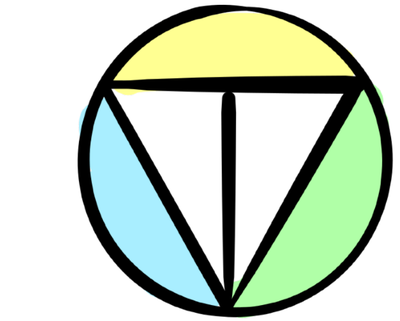


Steve's MS-22 (v1.5)

Build guide

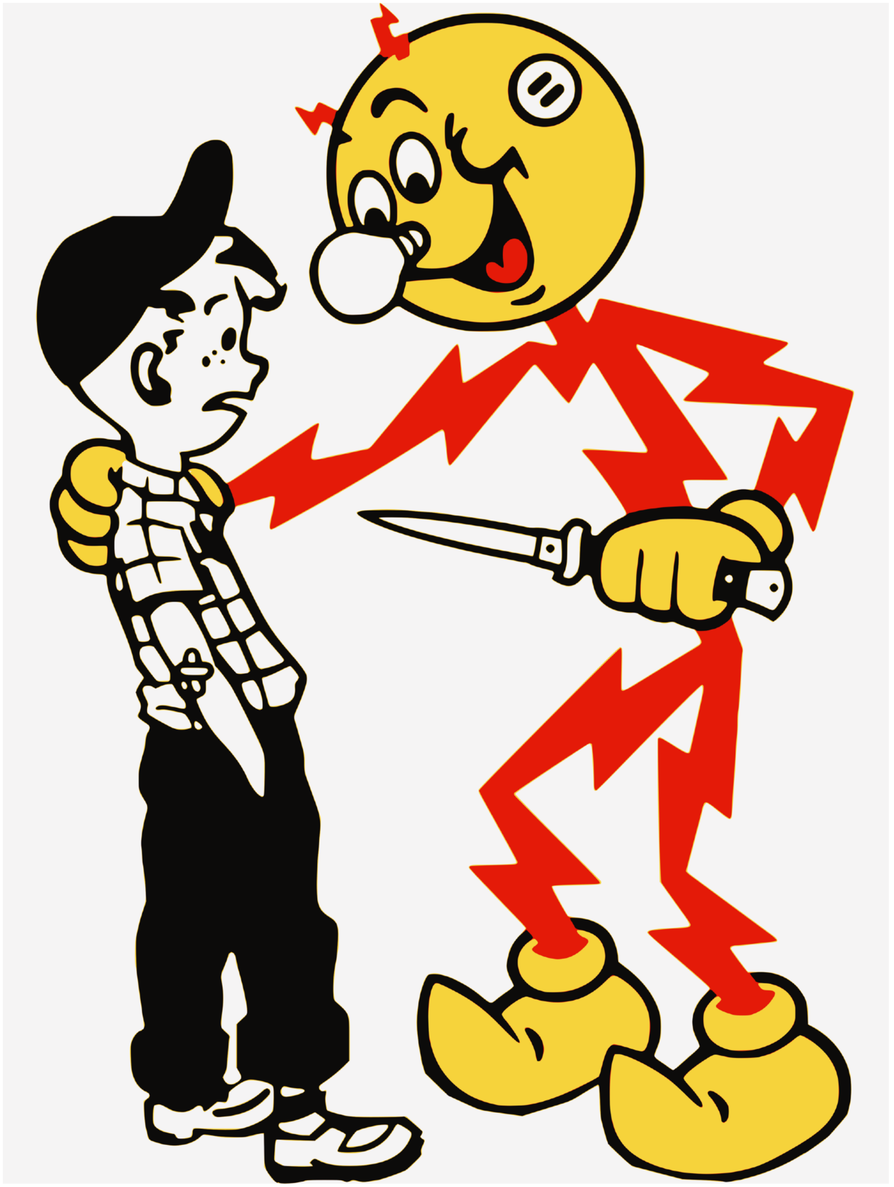
(v2.1, 30th of October 2023)

ir. ing. Tom Verschooten

Before we begin (1)

A small disclaimer...

- This is a DIY project, success relies on your skill as a builder
- Steve's MS-22 is not recommended as a first project
- This guide may contain errors, please let me know if you find one



Before we begin (2)

Solderzen, or solderfullness?

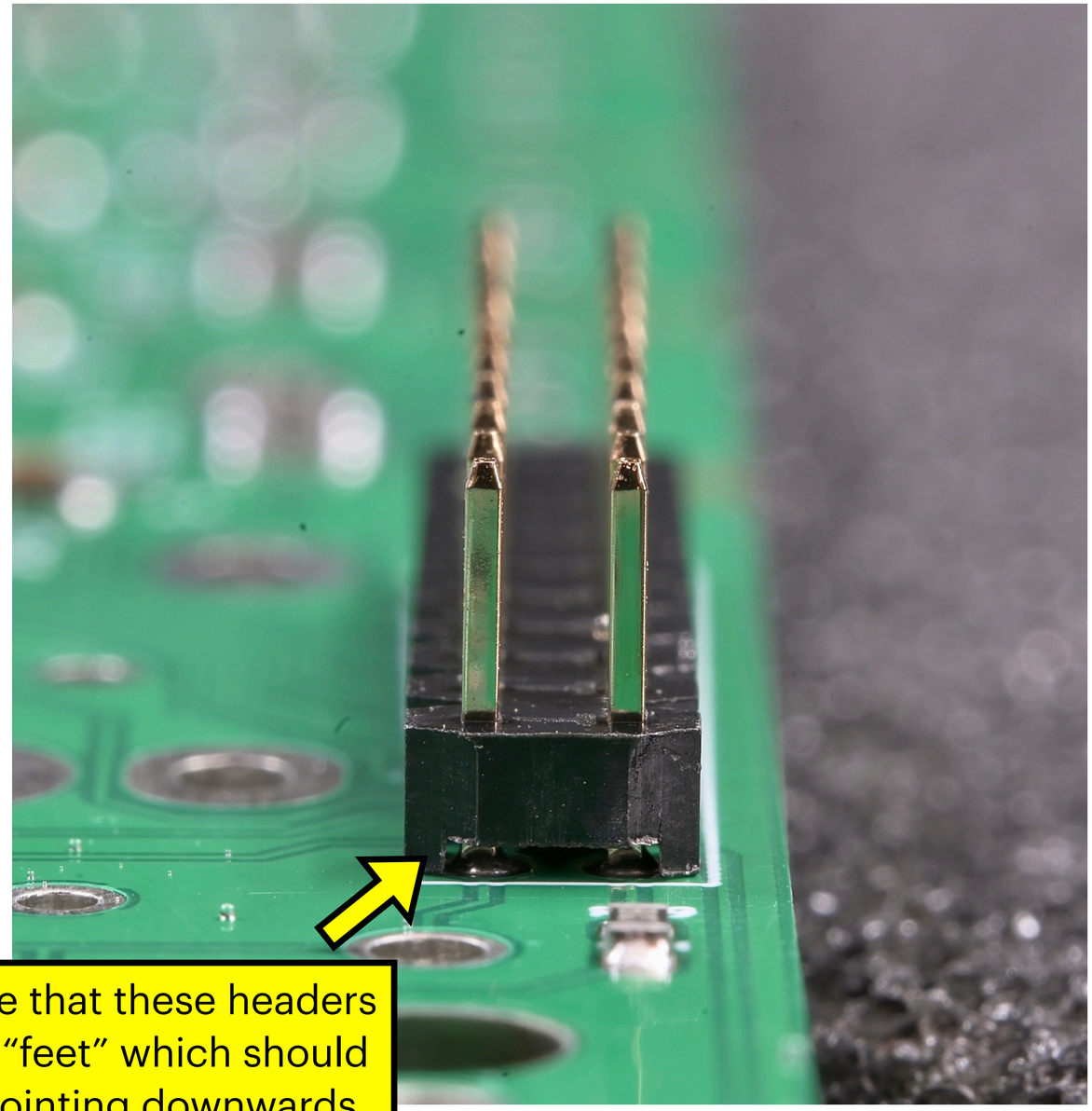
- Don’t forget to take a break now and then
- Maybe don’t try to complete the whole project in a single session?
- When in doubt, take a step back, ponder the problem a bit longer
- <u>Most importantly:</u>
  Take your time and have fun! :)

I drew this illustration in support of Jack Edwards’ **“The Art of Solderzen - Mindfulness through soldering”**, which he created in support of Suicide Prevention Bristol. Go check it out here: https://www.justgiving.com/fundraising/jack-edwards21

Before we begin (3)

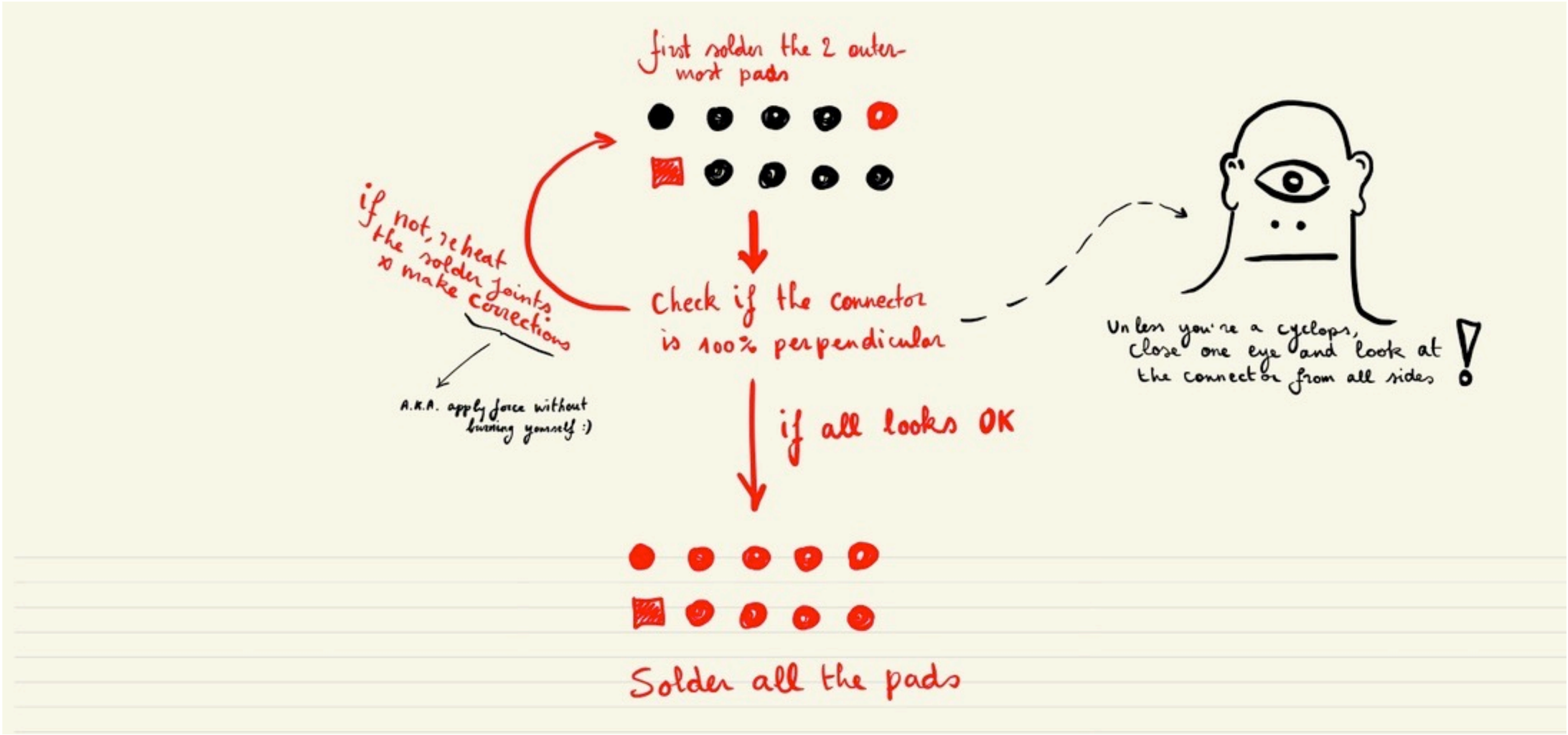
Header orientation

- Make sure to put the male 2.00mm headers in the right orientation
- If you get this wrong, they can be a pain to desolder
- I've warned you! :)



