(54) Title: WIRELESS TELEPHONE AIRPLANE AND ALARM CLOCK MODES
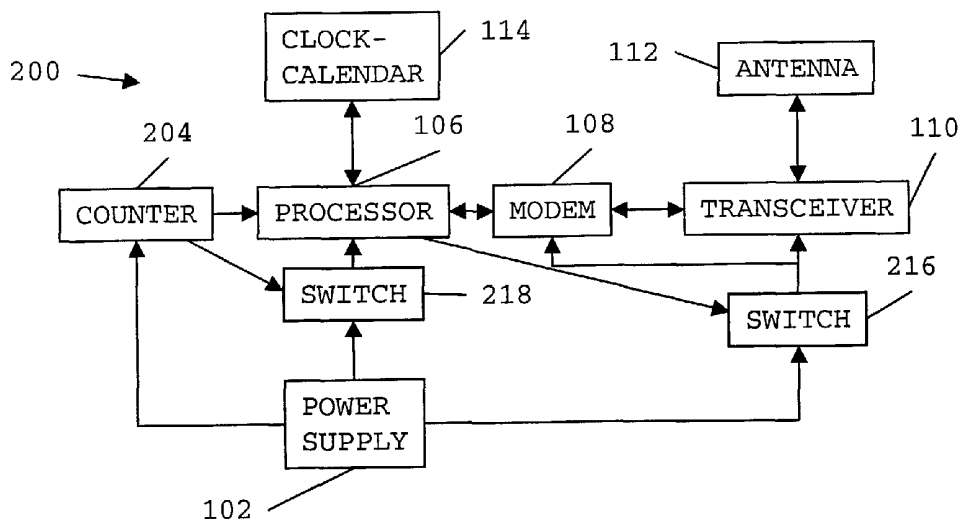
(57) Abstract: A wireless telephone (200) has a power supply (102), which supplies power to a counter (104), a processor (106), a wireless modem (108), and a transceiver (110). The transceiver (110) communicates with the outside world through an antenna (112). The processor exchanges signals with a clock-calendar (114). When the telephone is in power-conservation mode, the processor opens a switch (216) between the power supply and the transceiver and modem. A second switch (218) is interposed between the power supply (102) and the processor (106), and is under the control of the counter (204). Thus, in power-conservation mode, only the counter draws power. Power-conservation mode (302) may be exited by external command (304), a signal from the clock-calendar (306), or an attempt to place an outgoing call (308).

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WIRELESS TELEPHONE AIRPLANE AND ALARM CLOCK MODES

BACKGROUND OF THE INVENTION

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Technical Field

This invention relates to wireless telephones, and has particular relation to reduced power modes, such as when the telephone is in an RF-transmission-

10   restricted environment, such as an airplane, or is being used in a mode of reduced activity, such as operating as an alarm clock.

Background Art

15   A wireless telephone (cellular, PCS, etc.) is sometimes in a situation (such as on an airplane) where transmission is prohibited. The conventional method for dealing with such situations is to disable the transceiver, either by hardware or software. The transmitter and receiver consume much of the power required by the telephone, so this method has the additional benefit of conserving the

20   battery.

Similarly, the telephone may be used as an alarm clock. Since the user does not wish to receive calls while he is asleep, the transceiver is turned off, and the alarm clock feature continues. The alarm clock feature is distinct from the reminder feature, in which the telephone is configured to remind the user,

25   during the day, of an upcoming appointment, and also is configured to receive and place calls as required. Turning off the transceiver provides a significant power reduction in alarm clock mode in comparison to remind mode. Later the alarm clock can turn the transceiver back on.

