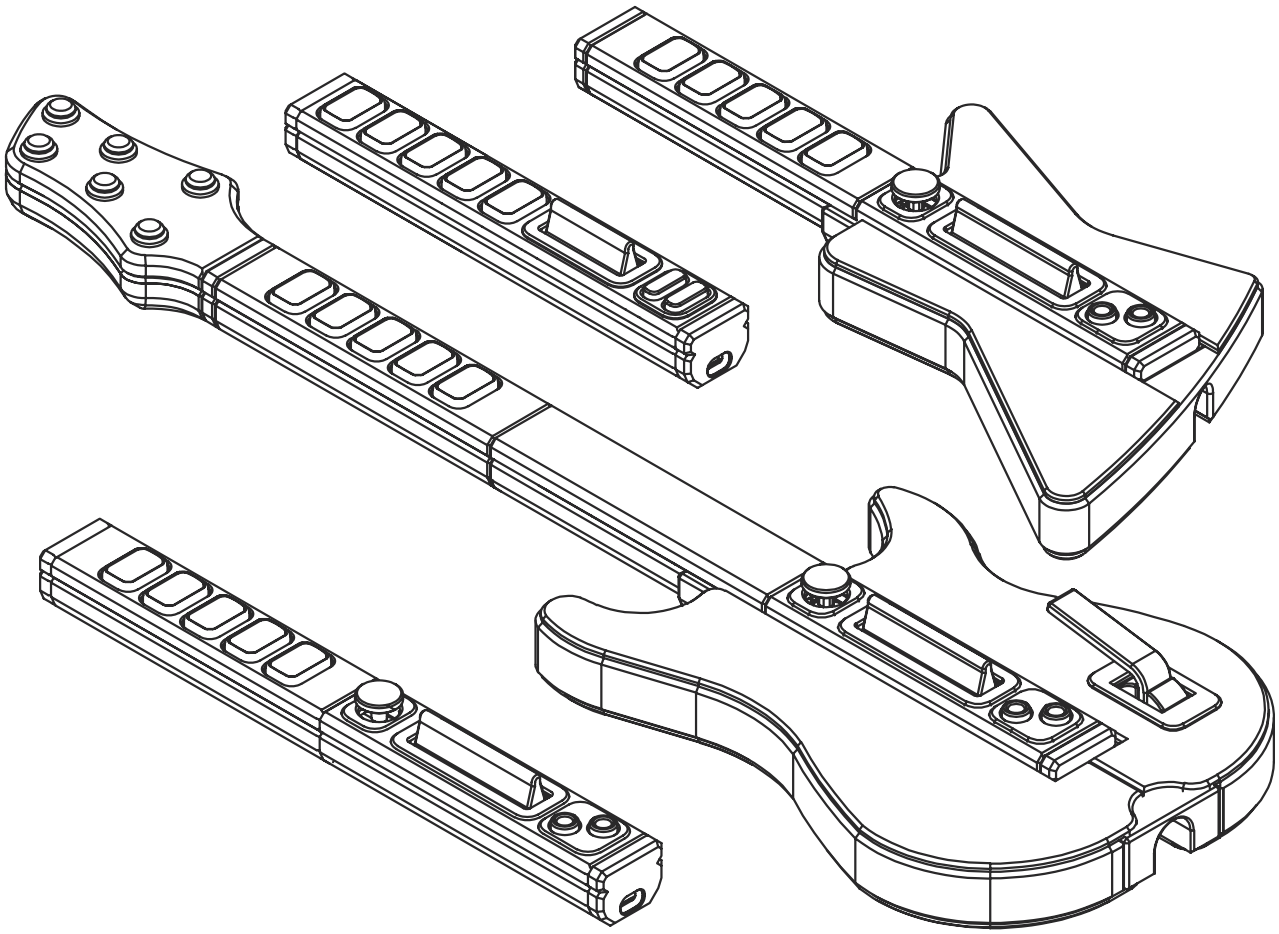
OFFICIAL BUILD GUIDE

FOR THE

Polybar SYSTEM



INTRODUCTION

THANK YOU FOR DOWNLOADING THE POLYBAR PROJECT!

This guide will assist you with assembling your guitar controller.

This guide assumes that you have a general understanding of soldering as a concept. This guide does not provide any soldering tutorials, it covers the assembly of the controller and placement of PCB components.

You can find soldering tutorials online for the various components you will find in this guide. Don't be afraid to ask for help in our Discord server!

Join our Discord!

We are more than happy to help!

CREDITS

I have worked on the Polybar project for over four years at this point. I've met a lot of awesome people along the way. Contributors, friends and community members that I all appreciate so much.

Music games have always meant a lot to me, and my mission statement from the beginning was that, I wanted to create the best feeling music game controller you could get your hands on.

It had to be cheap, it had to be easy to build, and be totally free for everyone to make. The project has come a very long way since it's inception, and evolved to be so much greater than I could have imagined.

I hope the Polybar System can meet your highest expectations! I have spent hundreds of hours designing, testing and ensuring that when you hit print, the best guitar controller you have ever used comes out of your printer.

Thank you so much for downloading, and please enjoy the hard work that rest of the team and I have put in to this for you to enjoy.

CREDITS:

Be sure to say thank you when you see these users on the Discord Server! From me to the contributors, thank you!

roadsidebomb - Creator

HeuristicBishop - PCB Contributor

PtigaD - PCB Contributor

Pits - Handwire components and build guide

GetRektRyan - PCB Contributor and wireless support designer

PossumOG - PCB Assembly and solderless kit designer

Moose - Build Guide design and layout

My deepest thanks and gratitude to everyone that has contributed their ideas and time, you are the best! Thank you!

DISCLAIMERS

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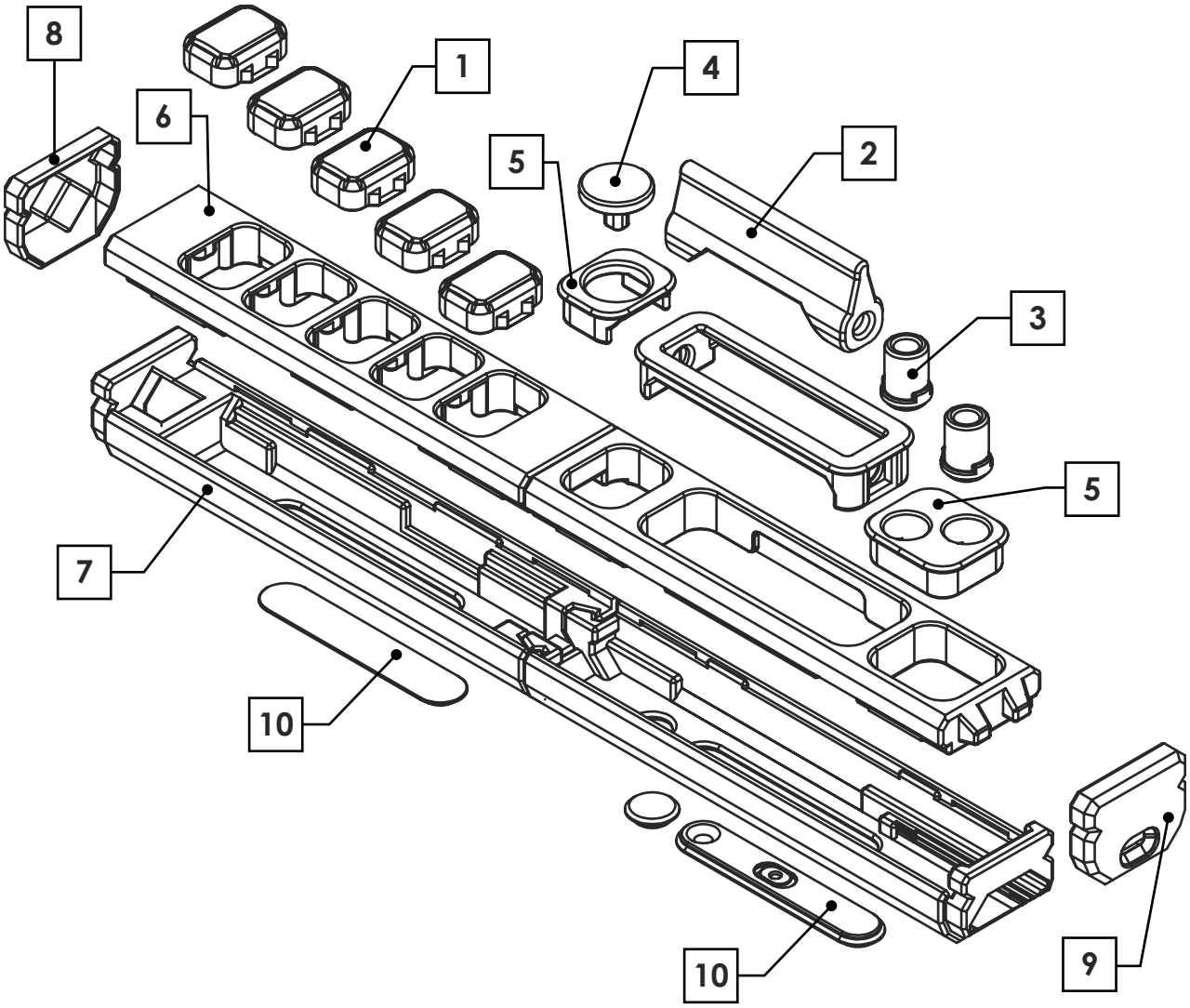
DIAGRAM VIEW - POLYBAR MINI/MAX

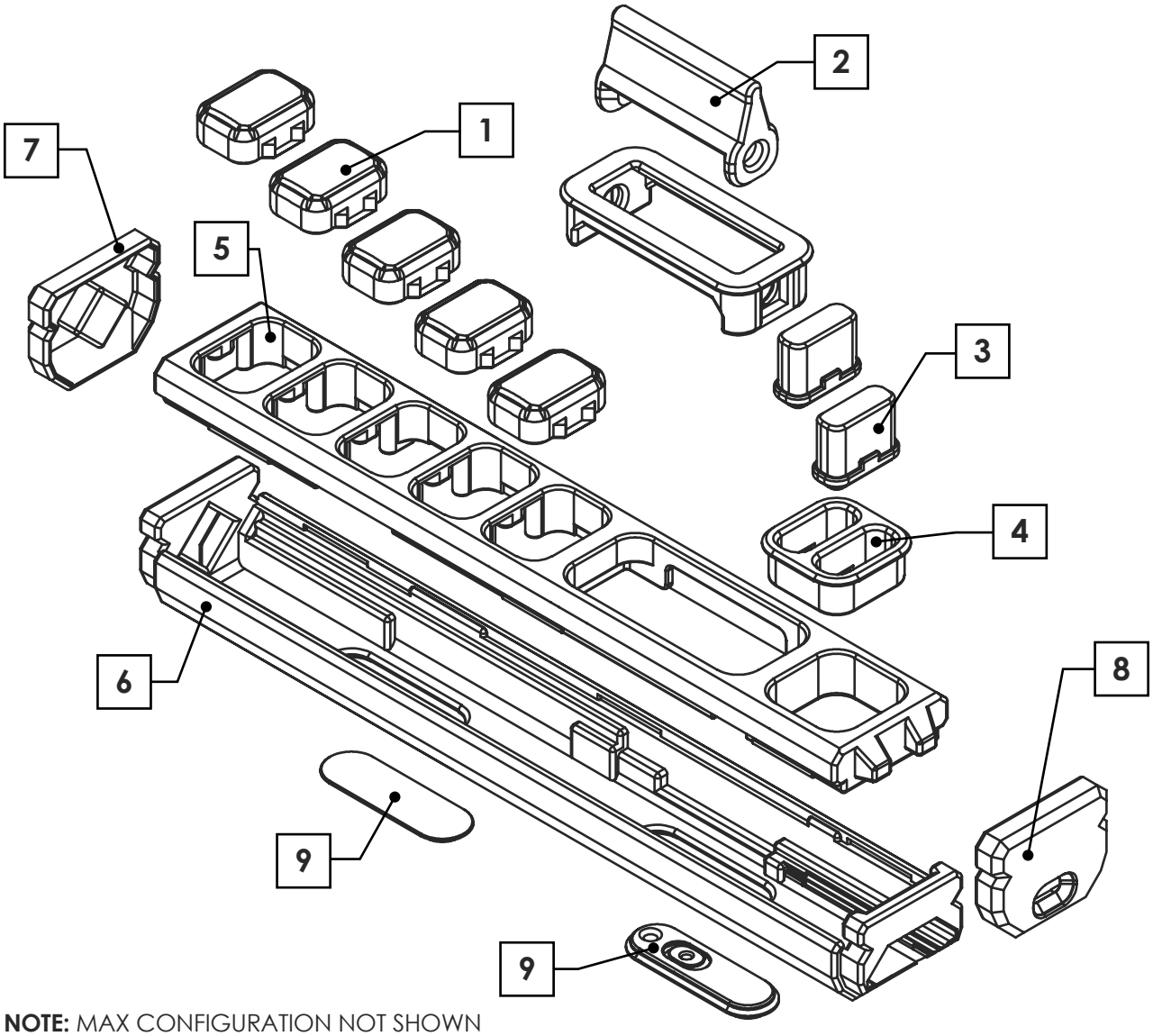


NOTE: MAX CONFIGURATION NOT SHOWN

LEGEND:

1. Frets (Inserts not shown)
2. Strum Bar (Pins not shown)
3. Start/Select Buttons
4. Joystick
5. Joystick/Strum/Button Chassis
6. Top Shells (Fret/Strum)
7. Bottom Shells (Fret/Strum)
8. Fret Case Cap
9. Strum Case Cap
10. Accessory/Switch Plate

DIAGRAM VIEW - POLYBAR MICRO

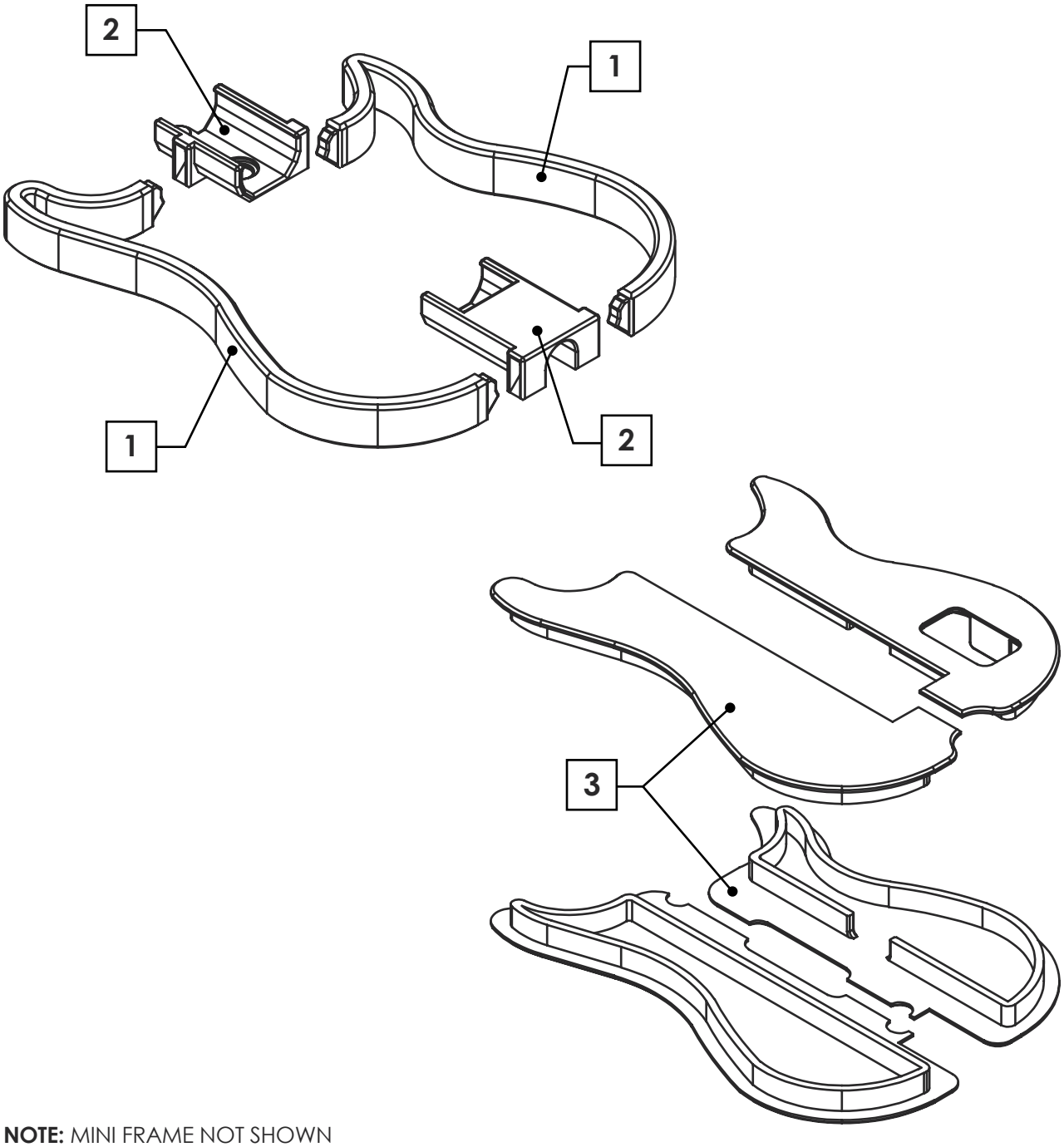


NOTE: MAX CONFIGURATION NOT SHOWN

LEGEND:

