

X-Days @ X-Hain hack+make space

Build-a-Synth Workshop  
September 26, 2025

# Tarie

Handheld Virtual Analog Stylus Synthesizer

Design by  
**Tinabel**  
@SoftEgg

Operations Manual

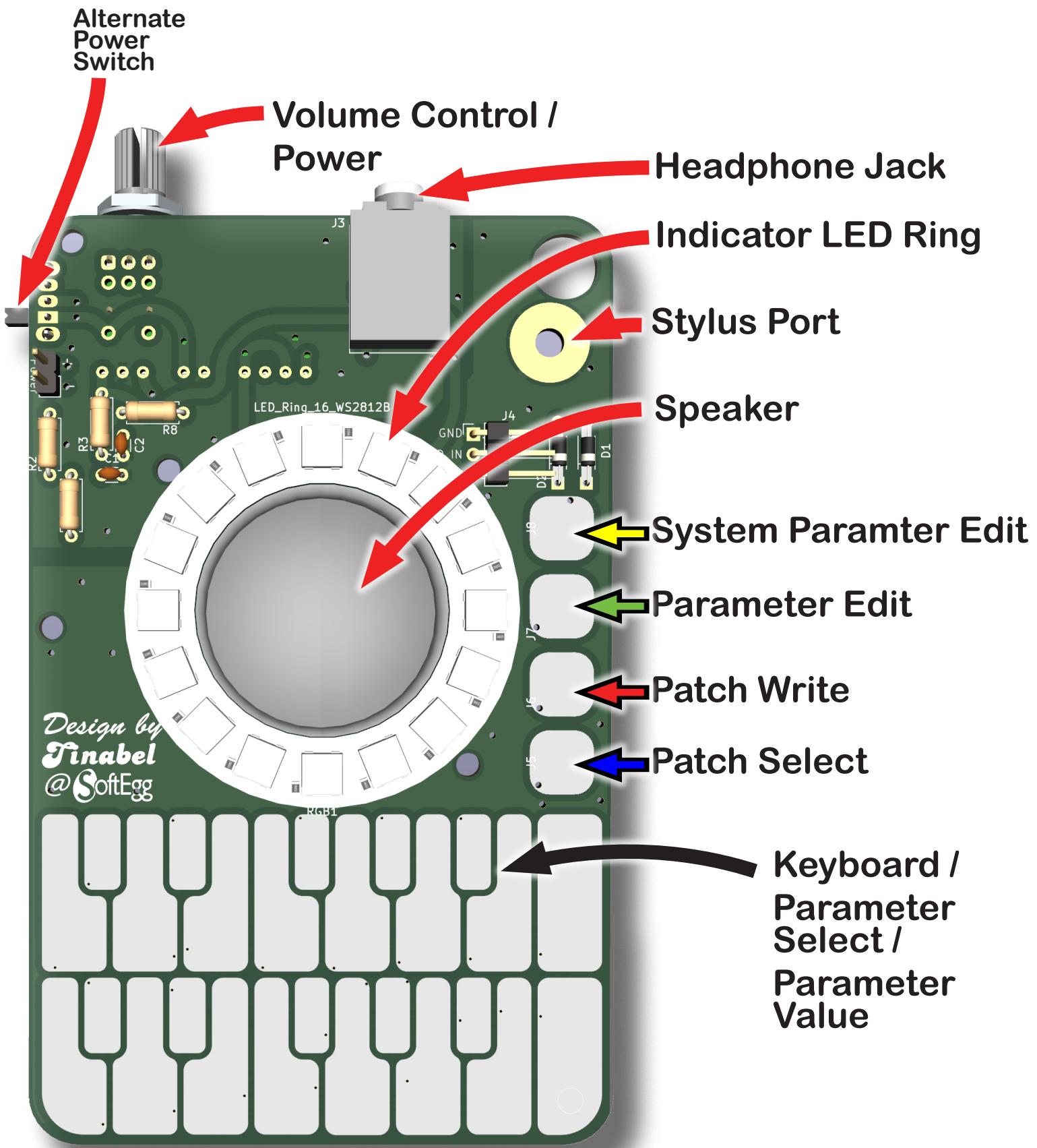
designed by

**Tina  
Belmont**

# User Map

## Front

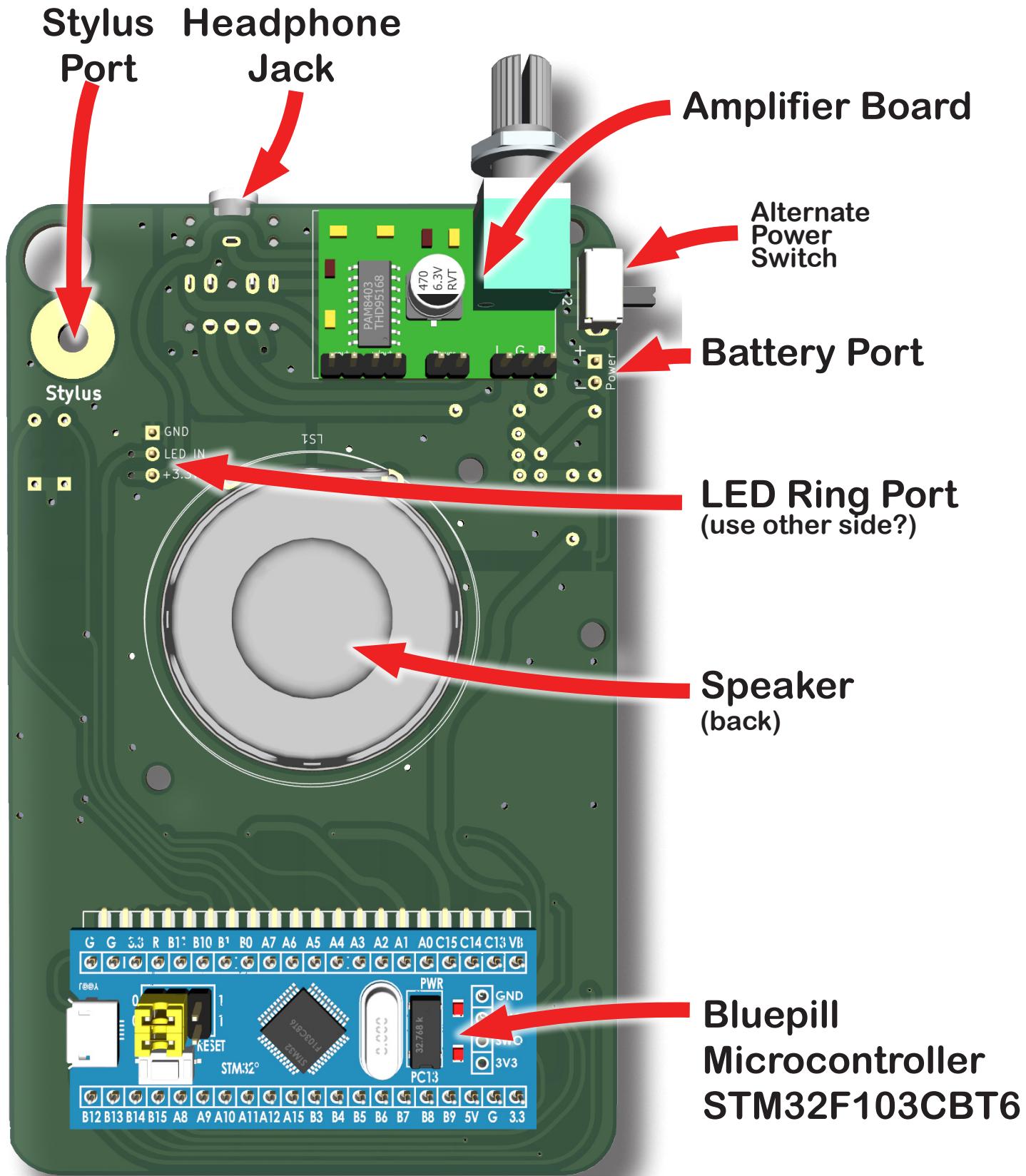
*Where to find controls and I/O.*



# User Map

## Back

*Where to find boards and I/O.*



# CONTROLS

## PATCH SELECT -



Loads a sound to play on the keyboard from memory.

Tap once and the LED ring flashes BLUE

Tap on the keyboard to select a sound to load

The new sound will play.

Tap on different keys until you hear the sound that you want to load.

Tap PATCH SELECT again to keep playing that sound.

Tapping any other button will abort and use the previously selected sound.

BLUE flashing light will stop to indicate PATCH SELECT mode is no longer active.

You can now play the keyboard normally.

## PATCH WRITE -



Writes the current sound to a different slot in memory.

Tap once and the LED ring flashes RED

Tap on the keyboard to select a sound to overwrite.

The sound currently in the selected slot will play.

Tap on different keys until you hear the sound that you want to overwrite with the current sound.

Tap PATCH WRITE again to overwrite that sound with the current sound.

Tapping any other button will abort and use the previously selected sound.

RED flashing light will stop to indicate PATCH WRITE mode is no longer active.

You can now play the keyboard normally.

# CONTROLS

## PARAMETER EDIT -



Changes parameter values of the current sound.



Tap once and the LED ring flashes GREEN on the left side only.



Tap on the keyboard to select a PARAMETER VALUE to change.



The LED ring will alternate between

- right half GREEN
- the PARAMETER NUMBER bargraph
- and the PARAMETER VALUE bargraph

Tap on the keyboard to select a new value for the selected parameter. The parameter value will update (the bargraph will reflect this).

The sound will also play at key pitch with the new value.

Tap PARAMETER EDIT again to keep the change.