30   **SUMMARY OF THE INVENTION**

Applicants have noted that, while transmission and reception consume much of the power required by the telephone, there is a substantial power drain even when the transceiver is disabled. In particular, the wireless modem

35   remains enabled even during airplane and alarm clock modes, when the transceiver itself is disabled. The present invention thus provides that both the

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transceiver and the modem be disabled, yet also provides that substantial other (and low power) apparatus be enabled during the airplane and alarm clock modes. For example, the user would continue to have access to the phone book, messages, and other phone features. Moreover, the alarm feature

5   continues to function, as do alerts from calendar applets. This last feature is particularly important when the telephone is coupled with a personal digital assistant (PDA). If the telephone is not coupled with a PDA, then it is the modem function, rather than a separate modem per se, which is enabled or disabled. Such coupling is preferred, but not required, in the present invention.

10   Applicants accomplish this by having a low current counter (hardware) wake up the rest of the processor every 2.5 minutes. This 2.5 minute time period is adjustable. Usually the only thing the processor does is update the clock/calendar and go back to sleep. However, it can be set to automatically turn the phone on at a particular time, or to wait until manually commanded to

15   turn the phone on.

The former choice is suited to an alarm clock mode. While the user is asleep at night, he does not want the telephone to receive calls, and therefore manually sets the telephone to alarm clock mode, so that he can continue to sleep. Alternatively, the user may select auto-entry, so that the alarm clock

20   mode is automatically entered at a fixed time every evening. At some pre-determined time the next morning, the phone (modem and transceiver) turns on and allows incoming calls. This turn-on may be accompanied by an audible alarm, or may be silent. The phone exits alarm clock mode when the user commands an exit, at the alarm time, or when the user places an outgoing call,

25   whichever happens first.

The latter choice is suited to the airplane mode. Even if the airplane is scheduled to land at 4:00 P. M., it is unwise to have the phone automatically turn itself on at that time. Planes often are late. It is far better for the user to wait until he is off the plane and in the terminal, and then manually turn the

30   phone on. The phone exits airplane mode only when the user commands an exit. There is no fixed exit time, and the user is not permitted to place an outgoing call when the phone is in airplane mode.

In either mode, the phone book, calendar applets, etc. remain enabled.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram of a prior-art wireless telephone.

FIG. 2 is a block diagram of wireless telephone according to the present

5   invention.

FIG. 3 is a flow chart of a novel method for operating a wireless
telephone.

DETAILED DESCRIPTION OF THE PREFERRED
10   EMBODIMENTS

FIG. 1 is a block diagram of a prior-art wireless telephone (100). A
power supply (102) supplies power to a counter (104), a processor (106), a
wireless modem (108), and a transceiver (110). The transceiver (110)
15   communicates with the outside world through an antenna (112). The processor
exchanges signals with a clock-calendar (114). When the telephone is in power-
conservation mode, the processor opens a switch (116) between the power
supply and the transceiver, thereby preventing the transceiver from consuming
power. The switch may be implemented in hardware or software. Thus, one
20   way to open a switch is to signal a power regulation circuit to remove power
from the transceiver. The processor itself may go into power-conservation
mode. In this mode, the counter (104) runs continuously. When it counts down
to zero (typically every two and a half minutes, although other periods may be
selected if desired), it so notifies the processor. The processor wakes up just
25   enough to reset the clock-calendar (114), and then goes back to sleep. Even
when asleep, the processor and modem draw some power, but the amount of
power is small.

FIG. 2 is a block diagram of wireless telephone according to the present
invention (200). The structure is similar to that of the prior-art telephone (100)
30   shown in FIG. 1, with two important differences. First, the prior-art switch
(116) has been modified to a novel switch (216) which controls power to the
modem (108) as well as to the transceiver (110). Thus, when the processor
commands a power-conservation mode, power is withdrawn from the modem
and the transceiver, and not just to the transceiver. Second, a second switch
35   (218) is interposed between the power supply (102) and the processor (106), and
is under the control of the counter (204). Thus, in power-conservation mode,

only the counter draws power. The processor draws power only intermittently, and both the modem and the transceiver draw power only when the switch (216) is commanded to close by the processor (106).