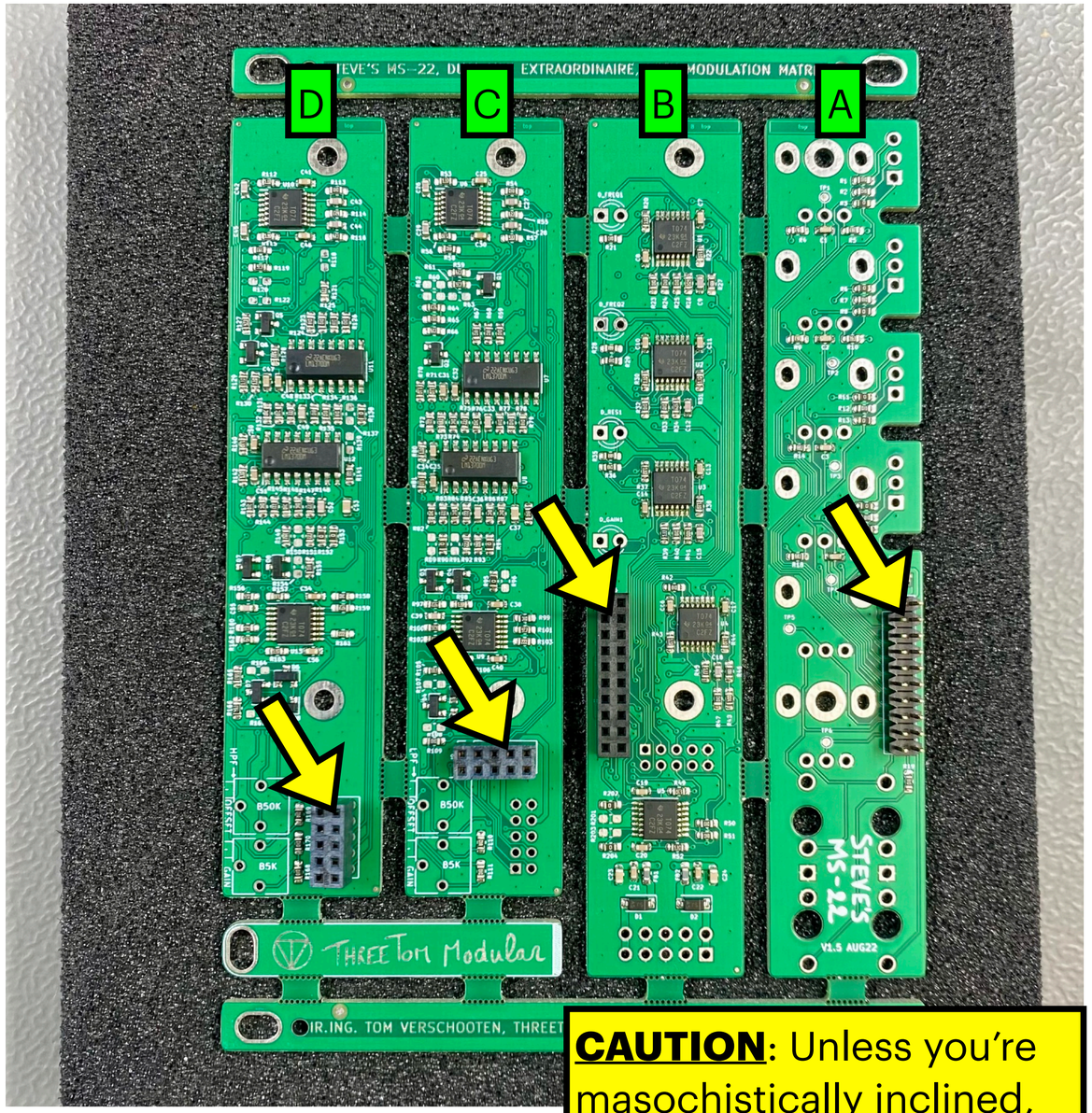
Before we begin (4)

Making sure headers sit flush on the board



Top headers

- Place the connectors on the top-side of the board, as shown in the picture
- Carefully flip the board (e.g. with a piece of cardboard, or foam)
- Solder the connectors in place
- Take note of the board names I've annotated at the top of the pictures, I'll refer to these later.

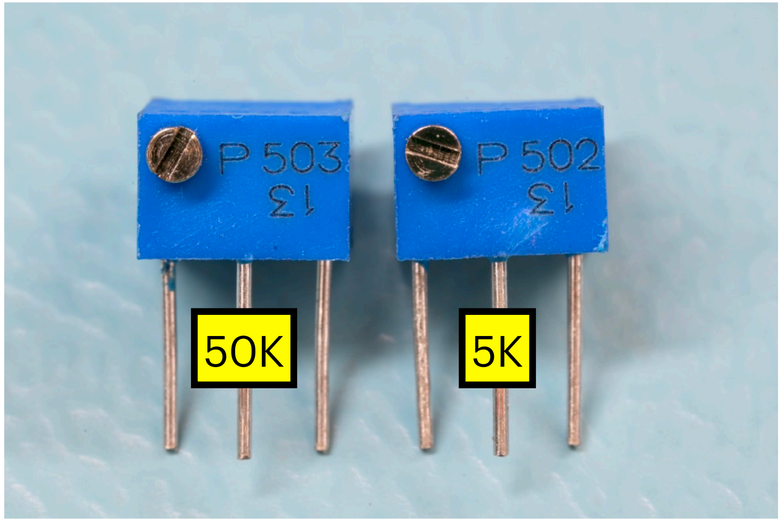


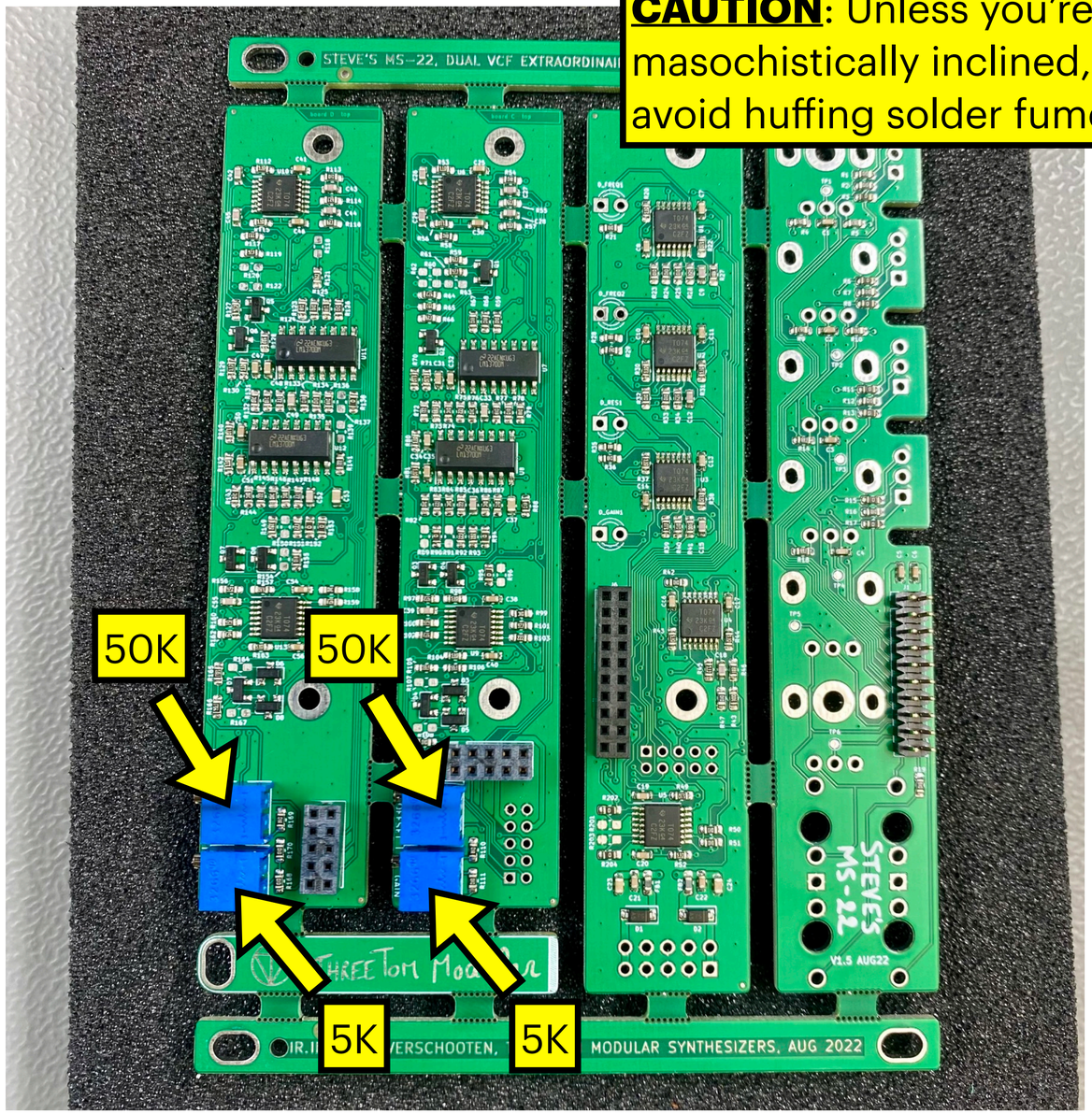
CAUTION: Unless you're masochistically inclined, avoid huffing solder fumes

Calibration trimmers

For optimal societal adjustment later

- Place the trimmers as shown
- Make sure the trimmers sit flush to the board!



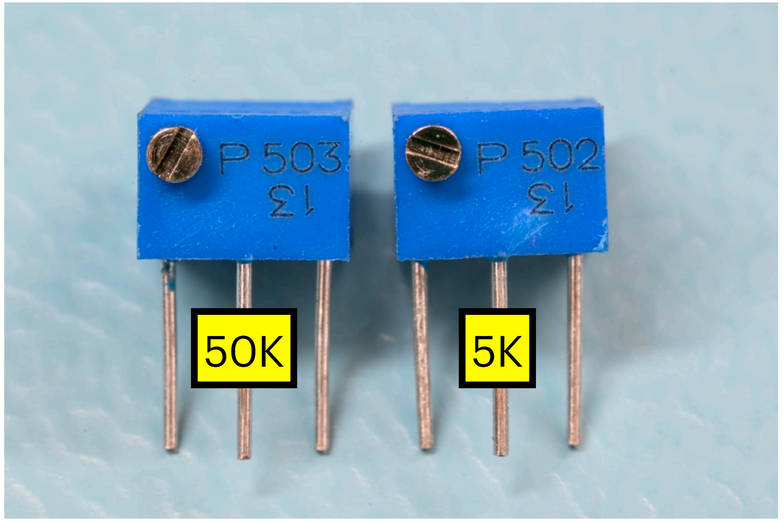


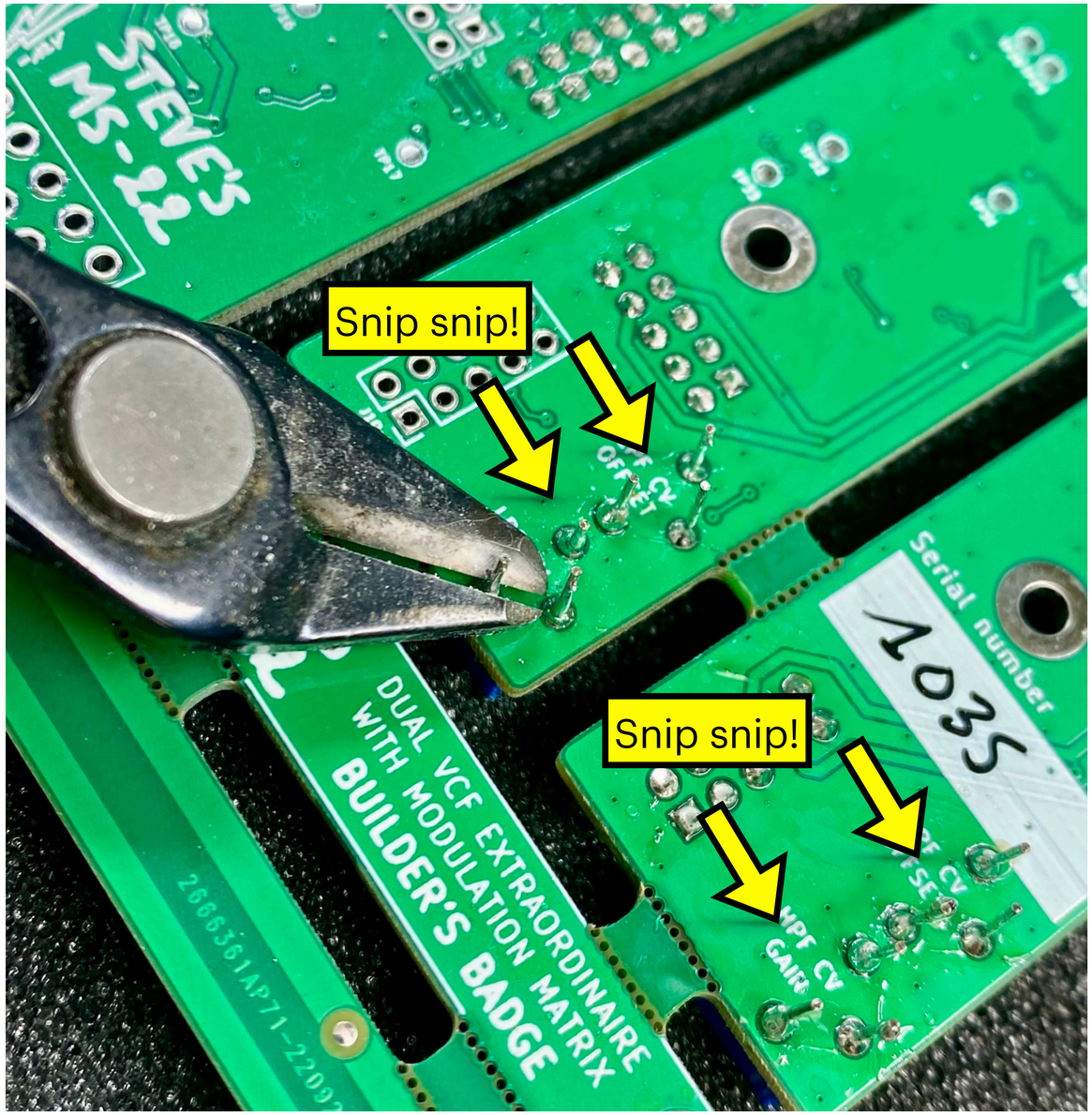
CAUTION: Unless you're masochistically inclined, avoid huffing solder fumes

Calibration trimmers

Snip snip!

