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How to use this FAQ

Welcome to the PowerBook 1400 FAQ (Frequently Asked Questions). This FAQ was first written in 1999, and has been updated several times since. The last update was performed on September 2004.

As you may have noticed, there is a PDF extended version of this FAQ document available for $3. Please help support this site by purchasing a copy of this document. The payment is settled through paypal, and you will be emailed a link to a 3.5MB zip file that contains a 45 page PDF document. The PDF is an extended version of this free online FAQ, and also comes with an illustrated take-apart guide (detailing how to remove the RAM, CPU, screen and hard disk.

You are, of course, welcome to use the free online FAQ. The $5 PDF is there to help support my work, but you should not feel guilty if all you want to do is read the web version. I am just glad that you are interested enough to come along to my site.

The online FAQ is laid out on a single linear page, with a full list of questions set out in a large block slightly further down this page. You can click on these questions to be transported to the correct section of the document. At the end of each answer you will find three dots ("..."). Clicking on these will return you to the top of the document and the list of questions.

FAQ Background & Foreword

This list of Frequently Asked Questions for the PowerBook 1400 was constructed by Grant C. Baxter from a mix of bitter experience and helpful guidance (from kind sages and online resources). The FAQ should be used as a first stop for all PowerBook 1400 owners (and also users of other x400 PowerBooks) who suddenly come up with a question to which they do not know the answer.

This was already a mature machine back in late 1999, when the FAQ first popped into existence. It is many years since the last PowerBook 1400 rolled off the factory floor, and into the hands of some grateful (and much lighter of pocket) owner. It is, in short, getting rather long in the tooth.

At this stage in its life many people are looking for ways to upgrade it, improve its performance, fix things which seem to have gone wrong, or get on board some new technology which they don't quite know if their book can support (like wireless networking - it works!) Hopefully many of your questions will be answered by this document. If not then please email me directly and I will do my best to find the answer and then reply (and add it to this FAQ).

I do not claim to be an expert, and many of the tips below are from sources other than me. If you have an answer for one of the questions below which is better than mine then please email me and let me know. Alternatively, if you think you have found an error or something missing, or have a new tip you want to share with the PB1400 community, then I would really appreciate an email

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from you.

This FAQ was produced out of love, and I cannot take any responsibility for any damage which occurs to you or you machine from advice you received in this document. If you want to try one of the more complex things then I advise you to only use this as your first source and to search out other, more complete, documentation on your specific course of action. I hope you enjoy, and thank you all for reading!

About the Author & his 'Books

This document was written by Grant C. Baxter, initially in 1999, but updated again in 2000 and 2004. My first PowerBook 1400 came into my possession when my brother-in-law (at that time he was just my girlfriend's brother) spilled a glass of cola over his PB1400. it went caput!, and he bought himself a Vaio. I was a fledgling geek at the time, but a fledgling geek without a computer, so I managed to acquire his dead PB1400 and set to work taking it apart and repairing it. Much to my amazement, the machine did survive; not only the glass of cola, but also my haphazard take-apart procedures, and somehow sprang back to life (it is amazing what a cloth and some water can do).

This was my first computer since an Amiga 500+ back in 1994, and I fell absolutely in love with it. It was a PowerBook 1400cs 133MHz version, and to me it felt pretty darn state of the art. I used it for about a year, becoming a proper Macaholic, finally selling it in April 2000 to part finance the purchase of PowerBook G3 400 MHz (Pismo).

Since then I progressed (although it did not feel like a progression) to an iBook when my Pismo died a screaming death of despair, and then to a PowerBook G4 1GHz (Titanium). The TiBook is, of course, my main 'Book, but I harbour a fondness for the PB1400 and its sturdy sexiness. For me, as a writer, the main attraction of the PB1400 is the keyboard, and the ability to run it completely silently on a PCMCIA card install (how to achieve this is discussed below). I have gone out and bought myself two PB1400s in late 2004 and have been experimenting with them all over again. One of them is a PB1400c 166MHz, with 60 MB RAM, running MacOS 9.1 (both off the hard drive and from a 256MB PC-Card Compact Flash drive), and with a wireless network card (orinoco silver). The other is a PB1400cs 117MHz, with 32 MB RAM, running MacOS 8.6, and consigned to the "backup of the backup" computer category.

Grant C. Baxter, Version 5, Sept 2004 (Email Me!)

Glossary

PB1400 - This is just shorthand for the rather laborious "PowerBook1400"
RAM - Random Access Memory - your computer's memory, NOT the same as your hard disk.
CPU - Central Processing Unit - effectively, this is the brain of your computer, and the faster the better!
G3 - This is the name that Apple used for a CPU that became their mainstream chip for a good few years, finding its way into the iBooks, PowerBooks, iMacs, and PowerMacs. This is a much more powerful processor than the 603e processor that came with the PB1400, but the good news is that you can upgrade your PB1400 to run with a G3 processor.
HD - Hard Disk - the internal storage medium of your computer.
Other abbreviations will be described the first time they are used in the document.

Questions

What is the PowerBook 1400?

What are the differences between models?

What online resources are available for the PB1400?

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What are its best points?

What are its worst points?

Opening it up.

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Which version of Mac OS should I install and why?

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I bought a SCSI external device but it does not plug into the port at the back. What can I do?

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What can I do to speed up my PB1400?

How playable are games like Quake on the PB1400?

Can I upgrade the Video RAM?

How do I install RAM?

How do I install a new Hard Disk and what sort of Hard Disk does the PB1400 support?

Where can I buy parts for my PB1400?

Why does my screen look lighter at the sides/top/bottom?

Are the G3 upgrade cards still available?

What sort of upgrades and accessories are available?

Eek, I spilled water on the keyboard and now it doesn't work. What can I do?

My screen died/cracked - can I get it repaired?

What is the average battery life for the PB1400?

How can I improve the battery life on my PB1400?

Can I use batteries from other PowerBooks in this machine?

Can I run XYZ on my PowerBook 1400?

Can I use a CD/RW drive with my PB1400?

Can I install Linux on my PB1400?

Is Mac OS X supported on the PB1400, and if not will it work?

How do I make the system boot from CD?

What is PRAM (Parameter RAM), where does the battery live and how can I change it?

Can you swap out a "cs" screen for a "c" screen or replace a broken screen?

There have been reports on faulty power adapters on some PB1400 models and damage to batteries. What is this about?

Can I improve screen visibility when working outdoors?

What can I use the infra red port for?

How do I add a modem and ethernet to my PB1400?

Are the Sonnet G3 cards stable, fast, worth the cash, trendy, cool and will they make me more popular?

Can the PowerBook 1400 use wireless/airport networking?

Answers

Q: What is the PowerBook 1400?

There are probably two ways to answer this. The first, dispassionate answer might be that the PowerBook 1400 was a mid-range PowerBook released by Apple in 1996, and continued through until 1998. Today it could be viewed as a rather sedentary, blocky little legacy Mac. There is another answer, though, perhaps the sort you would expect to hear from an avowed Macaholic like myself. This answer would take the following line: the PB1400 was a popular little 'Book that Apple released late in November, 1996 and discontinued in February, 1998. It had a long life for a portable computer and built up quite a large user-base. In all, Apple released 6 versions of this PowerBook. The differences between models are discussed in the answer to the next question. The machine was always viewed as being a little bit under powered, but that can only really be said about the original 117mhz version which for some reason Apple decided to release without level two cache on the CPU The later two speed bumps improved the performance by increasing the speed of the chip and adding some cache at the same time. It had a stunningly good keyboard, a large colour screen (for the day), and was built like a tank (although thankfully without the weight).

The PB1400 can still handle many general very well — from Microsoft Office and Quake all the way to Photoshop 5.5 and wireless web-browsing. The PB1400 came with Mac OS 7.X installed, but it can handle all subsequent Mac OS releases up to and including 9.1. In my opinion, it runs a lot better with Mac OS

8.6 than it ever did with 7.6, and if you have enough memory, MacOS 9.1 is well worth the small amount of extra RAM and processor demands for the stability and functionality it brings.

One thing in common with all releases of the machine is the excellent keyboard. The design of the computer allows access to the internals by flipping the keyboard up. This simple design made upgrading the PB1400 a breeze and did not compromise the strength of the typing surface at all. The keyboard is well spaced, very stable and quite simply the best typing surface on a portable computer ever (based on my unscientific experience on at least, ohhh, three 'Books).

The screen, regardless of whether it is the dual scan (denoted by a "cs" after the 1400) or the active matrix(denoted by a "c" after the 1400) is 11.3" inches diagonally across. This seems small by todays standards, but at the time it was considered to be a pretty good screen. The "cs" dual scan screen is noticeably inferior to the "c" active matrix screen, but both are still good enough for the sort of tasks you are likely to be using the PB1400 for. The battery is a NiMH, which means you don't get the worlds best battery time (about 90 minutes or so when new), and no Lithium Ion battery was ever released for this machine, so sadly that is what you are stuck with.

Okay, so what is the PowerBook 1400? It is a seven pound portable computer in slate gray. It has a color screen and a PowerPC 603e processor. Most importantly, it runs Macintosh Operating System (Classic) and is incredibly stable. A suprisingly large number are still up and running. There is no point trying to claim that it is a speed demon, but, with the right software and enough RAM installed, this can be a great little machine for students and home use.

Now for some basic specs:

Display

- Active-matrix or Passive-matrix Screen (displaying 1000's of colors)
- 11.3"
- 800x600 resolution

Ports

- 1 serial
- ADB
- audio in
- audio out
- video out (optional)
- HDI-30 SCSI
- IR
- 1 expansion bay
- 2 PC card slots

Battery

- 30 watt-hour nickel-metal-hydride (NiMH)

Sound

- 16-bit, CD-quality stereo sound capable of driving headphones or external speakers
- Built-in speaker and integrated microphone
- Digital-to-analog conversion sampled at 44.1, 22.05, or 11.025 kHz
- 16-bit audio line-in for recording

Weight

- 6.9 pounds with the optional CD-ROM drive installed
- 6.6 pounds with floppy drive installed

Size

- Height: 2.0 in. (5.2 cm)
- Width: 11.5 in. (29.2 cm)
- Depth: 9.0 in. (22.5 cm)

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Q: What are the differences between models?

