

## Hand wired left-handed numpad.

### Description:

I have been playing around with the idea of designing and building a hand wired keyboard for a while. Since I already have a perfectly usable keyboard, I don't really see the need to build a full-size keyboard. Since I use 68% keyboard as a daily, I decided that next keyboard project should be a numpad. Additionally, I chose left-handed numpad because having to move your hand from mouse to numpad to punch the numbers is annoying. Right-handed numpad works just fine if you're filling out excel fields but in CAD work it doesn't really provide any benefit since you need to click on specific sketch feature to dimension them, causing unnecessary arm movement. Being able to sketch the features and just use left hand to punch in the dimension is the most effective way to go in my opinion. In addition, if the numpad is attached to left side of keyboard it hinders the normal use of keyboard for writing or gaming. So, a separate left-handed numpad is logically the best choice.

### Hand wiring:

Hand wiring is a hard way of building a mechanical keyboard. You won't need to design/buy a PCB since hand wired key switch matrix will replace it. You only need a microcontroller that can utilize the switch matrix. It should be compatible with QMK (Quantum Mechanical Keyboard). Arduino or Teensy are both good choices for microcontroller. The most important component for hand wiring is diode which restricts the current flow. You need as many diodes as you have switches on your keyboard.



Picture 1&2 Some earlier testing I have done to find out the dimensions for plate.

## Designing the numpad:

Design of the numpad is divided into multiple section. The first thing that should be done is to choose what sort of layout you're aiming for. You can do whole full-sized keyboard or anything you want from 1 key keyboard to whatever macro pads with different layouts.

Since I'm aiming for left-handed numpad the layout needs to be mirrored compared to normal numpad. In pictures 1&2 you can see the conventional numpad layout but for left-handed everything needs to be mirrored. That also applies to the modifier keys on the numpad.



Picture 3 Mirrored number keys for numpad.

For designing the layout, I will be using KLE (Keyboard layout editor).

<http://www.keyboard-layout-editor.com/>



Picture 4: Finished layout for the numpad.

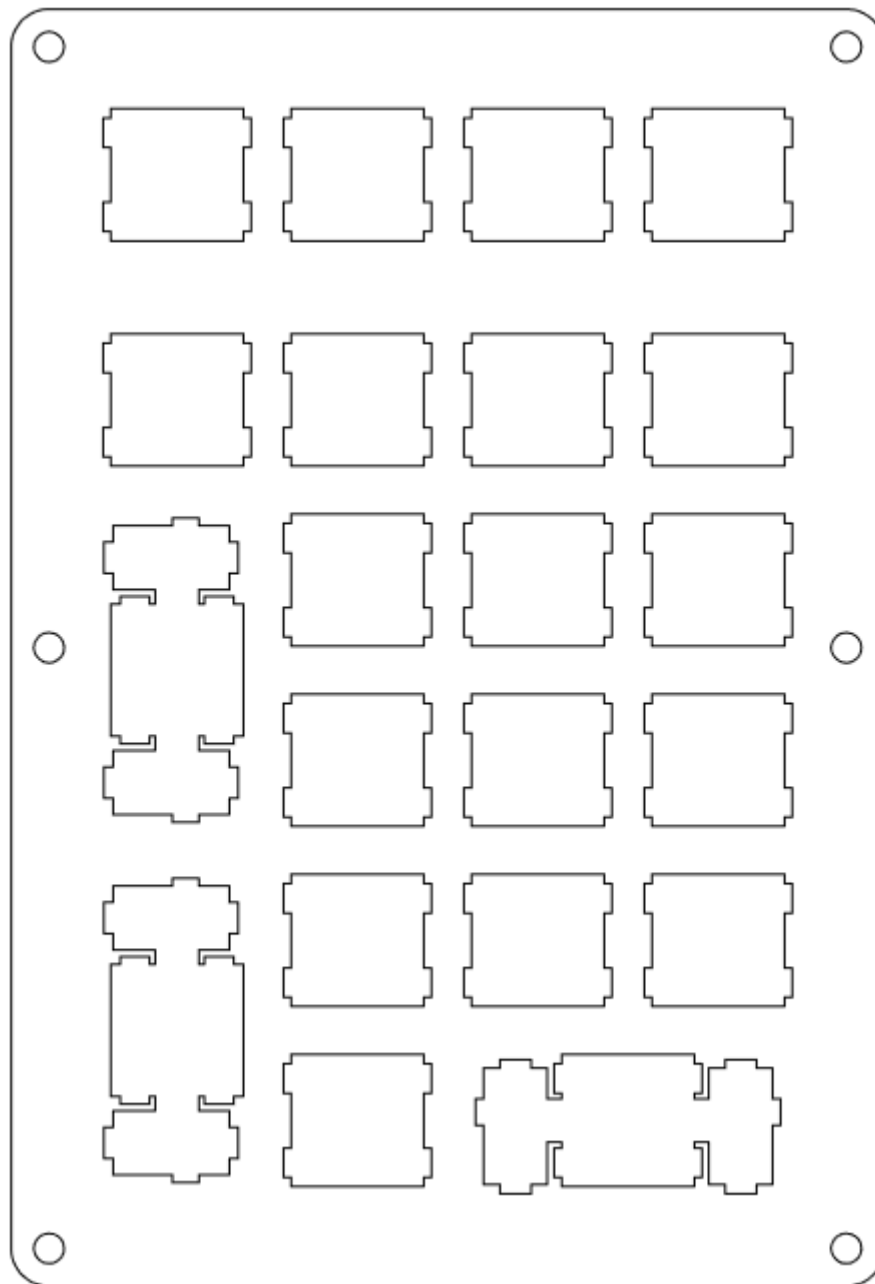
Next, we need to design the plate to accommodate all the buttons and switches. You can download the JSON file from KLE once you have finished the desired layout. JSON file for my design is available at GitHub. Function keys are just for extra functionality, they can be programmed to anything you want with GMK later.

