

HOTSAUCE PRESENTS:



FGC-9 MKII

**STINGRAY
EDITION**

Published by: hotsauce

Document version: 1.0

Author of this document: hotsauce, remixed from the work of JStark1809.

E-Mail: real_hotsauce@protonmail.com

Credit: The FGC-9 MkII Stingray edition, was designed by hotsauce and has been remixed from the FGC-9 MkII designed by: JStark1809, IvanTheTroll, and 3socksandcrops.

Websites:

<https://odysee.com/@hotsauce:6a>

<https://ctrlpew.com/>

<https://thegatalog.com/>

Special thanks to:

- A unnamed individual, for their support in prototype testing.
- A second unnamed individual, for their help with chambering DIY barrels.
- YeahNahPewPew for helping beta test and providing valuable feedback on the design and build process.
- ImmortalRevolt for providing the best ECM files and guide, and the mk3 bolt design.
- All members, fans and supporters of the Stingray's beta testing room.
- Designers whose creations inspired and influenced the FGC-9 MKII Stingray edition. In particular Derwood for coming up with the Shutty AP9 design, on which the FGC-9 mk1/mk2 and Stingray's core mechanisms are based upon.

Contents

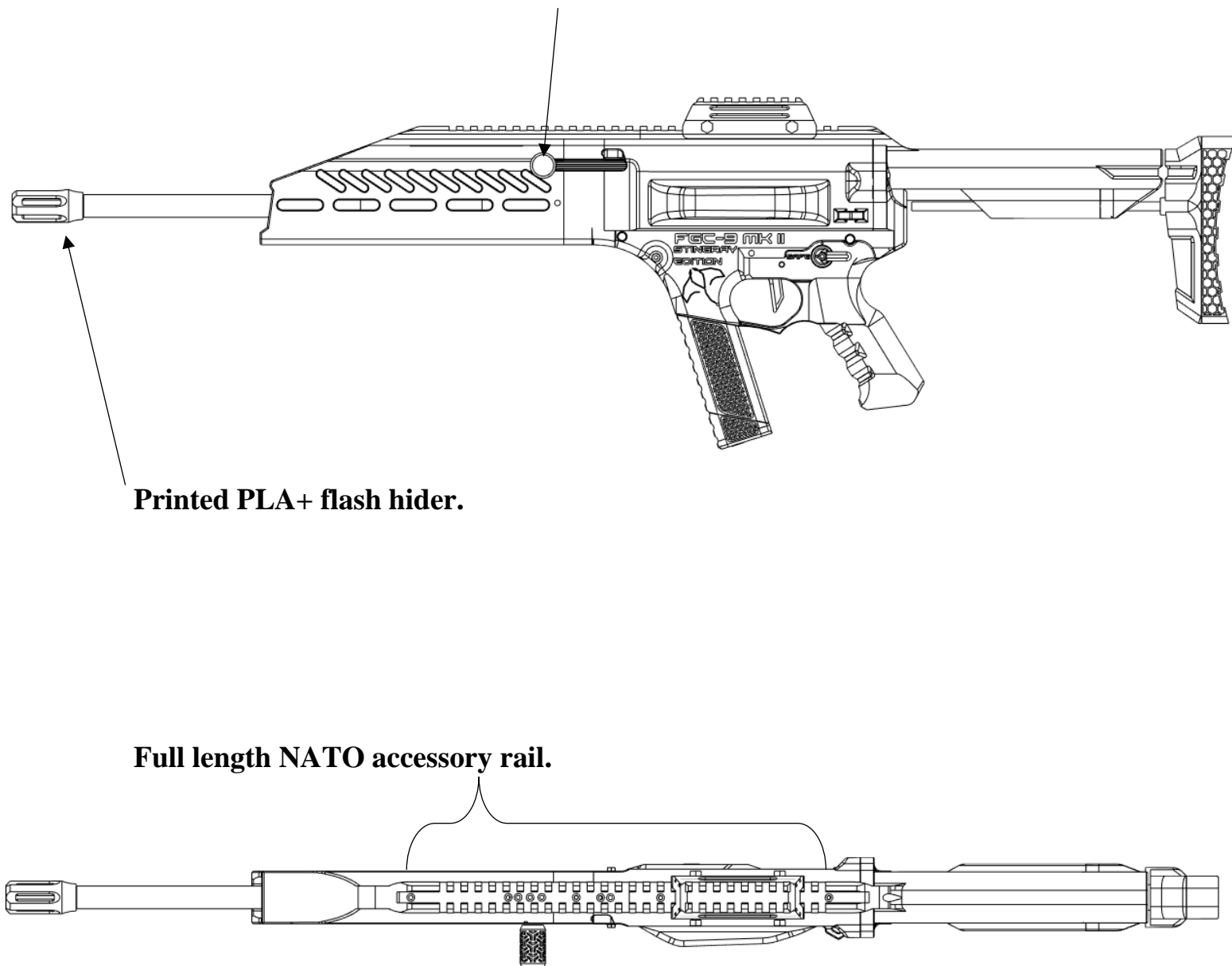
Technical specifications and features	4
Message from the author	7
3D-Printing.....	9
Recommended Print Settings.....	10
Printed Parts.	11
Materials Needed	31
Fire control group components.	31
General parts.....	33
Visual overview of the components.....	37
Making the barrel.....	38
Making the Bolt	39
Ammunition and How to Assemble a Magazine.....	43
Making the charging handle.....	46
Modifying the bolt.	49
Making the firing pin	51
Installing the Fire Control Group.....	64
Assembling the lower	67
Assembling the bolt assembly.....	71
Assembling the barrel assembly.....	73
Assembling the upper.....	76
Assembling the Barrel Retainer and Handguard.....	78
Attaching the Barrel and Handguard to the Upper.	81
Making the Locking Tabs.....	84
Making the Stock Adjustment Rods.	89
Assembling the Buffer Tube.....	95
Assembling the Stock.	99
Attaching the Lower Receiver to the Upper Receiver.	102
Attaching the Stock and Buffer tube to the Upper.....	103
Test firing and maintenance	105
Troubleshooting.....	106
Troubleshooting Failures to Extract.....	108
Firing Pin Troubleshooting.....	111