As mentioned, Apple released six versions all built around the same chassis and basic internals. For a full page run-down on each model, I recommend taking a trip to everymac.com, but below I will detail the key differences between the six models:

1400c/117: This model uses a 603e processor running at 117 megahertz with no on die cache. It has an active matrix screen and came with 12MB of RAM and a 750MB harddisk. The internal CD player was 6 times speed.

1400cs/117: As above but with a cheaper dual scan screen. This was the original budget model. This model came with either 12 or 16MB, depending on when it was released.

1400c/133: As the first but with 16MB of RAM, a faster processor (133mhz, but also with built in cache allowing the machine to run about 20+% faster than the 117mhz machine) and a 1000MB harddisk.

1400cs/133: Same as the 1400c/133, but with a dual scan screen.

1400c/166: The best version of the PB1400 released. This simply upgraded the processor by a notch to 166mhz. In tests it only runs about 10% faster than the 133 model, but if you can get one then why not? Other than the chip and a slightly larger hard disk (some shipped with 1200MB, others with 2000MB) this is identical to the 1400c/133.

1400cs/166: As above but with a dual scan screen.

It should be noted that some of the systems released in 1997 came with a faster 8 times CD player. This was not advertised and simply occurred because Apple had a shortage of the slower drives and had to meet a pent up demand for the PB1400. Performance improvement is minimal, but it came free

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Q: What online resources are available for the PB1400?

The problem with providing web resources is that they change so rapidly. Almost all of the links I provided in this article in 2000 are now dead. I have tried to at least provide a few valid resources here for you to explore, but it is almost inevitable that these will rapidly go out of date.

Apple's Technical Specification Pages:

- 1400cs/117
- 1400cs/133
- 1400cs/166

- 1400c/117
- 1400c/133
- 1400c/166

Charles Moore at MacOpinion and LowEndMac writes some of the most interesting PowerBook articles that I have found. He has lots of articles that discuss the PB1400, and he has been writing for years, so there is a deep archive of his work online. Well worth a read!

MacTips has some interesting retro archive articles worth reading. www.powerbookcentral.com is still online, but not really containing much in the way of anything nowadays.

MCE has some great PowerBook items for sale, and they maintain a good list of items for older PowerBooks. www.powerbook1.com. Also www.macsales.com, www.smalldog.com and www.powerbookguy.com as well as many others offer PowerBook items for sale.

The Ultimate Mac resource has a whole bundle of wonderful links. About a zillion. Go look at http://www.ultimatemac.com/, but be warned that some of the links contained will be very stale by now!

EveryMac has some great info on this machine and the upgrade cards available for it: http://www.everymac.com/, and http://www.everymac.com/upgrade_cards/by_system/powerbook_1400.html

Also good sites (with strong archives worth searching) are MacSpeedZone and XLR8your mac (at www.macspeedzone.com and www.xlr8yourmac.com) for tips on how to get the most out of your system and articles explaining technical subjects such as disk caching, etc.

Newsgroups: There are many newsgroups which you may find interesting for all sorts of Apple product information, help and advocacy. Below is just a partial list of the most general groups (all searchable through google's usenet search function).

comp.sys.mac.portables (Very good newsgroup for all sorts of PowerBook discussions)

comp.sys.mac.advocacy (Worth a visit if you want to waste your time arguing about nothing)

comp.sys.mac.misc (Another very good resource for all sorts of Mac related information)

comp.sys.mac.wanted (Where people advertise things for sale and things they want to buy)

comp.sys.mac.system (A good resource for general and software information)

For buying, eBay is your friend, and for searching, google owns you!

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Q: I have the chance to purchase a second-hand PB1400, should I?

The answer to this question depends on many things, not least of which are the price, and the use you would want to make of the PB1400. What I will do here is offer some questions you should ask yourself when considering the purchase, and also offer some help in answering them.

Is it worth the asking price? Well, this depends upon what model is being offered and at what price. This machine is getting older, and its resale value has pretty much reached the realms of cheap cheap cheap. This means that it, if you are lucky, you can get a very good purchase at a very good price. So, what is a good price? Well, different people will place a different value on this, but my basic price sketch is below (these assume full working condition with a battery that offers at least a small remaining charge):

1400/117 with 12MB and Dual Scan Screen: $70 (£40). Some people will tell you that is too low, but this is the slowest spec of all, and it will cost you another $50 to get enough memory to really make this useable. With an active matrix screen add about $30 to the price. The PB1400/133 is noticeably faster and is worth about $25 more than the 117 model (it also comes with 16MB and a larger hard disk). The 166 model is perhaps worth an additional $40 over the 117 model. So that would mean that the base model PB1400c/166 (active matrix, 16mb, 1GB) would be worth about $135 (£75). Of course, things are not that easy as second hand computers often come with lots of extras that the original users have added over the years and you need to make account them too when pricing it. Also, you need to subtract some value for scratches, missing software, broken parts etc.

The key features I would pay extra for are: CD-ROM around $20, extra RAM (up to $50 extra for a machine maxed out at 64MB). So, in short, a fully specified, top of the line (in 1998 terms) PB1400, 166MHz, 64 MB, 2 GB HD, CD-ROM would be worth about $200. It is often cheaper to buy a machine that already has all the items you desire installed, as hunting down and finding each element individually could take time, and cost more.

Before we leave the price issue altogether, it is worth taking a moment to say that some people don't just want a functional PB1400, they want a machine that is in very good physical condition. It may not quite be a collectors item yet, but some Macaholics (such as myself) would generally be willing to pay a bit more to get a high end machine in good condition, with all accessories, and no cracks, heavy scratches, missing port doors, etc.

Is it really still a useable computer (for what I want to do)? The PB1400 is an old machine, but old does not necessarily mean bad. You need to ask yourself a simple question: "Will this machine be able to do (almost) everything I need it to do and in a speedy enough manner that I do not get frustrated waiting?" To help answer that question here is some useful things to remember: Memory will max out at 64MB (60 on the first117 models), so some memory intensive applications will not run or will run slowly. USB is not supported, but you do get the very useful SCSI port. This is a PowerPC, so most modern apps will run on it. Games will not run particularly well. Quake runs at about 7 fps, Myth and Myth II run okay, but the animations stutter. Diablo is perfect. However, forget about Quake III, or Rainbow Six. This machine cannot handle it. Word processing, spreadsheets, internet, small game use, even some PhotoShop and CD burning (through an external drive) will all work. Usable? Definitely, but there are better (and more expensive) machines now available (of course).

I plan on upgrading it with a G3 processor. Is this realistic and worthwhile? For a long time it was unwise to buy a PB1400 with the intention of upgrading it to G3 because of what one newsgroup reader aptly named "The Rape of eBay". This was the problem caused when all G3 upgrades suddenly fell out of production and vanished. The only way to secure one was second hand, and that tended to result in a mass of people trying to outbid each other. It was often cheaper to just buy a second hand G3 PowerBook than it was to buy the PB1400 and a card. Then things changed. Sonnet announced that they had started production of two new G3 cards in 2000, and a further update in 2001, and suddenly the attraction

of upgrading became realistic again. If you can acquire a cheap PB1400 then it can be upgraded to a G3 466MHz monster for under $300. Not bad, but still not cheap. You really have to ask yourself whether you really love your PB1400 (in which case, upgrading it might be worthwhile), or whether you might actually be better off selling it on eBay, and they putting the money you get for selling it together with the cost of buying a G3 upgrade, and, hey presto, you almost certainly would have enough cash for one of the 500MHz G3 iBooks (give or take a few dollars).

Lastly, why not read some of the excellent articles on www.macopinion.com/roadwarrior about the PB1400 (and other models) and their resale value, utility, appropriateness and so on. This is well worth a visit before you buy any PowerBook!

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Q: What are the best things about it?

The keyboard really is a wonderful typing surface. The keyboard on my new Pismo is great, but still pales in comparison to the incredible keyboard on the 1400. If I were a professional writer I would probably keep a 1400 around simply because it is such a pleasure to type on (for laptop that is, as nothing beats an ergonomic desktop keyboard). The rigidity of the typing surface on the PB1400 is something I personally enjoy working with, and for me that is one of the key reasons I went out and bought a PB1400.

It might not be every day that you need to gain access to the internals of your laptop, but when you do, it can be a frightening experience. Not so with the PB1400. The excellent flip out keyboard design gives easy access to the internals (Bronze keyboard PowerBooks offer a similar mechanism, but the insides are much harder to access once the keyboard is removed). The PB1400 is as sturdy as they come. It also has a reasonably small footprint and excellent trackpad. It remains one of the easiest laptops to upgrade, and one of very few models ever released that allow the CPU to be easily upgraded. It also has the unique bookcover which allows you to personalise your PowerBook (There were bookcovers released in leather, wood, aluminium, solar panelling and plastic, as well as the favourite clear panel for displaying your own artistic creations underneath.)

Another factor in its favour (shared by many models) is that you can set yourself up with a bootable compact flash card, set the hard disk to spin down, and pretty much enjoy a completely silent computing experience. Silence can be absolutely golden for some of us, and the constant whine of a laptop fan (such as I get from my beloved TiBook) can drive even a nice young man like me crazy.

Let us not forget that this machine was sold for over two years, and there are a great deal of them out there. There have also been a whole host of upgrades released for the PB1400, including over 6 different processor upgrades. In fact, you could, if you wanted, take your 117MHz PB1400 all the way to a 466MHz G3 processor. That sort of speed increase is not available with any other laptop that Apple has ever released. As a geek, there is a certain coolness in managing to make an old machine roar!

