

DESCRIPTION

POWER SUPPLY CONTROLLER AND INFORMATION PROCESSOR

FIELD

[0001] Embodiments of the present invention generally relate to a power supply controller and an information processor.

BACKGROUND

[0002] Information processors, used in the field of industrial systems such as communication equipment, broadcasting equipment, or factory equipment, have been demanded to achieve higher reliability. In view of this, information processors are internally or externally provided with auxiliary power units to supply backup power to the information processors for a certain period of time at the time of power failures or trouble in power supply during system operation. Thereby, systems can continue their operation and are prevented from failures including program or data destruction.

[0003] Rechargeable secondary batteries are typically used for auxiliary power units. Secondary batteries include lead acid batteries, nickel-cadmium batteries, nickel-hydride batteries, and lithium-ion batteries. Such secondary batteries have a problem with longevity which tends to be shortened along with an increase in the number of charges and discharges.

CITATION LIST

Patent Literature

[0004] Patent Literature 1: Patent Laid-open Application Publication No. 2010-16996

SUMMARY OF THE INVENTION

Problem to be Solved by the Invention

[0005] The present invention aims to provide a power supply controller and an information processor which can elongate the longevity of batteries.

Means for Solving Problem

[0006] In view of solving the problem, a power supply controller of one embodiment receives power supply from an external power source to supply power to a system controller of an information processor. The power supply controller includes a capacitor that stores the power supplied from the external power source; a battery to be charged with the power supplied from the external power source; an external power supervisor that determines whether or not a voltage value of the external power source is equal to or lower than a certain first reference voltage value; a first switch that switches from the external power source to the capacitor to supply the power to the system controller when the external power supervisor determines that the voltage value of the external power source is equal to or lower than the certain first reference voltage value; a capacitor supervisor that determines, during the power supply from the capacitor, whether or not a charge level of the capacitor is equal to or lower than a certain reference charge level; a second switch that switches from the capacitor to the battery to supply the power to the system controller when the capacitor supervisor determines that the charge level of the capacitor is equal to or lower than the certain reference charge level; and a power supply that supplies output power by the second switch to the system controller.

[0007] An information processor according to one embodiment includes a system controller, and a power supply controller that receives power supply from an external power source to supply power to the system controller. The power supply controller includes a capacitor that stores the power supplied from the external power source; a battery to be charged with the power supplied from the external power source; an external power supervisor that determines whether or not a voltage value of the external power source is equal to or lower than a certain first reference voltage value; a first switch that switches from the external power source to the capacitor to supply the power to the system controller when the external power supervisor determines that the voltage value of the external power source is equal to or lower than the certain first reference voltage value; a capacitor supervisor that determines, during the power supply from the capacitor, whether or not a charge level of the capacitor is equal to or lower than a certain reference charge level; a second switch that switches from the capacitor to the battery to supply the power to the system controller when the capacitor supervisor determines that the charge level of the capacitor is equal to or lower than the certain reference charge level; and a power supply that supplies output power by the second switch to the system controller.

BRIEF DESCRIPTION OF DRAWINGS

[0008] FIG. 1 illustrates the configuration of an information processor including a power supply controller according to a first embodiment.

FIG. 2 is a flowchart of a backup power supply by the power supply controller in the first embodiment.

FIG. 3 illustrates the configuration of an information

processor including a power supply controller according to a second embodiment.

FIG. 4 is a flowchart of a backup power supply by the power supply controller in the second embodiment.

FIG. 5 illustrates the configuration of an information processor including a power supply controller according to a third embodiment.

DETAILED DESCRIPTION

[0009] Hereinafter, embodiments of an information processor including a power supply controller will be described with reference to the accompanying drawings.

[0010] First Embodiment

FIG. 1 illustrates the configuration of an information processor including a power supply controller according to a first embodiment.

[0011] In FIG. 1 an information processor 1 includes a power supply controller 19 and a system controller 20. The power supply controller 19 works to convert external alternate-current power (commercial power, AC) to DC power for supply to the system controller 20. The power supply controller 19 includes a power unit 2, an electric double layer capacitor (EDLC, capacitor) 7, an EDLC switching circuit 11 (first switch), an EDLC supervisory circuit 13, a battery (secondary battery) 8, and a battery switching circuit 12 (second switch). The system controller 20 works as a processor that controls a system with a CPU or an LSI. The system controller 20 includes a CPU substrate 3, hard disc drives 4, an optical drive 5, and a cooling fan 6.

