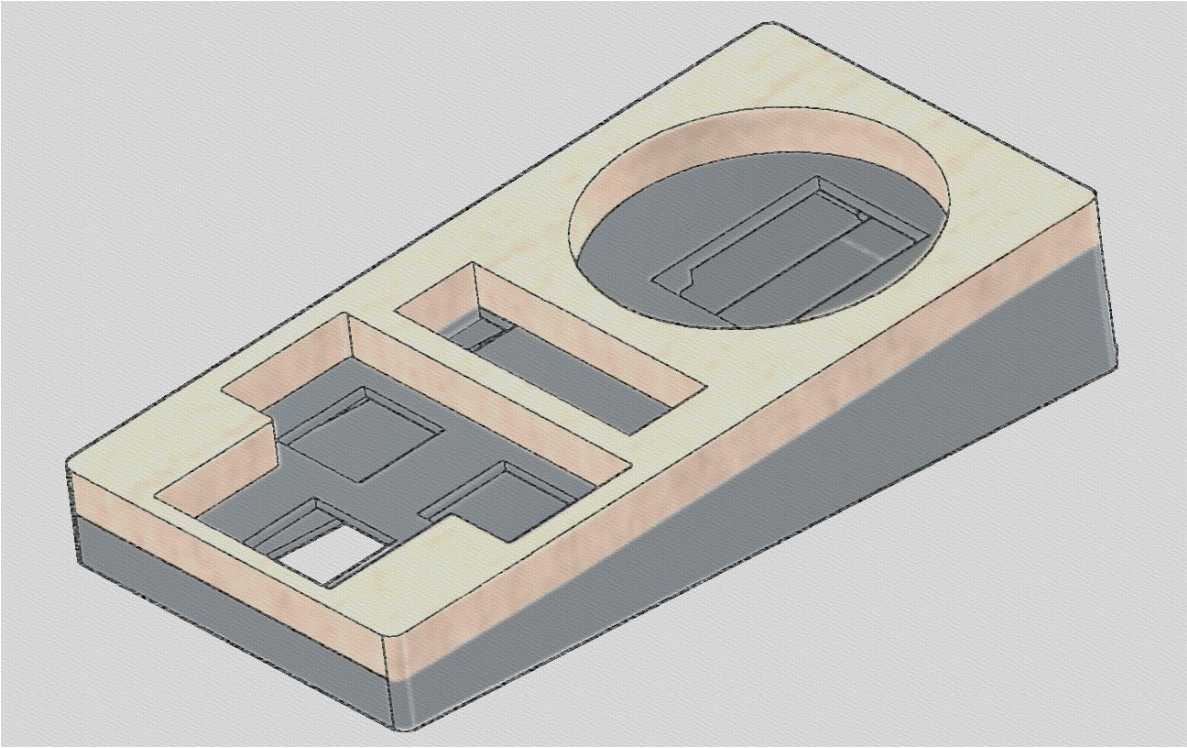
Béton3 // Build Guide

Final Assembly Guide

Welcome to the final Build Guide for Béton3. This Build Guide outlines a basic overview of the final assembly you'll need to do to finish building Béton3.



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Overview

Before starting with final assembly, you will need the following parts and materials in front of you.

1. Top Bezel
2. Main Chassis
3. Bottom Cover
4. Screen Bezel (see Appendix A: Making a Screen Bezel from Polycarbonate)
5. Adhesive Neoprene Foam
6. Concrete Knob (see Appendix B: Casting a Concrete Knob)
7. Pro Micro, with wires soldered directly to it, according to the Soldering Guide
    - **NOTE:** before installing the Pro Micro, it's critical to have the wires soldered to it labeled, because once it is installed in the chassis, it's near impossible to visually see which wire connects to which pin.
8. Rotary Encoder
9. #2 Wood Screws – ¼" long (you'll need at least 4)
10. 3 MX-compatible Switches
11. OLED Display
12. Hot Glue Gun with Hot Glue
13. Soldering Iron
14. Screwdriver
15. A USB cable compatible with your Pro Micro

Attaching the Top Bezel to the Main Chassis

The Béton3 top bezel is connected to the main chassis with 4 wood screws, one in each corner. You'll notice that the screw hole at the top left (looking from the bottom, as in Figure 1) is underneath the Pro Micro's mounting position, hence why this step must be completed first.