Lastly, and on a more esoteric note, the PB1400 has a lovely form factor. It has quite a small footprint, is as solid as a rock (I have received and revived two PB1400s that the owners thought were dead. In actuality, they are very difficult little machines to kill), and can act as a very cheap web-surfing (even wireless browsing with the correct card), emailing, and writing machine. If that is all you

need, perhaps a PB1400 is a very good, and very cheap, option.

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Q: What are the worst things about it?

There is no point pretending that the PB1400 is a hotrod. It is not. It may have aged well, but it has still aged. The CPU is slow by today's standards, and the bus speed is a pretty aenemic 33MHz. Even a G3 upgraded PB1400 will be unlikely to exceed even the low-end clamshell iBook, and would certainly not get close to a PowerBook G3 Firewire (Pismo) or even the 500MHz G3 ice iBook. Although the 466MHz G3 upgrades are an amazing improvement over the 603e processor that the PB1400s first shipped with, the slow bus and low memory ceiling will both hold the machine back.

Except for the later models, the internal hard disk was too small and slow (this is simply the fault of the fact that hard drives really have grown a lot faster and larger in the three years since the PB1400 was released). The original 117MHz model was rather crippled by Apple's decision to release it without any level-2 cache (the 133MHz and 166MHz models both shipped with 128KB of level-2 cache, and this, more than the pure megahertz speed boost, seems to have quite a lot to do with their improved general performance).

One of the most noticeably failings of the PB1400 is that it has an incredibly low (by today's standards) maximum RAM capacity of only 64MB. I am sure that back in 1997, that felt like a lot of memory, but in 2004, it is an unavoidable limit. Other missing features are that there is no cardbus or USB support (again, simply because these technologies were not prevalent at the time of its release), and as with most laptops, the speaker is weak. The PB1400 only has one speaker, so you do not get stereo sound unless you plug in some earphones.

Another rather annoying aspect, that actually got reported a fair bit during the initial reviews of the product, is that the battery life was poor (about 100 minutes from a fresh battery, but significantly lower than this on an old battery). Apple claimed 4 hours, but we all know by now not to believe what Apple claims when it comes to either battery life or processor performance.

A minor glitch was that the CD doors often fell off (mine has!). The CD player still functions normally without the door, but it looks ugly, and there is no room in my life for ugly (hence why I am a Mac person)

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Q: How do I open up the PB1400 to gain access to the innards?

Fortunately, the ease of access to the innards of the PB1400 is one of its strongest points, and possibly a contributing factor to why there are still so many working ones out there. As a general tip, take care to unplug everything and remove the battery before sticking your paws inside this or any other computer. Electricity should not be messed with. It also pays to either use a static discharge wrist band, or at the very least make sure that you are not doing any sort of work on the inside of a computer while sitting on your shag pile rug. Static kills more computers than anything else (well, except perhaps for the fall from the coffee table).

To open the PB1400, slip the speaker grill firmly to the left until it disconnects (it needs to slide about half an inch across to the left before it can be removed). Remove it and then lift the keyboard up towards you(if you do not have long nails then use a thin, flat implement to prise it forward by inserting it at the top

right corner and leveraging upwards) and lay it on the wrist rest (leave it plugged in at the moment). Unscrew the metal panel (5 screws in some, 4 in others) that is revealed under the keyboard, and hey presto - the innards are revealed. The CPU is on the top left, then the video expansion slot, then the memory slot on the right. The hard disk is just below and to the left of the CPU, and can be accessed without requiring you to remove the metal heatsink panel.

There is a very good PDF take-apart guide for the PB1400 that Apple created. This document contains a detailed drawing of every single step of the take-apart process, all the way to removing the screen, casing, and so on. Actually, it is quite simple. I managed to strip a PB1400 of its screen at the first attempt, with no broken parts (well, there was that one small sliver of grey plastic lying on the table at the end, but we will ignore that). If you can't find the document (use google), and really want to give it a go, then send me an email.

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Q: Where can I acquire a G3 upgrade card for my PB1400?

There are various places where you can buy the available cards (the Sonnet 466MHz G3 cards). Sadly MacCPU went out of business in 2000 and thus is no longer an outlet for these cards. However, the cards are available at many places (thanks to Sonnet's efforts). These include www.buycomp.com, www.smalldog.com, www.upgradestuff.com, www.macsales.com, and a whole host of other online Mac retailers.

Two other companies (Vimage and Newer) produced their own G3 upgrade cards for the PB1400, but both stopped production in 1999, and all remaining boards in the channels have been sold. There are various places worth looking if you want to try and find a second hand card (this includes the Sonnet 333MHz and 400MHz previous generation G3 cards).

You can post wanted ads on one of the many Mac newsgroups (probably comp.sys.mac.wanted or comp.sys.mac.portables are your best bets). Alternatively try your favourite online auction site and classified ads. Be careful not to spend more on a second hand card than you can buy a new card for (it happens), and also be sure that you would not be better off selling your PB1400 and using the cash to buy a second-hand iBook instead (hey, I have to mention these things just in case someone accuses me of being biased!)

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Q: Can I upgrade the 603e processor with a faster 603e chip?

According to Apple you cannot upgrade any PB1400 with the 166 chip due to a ROM incompatibility (The 166 Mhz board has ROM U3 (Low, 341S0364) and ROM U4 (High, 341S0365). The 117 and 133 MHz logic board have ROM U3 (Low, 341S0203) and ROM U4 (High, 341S0204) respectively). However, you should be able to replace the 117MHz processor with a 133MHz processor. Some people have suggested that very late model PB1400cs/133 can be upgraded to the 166 chip which would imply that some late model 133's shipped with the 166 logic board, but I have yet to confirm this (I have that model, but I have yet to find someone with a 166mhz chip that will sell it for dirt cheap). All models can be upgraded with any of the G3 cards or the Newer Technology 183MHz 603e card.

This Newer Technology 183MHz 603e card was the first ever CPU upgrade released for the PB1400, and while it might have made sense back in 1998 to move from 117MHz to 183MHz (a tasty 66 MHz boost), nowadays it is an almost worthless exercise. A 183 MHz 603e processor is not going to feel fast. Saying

that, if you can find one on eBay for a few dollars, then why not?

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Q: What is piggybacked RAM?

Apple built a unique RAM socket for the PB1400. To keep the footprint small they squashed the internals in nice and tight, and as part of this squishing process, they created a stacked RAM format. Basically this involves the use of RAM cards that come with an extra expansion slot to allow you to attach a second RAM card on top of the first. Using this socket you can fit two cards, one on top of the other, into the tiny ram space under the keyboard. Make sure when you order RAM that you get one with the pass through expansion slot on it so that later you can add another later, if you so desire.

Note, though, that the piggy-backing of RAM did lead to some problems. For more information on this, please read the following answer.

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Q: I have installed two RAM cards, but only one is recognised. Why?

Apple claims that some memory manufacturers released RAM before the official specifications were made available and consequently got them wrong, but this does not fit with my experiences. I have tried to install 32 and 8MB cards together into my first PB1400. Both cards worked alone, both worked together in another PB1400, but in my machine they could not be stacked. Another user reported a problem with stacking two 8MB cards or two 24MB cards. Again, all cards worked alone, but could not be stacked. They worked fine in another PB1400 however.

I finally found someone who mentioned that when you remove the Apple installed memory card (this is the small card to the left of the user RAM slots) the problem dissappears. I tried this recently with my new PowerBook, and I can verify that for me it solved the issue and my stacked cards which had been previously unstackable were now miraculously recognised.

The bad news to this is that is means that my Apple 8mb card is redundant. I have also been asked whether you could remove the Apple card and then install more than the normal 48MB into the user slots to have the machine recognise a full 64MB - I am afraid that I do not have an answer for that at present. What I did was take the 4MB Apple card out of another PB1400 and swap it with my 8MB Apple card. That worked, and gave me a machine with 60MB of RAM.

I can only surmise that some releases of the PB1400, but not all, have problems with the motherboard, ROM, or Apple memory that causes some conflict to occur between certain configurations of cards. I have never seen a consensus on this, and while the information above may help some of you with similar problems, it is sadly not conclusive. Some sites claim that there may be an issue with some 32MB cards (this may be true, but I had a problem with two 24MB cards), others that it is with early cards in general, and still others that if you are going to stack cards you have to make sure that they match (meaning that they are from the same manufacturer). I know that this is inconclusive. I have asked Apple for help, but they could not offer any new information to me. My best advice is either try RAM before you buy or buy from a place with a 30 day return policy.

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Q: What is the maximum amount of memory I can install in my PB1400?

This depends upon the original base configuration. If you have one of the older 117mhz models that shipped with 12mb RAM installed, then you can add another 48mb to give a total of 60mb. In all other cases the base model shipped with 16mb RAM and could be upgraded with 48mb to a total of 64mb. Not a lot by today's standards, but certainly a workable amount in Mac OS 8, 8.1, 8.5, 8.5, 9, and even 9.1.

They key is to tailor your system to the amount of memory you have installed.

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Q: Can I install more memory than the maximum supported amount?

Some people reported success in installing more than the maximum supported amount of RAM, but the computer cannot use more than the maximum supported amount. Make sense? Well, what I am trying to say is that if you really want you may, in theory, be able to install two 32MB cards and even though you would not be able to utilise 80MB it would at least allow you access to the full 64mb (or 60 if that is your limit). I must note here though that I have never tried this and I have had several problems with PB1400 memory, so I don't know whether this would work or not. Seems not to be a terribly common thing to occur (why buy more memory than you need?), but if anyone has tried it and wants to send me an email with information on whether it was successful or not, I would love to hear from them.

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Q: Which version of Mac OS should I install and why?

I want to make it as clear as possible that you should definitely install system 8 or later, so here it is in capitals: INSTALL SYSTEM 8.0 OR LATER!!!