[0012] The power unit 2 includes an AC/DC converter circuit 9 and an AC power supervisory circuit 10. The AC/DC converter circuit 9 receives AC power as commercial power from outside and rectifies and converts the AC power

to DC power. An output of the AC/DC converter circuit 9 is connected to the EDLC switching circuit 11 as described later. The AC power supervisory circuit 10 (external power supervisor) works to determine whether or not an AC power supply voltage of the AC power falls to or below a preset AC-power determination reference voltage value (first reference voltage value) to monitor a drop or non-drop in the voltage of the AC power. Upon detecting a drop in the voltage of the AC power, the AC power supervisory circuit 10 outputs an AC power supply voltage-drop detection signal as a detection signal to the EDLC switching circuit 11 as described later.

[0013] The EDLC switching circuit 11 works to switch between the AC/DC converter circuit 9 and the EDLC 7 to supply the DC power to the system controller 20. The EDLC switching circuit 11 is connected to the EDLC 7 and the battery switching circuit 12 as described below.

[0014] With no drop in the voltage of the AC power, the AC power supervisory circuit 10 detects no drop in the voltage of the AC power and the EDLC switching circuit 11 receives no AC power supply voltage-drop detection signal from the AC power supervisory circuit 10. The EDLC switching circuit 11 supplies the DC power from the AC/DC converter circuit 9 to the system controller 20 via the battery switching circuit 12 as well as stores the DC power in the EDLC 7. Thus, the EDLC 7 functions as a storage circuit. Meanwhile, with a drop in the voltage of the AC power, the AC power supervisory circuit 10 detects the drop in the voltage of the AC power and the EDLC switching circuit 11 receives the AC power supply voltage-drop detection signal from the AC power supervisory circuit 10. The EDLC switching circuit 11 then switches from the AC/DC converter circuit 9 to the EDLC 7 to supply the DC power to

the system controller 20 via the battery switching circuit 12.

[0015] The EDLC supervisory circuit 13 (capacitor supervisor) works to monitor a remaining level of charge stored in the EDLC 7. When the remaining charge level of the EDLC 7 lowers to or below a preset determination reference charge level (certain reference charge level or less) during the DC power supply from the EDLC 7 to the system controller 20, the EDLC supervisory circuit 13 outputs, to the battery switching circuit 12, an EDLC charge-level drop detection signal indicating a decrease in the charge level of the EDLC 7.

[0016] The battery switching circuit 12 works to switch among the AC/DC converter circuit 9, the EDLC 7, and the battery 8 to supply the DC power to the system controller 20. The battery switching circuit 12 is connected to the battery 8 and various kinds of circuits of the system controller 20.

[0017] While receiving the DC power from the AC/DC converter circuit 9, the battery switching circuit 12 supplies the DC power to the system controller 20 and charges the battery 8. With occurrence of a voltage drop in the AC power, however, when receiving the DC power from the EDLC 7 and the EDLC charge-level drop detection signal from the EDLC supervisory circuit 13, the battery switching circuit 12 switches from the EDLC 7 to the battery 8, i.e., switches to the backup power of the battery 8, to supply the DC power to the system controller 20. Thus, the battery switching circuit 12 also functions as a power supply that supplies output power (DC power) to the system controller 20.

[0018] The CPU substrate 3 of the system controller 20 includes an internal control circuit 15, an expansion card

16, a DC power step-down converter circuit 17, a real-time clock circuit (hereinafter, referred to as RTC)/memory 18(RTC and memory, RTC. memory). These circuits are supplied with the DC power from the battery switching circuit 12. The internal control circuit 15 works to control the system with the CPU or LSI. The expansion card 16 incorporates a print circuit board for expanding the functions of the system controller 20. The DC power step-down converter circuit 17 is intended to supply DC power to the RTC/memory 18 described below and step down a voltage to the operation voltage of the RTC/memory 18. The RTC/memory 18 is a memory device that stores time and data and drives by DC power source (not illustrated) such as primary batteries while the system controller 20 is not supplied with DC power and the system of the information processor stops operation. The RTC/memory 18 is supplied with the DC power at the step-down voltage from the power step-down converter circuit 17.

