Build Your Own Raspberry PiStation

Since the Raspberry Pi 2 was announced to the world, people started to think about what the additional processing power could be used for. Many people, like me, who were familiar with playing retro games via RetroPie immediately thought of using this power to play more technically demanding games for that nostalgic feeling. If you don't know what RetroPie is, then I highly recommend taking a look at The RetroPie Project over at petRockBlog here.

Now in the world of retro gaming, people aren't happy with a circuit board sitting naked on their TV stand / computer desk with bundles of wires and cables poking out. They want to replicate the feeling of playing on their old favourite console, but with the added twist of seeing the surprised looks on their friends' faces when they startup a custom system running lots of different console emulators.

I was one of these people. However, there was a trend for using old Nintendo Entertainment System (or NES) consoles, which whilst perfectly understandable, had been done plenty of times before. Granted, my PiStation is not ground-breaking, but I would like to think the guide is more detailed than any out there today.

So enough of the background, let me take you through a step-by-step guide on how to build your own Raspberry PiStation!

For my build, I used the following parts:

- Raspberry Pi 2
- 5V 2A power supply
- HDMI extension lead (25 cm)
- Bluetooth USB dongle
- Wifi USB dongle (optional)
- Mausberry Circuit (solder your own switch version)
- Red LED
- 330 Ohm resistor
- Solid core bell wire (for soldering switches / LEDs)
- Sony PlayStation One (faulty and bought off eBay for £6.49!)
- Sony PlayStation 3 Dual Shock Bluetooth controller

You'll also need to do some soldering, a little case modifcation and hot-gluing but you do not need to be an expert!

