wherein said control means includes:

display means for displaying the telephone number of the calling party identified by the control means and stored in the memory means.

40. The mobile telephone device of claim 37 wherein said control means includes:

display means for displaying message data contained in incoming calls processed by said paging signal channel means.

41. The mobile telephone device of claim 37 wherein the high frequency communication signals received or transmitted by said antenna include first high frequency signals and second high frequency signals of different respective frequencies, said first signal channel means processing only said first high frequency signals and said paging signal channel means processing only said second high frequency signals.

42. A mobile telephone device according to claim 41 wherein said paging signal channel means comprises a filter for extracting the second high frequency signals received by said antenna, means for converting the output signal of the filter to a base band signal and (needs finished)

43. A mobile telephone device according to claims 37 or 41 in which a ringing element connected to said control means is provided and the control means includes ringing means for driving said ringing element for a specified period of time.

44. A mobile telephone device according to claims 37 or 41 in which the control means includes instructing means for giving an instruction to the power supply control means to shut off the supply of electrical power to the telephone device upon completion of communication with a calling party.

45. A communication system substantially as hereinbefore described with reference to and as shown in Figures 5-6, Figures 7-9, Figures 10-11, Figure 12 or Figure 13 of the accompanying drawings.

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Databases (see over)

(i) UK Patent Office

(ii)

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Documents considered relevant following a search in respect of claims ALL

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	WO 88/06830 A1 Page 7, final paragraph	1,29,37

Category	Identity of document and relevant passages	Relevant to claim(s)

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