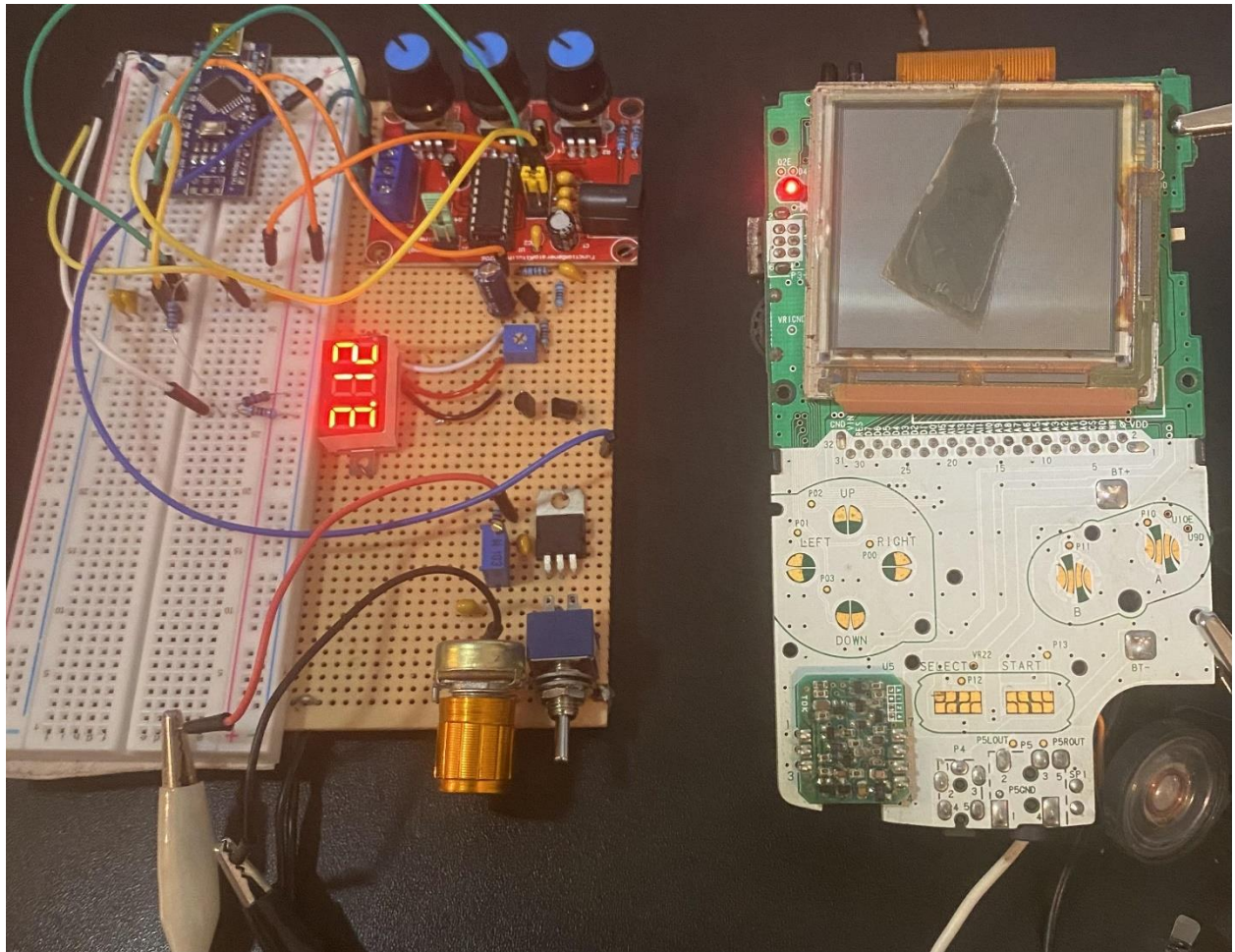


Electronics Refurbishment Portfolio



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Contextual Vocabulary

[1] **IPA** – Isopropyl Alcohol; Commonly used to clean motherboards due to its rate of evaporation and non-conductivity.

[2] **ABS Plastic** – Acrylonitrile Butadiene Styrene plastic: Commonly used thermoplastic.

[3] **Retrobrighting** – The process of using Hydrogen Peroxide and UV light to remove the yellowing of ABS plastic that appears with age. It got its name from the root word “Retro” meaning object or design from the past and “-brighting” from the use of UV to catalyze the process.