The code is tighter and has been implemented specifically for PowerPC processors so it runs faster than older versions of the OS do on the PB1400. I have two PB1400s. My 117MHz machine has a trimmed down Mac OS 8.6 system installed (when I say "trimmed down", I mean that I have turned off any extensions that I do not need so as to save on memory usage), and I love it to death. Virtual memory is a lot faster and the RAM usage is manageable. It only takes up about 12MB of the available RAM on my system, and this can be further reduced by trimming extensions.

Of course, if you are stuck with a very small amount of RAM and cannot afford to upgrade then you are probably best remaining with system 7.X due to the increase in RAM requirements for later revisions of the MacOS. However, at this stage in the PB1400's life, it is dirt cheap to add at least 16MB to your machine, and suddenly the world of Mac OS 8.6 is open to you (and what a pretty world it is).

One recommendation for those who are technically confident enough: do a custom install and make sure you only install what you need. After all, hard-disk space is at a premium and the smaller the install the less RAM the system will consume. There are several excellent articles by Eric Prentice at www.macnn.com/MacTips/archive on how to go about a custom install of versions 8.1 and 8.5. These are well worth a read by anyone planning on upgrading their OS, even if it does not cover the exact version you plan on installing.

Mac OS 9 and 9.1 also runs on the PB1400. The following is a direct quote from the Apple site: "How to run os9 - apple system requirements: 32 MB of physical

RAM, with virtual memory set to at least 40 MB". Many people have successfully installed 9.0, but the consensus is that 8.6 is the most stable, proven and well supported system for this machine unless you have 48MB or more.

If you do have more than 48MB installed, then I recommend going for Mac OS 9.1 (the 9.1 updater is available for free from the Apple site for anyone with a OS 9 install disk). The system can be trimmed as discussed above, and on my 'Book takes up about 17MB of system memory. However, for that extra RAM usage, you get a very stable, feature rich, highly polished version of the Macintosh Classic operating system - pretty much the final swan-song of the classic environment (technically there is a Mac OS 9.2.2, but this has very few differences from 9.1).

It is almost painful to state this, but Mac OS X will NOT run on a PowerBook 1400. It just is not possible due to the architecture of the machine. If you want to run Mac OS X, and want to do so on the cheap, then a PowerBook G3, 2000 (aka Firewire, aka Pismo) is probably the most realistic entry level system for your needs.

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Q: What is PCMCIA and what can I do with it?

The PB1400 has two stacked PC-card (PCMCIA) slots on the left-hand side of the case. This means that you can insert two type 1 or 2 cards or one type 3 card (a type 3 card is twice as thick as a type 1 or 2 card, but I personally don't know of any in existence). The PCMCIA card slots on the PB1400 do not support cardbus. This is an important point, as most modern PC-Cards that you find on the market are for the more modern cardbus slots.

Cardbus is just a faster interface (32 bit versus the PB1400 16 bit interface) that allows things like USB adapter cards to work. So that also means that you can never have a USB or FireWire port on your PB1400. This sounds all rather negative, but it is not all-bad. PCMCIA is still very useful and there are tons and tons of non-cardbus devices that you can use to add gallons of functionality to your machine. Examples include: external hard drives with PCMCIA interfaces, modems and ethernet cards, compact flash adapters (very useful if you want to create a silent PowerBook - see the PDF version of the FAQ for more information), external cd writers, etc.

It can be a bit of struggle to work out what is supported and what is not on your PB1400. The key is to try and make sure before you buy that the card supports MacOS and can be used on non cardbus machines.

Apple produced two very good documents that discuss PCMCIA in more detail, with specific focus on how to use it with your PowerBook. The links are below:

- PCMCIA for PowerBook: Frequently Asked Questions (1 of 2)
- PCMCIA for PowerBook: Frequently Asked Questions (2 of 2)

Lastly, there is one thing that you can add to your PB1400 via the PC-Card slots that could just about revolutionise the way you use the machine, and that is a wireless network card. There is a stunningly good, highly detailed and easy to follow article at penmachine.com that goes into exactly what you need to set up your PB1400 for wireless web browsing and networking. It is a must read, and probably the only remaining must-have upgrade for the PB1400!

- Wirelessly Networking a PowerBook 1400 or Other Old Apple Laptop: Step By Step

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Q: I bought a SCSI external device but it does not plug into the port at the back. What can I do?

You need to buy an adapter. There are several types of adapter, but for most devices you need to get your hands on a PowerBook SCSI adapter (This is a small plastic "L" shaped adapter that converts the PowerBook's 30 pin port into a long line of 25 pins). These adapters used to be very common, and you can still pick them up at lots of places, including on eBay.

Some devices also require a HD 50 connector. You can either buy an HD 30 to HD 50 cable or you can buy an HD 25 to HD 50 if you already have the adapter. Look closely at the specific devices requirements (all SCSI devices should list what sort of pin adapter it has and what cables it comes with).

Almost without doubt you need the 25-30 adapter before anything will work. If you go to an Apple reseller they can point you in the correct direction. Also, Apple themselves have a couple of very useful articles online that should remove any last doubts:

- PowerBook: Using SCSI Devices
- PowerBook: SCSI Cables Used

There are also excellent tutorials online that explain all of the different SCSI cables, how to connect them together and also how to troubleshoot SCSI devices. Have a look at the following: "All About PowerBook SCSI" for detailed description on how to connect SCSI to a PB.

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Q: What is SCSI disk mode and why would I want it?

SCSI disk mode allows you to connect your PowerBook to another Mac and access the PowerBook hard drive as simply as if it were local. The other machine will need to have a SCSI interface in order to facilitate the connection. Fortunately, this includes many old Mac machines, but due to the (positive) relentless advance of technology, more recent ones do not come with a SCSI interface (although if you are particularly keen to utilise this feature you may be able to add a SCSI card).

However, the Powerbook 190, 1400, 3400, 5300, G3 and G3 series computers do not have internal SCSI hard drives, but instead have IDE internal hard drives. Therefore it would not be correct to call it SCSI Disk Mode, but it is, for all intents and purposes, the same thing.

SCSI/IDE disk mode is very useful when you want to install software without using the CD drive, transfer large files without an ethernet or wireless network, or simply use your no longer needed PowerBook as an extra storage device (although, being logical here, what you shoud do in this case is sell it and buy a massive hard disk with the cash you gain).

There are Apple documents which explain how to go about making the connection. Just search for them on your local territory's Apple Support website

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Q: What is the difference between the C and CS models?

If your PowerBook is a "c" model then it means that you have an active matrix

(TFT) screen. This was one of the largest and nicest notebook screens available at the time. It is still a beautiful screen, even if it does pale a little when placed alongside a modern, widescreen PowerBook.

The "cs" model has a dual scan screen. Basically this was the budget category of the PB1400. The dual scan screen is slower and not as crisp, but the PB1400 screen was one of the best dual scan screens at the time. So what does active matrix mean? Basically your screen is built up of thousands of little dots of active color which are lit from behind. Whenever something moves on the screen the affected dots change color. Even today, several years later, the active matrix screen is the best type available. A dual scan screen is passive, meaning that individual pixels do not update themselves but instead the entire screen is updated each time something moves/changes. This obviously is less efficient and slows things down.

To improve this dual scan screens were introduced. These contained two screens which were slotted tightly together. This improved performance by reducing by half the area that has to be updated each time something changes (unless the change affects both upper and lower halves of the screen). Another difference between active and passive is that passive screens tend to be less bright and harder to read in natural light.

I have used PB1400 passive and matrix screen extensively, and the active "c" model really is a huge improvement over the "cs". With PB1400s being so cheap, if you are buying one for yourself, spend the small amount of extra cash to secure a "c" model if you can. Also, I would be reticent about spending large amounts of cash upgrading a "cs" model PB1400 when the logical step may be to sell the "cs" and buy a "c" before sinking additional cash into it.

One last word for those who do have the "cs" model 'Book. I used a PB1400cs for about a year, and I didn't have any problems at all with the screen. Perhaps this was because I didn't know any better, or perhaps it was because it really was more than good enough for my needs at that time. Regardless, just because the active matrix screen is better, that does not mean that dual-scan models are a waste of space. They are not, and they also constitute the bulk of the PB1400s that were sold, and thus far and away the easiest (and cheapest) ones to buy. I am just trying to say that if your plan is to buy a PB1400, max out the RAM, and add a G3 processor upgrade, then you might as well pay a small amount extra to get an active matrix model upfront.

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Q: Why does my screen have a thin white line across the middle?

This question got asked often enough to cause Apple to create a document explaining this. Basically, you have a dual scan screen (see the question and answer immediately above). The white line is the join where the screens meet (horizontal across the centre of the panel). This line should only be visible on some rare occasions, such as when the screen suddenly changes to black. I don't notice this 99.9% of the time, but every now and then I will be surprised when it becomes visible for a second, normally at startup.

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Q: What can I do to speed up my PB1400?

Definitely read the section on upgrades for more information. Basically, there are several bottlenecks in the design of the PB1400 that you can do nothing about, namely the slow bus speed and small memory ceiling. The CPU is another

obvious bottleneck, but one that can be upgraded with an expensive replacement card. However, even within these restraints, and leaving the discussion of upgrades until later, you can squeeze out some very good performance from the PB1400.

The first, and probably most important step that you can take is to add as much memory as you can afford to. Memory is still easy to pick up (again, eBay is your friend), and while it is not cheap, it is a lot cheaper today than it was four years ago. This should be your first purchase and really helps get things moving. If you decide not to max out the memory in one go then make sure that you buy a RAM card which can be stacked so that later you can slot another memory card on top of it.

Another useful tip is to set the disk cache to 32kb for each MB of installed RAM (in Mac OS 9, this is done for you, but in earlier versions you can set it manually). This is a tip that you will find repeated over and over on the web. I cannot really say whether it works, but I can tell you that MacSpeedZone did some benchmarks, and 2MB of disk cache seems to be the fastest, and it just so happpens that this is what the disk cache of the PB1400 should be set to if you have managed to max out the RAM to 64MB (64 x 32 = 2048 = 2MB).