I'll be using Swillkb plate and case builder to generate the DXF file for the plate and case.

<http://builder.swillkb.com/>

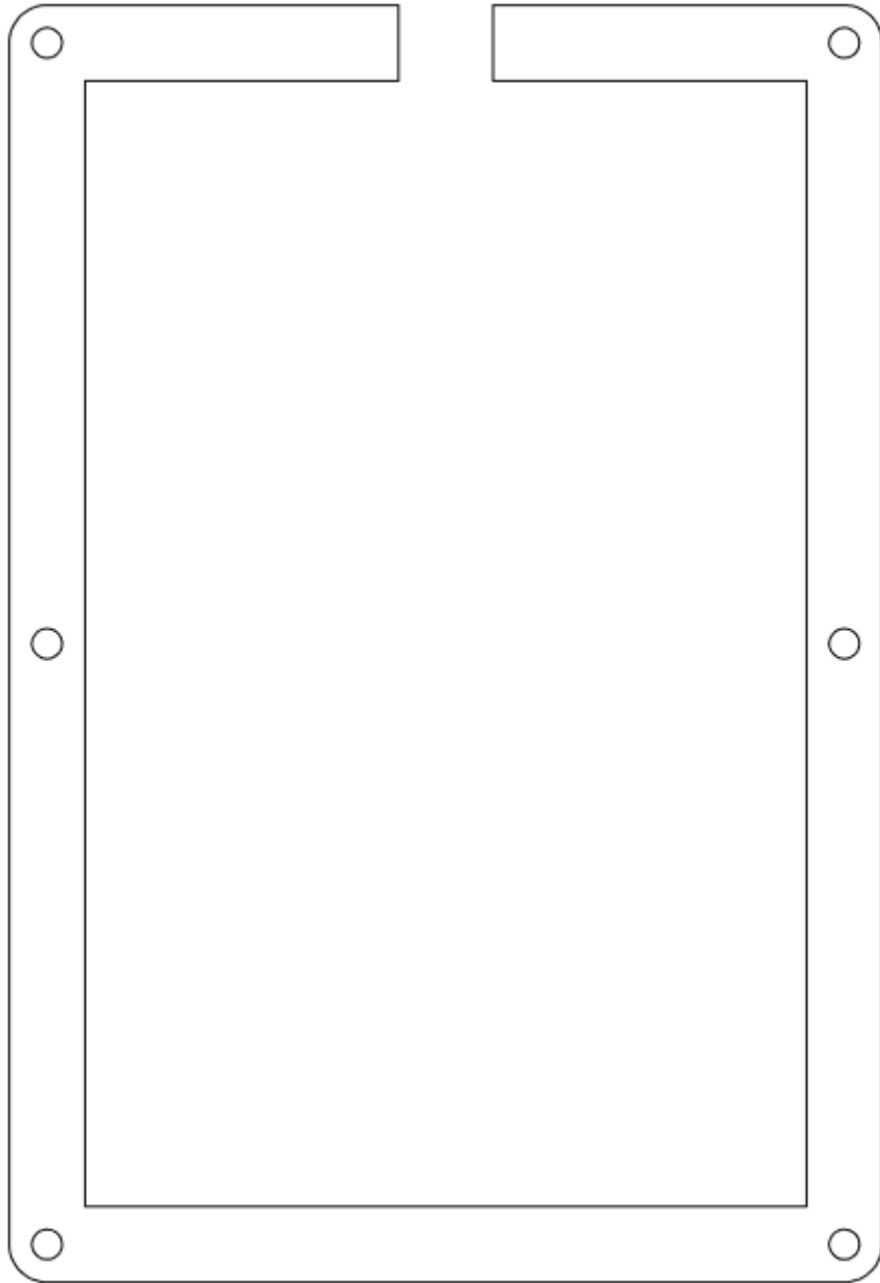
Copy the JSON file output into the site and play around with the settings until you get the look that you want for the plate.

