

- This document has been placed on the Net as a service to all PowerBook users. I wrote it for another purpose, but I thought that the information it contains would be useful for a number of people.

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If you believe any information is incorrect, mail me at [jhoward@ariel.unimelb.edu.au](mailto:jhoward@ariel.unimelb.edu.au). and I will endeavor to provide updates where possible.

Hope you find this useful,

Jeremy Howard.

# Extending Your Battery Life

## **INTRODUCTION—ABOUT THIS DOCUMENT**

Many people have indicated that they are dissatisfied with the battery life on the PowerBook. When used inefficiently, the PowerBook 170 battery will last about one hour, while the 180c battery may last as little as 40 minutes. However, using the following guidelines, I operated my PowerBook 170 for three and a half hours continuously, including network access.

This document describes various steps for improving battery life. The first steps make significant differences, are non-technical, and are thoroughly explained. The more technical, or more trivial options are examined later. Appendix A dispels some myths about battery usage in a PowerBook, and about the 'memory effect'. Appendix B presents the data on which these suggestions are largely based, and may be useful for those looking for more insight into this issue.

If you don't have time to spend reading this document, simply read the bulleted summary at the end of each section.

## BATTERY HOGS

### Step 1—Avoid The Backlight

The backlight uses the most power in the PowerBook, except for the central processor. The easiest and most effective way to save battery power is to turn the backlight down, or off. This is achieved by sliding the brightness slider to the left. By sliding it all the way to the left, you turn the backlight off. It is possible to work without a backlight in very well lit conditions - if you can get a window seat when flying, you may like to do so for this reason. PowerBook 180 and 180c users should move the contrast slider to the far right when using little or no backlight. These users can set their displays to black and white to assist viewing.

Ricardo Batista's *Backlight Control* is a free control panel which automatically turns backlighting off after a user specified period of inactivity (I suggest one to two minutes). Moving the mouse or pressing a key turns backlighting back on. All 'on-the-road' PowerBook users should use this program—it's free, does not interrupt any processes, and because the backlight turns on as soon as you touch the mouse, it is not inconvenient. You do not need this if *PowerBook Display* is already installed in your Control Panels folder, or if you have installed System Update 3.0, which replaces the Powerbook CDEV.

#### Summary

- Turn down backlight slider
- Find a well lit environment
- Install *Backlight Control*, *Sys. Update 3.0*, or *Powerbook Display*

### Step 2—Give it a Rest!

When you are not using your PowerBook, put it to sleep, by selecting *Sleep* from the *Special* menu. When asleep, your PowerBook uses 0.2% of the power required when it is in use. You should be able to leave any PowerBook asleep for a number of days without any problems. I find changing to the Finder to put my computer to sleep too slow, so I have installed a keystroke combination (an FKEY called 'PowerSleep') into my system which will sleep the computer from any application. Andrew Welch's *Siesta* is a CDEV with the same functionality.

When a PowerBook is asleep, it is in the same state as when it is shut

down, except that power is still passed to the memory (RAM) and to a simple circuit to detect whether you have pressed a key (and therefore wish to wake the computer up). Therefore, you can transport your PowerBook in sleep mode safely. I would recommend that you do not shut down your computer, since in sleep mode it is available to you more promptly.

Do not put your PowerBook to sleep when you have a server mounted, without first installing *Auto-Remounter*, included in Sys Update 3.0.

#### *Summary*

- Put your PowerBook to sleep when not actually using it (install Auto Remounter if using a network).
- Install *PowerSleep*, or *Siesta*, to allow keyboard access to sleep mode from any application.

### **Step 3—Allow Processor Cycling**

Processor Cycling is an automatic process by which the PowerBook 'idles' the central processor after one and a half seconds of inactivity. The processor is automatically woken as soon as an instruction arrives. Processor cycling can save a great deal of battery power, since the processor uses more current than any other component. To turn processor cycling on (if it is not already), open the *PowerBook* control panel (in the Control Panels folder, which is in the System Folder), click 'Options', and click on 'Allow Processor Cycling'.

A small number of programs (particularly some games) do not correctly wake up the processor, and therefore run very slowly.

#### *Summary*

- Select Control Panels from the Apple Menu.  
Double-click on *PowerBook*.  
Click 'Options'.  
Click on 'Allow Processor Cycling' if not already selected.

### **Step 4—Use a 3rd Party Battery**

Technöggin and VST both produce subsidiary batteries for PowerBooks. These third-party add-ons come in thin cases, which attach to the bottom of your PowerBook, adding about one centimetre to the depth, and one kilogram to the weight. The batteries connect to the power in socket on your PowerBook, and have their own power in socket.

