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(54) CELL PHONE AND PROGRAM FOR CONTROLLING BROADCAST RECEIVING FUNCTION OF CELL PHONE

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(57) **ABSTRACT**

The cell phone has a plurality of batteries for supplying power according to their use. When the power of a battery is nearly depleted while the user is viewing a TV program, the cell phone informs the user of that fact to restrict the viewing of the TV program.

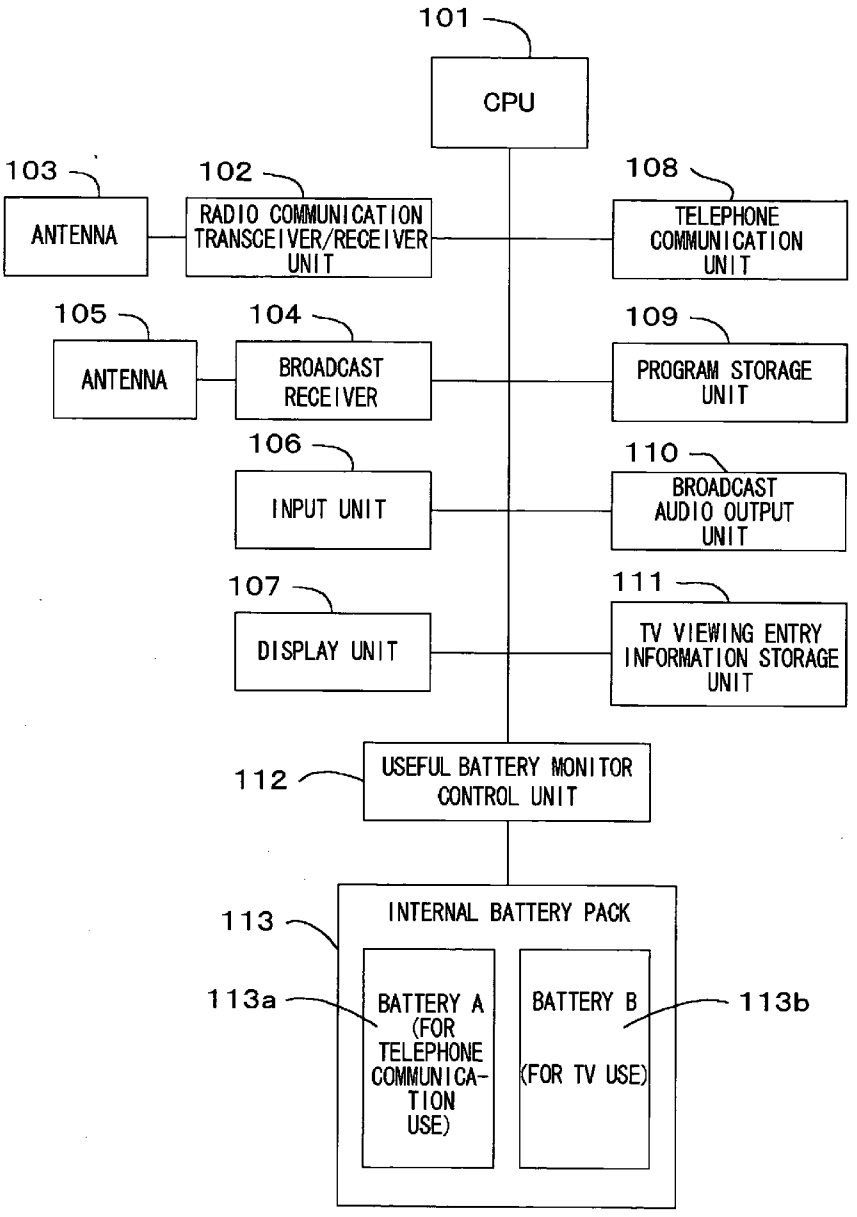


FIG.1

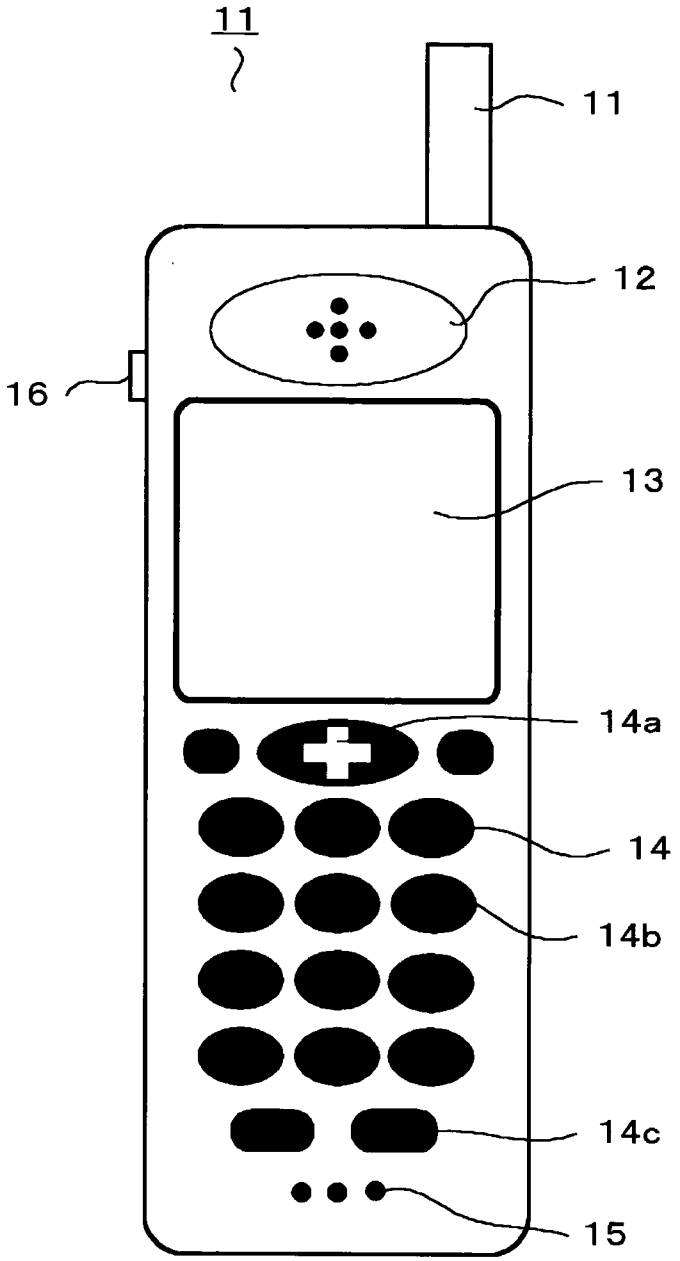


FIG.2

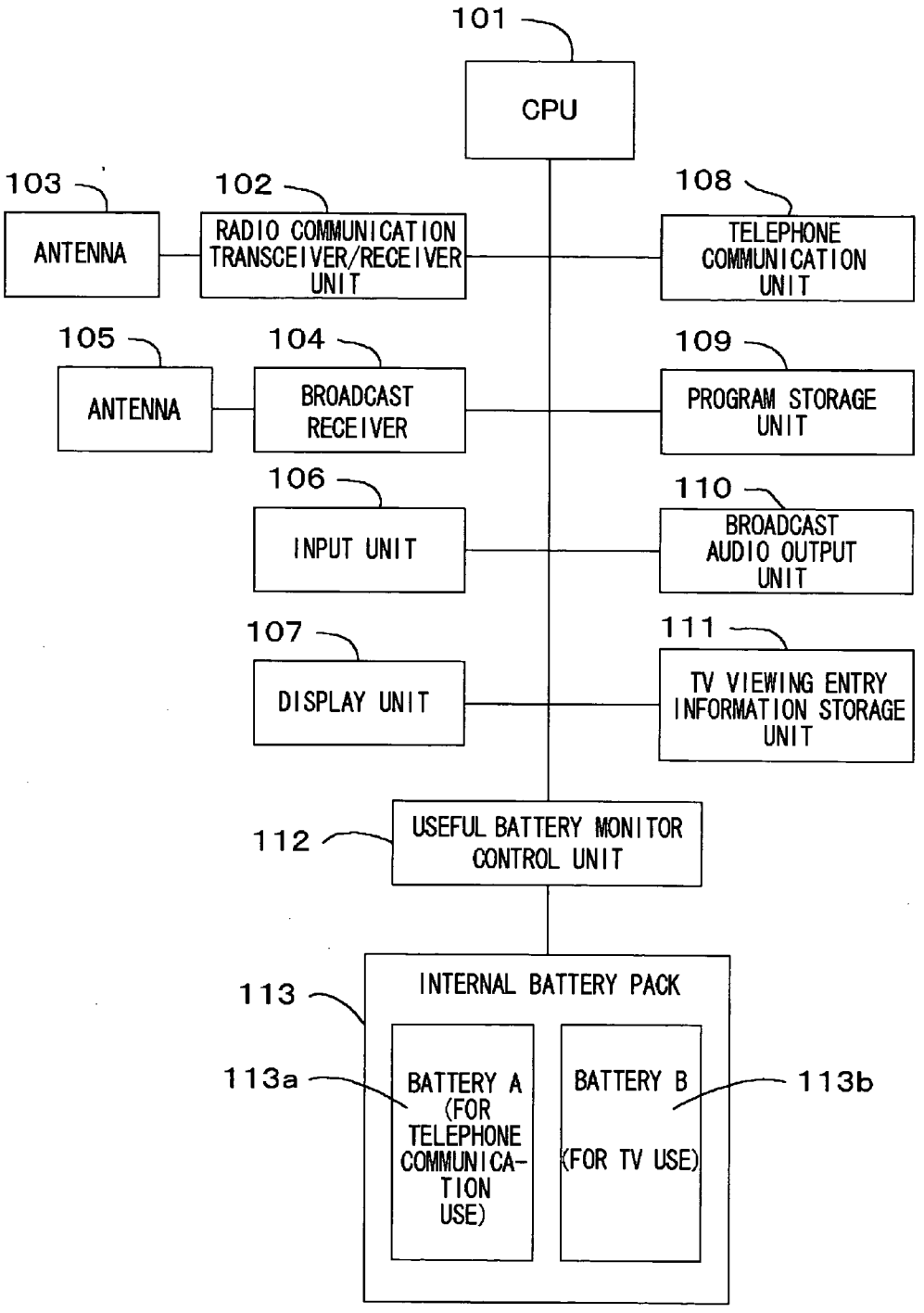

101
CPU
103
ANTENNA
102
RADIO COMMUNICATION TRANSCEIVER/RECEIVER UNIT
108
TELEPHONE COMMUNICATION UNIT
105
ANTENNA
104
BROADCAST RECEIVER
109
PROGRAM STORAGE UNIT
106
INPUT UNIT
110
BROADCAST AUDIO OUTPUT UNIT
107
DISPLAY UNIT
111
TV VIEWING ENTRY INFORMATION STORAGE UNIT
112
USEFUL BATTERY MONITOR CONTROL UNIT
113
INTERNAL BATTERY PACK
113a
BATTERY A (FOR TELEPHONE COMMUNICATION USE)
BATTERY B (FOR TV USE)
113b

FIG.3

ENTRY	ENTRY INFORMATION
USE OF BATTERY A	EITHER FOR TELEPHONE COMMUNICATION OR TV USE
USE OF BATTERY B	EITHER FOR TELEPHONE COMMUNICATION OR TV USE
TV VIEWING RESTRICTING FUNCTION	ON
TV VIEWING RESTRICTING MODE	TV VIEWING PROHIBITED
USEFUL BATTERY POWER THRESHOLD LEVEL	USEFUL POWER LEVEL OF 50%