1. Frets (Inserts not shown)
2. Strum Bar
3. Start/Select Buttons
4. Strum/Button Chassis
5. Top Shells (Fret/Extension/Strum)
6. Bottom Shells (Fret/Extension/Strum)
7. Fret Case Cap
8. Strum Case Cap
9. Accessory/Switch Plate

DIAGRAM VIEW - CONTROLLER FRAME

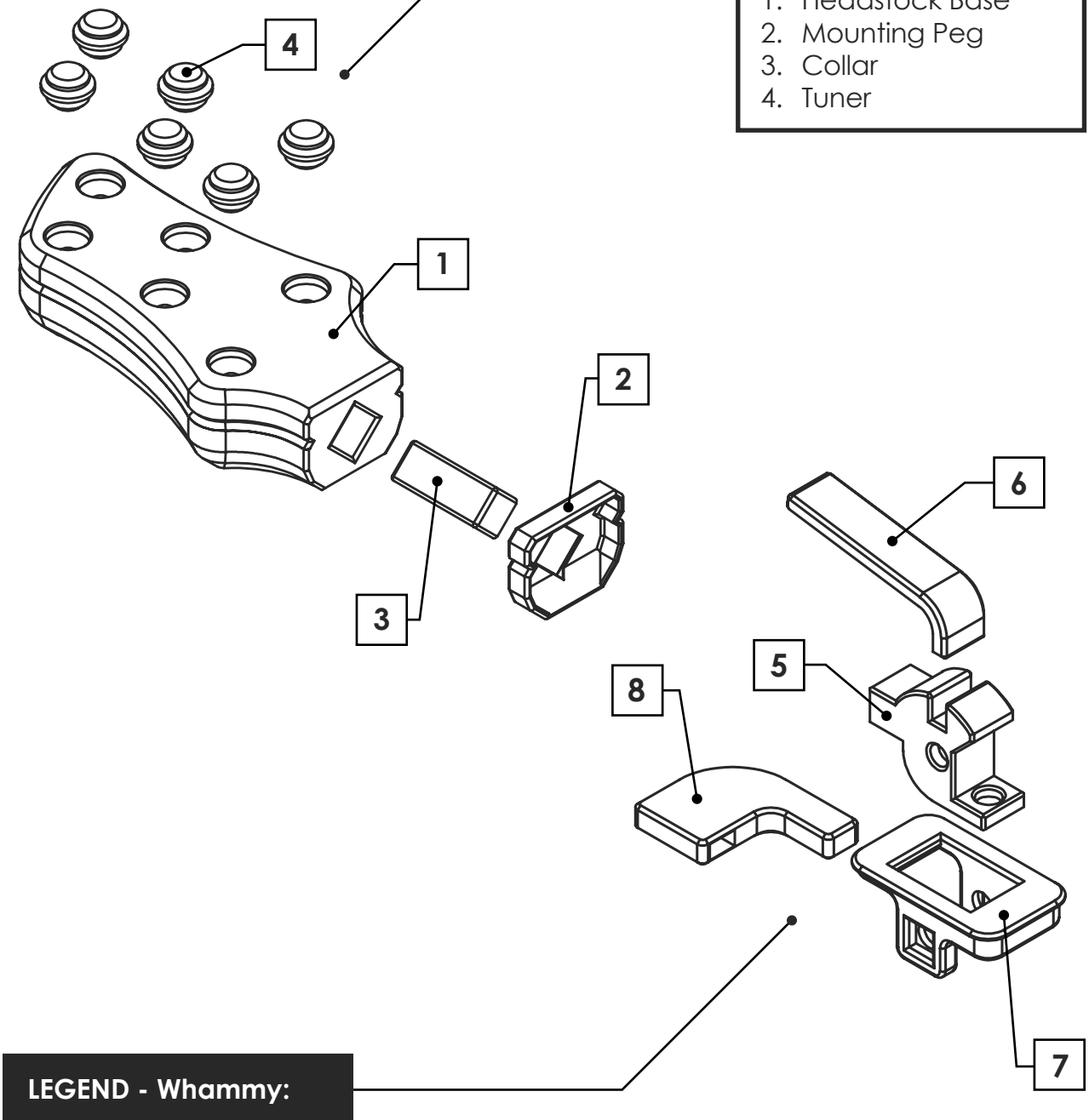


NOTE: MINI FRAME NOT SHOWN

LEGEND:

1. Frame Wing
2. Controller Sleeve
3. Fill Plate (Optional)

DIAGRAM VIEW - HEADSTOCK & WHAMMY



LEGEND - Headstock:

1. Headstock Base
2. Mounting Peg
3. Collar
4. Tuner

LEGEND - Whammy:

5. Whammy Core
6. Whammy Bar
7. Assembly Chassis
8. Magnet Paddle

COMPONENTS - STANDARD PARTS LIST

1

RASPBERRY PI PICO
(PICO W OPTIONAL FOR
WIRELESS CAPABILITY)

2

MX CHERRY
HOTSWAP SOCKET

3

KAILH CHOC
HOTSWAP SOCKET

4

MX CHERRY
LINEAR SWITCH

OR

KAILH CHOC
LINEAR SWITCH

5

KAILH BOX NAVY

6

JOYSTICK
(MODERN STYLE)

7

TACTILE SWITCH
(6X6X5)

8

BALL TILT SWITCH

9

SK9822 LEDs
(OPTIONAL)

10

ADXL345
ACCELEROMETER
(OPTIONAL)

11

9-PIN HEADER
(MICRO ONLY)

COMPONENTS - OPTIONAL PARTS LIST

OPTIONAL COMPONENTS FOR WIRELESS CONNECTIVITY

1

RASPBERRY PI PICO W
(SEE NOTE AT BOTTOM)

12

1000mah BATTERY
10X20X50
(READ DISCLAIMER)

13

2 PIN FEMALE JST
CONNECTOR WITH
LEADS

14

TP4056
CHARGE CONTROLLER

15

TWO POSITION
SLIDE SWITCH

OPTIONAL COMPONENTS FOR WHAMMY

16

OH49E LINEAR
HALL SENSOR
(OPTIONAL)

17

20x5x2 MAGNETS
(OPTIONAL)

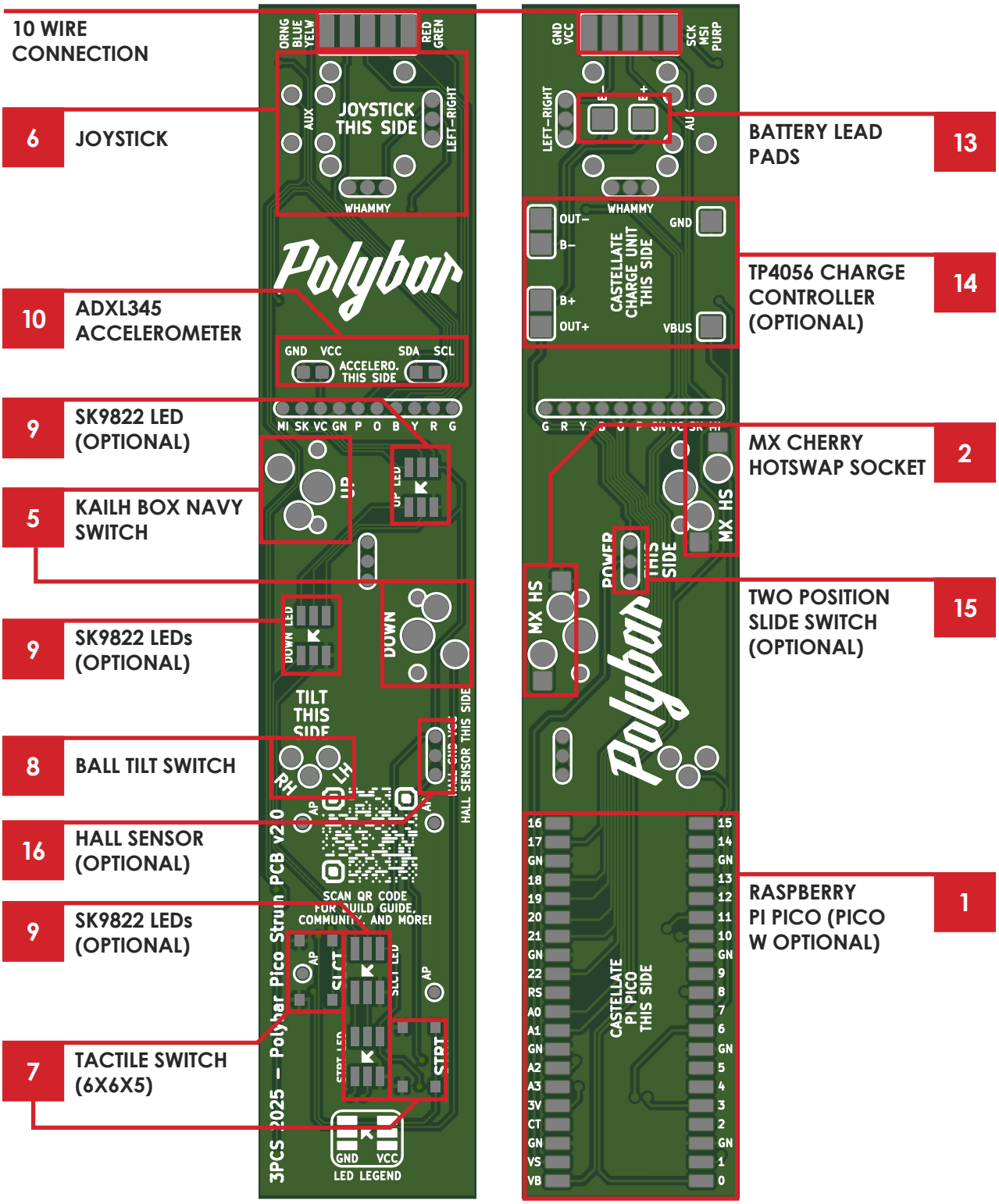
18

7x20 SPRING
(OPTIONAL)

! NOTE: RASPBERRY PI PICO COMPATIBILITY

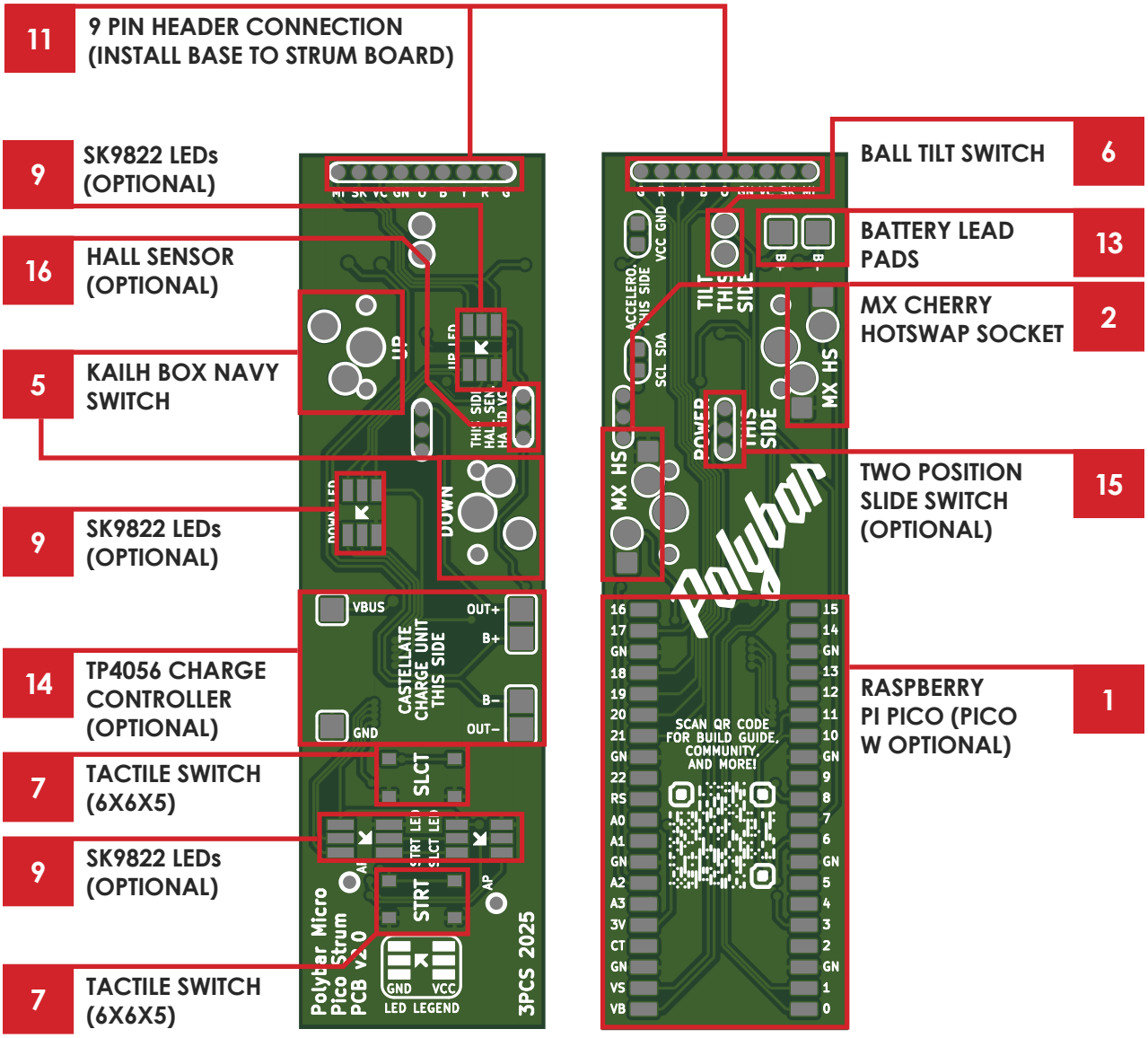
Please use Official Pi Pico W boards ONLY. Clone boards from unofficial sources have wireless chips incompatible with our config tool and Santroller.