Technical specifications and features

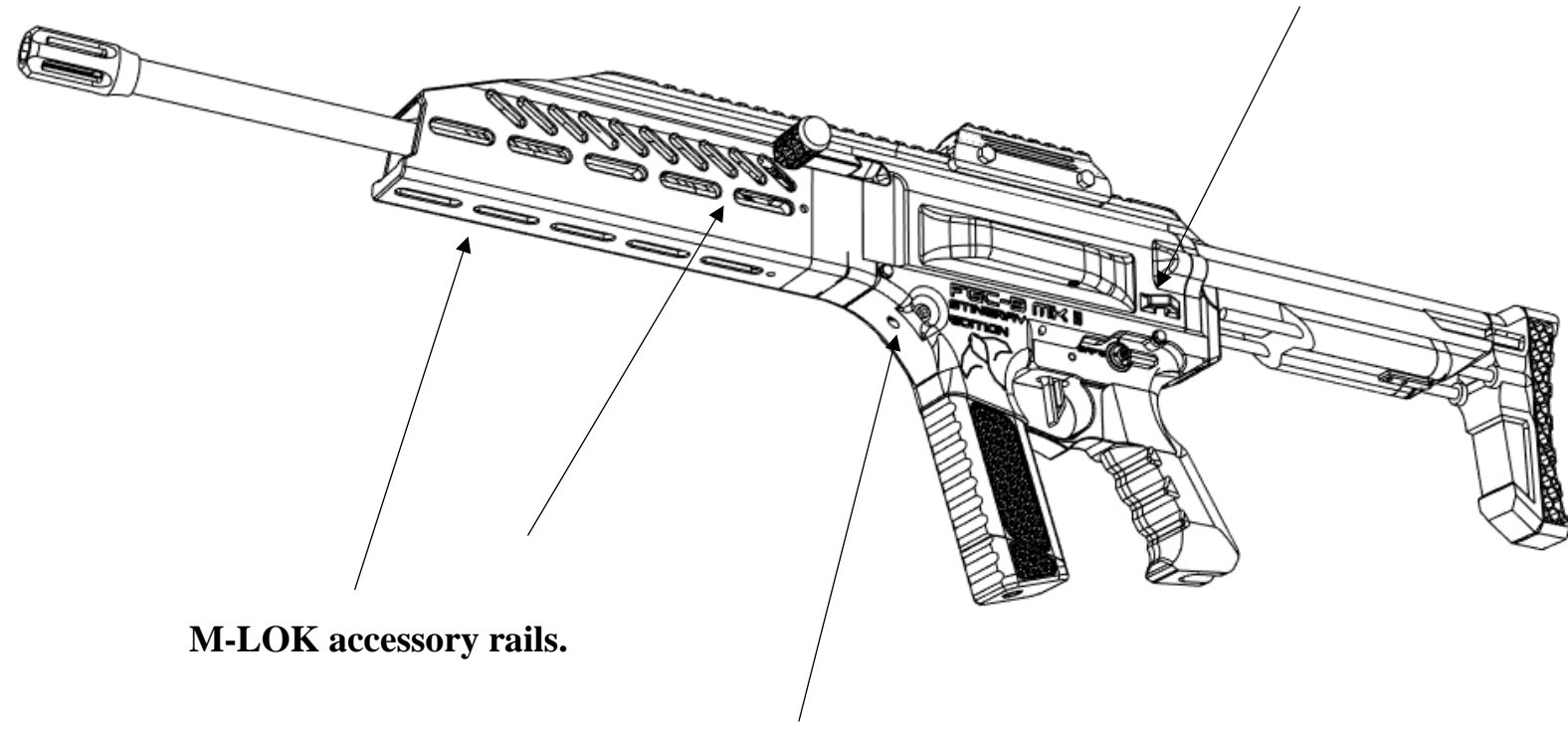
Non-reciprocating charging handle with bolt hold-open position.

Printed PLA+ flash hider.

Full length NATO accessory rail.

