Apple II

Floppy Emu II Hack

Assembly Manual

WARNING AND DISCLAIMER

Please note that this kit is a hack to existing apple disk II drive cases and the excellent floppy emu from Big Mess of Wires. It is not intended as a product in itself and the guide assumes the user has the necessary skills to implement the hack. Modifying any hardware always carries the risk of something being damaged during the process. As such no responsibility is accepted for any damages from this hack.

That being said, it is very straight forward and there is plenty of help available in the online forums and apple community groups and the finished item is a nice liitle retro modification to the old drives whilst adding modern functionality.

Its also a bit of fun ;)

CHAPTER 1
WHAT'S NOT INCLUDED

What's not included in the kit and needs to be provided by the end user are the following items.
- An old surplus Apple Disk II drive case. (Internals not necessary)
- A Floppy Emu Model C from BMOW.
  https://www.bigmessowires.com/floppy-emu/

The 3D Printed Parts are not included, but the STL files are available for free on Applefritter.
FE2_3d_Printing_.zip
Retro_Bill is currently offering a 3D printing service for those that need it.

WHAT IS INCLUDED

The following Items are included in the kit

Quantity	Name
1	Front Panel plus Perspex Window (2 Parts)
2	5mm Red Led
2	Black and red JST male female lead pair
1	2.42" OLED
1	Button PCB
4	Push Button Switches
4	Push Button Tops
1	Oled Display Harness (7 wire) (150mm) (Female - Male)
1	Push Button Harness (8 wire) (150mm) (Female - None)
1	Push Button Harness (Shell) End Only 8 Pin
2	OLED Display Harness (Shell) End Only 7 Pin
2	5mm Led Bezel
12	M2.5 Nut Nickel Plated
6	M3 Nut Nickel Plated
4	M3 Countersunk Screw 10mm Long Nickel Plated
12	M2.5 Washer Shakeproof Stainless
6	M3 Washer Shakeproof Stainless
4	M2.5 Nylon Screw 12mm Long
4	M2.5 Nut Nylon
1	2.54mm IDC HEADER PIN ROW (8+7) 15Pin
2	Heatshrink red 3mm
2	Heatshrink black 3mm

SKILLS REQUIRED

Basic Soldering / Desoldering skills are required for minor modifications and wire connections to the Floppy Emu model C.

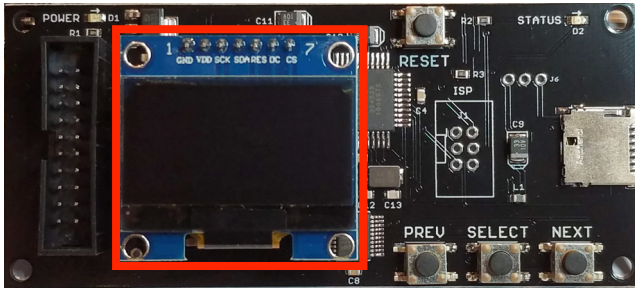
CHAPTER 2

FLOPPY EMU PREPARATION

To extend the floppy menu LED's and button inputs to the front panel, some jumper wires need to be soldered to the floppy emu itself. The LED Harnesses need to be connected as per the following instructions. The reason for this is that if you were to just solder directly to the LED, you would create a LED's in parallel situation which would increase the power draw through sensitive parts of the floppy emu circuitry. This has the potential to damage the floppy emu.

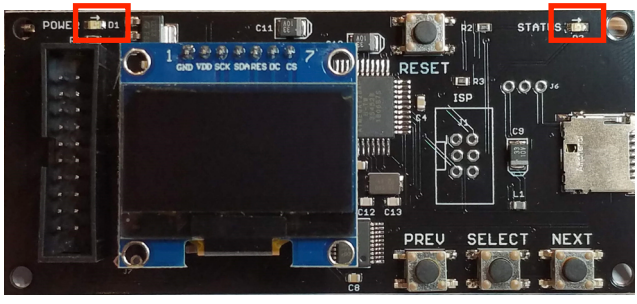
REMOVE SMALL OLED

Unplug the small OLED display module from the board and store away.

