The Gatalog
presents:

The NS3
Printable Stock/Brace System

Preface

This is the NS3 – a 3D printable folding stock/brace system. It provides a strong, rigid, and reliable (if a little bulky) way to affordably print a good option for stocks/braces. It has been tested across a wide variety of builds, from 22s to 308s, and has held up well. It was designed to be more resilient to abuse than existing printable options – a 10lb rifle can be picked up from resting flat on the ground using only this system, all without damaging the hinge/lockup of the system. This project draws from several previous projects – notably, Swarmtech's folding stock/brace system and the printable "Nadda" system itself.

*****Note that the brace included in this package is intended for use as a pistol brace and not for shouldering, but idiots who work for the government may think otherwise. Print at your own risk, understand the laws, etc*****

You can find parts kits for sale here: https://maf-arms.com/product/ns3-stock-fastener-kit/
Also here: https://rkspookware.com/ivans-ns3-stock-hardware-kit/

You can watch the assembly process on video here:
https://odysee.com/@Ivan's_CAD_Streams:c/NS3-Tutorial:e

Refer to the README for basic info/print settings for this build!

I recommend you use this document in conjunction with the video, having text-based steps helps keep things organized, being able to see things in real time helps clear up confusing instructions.

Do not be intimidated by the length of the build video/tutorial. If you run into issues, the troubleshooting section at the end of this document should help you out.

If you have found this tutorial useful, consider sending me Bitcoin to further development of this sort of thing – there is much more to explore in 3D printed guns, DIY guns, DIY ammo, etc.

https://ctrlpew.com/donate-to-ivanthetroll/

Table of Contents

Remember that it is our shared responsibility to be safe and smart with firearms and show the world there is a peaceful way to own guns – take the time to get training, to learn basic (and advanced) safety rules, and to share the hobby with everyone interested – those most scared of guns in the hands of the people are often the ones who have no experience with guns in the first place.

Shopping List

This list will cover what supplies you will need for a NS3 build.
Hardware kits are available: hardware kit link

Hardware Parts

- 3x M5x35mm Socket Head Bolts
- 3x M5 Nuts
- 1x M4x50mm Socket Head Bolt
- 1x M4 Nut
- 1x M3x30mm Socket Head Bolt
- 1x M2.5x8mm Bolt
- 1x 1" L x 0.48" OD x 0.045" WD Spring - https://www.mcmaster.com/9657K309/ (or similar)
- 2x 0.5" L x 0.25" OD x 0.025" WD Spring - https://www.mcmaster.com/9657K272/ (or similar)

- 2x M4x16mm Socket Head Bolts (for a stock build, for attaching buttplate)

Basic Tools

- Drill bits: 4mm
- Metric Allen Key Set (Ideally Ball-End, but Straight End is ok)
- Needle-Nose Pliers
- A boxcutter/utility knife
- Soldering iron (a cheap one, used to melt plastic, a wood burner or similar tool can also work)
- Dremel Tool (ideally, with some carbide grinding burrs)
- Blue threadlocker (optional)
- RTV Silicone (optional)

Printed Parts List

- 1x Mount
- 1x Pic Clamp
- 1x Folding Tube
- 1x Button
- 1x Stock OR 1x Brace
    - 1x Buttplate if printing Stock
- 2x Locking Blocks
- 2x Locking Levers

Build Tutorial

I recommend you read this section in its entirety, then watch the build video while you go about building your NS3. It's a fairly easy process but following the video should save you from wasting any time due to silly mistakes. In order for your stock to lock up tight and consistently, having your printer be tuned is important – if, after following all the directions in this document, your NS3 build doesn't work, refer to the FAQs at the end, if they don't resolve you issue, you'll likely need to fix an issue with your printer/settings.

REFER TO THE README FOR BASIC PRINT INFORMATION

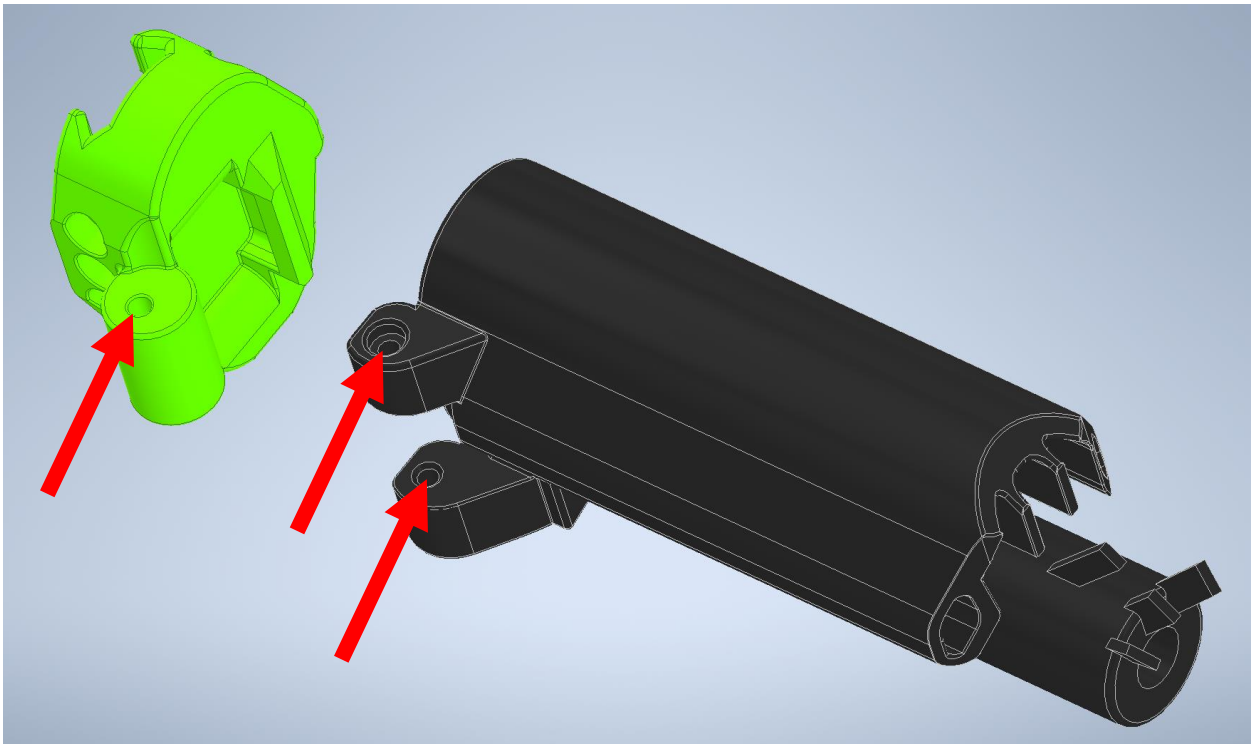
Step 1: Lay Out Your Parts/Prep Work

Spread of tools and parts used in a NS3 Build.

