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PowerBook Duo: Power Management Features 10/92

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TOPIC -----

To increase battery run time, Apple introduced a power management system in the original Macintosh Portable and PowerBook. This power management system has been upgraded in the Macintosh Duo, and is called the InCharge Battery Saver.

InCharge Battery Saver is a combination of hardware and software that maximizes battery run time. The core of the InCharge Battery Saver is a custom microcontroller chip that automatically controls power management.

DISCUSSION -----

A notebook computer's battery run time is affected by three key parts of the CPU:

- Screen Backlighting. Full brightness uses the maximum amount of battery power, whereas minimum brightness uses the minimum amount.
- Hard Drive Activity. Constantly spinning the hard drive up and down takes the most power; it is best to keep the drive off entirely, or turn it on only when necessary.
- Logic Board. The microprocessor itself requires the largest amount of power, and drain on the battery increases dramatically with an increase in system clock speed. InCharge can reduce power use in the Macintosh Duo up to 90% during idle periods by modulating the clock speed.

Power Saving Features

The InCharge Battery Saver provides the following power-saving features in the PowerBook Duo:

- Powers only a custom PowerBook Duo chip and DRAM in Sleep mode.
- Turns off the microprocessor when not in use.
- Spins down the hard drive after a predetermined amount of inactivity.
- Puts the CPU to Sleep after a predetermined amount of inactivity (user

sets the interval).

- Turns off these components when not in use: modem, screen backlighting, ADB, serial ports, trackball, keyboard scanning, sound, real-time clock, and parameter RAM.
- Lets the user replace batteries while the Duo is in Sleep.
- Automatically charges the battery when the Duo is plugged in to AC or docked into a docking station that's plugged into AC.
- Controls charging of the batteries in the external battery charger when attached to the AC adapter.
- Supports Nickel Hydride (NiHy) batteries.
- Provides a battery gauge to monitor battery level.
- Automatically senses if the AC adapter is plugged into a power outlet.
- Has worldwide AC adapter.
- Automatically keeps hard drive spun up when docked in Duo Dock.
- Turns PowerBook display off when it's docked in Duo Dock.
- Can operate PowerBook Duo on the power adapter without the main battery installed.

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