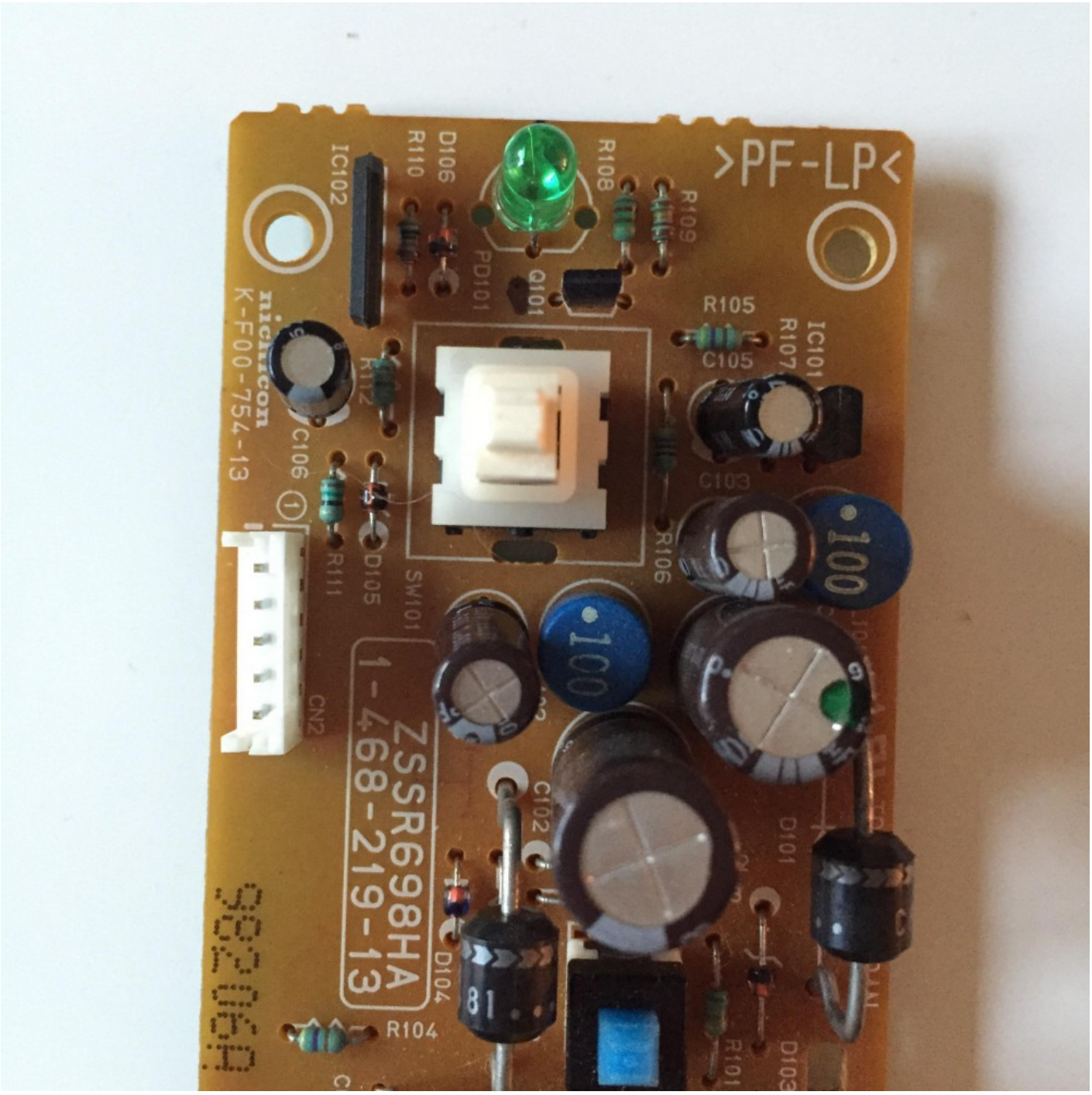
PlayStation Case Disassembly

Thankfully, taking apart the PlayStation case is pretty straight forward and can be done using a Philips head screw driver! If you flip the console over, you will find 6 screws underneath. Take these out and then flip back right-way around and you should be able to lift the top off the console.

For my PiStation, I removed everything with the exception of the power supply (PSU) located on the left-hand side of the console and separated by a plastic divider. Disassembly is pretty straight forward, simply removing a few screws and gently removing any connected cables so I won't cover that in this guide for the sake of keeping this as short as possible! If you get stuck, there a many guides on YouTube specifically for this.

Using the PlayStation's existing switches

One major factor for me choosing the PlayStation for my retro games console was being able to use the existing power and reset switches instead of messing around with shutdown and reboot commands. I decided to use the Mausberry Circuit for this because they had an option to solder your own switch to their circuit board, and rather than add my own switches I decided to use the existing ones.



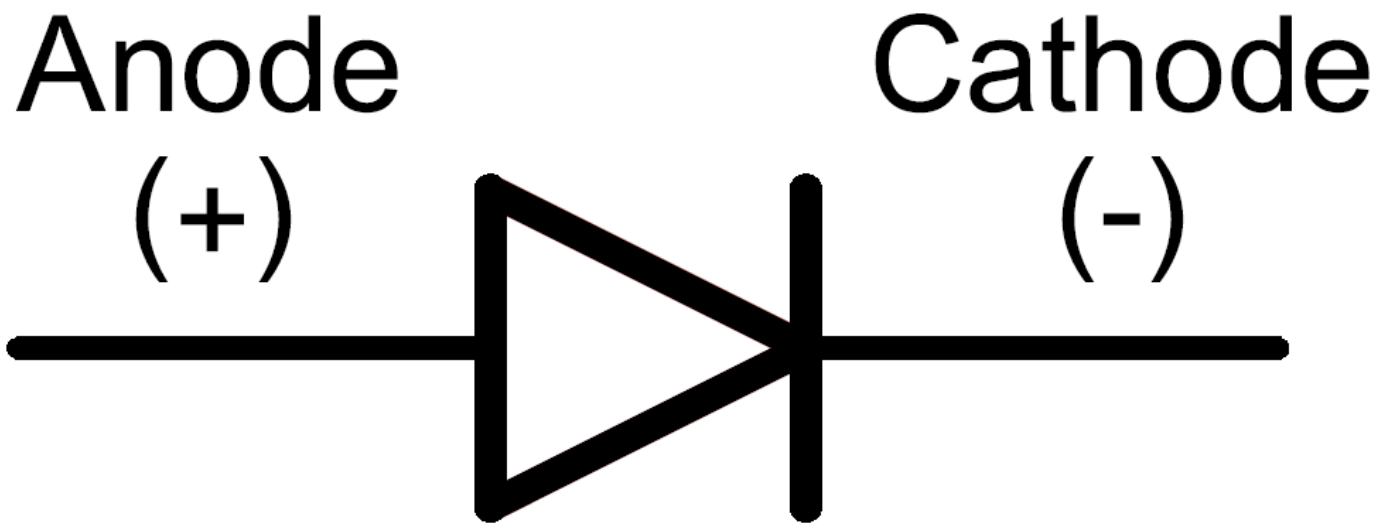
The unmodified Sony PlayStation PSU circuit board - you can see the switch just below the green LED

This part is optional, but I wanted to practice my soldering skills so I decided to remove every unnecessary component from the PSU circuit board with the exception of the two switches and the LED (which I'll come onto later). If you like, you can isolate the switches by carefully using a sharp knife or a Dremel tool to cut around the switches on the undeside of the circuit board, thereby breaking the connections.

Replacing the LED (optional) and solder points for the switch

If you wanted to make a subtle change to the PiStation visually, then changing the LED from the original green one is a simple yet effective option. I decided to install a red LED and it was very simple to do. The LED is soldered in and then protected by a plastic surround, which is easily removed by gently pressing the black plastic points on the underside of the PCB and gently pulling from the top until it comes off. You will then see the LED legs and you can then remove by using the soldering iron on the underside and gently pulling until it comes out.