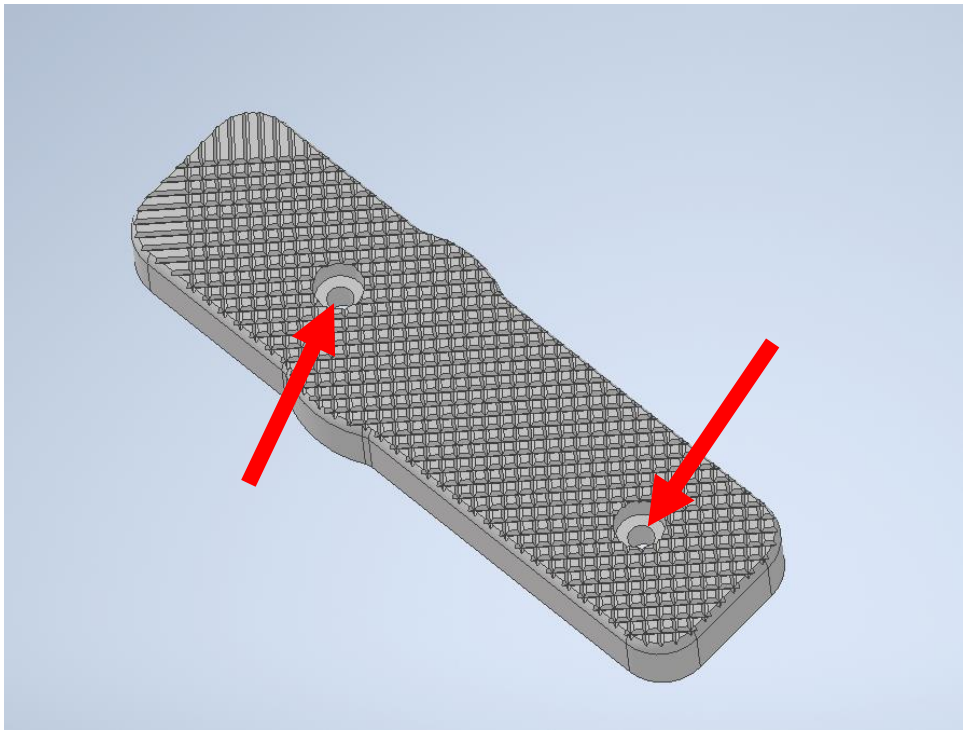
Begin by organizing all your parts, as laid out in the shopping list – there's quite a few tools, hardware parts, and printed parts involved.

As usual, begin by removing all support material from printed parts.

You can knock out some prep work now – there are some holes on the printed parts that will need cleaned up using a 4mm drill bit. Follow the drill chart below to get these holes prepared. Note that some holes will not require cleanup – only clean up the holes indicated.



Drill the hinge holes in the folding tube and mount with a 4mm drill bit. Be slow and careful, as you do not want to oversize these holes. Note that these holes sit at a slight angle – drill straight relative to the hole bore itself to ensure the hinge move freely but without slop/wiggle.

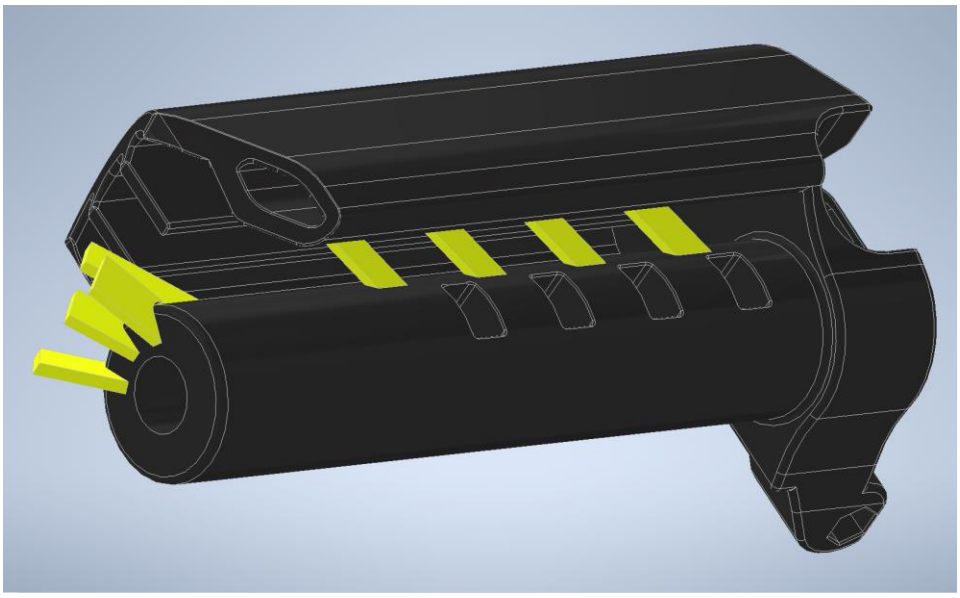


If you are printing the stock, drill these two holes in the buttplate with a 4mm drill bit as well.

Step 2: Assembling the Tube

With the cleanup prep work done, we're ready to do the Tube sub assembly. Get your folding tube, button, M3 bolt, and large spring (the 1" long one). Ensure that all brim/support is removed from the button. Remove the print-in-place supports from the folding tube – these supports are required due to the shape of the tube, as automatically generated supports often fail to support the tube. I recommend using a pair of pliers to pry out most of these supports, then use a Dremel tool with a carbide burr (or a metal file) to smooth out the remaining stumps. Once all these supports are removed (four on either side, plus four at the bottom) and smoothed out, take your spring, place it inside the recess on the button, then place the button into the recess in the tube. While holding the button down against spring pressure, insert the M3 bolt to retain the button. You will have to insert this M3 bolt straight in, then thread it into place – the bolt does not need to be tight, but does need to be inserted far enough that it sits flush with the outer face on the tube.

Use a Dremel tool (or similar tool/method) to clean up the stumps/supports that print integral to the tube



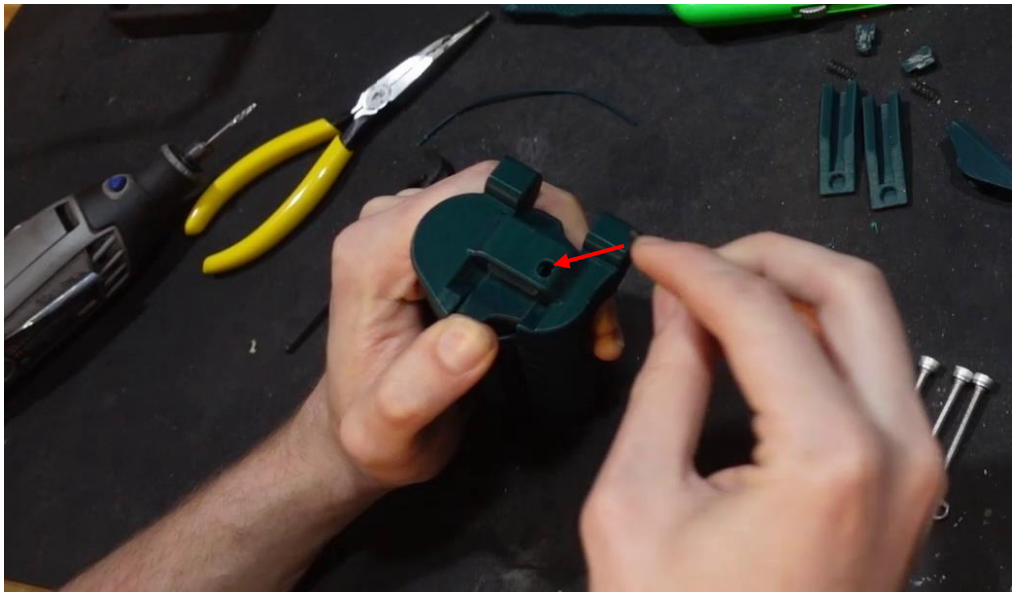
For reference, the tabs shown in yellow above are the supports to remove. There are four more tabs on the opposite side that also need removed. A Dremel tool with a cheap carbide burr makes this very easy.

