

Nifty Idea Fund Project

IBook G3 Clamshell Restoration + Battery Rebuild



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Guides/Sources Used

- <https://blog.lazd.net/rebuilding-an-ibook-g3-clamshell-battery.html>
- <https://www.youtube.com/watch?v=zGkUa2InwdE>

Materials Needed

- [Nickel Strips](#) - \$10
- [8x 18650 3500mah 8A Batteries](#) - \$66
- [Spot Welder](#) - \$51
- [2x 512MB PC1333 SODIMM Memory](#) - \$50
- [M.2 SATA SSD to IDE](#) - \$14
- 64GB [SATA M.2 SSD](#) - \$32
- CDs
- CD Burner

Overview:

I have always had an interest in retro technology, I own every single retro Nintendo console and I own the first iPhone. So when my friend found these Y2K styled IBook G3s covered in strange liquid and nasty dirt in his grandfather's shed I jumped at the opportunity to restore them. I dove into it, completely restored the blue one a year ago, but the orange one needed more work. The storage was dead, the motherboard was about to die (little did I know), the battery didn't hold a second of charge. So I knew to fix this IBook up would take not just a lot of time, but a good deal of money which is why I applied for the Nifty Idea Fund to achieve this.

IDE to M.2 SSD

I started first by installing my new storage as that would lay the framework for all future

upgrades; faster storage means I can install MacO

much slower and challenging without also, the ha

of failure for this 90s IDE drives. So I assembled

(these computers wont work with anything over) i

which is what many computers of the time used. U

designed this computer were not very keen on others opening or upgrading their hardware.

Therefore, in order to simply change the storage you have to take the entire IBook apart, literally

the entire thing. So I took the entire computer down to just the logic and the shell (this picture is

the blue IBook which I replaced the drive with a while ago). After painstakingly putting

everything back together, I slid in my whopping 512MB of ram stick into the board and powered

it on only to be met with 3 beeps and a black screen. Using my troubleshooting skills (google) I

determined this was the result of bad memory banks, so I unplugged my 512MB stick of ram and

hoped it was just a bad SODIMM. Because everything always seems to work against me, it was

not the SODIMM, it was the built in 64MB of memory soldered directly onto the motherboard.

Basically, this board was usable. As much as I dreaded it, I knew I had to take my spare IBook

without a screen (previously used for a display swap with a broken display) and take both IBooks

apart (again) and swap the motherboards. After testing the board to make sure that it worked, I

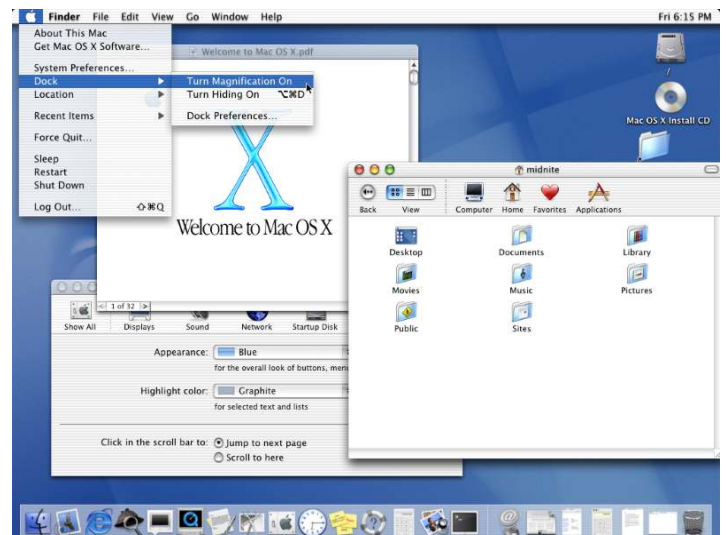
again took apart the laptop to access and replace the motherboard. After putting it all back

together I was greeted by the Apple startup chime, now I all I needed was a operating system.