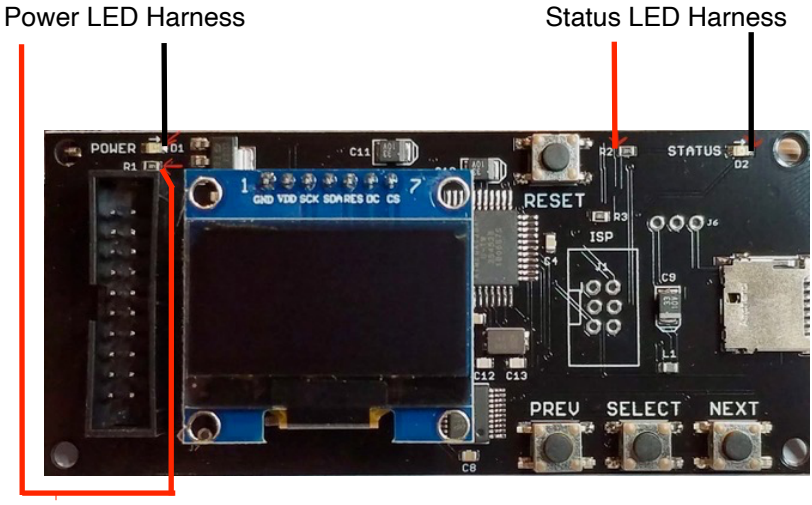


INDICATOR LEDs

The 2 onboard LEDS can be seen here. These are in series with Resistors R1 and R2. The idea is to solder the red harness wire to the positive side of the resistor and the black harness wire to the negative side of the onboard LED. The pre-made harness incorporates a 56Ø Ohm resistor and this has been calculated to limit current draw to 2ØmA.

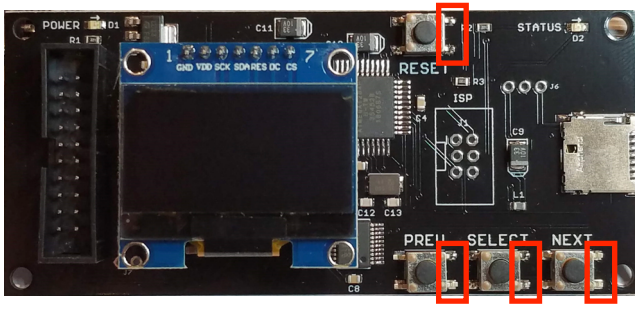


Solder the Black and Red JST harness to the pads left behind on the board. Pay attention to polarity and solder to board as shown. The arrow on the board points to the black wire. Pay close attention to the red wire connection points on R1 and R2.

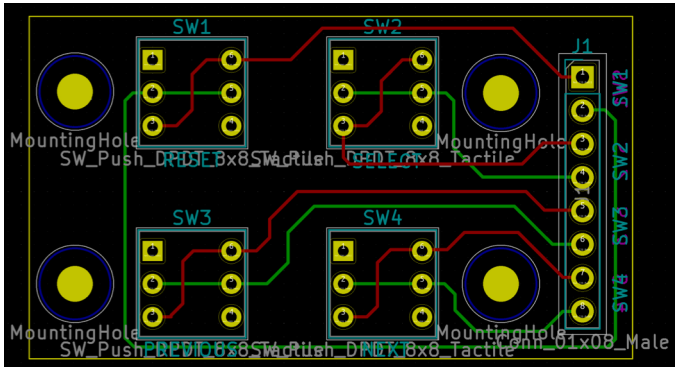


BUTTONS

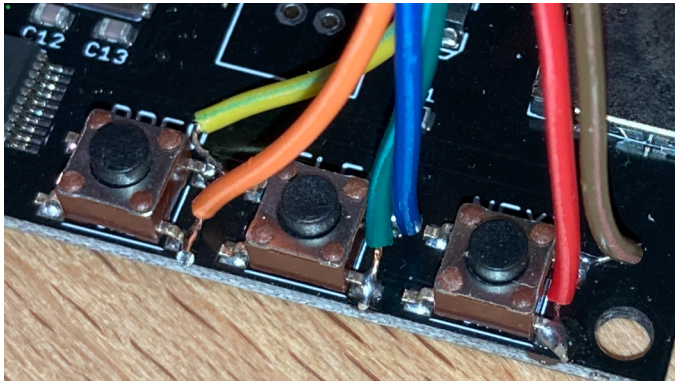
The existing buttons do not need to be removed and the pushbutton wire harness can be soldered directly to the pushbutton solder pads. The ordering of the wires is important and not all harnesses have the same colors. Look at the 8 pin wiring harness Socket and note the order of the wires. The buttons on the floppy emu are clearly labelled as well as on the pushbotton pcb.