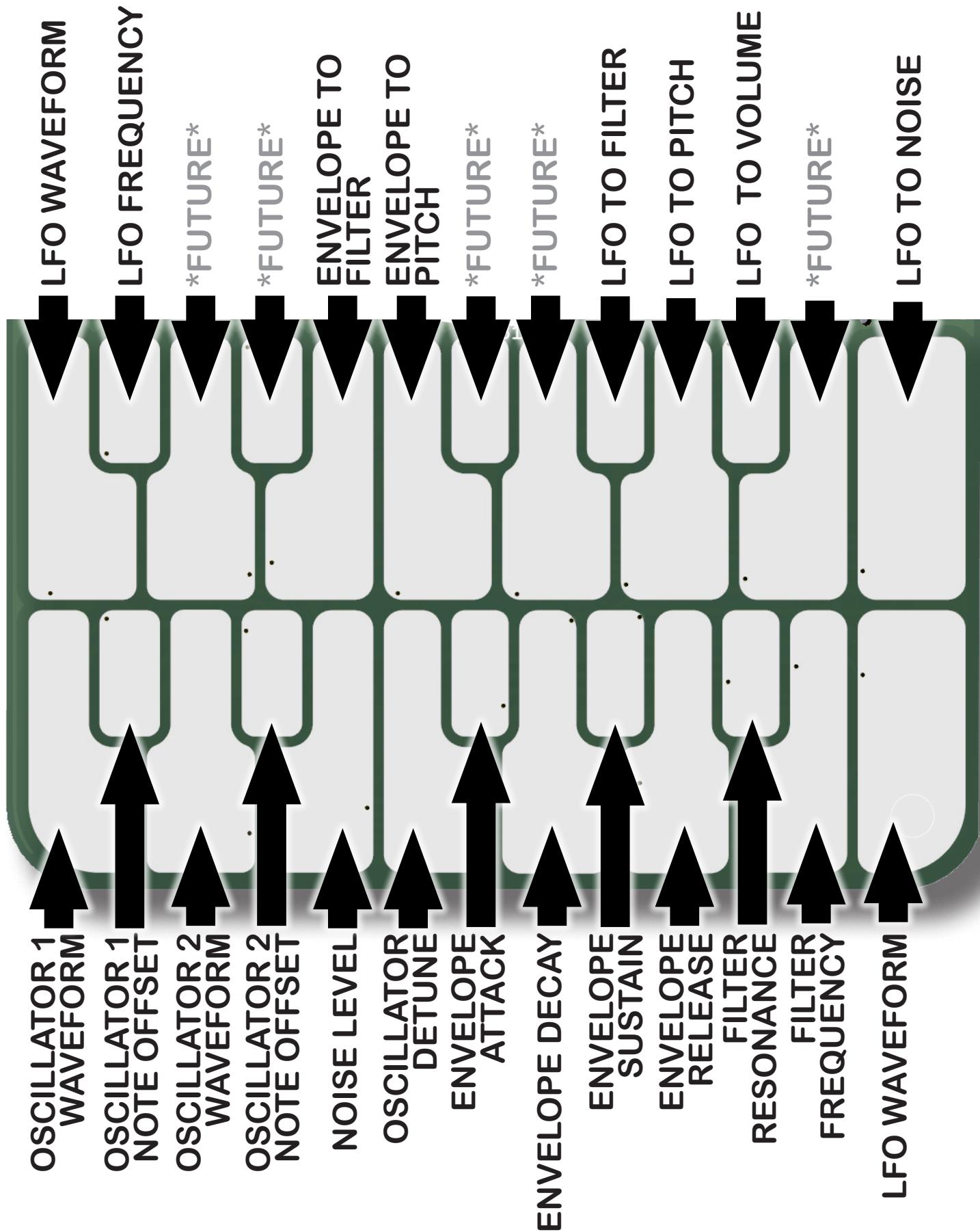
Tapping any other button will abort and use the previously selected value for the parameter.

GREEN flashing light will stop to indicate PARAMETER EDIT mode is no longer active.

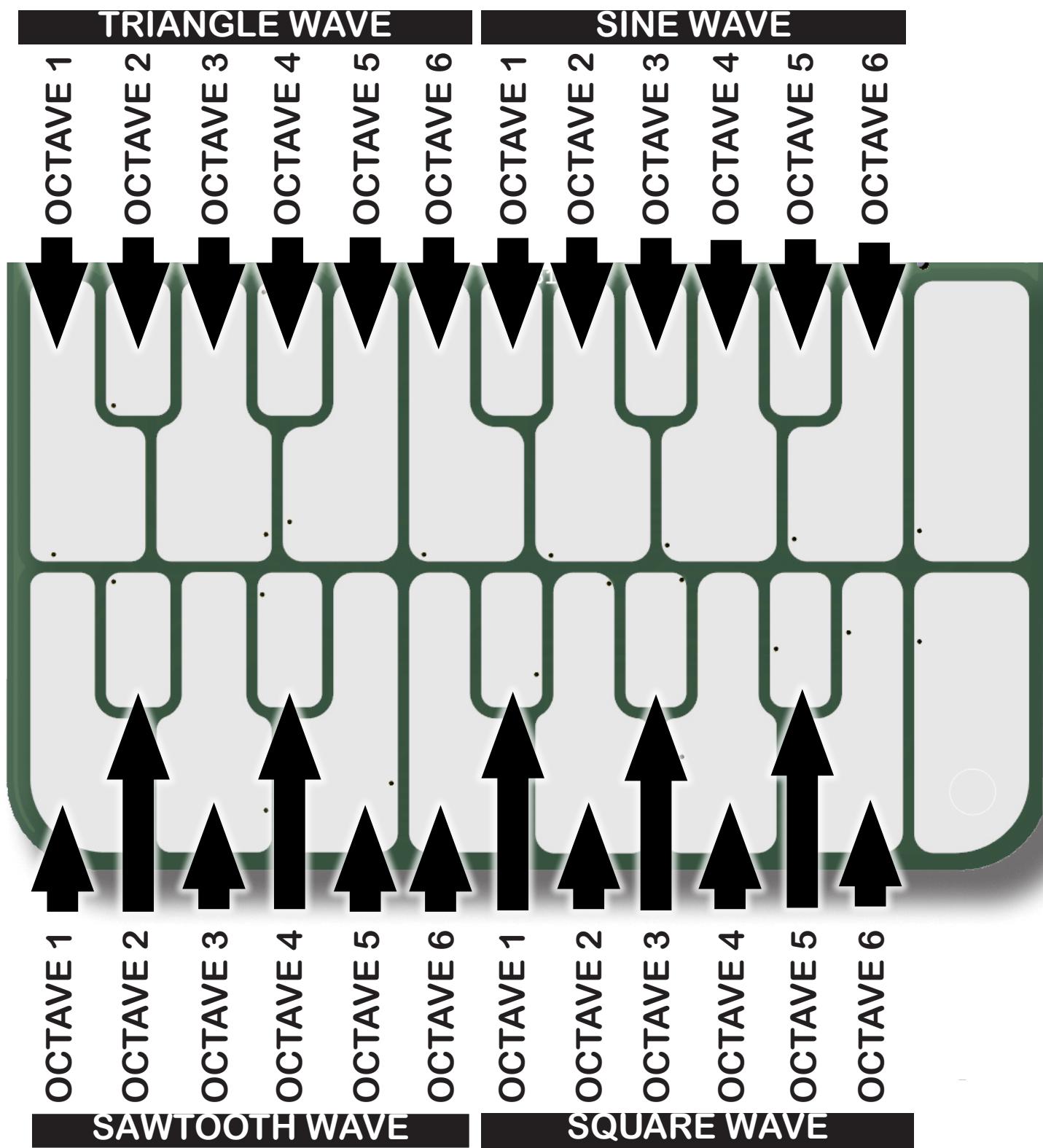
You can now play the keyboard normally.

The mapping of PARAMETER VALUE to KEY is on the next page.

# PARAMETER EDIT



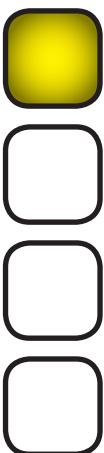
# OSCILLATOR 1,2 WAVEFORM



\* LFO WAVEFORM IS THE SAME BUT NO OCTAVE

# CONTROLS

## SYSTEM PARAMETER EDIT



Changes a **GLOBAL PARAMETER VALUE**

Tap once, and LED ring flashes **YELLOW** on the left side only.

Tap on the keyboard to select a **GLOBAL PARAMETER** to edit.

The LED ring will alternate between:

- Right half **YELLOW**
- **SYSTEM PARAMETER NUMBER** bargraph
- **SYSTEM PARAMETER VALUE** bargraph

Tap on the keyboard to select a new value for the selected **SYSTEM PARAMETER**.

The **SYSTEM PARAMETER VALUE** will update (the bargraph will reflect this).

The sound will also play at key pitch with the new value.

Tap **SYSTEM PARAMETER EDIT** again to keep the change.

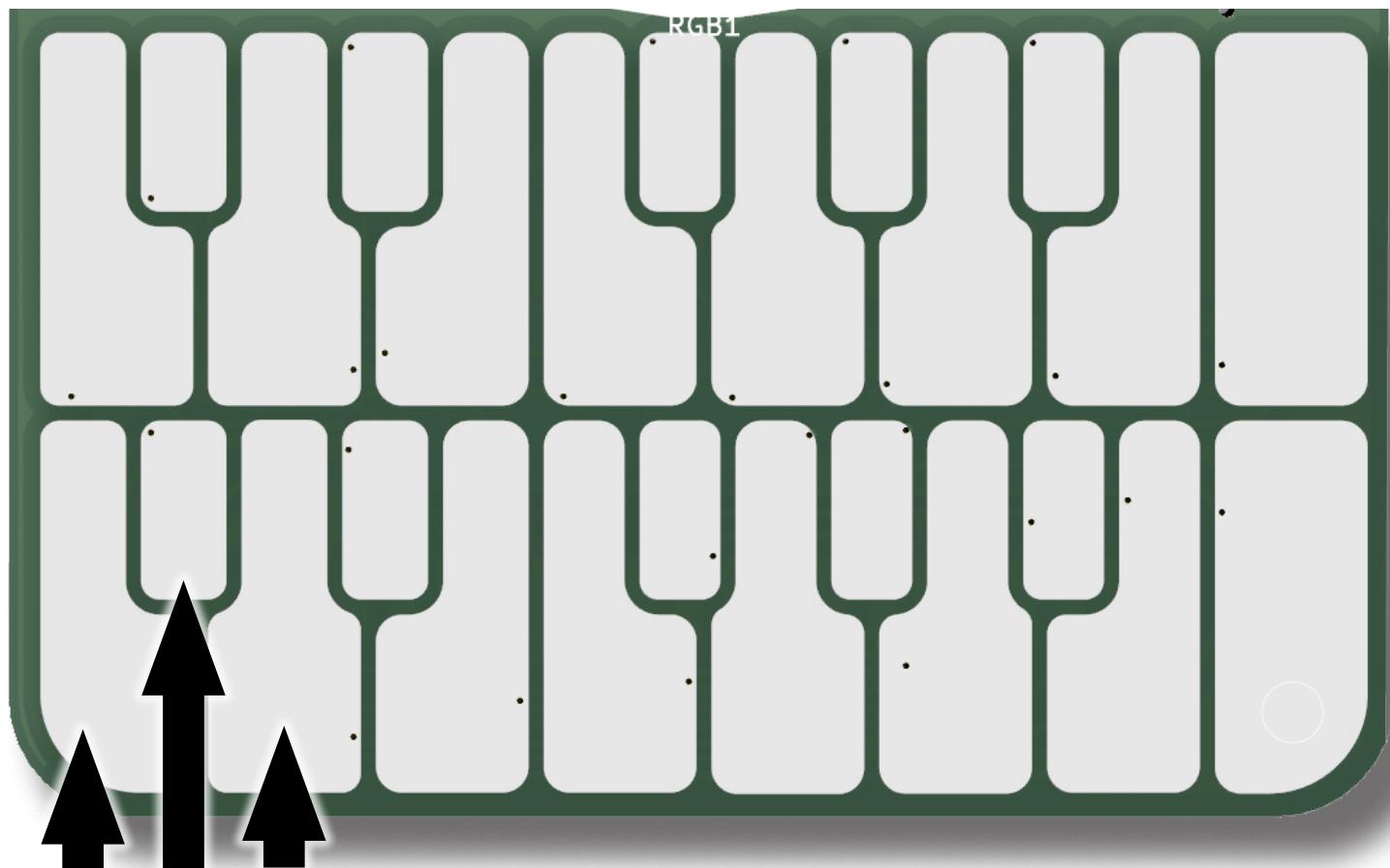
Tapping any other button will abort and use the previously selected value for the parameter.