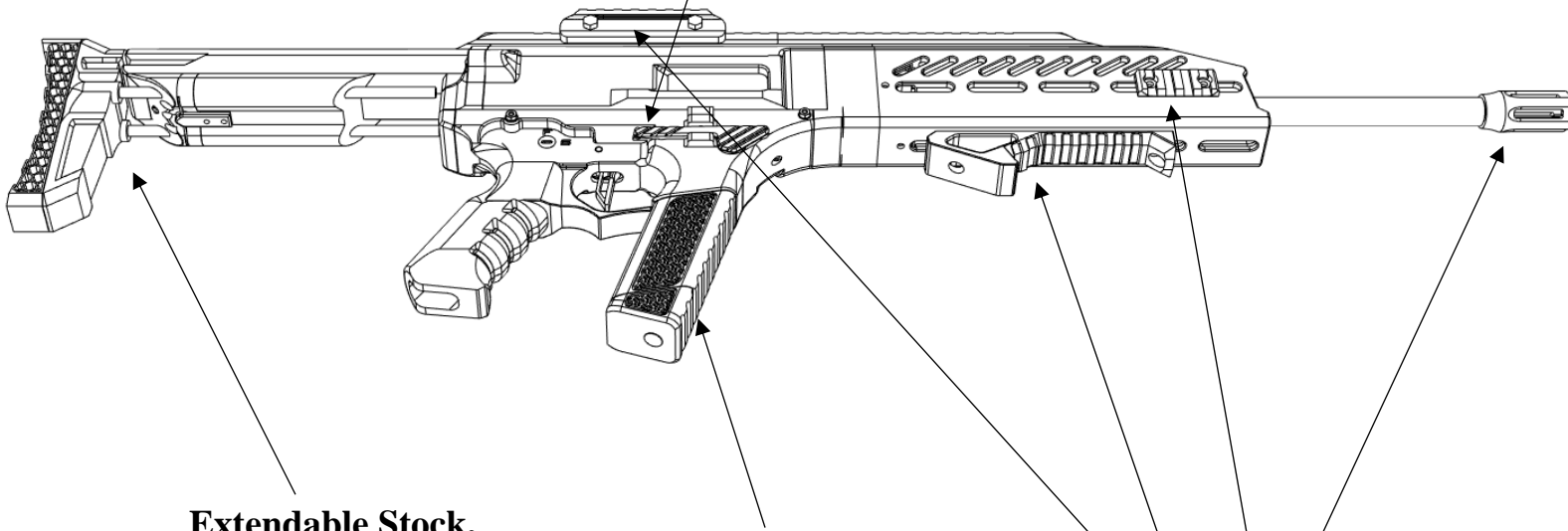


Single Point Sling mount.



M-LOK accessory rails.

Ambidextrous magazine release.



Extendable Stock,

Glock Compatible magazine, Optional Accessories.

Type: Pistol caliber carbine

Designer: hotsauce

Designed: 2021-2022

Mass (without magazine): 2750 grams or 6 lbs.

Length (16" barrel, stock collapsed): 865mm

Recommended Barrel length: 275mm-406mm, 10-16 inches

Cartridge: 9x19mm Parabellum

Action: Closed bolt straight blowback

Feed system: 25 round printed box magazine, or any Glock compatible magazine.

Message from the author

I hope that you appreciate the immense time and effort that was put into this project, as well as the risks that were involved. Hundreds, if not thousands of hours were put into designing, printing, prototyping, building, troubleshooting, testing, driving to and from the range, etc. I truly believe it was all worth it, and after seeing the results, I hope you would agree.

This guide is not designed to be a standalone document. When it comes to producing the bolt and barrel you will need to consult other DIY Guides (should you choose to build your own). However, this document does explain where to find any external resources you will need, and it does explain how to make every other component, as well as assemble everything.

This is a long document, however that should not intimidate you. It is filled with pictures to make the build process as straight forward as possible.

If you had success in producing your own Stingray or simply appreciate the effort of empowering the common man with firearms, consider donating to the developer of this project. Even a tiny donation will be appreciated.

If you can't and/or don't want to support the developer financially, but still want to show your support, consider sending pictures or videos of your builds to the Deterrence Dispensed Rocket Chat.

<https://chat.deterrencedisdispensed.com/>

Important: Do not send incriminating evidence of yourself breaking the law. Scrub all .exif data from media before sending. You never know who is watching on the internet.

Any funds donated help with future developments and improvements.

DONATION LINKS:

BTC

1JgTJw3KgSm2yq1qKaTkLxeDPD3vy1rsrA

ETH

0x3cdf8Ff8287f5A08afe9A1237133cBa826c6DD1A

LTC

LPz23SGeHinnVn4nJKWJqHDgqUUiUhFwhN

BAT

0x3cdf8Ff8287f5A08afe9A1237133cBa826c6DD1A

CRO

0x3cdf8Ff8287f5A08afe9A1237133cBa826c6DD1A

DOGE

D61W9K7reAEQKWPyFY8kpYKLk7iQDj6Dcn

3D-Printing

If you have never used a 3D-printer before and/or have never owned one refer to appropriate guides for beginners that include recommendations on what 3D-printer to buy and further relevant information:

- <https://www.youtube.com/watch?v=JTN6jtB5mqk>
- <https://www.enblocpress.com/guide/>
- <https://ctrlpew.com/the-complete-getting-started-guide/>

Once you've figured out how to print basic things that you can download from sites like thingiverse.com, you can go ahead.