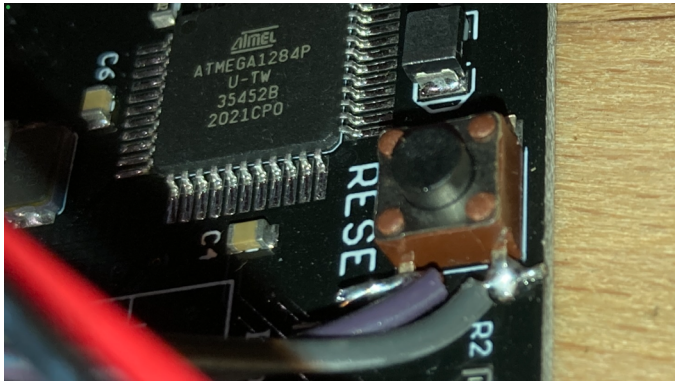


SW1 - RESET
SW2 - SELECT
SW3 - PREVIOUS
SW4 - NEXT



Once the ends of the 8 wire harness are soldered to the floppy emu buttons it should look something like this.

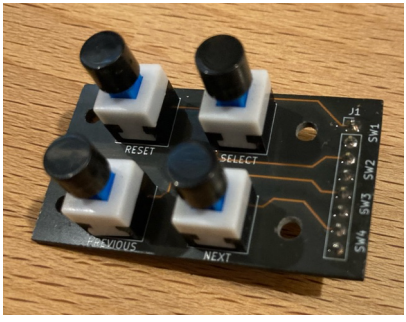


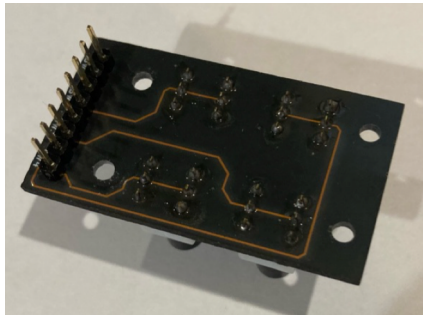


Thats all that needs to be modified on the floppy emu itself.

NEW PUSH BUTTON PCB

The next step is to solder the 8 Pin IDC Header and the 4 pushbuttons to the bare PCB. The 8 pin IDC Header goes to the underside and the pushbuttons need to be soldered onto the top surface. The buttons can be inserted either way and orientation doesnt matter.





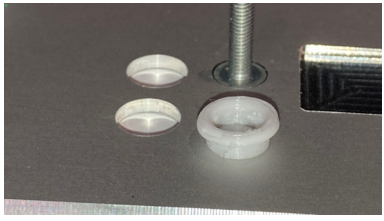
Once the soldering is complete add the push button tops to the pushbuttons.

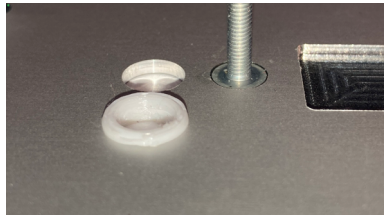
NEW 2.42" OLED DISPLAY

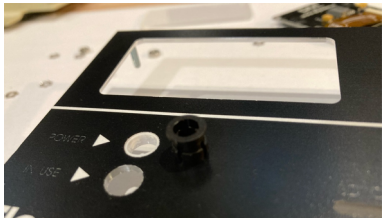
The new OLED display needs to have the 7 pin header soldered into the back of the display board.