**YELLOW** flashing light will stop to indicate that the **SYSTEM PARAMETER EDIT** mode is no longer active.

You can now play the keyboard normally.

The **SYSTEM PARAMETER** list on the next page.

# SYSTEM PARAMETERS



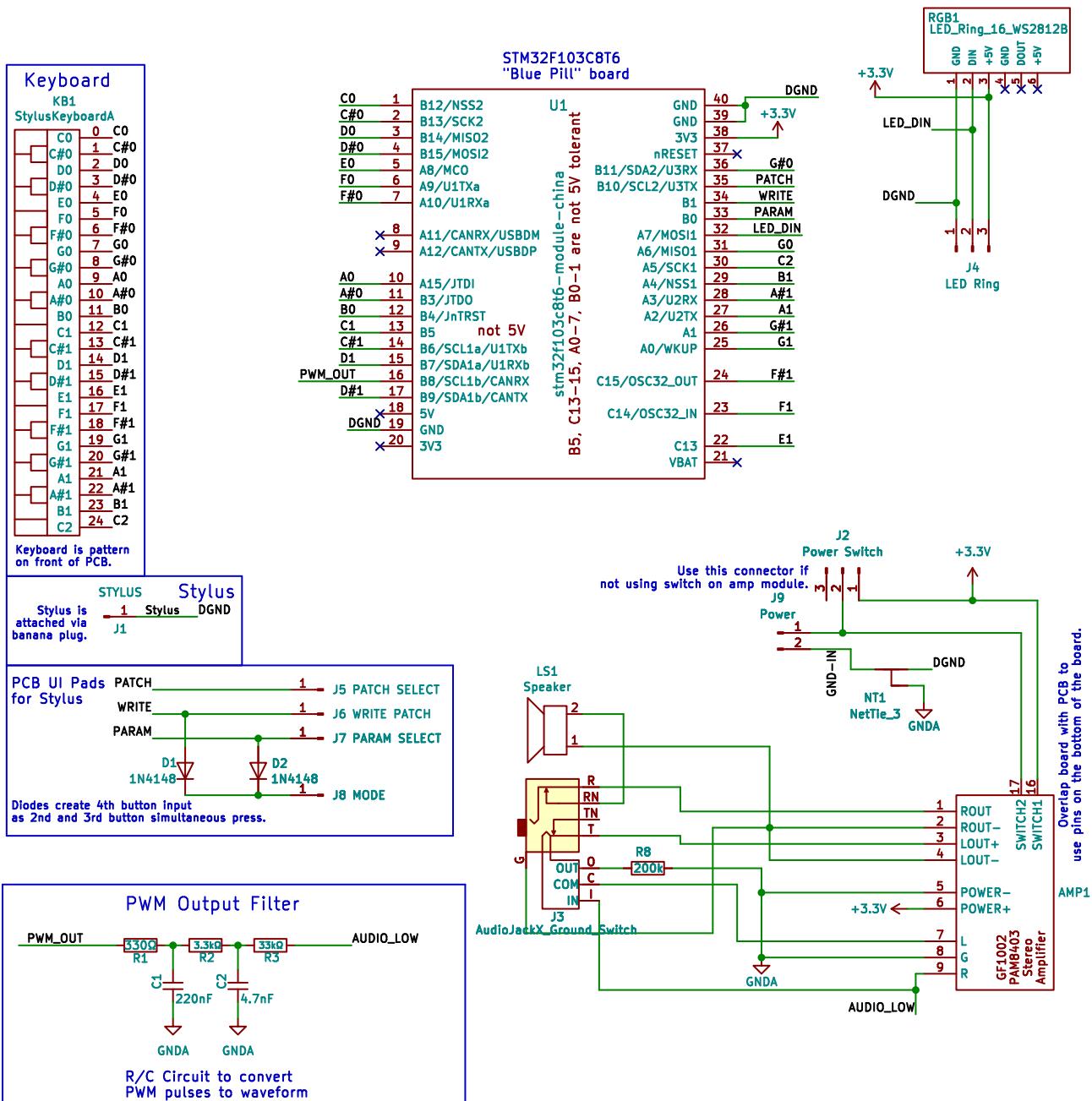
LED BRIGHTNESS

COARSE TUNING (NOTE)

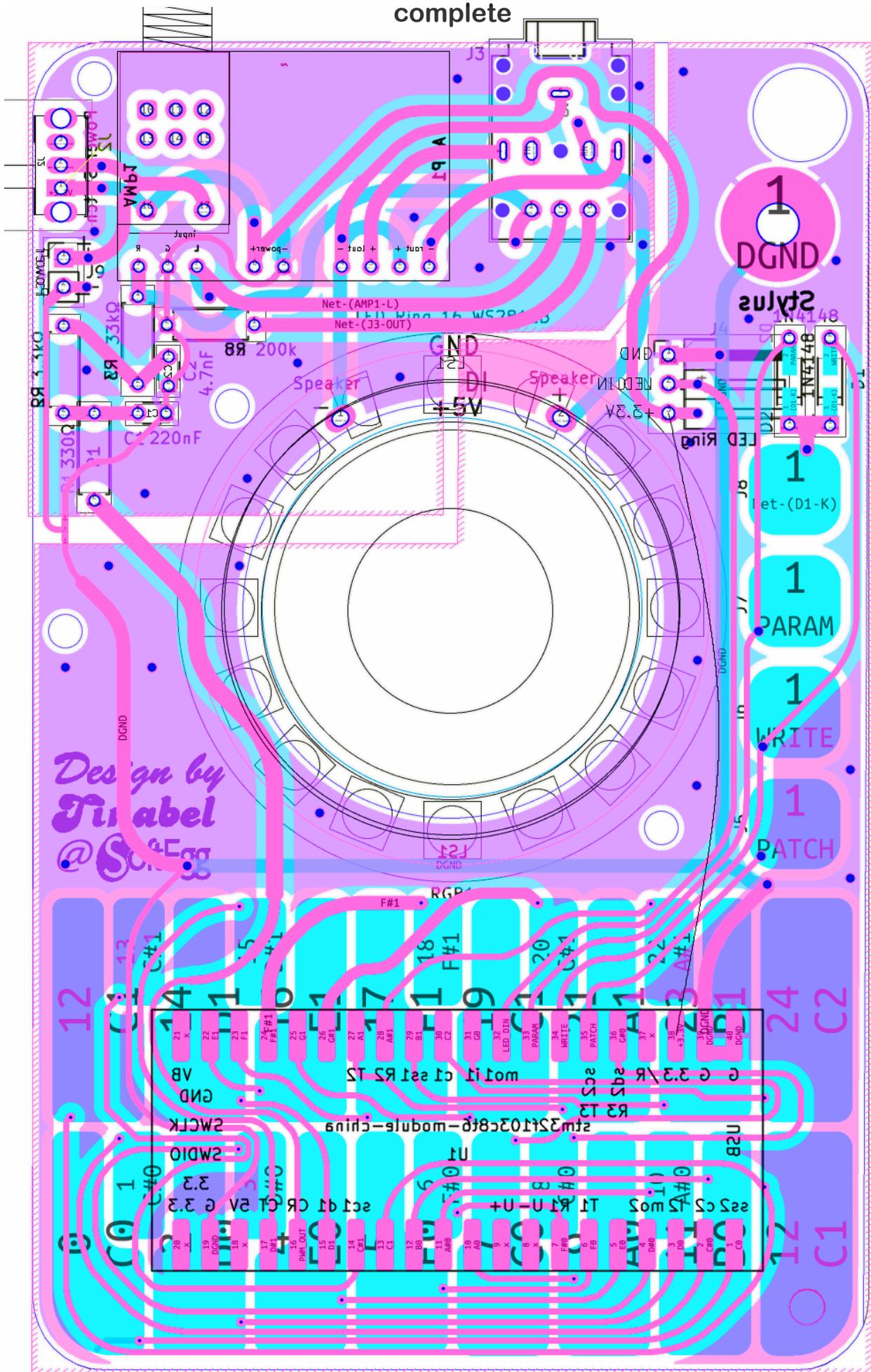
FINE TUNING (2 CENTS)