The phone can selectively power-down the transmitter and the receiver. The phone software can enable a counter which generates a signal when the counted time has passed. The phone software can cause the CPU to suspend operation, and optionally disable the CPU's clock source, until a signal arrives. The signal can come from the counter or from other devices such as a keypad.

FIG. 3 is a flow chart of a novel method (300) for operating a wireless telephone. It shows that the command from the processor (106) to the switch (216), to selectively disable (302) the modem and transceiver, may come from any of three sources. The first is an external command (304). When the user gets off the airplane, or wakes up before the alarm clock goes off, he can manually leave the power conservation mode. The second is from the clock-calendar (306). If the processor determines from the clock-calendar that it is time to wake the user up, then presumably the user wants to be able to receiver telephone calls as well. The third is from the attempt (308) to make an outgoing call. If the user wakes up in the middle of the night and attempts to make an outgoing call, then presumably he wants the modem and transceiver to work; he should not be required to manually leave the power-conservation mode by means of an external command.

Selective disabling (302) of the modem (108) and transceiver (110) is mandatory if invoked by an external command (304). The user has to be able to turn off the modem and transceiver (while leaving the other functions in operation) when he walks onto an airplane, and he has to be able to turn them back on when he walks off the airplane. The other two invocations of selective disabling -- by clock-calendar (306) or an attempted outgoing call (308) -- are optional. The user may configure his telephone so that, when he enters alarm clock mode, he can leave that mode by either, both, or neither of these invocations. Alternatively, the telephone may be configured by the manufacturer to respond to either, both, or neither of these invocations, without the user having the ability to reconfigure the telephone.

Industrial Application

Our invention is capable of exploitation in industry, and can be made and used, whenever is it desired to provide a wireless telephone with airplane

5   and alarm clock modes. The individual components of the apparatus and method shown herein, taken separate and apart from one another, may be entirely conventional, it being their combination which we claim as our invention.

While we have described various modes of apparatus and method, the

10   true spirit and scope of my invention are not limited thereto, but are limited only by the following claims and their equivalents, and we claim such as our invention.

WE CLAIM:

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CLAIMS

1.   A wireless telephone (200), wherein:

2   (a)   the wireless telephone includes a counter (204), a clock-calendar
                (114), a transceiver (110), and a power supply(102); and

4   (b)   the wireless telephone is *characterized in that* the wireless
                telephone includes:

6   (1)   means for selectively removing power from or applying
                        power to the transceiver without removing power from the

8   counter;

                (2)   means for the counter, upon completing count down, to:

10   (A)   apply power the clock-calendar if not already
                                applied; and

12   (B)   update the clock-calendar.

2.   The wireless telephone of Claim 1, *further characterized in that*:

2   (a)   the wireless telephone further includes additional apparatus; and

        (b)   the means for selectively removing or applying power from the

4   transceiver is structured to do so without removing power from
                the additional apparatus.

3.   The wireless telephone of Claim 3, *further characterized in that* the

2   means for selectively removing power from or applying power to the

        transceiver includes means for the clock-calendar to selectively remove

4   power from the transceiver.

4.   The wireless telephone of Claim 1, *further characterized in that* the

2   means for selectively removing power from or applying power to the

        transceiver includes means for the clock-calendar to selectively apply

4   power to the transceiver.

5.   The wireless telephone of Claim 1, *further characterized in that* the

2   wireless telephone is further constructed to selectively apply power to

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the transceiver when the transceiver has been removed from the power
supply and an attempt is made to place an outgoing call.

6.   The wireless telephone of Claim 5, *further characterized in that* the
means for selectively removing power from or applying power to the
transceiver includes means for the clock-calendar to selectively apply
power to the transceiver.