[0019] In addition to the above circuits, the hard disc drives 4, the optical drive 5, and the cooling fan 6 are connected to the CPU substrate 3 and supplied with the DC power from the battery switching circuit 12.

[0020] An EDLC attaching connector 21a is for attaching the EDLC 7 and enables attachment and detachment of the EDLC 7 to/from the power supply controller 19 (EDLC switching circuit 11 (first switch)). A battery attaching connector 21b is for attaching the battery 8 and enables attachment and detachment of the battery 8 to/from the power supply controller 19 (battery switching circuit 12 (second switch)). Herein, the system controller 20 receives the DC power from the battery switching circuit 12, and is thus a load of the power supply controller 19. The EDLC 7 and the battery 8 can be regulated in the

capacitance of DC power for output in accordance with the configuration (load) of the system controller 20. For instance, along with an increase in the number of connections to the hard disc drives 4 or the expansion card 16, the EDLC 7 and the battery 8 can be additionally mounted or be replaced with the ones of a larger capacitance, thereby changing the capacitance of the DC power output from the EDLC 7 or the battery 8.

[0021] For attachment and detachment, the EDLC 7 and the battery 8 are adapted to be independently attachable and detachable to be able to regulate the capacitance of output DC power of the EDLC 7 or the battery 8. Alternatively, the EDLC 7 and the battery 8 can be integrated into a unit to be attachable to and detachable from the EDLC switching circuit 11 and the battery switching circuit 12 as a unit.

[0022] FIG. 2 is a flowchart of backup power supply by the power supply controller in the first embodiment. The operation of the present embodiment is described referring to the flowchart.

[0023] According to the power supply controller of the present embodiment, the AC/DC converter circuit 9 of the power unit 2 converts AC power supplied from outside to DC power. The power unit 2 starts supplying the DC power converted by the AC/DC converter circuit 9 to the system controller 20 through the EDLC switching circuit 11 and the battery switching circuit 12 (step S1). Upon receiving the DC power supply, the system controller 20 boots an operating system (hereinafter, referred to as OS) (step S2). In this case the DC power converted from normal AC power supply voltage by the AC/DC converter circuit 9 is supplied to the system controller 20 as well as to the EDLC 7 through the EDLC switching circuit 11 to charge the EDLC 7 and to the battery 8 through the battery switching circuit

12 to charge the battery 8 (step S3).

[0024] The AC power supervisory circuit 10 monitors the state of the AC power to determine whether or not the AC power supply voltage of the AC power falls to or below (drop or non-drop in the AC power supply voltage) the preset AC-power determination reference voltage value (first reference voltage value) (step S4). Upon determining that the AC power supply voltage is not equal to or less than the AC-power determination reference voltage value (first reference voltage value), that is, finding no drop in the AC power supply voltage (No in step S4), the AC power supervisory circuit 10 does not output the AC power supply voltage-drop detection signal. Thus, it allows continuous DC power supply from the AC/DC converter circuit 9 to the EDLC 7, the battery 8, and the system controller 20. Meanwhile, when determining that the AC power supply voltage is equal to or less than the AC-power determination reference voltage value (drop in the AC power supply voltage) (YES in step S4), the AC power supervisory circuit 10 outputs the AC power supply voltage-drop detection signal to the EDLC switching circuit 11.

[0025] Upon receiving the AC power supply voltage-drop detection signal from the AC power supervisory circuit 10, the EDLC switching circuit 11 supplies DC power to the system controller 20 not from the AC/DC converter circuit 9 but from the EDLC 7 as storage circuit, implementing the backup power supply from the EDLC 7 (step S5).

[0026] The EDLC supervisory circuit 13 then monitors the charge capacitance (remaining charge level) of the EDLC 7 as storage circuit during the backup power supply to determine whether or not it falls to or below a preset determination reference charge capacitance (step S6).