\*FUTURE\*

# SCHEMATIC DIAGRAM



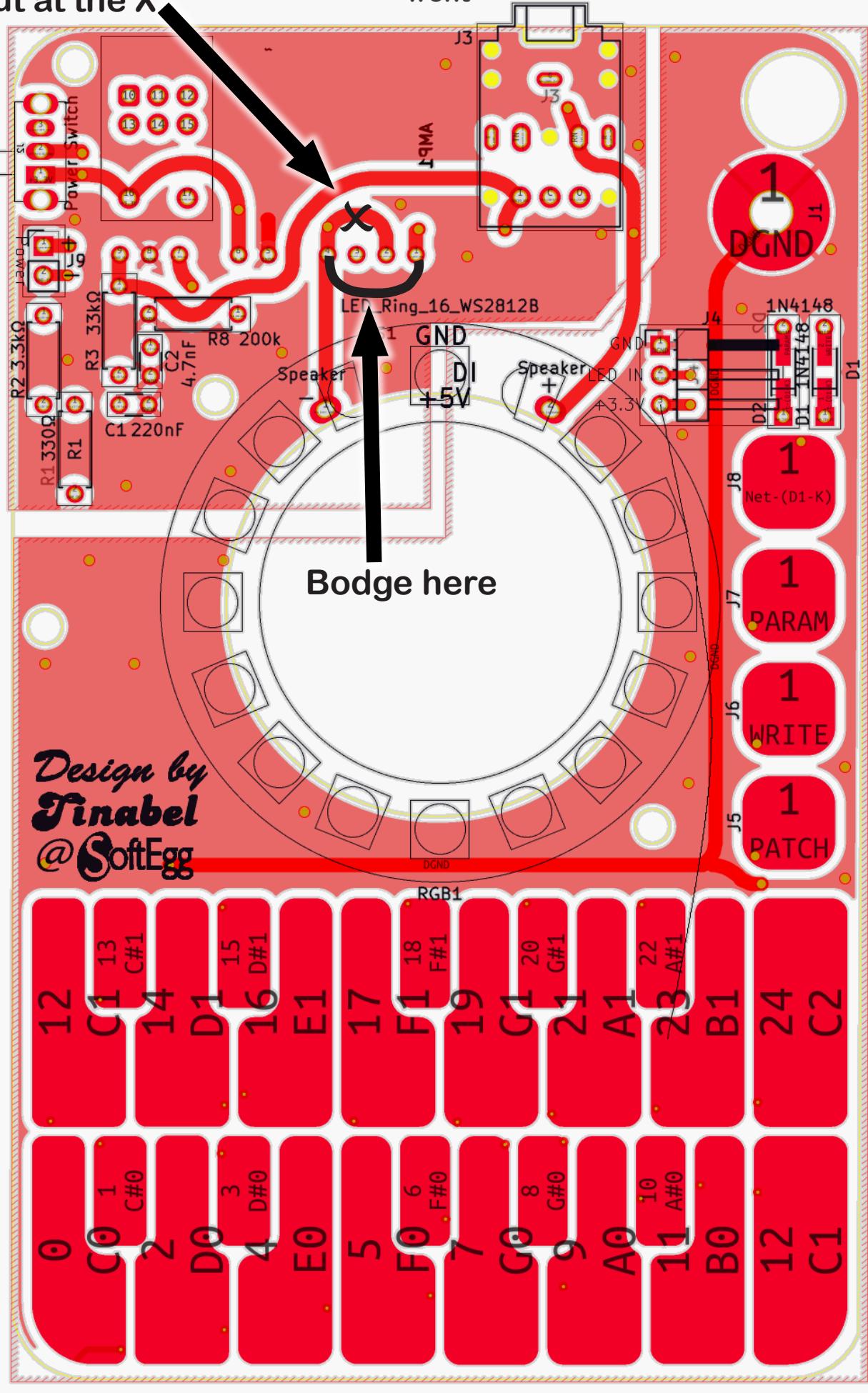
**PCB**  
complete



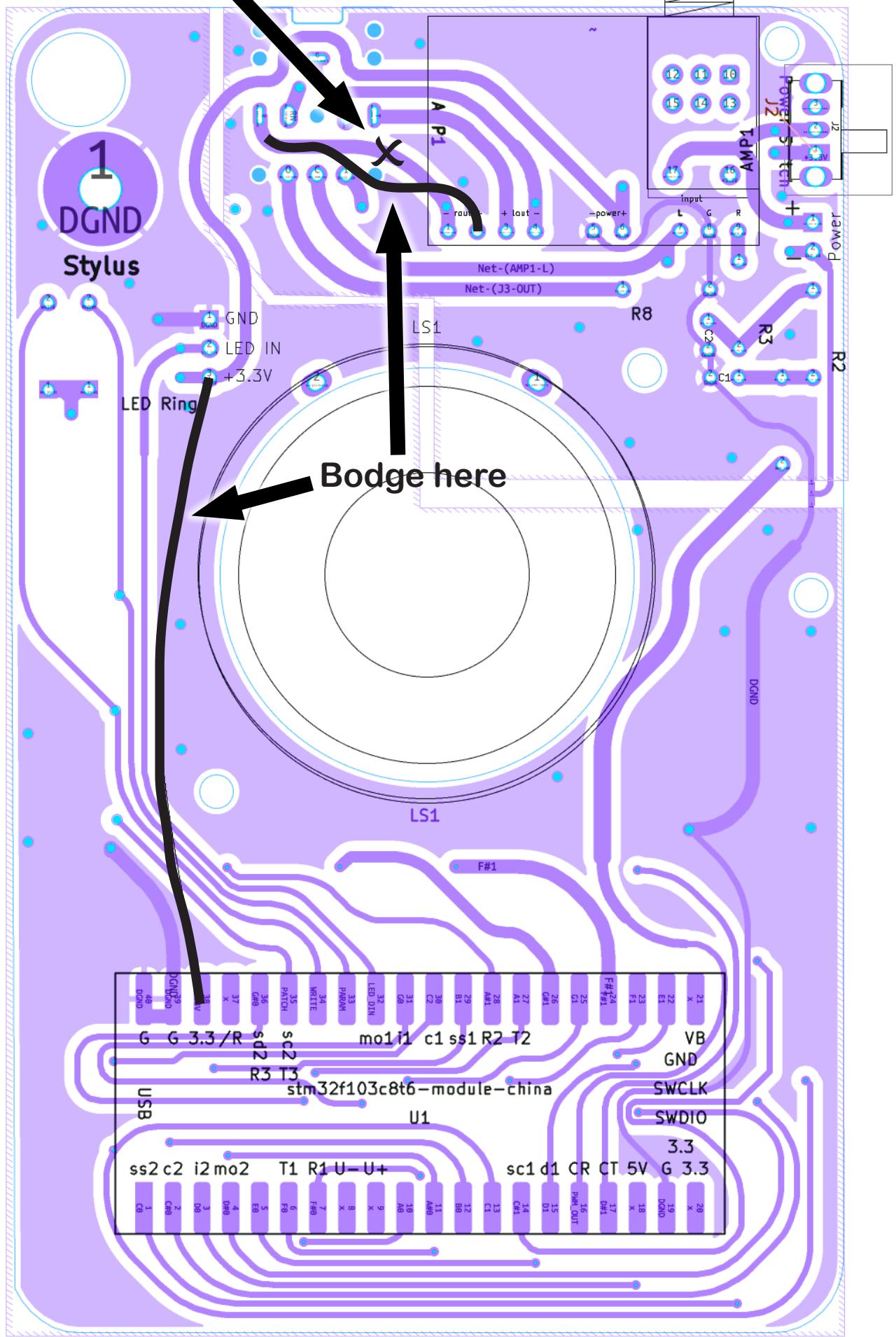
# PCB

front

Cut at the X

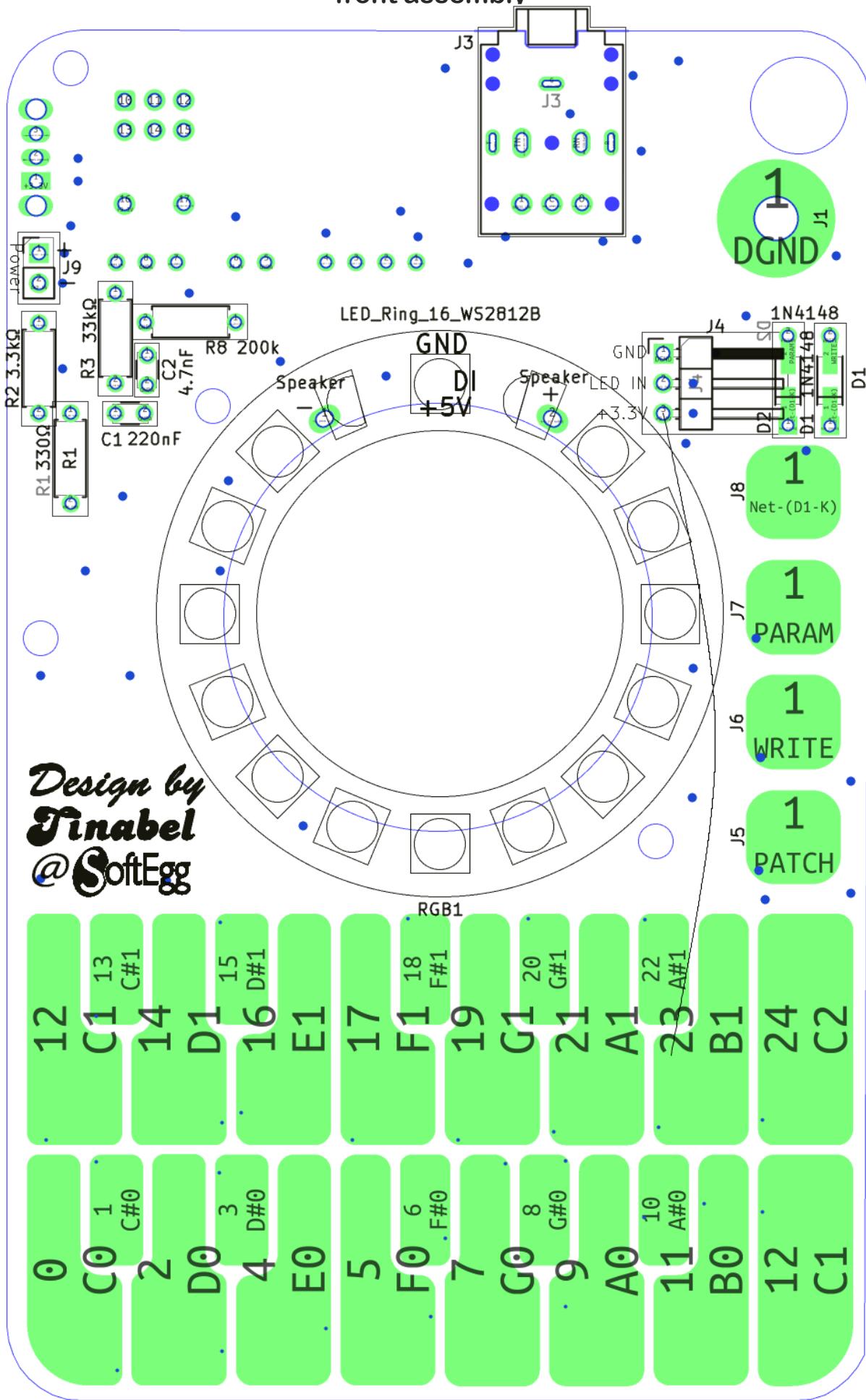


Cut at the X  
PCB back



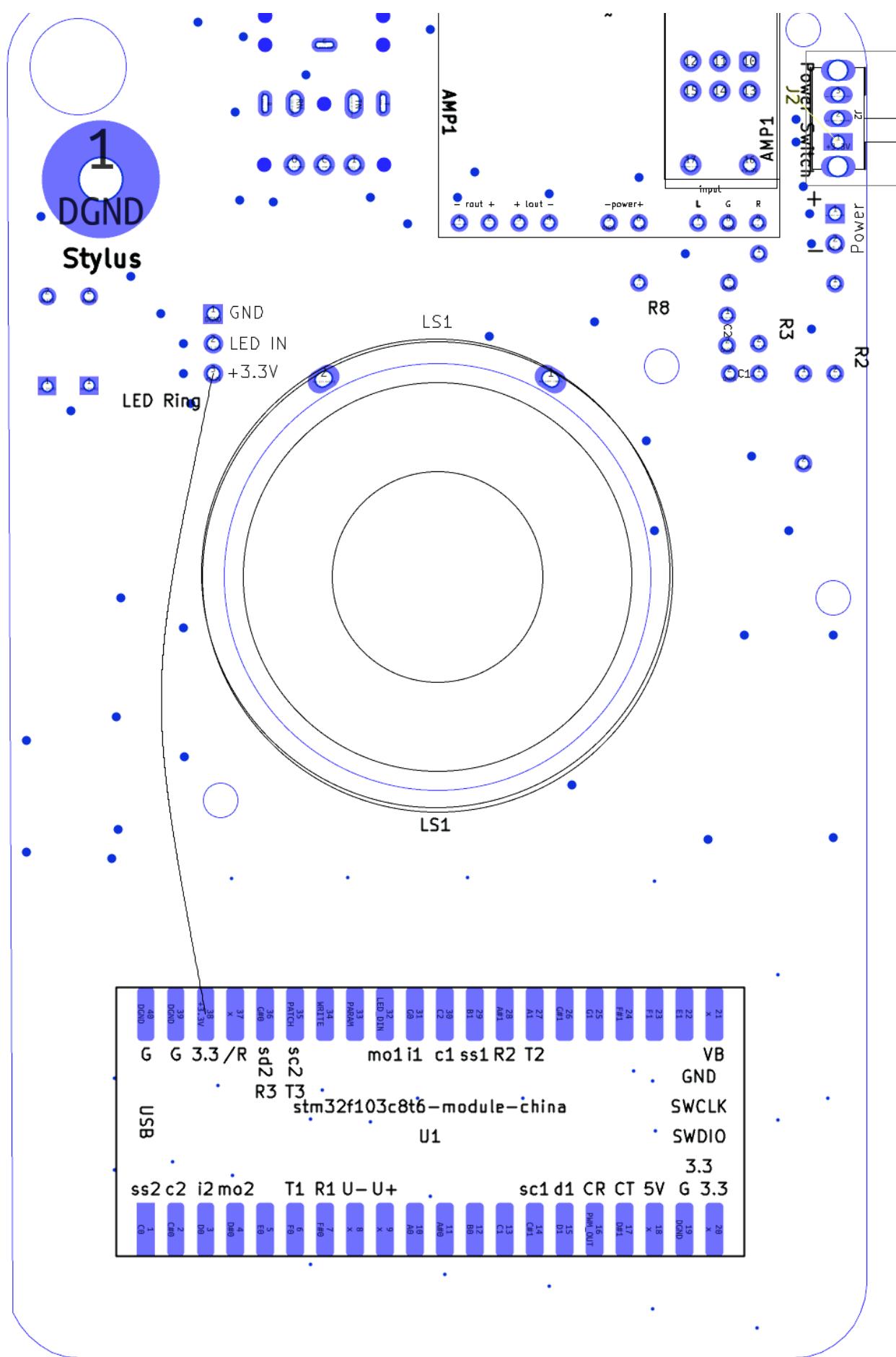
# PCB

front assembly



# PCB

back assembly



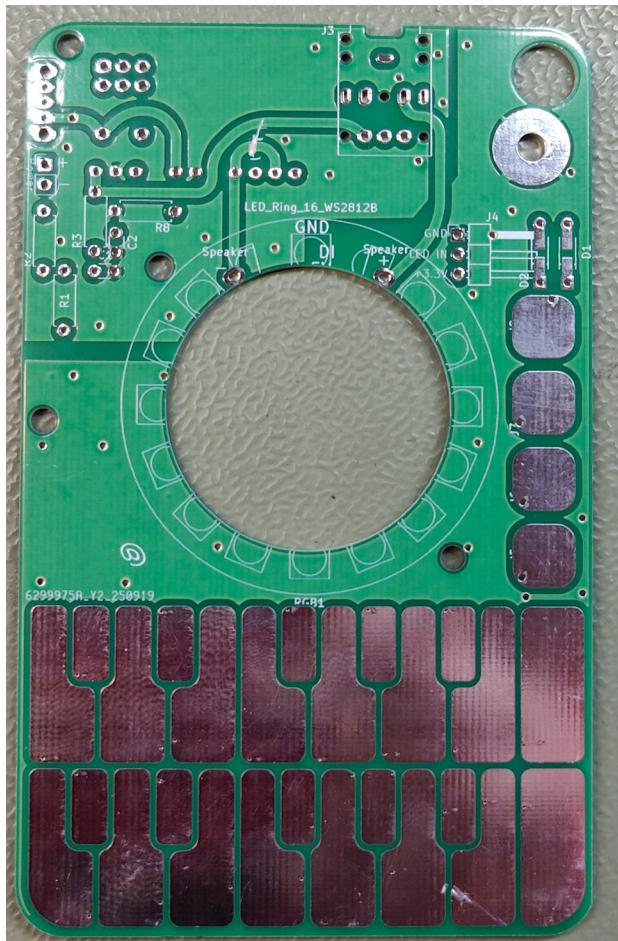
# Bill of Materials

## components assembly checklist

Id	Designator	Footprint	Quantity	Designation	Markings
1	U1	PinSocket_1x20_P2.54mm_Horizontal	2	Pin sockets for Bluepill Board 20 pin right angle 2.54mm pin pitch	Black, 20 pin socket
2	U1	PinHeader_1x20_P2.54mm_Horizontal	2	Pinheaders that come with the bluepill board	Yellow
3	U1	stm32f103c8t6-module-china-smd	1	BluePill board stm32f103c8t6	
4	R1	R_Axial_DIN0207_L6.3mm_D2.5mm_P7.62mm_Horizontal	1	330Ω	Orange Orange Black Black Brown
5	R2	R_Axial_DIN0207_L6.3mm_D2.5mm_P7.62mm_Horizontal	1	3.3kΩ	Orange Orange Black Brown Brown