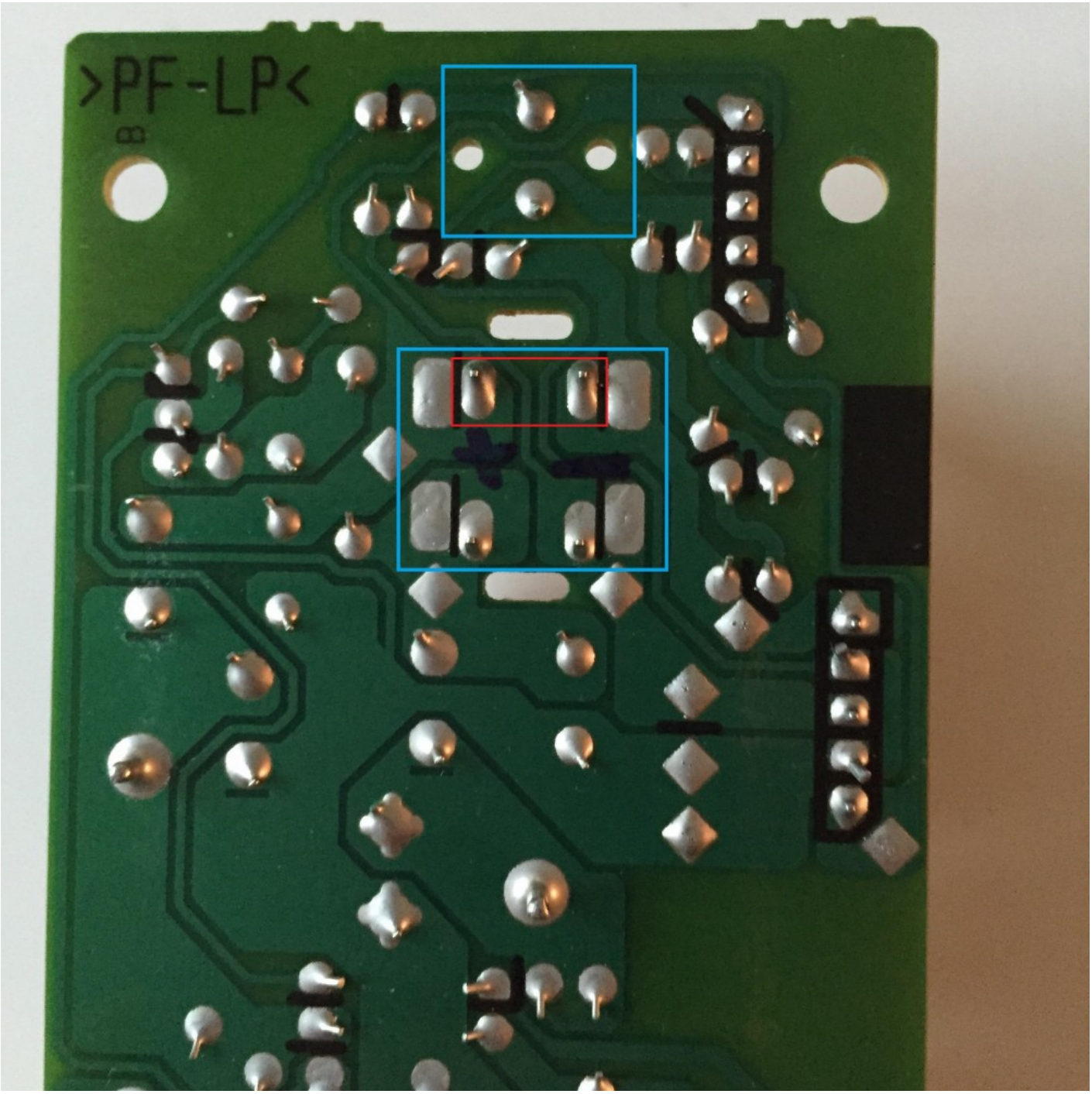
When you remove the LED, you should see a marking on the PCB indicating which hole is the anode (positive) and which is the cathode (negative) which looks similar to this:



On my PCB, the anode was the hole nearest to the edge of the PCB, but double check as yours may be different! You need to know this so you put the LED in the right way. For reference, the longer leg on the LED is the anode (positive) and the shorter leg the cathode (negative - if you are