[0027] When the EDLC supervisory circuit 13 determines

that the capacitance of the EDLC 7 exceeds the determination reference charge capacitance (NO in step S6), and the AC power supervisory circuit 10 continuously determines a drop in the AC power supply voltage (YES in step S7), the EDLC supervisory circuit 13 continues the backup power supply from the EDLC 7. Meanwhile, upon detecting a recovery of the AC power supply voltage, that is, determining that the AC power supply voltage returns to above the AC-power determination reference voltage value (first reference voltage value) (NO in step S7), the AC power supervisory circuit 10 stops outputting the AC power supply voltage-drop detection signal to the EDLC switching circuit 11. Upon stop of the output of the AC power supply voltage-drop detection signal from the AC power supervisory circuit 10, the EDLC switching circuit 11 switches back to the AC/DC converter circuit 9 of the power unit 2 from the EDLC 7 as storage circuit to supply the DC power to the system controller 20.

[0028] In step S6 when determining that the capacitance of the EDLC 7 is equal to or below the determination reference charge capacitance (drop in the EDLC capacitance) (YES in step S6), the EDLC supervisory circuit 13 outputs an EDLC charge-level drop detection signal to the battery switching circuit 12 as a detection signal. Upon receiving the EDLC charge-level drop detection signal, the EDLC supervisory circuit 13 switches the EDLC 7 to the battery 8 to supply the DC power, that is, switches to backup from the battery 8 (step S8), to supply the DC power from the battery 8 to the system controller 20 (step S9). Thus, steps S3 to S9 are a flow of operation when the system normally operates.

[0029] The present embodiment is considered to be adaptable to power failures lasting for less than one

second (hereinafter, referred to as momentary power failure) or equal to or above one second, in addition to a voltage drop as a voltage drop in the AC power. The same also applies to the other embodiments.

[0030] Hence, the present embodiment can implement backup power supply with no power supply from the battery 8 if the power supply from the EDLC 7 is sufficient to back up the system controller 20, for example, in the case of momentary power failure. Momentary power failures generally occur more frequently than power failures lasting for one second or more, therefore, it will be a larger number of opportunities for only the EDLC 7 to supply power. This results in decreasing the number of battery charges and discharges from that when only the battery 8 supplies power, advantageously enabling longer longevity of the battery 8.

[0031] Second Embodiment

FIG. 3 illustrates the configuration of a second embodiment. A power supply controller of the present embodiment additionally includes a battery supervisory circuit (battery supervisor) 14 relative to that of the first embodiment. Hence, same or like elements as those in the first embodiment are denoted by same or like reference numerals and a description thereof is omitted. During DC power supply from a battery 8, the battery supervisory circuit 14 monitors a voltage of the battery 8 and outputs, to an internal control circuit 15 of a CPU substrate 3, a battery voltage-drop detection signal indicating a voltage drop in the battery 8, when the voltage of the battery 8 falls to or below a battery-determination reference voltage value (second reference voltage value). Thus, the battery supervisory circuit 14 also functions as a notifier.

[0032] The internal control circuit 15 is supplied with

DC power from the battery 8 via a battery switching circuit 12 to control hard disc drives 4 and an optical drive 5. When receiving an AC power supply voltage-drop detection signal from an AC power supervisory circuit 10 of a power unit 2 and a battery voltage-drop detection signal from the battery supervisory circuit 14, the internal control circuit 15 shuts down the OS and outputs a DC power output control signal to the AC/DC converter circuit 9 and the battery switching circuit 12 of the power unit 2 to stop DC power output. Herein, OS control operation is assumed to include at least OS shutdown operation.

[0033] As in the first embodiment, an RTC/memory 18 in the present embodiment is supplied with DC power with a stepdown voltage, which is supplied from the battery switching circuit 12 and stepped down by a DC power step-down converter circuit 17.

[0034] As in the first embodiment, the EDLC 7 and the battery 8 may be attachable and detachable to/from the power supply controller of the present embodiment to regulate the DC power capacitance of the battery 8 or the EDLC 7 depending on the configuration (load) of the system controller 20. The EDLC 7 and the battery 8 are individually attachable and detachable to be able to regulate the capacitance of the DC power output from the EDLC 7 or the battery 8. Alternatively, the EDLC 7 and the battery 8 can be integrated into a unit to be attachable and detachable as a unit.

[0035] FIG. 4 is a flowchart of backup power supply of the power supply controller according to the second embodiment. The operation of the present embodiment is described referring to the flowchart.