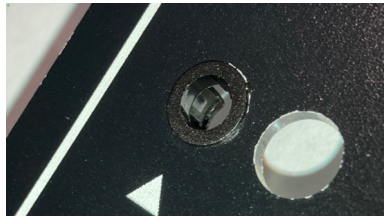
CHAPTER 3
ASSEMBLY

Firstly insert the 5mm LED Bezel and adapter/3d printed packer into the manufactured panel. The 3d printed adapter is inserted through the rear of the panel orientated as shown below. While holding the 3d printed adaptor from the back, carefully wrangle the black 5mm LED Bezel into the adaptor from the front.

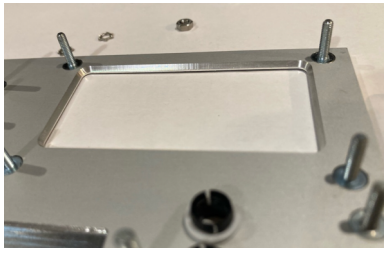


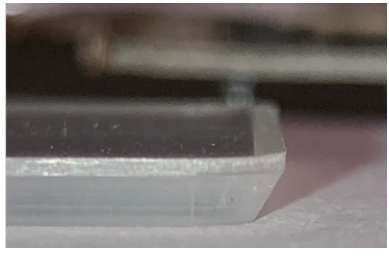


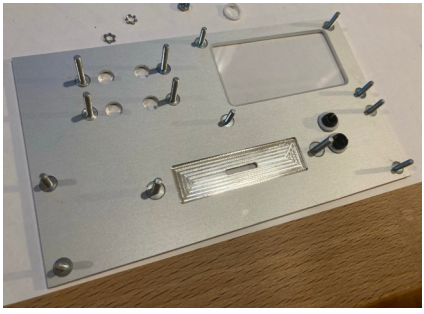


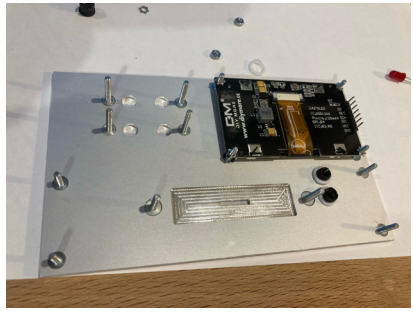


Next insert the perspex window and 2.42" OLED module into the panel. Lay the panel face down on cloth or some other protective surface and insert the perspex window into the opening. The aluminium panel and perspex window have both been machined with a bevelled edge for a tidy fit and to hold the perspex in place



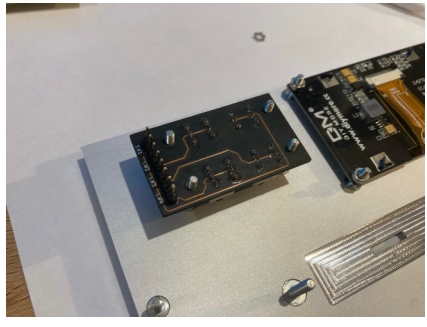


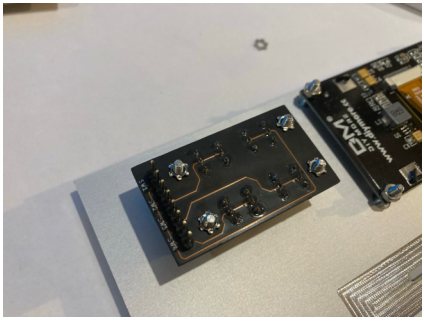


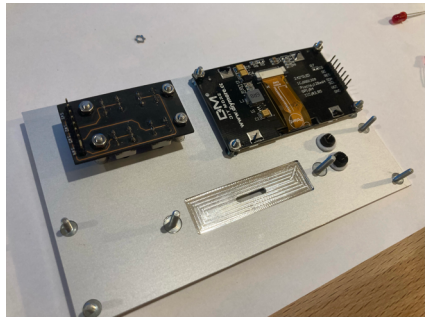


Make sure there is no dust on the inside of the perspex window or the front face of the OLED display and lower the oled display face down over the mounting screws. Add 4 M2.5 shakeproof washers then the 4 M2.5 nuts. The nuts only need to be finger tight. Do Not Overtighten as it may damage the OLED screen.