Gameboy Advance SP (Zelda Edition)

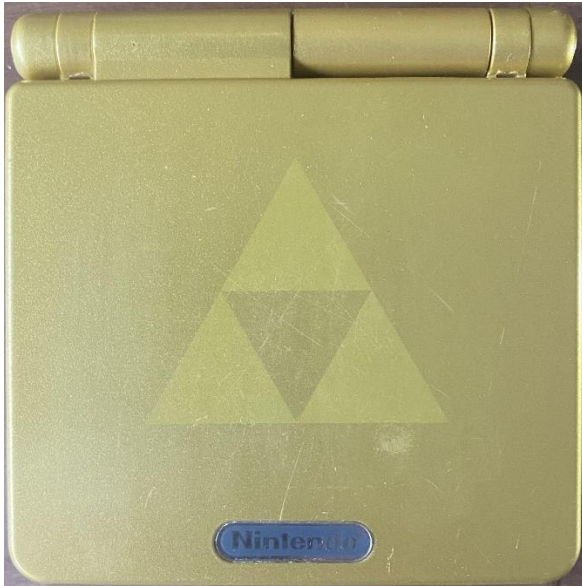


Figure 1.1: Outside Case

Problems:

- Console turns on but shuts off randomly
- Expanded Lithium Ion Battery
- Dirty motherboard board and components
- Corroded Ports

Repairs:

The motherboard was dusty so [IPA \[1\]](#) was used to clean it as well as the ports and components. The power switch was dirty which was causing the console to randomly shut off. Taking out the switch, cleaning it, and resoldering it fixed that issue. The battery was also replaced because the original was slightly bloated. The ports are corroded but it does not seem to be affecting the continuity. The case was also fully cleaned with IPA as well as the inside of the case below the motherboard, including the buttons and speaker.

Comments:

This repair was fairly easy and was listed for sale on eBay the same day I received it. The biggest issue affecting the performance was the dust on the motherboard.

Gameboy Color (Clear Purple)



Figure 2.1: Gameboy color as purchased

Problems:

- Does not Power on
- No polarizer on LCD
- Ribbon Port that connects LCD has bent corroded pins
- Corroded battery terminals
- Dirty motherboard
- Dirty casing
- Speaker does not work

Repairs:

The motherboard was dirty, and the battery terminals were corroded so the first thing that I did was clean them to try and fix the problem with the console not powering on. The casing of the console was dirty and yellowed. Using [IPA \[1\]](#), the dust was cleaned but the yellowing of the plastic will require some more work. Yellowing occurs in [ABS plastics \[2\]](#) when polymer chains degrade from UV radiation and is common with old plastic electronics like our specimen in Figure 2.1. Due to the purple color the yellowing is hard to notice, but it is present.



Figure 2.2: Yellow reversed case comparison

When polymer chains degrade from UV radiation, stabilizing agents in the plastic form free radicals. Hydrogen peroxide (H_2O_2) binds to the free radicals and reverse the yellowing in the plastic. By submerging the plastic casing in hydrogen peroxide and putting UV light under it, the bonding begins and over the next few hours the yellowing is removed. Figure 2.2 shows a clear difference between the yellowed and non-yellowed plastic. For clarification, the front panel on the right is the one that was what the restoration community calls, “[Retrobrighted \[3\]](#)” or “de-yellowed”.

