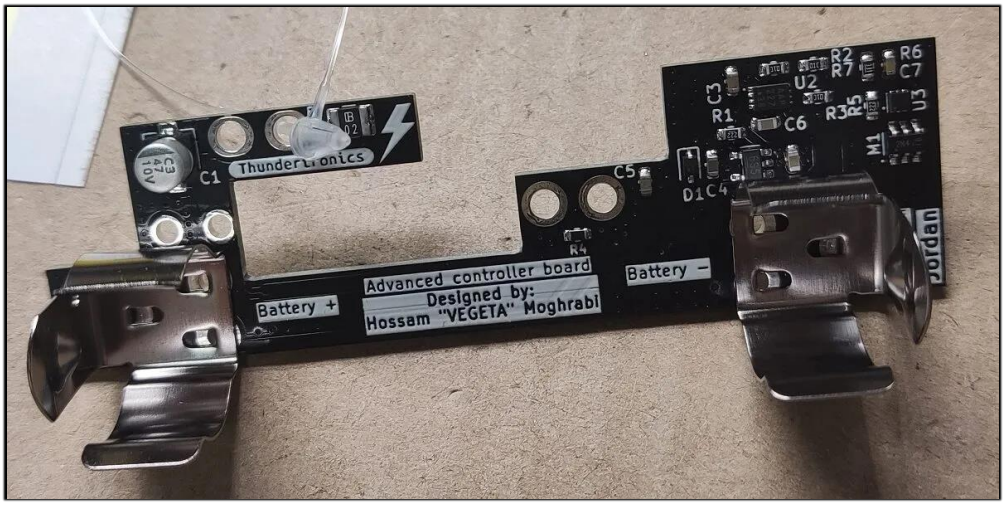
Dreamcast advanced controller board



Intro

This mod board is to be installed on top of original controller daughter board by soldering. It uses an 18650 li-ion battery to hold the charge, and it replaces original old components like the 47u capacitor, fuse, and 13R charge limiting resistor.

Features

- Keeps time forever, no need for any future battery replacement or any other hack.
- Replaces old components with new ones, and replacing regular fuse with resettable one.

Installation

1- Disassemble the console, and take the controller board out.
2- Desolder the fuse, resistor, battery, and capacitor.

3- Put the new mod board on top the controller daughter board, and solder them together using supplied pins. A total of 6 soldering points is needed.
4- Reinstall the assembled board in its place, and reattach the ribbon cable.
5- Install the battery in correct position. Now run the console and set the time.

Performance

The big 18650 battery will practically hold the charge forever. Our tests indicates that a simple one-hour playtime will charge the battery by about 70-100 mV which in turns is enough for more than 6 months.