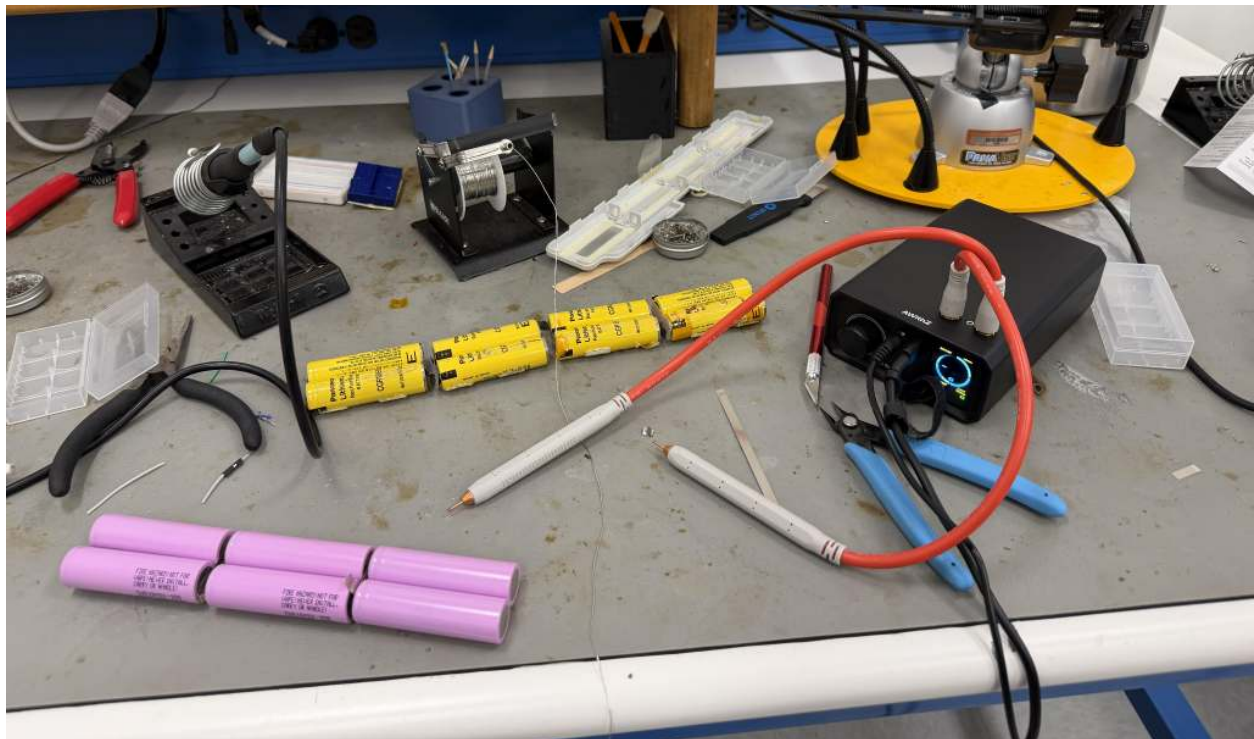
OSX Install

When these IBooks launched in the late 90s they ran MacOS 8.6. Even for a computer from the 90s I knew this would not cut it. On my other IBook (the blue one) I had tried and tried for days on end to get MacOS X to run on this device, it makes it leagues more usable and supports way more software. However, when I tried then I always ran into hurdle after hurdle and burning so many CDs proved to be exhausting. However, this time I was lucky enough to find a super legit not pirated Disc Image File for MacOS 10.1 (ISO). After burning the ISO onto the CD using a USB burner on my laptop I put it in the IBooks CD drive, only to hear ticking and seeing no bootable devices. I quickly realized that the CD drive in my IBook was also dead so again using my spare IBook I swapped out the drives and Booted right into the OSX Installer. I had gotten here before and then install still refused so I was still skeptical of the success but I formatted my new SSD, proceeded with installation and low and behold my 90s IBook was running MacOS Panther from 2003. During this process I used the desktop program IMGBurn to burn my ISO files to my CDs. As good as this program is, it also installed like 5 different adware programs on my laptop. I later realized that for most practical applications I needed to upgrade to MacOS 10.3 which I did.



Battery Rebuild

This was by far the hardest and longest part of this project. I spent multiple days up until 2am spotwelding, soldering, and troubleshooting to breathe new life into this IBook. However to me this was one of the most crucial parts of this project. These Clamshells are not just known for their bright colors and Y2K aesthetic but one of the coolest features about this laptop is the built in handle. Something that today would be considered gimmicky at best. However in the 90s the handle was a symbol of portability and versatility in this era of computing. Which is exactly why the completely dead battery is like a knife in the heart to this laptop as it completely limits it to being used at home and plugged in constantly. My mission was to restore these laptops to what they used to be, not just make them functional, so I knew rebuilding this battery would be an inevitable part of my journey. Unfortunately it is not just as simple as ordering a replacement, there are basically none on the market and the ones that are \$200+ which is about how much these laptops are worth on Ebay. While that is technically in my Nifty Idea Fund budget I wanted to take this opportunity to learn how to spotweld and rebuild these batteries.



Documentation:

I first started by disassembling the dead IBook Battery, this was harder than I expected it to be.

The adhesive was over 20 years old and needed lots of convincing to let go. I used a flathead screwdriver to pry the two halves apart from the side without the BMS attached to it.