[0036] Step S1 to step S9 of the flowchart of the present embodiment, i.e., until the switching to the backup

power supply from the battery 8 to the system controller 20, are the same as those in the first embodiment, thus, a description thereof is omitted.

[0037] The battery switching circuit 12 switches to the backup from the battery 8 (step S8), and the system controller 20 is supplied with the DC power from the battery 8 (step S9). Then, the battery supervisory circuit 14 monitors the voltage of the DC power of the battery 8 during the backup power supply to determine whether or not the DC power voltage of the battery 8 falls to or below a battery-determination reference voltage value (second reference voltage value) (step S10).

[0038] When the battery supervisory circuit 14 determines that the voltage of the battery 8 exceeds the battery-determination reference voltage value (second reference voltage value) (NO in step S10) and the AC power supervisory circuit 10 continuously determines a drop in the AC power supply voltage, that is, the AC power supply voltage equal to or lower than the AC-power determination reference voltage value (first reference voltage value) (YES in step S11), the battery switching circuit 12 continues the backup DC power supply from the battery 8.

[0039] Meanwhile, when detecting a recovery of the AC power supply voltage, that is, determining that the AC power supply voltage returns to above the AC-power determination reference voltage value (first reference voltage value) (NO in step S11), the AC power supervisory circuit 10 stops outputting the AC power supply voltage-drop detection signal to the EDLC switching circuit 11 and the battery switching circuit 12. Upon stop of the output of the AC power supply voltage-drop detection signal from the AC power supervisory circuit 10, the battery switching circuit 12 switches back from the battery 8 to the AC/DC

converter circuit 9 of the power unit 2 to supply the DC power to the system controller 20.

[0040] In step S10, when determining that the voltage of the battery 8 falls to or below (drop in battery capacitance) the battery-determination reference voltage value (second reference voltage value) (YES in step S10), the battery supervisory circuit 14 outputs the battery voltage-drop detection signal to the internal control circuit 15 of the CPU substrate 3. Upon receiving the battery voltage-drop detection signal, the internal control circuit 15 forcibly starts OS shutdown operation (step S12) and completes the OS shutdown operation (step S13). After the completion of the OS shutdown operation (step S13), the AC power supervisory circuit 10 of the power unit 2 determines whether or not the AC power voltage continues to fall (step S14).

[0041] In this determination, the continuous determination of a drop in the AC power supply voltage is that the AC power supervisory circuit 10 continuously determines the AC power supply voltage as being equal to or below the AC-power determination reference voltage value (first reference voltage value) (YES in step S14). In this case the AC power supervisory circuit 10 outputs the AC power supply voltage-drop detection signal to the internal control circuit 15. Upon receiving the AC power supply voltage-drop detection signal from the AC power supervisory circuit 10, the internal control circuit 15 sets the address of a circuit connected to the CPU substrate 3 to one, and outputs a DC power output control signal to the battery switching circuit 12 for stopping the power supply. This stops the DC power supply from the battery 8 to the system controller 20 (step S16). Meanwhile, when determining a recovery of the AC power or the AC power

supply voltage returning to above the AC-power determination reference voltage value (first reference voltage value) (recovery of the AC power supply voltage) (NO in step S14), the AC power supervisory circuit 10 stops outputting the AC power supply voltage-drop detection signal to the internal control circuit 15. Upon stop of the output of the AC power supply voltage-drop detection signal from the AC power supervisory circuit 10, the internal control circuit 15 inputs zero to the address of the circuit connected to the CPU substrate 3 for reset (step S15). Thereafter, due to the recovery of the AC power, the power unit 2 starts the DC power supply to the system controller 20 through the EDLC switching circuit 11 and the battery switching circuit 12 (step S1). Upon restart of the DC power supply from the power unit 2, the internal control circuit 15 reboots the OS (step S2). Thus, step S12 to step S16 are a flow of system stop operation.

[0042] When the AC power recovers after completion of the OS shutdown operation (NO in step S14), the internal control circuit 15 may output the DC power output control signal to the AC/DC converter circuit 9 and the battery switching circuit 12 for stopping power supply, and temporarily stop the DC power supply to the system controller 20 so as not to apply a voltage of the first reference voltage value or less and a voltage of the second reference voltage value or less to the system controller 20. The internal control circuit 15 can then stop outputting the DC power output control signal and control the power unit 2 to resume the DC power supply (step S1) and reboot the OS (step S2).