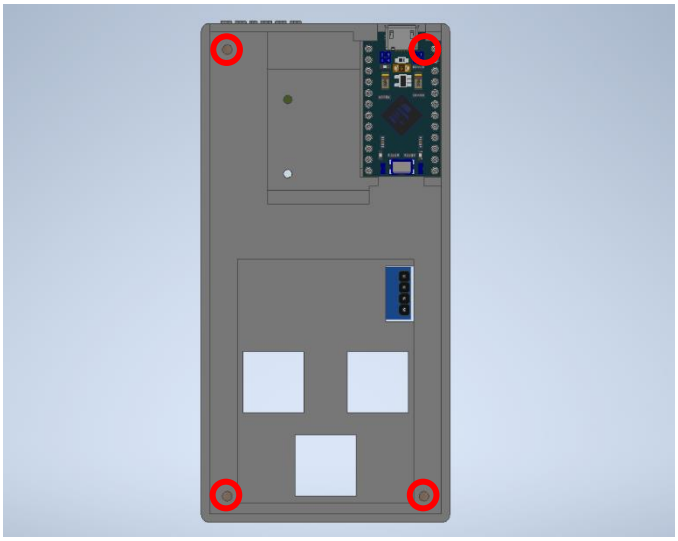

Figure 1 – The screw holes in question.

The top bezel is reversible, so choose the side that you want facing outwards and align the bezel with the chassis. Make sure you peel off any protective layers from the laser-cutting process before screwing into the bezel.

With the chassis on top of the bezel, face down, firmly hold the two pieces together, making sure the edges are perfectly flush on all four sides, and use the ¼ inch #2 wood screws to slowly, gently screw the two parts together. Try to screw in just far enough that the screw is snug, but not too much that you damage the wood underneath. It's probably worth screwing in all four screws a little bit to get the positioning right, then tightening all four in a star pattern (from corner to opposite corner, like a wheel on a car).

When finished, the two parts should fit together snug, with little to no visible gap.

Installing the Pro Micro and Rotary Encoder

Before doing anything else, make absolutely sure that you understand which wires will be connecting to which components (I made this mistake while assembling my own design). Whether that's labeling wires, writing down color codes, or whatever works for you, it's important as the wires will soon be tucked underneath the Pro Micro and solder joints/pins will be hidden.

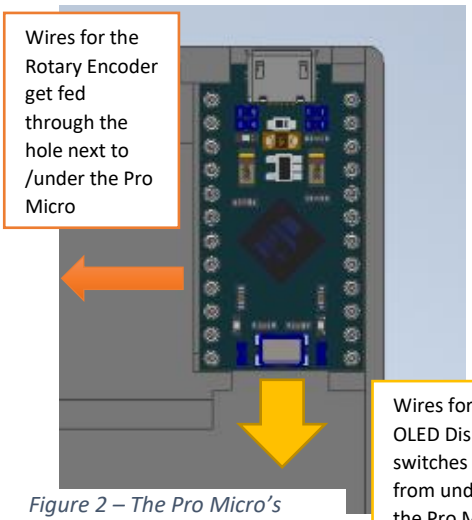

Figure 2 – The Pro Micro's mounting position, and wiring exit directions.

Positioning the Pro Micro

As described in Figure 2, in this next step you'll position and manage the wiring to feed away from the Pro Micro in two primary directions: left and down. Wires connecting to the Rotary Encoder will feed through the adjacent hole outwards to the left, and wires for everything else get tucked underneath the Pro Micro and feed through a gap in the chassis downwards.