Scrape any remaining brim/support/defects off the button

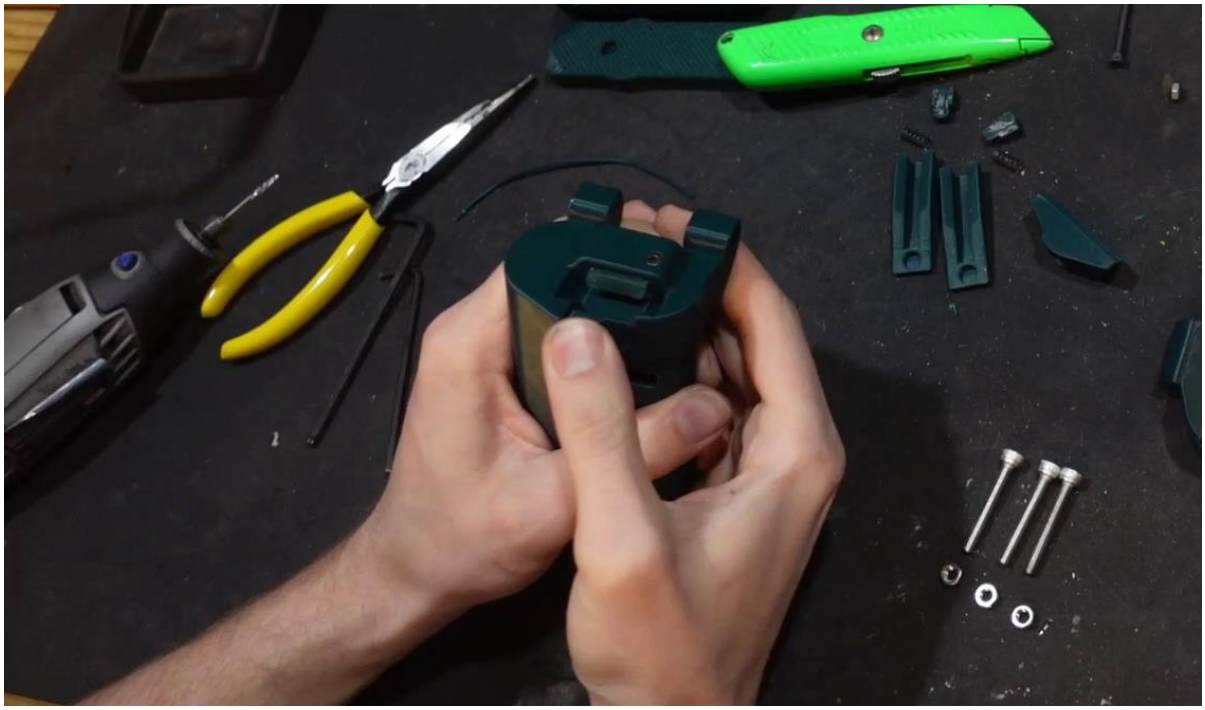
You can test fit the button into the recess – it should move without getting stuck. A little binding is ok. If it fits very tight, you may need to clear out supports from the recess or off the button better.

Place the spring into the hole on the button…

Place the spring and button into the recess…



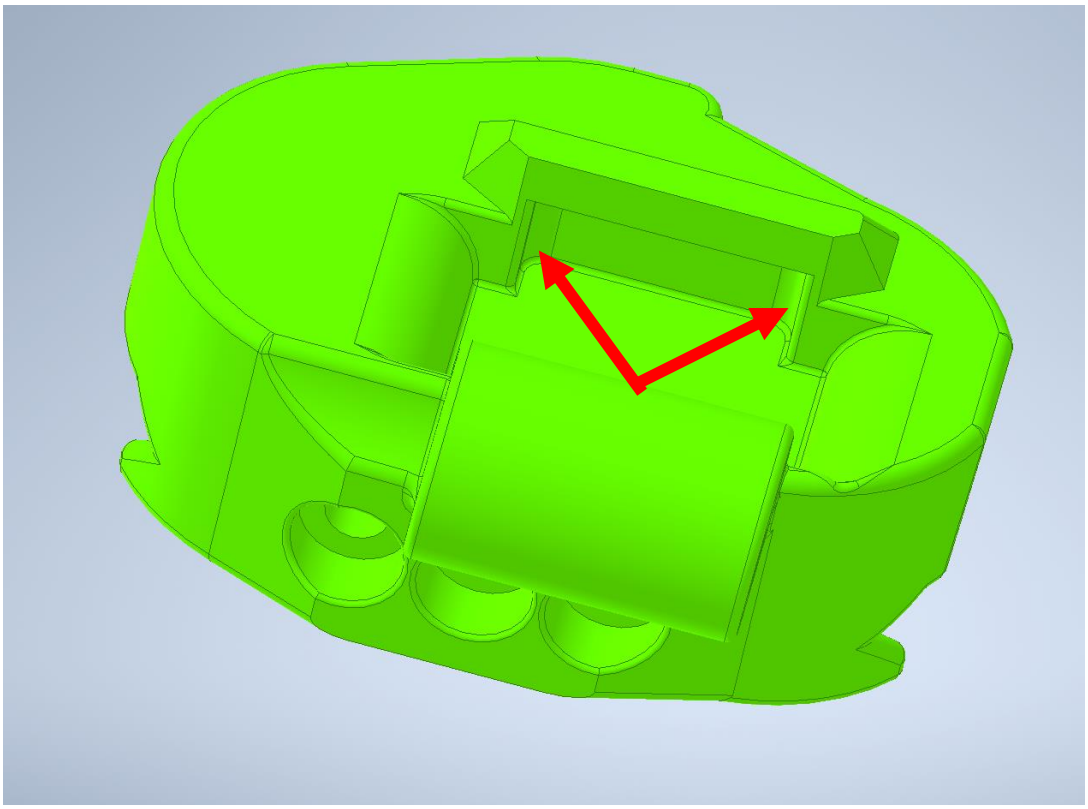
Then, while holding the button down, insert your M3 bolt into the retaining hole.



Thread the bolt in so that it sits flush with the top face of the tube. The button should move freely (or with minimal binding). If your button gets stuck or doesn't move, you can disassemble the tube and try applying oil to the button or sanding the button to get it to move without getting stuck.