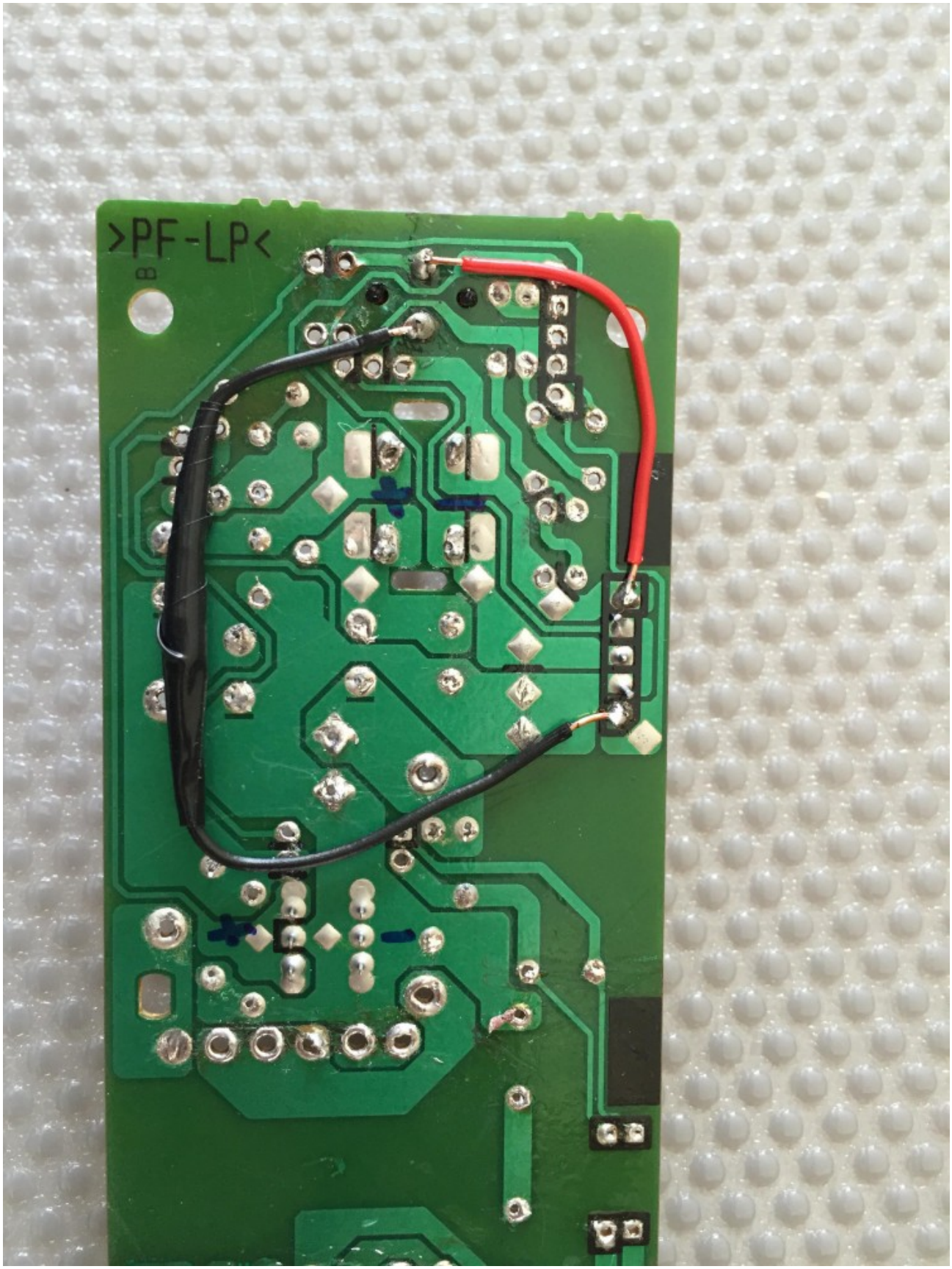
interested you can read more on LED and Diode polarity here). Once identified, pop the LED into the PCB and then solder in place and replace the black plastic protector.

The switches are a little trickier as there are 4 points instead of 2 to look out for (although only two are used). After much trial and error, I managed to figure out which points were needed, so they are as follows:



The blue boxes highlight the LED (top part) and power switch, and then the red box highlights the solder points on the switch itself.