STRUM BOARD - POLYBAR MINI/MAX



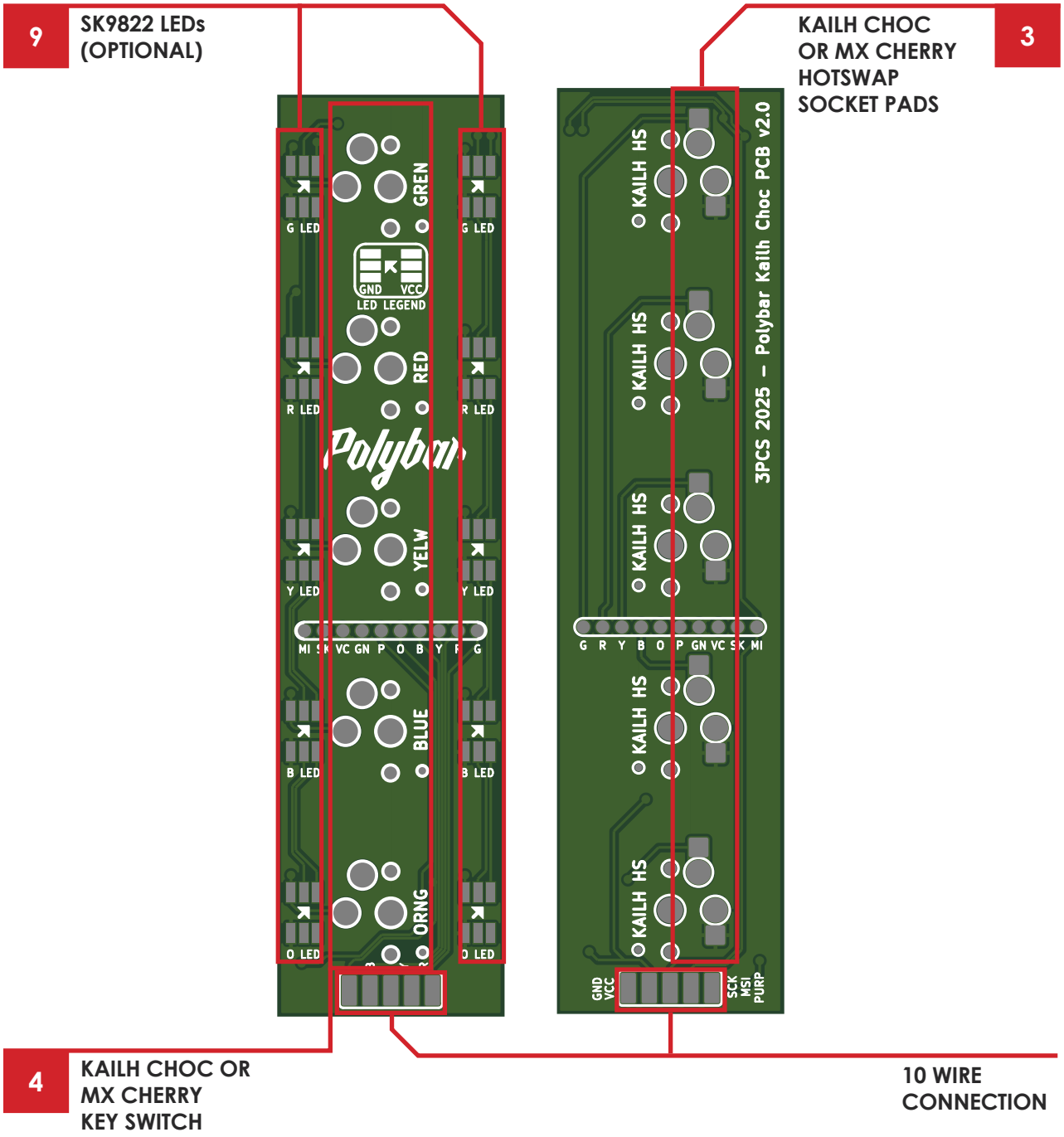
NOTE: The same principles apply for the KB2040 boards.
Please use the Pi Pico boards for optimal support and functionality.

STRUM BOARD - POLYBAR MICRO



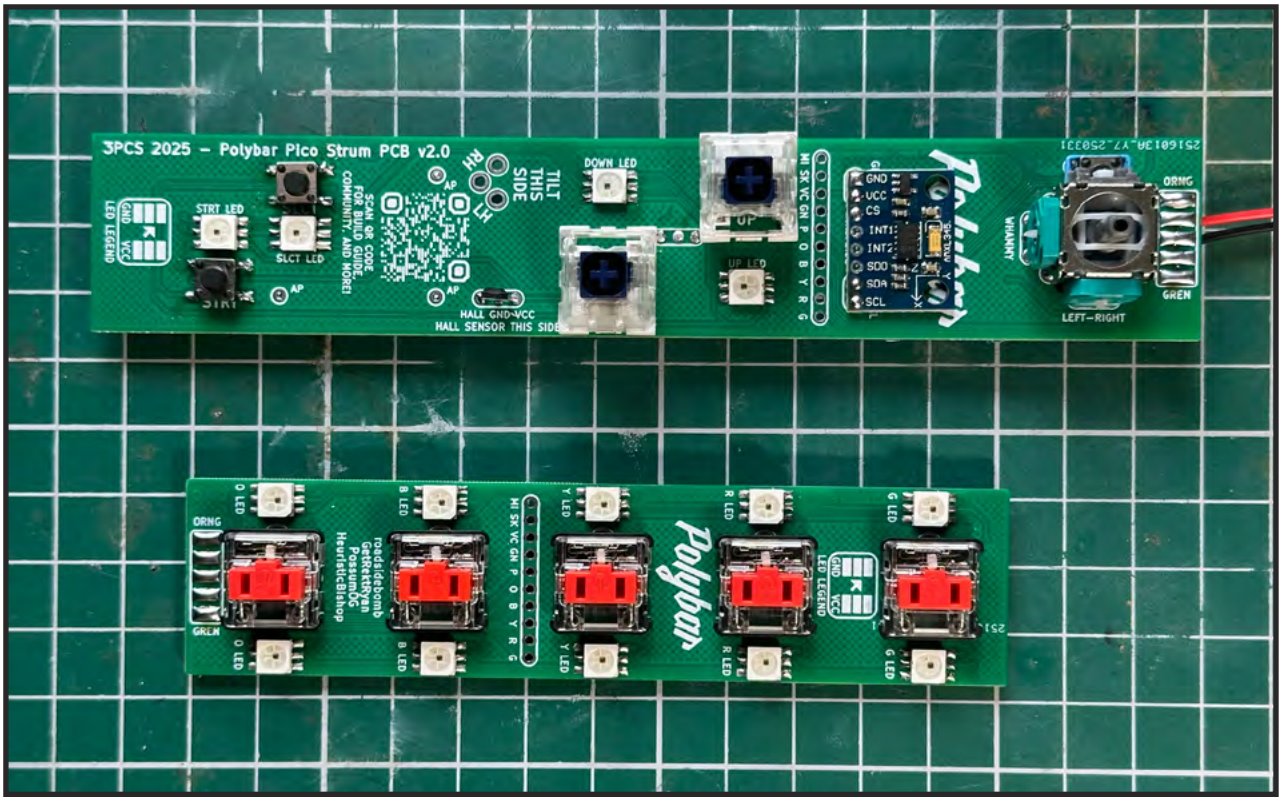
NOTE: The same principles apply for the KB2040 boards.
Please use the Pi Pico boards for optimal support and functionality.

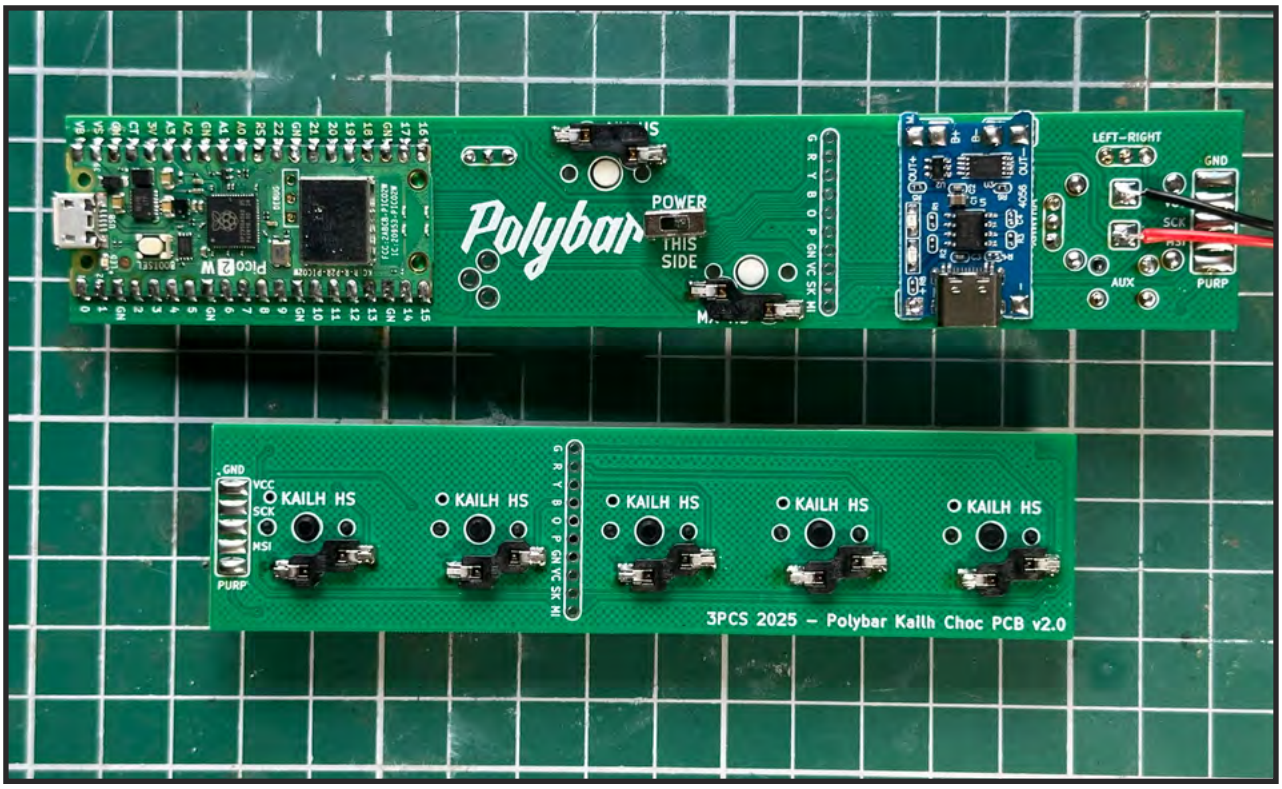
FRET BOARD - POLYBAR MICRO/MINI/MAX



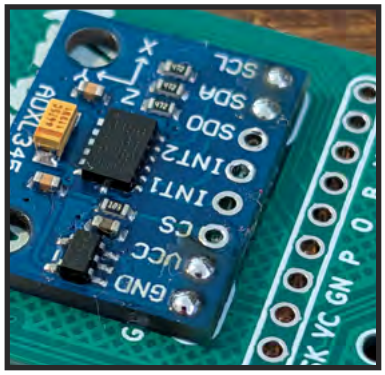
NOTE: The same principles apply for the MX Cherry board. Either option is optimal, but Kailh Chocs are required for smaller form factor wireless support. If using MX Cherry small form factor wireless builds, please add an extension to accomodate the battery.

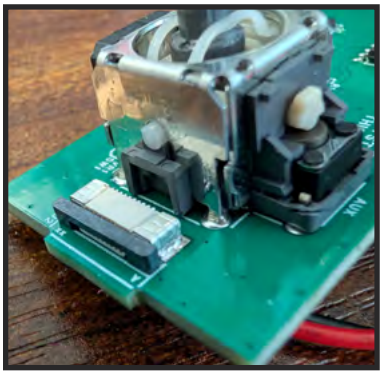
COMPLETED PCB EXAMPLES

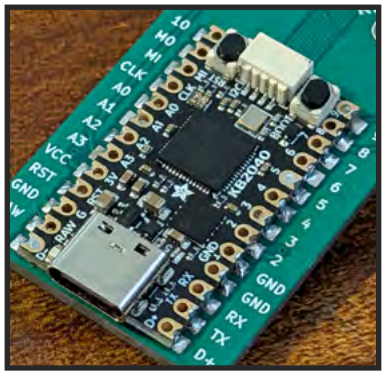


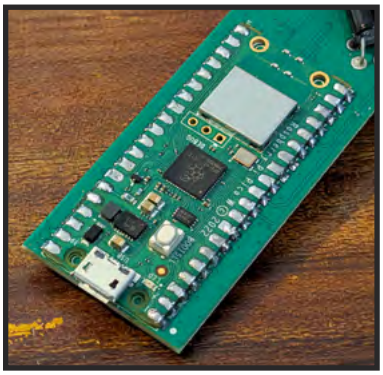


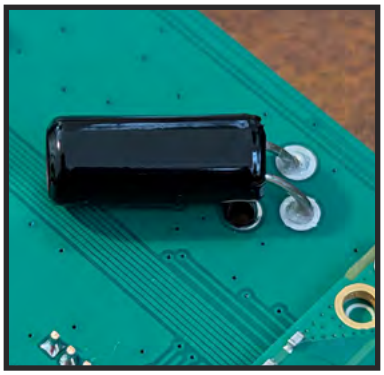
SOLDERED COMPONENT EXAMPLES

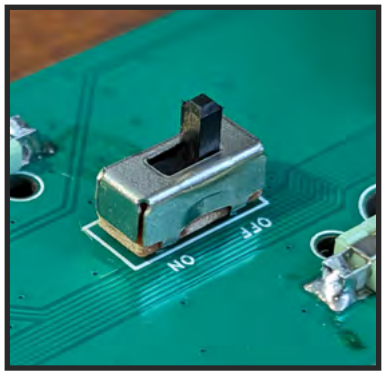


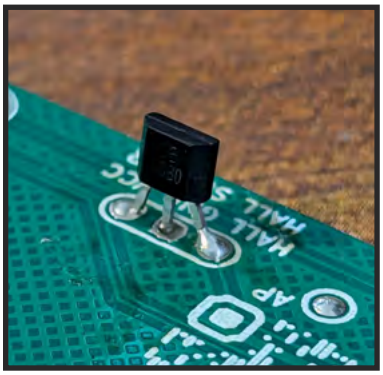


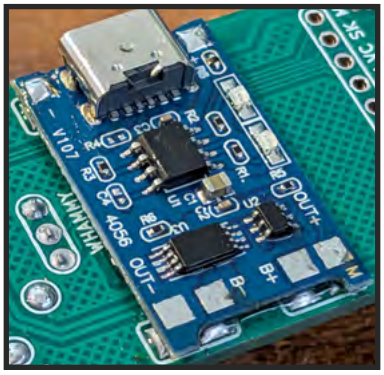


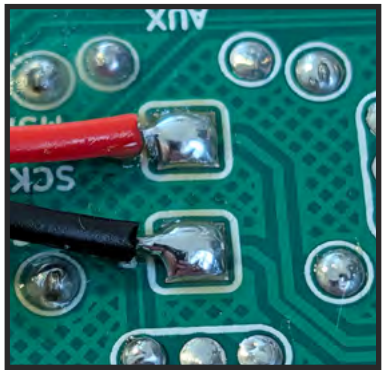


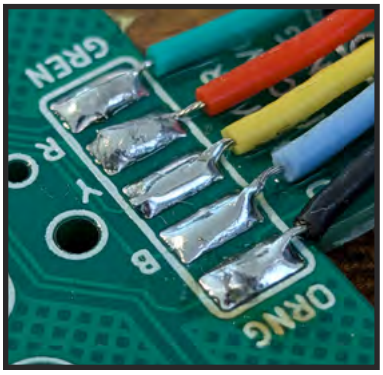




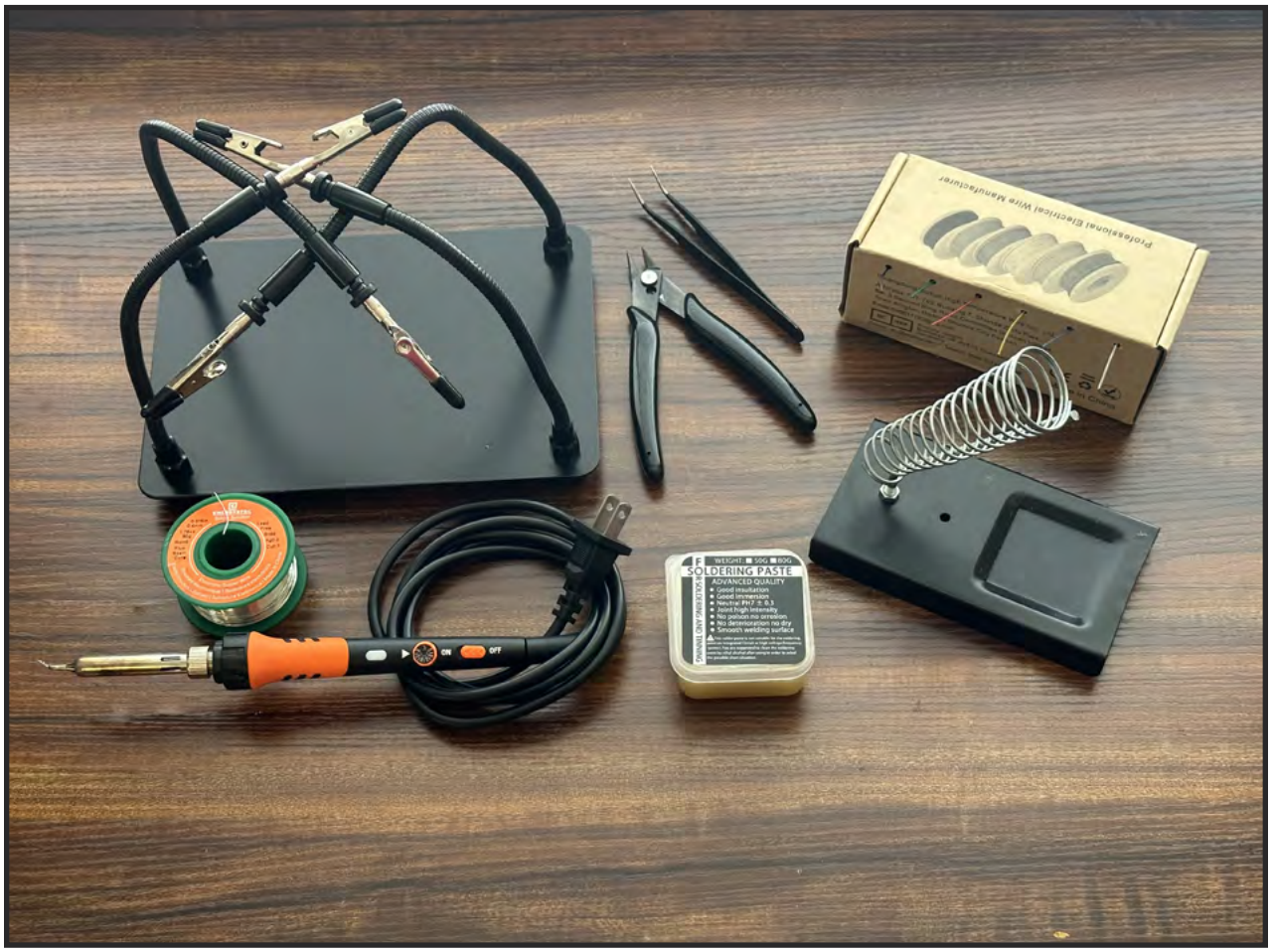








TOOLS & SUPPLIES



THE TOOLS SHOWN ABOVE ARE RECOMMENDED FOR BUILDING THE POLYBAR & MINIBAR.