7.   A method for using wireless telephone, wherein:
        (a)   the wireless telephone includes a counter (104), a processor (106),
                a clock-calendar (114), a wireless modem (108), a transceiver (110),
                and a power supply 102);
        (b)   the method includes:
                (1)   counting down the counter;
                (2)   upon completing count down, applying power to the
                        processor;
                (3)   the processor, upon being powered up by the counter's
                        count down, updating the clock-calendar; and
                (4)   the processor selectively removing or applying power from
                        the transceiver;
        (c)   the method is *characterized in that* it further includes, responsive
                to an external command (304) to the processor, selectively
                applying power to (302) the wireless modem, in conjunction with
                the transceiver.

8.   The method of claim 7, *further characterized in that* the selectively
applying power to the wireless modem, in conjunction with the
transceiver, is also selectively responsive to a signal from the clock-
calendar (306).

9.   The method of claim 7, *further characterized in that* the selectively
applying power to the wireless modem, in conjunction with the
transceiver, is also selectively responsive to an attempt to place an
outgoing call (308).

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10. The method of claim 9, *further characterized in that* the selectively
2 applying power to the wireless modem, in conjunction with the
transceiver, is also selectively responsive to a signal from the clock-
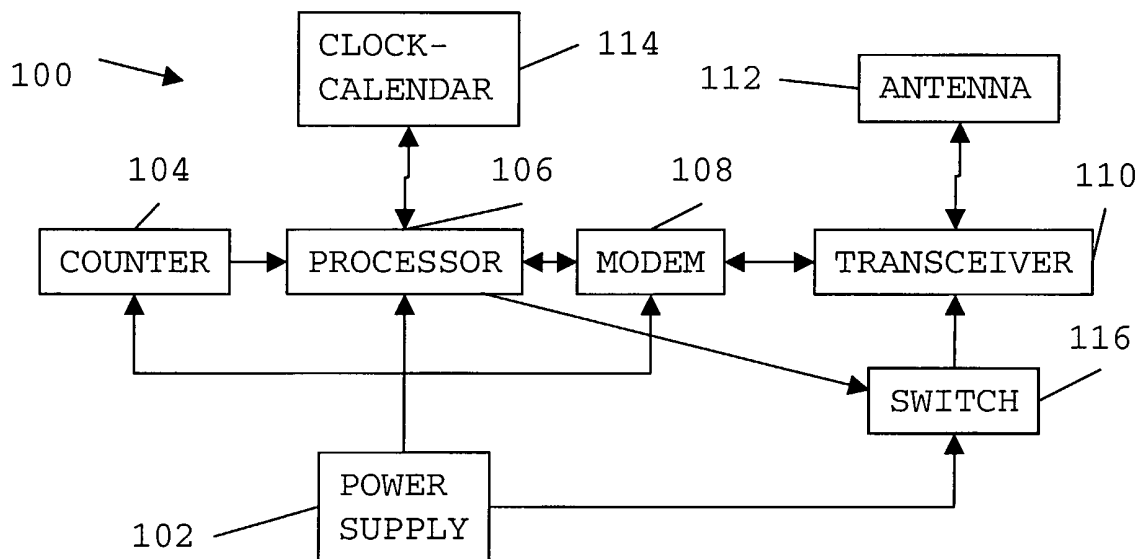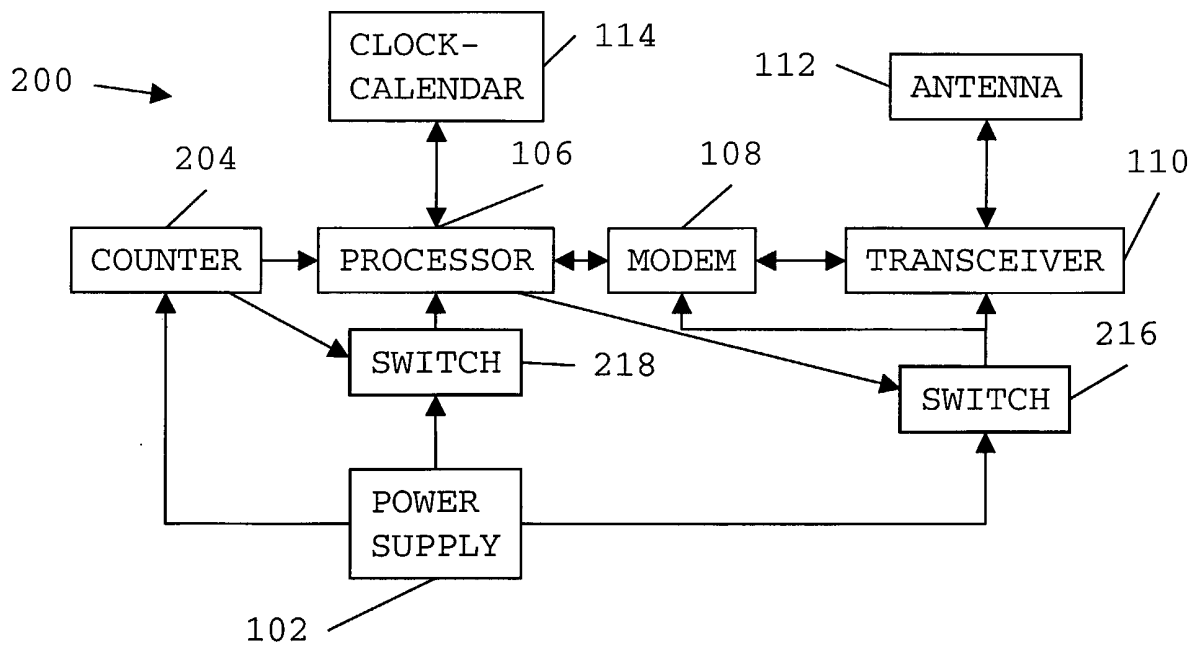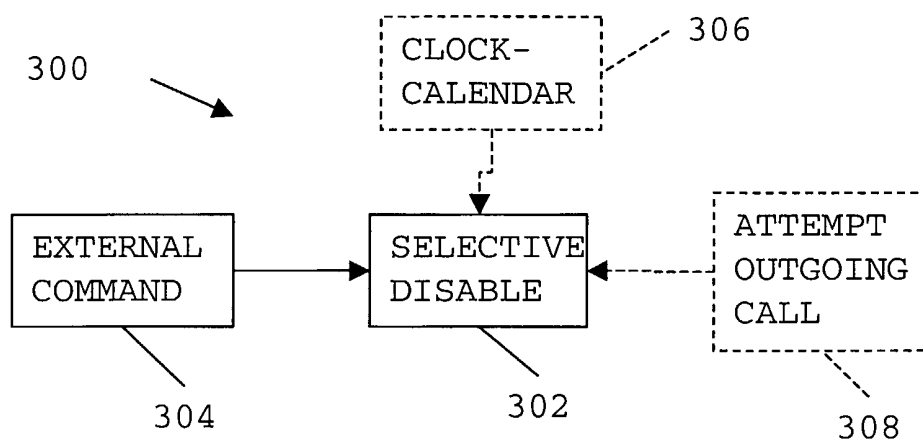4 calendar (306).

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FIG. 1
PRIOR ART

FIG. 2

FIG. 3

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B1/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 939 495 A (MOTOROLA SEMICONDUCTEURS) 1 September 1999 (1999-09-01) abstract column 2, line 36 -column 8, line 47 figure 5	1-10
A	US 4 860 005 A (DELUCA JOAN S ET AL) 22 August 1989 (1989-08-22) abstract column 3, line 57 -column 11, line 4 figure 2	1-10
A	GB 2 136 616 A (PHILIPS ELECTRONIC ASSOCIATED) 19 September 1984 (1984-09-19) abstract column 2, line 100 -column 5, line 30	1-10

☐ Further documents are listed in the continuation of box C.   ☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 July 2001	18/07/2001

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0939495	A	01-09-1999	NONE		
US 4860005	A	22-08-1989	AU	3044589 A	01-08-1989
			WO	8906477 A	13-07-1989
GB 2136616	A	19-09-1984	NONE		