These batteries give from two and a half to five times normal battery life, and cost between four hundred and eight hundred dollars (\$A). If you want to use your computer on the road, this kind of product is essential. I purchased a VST ThinPak last month for \$A430, and have got eight hours of battery life on a PowerBook 170, when following the other guidelines in this document.

#### *Summary*

- For \$430 you can get three times battery life with a VST ThinPak add-on battery, adding 1 cm depth to your PowerBook, and 1 kg weight.
- For \$800 you can get five times battery life with a Technöggin 5x, adding 1 1/2 cm depth and 2 kg weight.

### **Step 5—Reduce Processor Speed**

Most PowerBooks run at between 25 and 33 MHz. It requires significantly less (~10%) battery power to cycle the processor at 16 MHz. Calculation intensive applications will slow significantly at this speed, but word processing and other low calculation programs will not be noticeably effected. To slow down your processor, follow the procedure in the bulleted summary of this section.

#### *Summary*

- If you don't mind sacrificing a little speed for more battery life, open the PowerBook control panel, click on Options, and select 'reduced speed'.

### **Step 6—Turn Off Appletalk When On The Road**

When Appletalk is on, the presence of network devices is constantly checked for, thus stopping the processor from idling when not otherwise being used. If you are not attached to a network (when your PowerBook is probably plugged in to external power anyway) you should turn Appletalk off according to the method shown in the summary.

#### *Summary*

- When not connected to a network, turn off Appletalk by opening the Chooser (in the Apple Menu), and selecting Appletalk 'Inactive'.



## **APPENDIX A—BATTERY MYTHS (MORE TECHNICAL)**

### **The ‘Memory Effect’**

Many rechargeable batteries (particularly ‘Nicad’—Nickel Cadium—batteries), such as those in mobile and cordless phones, suffer from the ‘memory effect’. This occurs where a battery is often only half used before being recharged, and the resultant solid residues cause the battery to lose some capacity.

The PowerBooks’ Nickel-Metal-Hydride (NMH) batteries, however, only show this effect in extreme heat conditions (<-10°C or >50°C), and with repeated dischargings to very similar levels. The type of variable charging schedules which laptop computer batteries are likely to be subjected to are highly unlikely to cause the ‘memory effect’.

NB—The Lead-Bromide battery in the PowerBook 100 and some PCs is subject to the memory effect, and should be recharged with a full-cycle charger, or allowed to deep-discharge occasionally.

### **Spinning Down the Hard-Drive**

As you can see from Appendix B, the hard-drive takes up very little power when it is spinning, but not accessing data. This is because the IBM hard-drives in most PowerBooks are set aside when not actually being used and can spin freely. This is why you sometimes hear a click when you access your hard-drive. Therefore, spinning down the hard-drive does not save much battery life. For this reason, the slider bar in the PowerBook control panel should be set to ‘more performance’.

### **Using a RAM Disk**

Since spinning the hard-drive does not take up much power, a RAM disk is not an effective way of saving battery life. Making a RAM disk your startup disk can, however, make your computer significantly faster.

The only case where this does not apply is for applications such as very large databases, which constantly access the hard-drive to retrieve information. Since data is constantly being accessed, the hard-drive cannot spin freely. To avoid this, set a large RAM cache (in the Memory control panel) instead of using a RAM disk. I find about 2048k ideal (you can use RAM doubler to make this memory available).





## APPENDIX B—BATTERY USAGE DATA

The following data, which show how battery power is used, were used in the preparation of these guidelines.

PowerBook Subsystem			Battery Current (A)	Delta
CPU	Disk	Backlight		
<b>Rest</b>	Sleep	Off	0.56	0.55*
<b>33 MHz</b>	Sleep	Off	1.05	0.50
33 MHz	<b>Rest</b>	Off	1.07	0.02
33 MHz	<b>Active</b>	Off	1.17	0.10
33 MHz	<b>Seeking</b>	Off	1.25	0.08
33 MHz	Seeking	<b>On Low</b>	1.45	0.20
33 MHz	Seeking	<b>On High</b>	1.65	0.40
Shutdown			0.00	N/A
Sleep			0.01	0.01

\* $\Delta$  from sleep mode

This information is from the VST ThinPack User's Manual. Each row shows one subsystem changed, or added, from the previous row, and the figure in the Delta column shows the additional current taken by that subsystem.

It is clear that the processor and backlight take up the bulk of the current, and that the hard-drive takes up little current when spinning freely. Most of the suggestions contained in this document arise from these observations.