Once identified, I then soldered my wires to and from the Mausberry Circuits board (take a look at their website here for detailed instructions on getting this up and running) and as a result my customised PCB looked like this:

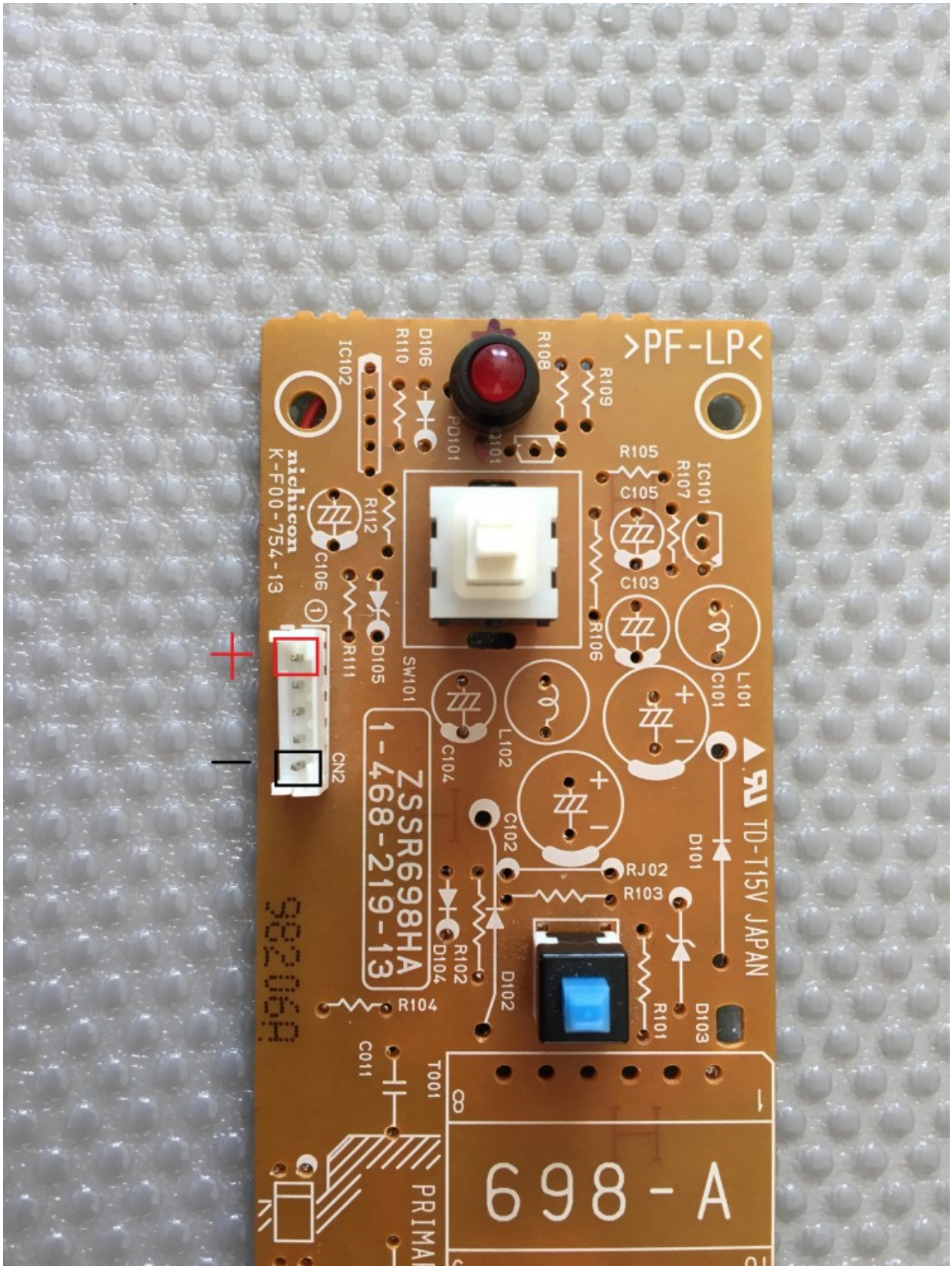

>PF-LP<

The LED and switch all connected up. There is a 330 Ohm resistor soldered in-line with the negative (black) wire and insulated using electrical tape.

You may have noticed that I have soldered my wires to a point on the right-hand side of the board - this is a breakout point like the GPIO's on the Raspberry Pi and makes connecting to the Pi itself a bit more accessible. You can connect your wires directly to the GPIO's on your Raspberry Pi, but I wanted to utilise the additional connector as it was easier once reassembled.