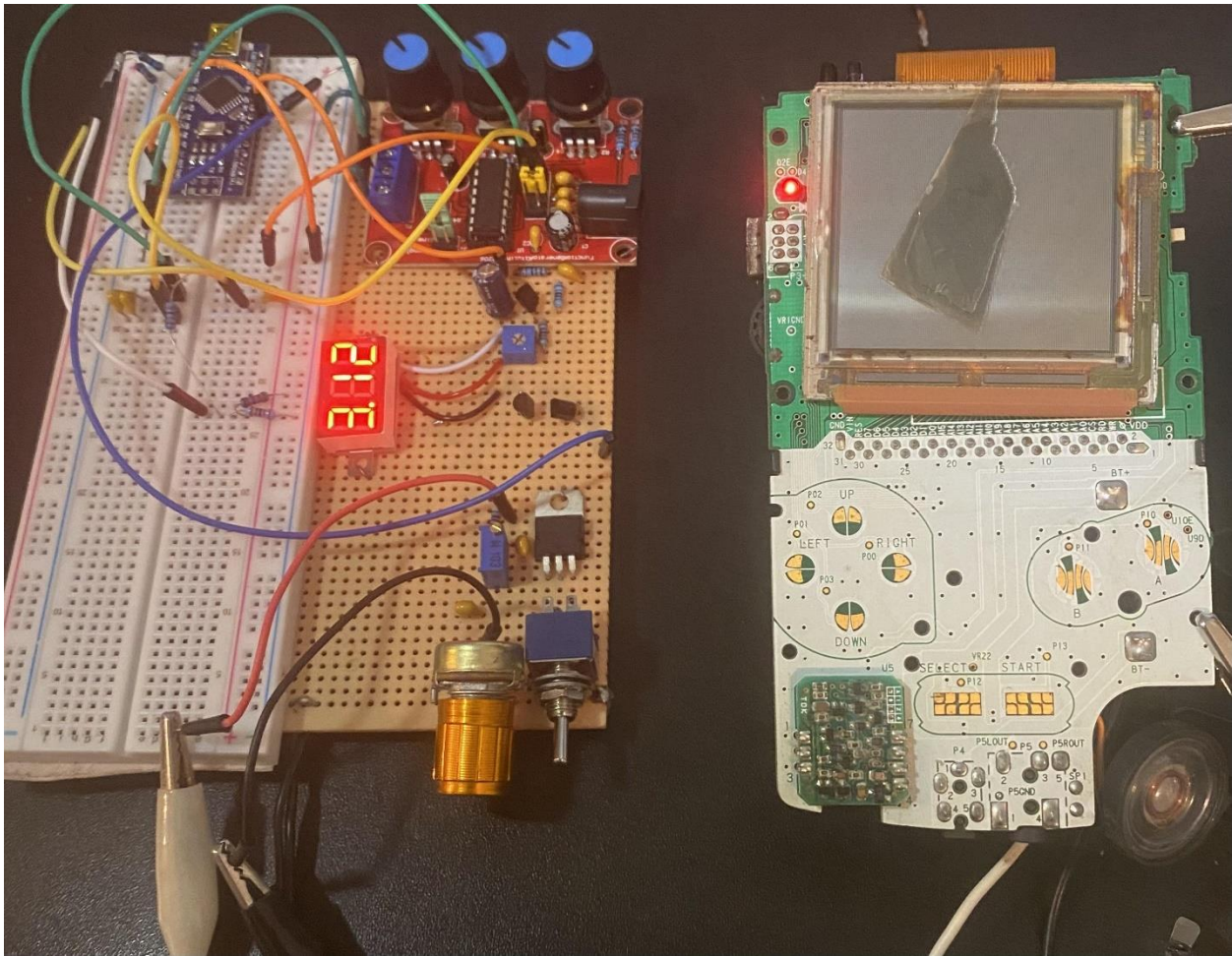


Figure 2.3: Motherboard connected to DC variable power supply

Using a DC variable power supply, I connected the positive and negative terminals to the motherboard of the Gameboy and set the supply to 3 Volts, equivalent to two AA batteries. As you can see in Figure 2.3, the console's LED that signifies that it is getting power is on, meaning that the power problem was the battery terminals were corroded and could not complete the circuit and the power switch was dirty. On the LCD is a piece of scrap polarizing lens that should show some pixels, but it appears that it is not showing anything at all. This is due to the ribbon cable port being corroded and bent. Testing the LCD on another working motherboard shows that the LCD is functioning, so the port is the problem. The port will need to be replaced.

The DC Variable Power Supply that I build can be seen on my website under the Resume->Projects tab: <https://evanfrack.github.io/ejf.github.io/>

Gameboy Color (Clear)



Figure 3.1: Gameboy Color as purchased

Problems:

- LCD Polarizer is burned and falling off
- Does not read games
- Generally dusty and yellowed plastic
- Corroded battery terminals

Repairs:

Similar to the previous Gameboy Color [here](#), I took it apart and cleaned the motherboard and casing using [IPA \[1\]](#). The console already powered on with the corroded terminals but they were cleaned as well to make sure that it does not become a future issue. To fix the issue with reading games the pins were cleaned and continuity of the pins was checked. It appeared that each pin was functioning so there was no problem with the cartridge input port. (Need polarizing film to confirm game being read. The speaker was working on initial start up but has issues after cleaning motherboard. (Check issue).