Outputs:



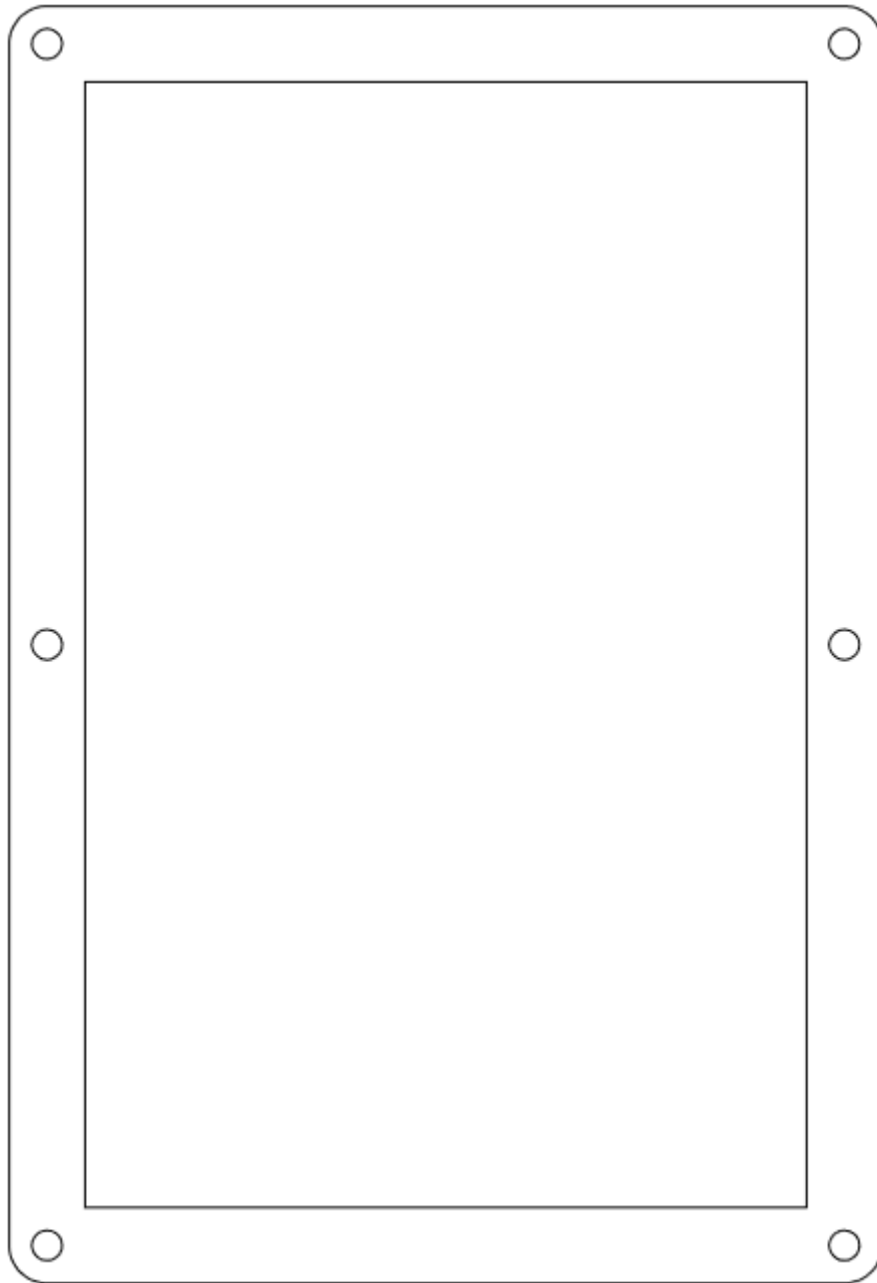
Picture 5: Switch layer

Width: 92.202mm, Height: 135.064mm, Surface Area: 7475.631mm<sup>2</sup>, Cut Path Length: 2042.531mm