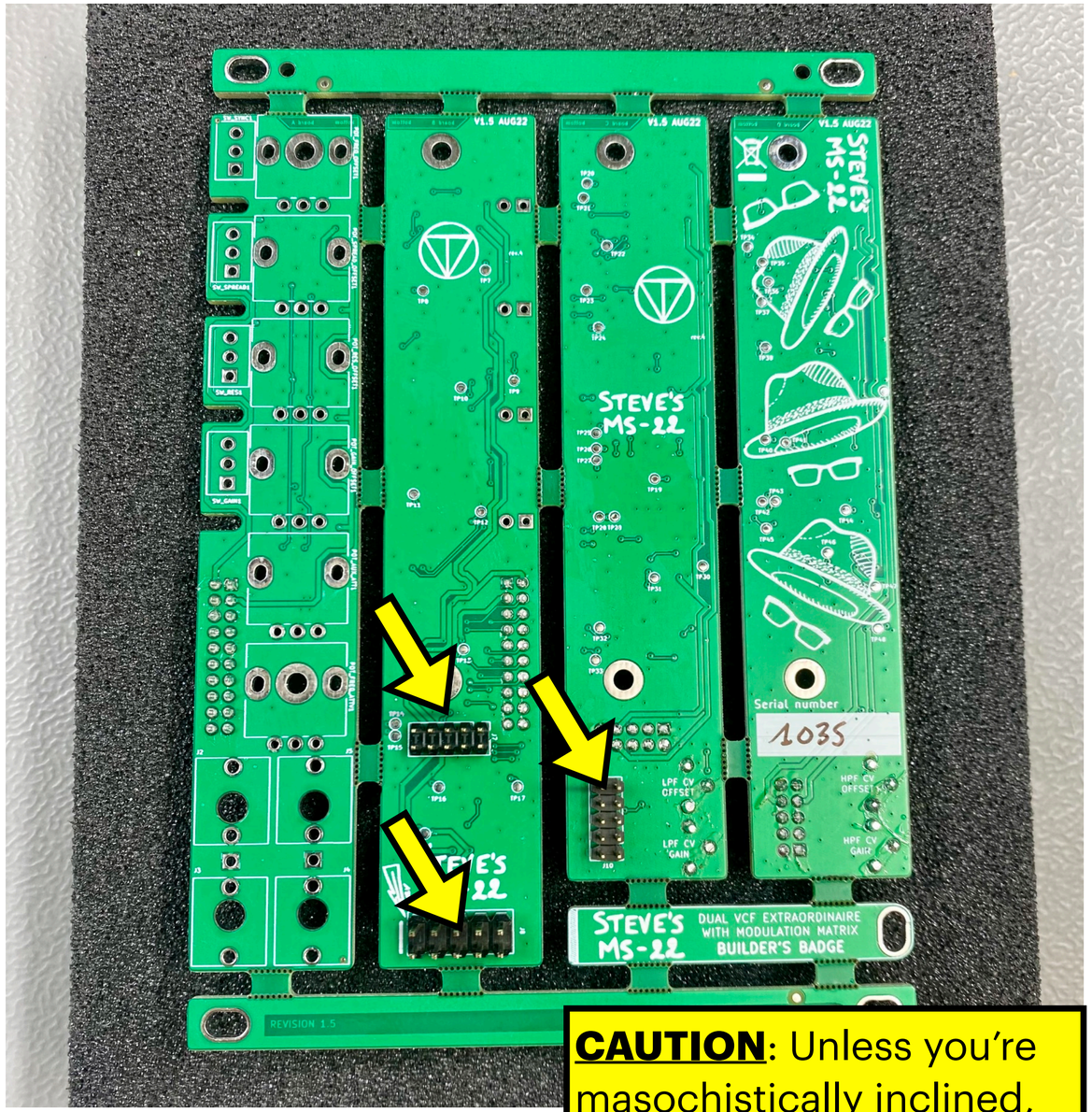
- Flip the board and snip off the excess length of the trimmer leads





Bottom connectors

- Place the connectors on the bottom side of the board, as shown in the picture
- Carefully flip the board (e.g. with a piece of cardboard, or foam)
- Solder the connectors in place

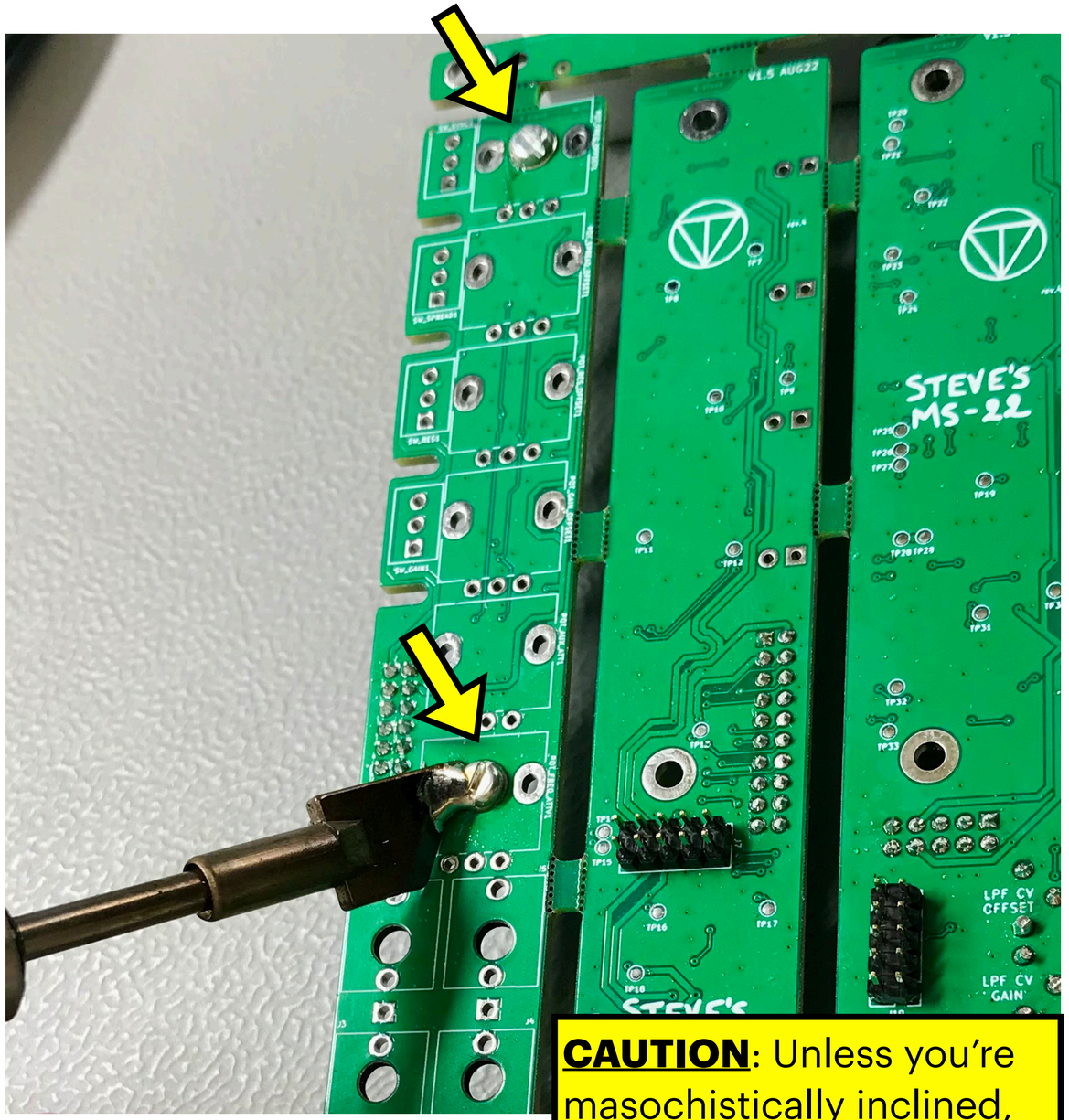


CAUTION: Unless you're masochistically inclined, avoid huffing solder fumes

Solder in screws (1)

DO NOT SKIP THIS STEP
(you'll be <u>screwed</u> later!)

- Solder the screws
- Use a big soldering tip and be patient, these screws heat up slowly!
- Make sure to keep the screws perpendicular to the board as you solder them. A pair of tweezers may to hold them down as you heat them can be handy!

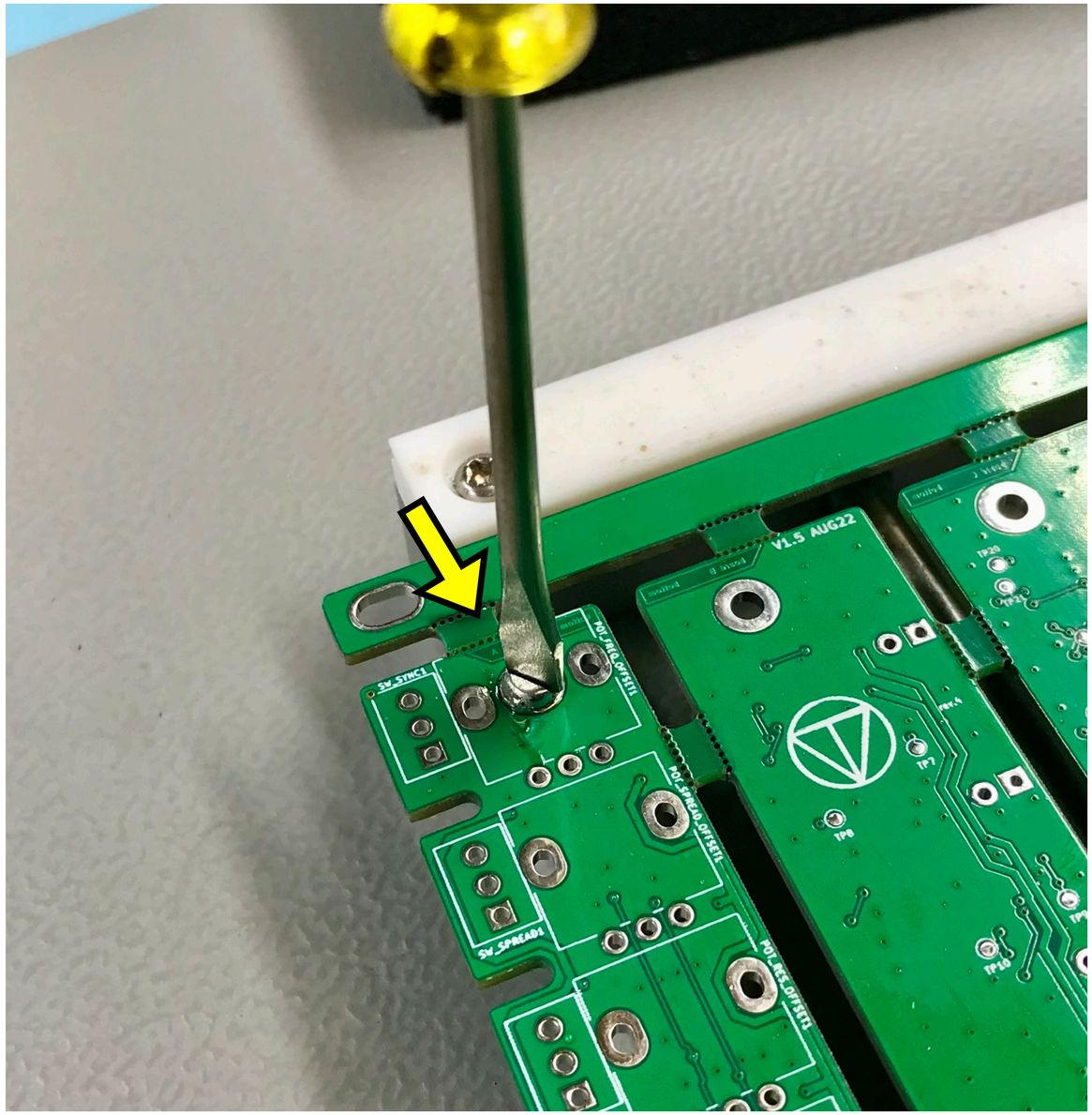


<u>CAUTION</u>: Unless you're masochistically inclined, avoid huffing solder fumes

Solder in screws (2)

DO NOT SKIP THIS STEP
(you'll be screwed later!)

- Use a screwdriver to check if the screw is properly soldered in place
- If not, repeat the previous step!



Depanel the boards

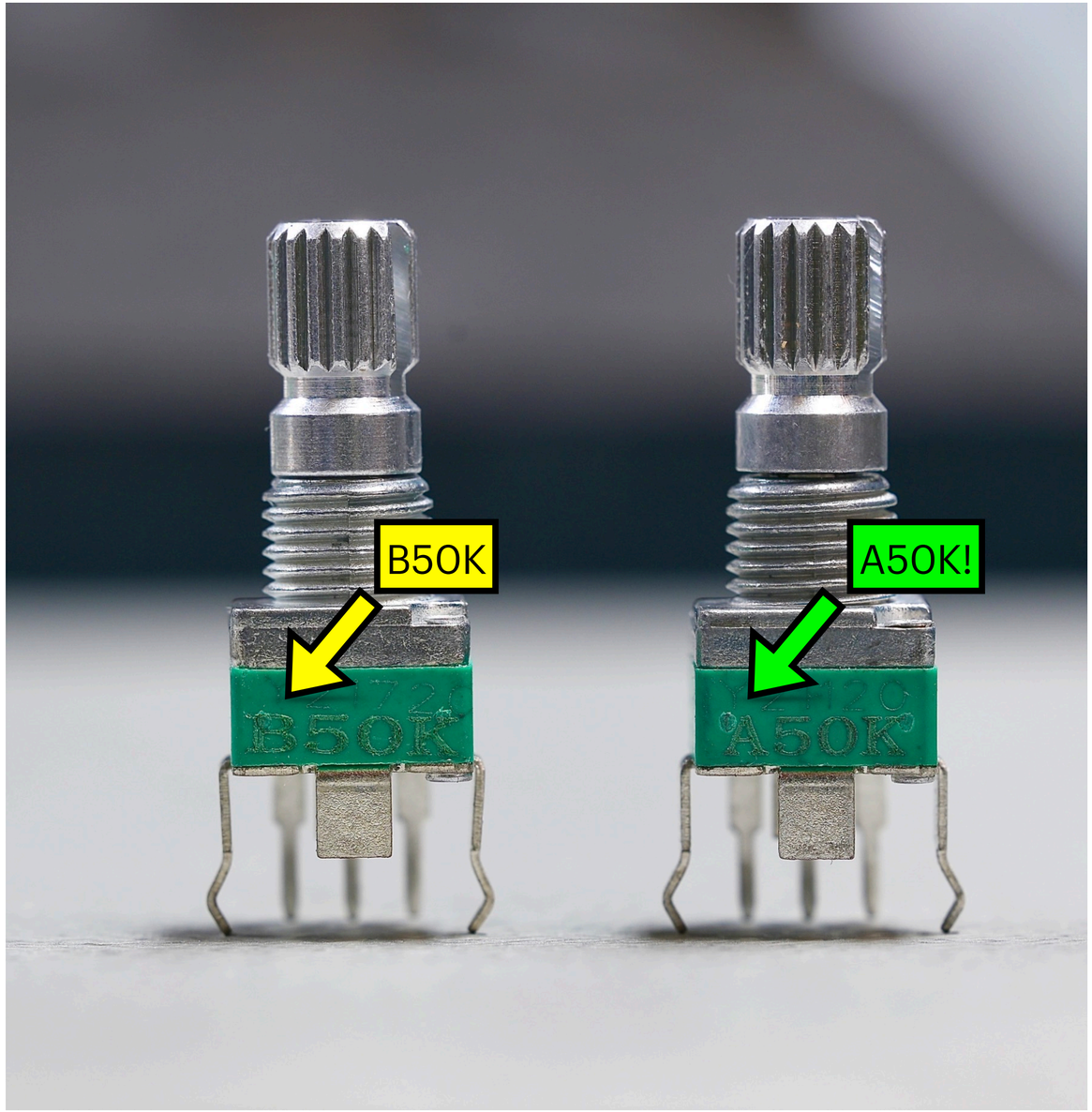
Snip, snip, crack

- Use cutters to cut all the boards from the panel
- Use a file to clean up your cuts
- **CAUTION**: cutting PCB material releases fine particles, you may want to wear an FFP2 mask for this step and/or do this outside.