6	R3	R_Axial_DIN0207_L6.3mm_D2.5mm_P7.62mm_Horizontal	1	33kΩ	Orange Orange Black Red Brown
7	R8	R_Axial_DIN0207_L6.3mm_D2.5mm_P7.62mm_Horizontal	1	200k	Red Black Black Orange Brown
8	C2	C_Disc_D3.0mm_W1.6mm_P2.50mm	1	4.7nF	473 (smaller, orange/tan)
9	C1	C_Disc_D3.0mm_W1.6mm_P2.50mm	1	220nF	224 (larger, red)
10	D2,D1	D_DO-35_SOD27_P7.62mm_Horizontal+SMD	2	1N4148	
11	AMP1	3-2-4 pinheader for Amplifier board	1	Modified pinheader	A pinheader with some pins removed to fit the amplifier board.
12	AMP1	GF1002-PAM8403_Amplifier_Module_w_bottom_pins	1	GF1002-PAM8403 Amp board	
13	J3	Jack_3.5mm_PJ-307A_Horizontal	1	3.5mm audio jack with switch	
14	LS1	Speaker 40mm	1	Speaker 40mm	
15	J4	PinHeader_1x03_P2.54mm_Horizontal	1	Optional pinheader for LED Ring	Black, 3pin right angle
16	RGB1	LED RING 16 WS2812B 48mm	1	WS2812B 16 LED Ring with wire	
17		Bodge wire 57mm	1	Connect from LED 3.3V to bluepill 3.3v	
18	J9	PinHeader_1x02_P2.54mm_Vertical	1	3xAA Battery Holder with wire	