Rotary Encoder

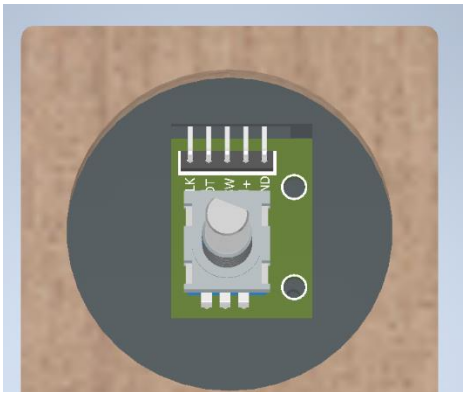

Figure 3 – The Rotary Encoder's mounting position

Once the Pro Micro is in position, connect the Dupont wires to the pre-soldered pins on the Rotary Encoder. The excess wiring for the encoder will now tuck into the back of the chassis and down underneath the Pro Micro.

This step is tricky, as the chassis is purposely designed to be a tight fit for the Rotary Encoder. Once the encoder is wired up, you have to essentially try to pivot it down into the cradle, pushing upwards and down to press fit. If you're having a lot of trouble with this step, you may have to trim the Dupont connectors some more (see **Soldering Guide**), or shorten the wires from the Pro Micro. Once you get it, it should fit snugly against the case, with little movement, and the encoder shaft should be pointing at a 90 degree angle from the case.

Hot Glue

Once both are successfully installed, you'll want to use some hot glue to semi-permanently affix both parts to the chassis. I had success using dabs of hot glue in corners, underneath parts, and between flat sections to keep parts from moving.

Installing the OLED Display and Connecting it

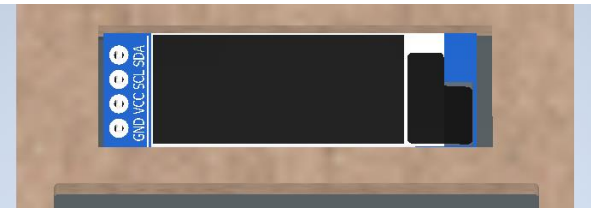

Figure 1 – The OLED Display's mounting position

Now that you've attached the top bezel, mounting the OLED to the chassis is fairly straightforward. The display mounts directly to the chassis through a rectangular cutout in the wooden top bezel roughly the same size as the display's PCB. The pins of the display poke through the chassis hole mentioned in the **Soldering Guide.** When I did this assembly, I used some double-sided 3M mounting tape (the foam-type, thick stuff, with red peel-off film), but hot glue should also work perfectly.

Positioning

One of the simpler steps of this build, you'll basically just want to center the display in the cutout as best as you can and use your mounting method of choice to affix it directly to the plastic.

Black Screen Bezel

If you have a bezel for the screen (see Appendix A: Making a Screen Bezel from Polycarbonate), mounting it is super simple. Use two dabs of hot glue on either side of the PCB, left and right, and position the bezel within the rectangular cutout of the wooden top bezel. Make sure you get rid of any dust on the screen or bezel before mounting.

Wiring

If you've labeled all your wires, this part should be fairly simple. You'll want to carefully bend the pins of the OLED display inwards (towards the left when looking at the bottom of the chassis) and use the Dupont wires soldered to the Pro Micro to connect the display.

Installing Switches, Wiring Them

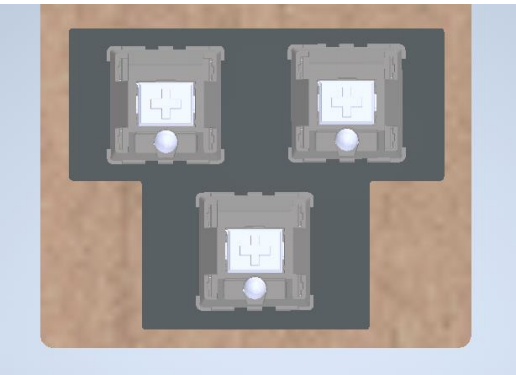

Figure 2 – The switch mounting positions

Now for the fun part – installing the switches! This part is also fairly simple: each switch snaps into it's designated mounting hole in the chassis. If desired, and depending on the tolerances of the 3d printed chassis, you can also use hot glue to further secure each switch into the chassis.