Find the A50K pot

You don’t want it to get mixed up

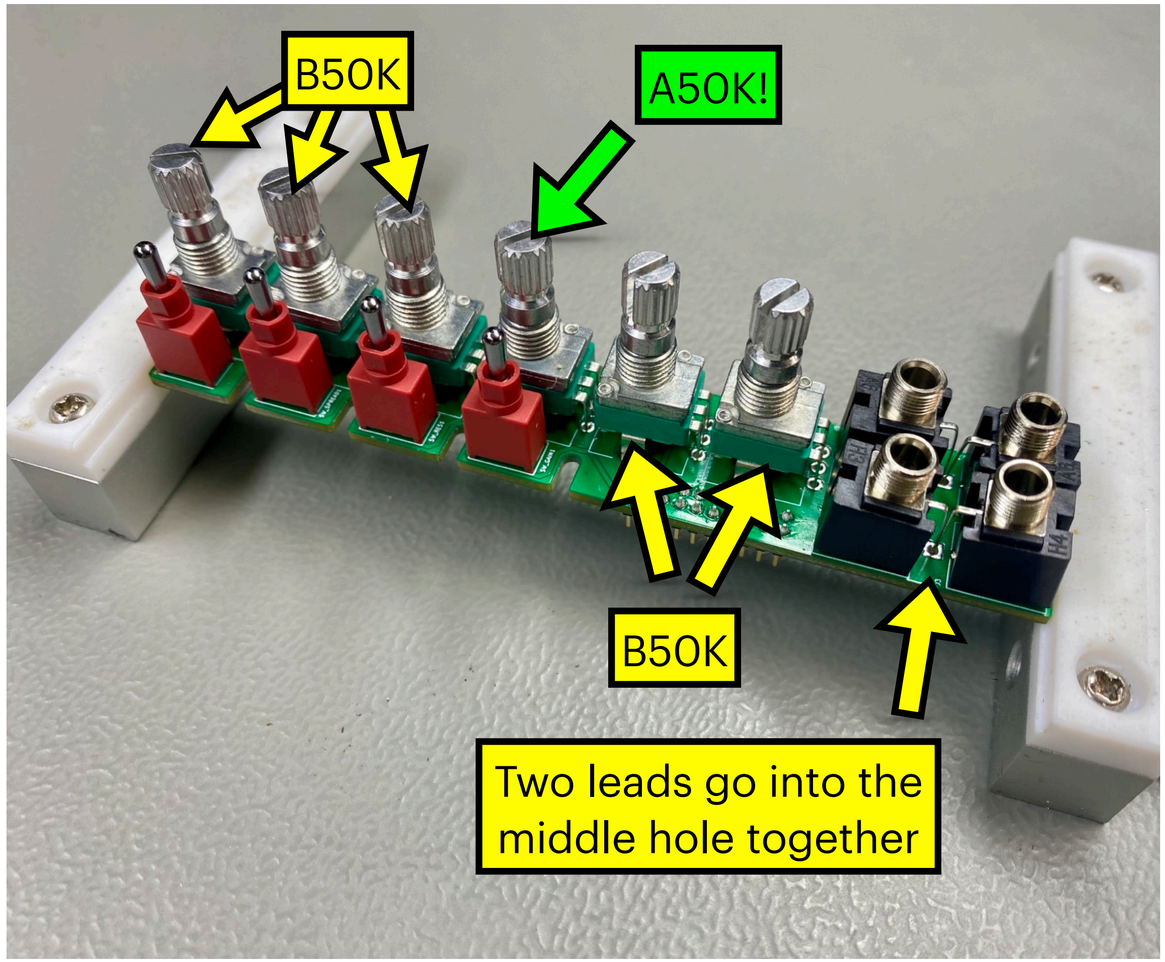
- There’s a single A50K pot in the kit, all the other pots are B50K
- Be sure to separate the A50K from the rest of the pack.



Mounting front panel parts

No tweaking things without these

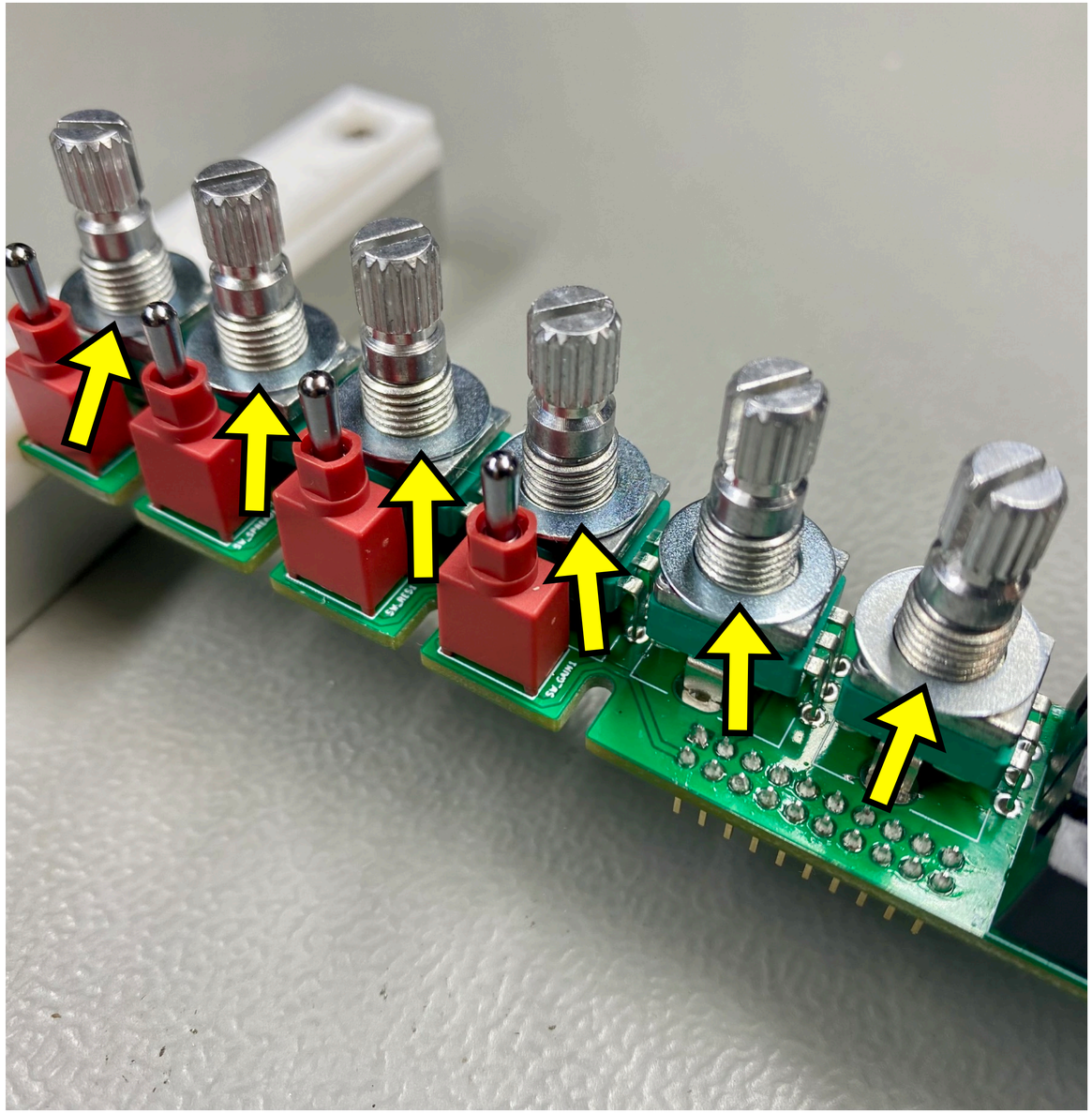
- Place the A50K gain potentiometer first, so you don't mix it up with the B50K's (trust me, been there done that!)
- Make sure that the outer lead of the jacks share the hole middle hole
- Make sure the orientation of the switches is matched (to satisfy your OCD)



Place the washers

(Does a washer make it cleaner?)

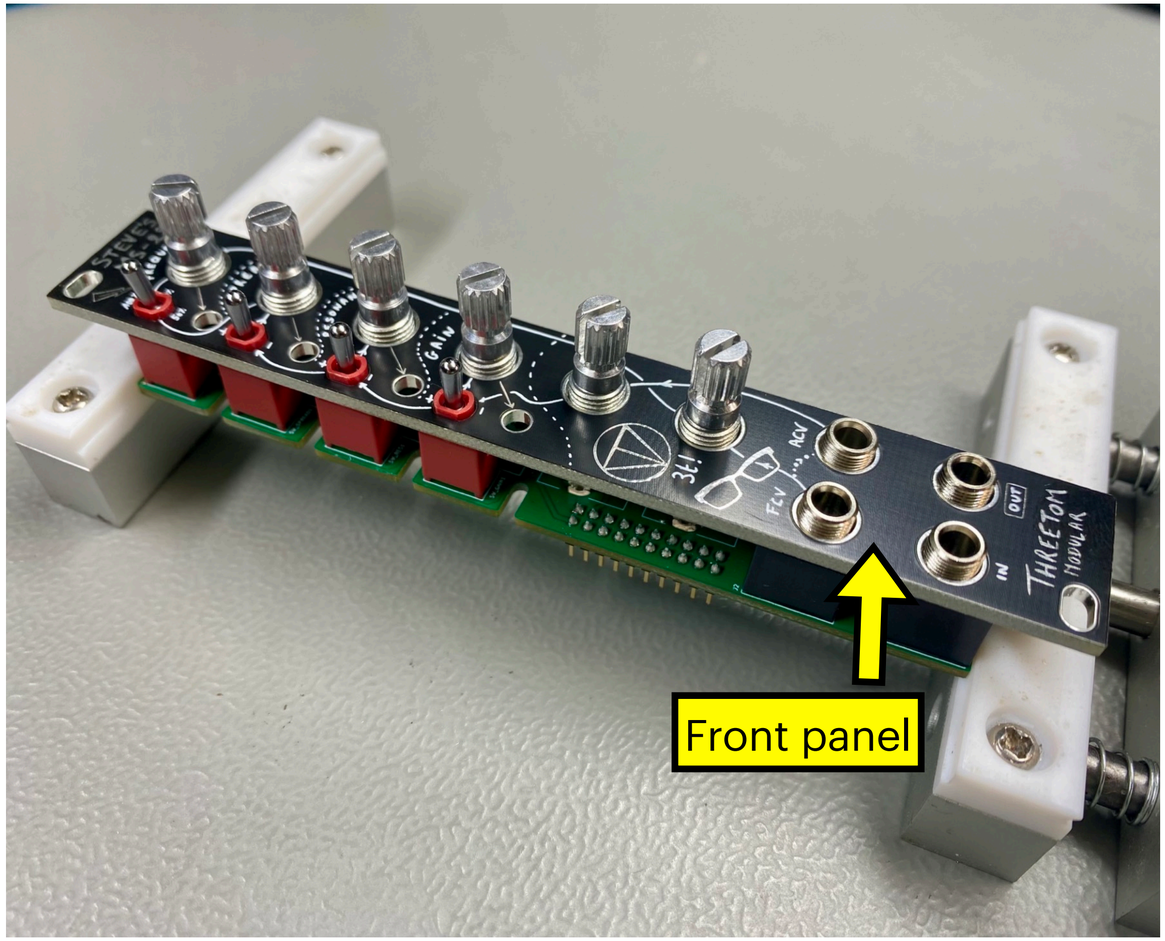
- These washers make sure that the front panel will sit on the potentiometers at the right height