As discussed earlier, I recommend that you install Mac OS 8.X, or 9.1 (if you have the RAM). See the specific section on this above for the reasons why.

Set virtual memory to 1 MB above the amount of installed RAM (this speeds things up on system 8.X and higher because it turns on file mapping and reduces the time it takes for applications to load).

If things are still slow, then a good tip is to set the number of displayed colours to 256 (unless you actually need the higher setting for some work you are doing). If you are a game player and want to improve performance try switching off in-game music (although the PB1400 is NOT a gaming machine).

The best way to increase the speed of an application is to set the memory in the get info panel to as high as you can allow it to be (normally RAM minus about 12 or 15 MB for the system to use) and then run only one application at a time. I have a owned a low, mid and high end PB1400, and I have managed to run Mac OS 8.6 comfortably on all, 9.1 comfortably on the 166MHz model, and have even got stuck in with Photoshop and Quark at the same time (although this was with a minimum of 48MB of RAM).

There are various CPU upgrades for the PB1400, from the 183MHz 603e upgrade (which only really boosts performance by about 20% on the average PB1400, and less even than that on the 166 model.) all the way to the copper G3 466MHz chip which makes your machine feel insanely fast (relatively speaking). This option will be discussed later.

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Q: How playable are games like Quake on the (non G3) PB1400?

They are definitely playable, but, well, the PB1400 is most definitely NOT a gaming machine by any stretch of the imagination. Saying that, if all you want is to mess around with some older games every once in a while, then there are a few good ones out there that will still play well on the PB1400.

There are a few things to keep in mind, of course. First of all, you will need enough memory to run the game (give it as much as you can and kill all other running applications). Sometimes you will need to turn off the soundtrack to help

boost the speed, or reduce the resolution and number of colours.

I play Quake, Myth, Diablo (that is Quake **1**, Myth **1**, and Diablo **1**, of course) with absolutely no problem (other than my lack of talent). If the game will run on your processor and memory configuration (according to the box) then it should be fine. The only other issue is that older Mac games are not the easiest thing to find, except for Diablo, which you can still buy on places like Amazon and is well worth the small amount of cash. Go on, kill some demons!

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Q: Can I upgrade the Video RAM?

The answer to this question depends on what you mean. If you are talking about upgrading the existing internal graphics in order to boost screen and gaming performance, for example, then unfortunately the answer is a very solid no (the graphic chip is soldered onto the motherboard). In short, you are stuck with the video performance that you have got. Adding a G3 processor will improve the video performance as a side effect.

If, however, you are wanting to add video-out capability (meaning the ability to connect your PB1400 to an external monitor), then the answer is a more positive "yes". Two upgrade cards were created to add this functionality. You can buy the Apple 8-bit or Newer Technology 16-bit Color Video-out Upgrade Kit. An internal slot could accommodate video-out or Ethernet upgrade cards, so unfortunately you cannot have both ethernet and video out through the internal slot, but at least ethernet can be added with a PC Card if you decide you need that too.

I have to be honest here and state that I don't know much about either the Apple or Newer cards. They are about as rare as hens' teeth, and I don't know whether they interfere with the RAM slots, possibly preventing two stacked chips being installed at once. In short, they are a mystery to me, although they do turn up on eBay from time to time.

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Q: How do I install RAM?

This is fortunately a pretty simple procedure, as long as you are not too concerned about removing the keyboard and getting into the internals of your PowerBook.

Follow my instructions above on how to open the PowerBook and then locate the RAM slot on the top right of the motherboard. It is an off-white (it is beige, but us Apple people don't like to use that word too often) plastic slot lying vertically. The first memory card (since you can install two) should be placed in gently so that the card slips in under a tiny hidden shelf of plastic that lies against the side of the PowerBook. You may not be able to see this shelf, but the card should not slope up towards you, but instead be pretty flat to the motherboard. The second RAM card slips into the expansion slot on the first card and should rest above the shelf on the side of the PowerBook. As a general tip, take care to unplug everything and remove the battery before sticking your paws inside this or any machine.

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Q: How do I install a new Hard Disk and what sort of Hard Disk does the PB1400 support?

Regardless of which model of PB1400 you have, by todays standards the hard

disk that it shipped with is pretty small. The good news is that notebook hard disks are no longer as expensive as they once were, and adding a few gigabytes of storage need not break the bank.

Installing a hard disk is also relatively straight forward thanks to the ease with which you can gain access to the innards of the PB1400. Two things to be careful of though: First is to check that the Apple Drive Setup software supports the make of drive that you are interested in (IBM etc. are supported). There is no real way to make sure of this, but I think that the vast majority of HDs should work fine. Second is to make sure that the drive will fit into the enclosure. You need to get a drive 12.5mm or smaller, and of course it has to be a laptop drive (meaning 2.5 inch) with an IDE interface.

Some companies sell drives which are guaranteed to work with the PB1400 (www.powerbook1.com) and come with the required brackets. However, they charge a small premium for these drives and if money is tight then you will be fine picking up a drive from elsewhere. There are an additional two words of warning though: First, most modern drives have the mounting holes in different areas from the PB1400 and thus the drives will not be able to easily screw in. If you are technically proficient then you can easily seal the drive yourself (or create new mounting holes on the PB1400 hard drive cage), but if not then you may want to just pay the extra for the drives which come with the brackets for the PB1400.

Another thing to be aware of is that any drive larger than 4.3 GB will not work reliably in SCSI/IDE disk mode. If you do not use SCSI disk mode then this is not an issue. If you do, stick to a smaller drive, or perhaps try partitioning into smaller chunks.

Installing the drive itself is not too much of a nightmare as far as computer work goes. It is wise to use an antistatic wrist strap (I used to use this all the time, but lately I have become lazy and I guarantee you that I will be punished eventually!). Many people have mentioned that modern hard drives have their bracket mounting screws in a different location from the drives that the PB1400 originally used. This is because drive manufacturers moved the screws as part of their work to increase the capacity of drives. The problem with this is that the newer drives can no longer be easily attached to the old PB1400 hard drive bracket.

I should note here though that my drive bracket actually contained two sets of holes on the bottom - one in the location of the old drive screw holes and one in the location of the new style drive holes. Several other owners have confirmed the same. I can only guess that some older PB1400 models came with drive brackets which do not have the newer style holes in the bottom. If you are about to install a new drive you should check whether your bracket has holes in the correct place. This is easy to do - just remove the two holding screws and lift the drive up a little to take a quick peek. If you only have the old holes in your bracket than you may want to either drill your own or just buy your drive from a place that can supply you with a bracket at the same time.

When you are ready to proceed, all you will need is a small phillips screwdriver. Just unplug the power cord, pull the battery out of the machine. Next lift up the keyboard (be sure to back everything up to another drive, obviously). Ground yourself to the frame inside, or ideally have a ground strap on attached to the frame. The hard drive sits to the bottom left of the keyboard area. If you look at the right hand side of the drive you will see that there are two small screws which hold the drive bracket to the computer casing. You need to remove these two screws. Next pull up the old drive by gently picking up the right hand side

and swinging it up and towards the left hand side of the powerbook. You have to be gentle here, because the hard disk cable is attached to the logic board and you don't want it to come loose (if it does, you have to take the whole thing apart to reattach it).

The drive bracket is attached to the left side by a small lip of metal. This should pop out if you pull hard enough. Just take care with the cable all the time that you are doing this. Next you want to remove the HD screws that actualy hold the hard disk to the bracket. These are on the bottom of the bracket. Then gently pull the connector from the end of the HD (It is a plastic connector which will disconnect if you give it a tug - but do not bend any of the pins if you can avoid it).

Remove the old drive and keep somewhere safe incase the new drive ever dies. Now feed this connector and cable through the bracket into the new drive, and attach the new drive with the original screws. In my case I could not get the cable to unwind at all, so rather than forcing it (and trust me, I tried pulling at it for long enough) I decided to skip the feeding of the plastic connector and cable into the bracket and instead just attached my new drive to the bracket and then went about the connection of the drive pins to the connector. However, if you can get the cable to feed into the bracket then you really will have an easier time of this.

Carefully tuck the drive cable back down as it was before and reseat the drive in it's little space and put the screws and keyboard back in place. There you have it. You now want to restart from a CD containing your drive setup software. If you are going to format your drive then you are probably best doing a low level format and zeroing all data. This can take a long time to complete, but it helps ensure a well prepared and error free drive. All that is left is for you to install your OS and applications. Thanks to Cotty for help with the above. Using his advice I recently undertook this operation myself.

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Q: Where can I buy parts for my PB1400?

If you are willing to try and fix your own PB1400, then you may be best just buying another PB1400 (even a broken one) on eBay. They are cheap, and reasonably plentiful. This is often the best way to get hold of a single component, such as a replacement trackpad. Other companies such as PowerBookGuy will sell you drive doors for your CD player, speaker grills and keyboards, but you are almost always cheaper going via eBay.

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Q: Why does my screen look lighter at the sides/top/bottom?

This is caused by the joining of the screen to the casing. Basically the casing grips the screen and causes it to become tight and slightly convex. What you see as the result of this is some lighter patches. Also, in some serious circumstances over enthusiastic handling of the casing can damage the screen. If you or someone else has pressed too firmly on the screen or the casing around the screen you may see some damage. This is generally visibly by extra light coming through and less definition on colors on the affected area.

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Q: Are the G3 upgrade cards still available?

The PB1400 was one of the very few PowerBooks that Apple made with a CPU that was not soldered on to the motherboard. This allows the CPU to be upgraded with third party cards. Several companies saw the opportunity and began to market G3 cards for this machine. There was, for a long time, only two companies involved in producing cards: Newer Technology and Vimage (a child of Interware of Japan). Between them they made a whole host of different cards.