FIG.4

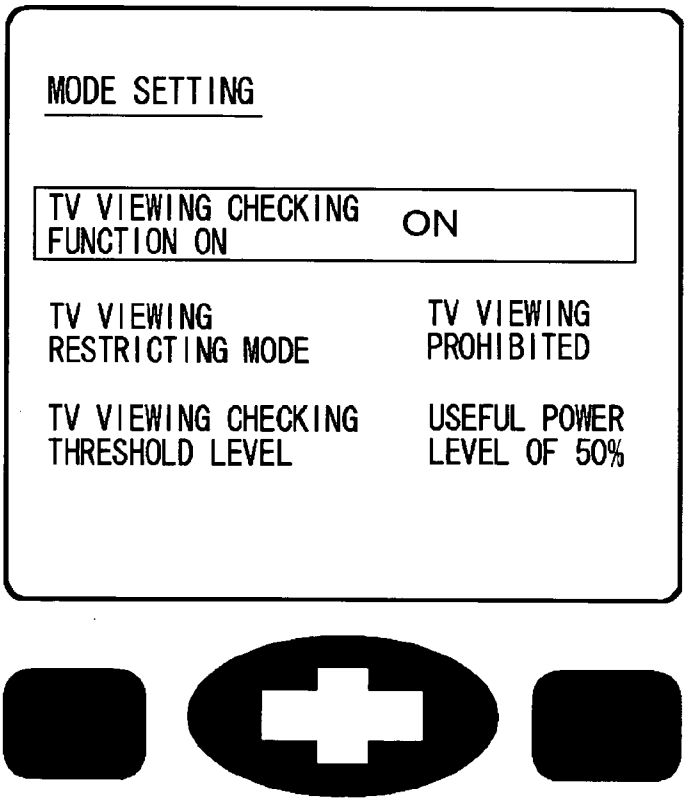
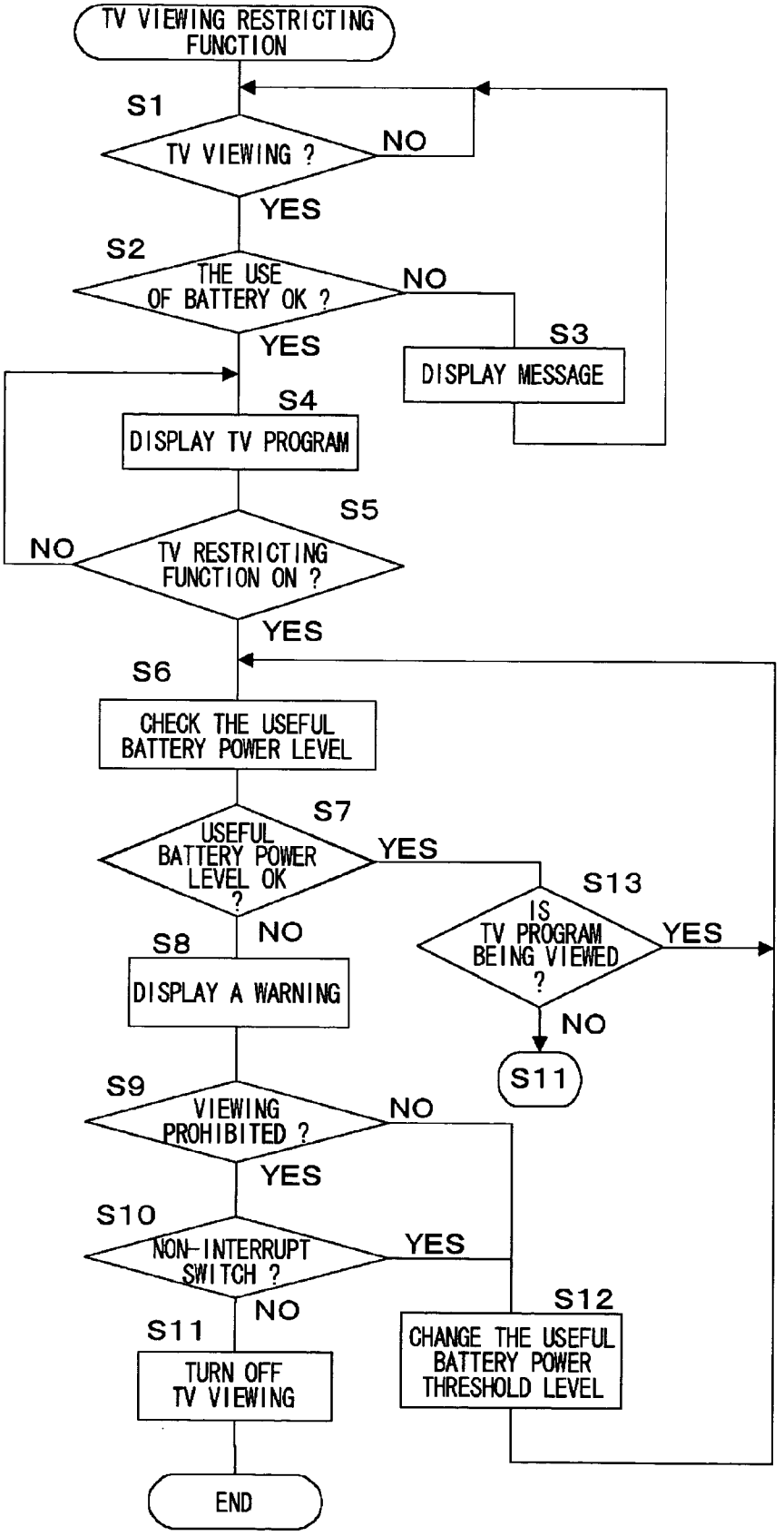