[0043] According to the present embodiment, when receiving the battery voltage-drop detection signal from the battery supervisory circuit 14, the internal control

circuit 15 starts the OS shutdown operation (step S12). Alternatively, before the shutdown operation, the OS may be placed in power saving mode such as sleep mode or dormant mode, waiting for the recovery of the AC power. In the case of no recovery, then, the OS may be shut down. Such OS control operation is defined to include at least the OS shutdown operation.

[0044] As described above, the present embodiment advantageously achieves monitoring the voltage of the external power source after the OS shutdown and automatically resuming the DC power output from the power unit 2 when determining the recovery of the power.

[0045] The present embodiment further advantageously prevents the occurrence of events that a long-time power failure and a voltage drop due to insufficient power capacitance of the battery 8 cause non-normal termination of the OS. The battery 8 is also avoided from decreasing in its longevity because of full discharge.

[0046] In the present embodiment as with the first embodiment, in case of momentary power failures, for example, the power supply from the EDLC 7 alone can back up the system controller 20 without the power supply from the battery 8. Thereby, the number of battery charges and discharges is decreased from that when the power is supplied from the battery 8 alone. This can advantageously elongate the longevity of the battery.

[0047] Third Embodiment

FIG. 5 illustrates the configuration of a third embodiment. The present embodiment additionally includes a DC power switching circuit 22 (DC power switch) relative to the second embodiment. The DC power switching circuit 22 is intended for directly supplying DC power from a battery 8 to an RTC/memory 18 when a decrease in the voltage of AC

power to below the first reference voltage value is detected. Same or like elements as those in the second embodiment are denoted by same or like reference numerals and a description thereof is omitted.

[0048] During DC power supply from an external AC power source, an RTC/memory is supplied with DC power via a battery switching circuit 12. When determining that the AC power supply voltage decreases below the AC-power determination reference voltage value (first reference voltage value), an AC power supervisory circuit 10 outputs an AC power supply voltage-drop detection signal to the DC power switching circuit 22. When receiving the AC power supply voltage-drop detection signal from the AC power supervisory circuit 10, the DC power switching circuit 22 switches to direct DC power supply from the battery 8 to the DC power step-down converter circuit 17 not via the battery switching circuit 12. Thereafter, when the AC power supply voltage exceeds the AC-power determination reference voltage value (first reference voltage value), the DC power switching circuit 22 switches to the DC power supply to the RTC/memory 18 via the battery switching circuit 12.

[0049] When the AC power supply voltage continues to drop, the voltage of the battery 8 falls below the battery-determination reference voltage value (second reference voltage value), and the internal control circuit 15 has completed the OS shutdown operation, the DC power switching circuit 22 switches to direct DC power supply from the battery 8 to the DC power step-down converter circuit 17. The RTC/memory 18 consumes less power than the internal control circuit 15 or the expansion card 16, so that during stop of the information processor 1, it can sufficiently retain data at a voltage from a remaining capacitance of

the battery 8 even when the voltage is below the battery-determination reference voltage value (second reference voltage value).

[0050] Upon recovery of the AC power after the OS shutdown operation, the DC power switching circuit 22 switches again to the power supply from the battery switching circuit 12 to supply the AC power to the RTC/memory 18.

[0051] Thereby, in the present embodiment the battery 8 can supply power to the RTC/memory 18 even after the stop of power supply to the information processor. This enables omission of typically used primary battery cells and the like.

[0052] As with the first embodiment and the second embodiment, in the present embodiment the EDLC 7 and the battery 8 may be attachable to and detachable from the power supply controller of the present embodiment to regulate the capacitance of DC power output from the EDLC 7 or the battery 8 depending on the configuration (load) of the system controller 20. The EDLC 7 and the battery 8 can be independently attached and detached to regulate the capacitance of DC power output from the EDLC 7 or the battery 8. The EDLC 7 and the battery 8 may be integrated into a unit to be attachable and detachable as a unit.

[0053] In the first to third embodiments, the power supply controller and the system controller 20 are provided in the same housing. Alternatively, the power supply controller may be an independent housing as an uninterruptible power supply unit externally connected.