Add the 4 3D-Printed spacers onto the studs for the pushbutton cluster then carefully lower the pushbutton circuit board onto the studs. Its a bit fiddly getting the button tops through the holes due to the close fit. Add 4 M2.5 shakeproof washers and 4 M2.5 nuts. Again do not overtighten as you may crush the 3D-Printed spacers.

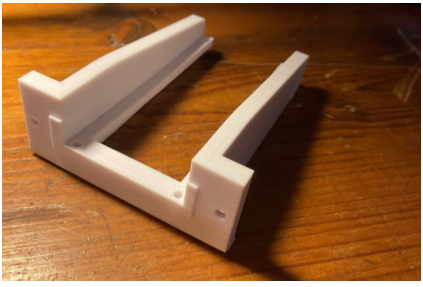


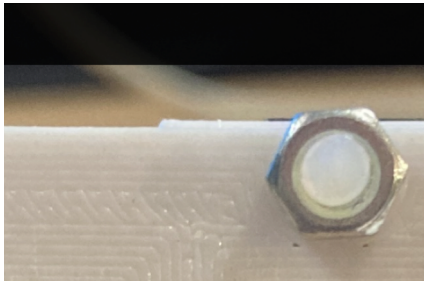


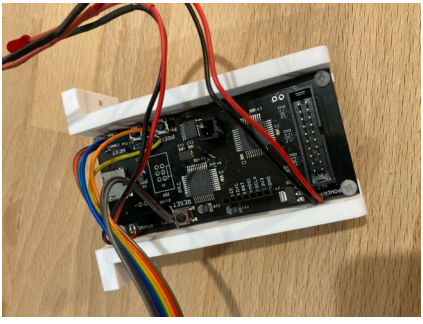


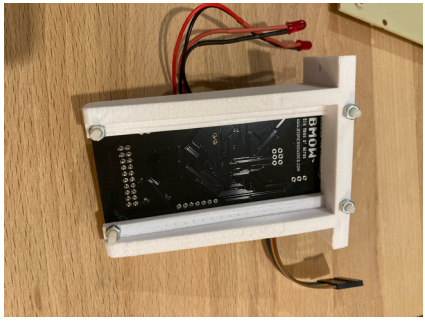
Next need to insert the prepared Floppy Emu board into its mounting cradle. Place the floppy emu board in the orientation as shown in the photos below. Secure with the 4 Nylon M2.5 screws and 4 Nylon nuts. Note: The photos show steel nuts but they are now nylon.

The front 2 screws and nuts are very close to the front panel and its a good idea to try have the flats of the nuts parallel with the front of the cradle.

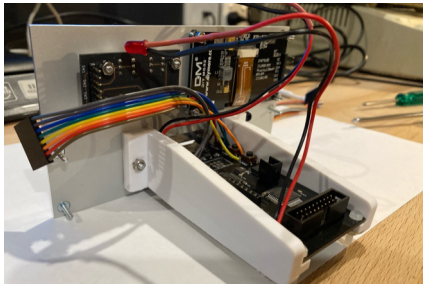




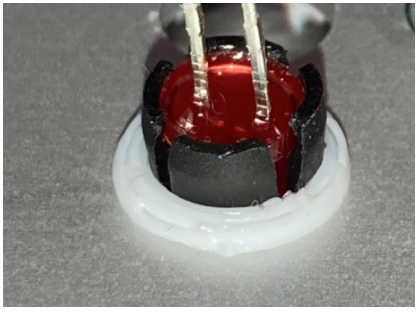


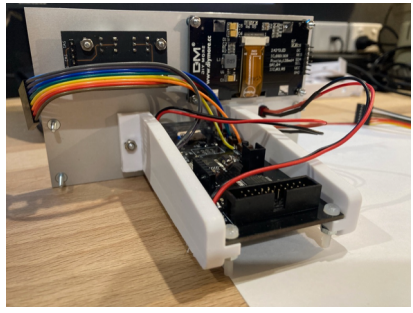


The completed cradle is then attached to the aluminium front panel. There is a raised profile on the front of the cradle which keys into the rebated recess in the back of the front panel. It should go straight in. This recessed arrangement helps bring the SD Card closer to the front and helps the removeable SD Card protrude from the front of the case better. Place 2 M3 shakeproof washers on the studs holding the cradle and fasten with 2 M3 nuts. Do Not Overtighten.