Place the front panel

The module may feel a bit naked without it

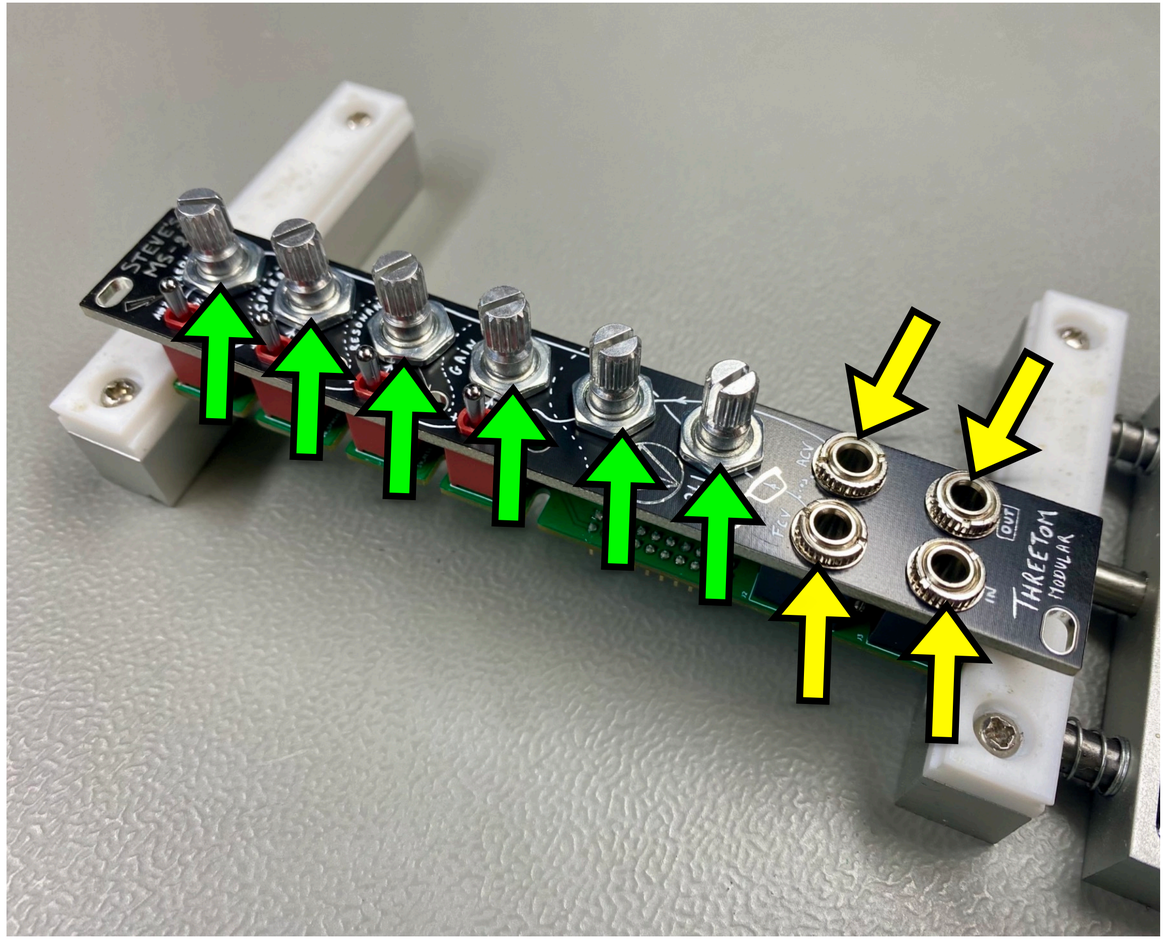
- A little wiggling around the front panel usually helps
- Don’t apply excessive force
- From time to time the fit with the switches is a bit tight. If the switches give you trouble, insert them into the front panel first, then fit the frontpanel with switches to the rest of the assembly



Nuts, nuts, nuts!

Time to get squirrely?

- Place the M7 nuts over the potentiometer shaft
- Place the washers over the jacks, followed by the jack nuts

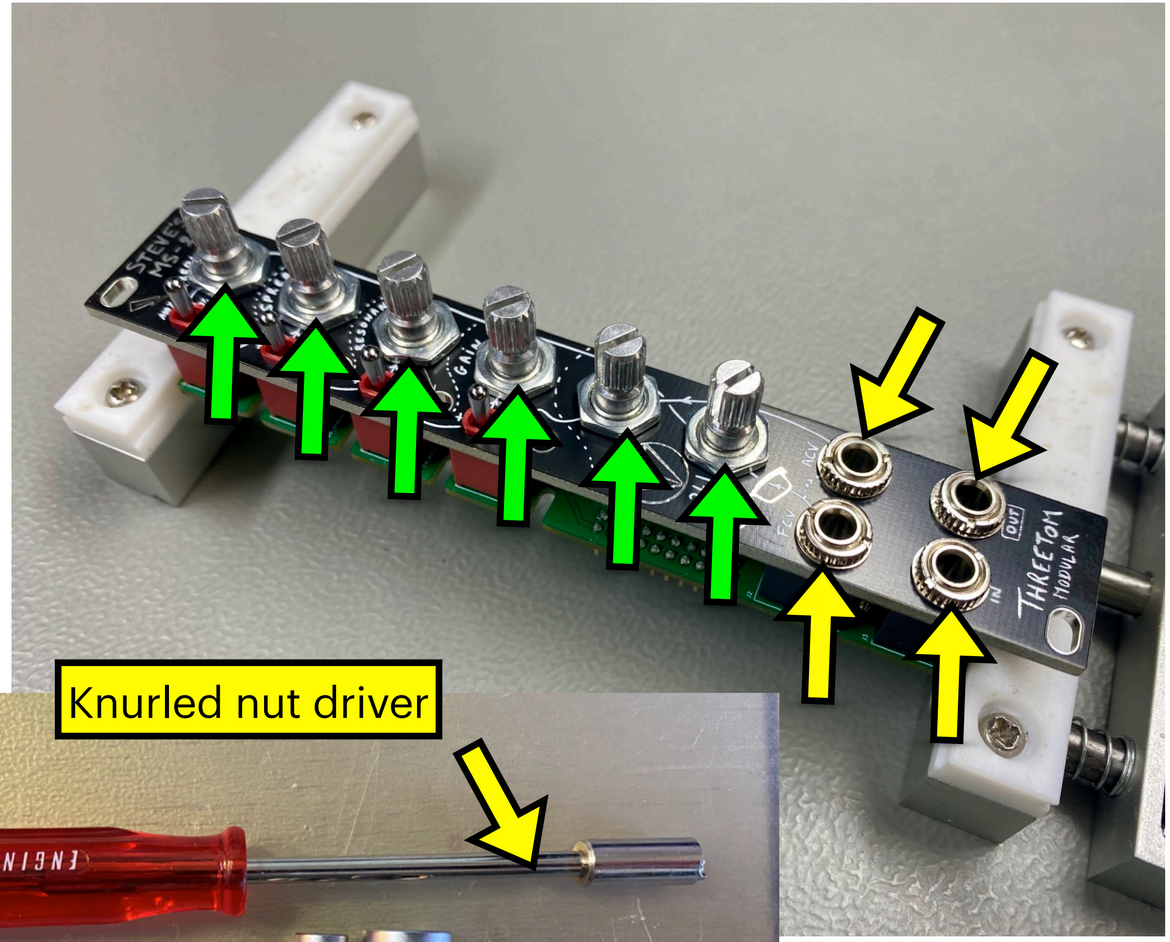


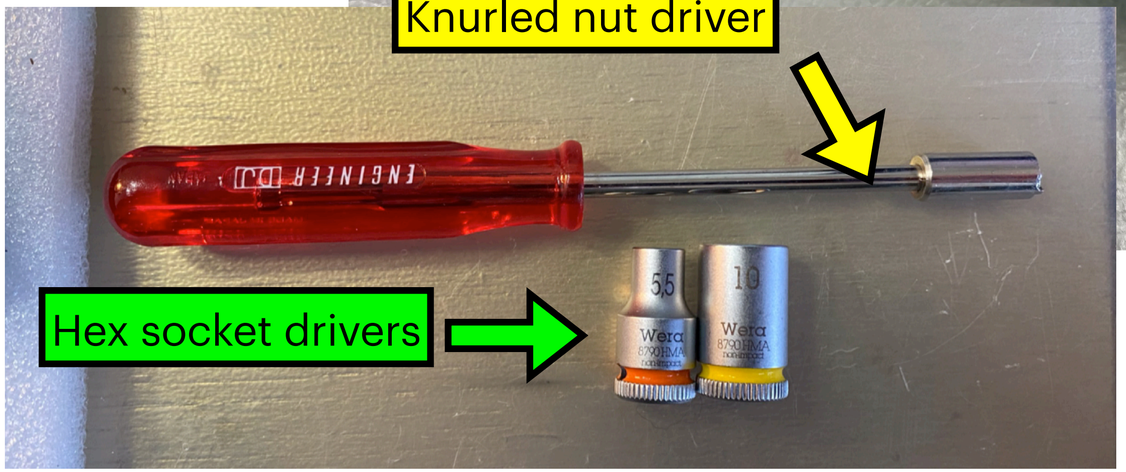
Tighten your nuts

Don’t go commando on this one!

- Use the right tools for the job!
- Tighten gently but firmly
- When properly tightened, you shouldn’t be able to remove the nuts by hand

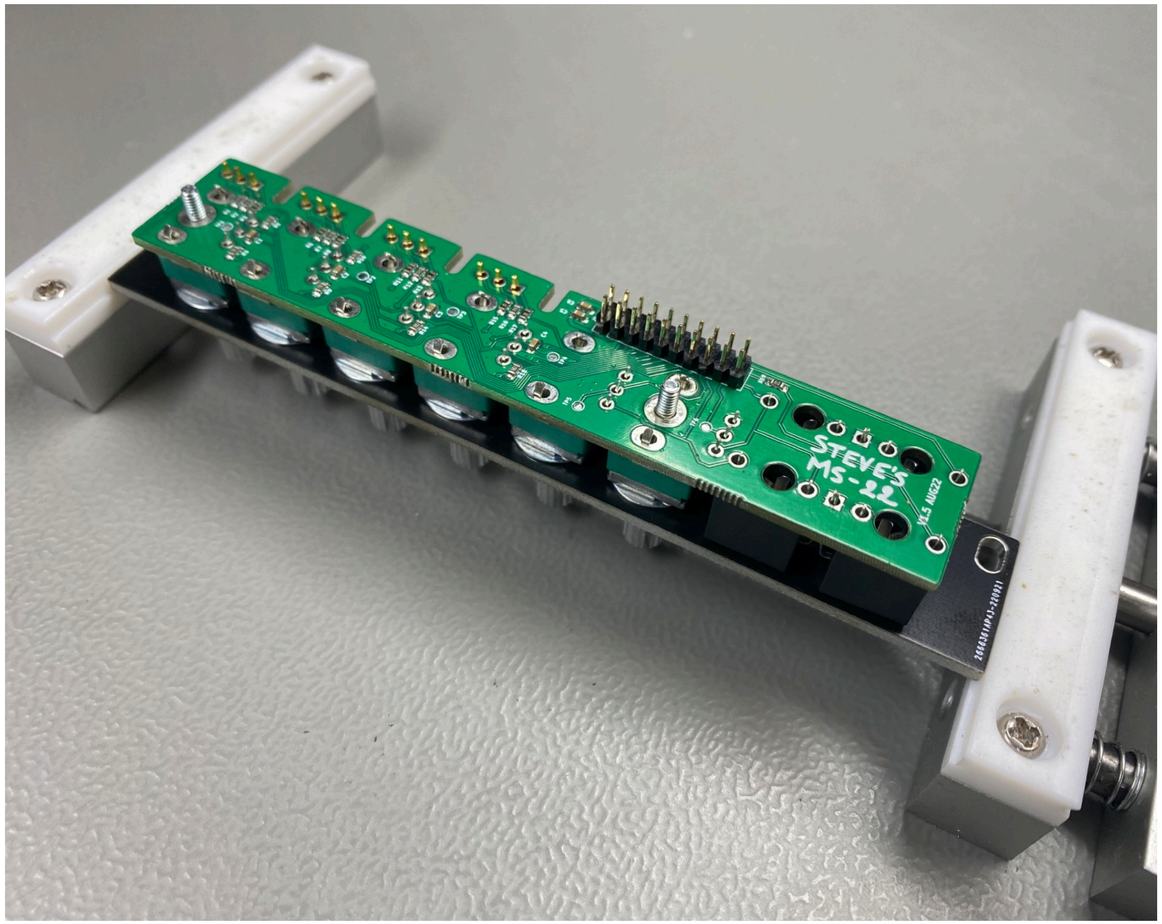
Protip: when not using the proper tools, e.g. tightening nuts with pliers, apply masking tape to the tool to avoid making scratches on the front panel!





Time to solder!

- Carefully flip over the module
- Check that all front panel components are still sitting flush
- Start soldering!
- Double-check your solder joints for cold joints!

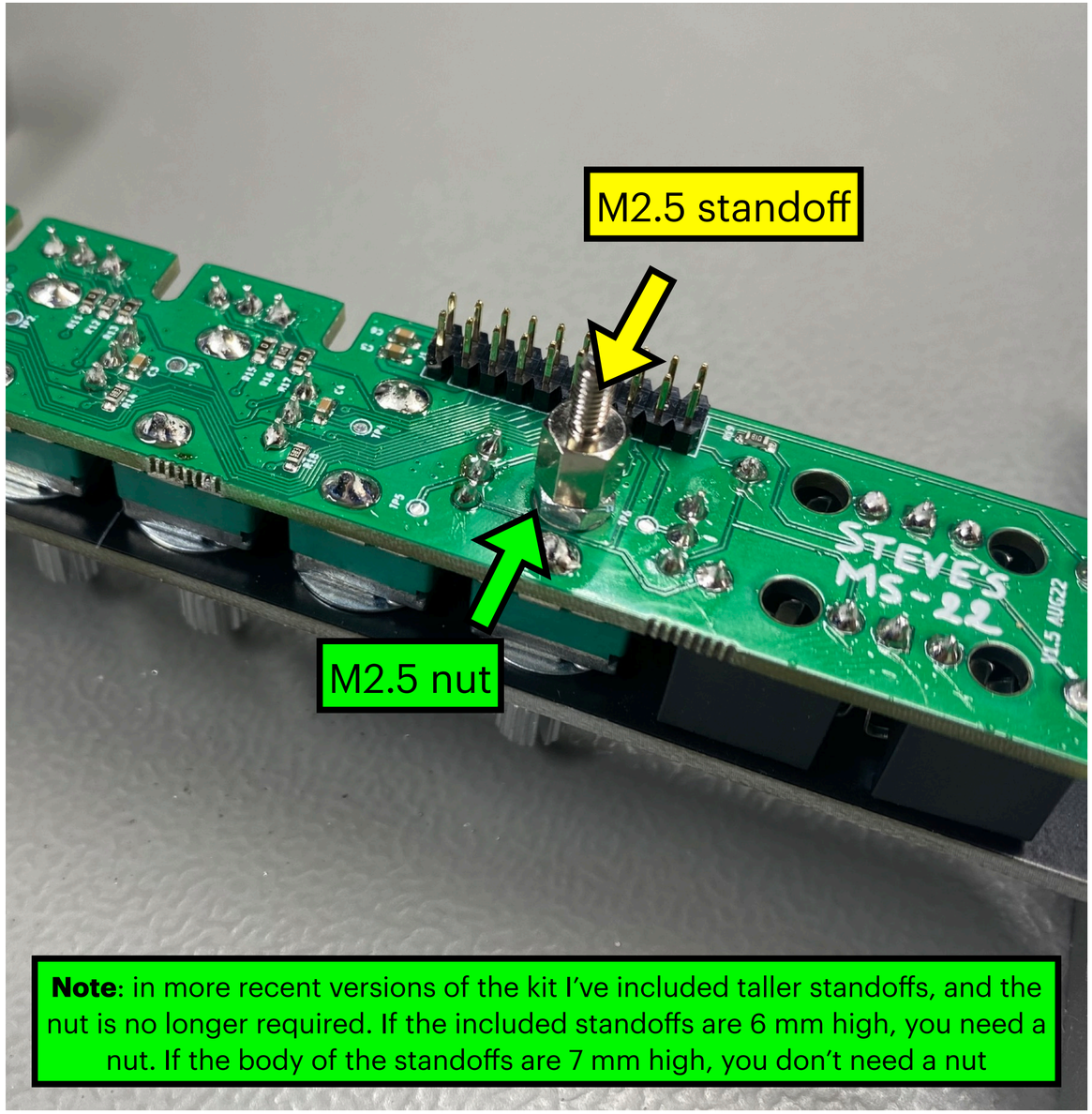


CAUTION: Unless you're masochistically inclined, avoid huffing solder fumes

Standoffs (1)