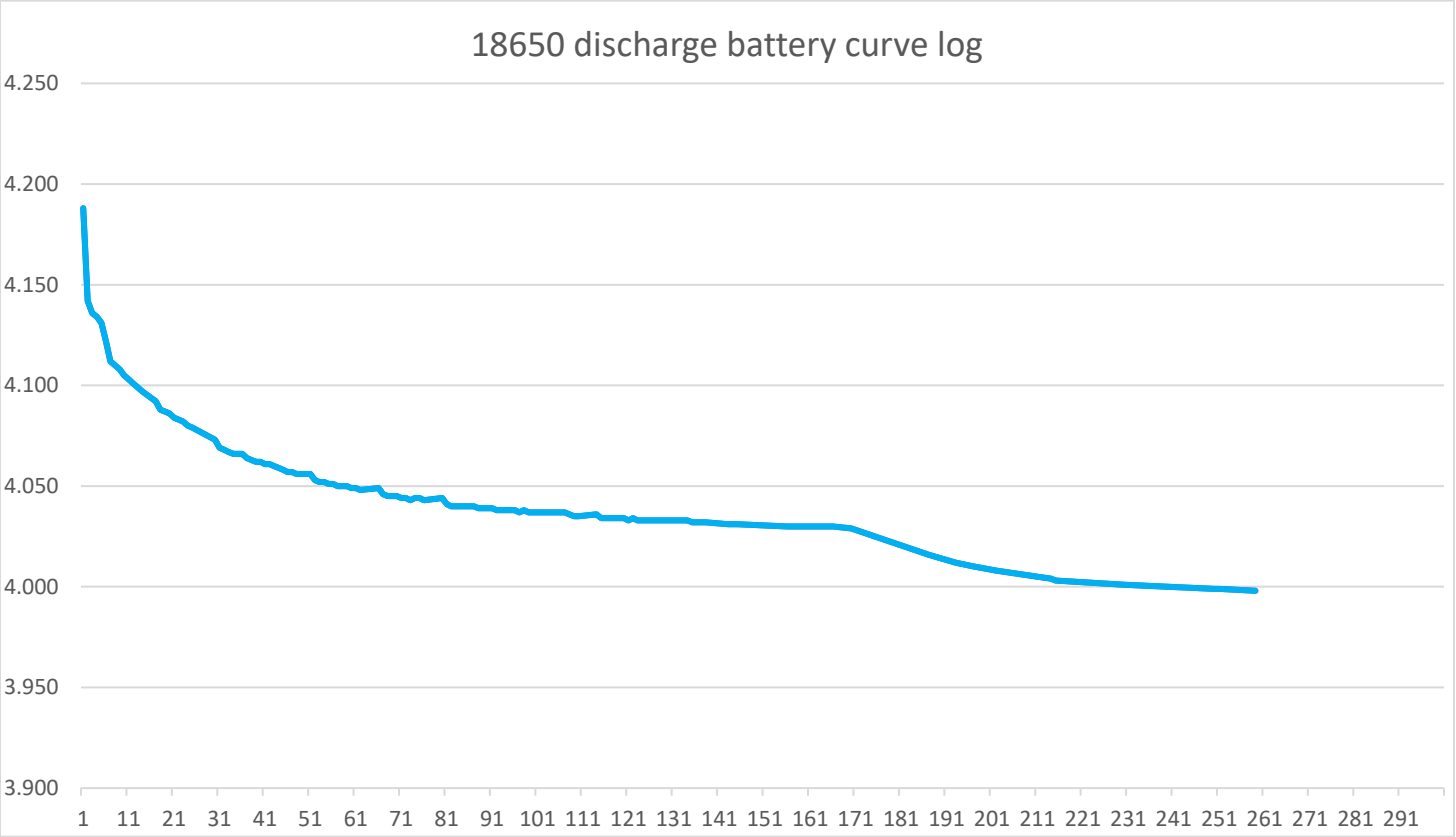


Figure 1: mod board battery voltage measurement

The curve seen in figure 1 shows the actual measured battery voltage, which is identical to 18650 battery discharge curve. Meaning, extremely small current is being drawn which will make it last for years.

In-depth technical information

Circuit of the mod takes 5v rail as its supply and won't draw more than about 110mA when fully working, thus won't tax the 5v rail. It consists of battery charging and battery protection IC, plus voltage regulation circuitry.

The initial charge as seen in curve made battery voltage to a little less than 4.2v which was designed to ensure battery never reaches 4.2v for safety reasons. Then it dropped fast to about 4v which is not because of mod board current consumption but rather because of 18650 battery normal discharge behavior after its fully charged.

Figure 1 test shows that almost 9 months, battery voltage still about 4v which is a lot more than nominal 3.7v, only losing about 1mv each week or two afterwards which is excellent performance.

Dreamcast battery circuit was shown to work with about 2.6v minimum, the mod board has a diode implemented and a 3.3v regulator before it which means about 3.1v is delivered to the console. Assuming li-ion battery absolute minimum voltage is 3v, which will deliver final 2.8v to the console... if using 1mV per week (real performance can easily be better), then a simple calculation shows one full charge can give about 20 years of time keeping! This is just a rough calculation since no one will run the console once in a very long time but the mod was created to solve the problem under all circumstances.

Test was done using a very old Chinese no-name brand battery which means using a good battery will give more performance. Nonetheless, using any battery will work perfectly fine as long as the battery is not broken.