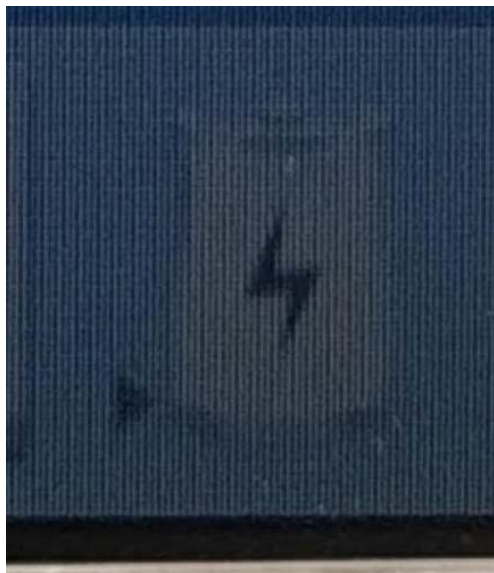
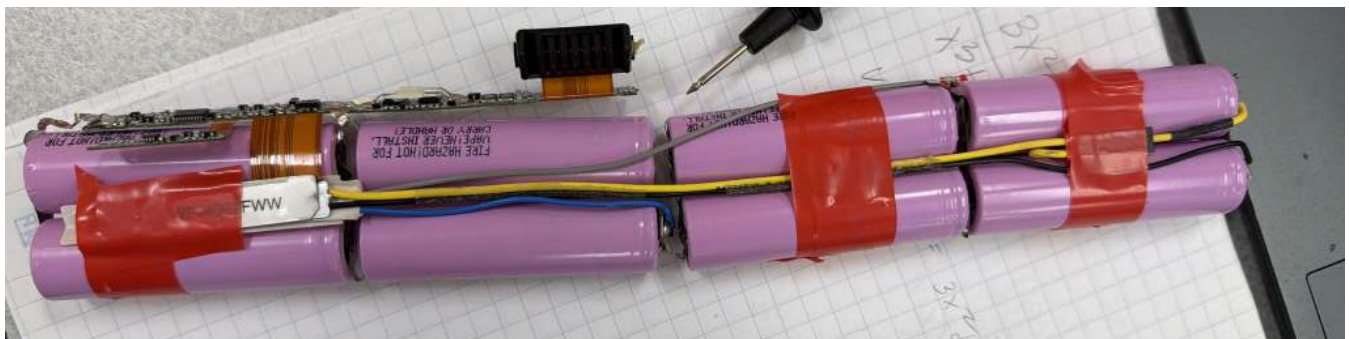
I had to be very careful during this process as if I damaged the battery management board sourcing another one would be a challenge (Battery taken apart below).



Then I removed the dead samsung cells from the enclosure along with the BMS board. Firstly I layed the batteries out in front of me and took a picture of the way they were all connected to the board and oriented. They are together in what is known as a 4S2P which basically means there are 4 groups of batteries in series and each group has 2 18650 cells in parallel. This allows the battery to give a max of 16.8V while also having ample runtime, around 6 to 8 hours.

After laying them all out I got to spotwelding the batteries. One of the hardest parts was lining up all the batteries side by side perfectly as if you tried to spotweld with a gap in between the nickel strips and the battery it usually punches a hole through the nickel and creates a lot of sparks that land on you and burn. Once all the cells were welded together it was time to resolder the BMS board onto the cells which required it, this was also very challenging as the nickel strips had to be shaped perfectly to bend back into shape to solder to the board. Once completed I put the

battery into the computer and while it allowed the computer to hold a charge, it was only for a short while as the battery quickly died and would charge back up. I also noticed the battery was not even being recognized by the OS. However, it did work in the open terminal. I then rechecked all of my welds and solder joints to make sure there was adequate contact, so I reset the PRAM. It wasn't until I used a multimeter to measure the voltage I realized that it simply was not holding a charge. It had worked at first because the cells come at 3.5V, however that was used up by the computer and now they would not charge again.



After consulting several online forums, reddit, discord, vintage Apple forums, I came to the conclusion that the issue was likely in the BMS board. These boards are known to be fragile and sometimes just die. Luckily I had another dead IBook Battery with a BMS board available so I took that one apart only to realize that this one was a different revision and therefore all of my welds would have to be completely redone. At this point my hands were cut up from the nickel strips, I was exhausted and had resoldered and welded so many times I was about ready to give up. I figured I had come so far so I might as well make one attempt to make it work with this BMS board. So I redid all my welds, and soldered the hardest joint of my life to the BMS and anxiously put it in my IBook. Fortunately, the battery symbol was no longer just blank but red with a charging indicator, the battery had worked.



Conclusion:

It is currently 5AM and I was able to get video games on the IBook so I am having a blast. My biggest takeaway from this project is not only to be a stubborn troubleshooter and to try literally anything you can before letting a goal go, but to always have a backup plan. If I had not had an extra motherboard and BMS board this project would not have been possible. I never thought this project would have taken several nights up until 3AM; I am very glad I saw this through until the Battery worked. Even though I had gotten it to show some functionality on my first attempt, I was determined to make it run like it would have nearly 30 years ago.



Thank you to Matt Lamparter and the Nifty Idea Fund for making this possible. Also, big thanks to Nathaniel Saltsgiver for being helping me with this project physically and emotionally.