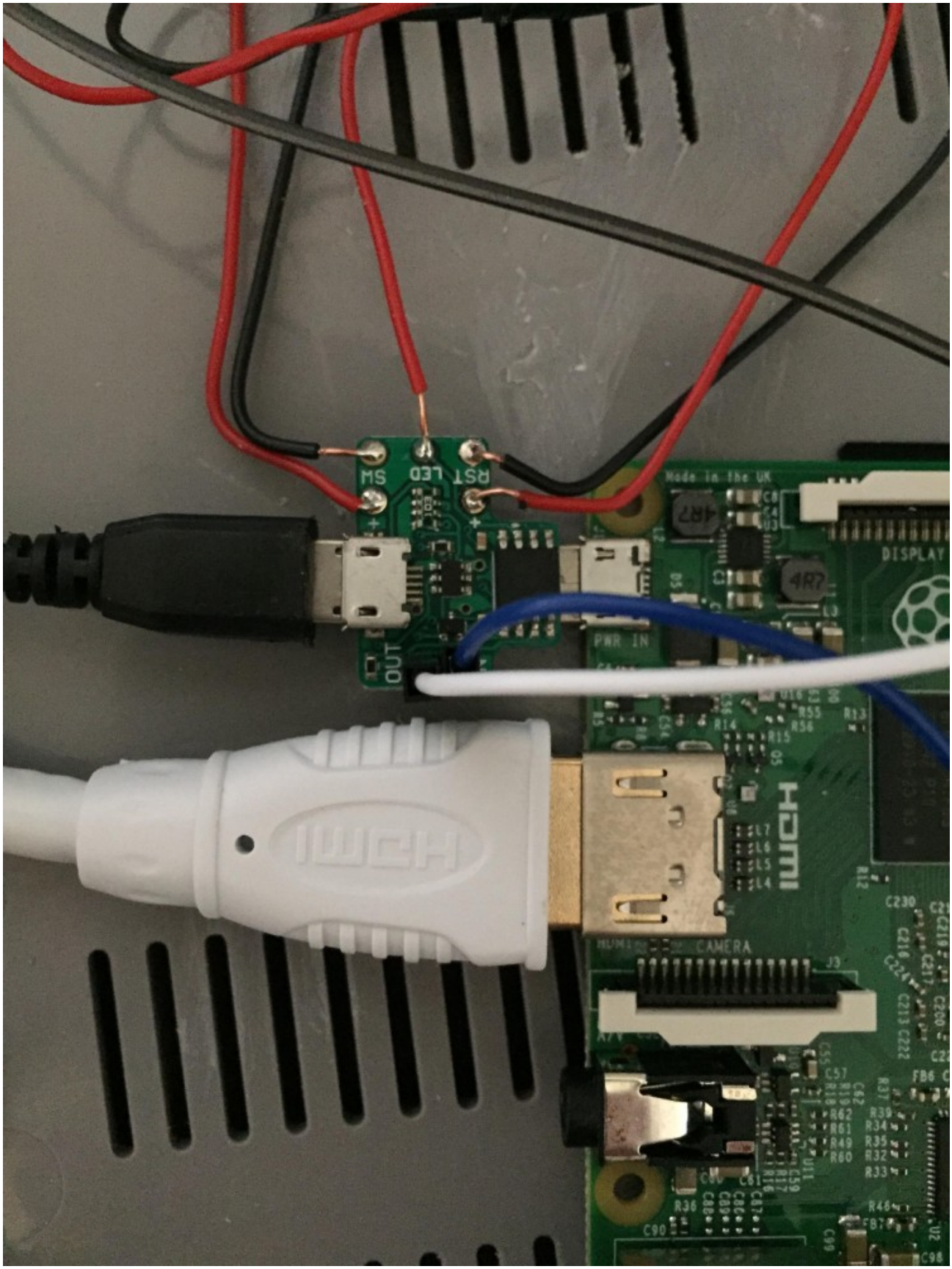
The black (negative) wire also has a 330 Ohm resistor inline. I have insulated this with some electrical tape...some people have since told me this is not necessary but I preferred to be safe rather than sorry!

The red (positive) point is connected to the LED point on the Mausberry Circuit and the black (negative) point is connected to any ground pin on the Raspberry Pi. It is a simple circuit that turns on when there is power to the Pi and off when there isn't. There are also two additional pins connected to the Mausberry Circuit which is explained on their setup page.


>PF-LP<
IC102
D106
R110
PD101
R108
R109
R105
C105
IC101
R107
C103
R106
nichicon
K-F00-754-13
R112
C106
D105
R111
SW101
CN2
C101
L101
C104
L102
C102
RJ02
R103
D101
TD-T15V JAPAN
ZSSR698HA
1-468-219-13
R102
D104
D102
R104
R101
D103
C011
T001
698-A
PRIMA