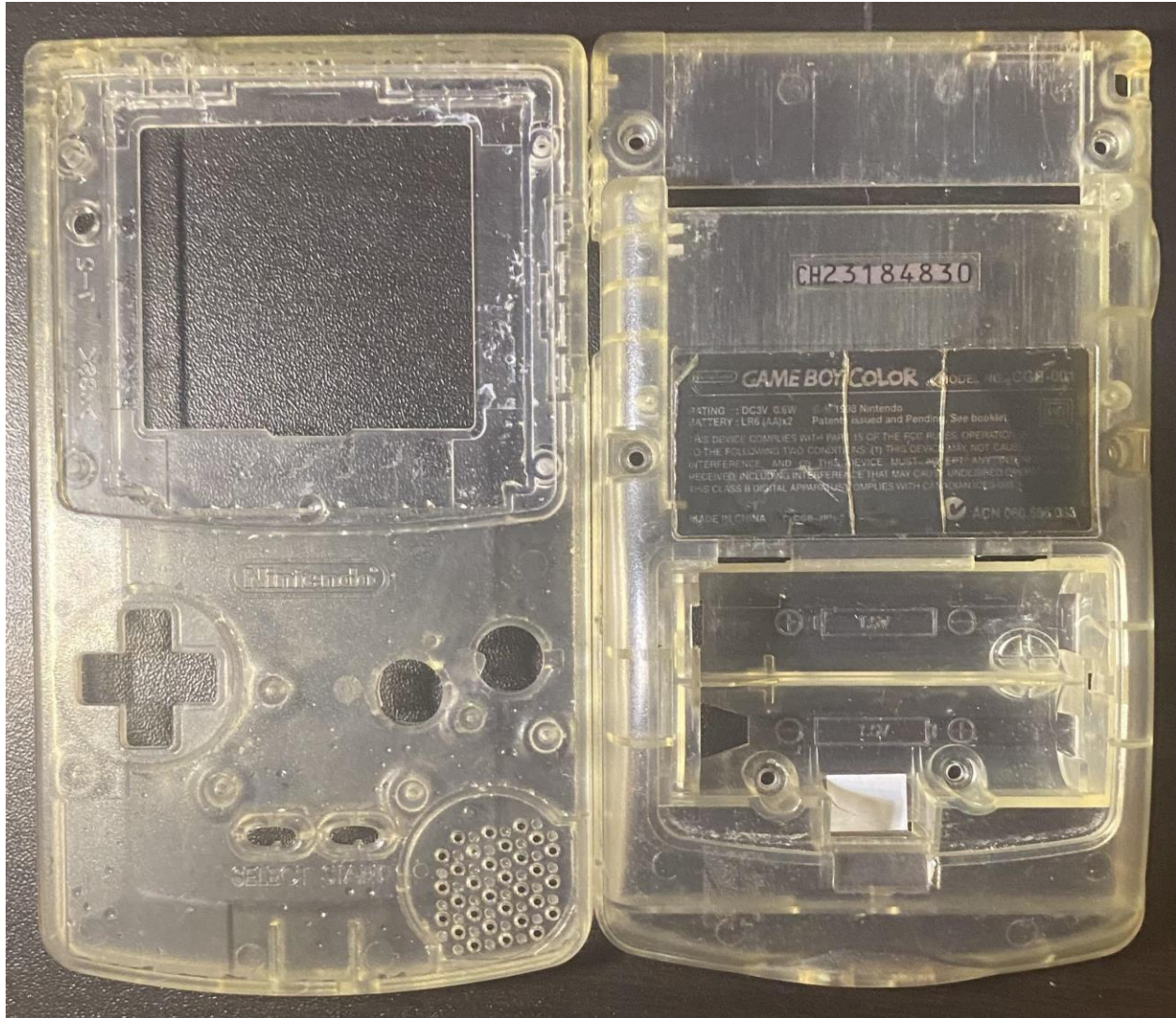


Figure 3.2: Yellow reversed case comparison

The same technique of [retrobrighting \[3\]](#) was used to remove the yellowing on the casings plastic. The case was submerged in hydrogen peroxide for the same amount of time as the [Atomic Purple Gameboy](#) in Figure 2.2 but the difference of yellowing is much more negligible here. The casing on the left of Figure 3.2 was retrobrighted.