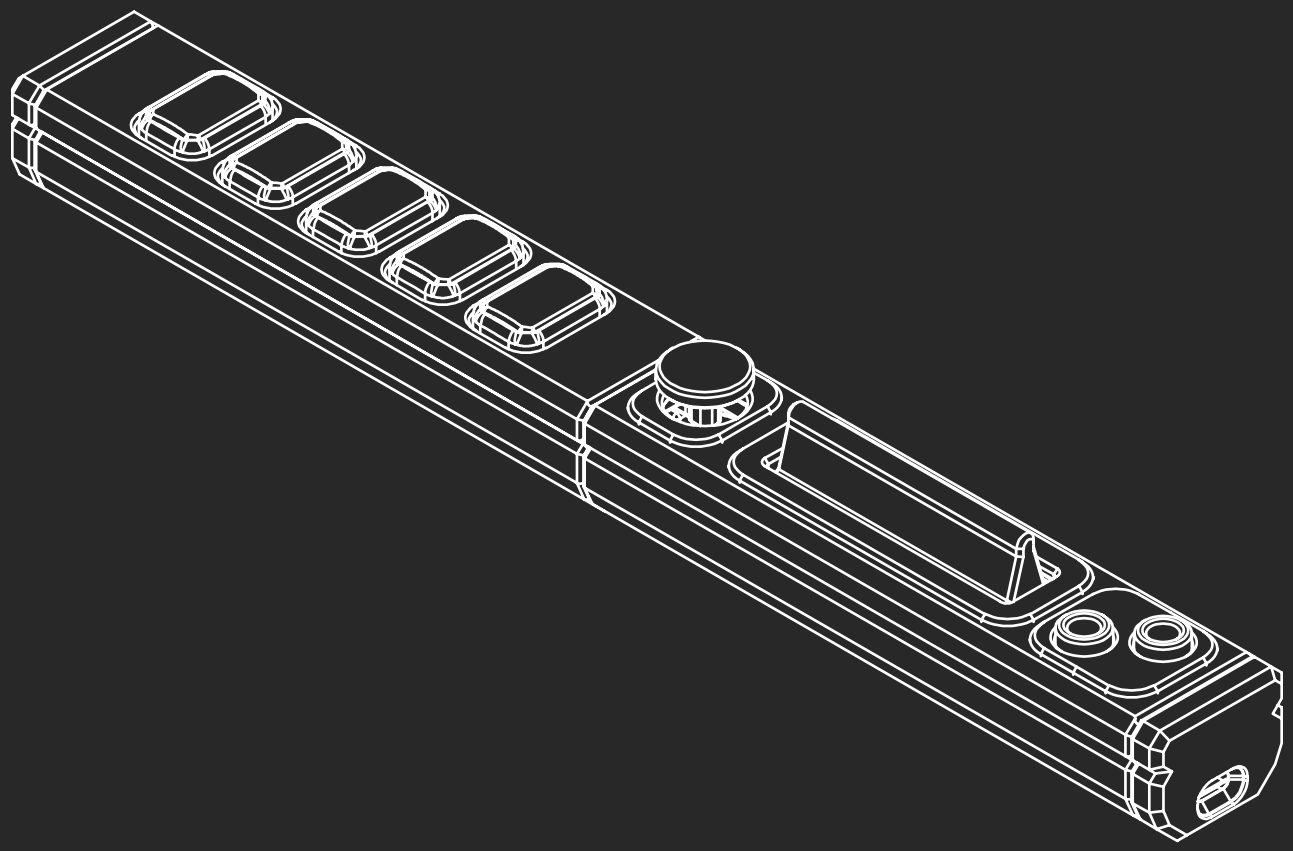
While all of these tools aren't completely necessary, it will save you time and headache if you plan on building multiple units.

You can build the polybar & minibar guitars with a basic soldering kit from online retailers such as Amazon or Aliexpress.

- Soldering iron
- Rosin core solder
- Soldering flux
- Flush cutters
- Tweezers
- Helping hands
- Misc. Wire
- Superglue

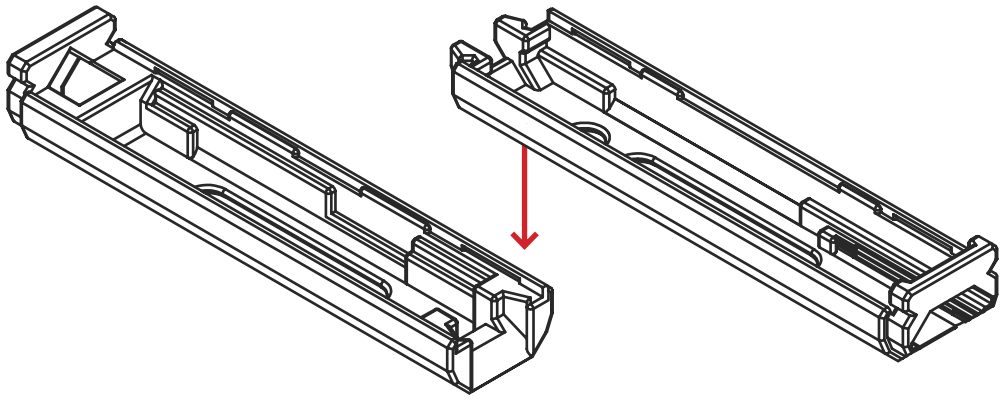
Polybar MINI + Polybar MAX

MAIN BODY ASSEMBLY



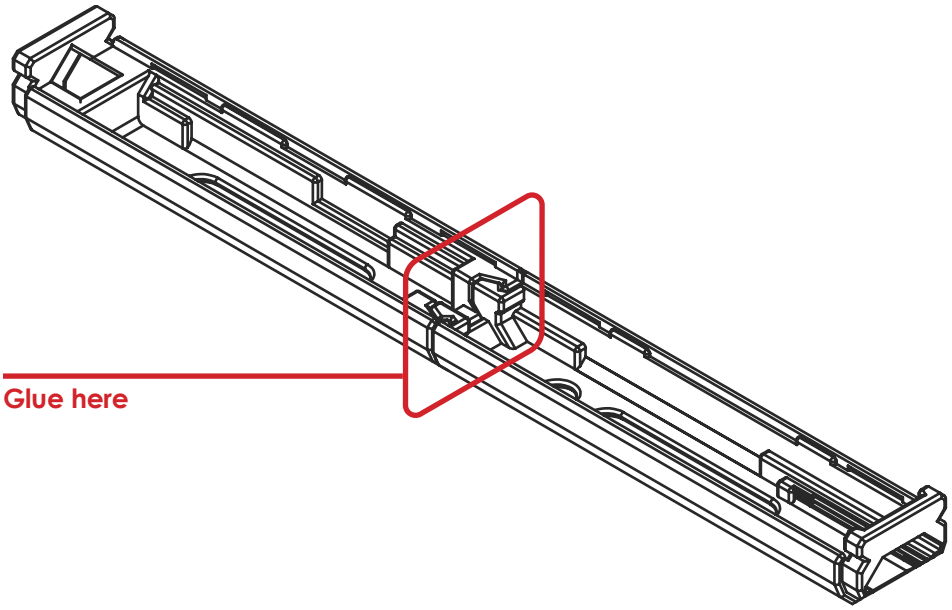
POLYBAR MINI/MAX ASSEMBLY

STEP 1



Start by using the dovetail joints to connect the two bottom shells.

STEP 2



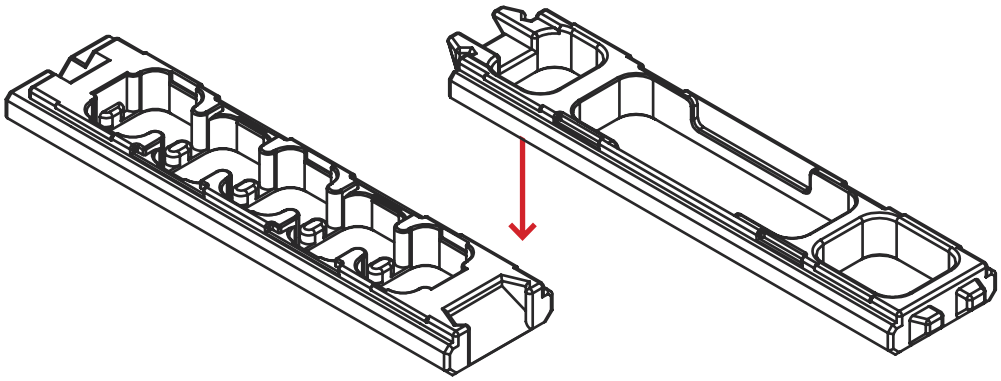
Add glue to the dovetail joint to secure the two bottom shells together.

NOTE: This may not be necessary depending on your specific filament or desired configuration.

Note: Max configuration not shown.
Install shell extensions depending on your desired controller length.

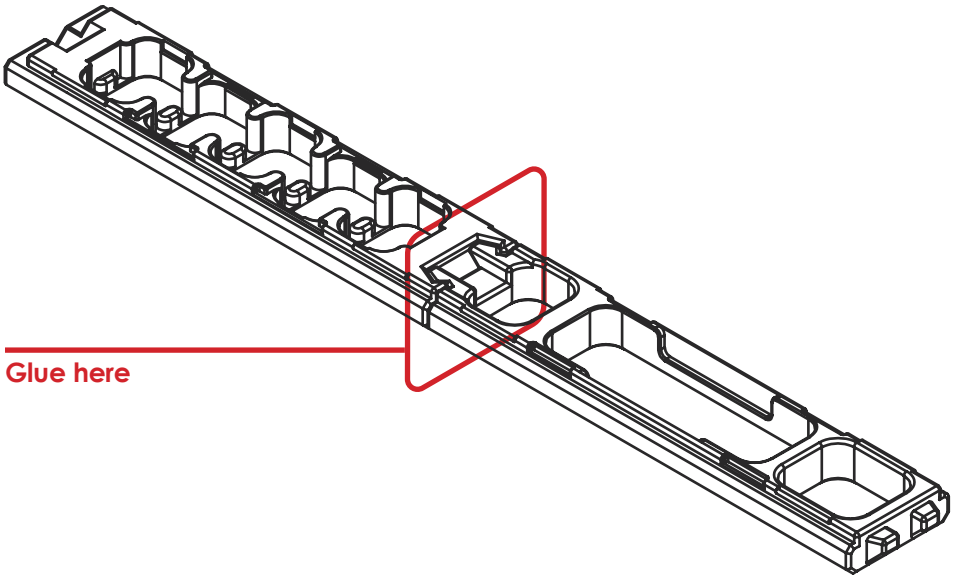
POLYBAR MINI/MAX ASSEMBLY (CONT.)

STEP 3



Use the dovetail joints to connect the two top shells.

STEP 4



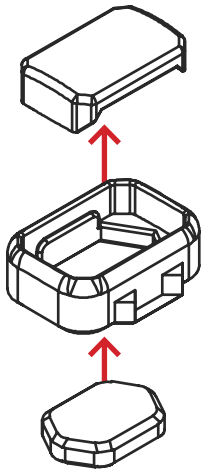
Add glue to the dovetail joint to secure the two top shells together.

NOTE: This may not be necessary depending on your specific filament or desired configuration.

Note: Max configuration not shown.
Install shell extensions depending on your desired controller length.

POLYBAR MINI/MAX ASSEMBLY (CONT.)

STEP 5

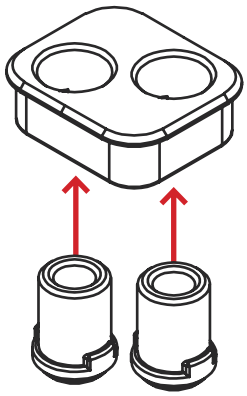


NOTE: Pro frets shown, glue as necessary for stability.

Build your five fret assemblies.

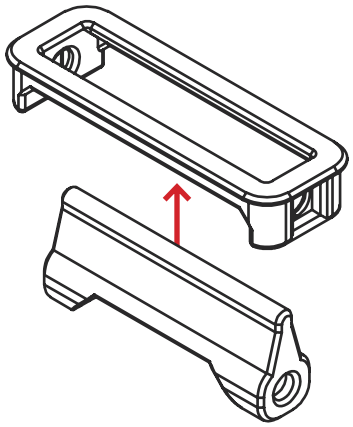
NOTE: If using "pro" fret inserts, you will need to force the keyswitch stuck, install the "pro" fret insert onto your keyswitch, then install the fret assembly onto the insert.

STEP 6



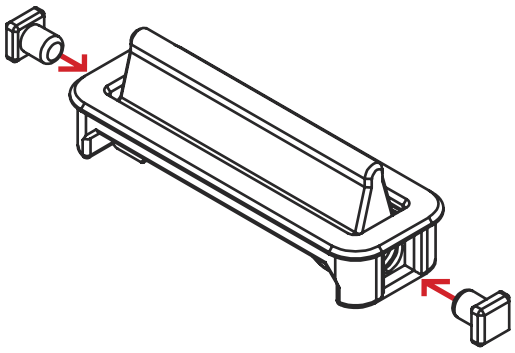
Install the start and select buttons into the chassis.

STEP 7



Slide the strum bar into the chassis.

STEP 8

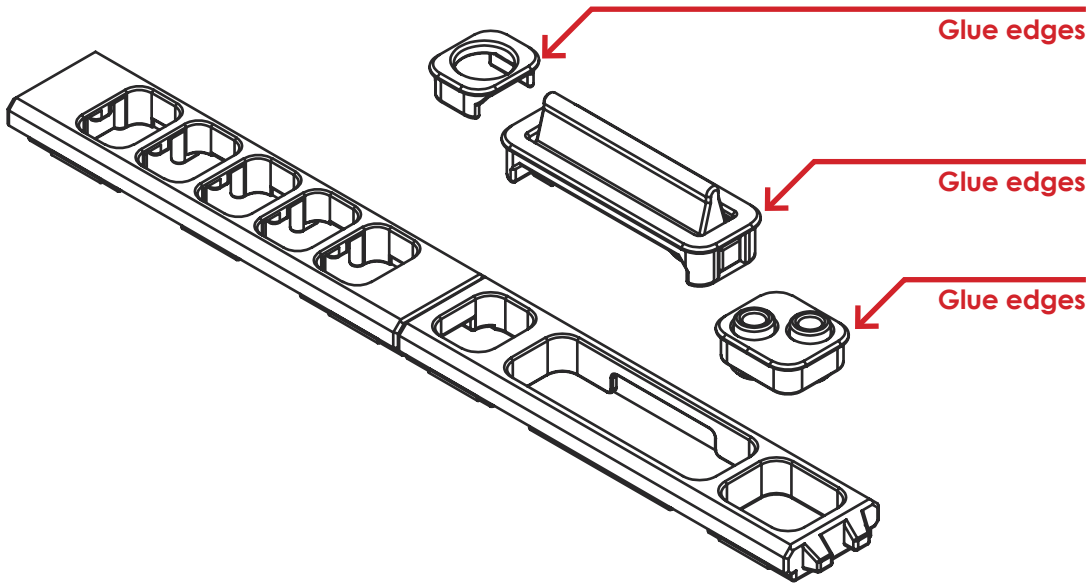


NOTE: Break in the pivot pins to match your strum bar

Push the rotation pegs into the strum bar chassis to secure the strum bar assembly. You may need to rotate the pins depending on the location of your print seams. Adjust as needed.