[0054] The first to third embodiments have exemplified the EDLC, however, should not be limited thereto. Any types of capacitor can be applied.

[0055] While certain embodiments have been described,

these embodiments have been presented by way of example only, and are not intended to limit the scope of the inventions. Indeed, the novel embodiments described herein may be embodied in a variety of other forms; furthermore, various omissions, substitutions and changes in the form of the embodiments described herein may be made without departing from the spirit of the inventions. The accompanying claims and their equivalents are intended to cover such forms or modifications as would fall within the scope and spirit of the inventions.

CLAIMS

1. A power supply controller that receives power supply from an external power source to supply power to a system controller of an information processor, the power supply controller comprising:

a capacitor that stores the power supplied from the external power source;

a battery to be charged with the power supplied from the external power source;

an external power supervisor that determines whether or not a voltage value of the external power source is equal to or lower than a certain first reference voltage value;

a first switch that switches from the external power source to the capacitor to supply the power to the system controller when the external power supervisor determines that the voltage value of the external power source is equal to or lower than the certain first reference voltage value;

a capacitor supervisor that determines, during the power supply from the capacitor, whether or not a charge level of the capacitor is equal to or lower than a certain reference charge level;

a second switch that switches from the capacitor to the battery to supply the power to the system controller when the capacitor supervisor determines that the charge level of the capacitor is equal to or lower than the certain reference charge level; and

a power supply that supplies output power by the second switch to the system controller.

2. The power supply controller according to claim 1, wherein

the capacitor is attachable to and detachable from the first switch.

3. The power supply controller according to claim 1 or 2, wherein

the battery is attachable to and detachable from the second switch.

4. The power supply controller according to claim 1, wherein

the capacitor connected to the first switch and the battery connected to the second switch are integrated into a unit, and the unit is attachable to and detachable from the first switch and the second switch.

5. The power supply controller according to any one of claims 1 to 4, further comprising:

a battery supervisor that determines, during the power supply from the battery, whether or not a voltage value of the battery is equal to or lower than a certain second reference voltage value; and

a notifier that outputs a result of the determination to the system controller when the battery supervisor determines that the voltage value of the battery is equal to or lower than the certain second reference voltage value.

6. An information processor comprising a system controller, and a power supply controller that receives power supply from an external power source to supply power to the system controller, wherein

the power supply controller comprises:

a capacitor that stores the power supplied from the external power source;

a battery to be charged with the power supplied from the external power source;

an external power supervisor that determines whether or not a voltage value of the external power source is equal to or lower than a certain first reference voltage value;

a first switch that switches from the external power source to the capacitor to supply the power to the system controller when the external power supervisor determines that the voltage value of the external power source is equal to or lower than the certain first reference voltage value;

a capacitor supervisor that determines, during the power supply from the capacitor, whether or not a charge level of the capacitor is equal to or lower than a certain reference charge level;

a second switch that switches from the capacitor to the battery to supply the power to the system controller when the capacitor supervisor determines that the charge level of the capacitor is equal to or lower than the certain reference charge level; and

a power supply that supplies output power by the second switch to the system controller.

7. The information processor according to claim 6, wherein the power supply controller further comprises:

a battery supervisor that determines, during the power supply from the battery, whether or not a voltage value of the battery is equal to or lower than a certain second reference voltage value; and

a notifier that outputs a result of the determination to the system controller when the battery supervisor determines that the voltage value of the battery is equal

to or lower than the certain second reference voltage value.

8. The information processor according to claim 7, wherein

the system controller includes a system controller that controls an operating system when notified from the power supply controller that the voltage value of the battery is equal to or lower than the certain second reference voltage value.

9. The information processor according to claim 8, wherein

the system controller boots the operating system when, after completion of the control over the operating system, the external power supervisor determines that the voltage value of the external power source is equal to or lower than the certain first reference voltage value.

10. The information processor according to any one of claims 7 to 9, wherein

the system controller comprises a memory device that holds data of the information processor when the voltage value of the external power source is equal to or lower than the certain first reference voltage value; and

the power supply controller further comprises a DC power switch that directly supplies the power from the battery to the memory device when the external power supervisor determines that the voltage value of the external power source is equal to or lower than the first reference voltage value.