Wiring

Each switch has two pins, which get soldered to either a ground wire, or a wire directly connected to a pin on the Pro Micro. The details of this wiring are listed in the Soldering Guide. Since you should already have loose wires intended to connect to each switch, this step is just a matter of wrapping each respective wire around a pin on a switch and using a soldering iron to connect them.

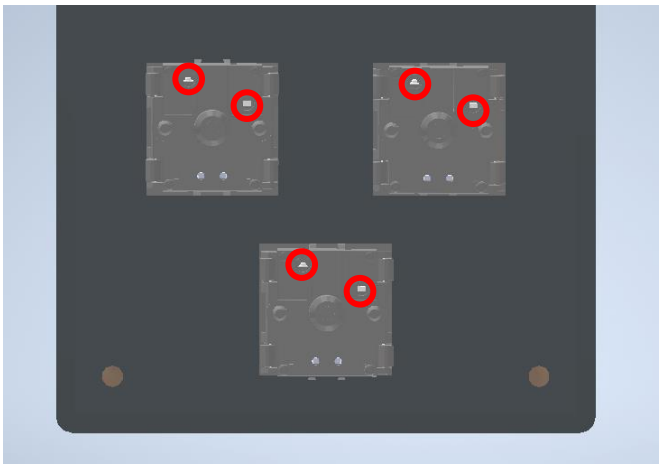

Figure 6 – Looking at the bottom of the chassis, the bottom of each switch and their respective pins (highlighted).

NOTE: I found that Switch #1 (the closest to the front edge of the unit), should have its pins bent slightly towards the back of the unit, just to avoid any clearance issues with the sliding bottom cover.

Installing the Concrete Rotary Encoder Knob

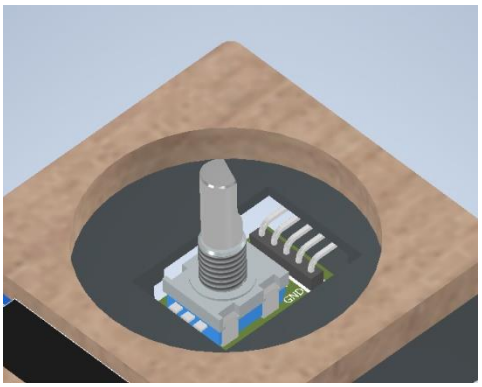

Figure 7 – The Rotary Encoder's shaft

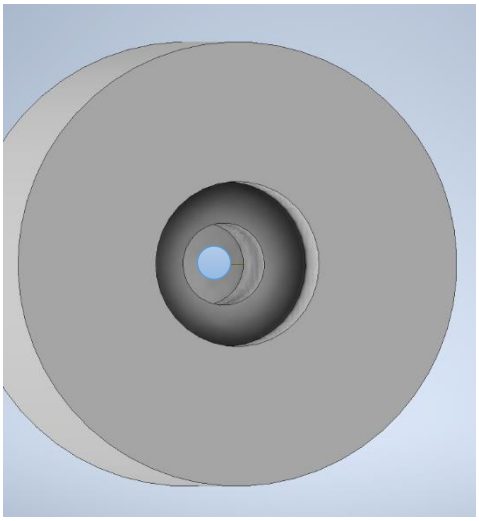

Figure 8 – The hypothetical underside of a concrete knob

For the final major step, you'll need to install the Concrete Knob onto the Rotary Encoder. This step is also fairly simple, but don't be afraid to do some trial-and-error to get it perfectly centered.

Procedure

What you're basically doing in this step is attaching the innermost hole to the rotating shaft of the Rotary Encoder. When the concrete knob comes out of the mold (see Appendix B: Casting a Concrete Knob if you need to cast one), it has a hole on the bottom that looks something like Figure 8 to the left.

What you want to do is essentially put one or two pumps of hot glue into the innermost hole, marked by the blue dot, and then quickly press the knob onto the rotary encoder shaft before the glue cools.