# Assembly Instructions

**Step 0: Bodge, Bodge, Bodge... We all make mistakes!**

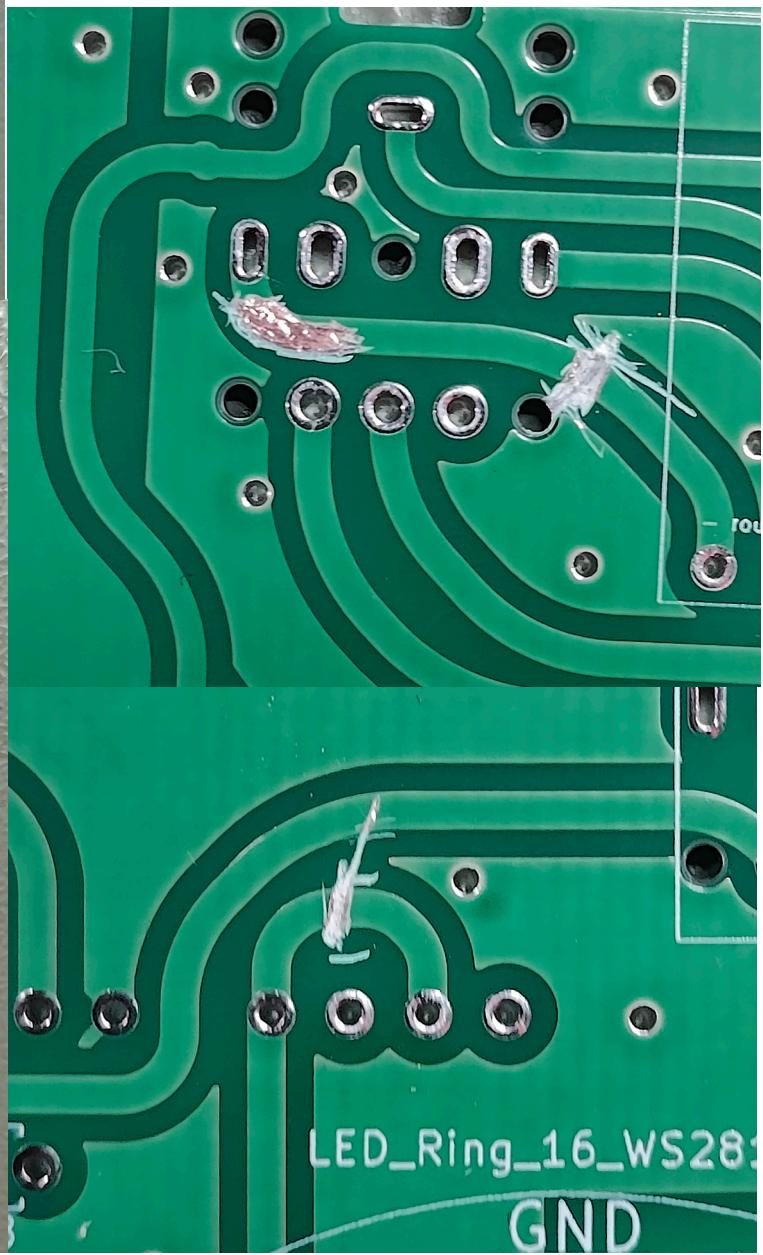


**So, this project went to press without testing, and, well, it's got problems!**

We shall now engage the time-honored engineer's discipline known as "bodging the circuit".

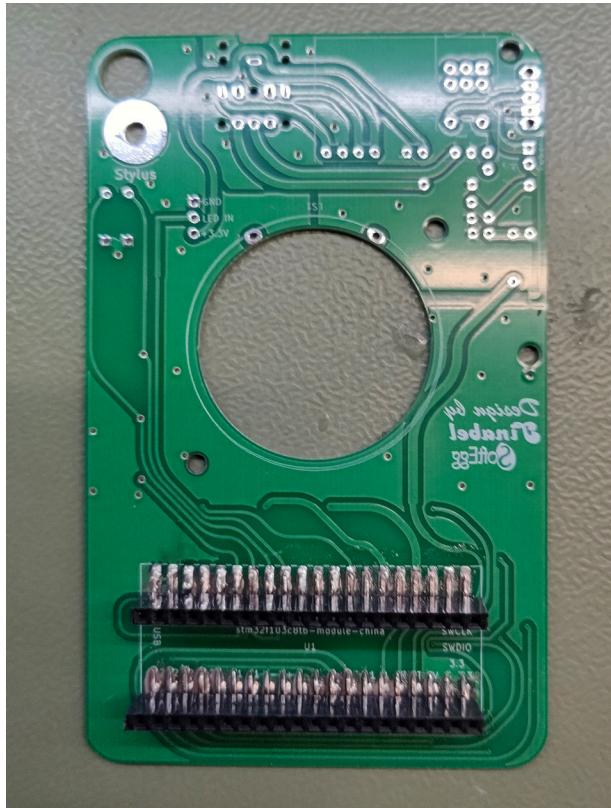
Simply put, we will cut the bad traces, shave off a little soldermask to expose some copper, and then solder a wire where it is supposed to go.

But adding wires is easier done after the parts are in, so right now we are just going to cut the traces.



# Assembly Instructions

## Step 1: Pinheaders for processor



Solder Yellow pinheaders from the Bluepill bag, with the yellow plastic under the board.

If you aren't good with soldering yet, practice first.

Stick the 20 pin right angle pinheaders into the pins of the Bluepill so that the pins on the feet are both pointing away from you.

Apply solderpaste (ChipQuik) on each pad for Bluepill.

Place v with feet onto the pads so that they line up best.

Using a soldering iron, hot air tool, or hot-plate, melt the solder paste on the board. For the one under the processor, you should do the pins on the end that you can see first, and maybe the backs of the pins from under the plastic of the connector. Then, once it's cool, remove the processor, and do the fronts of the pins of the one you couldn't get to. Make sure to heat the area between the pins as well to get up any unsolidified solder.

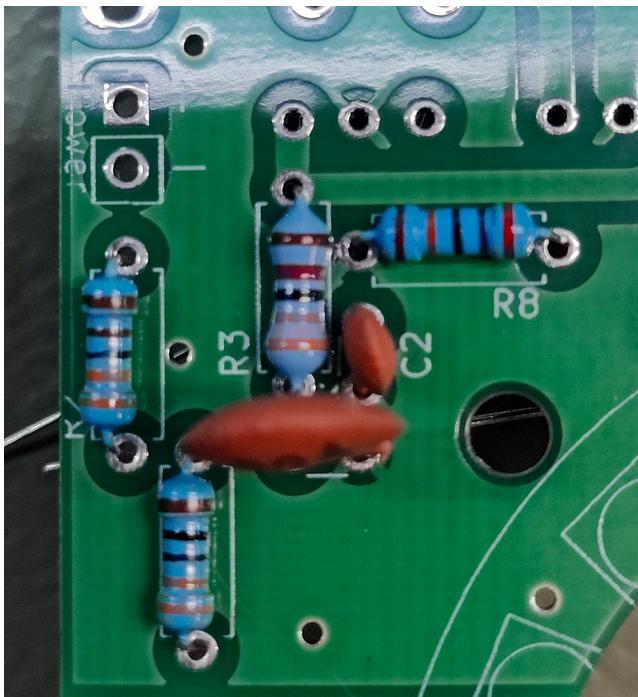
Clean up with Isopropyl alcohol and test each pin with the continuity tester for bridges or lack of connection before moving to the next step.

Bluepill should be places with the USB port and debugging port as shown on the board, and in this diagram.



# Assembly Instructions

## Step 2: Resistors, Capacitors, and Diodes



Place the resistors and capacitors in their appropriate holes as shown.

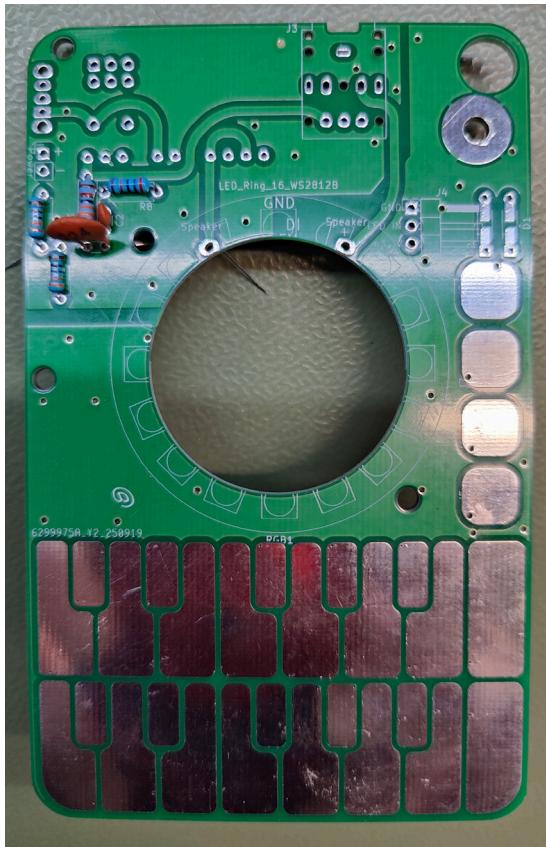
The BOM should have the color codes and numbers, and the PCB layout documents can show you in great detail where it all goes.

With each one, bend the leads to the side to keep it from falling out when you place the other ones.



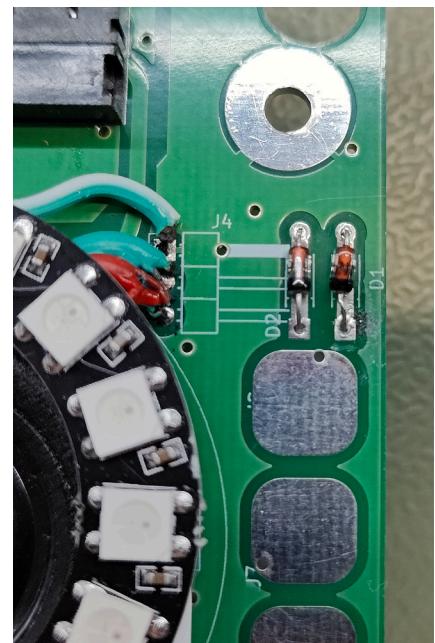
When are in, flip the board, and solder each of the pads (normal solder is fine) Make sure the holes around the leads are completely covered.

Cut off each excess lead as you solder it, and save them for future use.



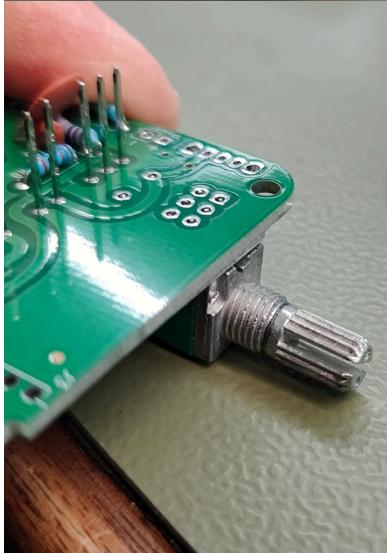
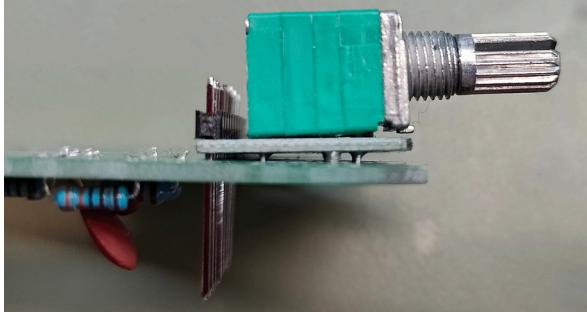
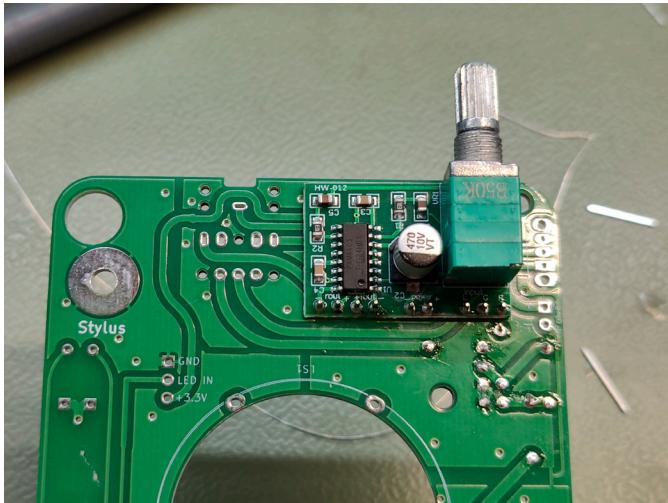
Once completed, do the diodes! The black line goes down!