Newer came out with a 233MHz card with 512k of backside cache and also a very popular 250MHz card with a full megabyte of cache. They also produced an earlier 216MHz card that was discontinued when the 233 card was released. Vimage managed only to produce a 233MHz card in volume before exiting the market. This card was on a par with the Newer 233 card and also came with 512k of cache. Vimage also produced a 266MHz card, but this is as rare as hen's teeth as Vimage went out of business before selling many of these cards.

All of the above cards went out of production long before the demand had dried up and the result was an short period of frenzied activity in the secondary market. On eBay and the likes people would bid up to and beyond $600 for a second hand card. For a long time it looked like all PB1400 owners who had not been fortunate enough to buy the cards when they were first available were going to just have to accept their lowly 603e chip forever. Then at MacWorld in January of 2000, Sonnet made a surprise announcement that they were going to enter the market with a 333MHz copper G3 chip with 512k of cache.

Sonnet followed this up later by announcing a similar card but with a full megabyte of cache. The resale market collapsed and many owners breathed a massive sigh of relief. Also of interest is that Interware (parent of Vimage) released their own 333MHz G3 card at the same time as Sonnet, although this card was only ever available in Japan.

At MacWorld NewYork in July 2000, Sonnet announced a third addition to their PB1400 upgrade line. They added a G3 400MHz card with a full 1MB of backside cache running at 200MHz. More recently, Sonnet stopped selling the 333 and 400MHz cards, and introduced a new 466MHz G3 card. This card is still being produced and sold, and is available from a whole host of retailers online. They are marketed under the Crescendo name.

The cache on all cards runs at half the speed of the processor and really helps with a machine like the PB1400 because it reduces the number of accesses the CPU requests to the slow system memory (memory runs at 33MHz across the system bus on the PB1400 while the cache can deliver data at up to 200MHz on the 400MHz card).

The Crescendo cards also use copper G3 processors from IBM. These cards reduce power and are thus kind on battery life. The 333MHz cards can increase battery life by 10-20% (this is what Sonnet "claims", reality may translate to a more realistic situation such as battery life that is unaffected by the upgrade rather than improved. User reports of battery life vary) while the 466MHz card will keep battery life pretty much as it was before. This is no mean feat when you consider that the incredibly hot Newer and Vimage upgrades basically toasted battery life and turned the PB1400 into a desktop (or requiring you to pack several batteries).

Some users have reported some software instability with the Sonnet cards. This only occurs under certain programs and certain uses and most users have reported no problems. However, Sonnet offers a full 30 day money back guarantee, so if you find that some third party extension or program is conflicting with your upgrade Sonnet will accept the card back. This is as good as you can hope for it is impossible to guarantee flawless performance with all of

the thousands of third party software programs on the market.

- Sonnet Crescendo 466MHz G3 Upgrade Card

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Q: What sort of upgrades and accessories are available?

See the answer to the question above for information on the G3 card upgrades which were released for the PB1400. Most owners absolutely love them to death! Any G3 card at all will massively improve the performance of your PowerBook. The early ones did kill the battery time however and also marginally increased the heat of the 'Book. The Sonnet cards were produced with copper chips which require less energy to run and thus actually improved the battery life of the PB1400. You can expect to see an increase of between 4 and 9+ times over the original speed of your PB1400, depending upon the card you install.

Installing the cards was meant to be a simple operation, made even easier by the beauty of the PB1400's easy access to the internals. There were also very few conflicts reported by users of the various G3 cards. All in all they are an excellent choice of upgrade if you cannot afford a brand new machine and want to extend the power of your existing PB1400.

There is a whole host of information on these cards on the web. You can find reviews at www.macworld.com, benchmarks at www.macspeedzone.com and www.ivsoftware.com/1400.html (NUpowr 250 card), user comments on comp.sys.mac.portables and a whole host of other information by searching on the various excellent Macintosh websites.

Perhaps it is worth noting here that while these cards will turbo charge your machine, they will not help break the bottlenecks caused by a lack of memory, a slow hard drive, the rather poor Video RAM, or the 33MHz system bus. They do however add a rather large jolt of adrenaline.

Also available second hand is the Newer Technology 603e card which offered 183 MHz and was better than the CPU that the PB1400's came with, but not by much (people claimed about 20% faster than the 133 card, but when you consider that the 233 G3 card is commonly accepted as being between 4 and 6 times faster than the 133 PB1400 the 20% increase just seems, well, inadequate). All are installed in the processor slot, replacing the original processor card.

You can also add a video out card. Both Apple and Newer released a version - The Apple one is 8-bit, whereas the Newer card was 16-bit with the concomitant increase in quality and number of colours supported onscreen. These cards allow you to send your output to an external monitor. This is a useful addition to your machine if you want to do work on a larger display. One cautionary note is that the Newer card overlaps the top RAM slot of the user RAM slots and thus removes the ability to use two RAM cards stacked together. If you want to use both the Newer video out card and also reach your maximum RAM allowance you will have to purchase the single 48MB RAM card that Newer released (other companies may have released single 48MB cards too). This is a non stacked card that leaves the top slot free for the overlapping video card. If you buy the Apple card then you can still stack two RAM cards without any problems.

There was also an internal Ethernet card produced for the PB1400. These are no longer for sale new, but they are normally not too hard to track down at auction sites or through the normal sources for discontinued Apple hardware. The internal card goes in the same slot as the optional video card, so you cannot have both at once. Both Newer and Farallon made these cards. Michael Jones

emailed me to report that he had sourced a Newer card which for his PB1400 and that it works . Thanks for the info Michae!

Remember that you can also add ethernet via the PCMCIA slots. These are still available new, and all 16-bit (meaning NOT CARDBUS and thus only 10 Tbase) ethernet PC cards that work with a Mac laptop will work with the PB1400 (not all ethernet cards offer Mac support though, so make sure you get one that states it has Mac support). The main benefit of the internal card is quite simply that everything is "there" whenever you pull your 1400 out of the bag.

Another very popular upgrade is a larger hard disk. Please see the specific question for more information.

You can also add RAM, and VST released an internal modular ZIP drive for the CD/Floppy bay. Other than this you are really dependent upon PCMCIA card expansions (such as modems, PC Card hard drives and external drives, etc.) and external peripherals. With SCSI on board you have access to a lot of external devices. You need to be careful that they support MacOS, but many do. Some printers also allow you to connect to the Mac serial connection. Apple also released some proprietary devices for their ADB (Apple Device Bus) such as printers.

As an aside: No PB1400 can be upgraded to cardbus, and you cannot add USB functionality to it. That is a basic limitation that you are going to have to learn to live with

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Q: Eek, I spilled water on the keyboard and now it doesn't work. What can I do?

This depends upon how bad the spill was. If no keys are working but all other functions seem fine (the computer starts and the trackpad etc. are working) then you should be able to just buy a replacement keyboard (check with an Apple specialist retailer such as www.powerbook1.com or take a visit to eBay).

If you are technically savvy then you can always try to fix the keyboard yourself. Unfortunately the bottom of the keyboard is soldered on to a metal tray (but this is not soldered onto the body of the PowerBook), so if you want to gain access to the internals of the keyboard then you have to basically rip the thing off. Now, this sounds bad, and it is, but I have done it before and managed to salvage a keyboard. A less severe, and with retrospect a wiser method is to remove all of the keys which are not working (you can just prise them off gently with your fingers or a flat bladed implement), then clean the key contacts underneath with a cotton stick. You really need to clean the connector beneath the rubber sheet, but you should be able to reach that with the cotton stick. If you need to you can use a mild cleaning alcohol. If this does not fix anything then you really need to replace the keyboard. On the bright side, you can buy a new replacement for about not a lot of cash nowadays.

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Q: My screen died/cracked - can I get it repaired?

Yes, several specialised Apple repair shops will offer to replace a broken screen on a PB1400. However they will charge an astounding amount of cash (more than any sane person should pay, and more than a second hand PB1400 with a working screen will cost you), and you can probably do the repair yourself if you have the courage. Apple produced a take-apart guide for the PB1400, and while

removing (and replacing) the screen is not trivial, I have managed it without major incident. Your best bet is to either fix your screen (by cannibalising another PB1400 that you acquire), or buy another PB1400 on eBay and then just remove your hard disk and insert it into the new PB1400, and hey-presto, you basically have a new machine with your old data. Just be sure to move RAM, and other expansion cards across too.

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Q: What is the average battery life for the PB1400?

Not much is the sad answer. The batteries are NiMH, which is shorthand for "Not incredibly Many Hours". You will get about 2 hours or slightly more on a new battery (as long as you use a small amount of power conservation. You can get 20 minutes or less on an old battery. Initial tests of the new Sonnet G3 card show that it may increase battery life close to 2.5 hours on a new battery. Also, some of the third party batteries produced for the PB1400 are a little more powerful than the Apple one and I would expect that you could gain about 20 or more minutes with one of these.

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Q: How can I improve the battery life on my PB1400?

Battery life on the PB1400 was always less than one would have liked. Now, years and years after they were first introduced, you have the added issue of slowly drained NiMH batteries that barely hold a charge at all. There are, however, a few things you can do that may offer substantially increased battery life.

The first step is to recondition your batteries using the Apple utility that comes on the original CD. This should eke out a few more minutes of life for you. This is not a holy grail, however. A dead battery is a dead battery, regardless of how many times you attempt to recondition it.

On a positive note, you can still easily find replacement batteries for the PB1400. Several third parties created and marketed batteries for this machine, some offering increased capacity over the original Apple specification. For information have a look at: http://www.pbsource.com/battery/1400.shtml (note: this site is virtually dead, so this link may die in the not-too-distant future).

Two great way of extending battery life do exist though. The first one involves setting up a RAM disk. The second, which I will fully explore in the PDF version of this FAQ, discusses the use of a Compact Flash card install for a silent and longer-life PB1400.