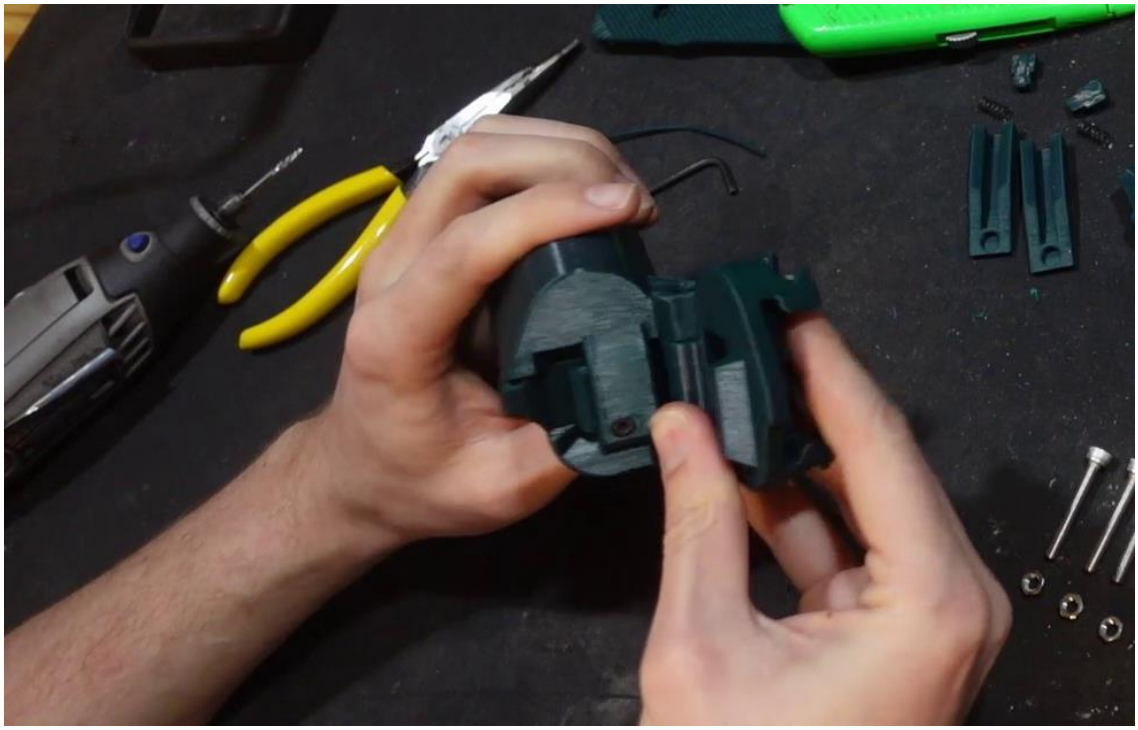
Step 3: Hinge Assembly

Now that we've got the tube assembled, we can mate the tube and the mount. This is pretty simple – place the mount and tube together, take your M4x50mm nut and bolt, place the nut into the nut recess, stick the bolt through the hinge, and tighten it into the nut. Ideal tightness is enough that the tube can still move, but it feels tight/stiff – this ensures minimal wiggle will be present in the hinge. As/if your hinge wears in, you can tighten the screw another 1/4 turn to keep the hinge tight. I recommend you use blue threadlocker on the hinge to prevent the bolt from coming loose, but this is optional.

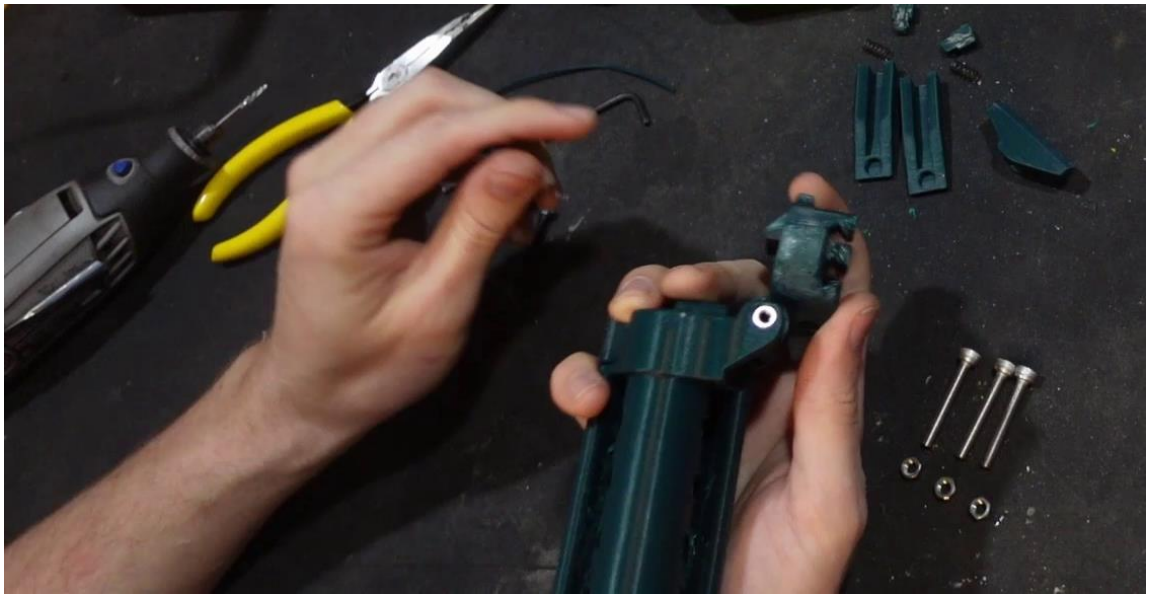


Ensure that you get all support material out from the locking recess on the mount – otherwise, the tube won't be able to latch! A small screwdriver will be able to get into the corners to clear them out.

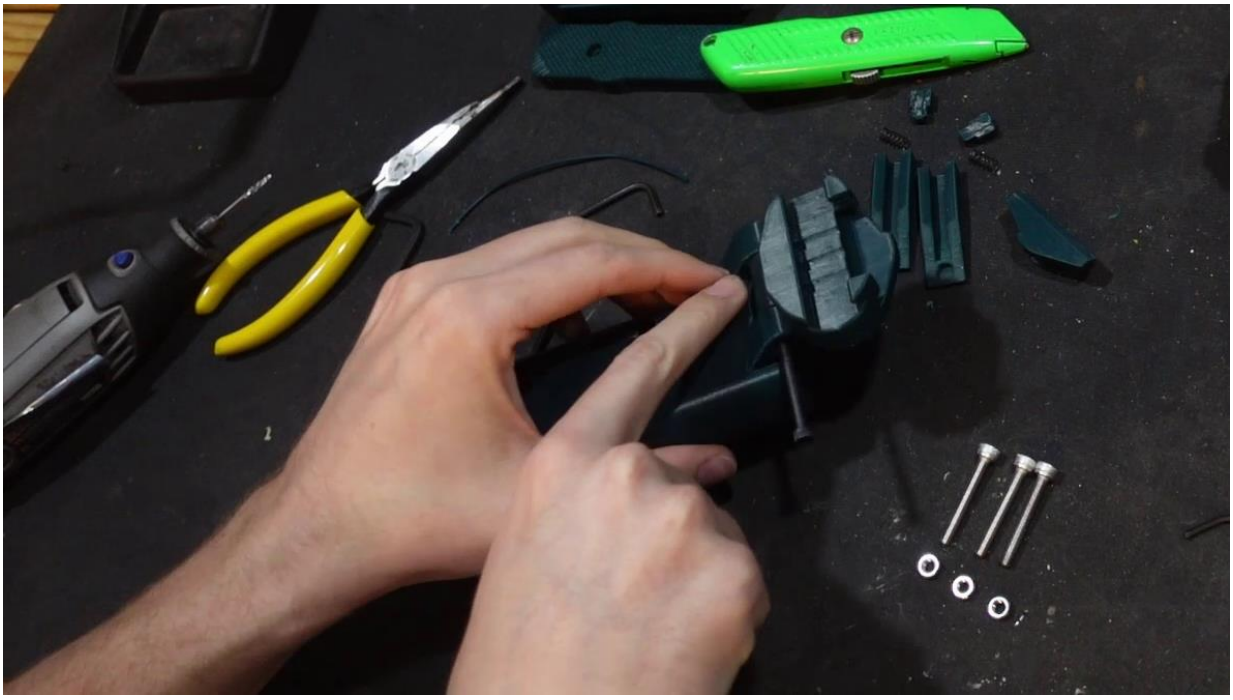
Take the mount and the tube…



…and slide them together.



Place the M4 nut into the recess on the bottom of the hinge joint



Then insert the M4x50mm bolt from the top of the hinge joint. Do not try to force it. You should have cleaned up these holes with a 4mm drill bit already – the bolt will go through the holes once they are lined up. Attempting to force the bolt through can damage the hinge.

Tighten the bolt to the point that the tube and mount feel stiff, but can still be moved. I recommend you put threadlocker inside the nut threads (do this before you install the bolt).

With the bolt tightened, you can test the latch mechanism out. It will likely be stiff at first when you try to lock into the open position. If you snap it into place, it should lock open. The button will pop up, indicating the latch is locked. If the button doesn't pop up, you may need to do a little fitting – this is unusual and usually a result of a printer issue, refer to the FAQ for help.