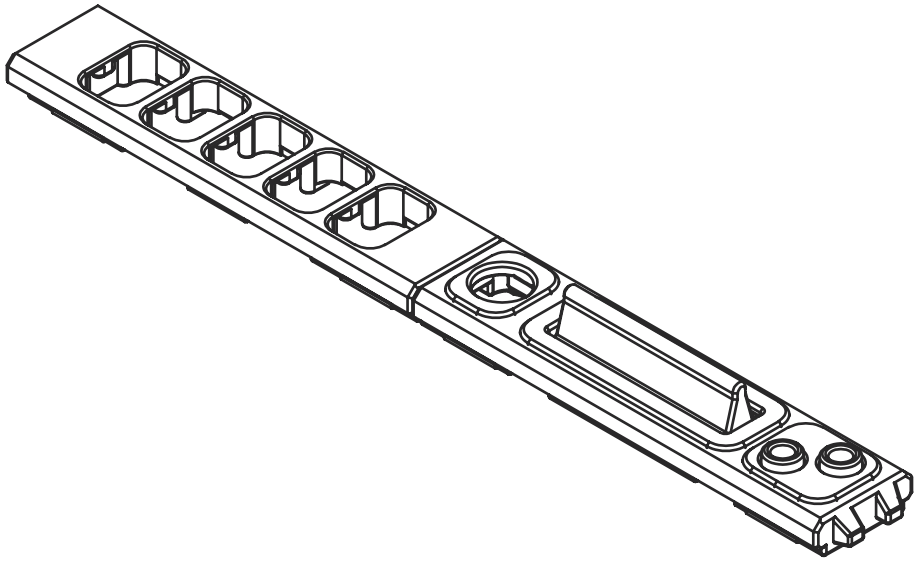
POLYBAR MINI/MAX ASSEMBLY (CONT.)

STEP 9



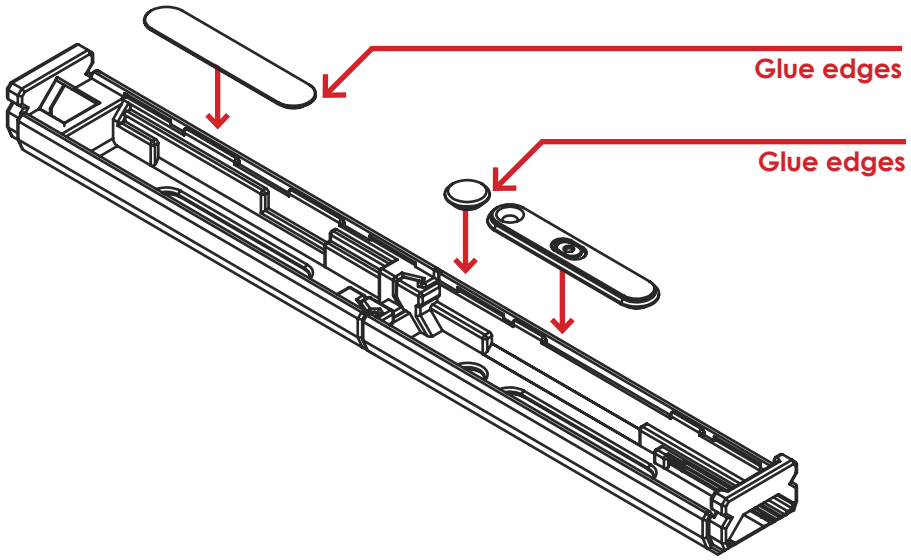
Insert all three chassis components into the front face of the top shell assembly. Glue is recommended to hold the chassis components into the top shell assembly.

FRONT SHELL ASSEMBLY COMPLETE



POLYBAR MINI/MAX ASSEMBLY (CONT.)

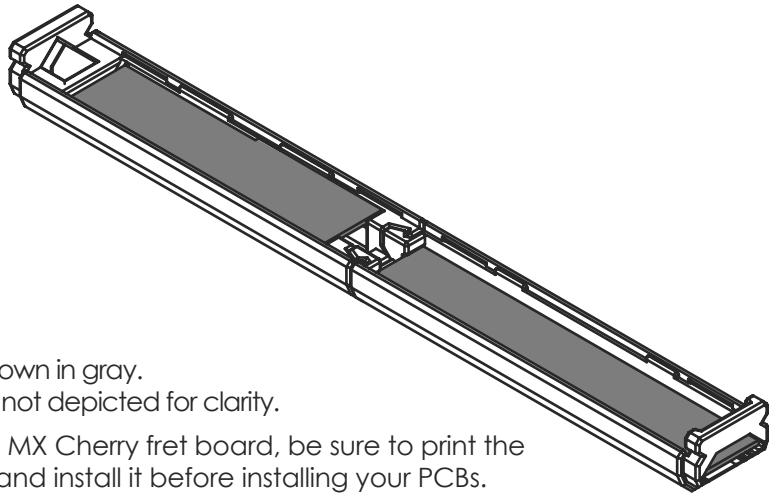
STEP 10



Install the three accessory cover plates into the bottom shell.

NOTE: Plates used will change depending on your desired configuration. Consider printing the circular plate in transparent filament as a battery readout. If using the power switch plate, ensure the dimple is facing the frets for proper alignment.

STEP 11



NOTE: PCBs are shown in gray.
PCB components not depicted for clarity.

NOTE: If using the MX Cherry fret board, be sure to print the support bracket and install it before installing your PCBs.

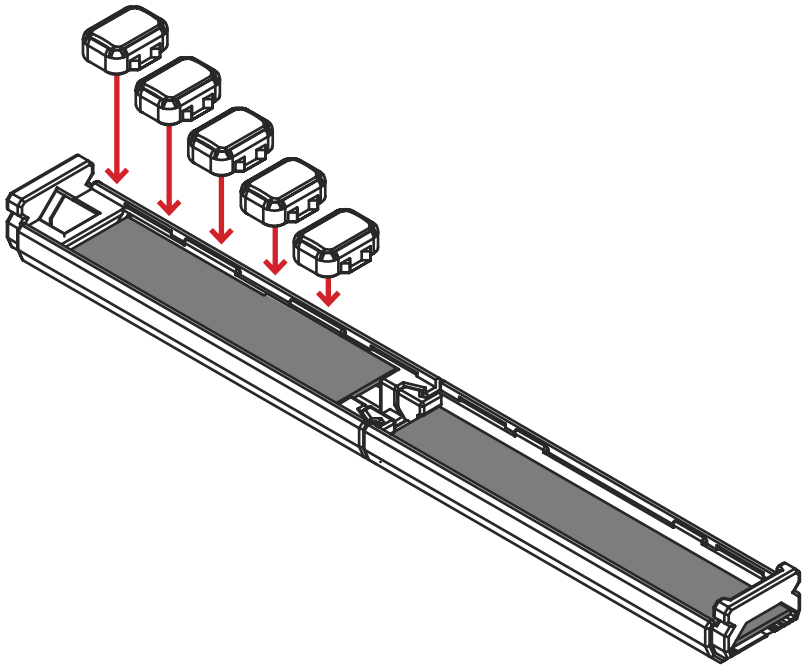
Insert your PCBs into the bottom shell assembly.

NOTE: If opting for bluetooth and battery support, use the opening in the bottom fret shell as a battery caddy. Add support or tape as needed to secure battery.

NOTE: Ensure proper alignment of the power switch by sliding the switch on (towards the frets), then tilt the controller forward to allow the 3D printed switch to slide forward then install the PCB.

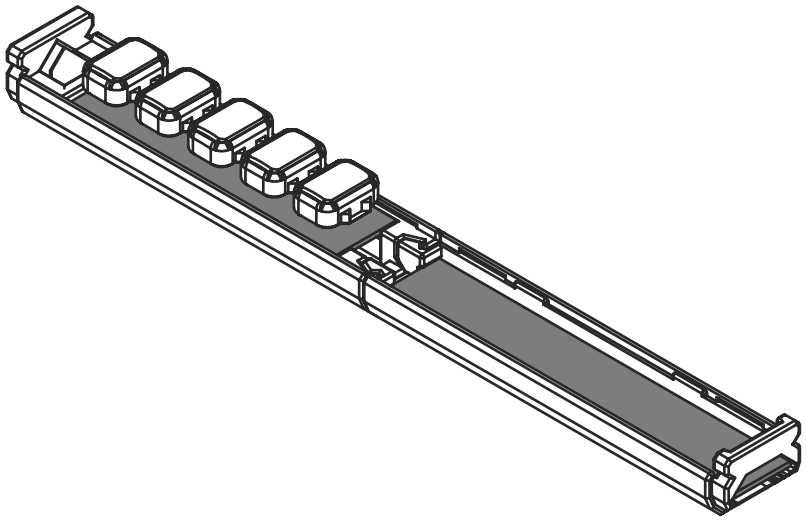
POLYBAR MINI/MAX ASSEMBLY (CONT.)

STEP 12



Install your five fret assemblies onto the PCB and keyswitches. Depending on your desired configuration in previous steps, this may vary.

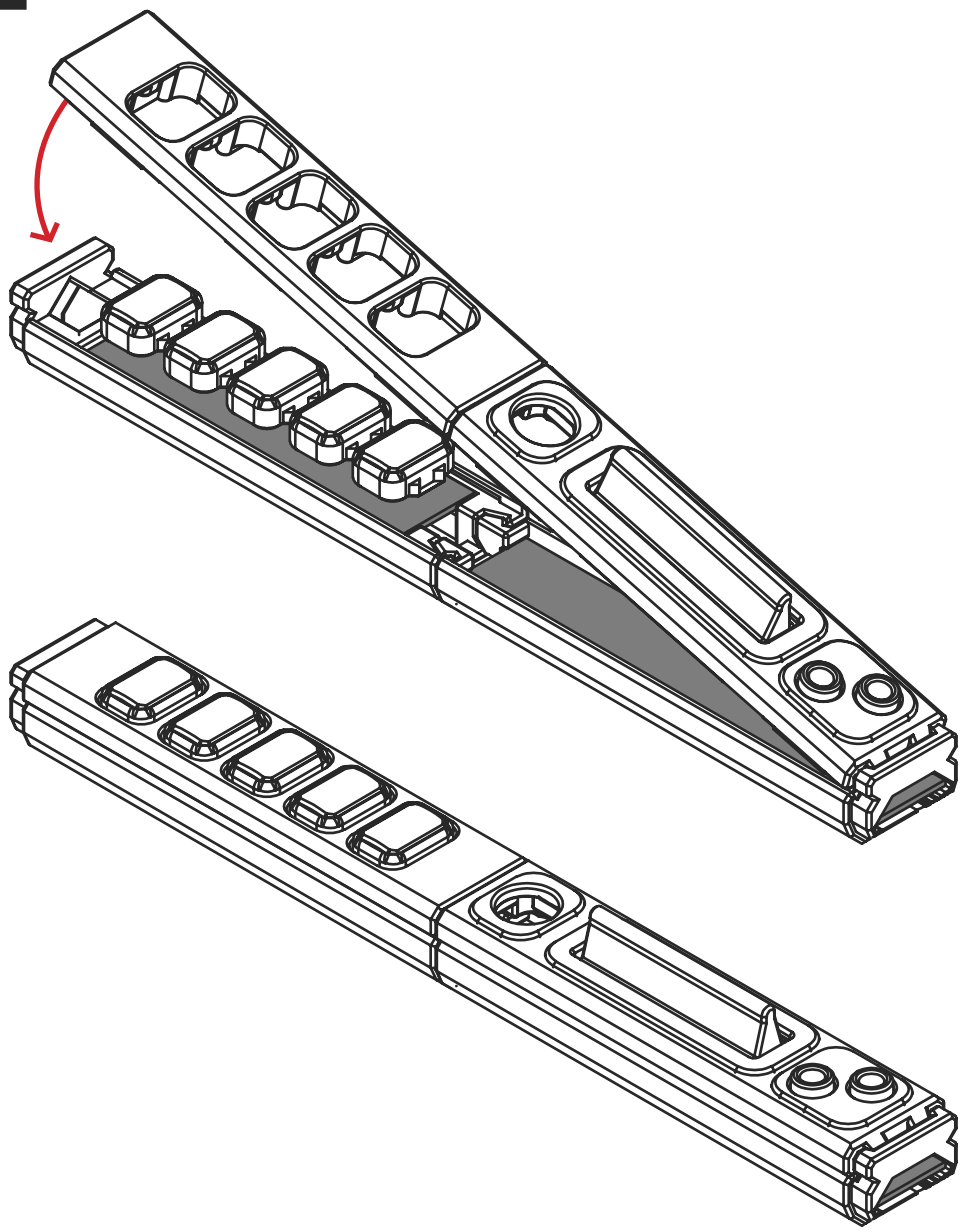
STEP 13



With your fret switches installed, test that all components and inputs function correctly, the battery functions, and adjust as needed with the firmware configurator tool.

POLYBAR MINI/MAX ASSEMBLY (CONT.)

STEP 14



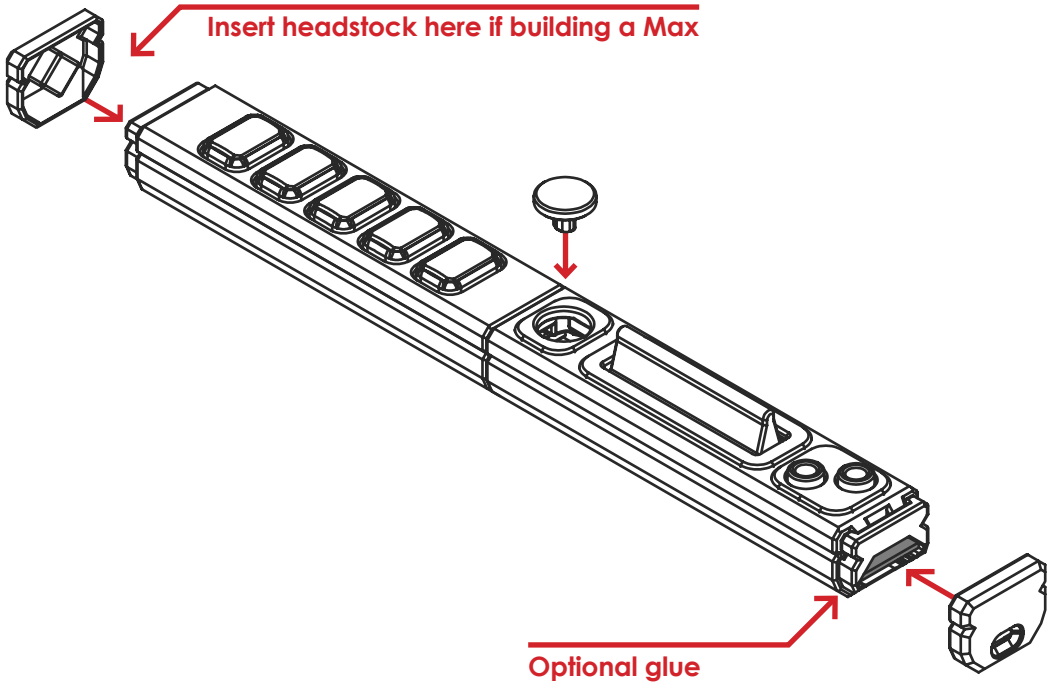
Install the top shell assembly of the controller into the bottom assembly.

Start by **pushing the top shell assembly into the hold down** near the end of the controller, and carefully close the shell while ensuring all components are secure.

Press the shells closed firmly to engage snap clips to seal the controller.

POLYBAR MINI/MAX ASSEMBLY (CONT.)