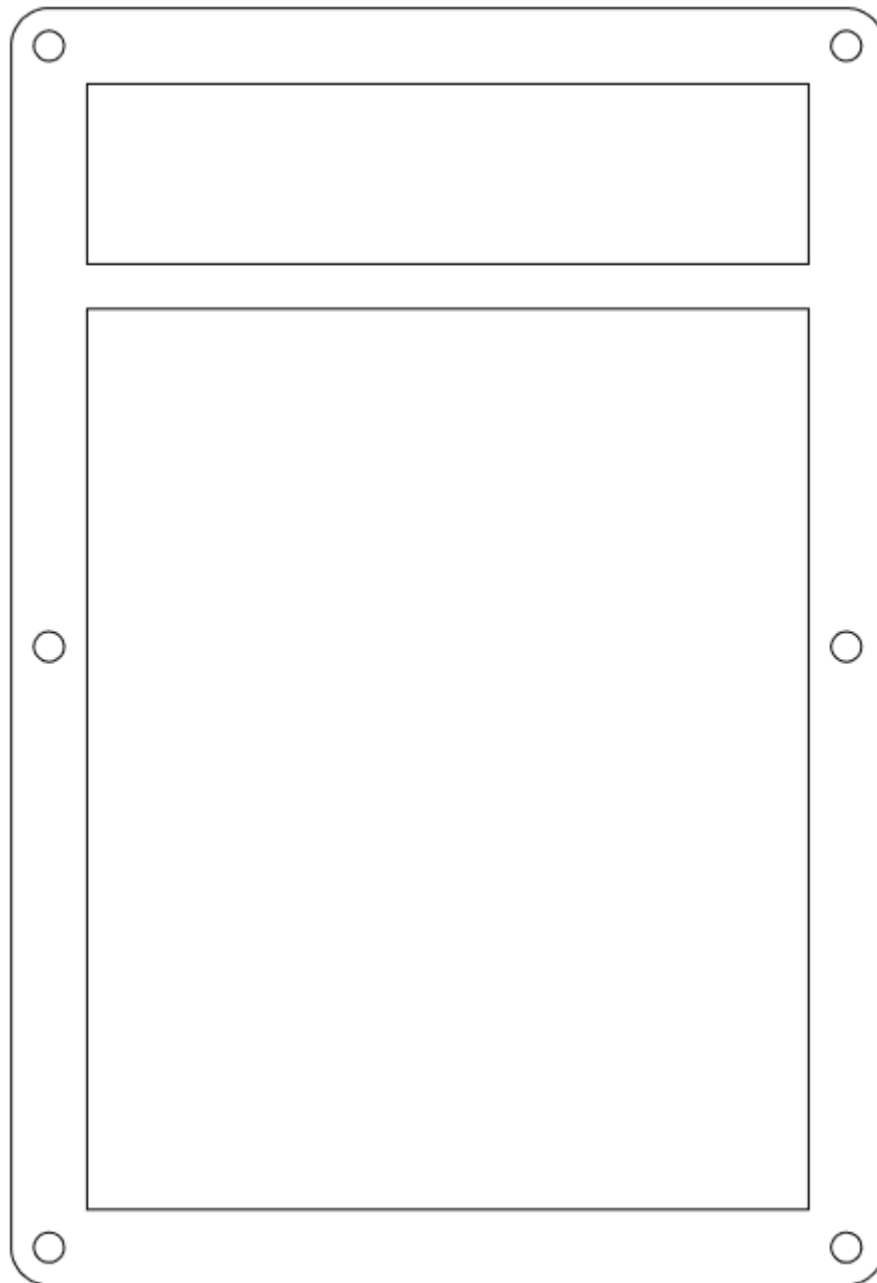
Picture 6: Open layer

Width: 92.202mm, Height: 135.064mm, Surface Area: 3229.085mm<sup>2</sup>, Cut Path Length: 894.256mm