Step 4: Stock/Brace Assembly

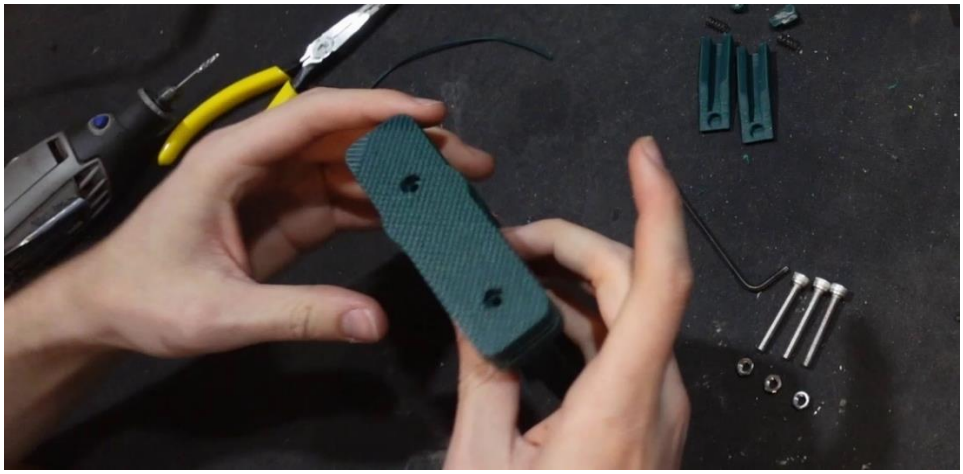
If you are doing a brace build, skip the steps concerning the buttplate. Note that the two-part brace shown is not the final design, as the final design is a single part (to make it more brace-y).

To assemble the buttplate, I recommend you use RTV between the stock and buttplate – this is optional, but I think it helps. I also really like putting RTV on stuff, so there's that. Place the buttplate onto the stock, then use your two M4x16mm bolts to attach the buttplate to the stock. These do not need to be very tight, just a little past snug.

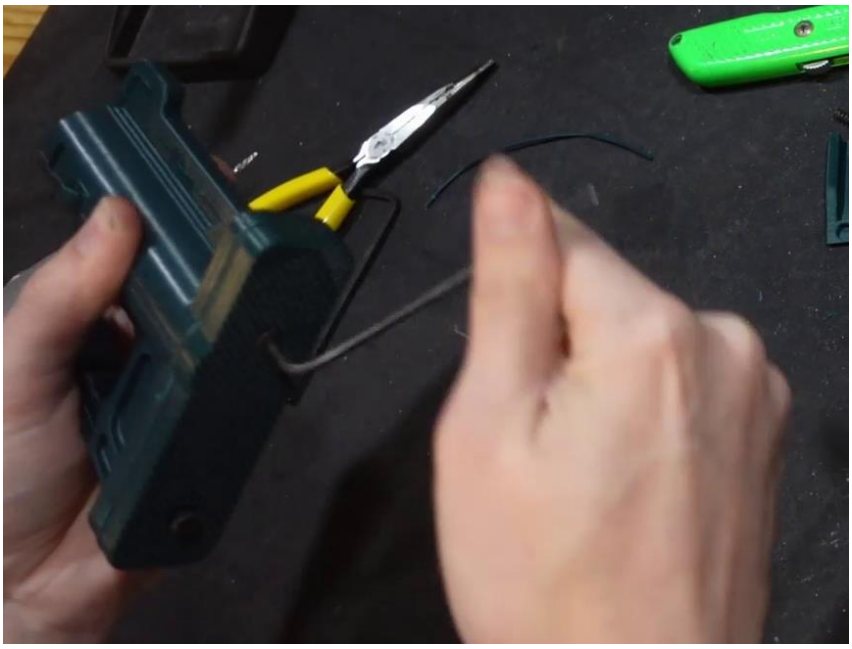
The stock. Be sure to remove all the supports from inside of it!

Place a couple dabs of RTV onto the back of the stock (if you're cool)

Place the buttplate down onto the stock. Note that the textured end of the buttplate faces away from the stock, you want the textured end to be able to go into your shoulder.



This is how the buttplate should look. The screws will go into the holes.



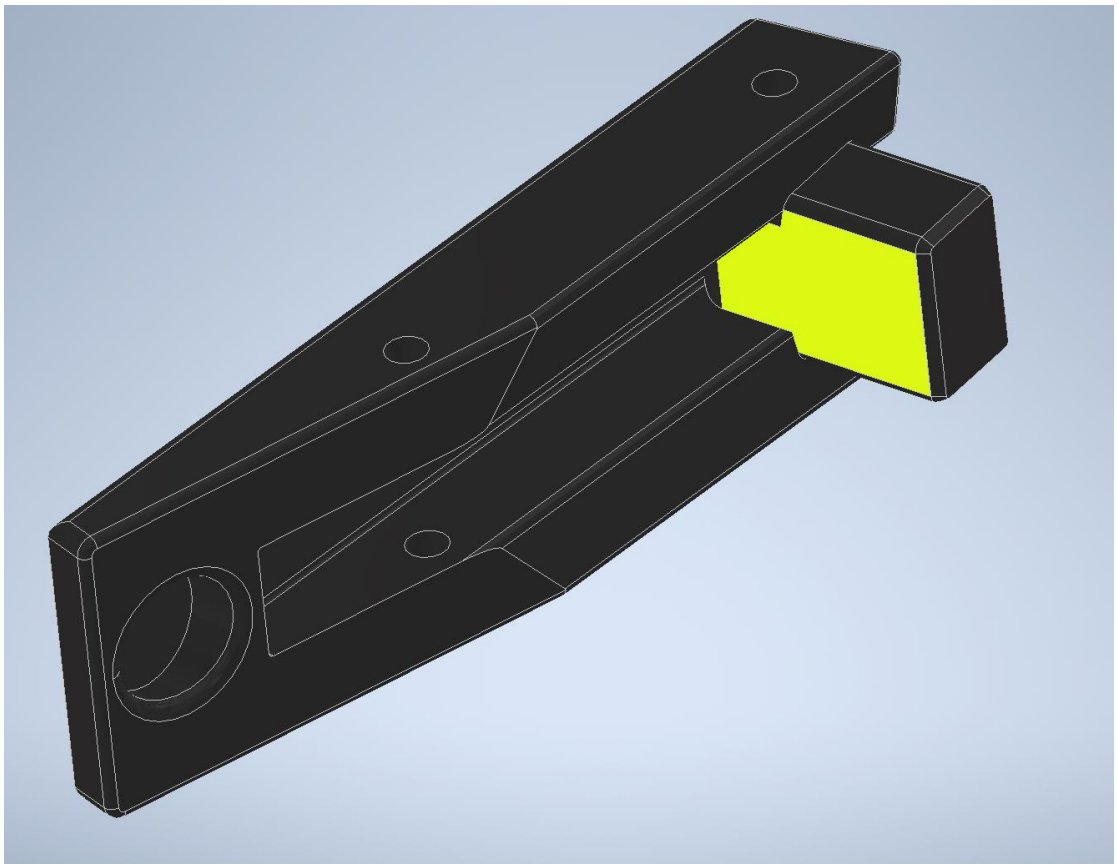
Screw both screws in. They do not need to be very tight.

The buttplate, assembled.

Now, with the buttplate assembled (or, just starting out for the brace build), we'll need to assemble the locking levers. This is intended to be done using spare filament, but it can also be done using 2mm roll pins. This documentation will cover the filament method, since the roll pin method will be straightforward. Take a locking block and locking lever. Place the locking block into the locking lever so that the side of the locking block that was touching the print bed faces towards the back of the lever, and the side the faced away from the print bed faces towards the front of the lever. Align the slot in the block with the hole in the lever, then stick a strand of filament through the hole. Use a hot soldering iron to melt the head of this filament strand into the locking lever. Repeat for the other side of the filament strand, pulling the excess filament away as you melt. This will pin the locking block into place.