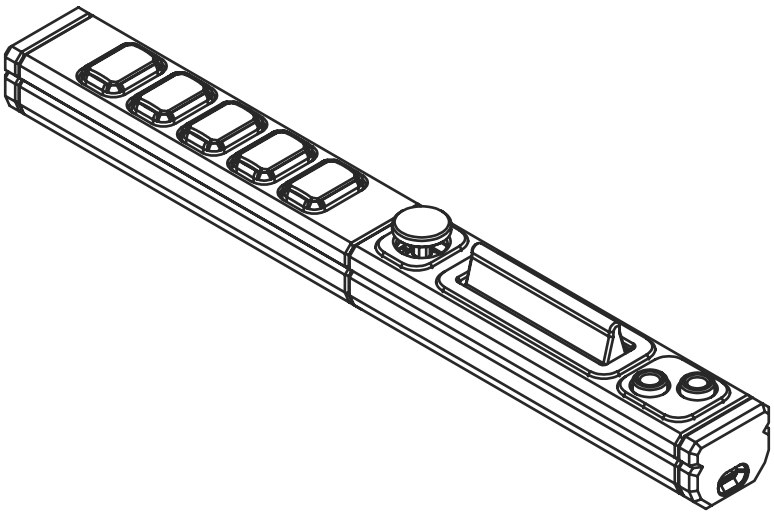
STEP 15



Install the finish caps and joystick onto your controller. Add glue to the finish caps where necessary. If using accessories, it is recommended to glue the end caps on.

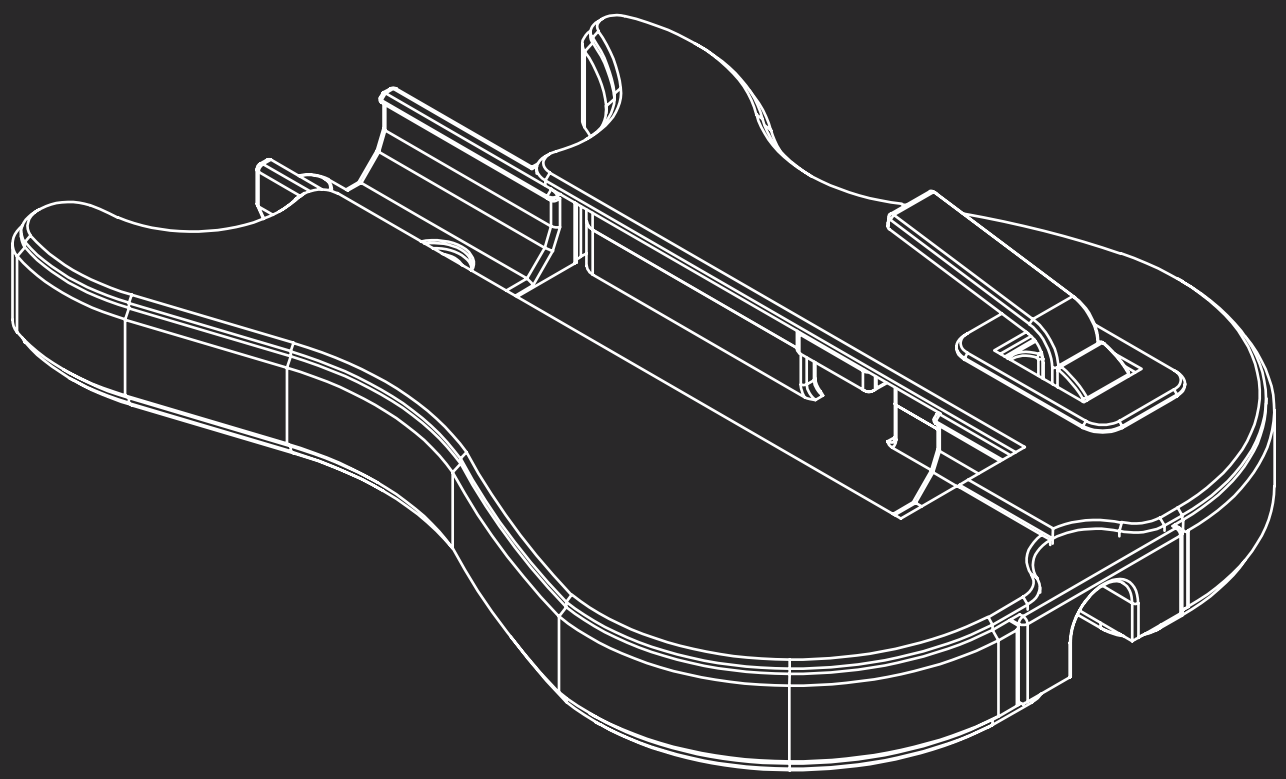
NOTE: The top cap can be used for access to disassemble the housing, glue at your discretion.

ENJOY YOUR COMPLETED POLYBAR MINI/MAX



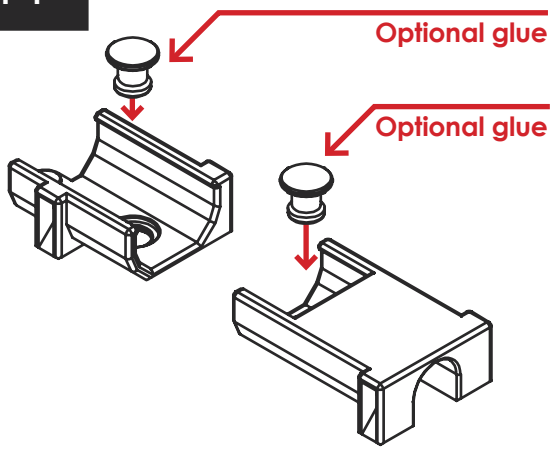
Polybar MINI + Polybar MAX

BODY FRAME, WHAMMY & HEADSTOCK ASSEMBLY



POLYBAR BODY FRAME

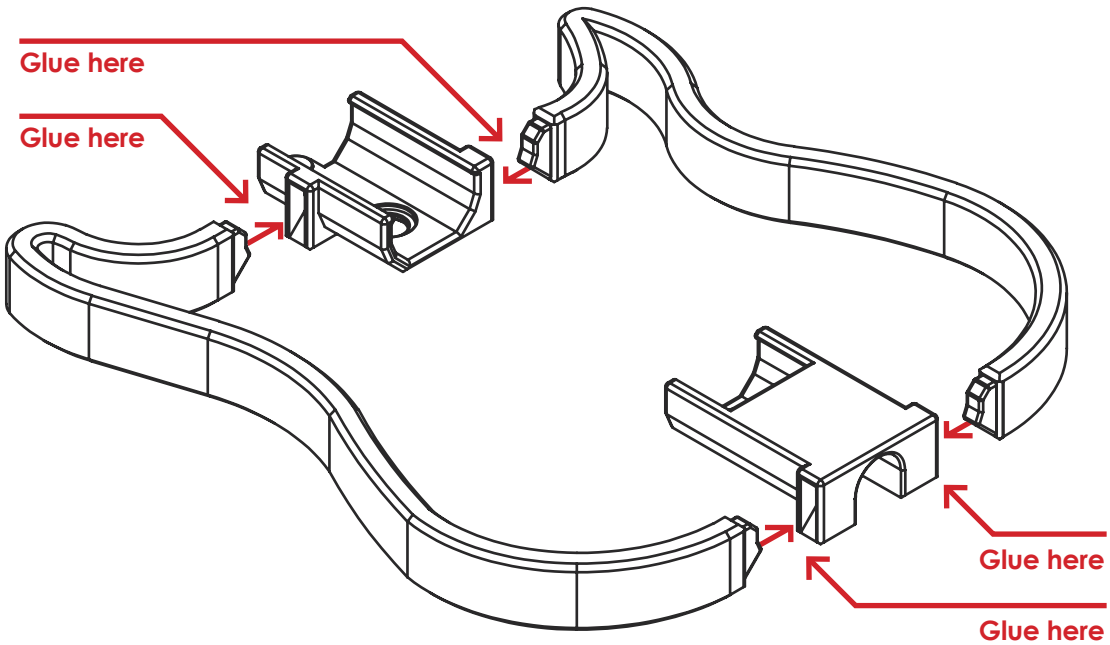
STEP 1



If using a strap, install the strap lugs. The main controller, once in position, will hold these in place but glue can be used for extra security.

NOTE: Use "Long" lugs where needed for clearance from body plates.

STEP 2

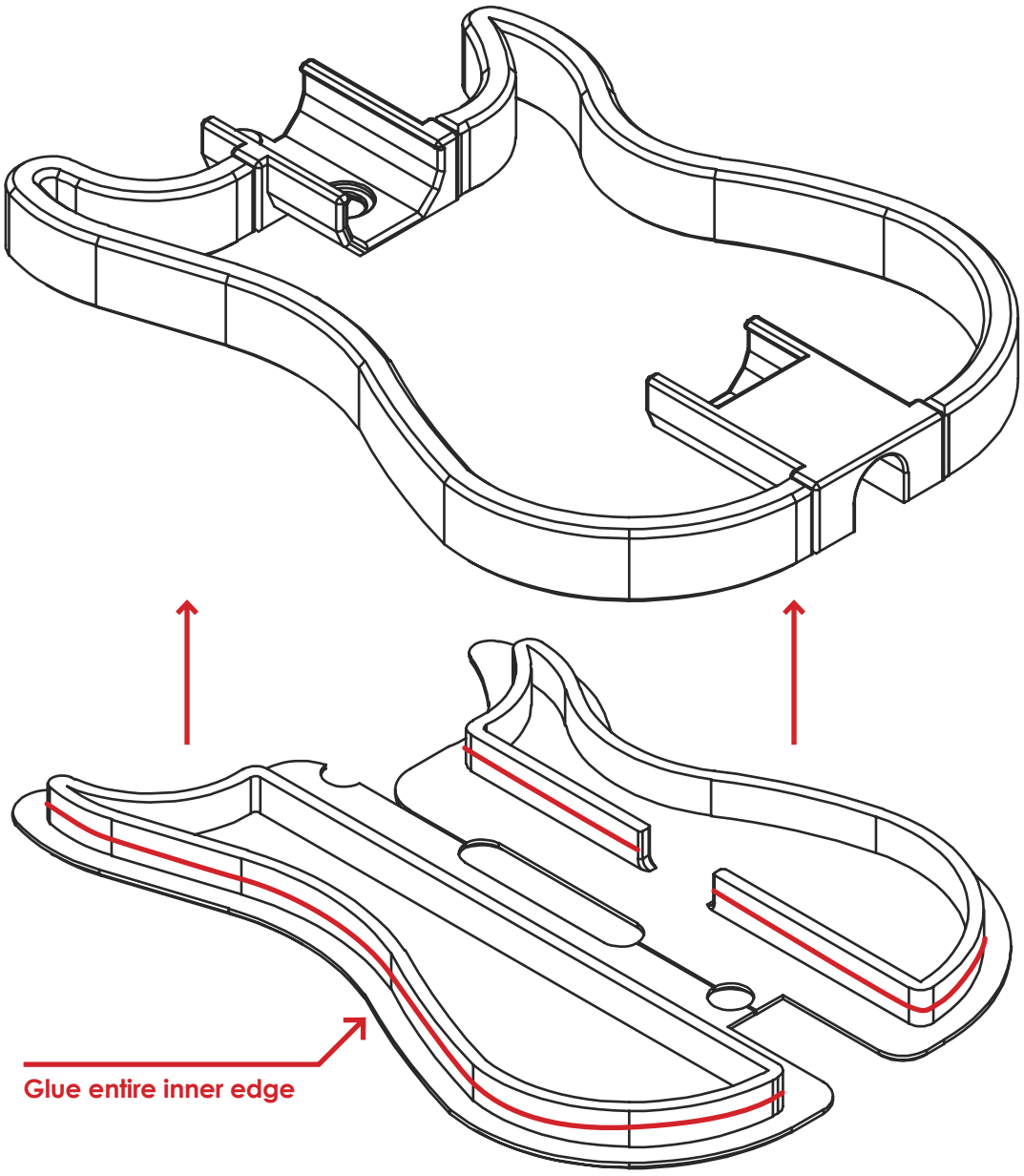


Apply glue to all 4 female wing attachment points, and connect the wings to the sleeves. Allow glue to properly dry.

NOTE: If you don't want to add a whammy bar or finish plates, this is the final step for hollow frames.

POLYBAR BODY FRAME (CONT.)

STEP 3

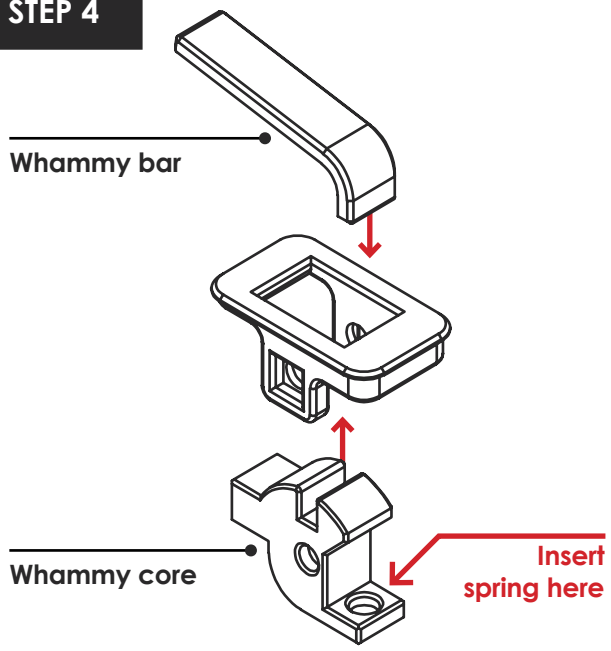


Insert the rear finish plates and glue the entire inner edge to the wings.

Allow glue to properly dry.

POLYBAR BODY FRAME (CONT.)

STEP 4

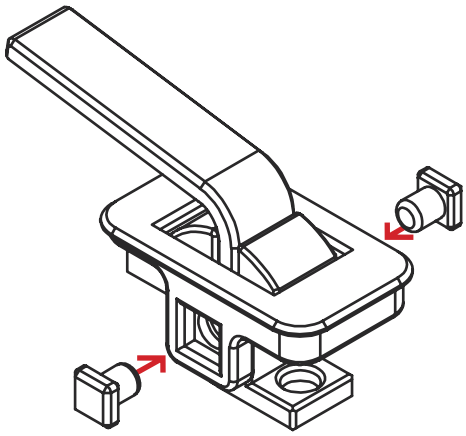


Build the whammy assembly as shown.

Add glue as necessary to hold the whammy bar into the whammy core. Insert your spring into the rear lug and hold down location.

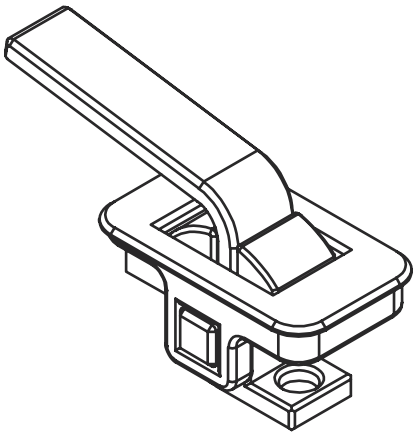
NOTE: Spring not shown in diagram.

STEP 5



Insert the pivot pins into the sides of the whammy assembly.

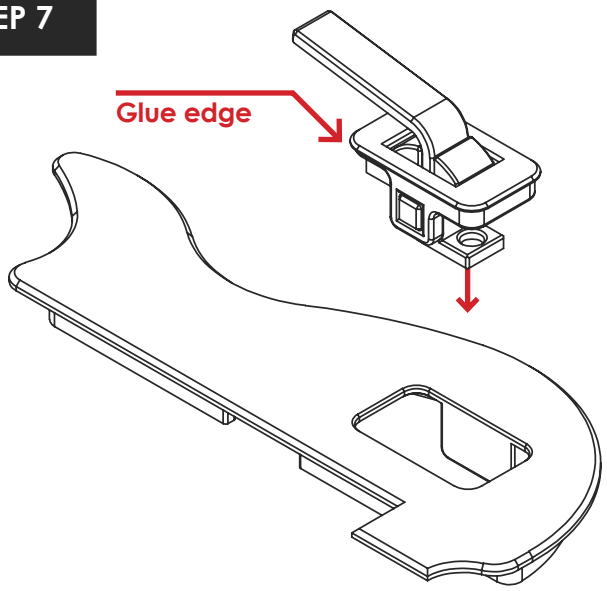
STEP 6



Whammy assembly complete. Test functionality and adjust components as needed.