New red LED and highlighted the top-side of the power points

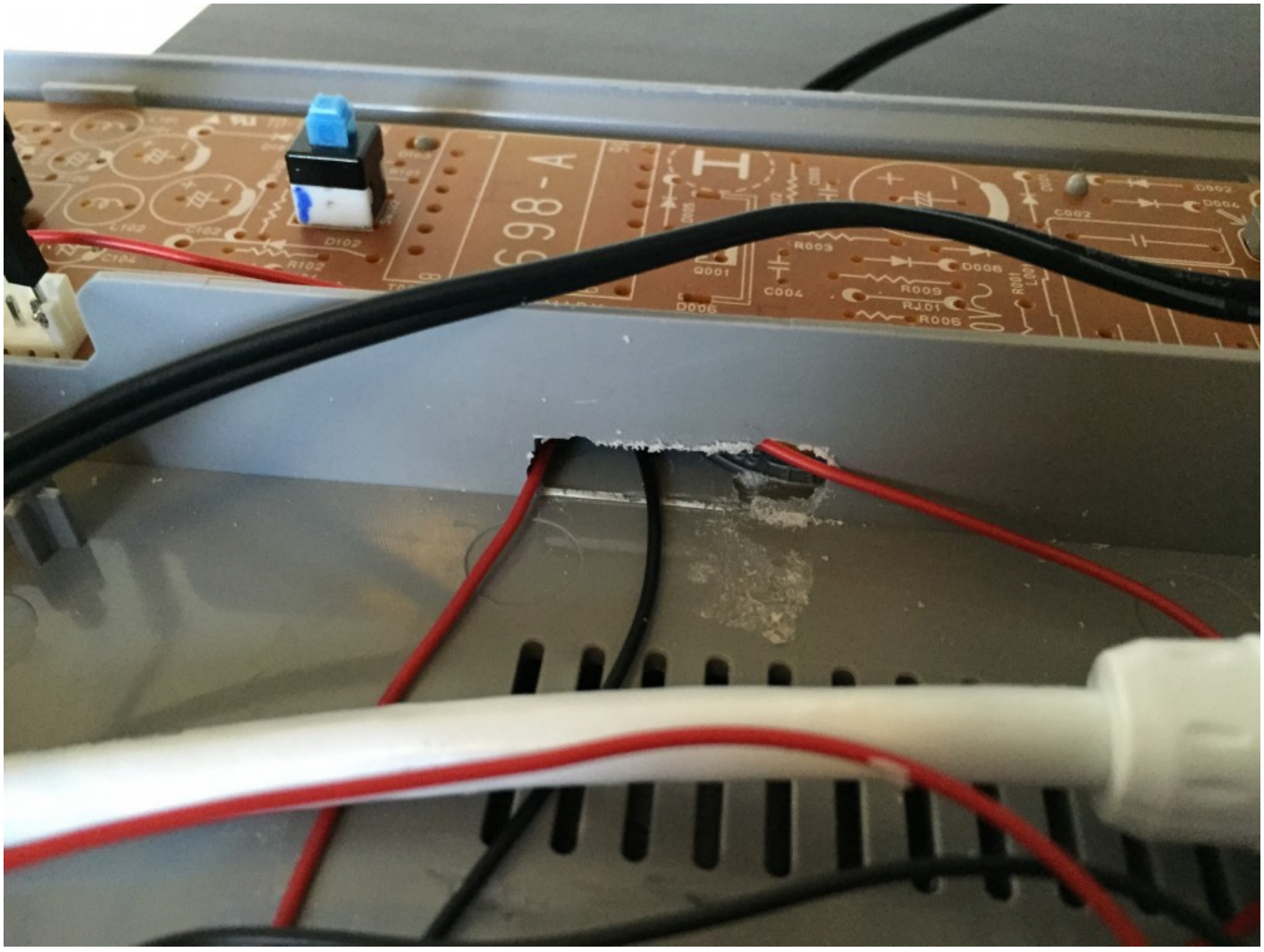
Now that the LED and switch has been integrated into our circuit, you should now have the Mausberry Circuit connected to the switch and your Pi. This is a close-up of the completed Mausberry Circuit (quick note - I couldn't figure out how to get the reset switch working but I left wires soldered to the switch just in case I did in the future):


SW
LED
RST
OUT
PWR IN
DISPLAY
CAMERA
HDMI

Completed Mausberry Circuit - the reset circuit is not functional, but left soldered in case I figured it out in the future!

Modify case to allow wire access

Rather than run wires in places that may get pinched when the case is put back together, I cut a small hole in the dividing plastic wall using a drill and a small file to run my wires through. It might look a little messy, but once the console has been reassembled, nobody will notice:



Access point for wires. Not pretty, but it works!