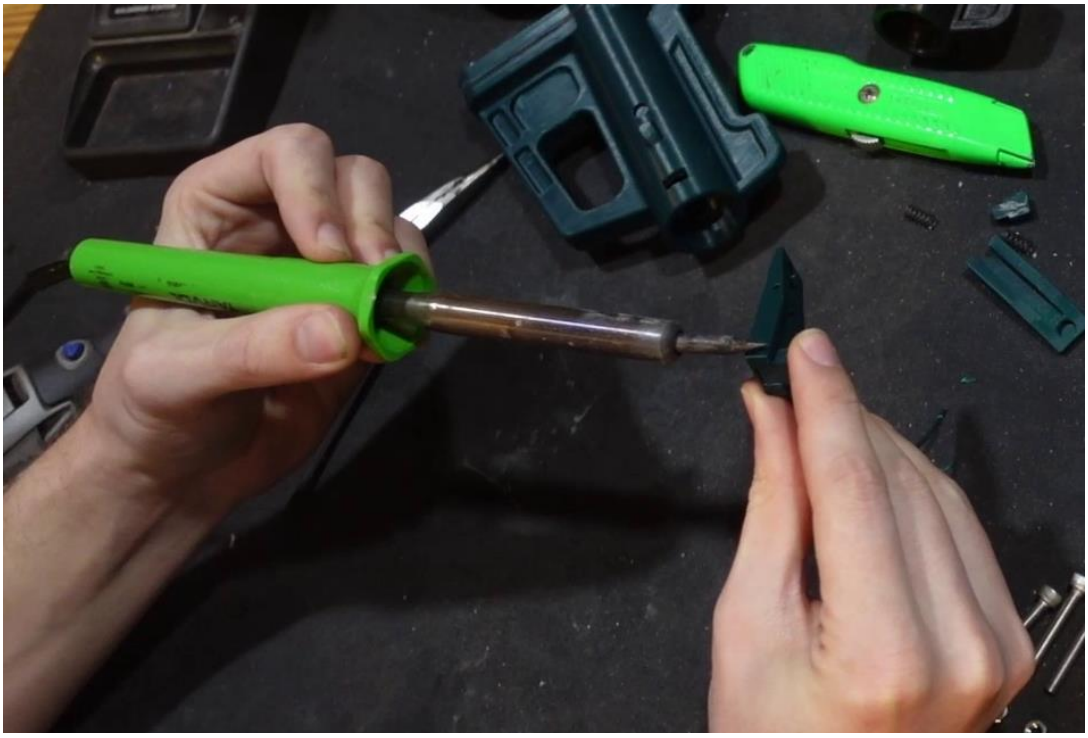
It is **VERY IMPORTANT** to remove all brim/support/defects from the locking blocks before assembling. Use a boxcutter, Dremel, or other tool to scrape off all brim/bulge where the locking block sat on the print bed

The locking block and locking lever. Note the spare filament strand in the background – you can cut one off your filament roll itself.

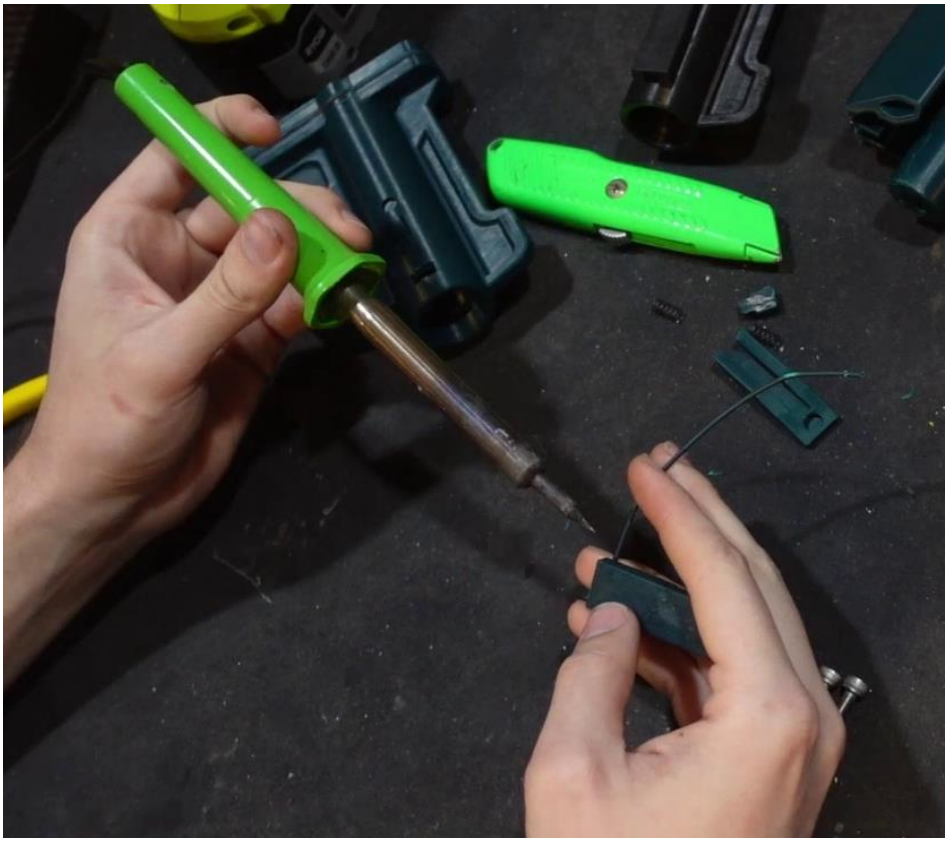


Proper assembly orientation of the lever and block – the yellow face above represents the face on the block that was on the print bed. Note the hole in the top of the lever – this lines up with the slot in the block.

Stick your filament strand through the hole – this is hard to show using pictures, refer to the video if you're not certain what is being described here. About a tenth of an inch (2mm) of the filament strand should protrude – melt this down so that it merges with the lever itself.



Use a soldering iron to melt over the exposed tip of the filament strand. Let it cool (you can blow on it) before proceeding.



On the other side of the lever, use the soldering iron to melt the other end of the filament strand into the lever, while pulling the excess filament strand free of the melt pool.

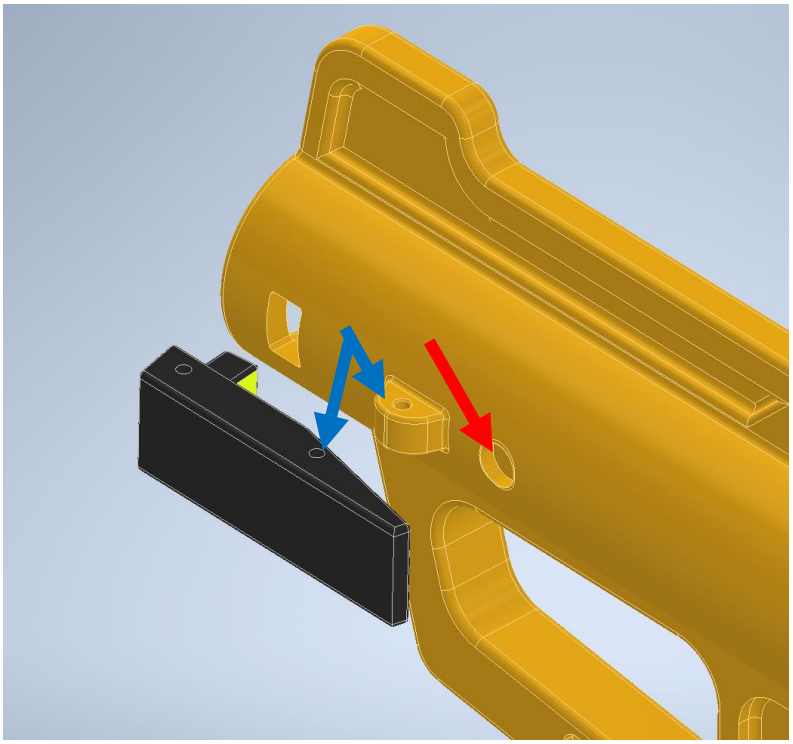
The block should be able to rotate and wiggle some – this is normal, and won't cause loose fitment of your stock.