POLYBAR BODY FRAME (CONT.)

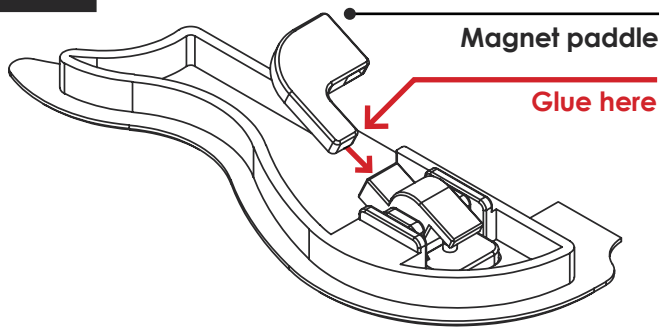
STEP 7



Insert the whammy assembly into the top finish plate.

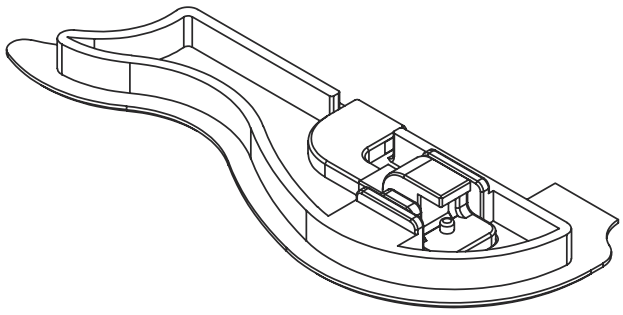
It is recommended to glue the whammy assembly assembly in place to keep it secure.

STEP 8



Flip the finish plate over, and press down and rotate the whammy core upwards. Insert five (20x5x2) magnets into the magnet paddle and insert and glue the whammy paddle into the whammy assembly.

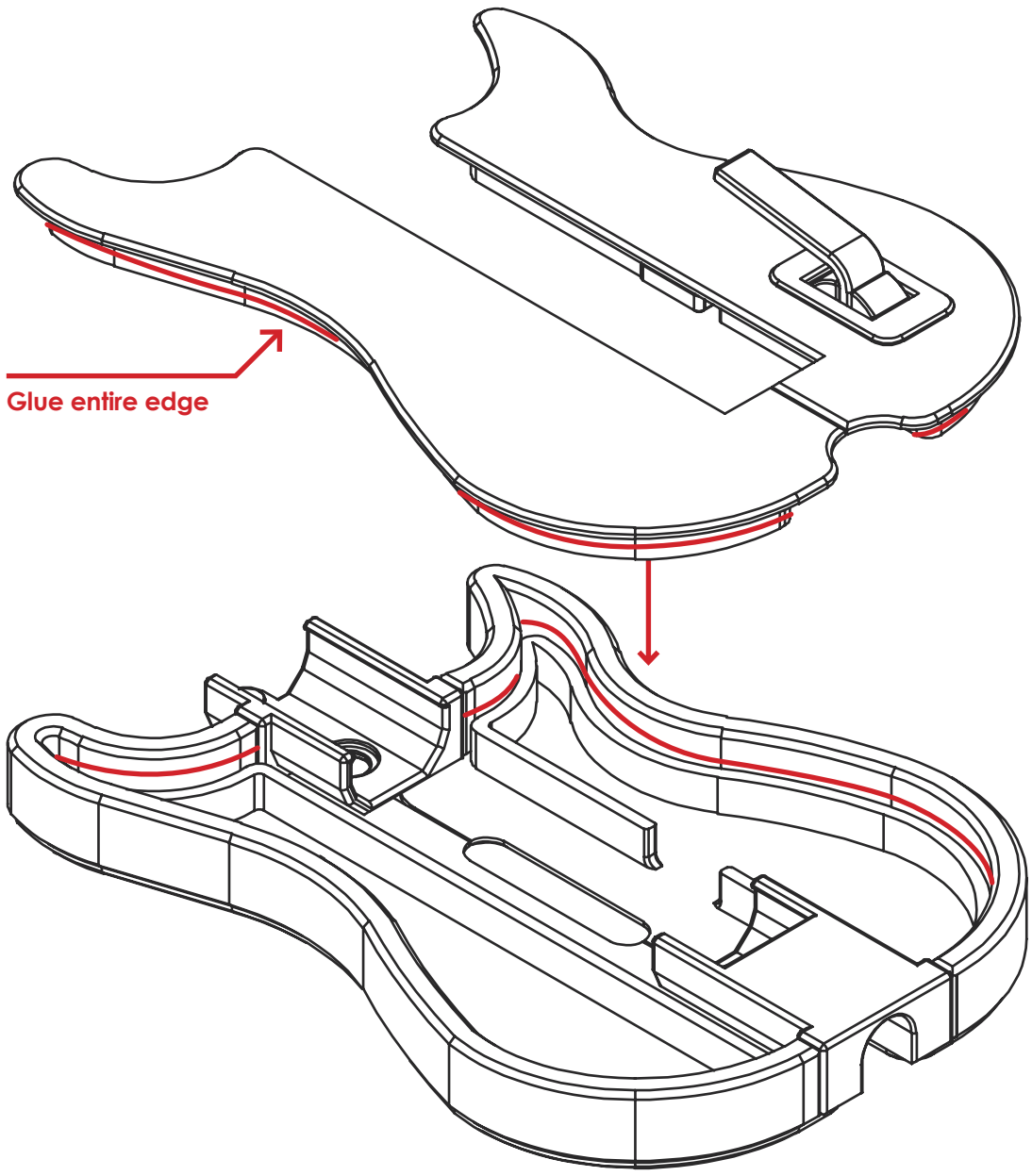
STEP 9



Ensure functionality and clear space of the whammy assembly, and test proper rotation and action, adjust as needed.

POLYBAR BODY FRAME (CONT.)

STEP 10

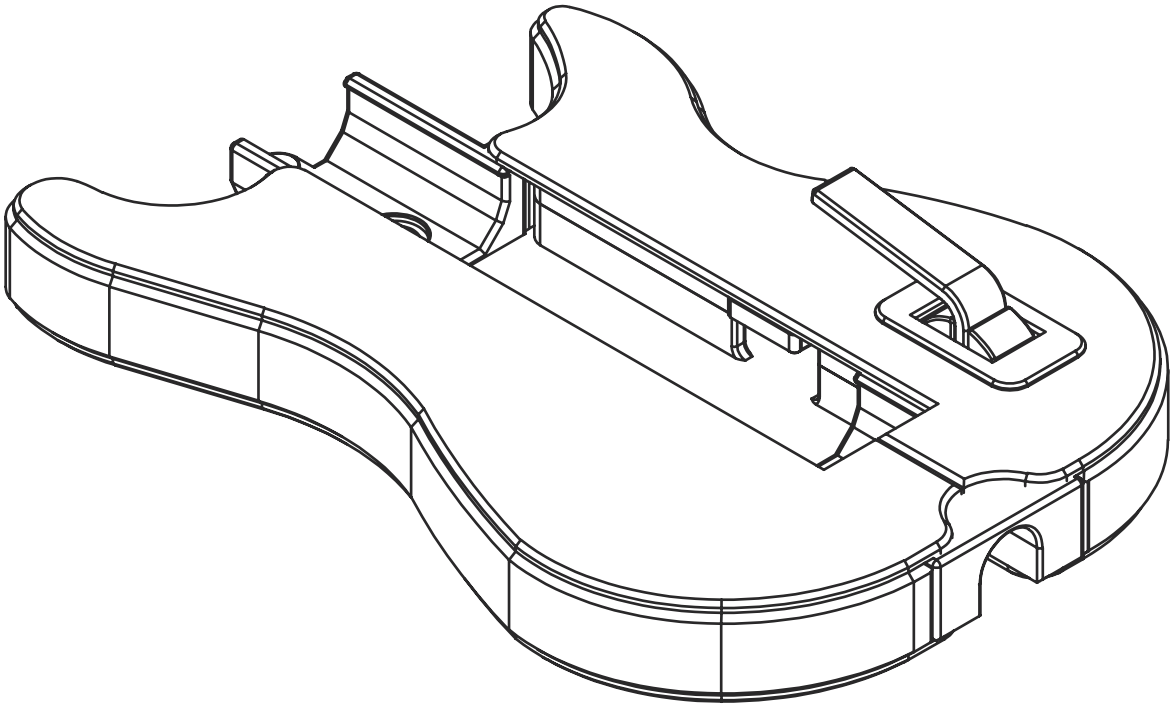


Insert the top finish plates and glue around the inner edge, and allow the glue to fully dry.

NOTE: The whammy assembly is a sealed mechanism. If you decide to glue the front whammy finish plate, destructive methods will be required to remove the magnet and spring.

POLYBAR BODY FRAME (CONT.)

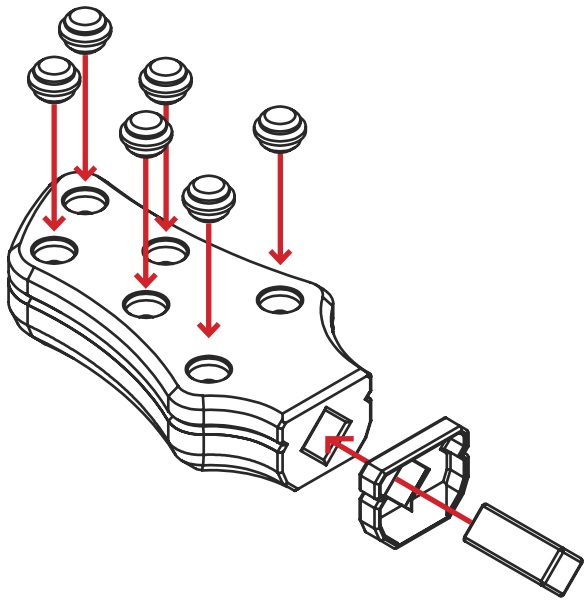
ENJOY YOUR COMPLETED FRAME



Insert your Polybar Max into the completed frame and use the programmer tool to calibrate the whammy. **Enjoy your completed frame!**

POLYBAR BODY FRAME (CONT.)

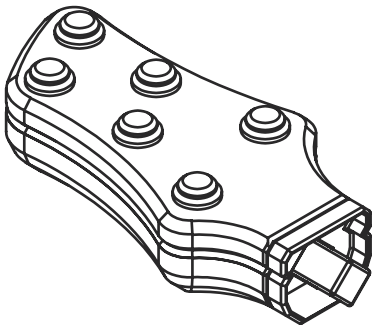
STEP 12



Connect all headstock components together as shown, and glue all components together.

Allow glue to fully dry.

ENJOY YOUR COMPLETED HEADSTOCK

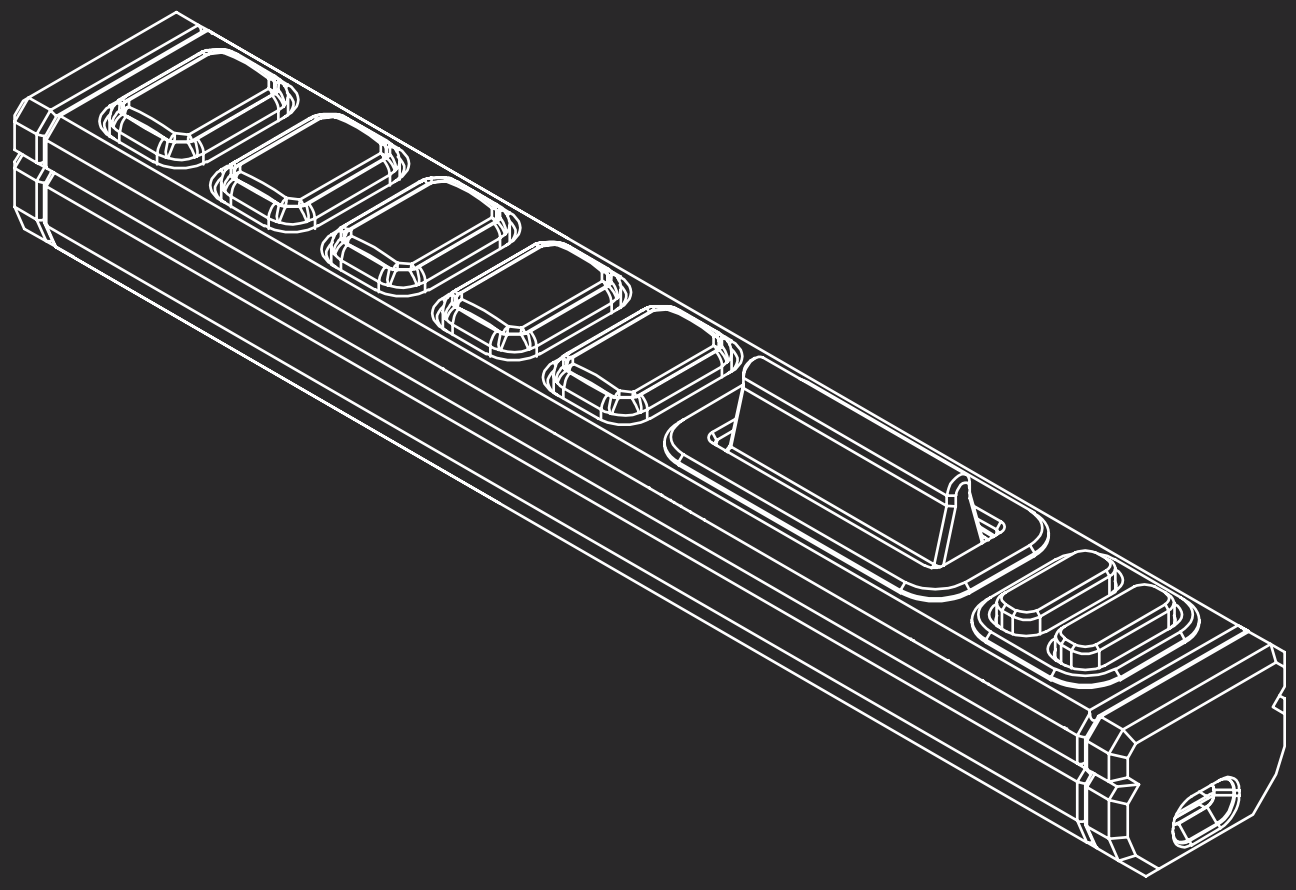


Enjoy your completed headstock!

Insert the headstock in place of the top finish cap. You may glue the headstock in place, or choose to leave it unglued if using the top access hole for disassembly purposes.

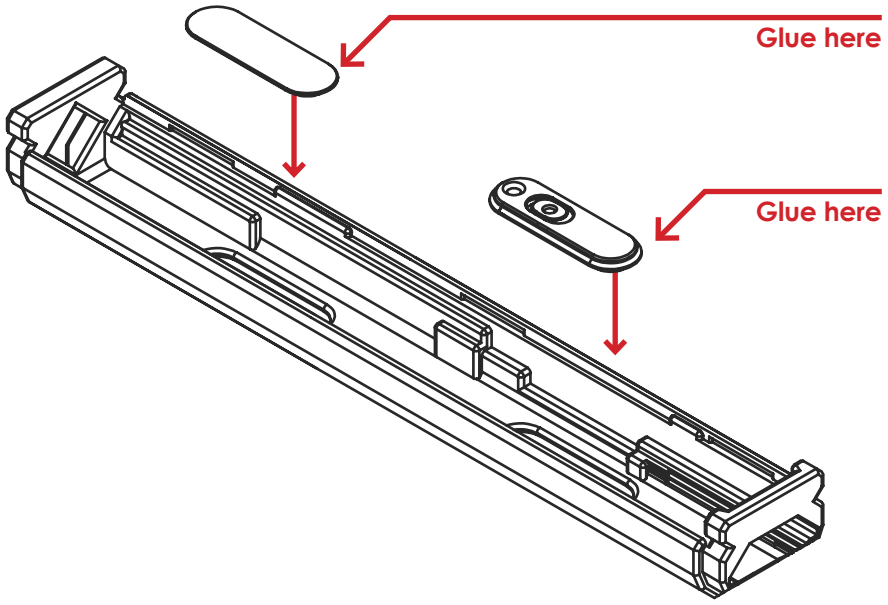
Polybar MICRO

MAIN BODY ASSEMBLY



POLYBAR MICRO

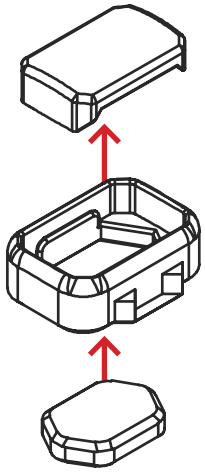
STEP 1



Insert and glue the accessory plates into the bottom of the shell.