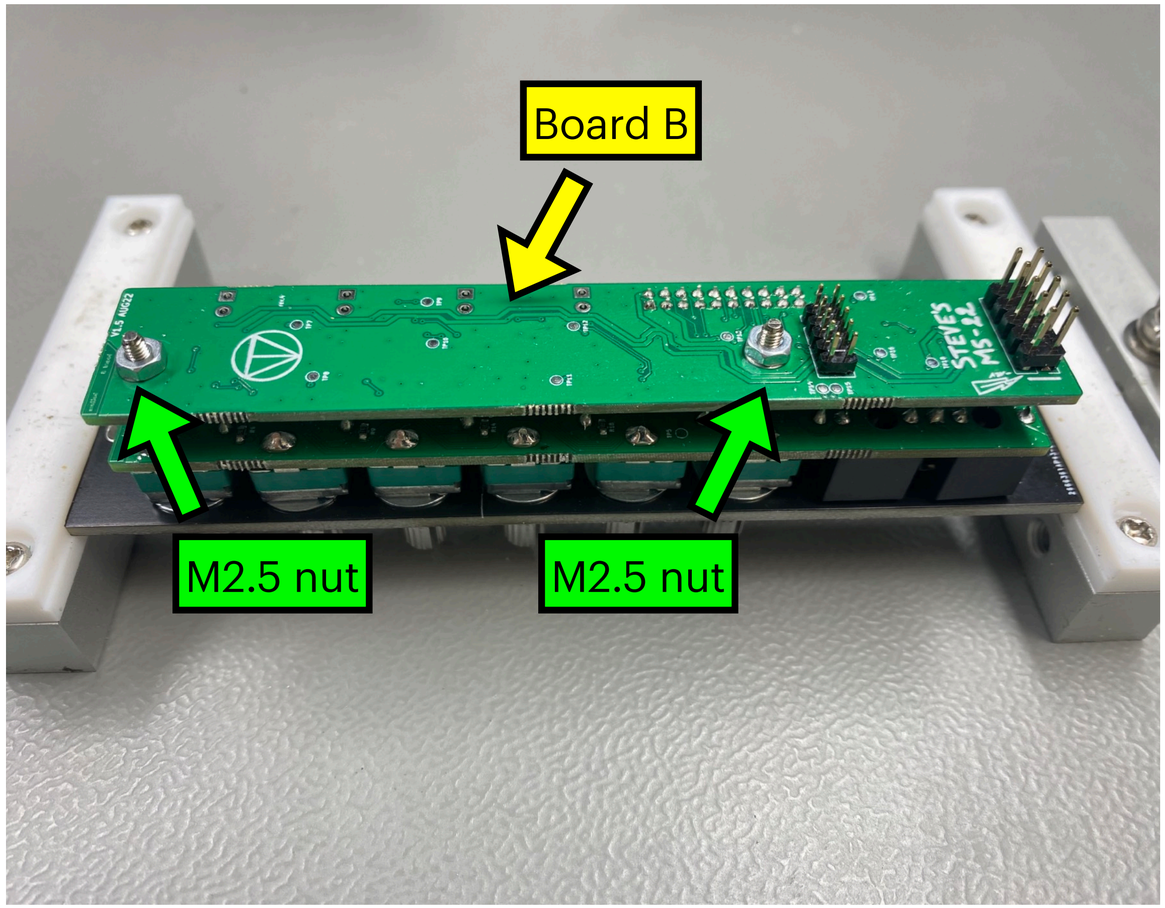
Don’t bring a knife to a gun fight

- First place the M2’5 nuts over the screws sticking through the back of board A.
- Tighten gently but firmly
- Now place the M2.5 standoffs onto the same screw
- Tighten gently but firmly



Board B

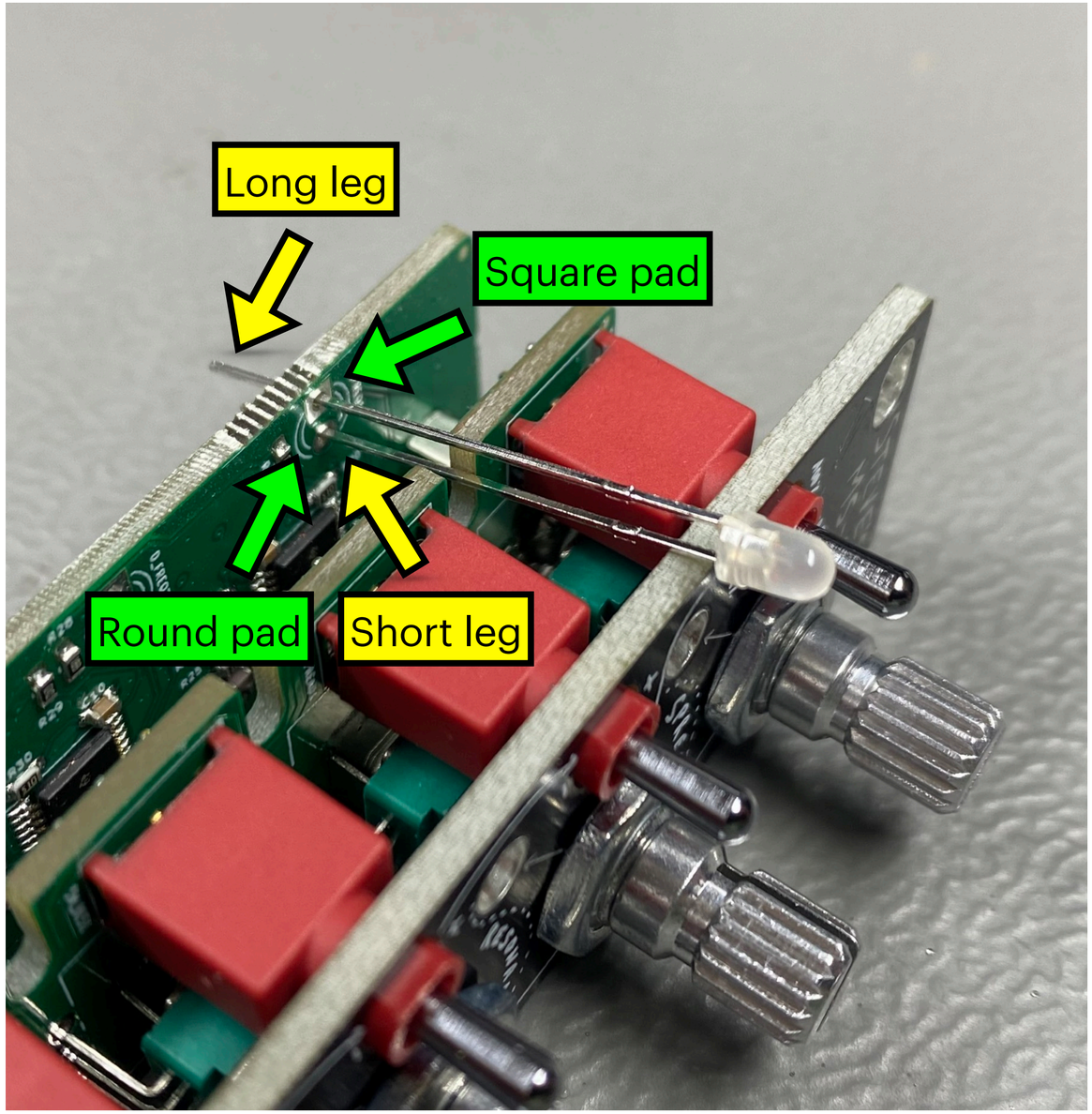
- Slide board B onto the standoffs
- Make sure that the connector between board A and B is properly aligned for applying any kind of force
- Press down gently but firmly
- If you need to apply excessive force, something is wrong, take a step back and figure out what's wrong
- Add the next set of M2.5 nuts to the standoffs
- Tighten gently but firmly



Front panel LEDs (1)

A.k.a. “Miniature jousting”

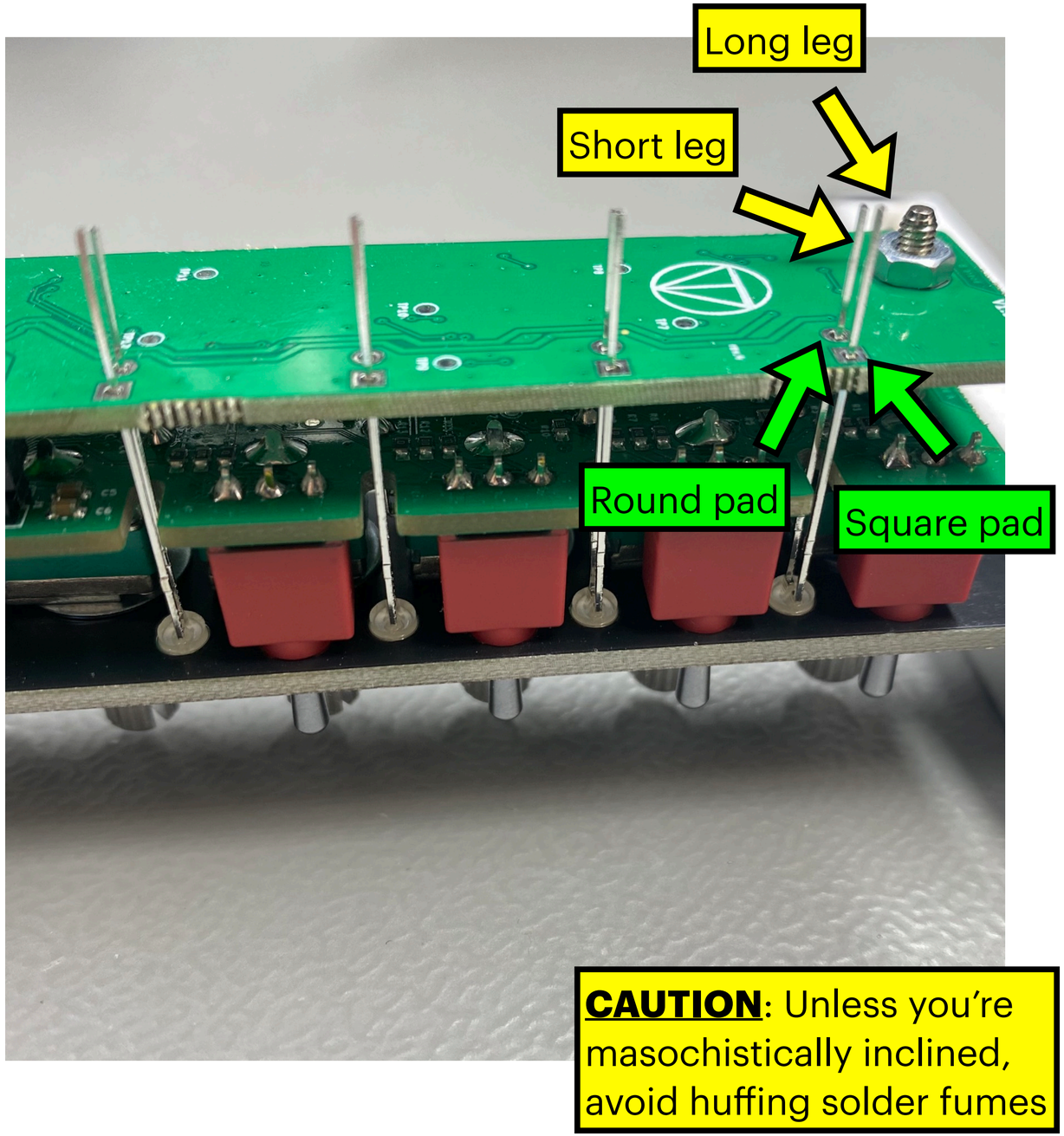
- Insert the LEDs into board B from the side
- **IMPORTANT:** The **long leg** should go into the **square pad**
- The LEDs legs should fit in the cutouts in board A



Front panel LEDs (2)

A.k.a. “Miniature jousting”

- Once inserted properly, push the LEDs towards the front panel so they sit flush with the front panel
- Before soldering **double-check**:
  - The M2.5 nuts should be in place and tightened!
  - The **long leg** needs to come out of the **square pad**
- Now solder the LEDs in place