(Left, completed resistors)



# Assembly Instructions

## Step 3 Amplifier Board



Place the pinheader through the amplifier board so that the plastic is on the bottom. You might need to slide the pins up a little by pushing them into the workbench until they stick out the top of the board.

Solder the pins on the top side of the board.

Then, using pliers, remove the black plastic spacer from pinheaders on the bottom side of the board.

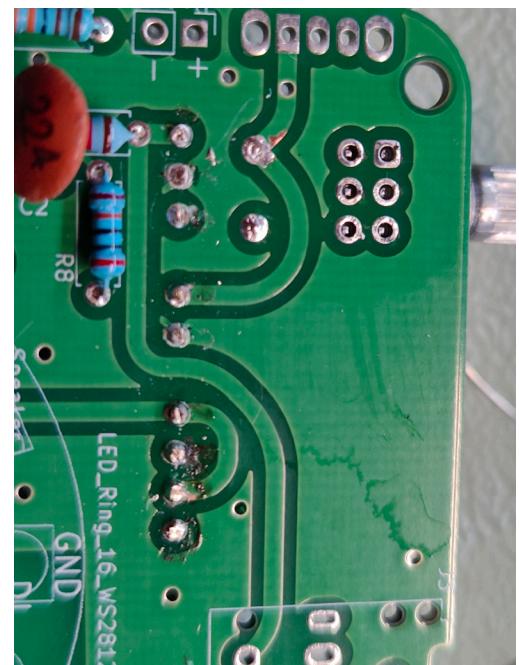
Mount the board on the bottom of the main Talkie PCB by pushing the pins through the holes. Push it all the way down so that the pins on the back of the potentiometer show through the vias on the front of the board.

Then solder the pinheader and cut off excess pins.

Now, add some flux on the two pins below the potentiometer closest to where you just soldered the pinheader on the front of the board.

Solder these using copious amounts of solder so that it will flow through the holes and make contact with the board below.

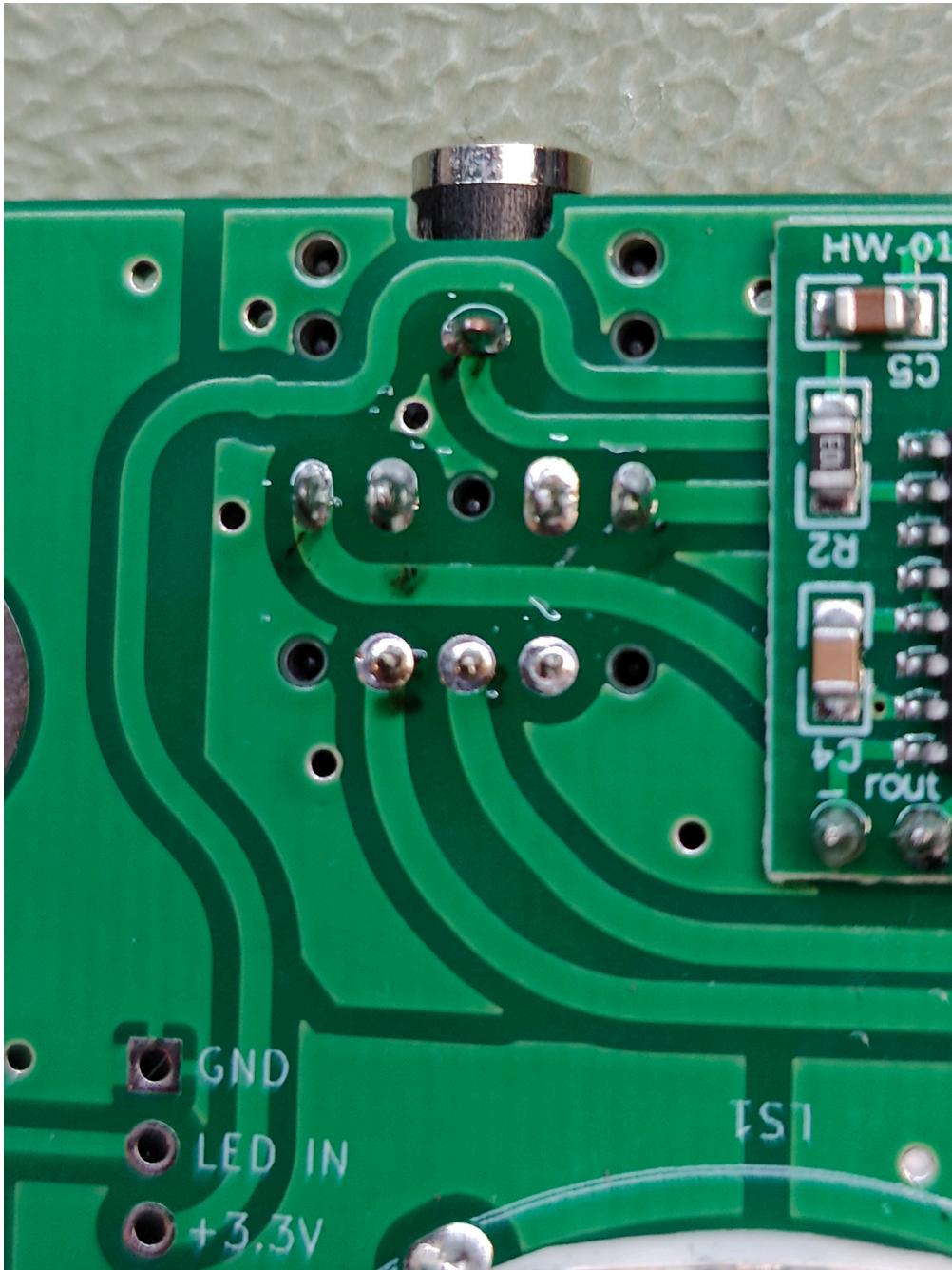
Check all soldering for bridged connections, and make sure that the switch on the potentiometer works with the continuity checker by checking it in on and off positions.



# Assembly Instructions

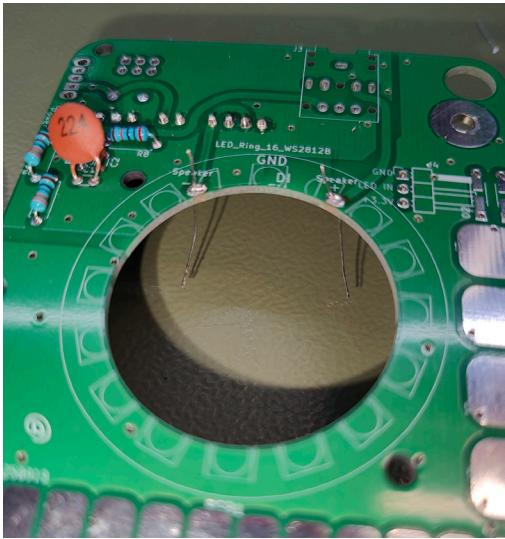
## Step 4: Headphone Jack

Push the headphone jack through the front of the board, so that the pins show on the back of the board. Solder all of the pins.



# Assembly Instructions

## Step 5 Speaker



Use some of your excess leads, push them through the holes in the board so the longer part is sticking out the back, then solder them in place from the front of the board and cut off any excess on the front of the board.

Cover the exposed pins on the front of the board with tape or paper, so that the speaker won't short the pins out.

Place the speaker through the hole so that the speaker terminals are on the same side as the leads.



Using pliers, thread the leads through the terminals so that they can be soldered without making contact with the metal parts of the speaker.

Cut off any excess wire.

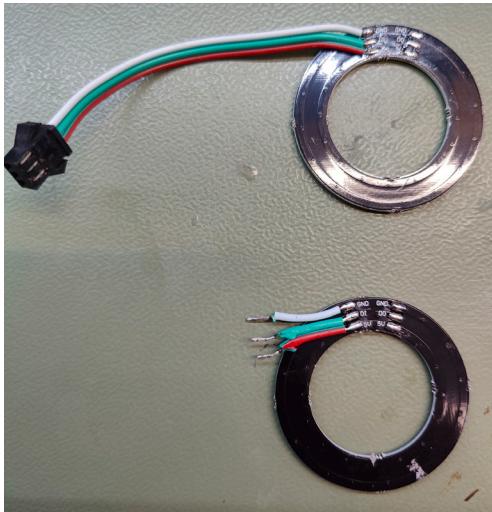
You might use a little hot glue

around the edges to hold the speaker down. Don't get it inside the speaker!



# Assembly Instructions

## Step 6 LED Ring



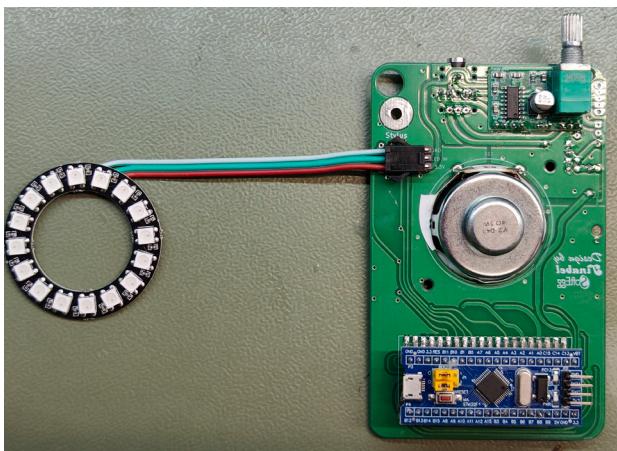
This LED ring has a nicely mounted cable on it, which prevents the pads ripping off problems I had in previous versions of this project. But the cable is a bit long.