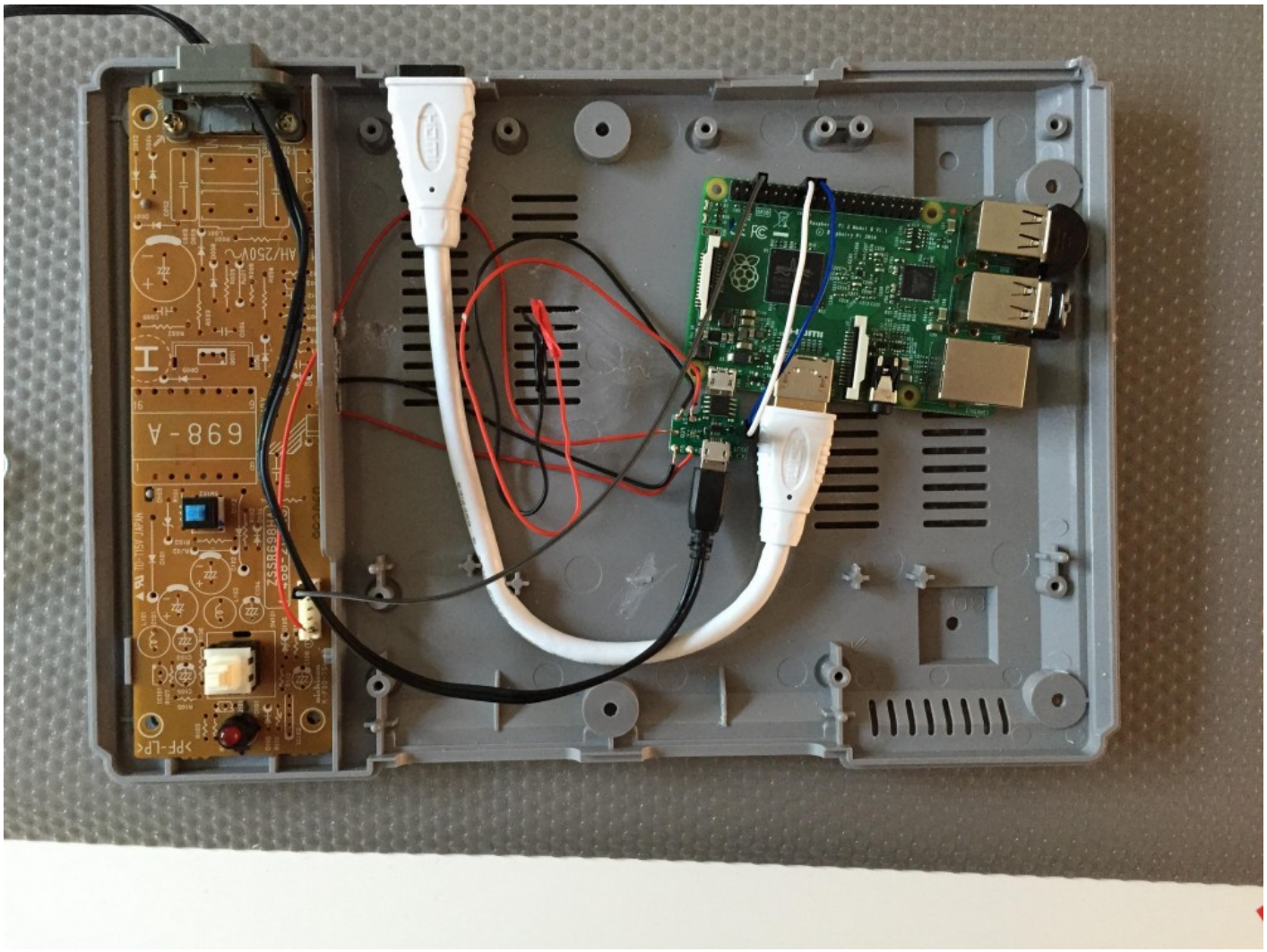
I also drilled a hole in the original power point on so that I could run my micro-USB power supply into the console. This is just a bit of trial and error using a drill and a small file until the hole is big enough to allow the cable to pass through:

Modified Power Port and HDMI Port

You can also see where I hot-glued my HDMI extension lead to the case in place of the old AV Multi Out port.

Almost there!

The complicated stuff is now out of the way and the rest is simply putting everything together. If you have bought a Wifi USB dongle, pop that in your Pi along with the Bluetooth USB dongle. Don't forget to put your RetroPie loaded SD card into your Pi too! Cable management is a little tricky and the shorter the cables used, the better, otherwise you'll end up with lots and lots of cable that needs dealing with! This is how mine looked once everything was put inside:



Semi-complete and not a lot of cable to deal with

The last part is to reassemble the case and pop the lid back on. Pop the 6 screws back in and then you should have a complete Raspberry PiStation! The next challenge is to configure all your emulators, controllers and so on but we can look at that another time! Here are some more pictures to show the completed PiStation:

Lid back on and powered up…

The red LED is working!

INFOCOM
AMIGA
MENU
SELECT
CHOOSE
TOSHIBA
Synology

At last! Everything is working as planned and RetroPie is running! Enjoy!

I hope you enjoyed this guide! This was the first major project I tried and I was quite proud to complete this myself. If you are new to the world of Raspberry Pi, then the best way to learn is to give it a go and learn from your mistakes! The community is fantastic here, so if you cannot find an answer on your own then just ask and you will more than likely get an answer!

PiStation Boot Logo