FIG.5


TV VIEWING RESTRICTING FUNCTION
S1
TV VIEWING ?
NO
YES
S2
THE USE OF BATTERY OK ?
NO
YES
S3
DISPLAY MESSAGE
S4
DISPLAY TV PROGRAM
S5
TV RESTRICTING FUNCTION ON ?
NO
YES
S6
CHECK THE USEFUL BATTERY POWER LEVEL
S7
USEFUL BATTERY POWER LEVEL OK ?
YES
NO
S8
DISPLAY A WARNING
S13
IS TV PROGRAM BEING VIEWED ?
YES
NO
S11
S9
VIEWING PROHIBITED ?
NO
YES
S10
NON-INTERRUPT SWITCH ?
YES
NO
S11
TURN OFF TV VIEWING
S12
CHANGE THE USEFUL BATTERY POWER THRESHOLD LEVEL
END

CELL PHONE AND PROGRAM FOR CONTROLLING BROADCAST RECEIVING FUNCTION OF CELL PHONE

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to cell phones (including Personal Handy-phone System terminals or personal digital assistants) which have the function of receiving a broadcast such as a television broadcast, and more particularly to functional control provided to the cell phone by detecting the useful power level of a battery incorporated therein.

[0003] 2. Description of the Related Art

[0004] Recent years have seen significant widespread use of cell phones.

[0005] Cell phones, used only for making a call in the past, are now provided with additional functions to serve as an information terminal device, e.g., for transmitting and receiving E-mail or image information and for retrieving information over the Internet. They are expected to be further provided with an additional function as a television broadcast receiver in the future.

[0006] On the other hand, since the cell phone is battery powered, efforts have been made for battery power savings purposes so that the cell phone can be operated on a limited-capacity battery as long as possible (see the Related Art List (1)).

[0007] Related Art List

[0008] (1) Japanese Patent Application Laid-Open No. 2002-223291.

[0009] However, although the power consumption has been reduced as mentioned above, the additional functions provided to the cell phone may cause the user to spend more time on it, e.g., viewing TV programs in addition to making telephone calls. While viewing a TV program, the user can be so absorbed as not to notice the battery power being dissipated to such an extent that the user cannot make a call thereafter as desired due to the lack of battery power.

SUMMARY OF THE INVENTION

[0010] The present invention was developed in view of the aforementioned problem. It is therefore an object of the invention to provide a cell phone and a program for controlling a battery thereof which ensure the battery to provide power at least for a necessary call by preventing the user from spending too much time viewing a broadcast such as TV programs to notice the battery power being dissipated to such an extent that the user cannot make a call thereafter as desired due to excessive battery power consumption.