Front panel LEDs

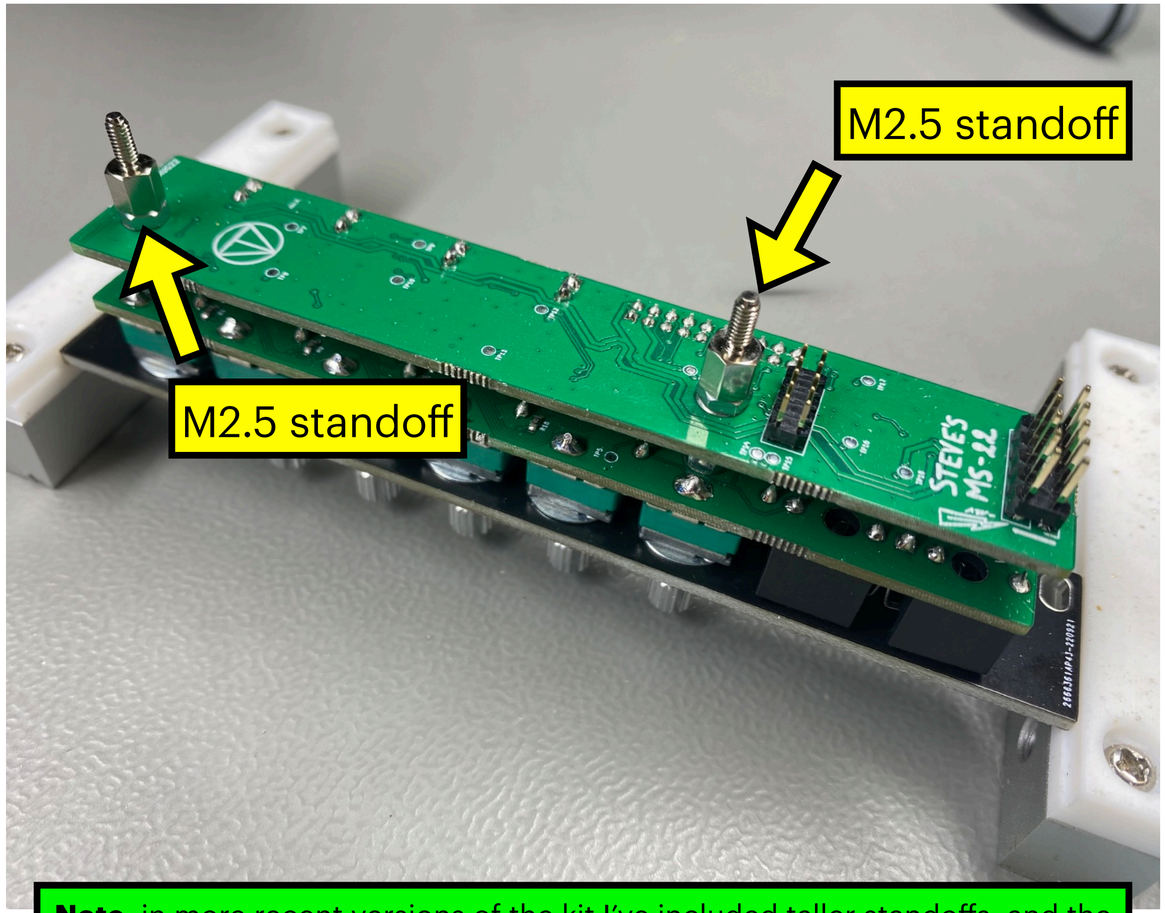
Snip snip!

- Solder the LEDs and snip off the excess length of their legs

Standoffs (2)

“Nobody moved, or said anything, for the next few moments…”

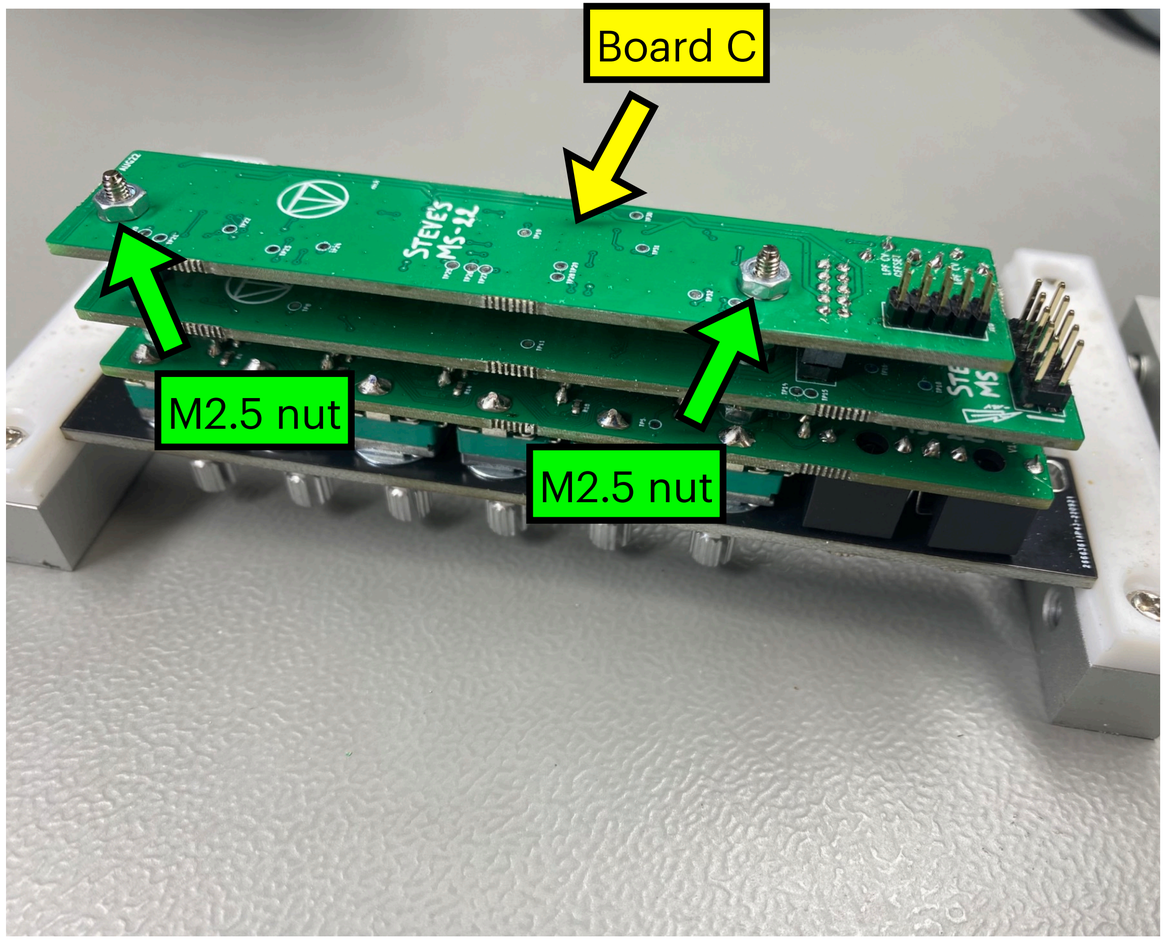
- Install the next set of M2.5 standoffs
- Tighten gently but firmly



Note: in more recent versions of the kit I’ve included taller standoffs, and the nut is no longer required. If the included standoffs are 6 mm high, you need a nut. If the body of the standoffs are 7 mm high, you don’t need a nut

Board C

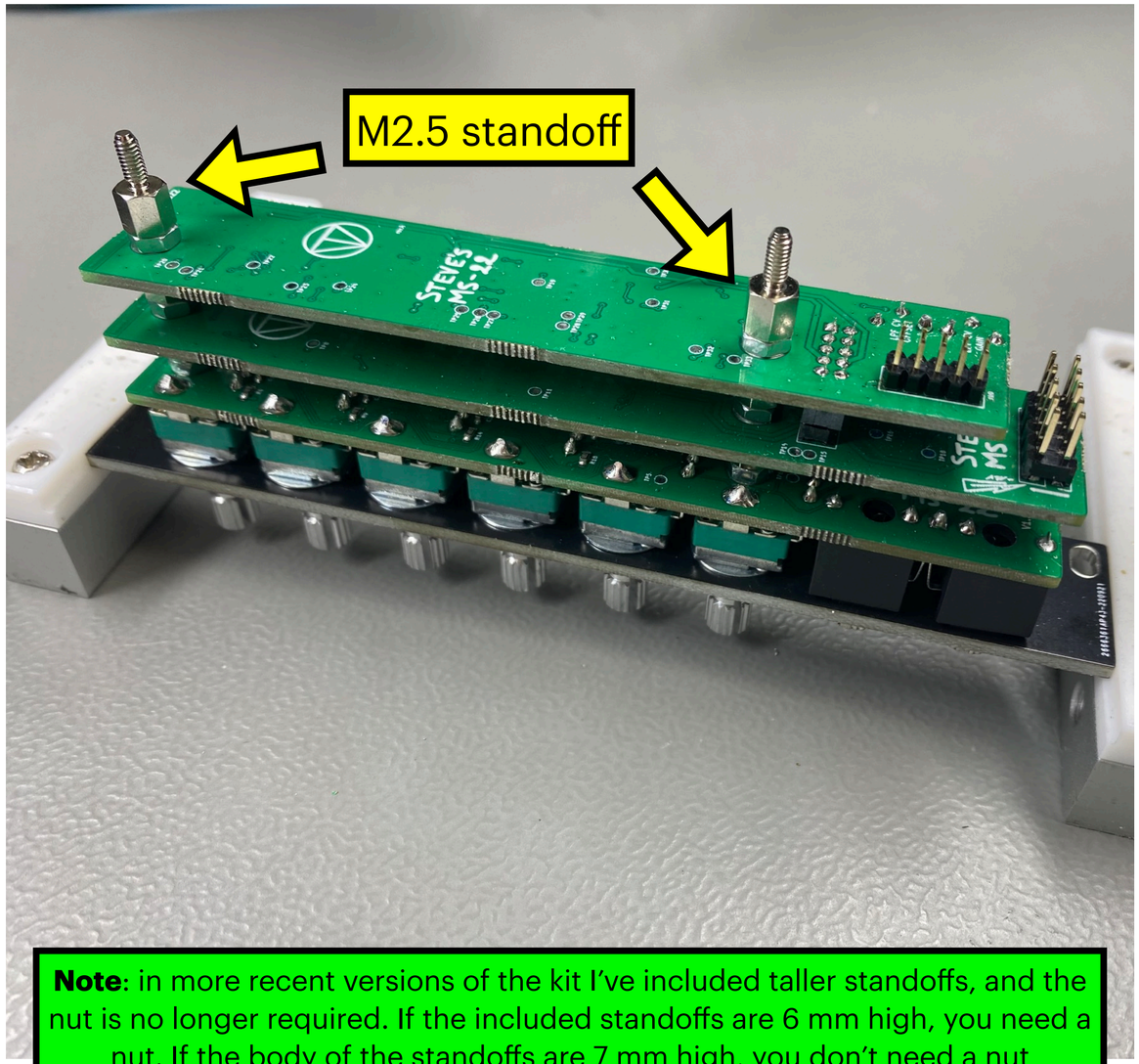
- Slide board C onto the standoffs
- Make sure that the connector between board B and C is properly aligned for applying any kind of force
- Press down gently but firmly
- If you need to apply excessive force, something is wrong, take a step back and figure out what's wrong
- Add the next set of M2.5 nuts to the standoffs
- Tighten gently but firmly



Standoffs (3)

“Keeping boards from reaching agreements since the dawn of electronics”

- Install the next set of M2.5 standoffs
- Tighten gently but firmly

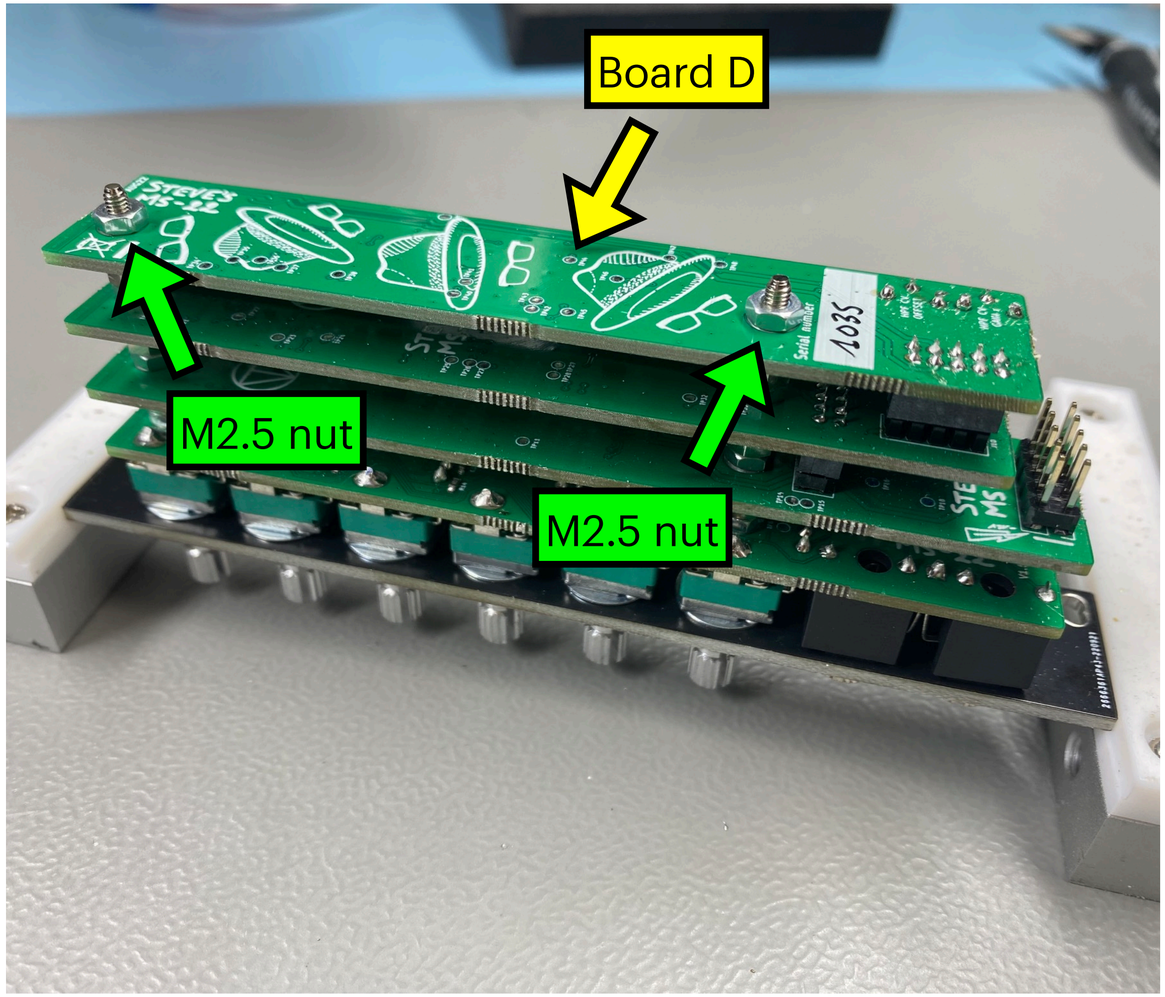


Note: in more recent versions of the kit I’ve included taller standoffs, and the nut is no longer required. If the included standoffs are 6 mm high, you need a nut. If the body of the standoffs are 7 mm high, you don’t need a nut

Board D

Almost there!