The next pages contain the general suggested settings for your printed parts. You can deviate from these settings based on your 3D-printer, consistency of PLA filament and general experience with 3D-printing.

These settings were optimized for [Creality Ender 3](#) printers in combination with the use of the [Cura slicer program](#).

After printing each part, make sure to get rid of any edges and artifacts that result out of the nature of 3D-printing. Before you install any 3D-printed components make sure to insert and remove items from their destined place on the receiver multiple times to make sure that they move smoothly if they are intended to do so, which is the case, for example, for the bolt carrier. So if a part does not fit or move in the manner you would expect, try to smoothen the surface of the 3D-printed object and get rid of any squished edges with your craft knife.

Do not re-use any parts that you may have from an FGC-9 MkI/MkII build. Almost all printed parts have undergone changes, thus re-using MkI/mII parts may lead to malfunctions and less than ideal operation of your gun.

Recommended Print Settings.

Filament type: PLA+ (Optional: TPU for stock butt pad, and locking tab push button)

Nozzle size: 0.4mm

Layer height: 0.1mm - 0.2mm. Recommended: 0.16mm

Infill density: 100% (99% when using Cura, for shorter print time)

Nozzle temperature: 210°C +-10°C (or as specified by filament manufacturer)

Bed temperature: 50° (or as specified by filament manufacturer)

Fan Speed: 100%

Support: As needed (Turn on tree supports!)

Build Plate Adhesion: I recommend using rafts for all prints. This eliminates print warping, and elephant's foot. However, if you are confident in your printers' abilities, feel free to use skirts or brims at your discretion.

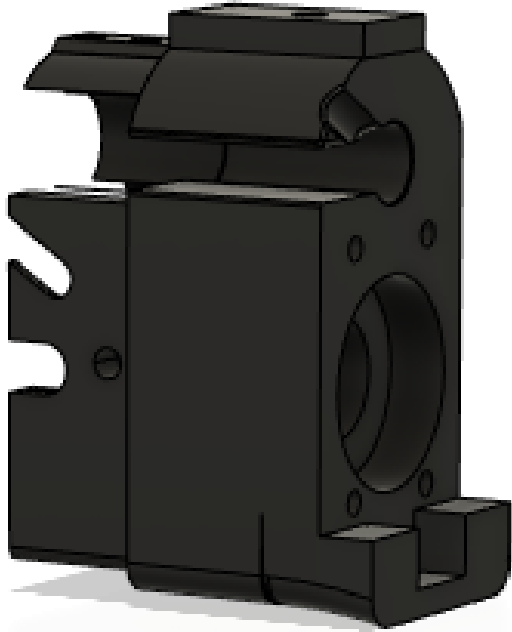
Print Orientation: **As a rule of thumb, print all parts in the orientation that requires the least amount of support. Any exceptions will be noted below in the Printed Parts section of this guide.**

Post Processing: In addition to the standard post processing associated with 3D printing, I recommend giving each part a clear coat of spray paint. A matte clear finish helps to hide layer lines, provides a slightly protective finish, and gives a nice matte finish to your parts.

Printed Parts.