[0011] To achieve the aforementioned object, a cell phone according to a first aspect of the present invention includes an radio communication transceiver/receiver unit which transmits and receives speech or data by radio, a broadcast receiver which receives broadcast waves such as of a TV broadcast, a power supply unit which supplies power to each of the radio communication transceiver/receiver unit and the broadcast receiver, a plurality of batteries provided in the power supply unit, a use management unit which manages the use of the plurality of batteries, a power supply management unit which manages supply of power to the radio communication transceiver/receiver unit or the broadcast receiver according to the use managed by the use management unit, a power supply monitoring unit which monitors the useful power level of the batteries, an alarming unit which alarms the user that the power of a battery is nearly depleted while a broadcast is being received, the battery supplying power to the broadcast receiver, and a power supply restricting unit which restricts the supply of power to the broadcast receiver after the alarm has been provided.

[0012] To achieve the aforementioned object, a cell phone according to a second aspect of the present invention, based on the aforementioned first aspect, includes a non-interrupt instructing unit which instructs to continue receiving a broadcast, in which the power supply restricting unit continues supplying power to the broadcast receiver when the non-interrupt instructing unit instructs to continue receiving a broadcast when the useful power of the battery has been nearly depleted.

[0013] To achieve the aforementioned object, a program for controlling a broadcast receiving function of a cell phone, the cell phone having an radio communication transceiver/receiver unit which transmits and receives speech or data by radio and a broadcast receiver which receives broadcast waves such as of a TV broadcast, allows the cell phone to function as follows. That is, the program allows the cell phone to serve as power supply means which supplies power to each of the radio communication transceiver/receiver unit and the broadcast receiver, use management means which manages the use of a plurality of batteries provided in the power supply means, power supply management means which manages supply of power to the radio communication transceiver/receiver unit or the broadcast receiver according to the use managed by the use management means, power supply monitoring means which monitors the useful power level of the batteries, alarming means which alarms the user that the useful power of a battery is nearly depleted while a broadcast is being received, the battery being supplying power to the broadcast receiver, and power supply restricting means which restricts the supply of power to the broadcast receiver after the alarm has been provided.

[0014] To achieve the aforementioned object, a program for controlling a broadcast receiving function of a cell phone according to a fourth aspect of the present invention includes non-interrupt instructing means which instructs to continue receiving a broadcast according to the third aspect of the invention, allowing power to be supplied to the broadcast receiver means when the non-interrupt instructing means instructs to continue receiving a broadcast when the useful power of the battery has been nearly depleted.

[0015] Moreover, this summary of the invention does not necessarily describe all necessary features so that the invention may also be sub-combination of these described features.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] **FIG. 1** is a view illustrating the outer appearance of a cell phone **10** according to an embodiment of the present invention;

[0017] **FIG. 2** is a block diagram illustrating the functional structure of the cell phone **10** according to the embodiment of the present invention;

[0018] **FIG. 3** is a schematic view illustrating a table containing the entries and entry information to be stored in a TV viewing entry information storage unit according to the embodiment of the present invention;

[0019] **FIG. 4** is a view illustrating an entry window for imposing a restriction on TV viewing according to the embodiment of the present invention; and

[0020] **FIG. 5** is a flowchart illustrating the operation of a TV viewing restricting function according to the embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0021] Now, the present invention will be described below in more detail with reference to the accompanying drawings in accordance with the embodiment.

[0022] **FIG. 1** is a view illustrating the outer appearance of a cell phone **10** according to the embodiment of the present invention. The cell phone **10** includes an antenna **11**, a speaker **12** for receiving a call, a display **13** such as an LCD, a set of various entry keys **14**, a cursor control key **14***a*, numeral and character entry keys **14***b*, a TV viewing non-interrupt switch **14***c* which instructs a TV broadcast to be continually viewed in a case of an alarm being provided for restricting (prohibiting) TV viewing while the TV broadcast is being viewed, a microphone **15** which sends a call, and a microphone/earphone jack **16**.