Repeat the above steps for the second lever and locking block. Note that you may need to use a pair of cutting pliers to snip the melted end of your filament strand off so that you always start with a clean end when you stick the filament strand through the holes.

Once you have finished both of these sub-assemblies, you are ready to mount the levers to the stock/brace. This is a similar process; you will also use a filament strand melt to attach the levers. However, you will need to remember to place the lever springs between the levers and stock/brace before you install the pin. Simple place the spring into the boss on the stock/brace, then place the lever down on top of the spring, ensure the spring sits inside the boss on the lever, then align the holes in the stock/brace with the holes in the lever, and stick the filament through. Melt the filament the same way as shown above.

Take your spring…

…and place it into the boss on the stock/brace. Compress the spring using the lever.

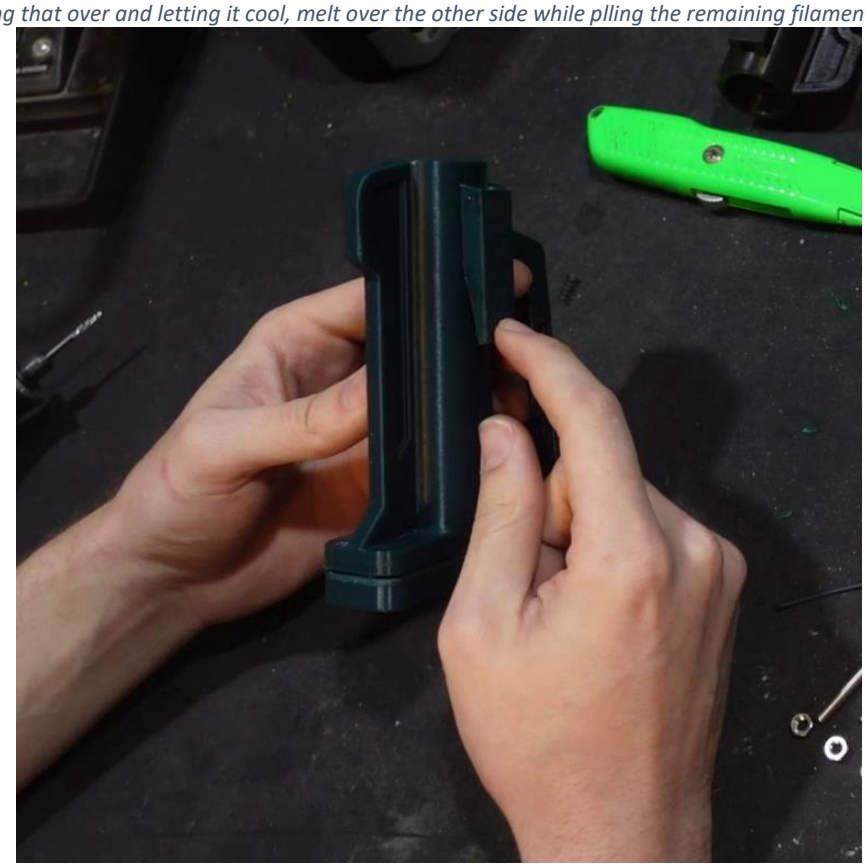


For reference, the boss on the stock/brace is shown above with the red arrow, and the blue arrow shows the holes that will line up for the filament pin.

While compressing the spring, you may have to manually nudge the locking block into the square hole in the stock/brace. Note that you need to ensure that you have removed all support material from the square hole in the stock/brace first. Once the block has slotted into the square hole, the holes for the filament pin should align.

With the holes aligned, stick the filament strand into the holes.

Like before, use a soldering iron to melt over the filament strand. About 2mm should protrude from the first side, and after melting that over and letting it cool, melt over the other side while plling the remaining filament away.



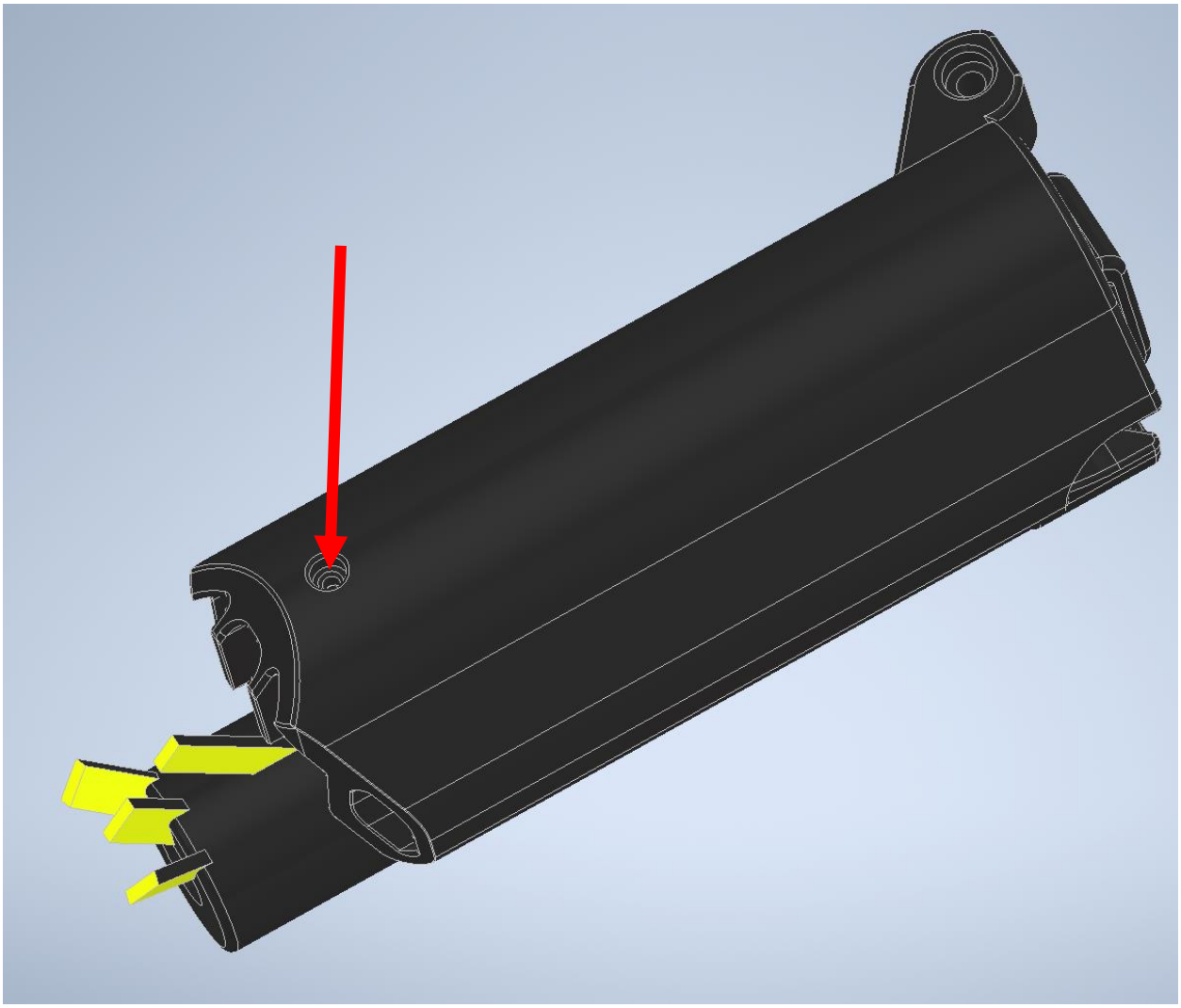
Once you have installed the first lever, you can test it out – sometimes, the locking block may need a little oil to move freely, but usually they will just work right away. Repeat these steps for the other lever.