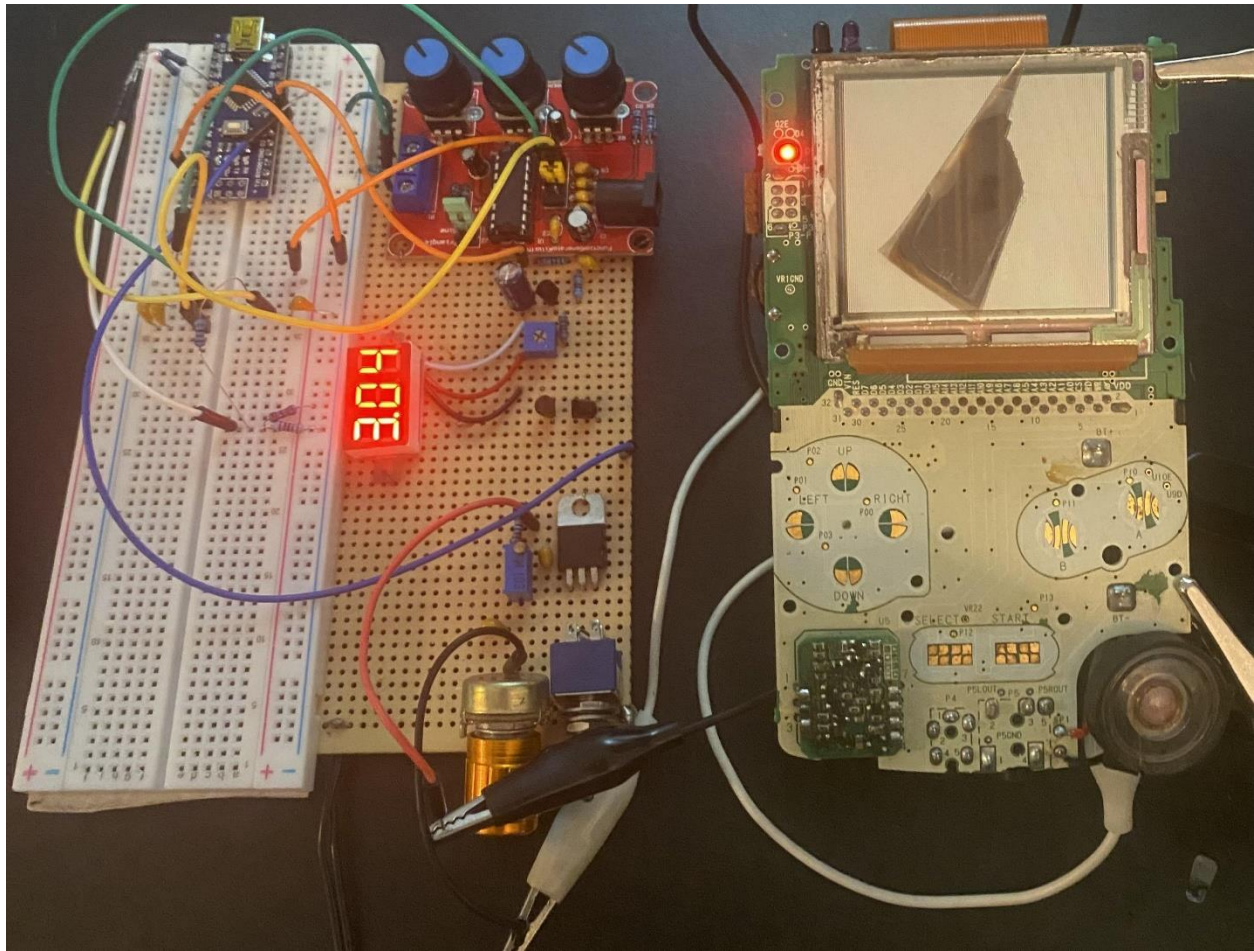


Figure 3.3: Motherboard connected to DC variable power supply

The console was able to power on and display the start up screen on the LCD even with the burnt polarizing film shown back in Figure 3.1. I removed the burnt film so it can be replaced. In initial testing connected to my DC variable power supply set to 3 Volts, the console powered on and displayed the start up screen as seen in Figure 3.3. It is hard to tell but the fragment of polarizing film shows pixels on the LCD compared to [Figure 2.3](#) which shows nothing under the film. A replacement film is required to see the properly displayed image.