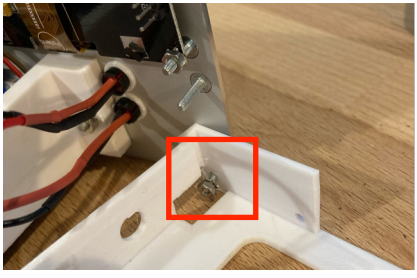


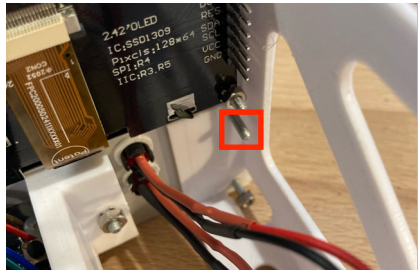
Insert the LED's into the bezel/adaptor arrangement from the rear. Its a tight fit but eventually settles in to place. You may need to gently tease the black bezel flaps out slightly to facilitate the 5mm LED. I used a small flat blade jewellers screwdriver for this purpose.

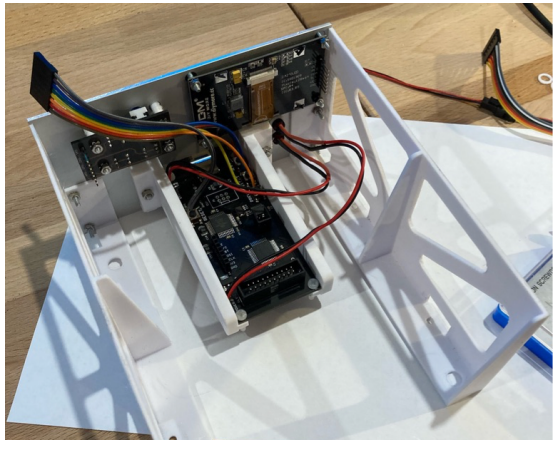




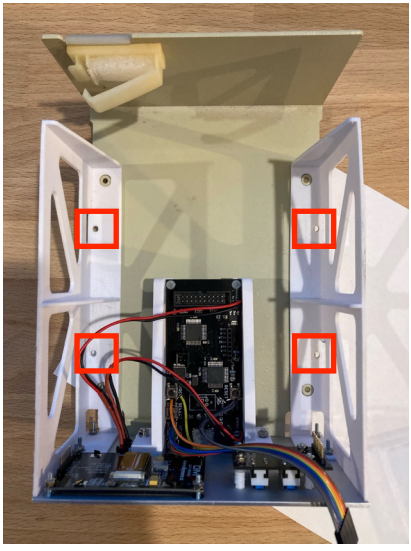
Now need to attach the 2 3D-Printed Side support brackets to the aluminium front panel. The lower 2 studs are very constrained and hard to get the nuts onto. Suggest trying to get these ones on first and having the bracket only just on the stud. Once the nut has just engaged with the lower stud can twist the bracket all the way around and align onto top side bracket stud and place the M2.5 shakeproof washer and nut onto top stud. Spin the nuts all the way home and gently tighten up. The LED side (Left side) is more constrained and it probably pays to do that side first. Be careful not to damage 3D Printed side while positioning.