Running off of a RAM disk is not a trivial thing to set up, but it can result in significantly extended battery life. There is a full article on this by Charles Moore called "Working with RAM disks" that fully details the process required to set this up. There are a few very positive effects from running from a RAM disk. One is that you tend to see a noticeable improvement in battery longevity. Secondly, you should find your system to be pretty close to silent (especially if you hide the hard disk as the article explains). Lastly, the use of a RAM disk will generally make your system feel remarkably responsive. Boot times will be faster, and everything will just feel snappier. This comes from the fact that you are running a cut-down OS, and also that your RAM is significantly faster than your hard disk, and with a RAM disk you are running everything from RAM. A short article at MacSpeedZone benchmarks the speedup they witnessed.

The down sides to running off of a RAM disk are pretty clear. The first is that it uses up a large chunk of your RAM, and on the PB1400, RAM is a very precious commodity. However, if you are happy to use a cut down system with a few core applications, then perhaps that won't matter to you. Lastly, you need to be careful to back up any work that you are doing on a RAM disk as RAM is volatile (meaning the contents of it are lost when the power goes down). To quote Charles Moore's article:

"Note well that the contents of a RAM disk are dependent on the computer remaining powered up. If you have checked the Save On Shutdown box in the Memory Control Panel, your RAM disk contents will be automatically save to the hard drive at shut down, and PowerBooks have additional insurance against unexpected power failures, thanks to their battery. However, a system crash or lock up that requires a force restart can destroy unsaved data. Save two disk often."

Another simple reader-supplied tip (backed up by an article in MacAddict no. 6) is that if you are travelling with the CD drive in the modular bay always make sure that you have a CD already inserted into the drive to prevent the machine from frequently polling the drive unit to see if it is empty or not. This little tip can save you a few vital minutes of battery life when on the road.

As mentioned, a similar technique to the RAM disk exists, but using compact flash cards for the system install and book. This will be explored in detail in the PDF version.

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Q: Can I use batteries from other PowerBooks in this machine?

No. Only PB1400 batteries will fit in the PB1400. However, you can still buy new batteries quite easily from Apple resellers. There are also plenty of third party batteries available (often with extra capacity than the original Apple batteries that shipped with the PB1400), and these are not particularly difficult to find online with a little searching.

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Q: Can I run XYZ on my PowerBook 1400?

If it says it will run on a PowerPC and your processor matches or exceeds the minimum required speed that it states on the box and you have sufficient RAM and hard disk space, then yes it will probably work. Most things work. Photoshop, Illustrator, Office, SoftWindows, Quake, Doom, etc. There are no anomalies with the PB1400 that stop things running on it that would otherwise run on similarly spec'ed desktops

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Q: Can I use a CD/RW drive with my PB1400?

If you have an external SCSI CD/RW drive, then, as long as it comes with Mac drivers and you have the relevant cables to attach it (see the questions on SCSI), it should work. Remember, most of these drives come with mastering software that are required to utilise the drive. You need to ensure that the drive you are about to invest in comes with a Mac version of that software. Also, the bus speed on the PB1400 is pretty poor, so do not expect to write at anything other than one times speed (some have managed to burn at two times speed).

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Q: Can I install Linux on my PB1400?

Originally I thought that the simple answer to this question was NO, but it turned out that I was wrong! Although the PB1400 cannot be used with LinuxPPC, SuSe or YellowDog or any of the other RedHat flavours of Linux, you can install MkLinux. The biggest problem is minimal peripheral support (no PCMCIA cards, for example), and that MkLinux seems to have somewhat died.

While I would normally recommend someone who is technically savvy and wants a bit of an adventure to go out and try Linux, in the case of the PB1400 it makes very little sense as the machine is so poorly supported by Linux, and Mac OS runs so well on it. It just feels like a rather futile exercise to spend hours and hours getting a four year old install of Linux working unless you really need access to a unix terminal or similar (in which case - go investigate mklinux).

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Q: Is Mac OS X supported on the PB1400, and if not will it work?

It is not supported as this is technically a NuBus computer and no NuBus machine is supported for OSX. Worse than that, not only is it not officially supported, but it will never be possible to run OSX on a PB1400 unless something major changes rather unexpectedly in the future.

Even if in theory you could install Mac OS X (which you can't), the 64MB RAM ceiling of the PB1400 would make it all but unusable (256MB really is the minimum useable amount of memory for Mac OS X in my humble opinion).

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Q: How do I make the system boot from CD?

One of the first things PB1400 owners will notice when trying to install a new Operating System is that the machine does not support the standard Apple keyboard command to boot from CD. On other systems you could simply hold down the "C" key at boot up to make the computer choose the CD as the boot disk. With the PB1400 however, you can achieve the same result by holding down the command (The key with the small Apple logo on it), option, shift and delete keys until the "Happy Mac" icon appears on the screen. Do not continue to hold the keys down for too long after this unless you want to prevent the hard disk from mounting after the CD (you normally only want to stop the hard disk from mounting when you want to run Disk First Aid from your CD to try and recover a damaged disk).

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Q: What is PRAM (Parameter RAM), where does the battery live and how can I change it?

Whenever something goes wrong with your PowerBook, you will often find people tell you to try resetting your PRAM. PRAM is shorthand for "Parameter RAM", meaning the small section of memory where all of the user and system preferences are stored. This memory has to be maintained when the system is switched off, so it is powered by a small battery. This makes sure that between uses your system maintains all of the useful information that it needs to keep it set up to your exact specifications (virtual memory status, startup disk, amount of memory installed, date and time etc.)

PRAM can become corrupt, or perhaps jumbled is a better description. This can

cause problems - such as not allowing new memory or peripherals to be recognised. You can normally fix this by wiping the PRAM memory and thus starting with a clean slate. The result is that you have to reset all of your user preferences, the date and time, and so on. To reset PRAM you can press the small button that nestles between the serial and ADB port at the back of the PB1400. Hold this in for a few seconds until you hear the music sound.

An alternative method for clearing the PRAM is to hold down the Control-Option-P-R key combination at startup. You need to hold them until you hear a second startup chime.

Sometimes, after a few years of extensive use, your PRAM battery may fade. This causes your settings to be lost each time you switch off. It can also cause problems in starting your system, and other random occurrences. When this occurs you need to replace the battery that powers your PRAM. This is not a simple job though. Even though the battery can be bought at Radio Shack, getting to it is not trivial. It lives under the trackpad/arm-rest area and is thus not easily accessible like the RAM slots and hard disk are. If you are not the sort of person who likes ripping apart computers then I would recommend contacting your local Mac technician for help (or, due to the cost, just putting up with a machine with memory loss).

If you do want to do it yourself then be prepared to take apart the entire lower half of the machine. I believe the PRAM battery is the small black disk you can see at the top right of the battery enclosure when you slip the main battery out. A new battery will cost you about $10 at Radio Shack (take the old one along so that they can hook you up with the right type), or about $25 from an Apple retailer (don't know why they charge so much, probably they sell some official Apple replacement version whereas Radio Shack are just hooking you up with some generic battery. Either will perform the task though).

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> **Q: Can you swap out a "cs" screen for a "c" screen or replace a broken screen?**

Someone has reported that you can indeed swap out the screen on a "cs" model for the screen on a "c" model. I have never tried this, but it seems reasonable. The only problem is getting a replacement screen. If you are just trying to salvage two broken PB1400's to make one good one then the screens should be interchangeable.

Some Mac outfits will be able to replace a broken or damaged screen on your PB1400, but they tend to charge an extortionate amount. In fact, they often charge more that the price of picking up an entire second hand machine. I personally would probably use a broken screen as an excuse to buy a new machine, selling the PB1400 for parts, but if you absolutely have to fix it then I would recommend picking up a broken second hand PB1400 (as long as the screen is not the broken part) and using the screen from this.

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> **Q: There have been reports on faulty power adapters on some PB1400 models and damage to batteries. What is this about?**

There is some great information on the PBSource.com website (now virtually dead) about this problem dating back to August 1999. In brief the problem is concerned with several versions of the power adapter (Models no: M4895/M4896, Rev: 3A/3A are mentioned in the article) having decreased

voltage output. This in turn was damaging the NiMH batteries and resulting in a non-chargeable battery. This problem is when a fault in the power adapter basically kills the battery completely and may even prevent boot up from AC power on some occassions.

If you are experiencing similar problems then the suggested solutions seem to be: buy a new adapter, run the Apple battery recondition utility, reset PRAM and if this doesn't work then get a new battery. One thing is be careful not to mistake the PB1400's short battery life with this problem - they are distinct. Even a perfectly good PB1400 will only last an hour or two on battery power at the best of times, and NiMH batteries die slowly over time, so by now many PB1400s will quite simply be dead.

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Q: Can I improve screen visibility when working outdoors?

As many PB1400 owners are aware, the dual scan screen is not exactly good for outdoor use. In fact, it tends to become almost impossible to see what one is working on due to the effect of the glare on the screen. One reader has recommended a very simple and effective tip for overcoming this problem. If you want to work in sunlight simply change the screen to 4 greys or black and white. Almost all applications are very useable in this format, especially if you are simply word processing or internet browsing. This may make your 'Book look less poser-cool, but it works and for most of us that is all that matters.

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Q: What can I use the infra red port for?

There has been several discussions on this topic on the PowerList and on comp.sys.mac.portables. Users have been trying to get their PB1400 to talk to their new Pismo laptops, or other new gadgets. Some people have even been trying to change their television channels with the infra red port (this may sound crazy, but on more modern IRDA ports it is possible). The answer rather discouragingly is that you cannot do very much with your PB1400 IR port. It only supports AppleTalk and is not IRDA complaint. This means that you cannot connect to the internet via your funky new Nokia or send documents to non-AppleTalk printers. You cannot even play IR networked Quake3 with your Pismo owning friends (yeah, like the PB1400 would even load Quake3!)