[0023] **FIG. 2** is a block diagram illustrating the functional structure of the cell phone **10**. The cell phone **10** includes an radio communication transceiver/receiver unit **102** which transmits and receives speech and data by radio for telephone communications, a transceiver/receiver antenna **103** for the telephone communications, a broadcast receiver **104** which receives broadcast waves such as of a TV or radio broadcast to output a desired program for display, a broadcast receiver antenna **105**, an input unit **106** which recognizes signals provided by pressing the set of various entry keys **14** for input, a display unit **107** which displays video information on the LCD **13**, a telephone communication unit **108** made up of the speaker **12** which receives a call and the microphone **15** which transmits a call, a program storage unit **109** which stores various control programs such as a control program which provides prohibition control to the function of viewing a broadcast such as a TV broadcast in accordance with information on a useful battery power level, a broadcast audio output unit **110** which outputs audio information of a broadcast program via the speaker **12** or the earphone jack **15**, a TV viewing entry information storage unit **111** which sets and stores the operating conditions of the TV broadcast viewing function in accordance with a useful battery power level, a useful battery monitor control unit **112** which monitors the respective voltages of an internal battery A **113***a* and battery B **113***b* and provides control to the battery used for supplying power to the cell phone **10** depending on the use thereof, and an internal battery pack **113** made up of rechargeable batteries, i.e., the battery A **113***a* used mainly for a telephone call function and the battery B **113***b* used mainly for a TV function.

[0024] **FIG. 3** is a schematic view illustrating a table containing the entries and entry information stored in the TV viewing entry information storage unit. The entries include the use of the battery A **113***a* and the battery B **113***b* (for a telephone communication use only, for a TV use only, or for either the telephone communication or TV use), the operating condition for the function of restricting the TV broadcast viewing in accordance with a useful battery power level upon viewing a TV broadcast (entry information: ON or OFF), the operating condition of a TV broadcast viewing restricting mode for setting the operating condition of the TV broadcast viewing restricting function when the useful battery power level has reached a predetermined voltage value (entry information: TV viewing prohibited (with an alarm) or TV viewing continued (only with a warning), and a useful battery power threshold level for setting the condition for the useful battery power level at which the TV broadcast viewing restricting function operates (entry information: useful battery power level (a useful power level of 90%, 70%, 50%, 30%, or 10%)).

[0025] The aforementioned TV viewing entry information can be set by the user on a mode entry window of the cell phone **10** as appropriate. **FIG. 4** is a view illustrating an entry window for setting the conditions of restricting the TV broadcast viewing.

[0026] Now, the operation of the TV viewing restricting function performed while a TV broadcast is being viewed is explained below with reference to the flowchart illustrated in **FIG. 5**.

[0027] When the TV viewing switch is selected in step **1** or **S1** (the term "step" is denoted as "S" hereinafter as well as in the figure), the process checks the information on the use of the internal batteries **113***a*, **113***b* (**S2**). If both the batteries are set only for the telephone communication use, the process displays that the use of the batteries has to be changed. If the information on the battery use shows that the batteries are set only or also for the TV use, the battery set for the TV use supplies power, thereby allowing a TV program image to appear on the display **13** (**S4**).

[0028] If the TV viewing restricting function is set at ON (**S5**), the process monitors the useful power level of the battery assigned to the TV use (**S6**). The useful power level of the battery **113** for the TV use is checked; if both the batteries A **113***a* and B **113***b* are set for the TV use, the total useful power level of both the batteries is checked. If a sufficient useful battery power level is available (**S7**), the process allows the user to continue viewing the TV program (**S13**) that the user has been viewing, and continues monitoring the useful battery power level. If the useful battery power level has reached the preset level (**S7**), the process indicates a warning (**S8**).

[0029] If the TV viewing restricting mode is set at the TV viewing prohibited (**S9**), the process determines whether the TV viewing non-interrupt switch **14***c* has been depressed during the indication of the warning (**S10**). If the non-interrupt switch **14***c* has not been depressed, the process turns OFF the TV viewing function (**S11**).

[0030] On the other hand, if the non-interrupt switch **14***c* has been depressed (**S10**), the process allows the warning to disappear and the useful battery power threshold level to be set to the next lower level (**S12**) (e.g., to be changed from the

useful power level of 50% to 40%), thereafter monitoring continually the useful battery power level (S7).