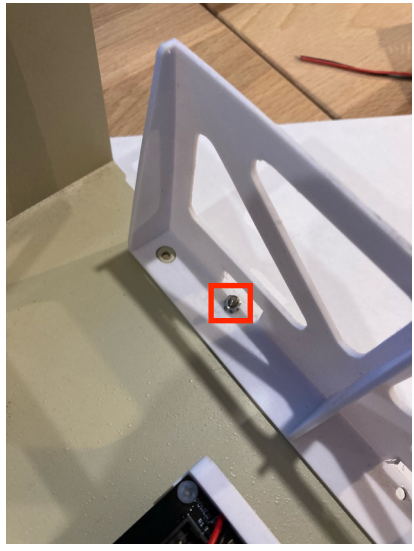




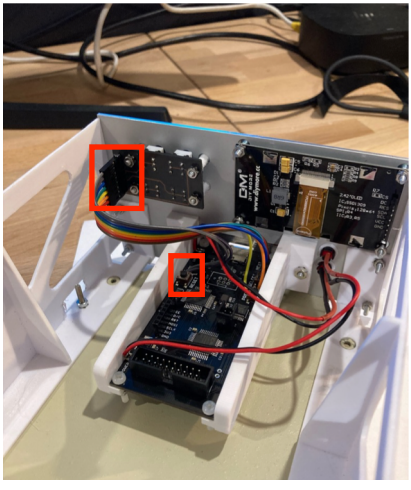


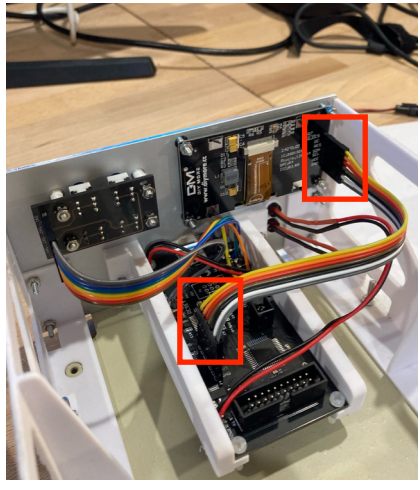
Once the 2 side support brackets are fixed to the front panel, place the whole arrangement onto the base half of the Disk II case. The raised bosses in the baseplate go into the holes in the Side brackets. The screws don't go into these raised bosses but rather the smaller holes adjacent. Fix the side brackets to the baseplate with the 4 M3 Countersunk screws, shakeproof washers and Nuts.



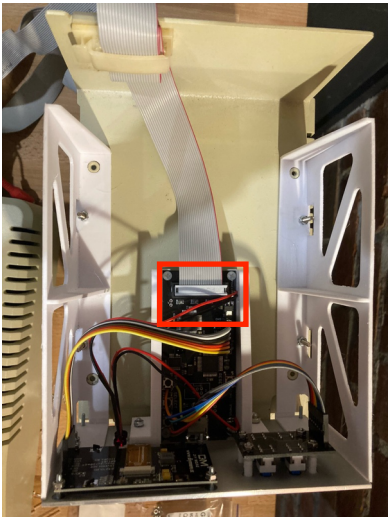


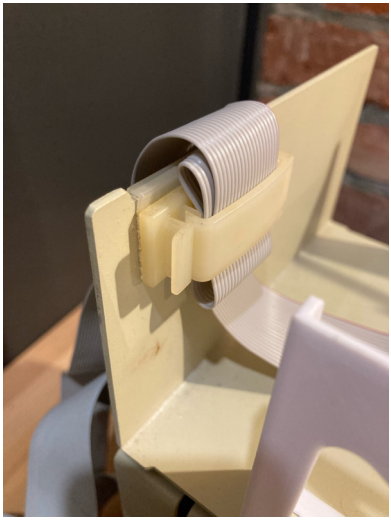
Next step is to connect the 8 pin wiring harness that was previously soldered to the floppy emu onto the button PCB Header. As a guide the soldered wires from the reset button should be at the top.
Then connect the 7 pin wiring harness to the floppy emu where the old smaller OLED used to be plugged in. Take care while inserting and support underside of floppy emu cradle while connecting harness.
Connect the other end of the harness to the header on the rear of the new OLED display. The pins are clearly marked on the display and the floppy emu, so make sure the harness is plugged the right way around.





The final connection is the floppy emu drive cable. Exercise care when connecting floppy cable to floppy emu and dont push straight down unsupported as you may break the 3d mount. Support underside of cradle with other hand while connecting. Take care with orientation of cable.





Place the drive cable in the existing strain relief clamp in the original drive case. I found the floppy emu cable slipped through this so I ended up doubling it back an extra time and it seemed to provide a suitable grip.

And thats pretty much it. Time to give it a test.

CHAPTER 4
TESTING

Connect to computer as per floppy emu documentation and turn on. Try the buttons and see if they work as expected. Any problems, shout out in the forums.