NOTE: Plates used will change depending on your desired configuration. If using the power switch plate, ensure the dimple is facing the frets for proper alignment.

STEP 2

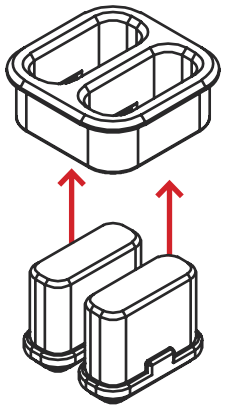


NOTE: Pro frets shown, glue as necessary for stability.

Build your five fret assemblies.

NOTE: If using "pro" fret inserts, you will need to force the keyswitch stuck, install the "pro" fret insert onto your keyswitch, then install the fret assembly onto the insert.

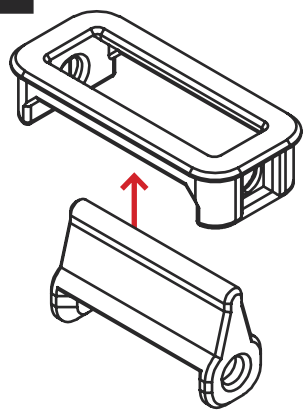
STEP 3



Install the start and select buttons into the chassis.

POLYBAR MICRO (CONT.)

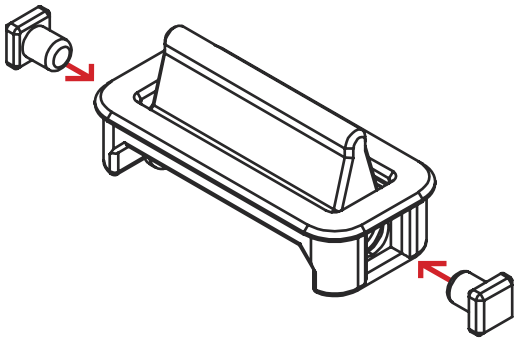
STEP 4



Slide the strum bar into the chassis.

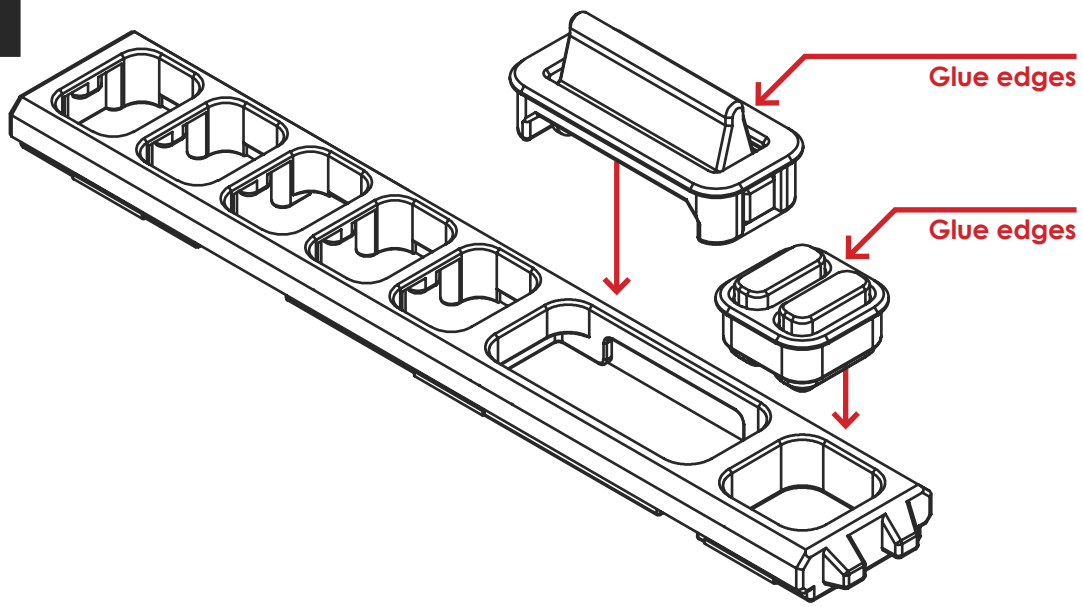
STEP 5

NOTE: Break in the pivot pins to match your strum bar



Push the rotation pegs into the strum bar chassis to secure the strum bar assembly. You may need to rotate the pins depending on the location of your print seams.

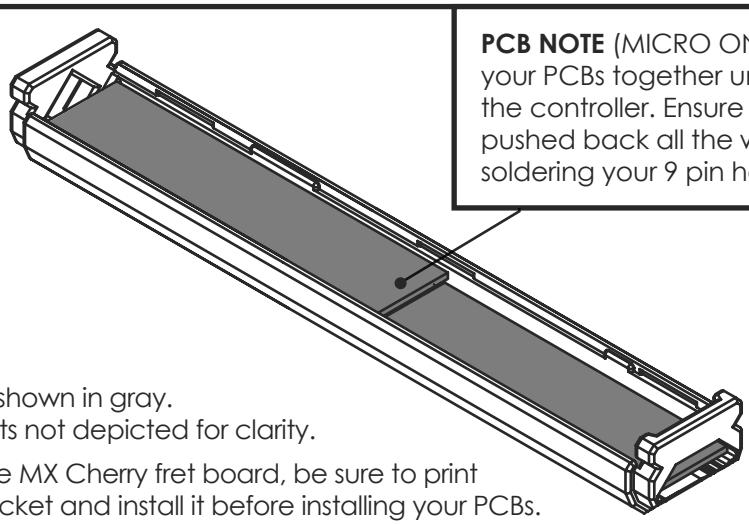
STEP 6



Insert the two chassis components into the front face of the top shell assembly. Glue is recommended to hold the chassis components into the top shell assembly.

POLYBAR MICRO (CONT.)

STEP 7



PCB NOTE (MICRO ONLY): Do not solder your PCBs together until you lay them in the controller. Ensure that your fret PCB is pushed back all the way ito it's tray before soldering your 9 pin header connection.

NOTE: PCBs are shown in gray.
PCB components not depicted for clarity.

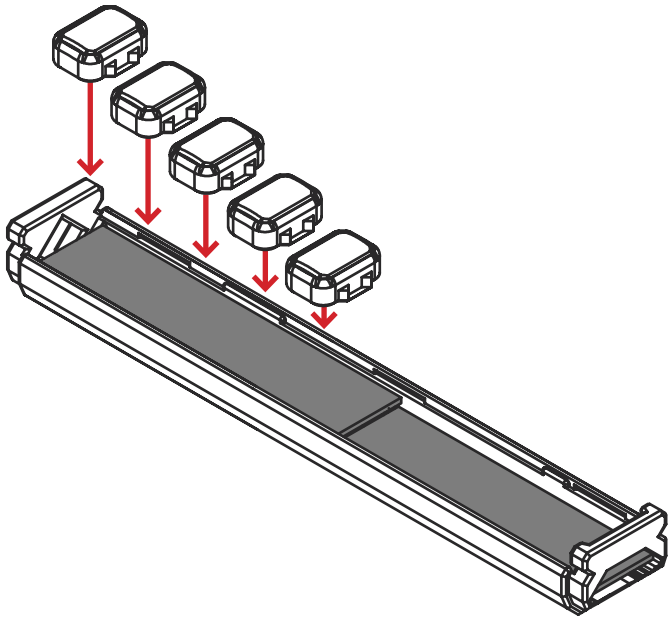
NOTE: If using the MX Cherry fret board, be sure to print the support bracket and install it before installing your PCBs.

Insert your PCBs into the bottom shell assembly.

NOTE: If opting for bluetooth and battery support, use the opening in the bottom fret shell as a battery caddy. Add support or tape as needed to secure battery.

NOTE: Ensure proper alignment of the power switch by sliding the switch on (towards the frets), then tilt the controller forward to allow the 3D printed switch to slide forward, then install the PCB.

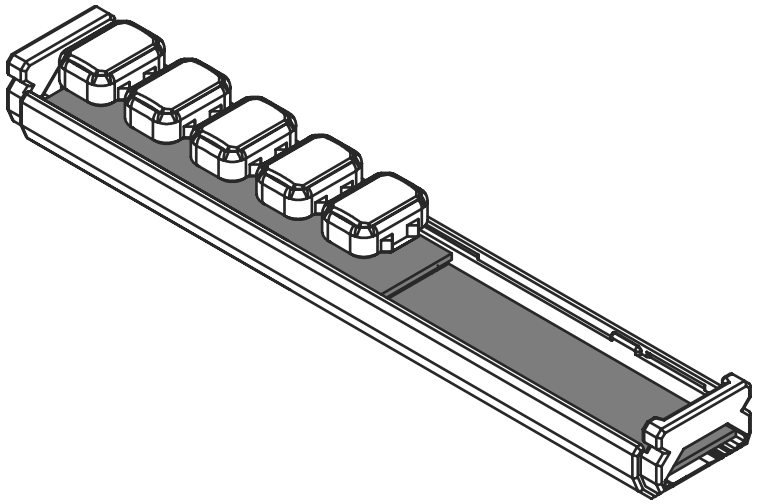
STEP 8



Install your five fret assemblies onto the PCB and keyswitches. Depending on your desired configuration in previous steps, this may vary.

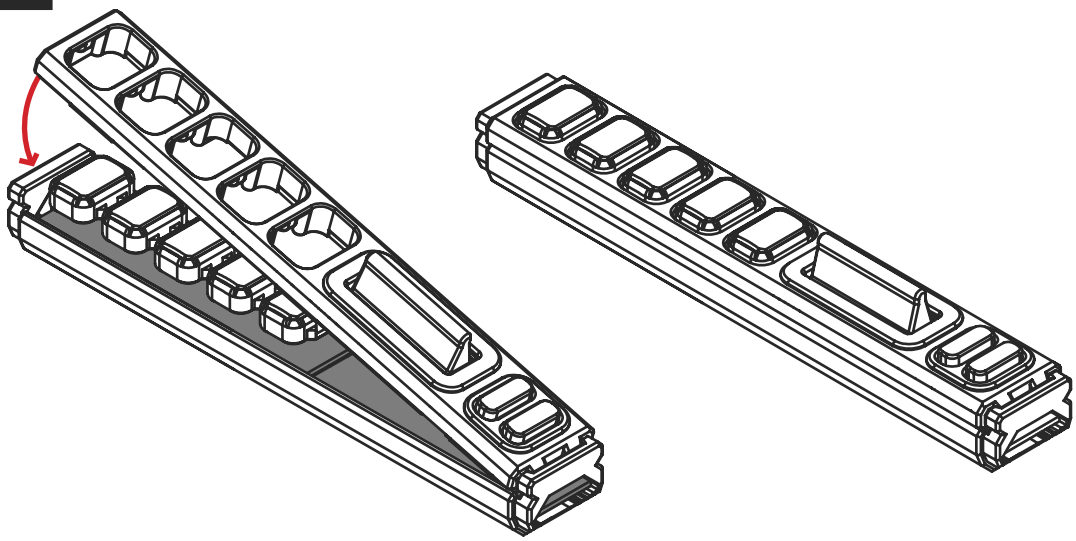
POLYBAR MICRO (CONT.)

STEP 9



With your fret switches installed, test that all components and inputs function correctly, the battery functions, and adjust as needed with the firmware configurator tool.

STEP 10



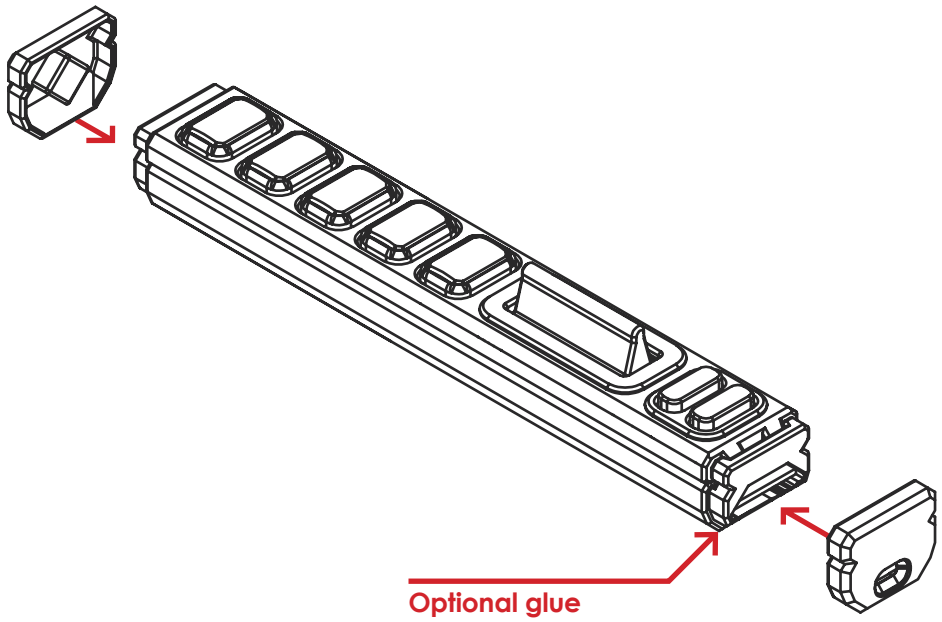
Install the top shell assembly of the controller into the bottom assembly.

Start by **pushing the top shell assembly into the hold down** near the end of the controller, and carefully close the shell while ensuring all components are secure.

Press the shells closed firmly to engage the snap clips to seal the controller.

POLYBAR MICRO (CONT.)

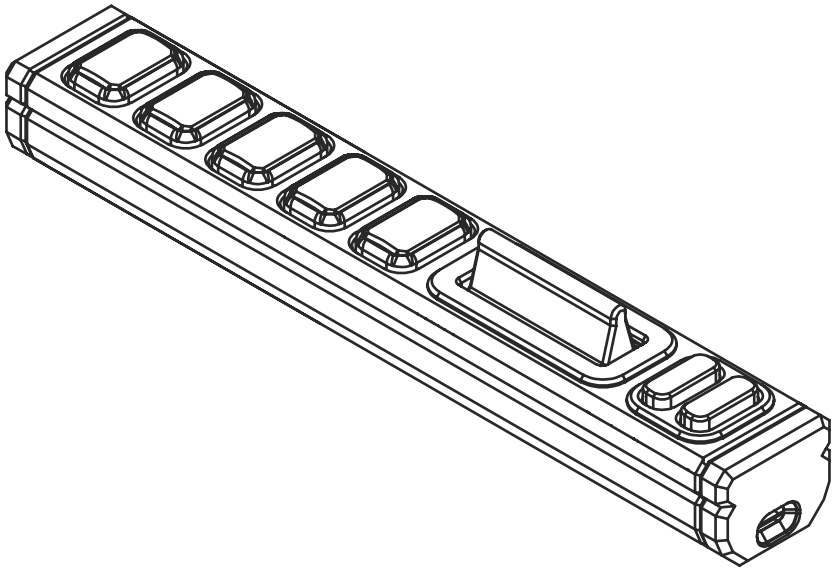
STEP 11



Install the finish caps and joystick onto your controller. Add glue to the finish caps where necessary. If using accessories, it is recommended to glue the end caps on.

NOTE: The top cap can be used for access to disassemble the housing, glue at your discretion.

ENJOY YOUR COMPLETED POLYBAR MICRO



PROGRAMMING & CONFIGURING

SETTING UP YOUR CONTROLLER WITH CUSTOM FIRMWARE

Here's how to set up your controller with custom firmware. For the latest files and help, check out our Discord server.

Join our Discord!

CONTROLLER SETUP:

You can either use our provided presets, or create your own:

USING OUR PRESETS

You can find official presets on our Discord server. Download them to get started.

NOTE

If you ever run into problems, you can always reset the controller to factory defaults and flash back our preset. **No harm no foul!**

MAKING YOUR OWN SETUP

For more control, you can download Sanjay900's Santroller firmware tool. It's the easiest way to customize your controller.

WHAT THE SANTROLLER TOOL DOES:

- It lets you import our setups and save your own.
- You can change things like the LED colors, button mapping, and add shortcuts.
- Play around with the settings to get it just right. You can import our setups, and then change them to your liking if need be.