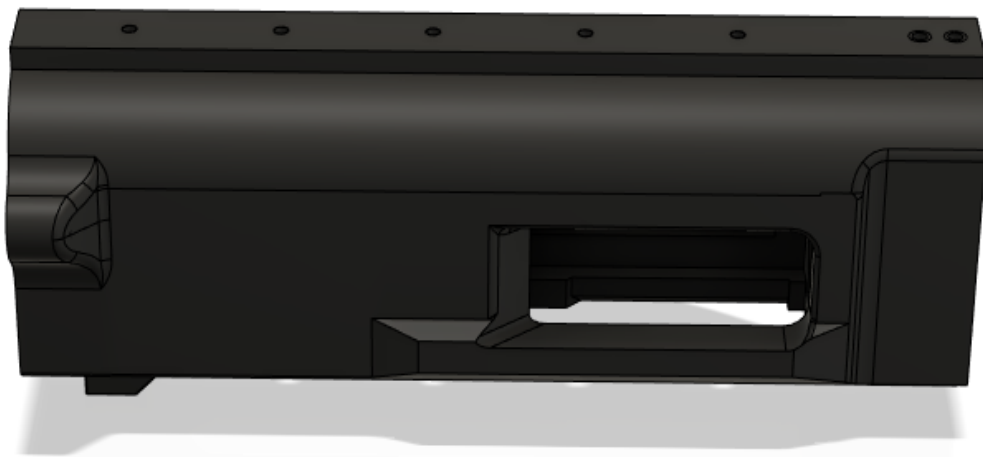
This section will list all printed parts, use it as a checklist to ensure you print all parts needed.

Barrel Retainer



Notes: Print facing upwards.

Upper Receiver



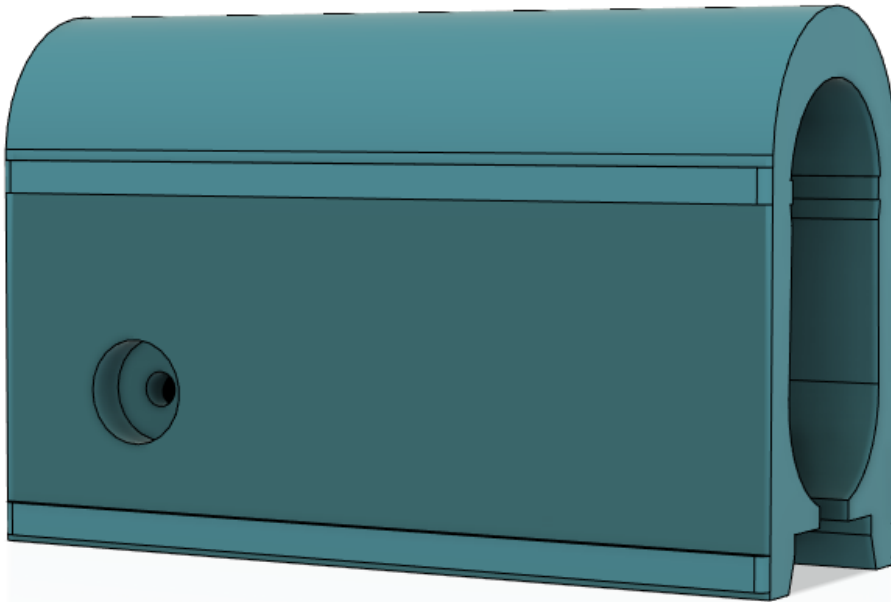
Notes: Print Standing up on front end.

Hand Guard



Notes: Print standing up, with tapered end at top.