[0031] Even when the TV viewing restricting mode provides only a warning, the useful battery power threshold level is set to the next lower level to continue monitoring the useful battery power level (S6).

[0032] It should be understood that the aforementioned embodiment has been disclosed herein not for restrictive purposes but only by way of example in all respects. It is also intended that the present invention is not defined by the embodiment described above but by the scope of the appended claims, and includes all the equivalents and modifications that fall within the scope of the claims.

What is claimed is:

1. A cell phone comprising:

a radio communication transceiver/receiver unit which transmits and receives speech or data by radio;

a broadcast receiver which receives broadcast waves such as of a TV broadcast;

a power supply unit which supplies power to each of the radio communication transceiver/receiver unit and the broadcast receiver;

a plurality of batteries provided in the power supply unit;

a use management unit which manages the use of the plurality of batteries;

a power supply management unit which manages supply of power to the radio communication transceiver/receiver unit or the broadcast receiver according to the use managed by the use management unit ; a power supply monitoring unit which monitors the useful power level of the batteries;

an alarming unit which alarms the user that the power of a battery is nearly depleted while a broadcast is being received, the battery supplying power to the broadcast receiver; and

a power supply restricting unit which restricts the supply of power to the broadcast receiver after the alarm has been provided.

2. The cell phone according to claim 1, further comprising a non-interrupt instructing unit which instructs to continue receiving a broadcast, wherein

the power supply restricting unit continues the supply of power to the broadcast receiver when the non-interrupt instructing unit instructs to continue receiving a broadcast after a useful battery power level has been nearly depleted.

3. The cell phone according to claim 1, wherein

at least one of the plurality of batteries is used mainly for transmitting and receiving speech or data, the other of the plurality of batteries being used mainly for receiving broadcast waves.

4. The cell phone according to claim 1, further comprising a TV viewing entry information storage unit which stores an operating condition of a function of restricting a receiving of broadcast waves when the useful battery power level has reached a predetermined value.

5. The cell phone according to claim 4, wherein

the TV viewing entry information storage unit stores an ON or OFF operating condition of the function of restricting the receiving of broadcast waves.

6. The cell phone according to claim 4, wherein

the TV viewing entry information storage unit stores the predetermined value.

7. The cell phone according to claim 4, further comprising an input unit which receives, from outside, the operating condition of the function of restricting the receiving of broadcast waves, the operating condition being stored in the TV viewing entry information storage unit.

8. The cell phone according to claim 5, further comprising an input unit which receives, from outside, the ON or OFF operating condition of the function of restricting the receiving of broadcast waves, the ON or OFF operating condition being stored in the TV viewing entry information storage unit.

9. The cell phone according to claim 6, further comprising an input unit which receives, from outside, the threshold value stored in the TV viewing entry information storage unit.

10. A program for controlling a broadcast receiving function of a cell phone, the cell phone having an radio communication transceiver/receiver unit which transmits and receives speech or data by radio and a broadcast receiver which receives broadcast waves such as of a TV broadcast, the program allowing the cell phone to serve as:

power supply means which supplies power to each of the radio communication transceiver/receiver unit and the broadcast receiver;

use management means which manages the use of a plurality of batteries provided in the power supply means;

power supply management means which manages supply of power to the radio communication transceiver/receiver unit or the broadcast receiver according to the use managed by the use management means;

power supply monitoring means which monitors the useful power level of the batteries;

alarming means which alarms the user that the useful power of a battery is nearly depleted while a broadcast is being received, the battery being supplying power to the broadcast receiver; and

power supply restricting means which restricts the supply of power to the broadcast receiver after the alarm has been provided.

11. The program for controlling a broadcast receiving function of a cell phone according to claim 10, comprising non-interrupt instructing means which instructs to continue receiving a broadcast so as to allow power to be supplied to the broadcast receiver means when the non-interrupt instructing means instructs to continue receiving a broadcast when the useful power of the battery has been nearly depleted.

* * * * *