I've found that the best way to do this is to prop up the whole chassis with something small like a bottle cap first, to get rid of the slight angle in the case and make the top mostly level. Then, put some hot glue into the knob, center it above the circular cutout in the wooden bezel, and slowly press down onto the shaft of the rotary encoder, making sure to apply uniform pressure on all sides of the knob (eg: use the tips of your fingers on the side of the knob, don't press down on the knob with your palm)

Hold the knob there for about 30 seconds while the hot glue hardens. When it does, you should be able to let go and spin the knob freely, without any scraping.

If the knob does scrape against the wooden bezel, you can gently peel it off of the shaft by rocking it back and forth while applying even pressure upwards. This is definitely a trial-and-error step, so do this as many times as you see fit until you have a result you're satisfied with.

Installing the Bottom Sliding Cover

Molded into the main chassis, there are two "rails" along the left and right walls that accept a sliding bottom cover to finish off this build. Before sliding on this cover, one last step you may want to do involves sticking on some neoprene foam to prevent the whole unit from sliding around on your desk.

Cut two strips of neoprene, roughly according to the dotted rectangles in Figure 8.

The strip of neoprene furthest away from the back "lip" should be large enough to cover the slight cutout in the sliding cover (as mentioned before, this cutout allows the whole unit to be thinner and provides clearance for the switch pins underneath it)

Once completed, simply slide the bottom cover into the main chassis, making sure the rear lip of the bottom cover matches up with the rear wall of the chassis.

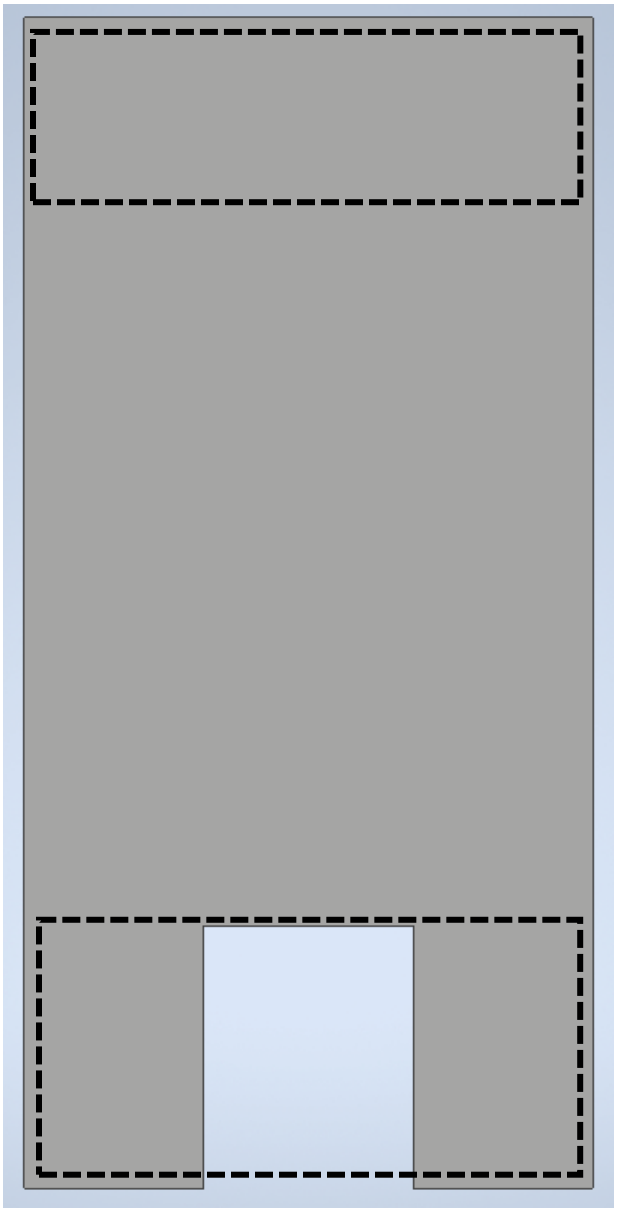

Figure 8 – The underside of the bottom sliding cover, with rectangles representing where foam should be stuck on.

Congratulations! You have assembled Béton3.

If you will be using the stock firmware, proceed to **Appendix C: Flashing Stock Firmware** to install it.