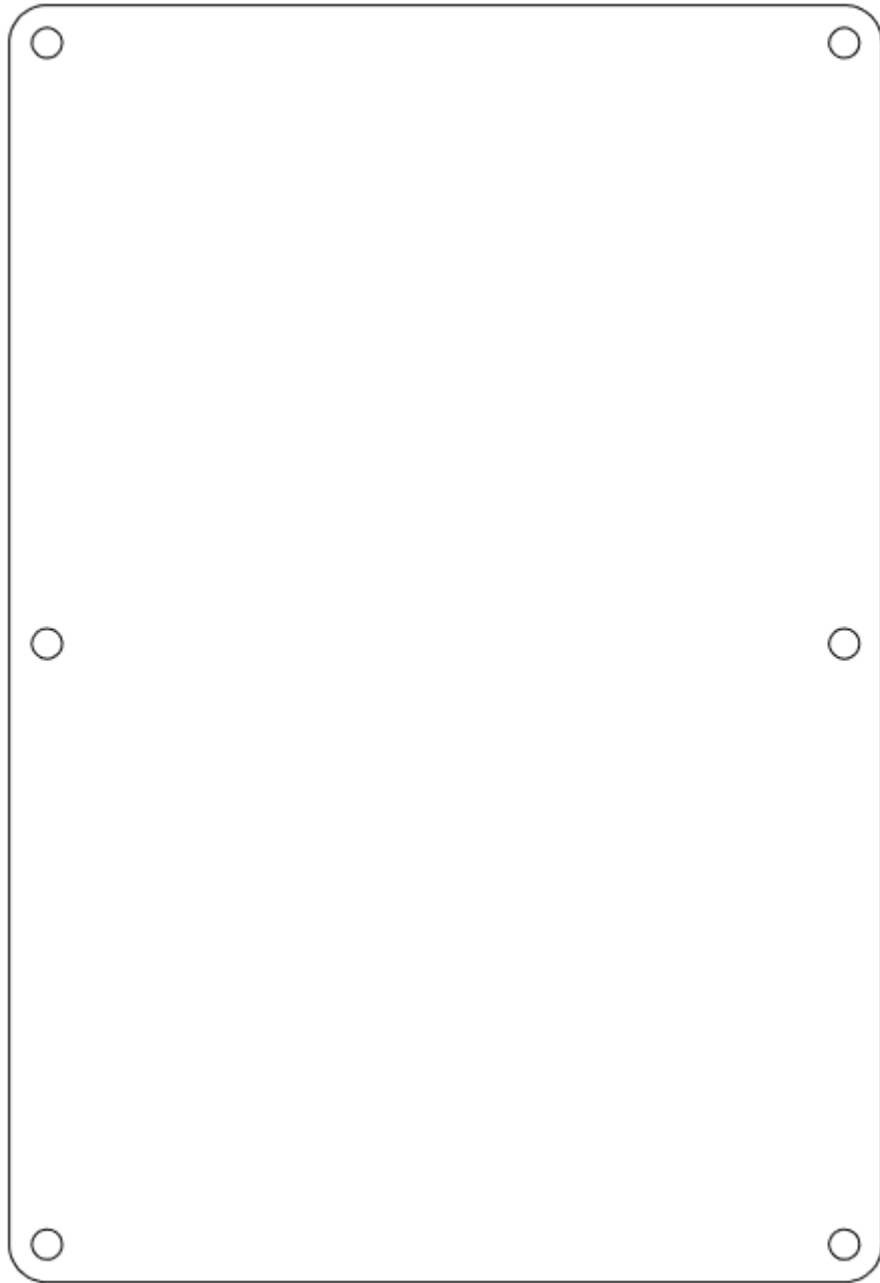
Picture 7: Closed layer

Width: 92.202mm, Height: 135.064mm, Surface Area: 3319.085mm<sup>2</sup>, Cut Path Length: 898.255mm



Picture 8: Top layer

Width: 92.202mm, Height: 135.064mm, Surface Area: 3681.421mm<sup>2</sup>, Cut Path Length: 1041.149mm



Picture 9: Bottom layer

Width: 92.202mm, Height: 135.064mm, Surface Area: 12391.805mm<sup>2</sup>, Cut Path Length: 507.727mm

This gives now a good starting point to start doing 3D modelling for the case. Not all layers are needed but they're also available at the [GitHub](#).



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3D Modelling the numpad:

Modelling software: Fusion 360

**WIP**