Once both levers are mounted, you can test out the fit between the stock and tube. If it fits tight, you may need to go back and ensure all the support stumps are removed from the tube, and that the stock doesn't have any supports left inside. To install and adjust the stock, pinch both levers.

Install the stock to check fit/function

The stock should be able to collapse fully and the latches should be able to lock in at each of the four positions.

At this point, you can install the M2.5mm screw – it threads directly into the top of the tube, and prevents you from pulling the stock/brace off of the tube on accident. This is an optional step, as you may wish to be able to pull the stock/brace off the tube quickly. However, if you'd like to be able to extend the stock out to its max length without worrying about taking it off, you can install this screw.



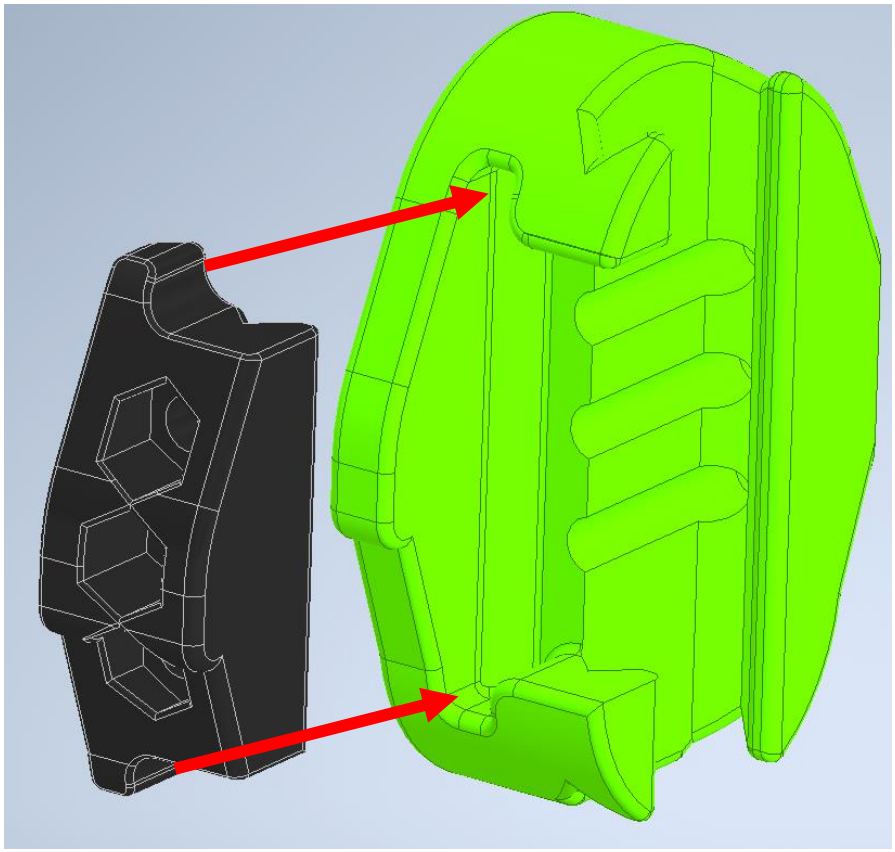
AFTER INSTALLING THE STOCK, the M2.5 screw gets threaded in here.

Finally, all that's left to do is mount the NS3 to a rail. The NS3 uses a hybrid slot-on/clamp-on design (in an attempt to be strong, compatible with as many rails as possible, and to minimize the risk of damaging it on assembly). Begin by sliding the mount onto the pic rail you wish to install the NS3 on. Take the clamp and place it into the recess in the mount. Use your M5 bolts and nuts to secure the clamp and mount to the rail.

The NS3 has two partial rails to ensure a better fit. Slot these rails onto the desired gun.

While slotting the mount onto the rail, align the half-hole on the mount with the cutouts in the rail.

Install the clamp into the mount.



For clarity, the clamp slots into the mount like so.

Stick the bolts through the mount side (blue), and the nuts into the clamp side (red). They do not need to be extremely tight, but do need to be a little more than snug – I have had these bolts work their way loose over hundreds of rounds. Blue threadlocker is an option.

With the NS3 attached, you're read to function check it. Fold it, unfold it, etc. Give it a shake, check for any wiggle or wobble. Once you're satisfied, go shoot with it! If you've got issues, check the FAQ at the bottom of this document. Note that the NS3 does not have a provision for locking unfolded. Gun-specific means of locking unfolded could be designed, but I was unable to come up with a sufficiently strong mechanism for locking it unfolded on the NS3 assembly itself. I recommend snugging the hinge bolt up a little, so that the stock can't move under its own weight, if you find yourself annoyed with the floppiness of a stock that won't stay folded up.

FAQ/Troubleshooting

Q: What sort of round counts should I expect? What ends up breaking?

A: I've tested the NS3 for thousands of rounds across many different calibers – it's held up well. Across several design revisions, I've improved and reinforced what broke. The current weak point is at the button/mount interface – the locking lip on the button can shear off with sufficient force. This force is pretty significant, however, and only requires replacing the button if the break occurs. I have forced this break to happen using a hammer.

Q: What can I do about the rough finish where supports were touching the parts?

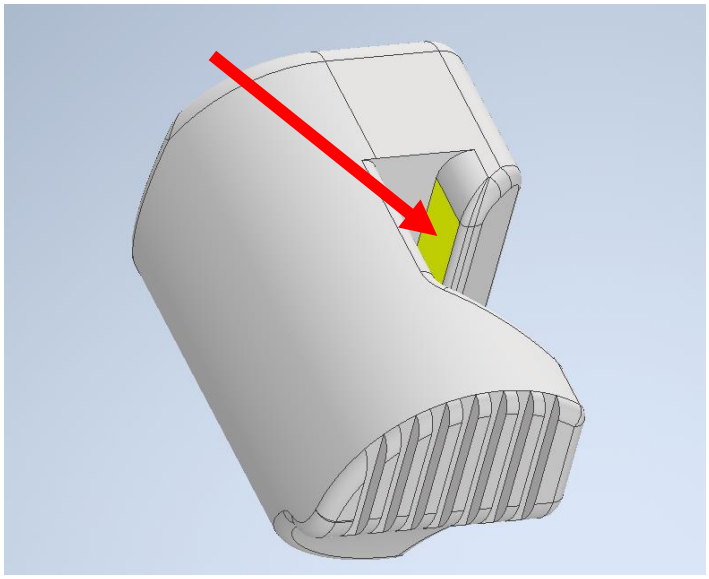
A: If the few places this happens bothers you, you can use a soldering iron to melt these areas smooth.

Q: My NS3 is all wiggly and loose. Why?

A: This is an issue with your print settings/calibration, or you messed up during assembly. If you hand fit parts, you may have hand fit them too aggressively. You may have drilled out the holes for the hinge poorly enough to allow slop to show up. Some slight wiggle is normal (and hard to avoid in an all-plastic setup), but this wiggle should be minimal, and shouldn't affect the shootability of the gun.

Q: My NS3 won't lock. Why?

A: Again, this is most likely a print settings/calibration issue. You can use a file to remove a little material from the lip edge of the button to try and hand fit parts, as this lip edge is usually what prevents the tube from locking. However, you should double check the parts to ensure that no supports or print defects are stuck to the parts in any locations.



Q: Can I mount the NS3 on pic rails that aren't as long as the clamp?

A: Yes, the NS3 should be able to be used on short rear-facing rails, even if you can only install one of the bolts – so long as the bolt you install is the middle one of the three. The NS3 relies on an inline recoil design methodology, so some builds may require the use of risers to get optics up high enough.