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Macintosh Portable: Power-Saving Features

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TOPIC -----

This article describes Macintosh Portable computer's power saving features.

DISCUSSION -----

The Macintosh Portable has a number of power-saving features that give it 6 to 12 hours of battery life. The Macintosh Portable contains two batteries: a main battery that provides power while the computer is in use, and a backup 9-volt transistor battery that sustains the computer's memory while the main battery is disconnected (as when a fresh main battery is being installed).

Note: The main battery is required for operation of the Macintosh Portable. The hard drive will not spin up without the internal battery.

The power-saving features are controlled by the power-manager processor. The power-manager processor is a separate "computer" inside the unit that controls the power functions of the unit.

The Macintosh Portable is the only member of the Macintosh family that is designed to be powered by a battery. In normal operation, the Macintosh Portable never switches off. Rather, it goes into a low-power consumption\ state, the sleep state, when it is not in use. Ideally, the Macintosh portable is switched on only when the battery is first installed or after the battery has been removed to install an expansion card in the machine.

Sleep

System sleep helps the Macintosh Portable operate longer between charges. When in sleep state, the Macintosh Portable maintains full power to system RAM, video RAM, and the power-manager processor. The power-manager processor stops the clocks to the SCC, the SWIM, and the ASC. Stopping the clocks to these devices, reduces their power consumption to almost zero without requiring that they be reset. The power-manager processor switches off power to the serial drivers, ROM, flat panel display, the

ASC, the Sony sound chips, the SCSI, and to a variety of pull-up resistors and other components. The power-manager processor also sends a signal to the internal modem that causes the modem to shut itself down, if not in use.

The system can enter sleep in the following ways:

- The user selects sleep from the Special menu in the Finder.
- The user selects sleep from the Battery DA.
- The system enters sleep after a period of inactivity (the interval is user selectable).
- The system enters sleep, because battery power is at the software-shutdown level.
- This is the first time power is being applied.
- The power-manager processor is reset.

The system will not enter sleep, if the internal modem is executing an AT command or if the modem is off-hook, except at hardware shutdown.

Macintosh Portable will come out of sleep for any of the following reasons:

- A key is pressed on the keyboard (except Caps Lock).
- The wake-up timer matches the real-time clock.
- The internal modem is installed, and a ring detect comes in, while the modem is set to watch for ring detect.

Note: If the unit is in software shutdown, the Macintosh Portable does not come out of shutdown until the power adapter is plugged in or until the battery is replaced.

When power is first applied to the Macintosh Portable, the power-manager processor immediately puts the system into the sleep state. When a key is pressed, the power-manager processor initiates a system reset and the Macintosh Portable goes through the same sequence of start-up events as the Macintosh SE.

Macintosh Portable presents four dialogs to the user when the battery is running low. The first three warn the user about the power condition, and the last lets the user know the system is going to sleep mode.

Sleep vs Shut Down

The Shut Down menu item doesn't care about memory contents and quits applications before shut down. Sleep saves memory contents. Shut Down should be used for the following:

- To have the unit wake up and reboot
- To add an external peripheral
- To make sure all applications have been quit
- Hard Drive Sleep. If the Macintosh Portable has a hard drive, the control panel displays an option to put the hard drive to sleep. This causes the hard drive to stop spinning. Hard drive sleep automatically occurs when the Macintosh Portable goes into system sleep.

Any hard disk activity causes the Macintosh Portable to come back out of hard drive sleep. It takes one or two seconds for the hard drive to get up to speed, allowing access to the drive.

Rest

The power-manager processor monitors the amount of time the Macintosh Portable has been inactive. After a period of 15 seconds without any activity, the unit goes into Rest mode. It causes the CPU to insert 64 wait states into RAM and ROM accesses which lowers the effective clock rate to approximately 1 MHz. Interrupts continue to be processed at the same rate. As soon as the trackball or mouse moves, or any peripheral device is activated, the computer comes up to full speed instantly.

The following items are checked and stop the unit from entering rest mode:

- Mouse movement
- I/O activity, (keyboard, trackball, modem, etc..)
- Cursor change
- Serial port access

This feature can be turned off, when running Video Works or some other program that avoids detection by the rest routine. The user can disable rest mode by doing the following:

- 1) Enter the Control Panel DA and select the Portable icon.
- 2) Hold Down the Option key and click the words "Minutes Until Automatic Sleep."
- 3) Click on Don't Rest in the dialog box that comes up, and select OK

Low Power Warnings

When the battery starts to run low, a series of messages appears, warning the user that it is time to recharge. A flashing battery replaces the Apple Icon in the menu bar. When these messages start to appear, save any

open documents and plug the Macintosh Portable into the power adapter as soon as possible. (Saving work is a good thing to do every once and a while, anyway.) The computer can be active, while it is recharging the battery.

After the fourth warning, the computer automatically goes into system sleep, while there is still enough power to hold the contents of memory for five days.

Note: As long the battery is recharged within five days, the contents of memory remain intact, and the computer will pick up where it left off before the battery ran low. The only consequence of not recharging within five days is that the contents of memory are lost.

When not using the computer for more than one month, save any files and select Shut Down from the Special menu. After shut down, remove the battery to make sure the battery does not become completely discharged. Copyright 1989 Apple Computer, Inc.

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