I offer three choices for mounting it. Choose what seems best for aesthetics and your skill level.

### Option 1:

Use the  
3 prong  
right angle

pin header pointing away from the center of the board, and solder it from the back of the board. Then the LED ring can be installed upside down, and the cable folded over to place the LED ring over the speaker.



### Option 2:

Mount the 3 prong pinheader on the bottom of the board (soldering on the top side, and fold the wire over from the back of the board. The same amount of wire will stick out, but at least it will be on both sides of the board.

### Option 3:

Cut the connector off, leaving the leads short enough to just fit through the hole, with enough excess wire to solder on the other side of the board. You might want to twist the copper and tin the leads before sticking them through the holes to solder on the back of the board. This gives the cleanest mounting, and the LED will stay in place even without hot glue or an enclosure.  
Remember in all cases that the white wire is always on top!



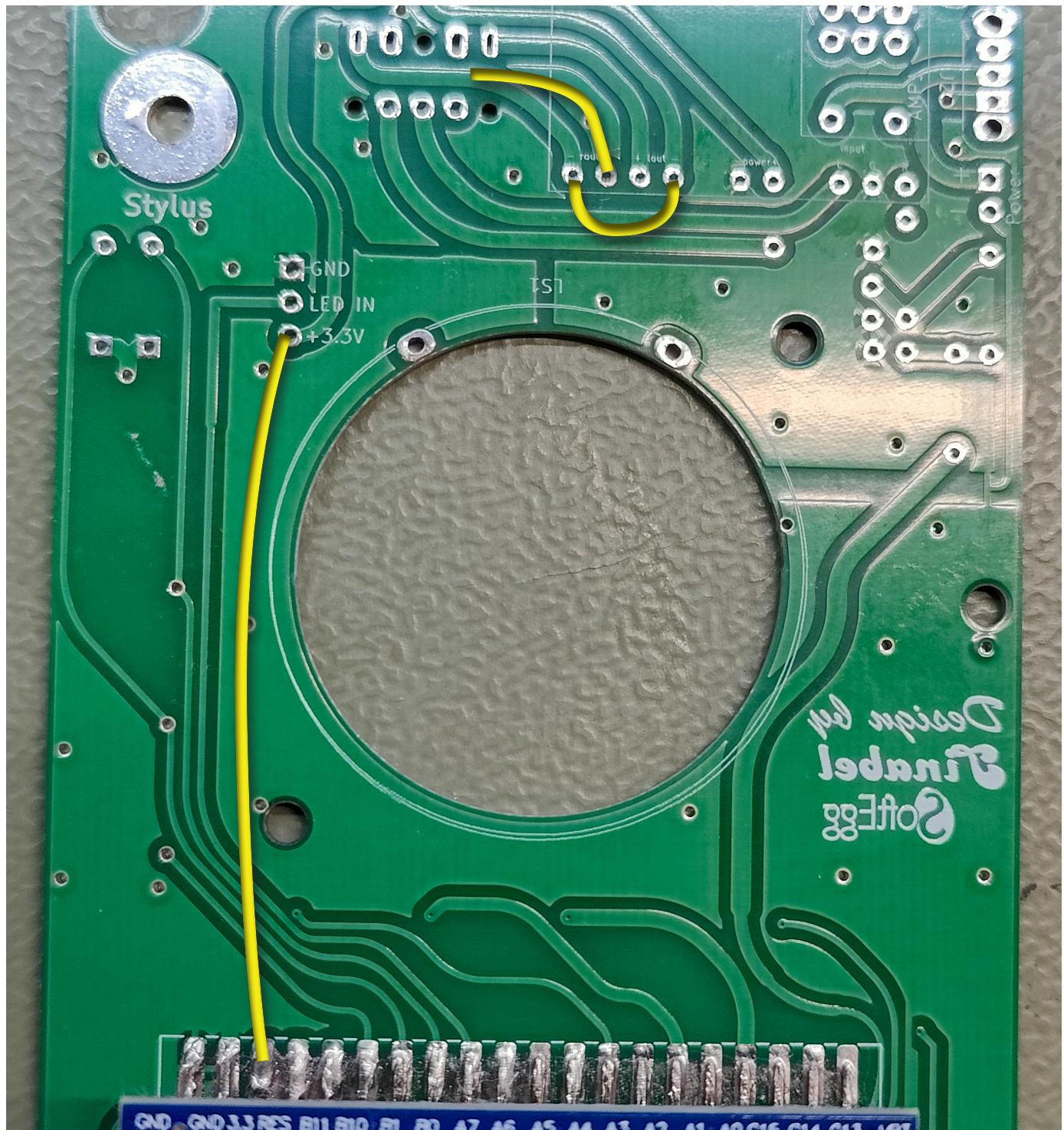
# Assembly Instructions

Step 7: Bodge, bodge, bodge... we all make mistakes!

Now is when we add the wires to fix the errors. We cut the traces earlier in step 0.

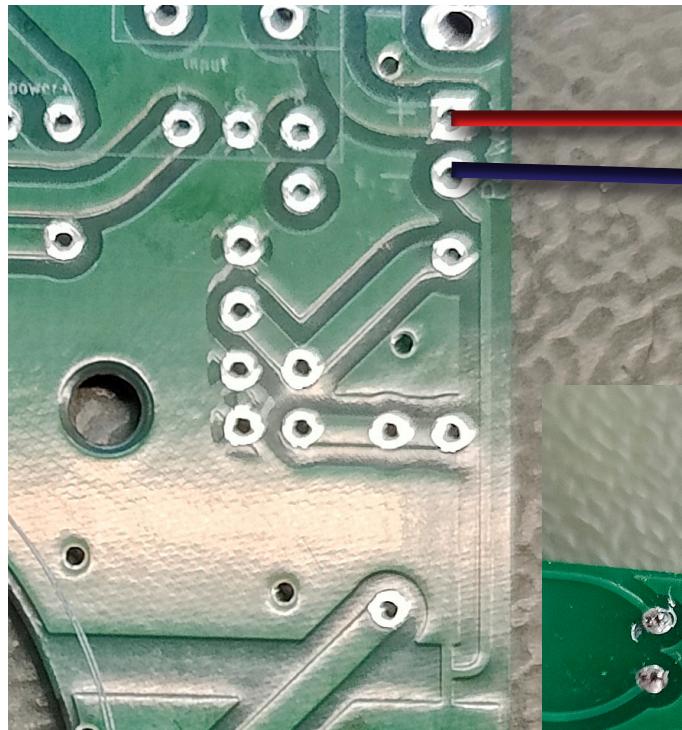
Basically, I had two pins on the amplifier with the wrong polarity and in this design it actually matter.

You may want to use different routing for your wires. This is just for illustration.



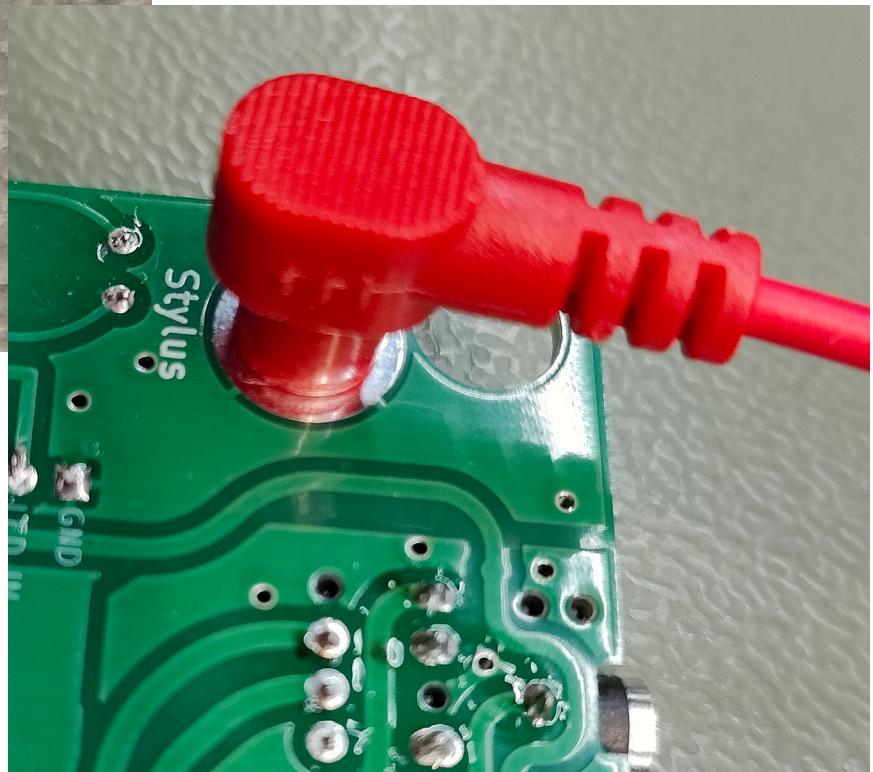
# Assembly Instructions

## Step 8: Battery Holder and Stylus



Strip, twist and tin the wires for the battery holder, and then push the wires through the appropriate holes from the back. Red goes in +, black in -.

Solder on the front side of the board and cut off any excess.



Finally press the banana plug on the stylus through the rear of the PCB through the marked hole.

Your Talkie Handy Stylus Synth should now be complete and ready for operation.

# Assembly Instructions

## Troubleshooting

Your Talkie Handy Stylus Synth should now be complete and ready for operation.

If it doesn't work, here are some troubleshooting tips.

If the LED ring doesn't come on when batteries are in and the volume turned up, make sure your bodge wire is wired correctly. Check for voltage on the Bluepill, the LED ring, and the amplifier. Make sure no connections are bridged.

If none of those is the issue, try a different microcontroller and see if it is just that yours is blown up or not programmed correctly.

Check the wiring on to the LED ring to make sure it is getting signal and power.

If the LED ring is working and it isn't making any sound when you touch it with the stylus, check to see if there is power to the amplifier board.

Make sure there is a signal at the input of the board. If not, check the PWM circuit to make sure all resistors and capacitors are mounted and in the right place.

Make sure the speaker and none of the other output connections are bridged.

Thank you for your purchase!

Remember, we bear no liability if you build your kit incorrectly and it doesn't work. We just supply parts... We'll try to talk you through it, but no guarantees, warranties or otherwise are implied.

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