What you can do is connect to an AppleTalk network with any other AppleTalk supporting IR port. That includes the PowerBook 3400, Kanga, PowerBook 2400, and some of the earlier Duos. That sadly is about it. If you know of any cool things that you can do with your IR port then please drop me an email as it would be fun to try them out and add them to the FAQ.

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Q: How do I add a modem and ethernet to my PB1400?

There are two ways to add ethernet to your PB1400, and rather conveniently there are also two ways to add a modem to your PB1400. Ethernet can be added using a PCMCIA card or using an internal ethernet card. The PCMCIA card option is now the easier one to choose because companies still sell cards that will work with the PB1400. To get one that works you need to make sure that it is a non-cardbus card (this means that you are stuck with a 10 base ethernet card because 100 base requires a cardbus enabled PCMCIA slot (which unfortunately the PB1400 does not have).

When you finally decide upon which ethernet card to get, make sure that it supports the Macintosh and comes with the necessary enabler software (or that you can at least locate the required software for download online). The internal cards are no longer manufactured (both Newer and Farallon used to produce these cards.) and are thus hard to get a hold of (eBay is your best bet, but they are very rare). The advantage of them is that they are all neatly contained withing the machine, occupying the same spot that the optional Video Out card would occupy. Of course this means that you cannot have both an internal ethernet card and a Video Out card installed at the same time.

The PB1400 is not the fastest machine in the world for surfing the web, but if you can set up a RAM disk for the internet cache and use a nice, fast, low-resource browser like iCab or Mozilla then you can get good performance. There are three key ways to connect to the internet via the PB1400; ethernet via another computer that is attached to the internet, wireless networking via a PC-Card wireless network card, or via a telephone line and PC-Card modem.

In this day and age, wireless networking is almost certainly the way to go, but there are times when a good old 56K modem is all you need (or all you can use). Apple did not see fit to ship the PB1400 with one built in, so you will need to equip yourself with ou can pick up non-cardbus 33K or 56K modem that will work perfectly in your PB1400. These should not be expensive on eBay, and there are lots of PC Card modems that will work in your PB1400. Most will support the MacOS, but as always you should just check first that a specific card does work on your machine before you dish out the cash for it.

Technically, you could also connect via an old serial modem. These are pretty hard to get hold of (and you would need to get an adapter to convert the serial cable to the PB1400 mini-din format of serial port), and I would recommend leaving this option where it belongs - in the garbage pan of history.

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Q: Are the Sonnet G3 cards stable, fast, worth the cash, trendy, cool and will they make me more popular?

This answer section is really my attempt to address the various questions I get about the Sonnet G3 cards. Here goes:

Sonnet first announced that they would be entering the PB1400 upgrade market in January of 2000. They made a lot of people happy with that announcement because the previous two companies with upgrade products for the PB1400 had withdrawn from that particular market in 99 and the cost of G3 upgrades on eBay was fast becoming ridiculous. There were sceptics that assumed that the Sonnet cards would be late, plagued by supply problems, and probably unstable. Well, they were a little late, but no more than we are used to (being Apple fans and all!), and when they did arrive they were widely available and generally very well received.

Sonnet started out by offering two 333MHz Copper G3 models. The cheaper model had 512k half speed cache, the more expensive model had a full 1MB of half speed cache. In July of 2000, Sonnet announced an addition to their line: A 400MHz Copper G3 upgrade card with 1MB of half speed cache. And then again in March of 2002 Sonnet announced that the previous versions of their upgrade cards would be replaced by a single 466MHz G3 offering.

All four Sonnet cards use IBM Copper interconnect G3 processors. This means that they actually runner cooler than the original 603e CPU chips that the PB1400 shipped with. This means that you also get the added bonus of increased

battery life when using these Sonnet G3 cards. Sonnet claimed an increase in battery life of around 15-20%, but actual user feedback seems to suggest that it is slightly less than this - some claiming battery life is unchanged, others that it is marginally improved.

The 466MHz card is expected to run at about the same heat as the original 603e chips and thus Sonnet are not claiming an improvement to battery life with this card. It is still pretty impressive that a CPU card that will increase system performance so massively (The 333MHz cards made the overall system run about four or even more times faster, depending upon how cache efficient the application you are using is) does not kill the battery. If you compare it to the earlier Never G3 cards you can see the difference (they reduced battery life to a handful of minutes and ran hot hot hot!).

All of the Sonnet cards are fast. Computer speed is relative of course and what seems fast today will be considered pedestrian in a few short years. When Sonnet released the 400MHz card the fastest Apple PowerBook ran at 500MHz, so the clock difference was not too bad for a three year old machine. The G3 chip in the Sonnet card is just as good (identical) as the chips that Apple themselves used in their Pismo line. However, a 400MHz G3 PowerBook 1400 will not approach a 400MHz Pismo PowerBook except for those very rare tasks that use only the processor and cache and never have to access the system bus, memory or video component of the system.

As mentioned earlier in the FAQ, the PB1400 is slowed down by its slow system bus (33MHz versus 66MHz on the early iBooks, 100MHz on the PowerBook G3 FireWire and later iBooks), the video memory is slow and small (Nubus technology and only 1MB versus 4 or 8MB on the early iBooks). Any accesses to memory slow the system down due to the relatively slow memory speed and system bus. Add on top of this the fact that the hard drive interface is not as fast as the current PowerBooks, and all of these factors contribute to slow down the machine. However, you WILL see a massive speed improvement if you install a Sonnet G3 upgrade card, significant enough to actually notice it in virtually every task.

There is no way to say exactly how much faster an upgrade will be because there are many different configurations of PB1400 and everyone uses their machine for different tasks, but a reasonable idea is that you average task will probably be about 4 or so times faster than it was previously with the 333MHz version, and perhaps 5 or 6 times faster with the top of the range 466MHz version. That is quite a speed-up, but at a cost (the newest 466MHz G3 card retails for around $300).

Are they stable? Well, there have been a few reports of some third party software titles not working with the Sonnet cards, but these are very few and far between (warcraft I believe was one such title). Most things that worked before the upgrade will work identically after it.

And what about installation? Well, you can either do it yourself (Sonnet includes details on how to do the install with the card) or if you are the nervous or non-techie type then you can pay for a certified Apple technician to do it for you (this will be expensive, and if you are a non-technie user you should really sell your PB1400 and buy a newer laptop).

The card is a tight fit and requires quite a lot of pressure to seat, but if you have messed around with installing RAM or a hard drive before then you should be able to do the install without too much hassle.

Are the cards worth the money? Well, they are certainly a lot cheaper than the

cards were selling for on eBay before Sonnet announced that they were entering the market. The initial 333MHz/1MB card was initially introduced for $500. This then fell to $450, with the entry level 333/512k card retailing at $400. Slowly, over the past year, these prices dropped. With the release of the 466MHz version, Sonnet held the price at $300, and that is where it remains to this day.

The only card readily available new is the 466MHz version, and that tends to sell for close to its full price (perhaps $275 if you shop around). The older models often appear on eBay, but they tend to sell for a price that makes me think that you might as well just buy a brand new card if you are in the market for one.

The next question is whether it is worth the cost. Charles Moore tackled this subject well back in March 2002 in an article entitled "Does a 466 MHz PowerBook 1400 Make Sense?". I can heartily recommend reading this article before taking the plunge, as it quite clearly lays out the questions you should be asking yourself.

But what is my opinion? Well, I have to admit that I admire Sonnet for releasing the 466MHz card, and as a geek I cannot help but get excited about something that claims it will boost the speed of my laptop by 11 times. The reality is that purchasing one of these cards is probably not a logical thing to do (since you could go out and buy another PowerBook without the PB1400's limitations for the cost + price you would get for your second hand PB1400). Howver, logic does not need to always get in the way of having some fun, and I love my PB1400. Anything that will extend the useful life of the PB1400 is to be applauded.

However, it is important to remember that this is not a magic upgrade to the PB1400. Your machine still will not allow USB devices or FireWire to be added, it is still limited to 64MB of RAM, it is still not going to run OS X, and it still has a slow system bus and slow video sub-system. However, as long as you do not mind the above limitations then I personally think the Sonnet cards are very reasonably priced for the performance boost they offer. What it really comes down to is a question of whether you want to keep your PB1400 for another 3 years or not :)

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Q: Can the PowerBook 1400 use wireless/airport networking?

The answer to this question has been mentioned in brief in various other parts of the FAQ, most specifically in the PCMCIA section. The answer, of course, is YES! It is pretty amazing (and pretty geeky) that you can get a 7 year old laptop set up to wireless connect to high-speed broadband, and, while Netscape is not exactly going to roar (web page drawing can be quite slow), it is still perfectly useable for light web browsing and other types of wireless networking.

So what does it support and how do you do it? Well, rather than explain this myself in depth, I will instead point you towards an absolutely amazing in-depth article on PenMachine.com that will walk you through exactly what you need, and how to set up your system.

- Wirelessly Networking a PowerBook 1400 or Other Old Apple Laptop: Step By Step

I have a silver orinoco wireless network card in my PB1400, set up to use 64bit wireless encryption, and amazingly getting much stronger signal reception than the Apple airport card built in to my Titanium PowerBook. Of course, it is slow to surf, but perfectly adequate for my uses (which tends to mean using online dictionaries while writing, checking up on the news, surfing the odd forum, etc.)

So not only is it do-able, but it is cheap. My wireless card cost under Â£20 on eBay, and that is not a lot of money in my opinion. The only negative, other than speed, is that the wireless card extrudes from the PC-Card slot. Not a huge bother, really.

Lastly, although you can connect to an airport network, you cannot use Apple's airport wireless networking cards. These require an internal cardbus slot, and the PowerBook 1400 uses an external PCMCIA 16 bit slot. You shouldn't find it too difficult to find a card that does work on eBay however. Good luck!

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