Bolt Carrier



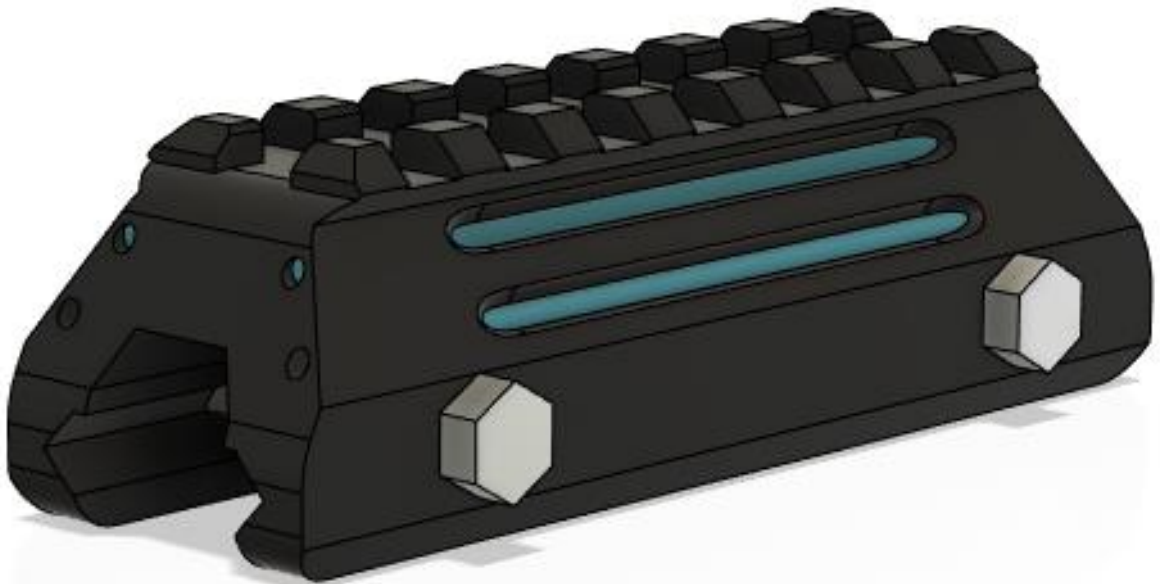
Notes: This part should be printed as shown above. This makes for smoother and quieter action when charging the firearm.

Top Rail (Two Parts)



Notes: Print in orientation shown above.

Sight Riser (Optional)



Notes: Print standing up on end.

Buffer Tube



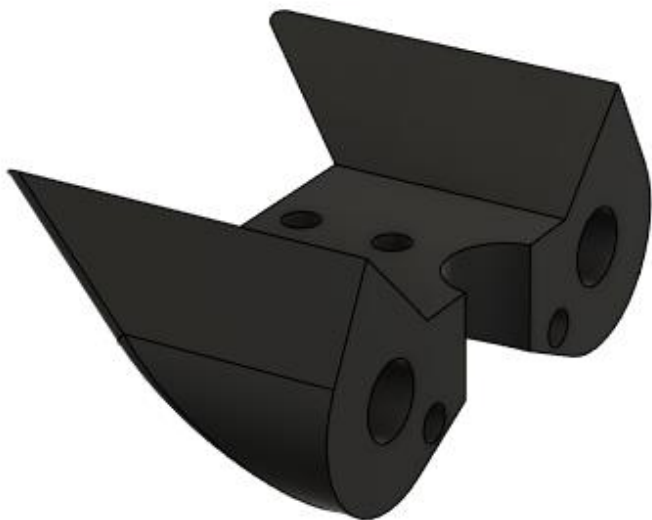
Notes: Print on end with smaller end at top.

Locking Tab Spacer



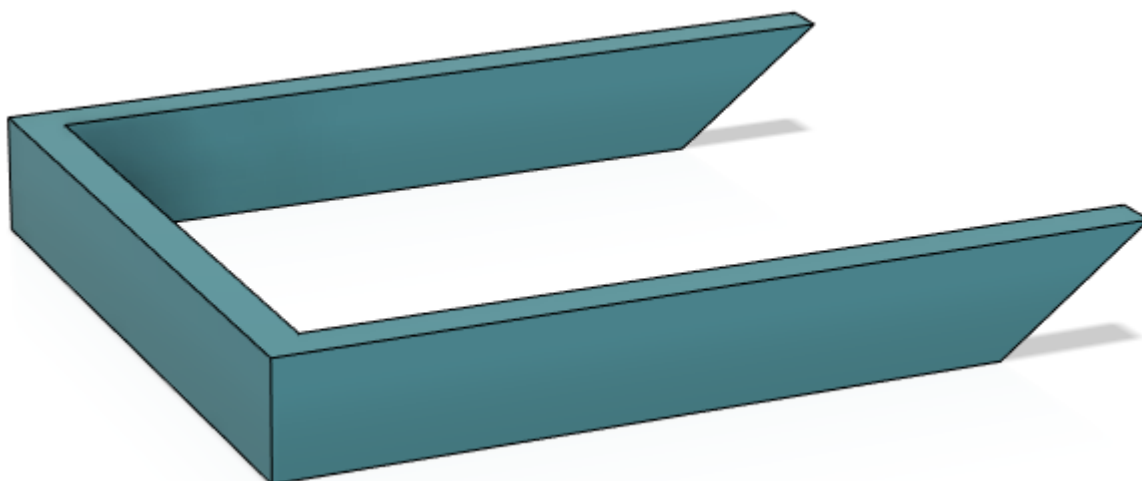
Notes: Print with flat bottom down.