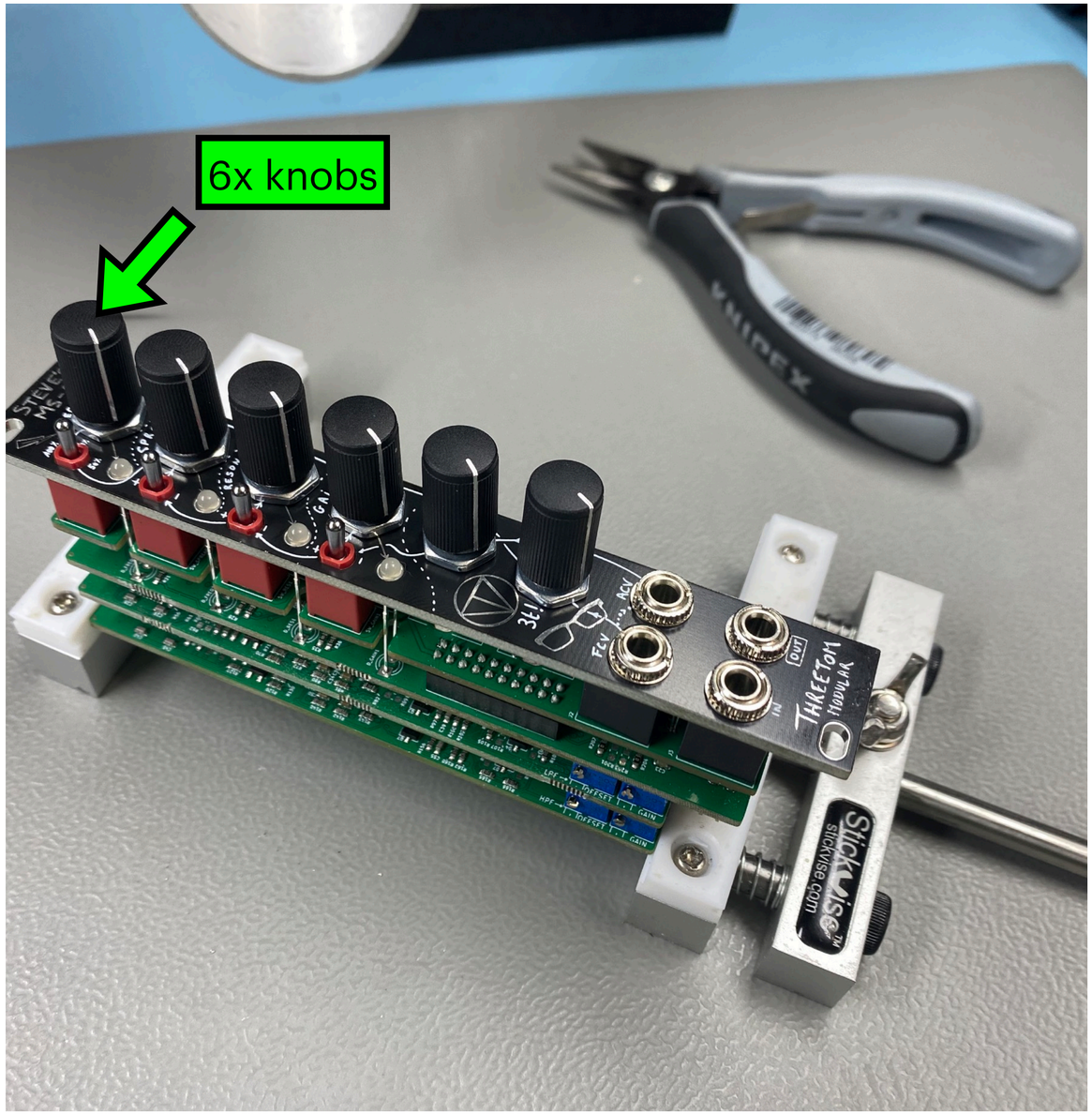
- Slide board D onto the standoffs
- Make sure that the connector between board C and D is properly aligned for applying any kind of force
- Press down gently but firmly
- If you need to apply excessive force, something is wrong, take a step back and figure out what's wrong
- Add the next set of M2.5 nuts to the standoffs
- Tighten gently but firmly



Fit the knobs

For optimal wiggling!

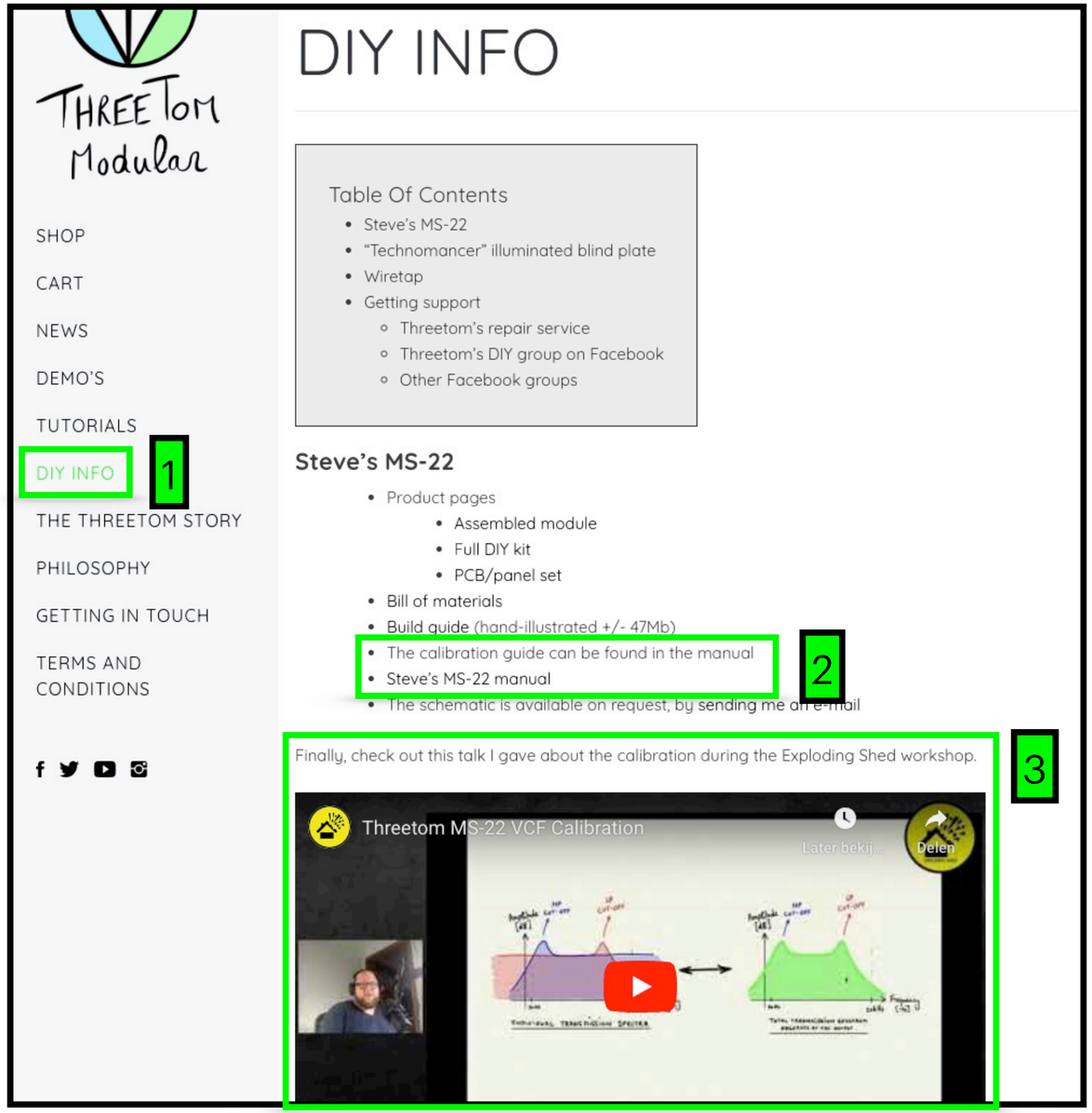
- Turn the potentiometers fully counterclockwise
- Align the knobs' indicator lines as indicated in the picture
- Press the knob down gently but firmly
- If you need to apply excessive force, something is wrong, take a step back and figure out what's wrong



Calibration

Adjust MS-22 to societal norms (or not)

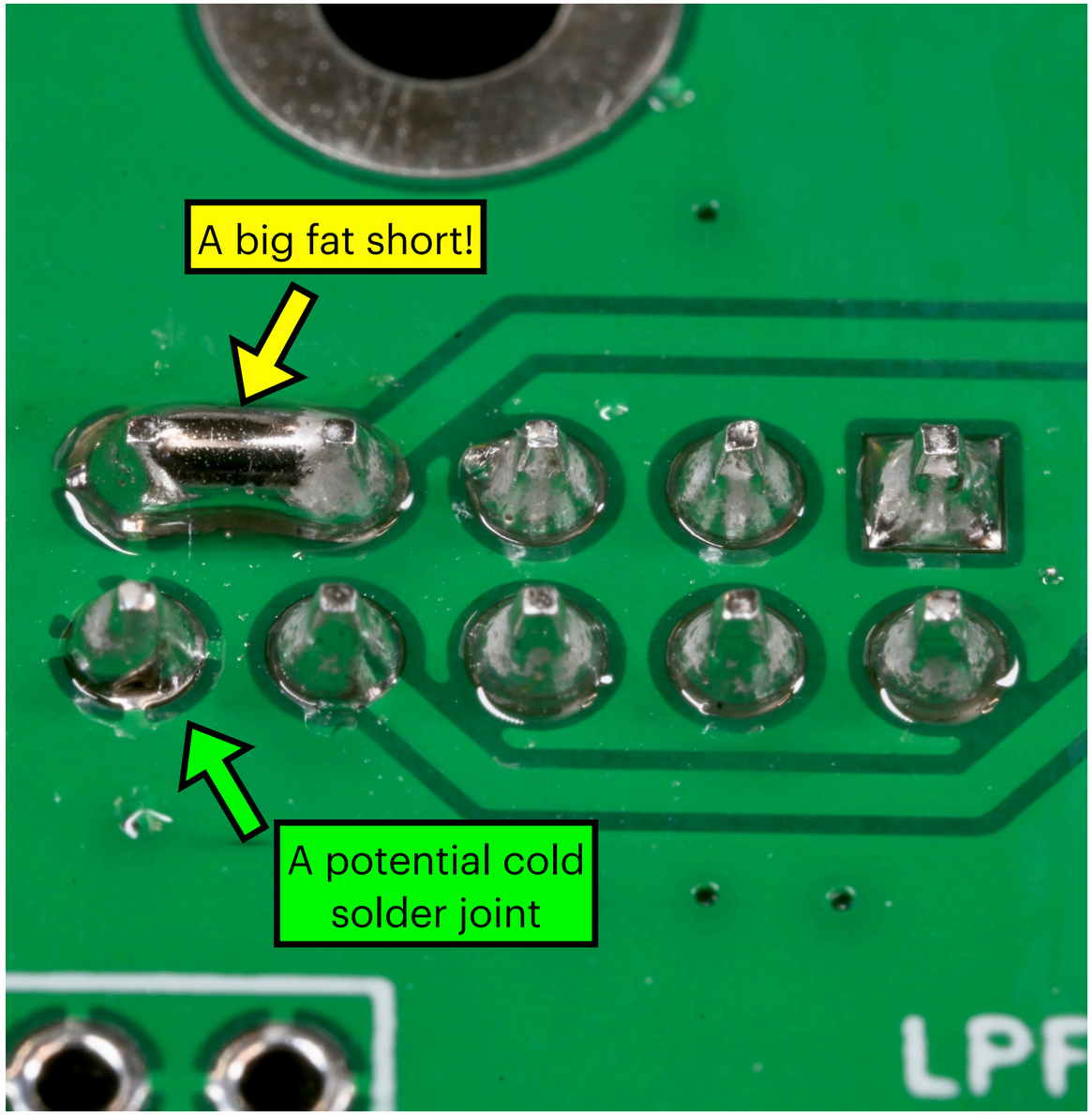
- Head over to [1]: www.threetom.com/diy-info/
- The calibration guide can be found in Steve's MS-22's manual [2]
- You may also want to watch the YouTube video by Exploding Shed, where I clarify the calibration steps a bit further [3]



Troubleshooting

Pew, pew, pew!

- 95% of all issues are rooted in cold solder joints and shorts
- Meticulously inspect your solder joints and reflow them when in doubt
- Make sure your soldering iron didn't slip onto the SMT components and cause mayhem over there
- When the signal going through the filter is very low, the calibration of the high pass filter may be off



All done!

I hope you enjoyed the build :)

PS: If you had a good time with your full DIY kit, and are loving Steve's MS-22, it would mean the world to me if you'd share and tag me on Instagram!

Sincerely,
Tom :)