Locking Tab End Cap



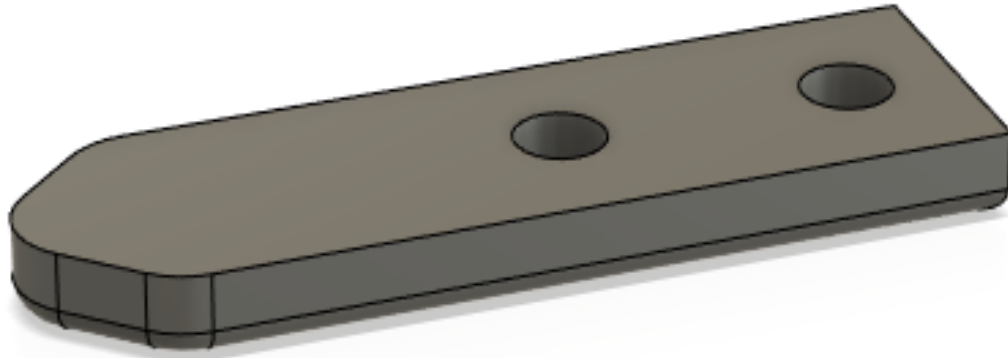
Notes: Print with pointy ends up.

Buffer Tube Color Inlay



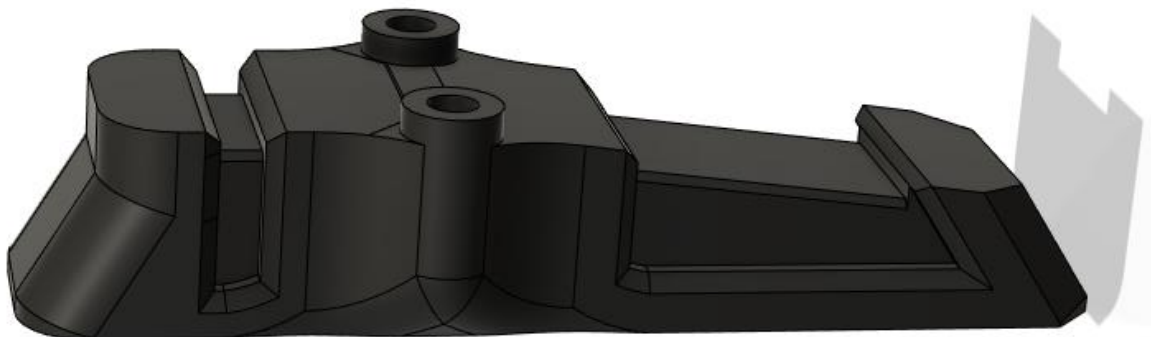
Notes: Print upside down

TPU Push Button (optional)



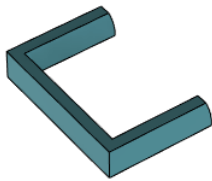
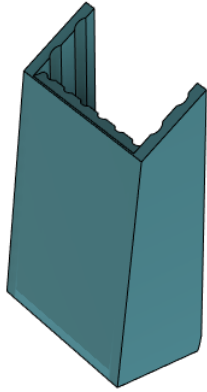
Notes: This part is recommended, but optional. Must be printed in TPU.

Stock



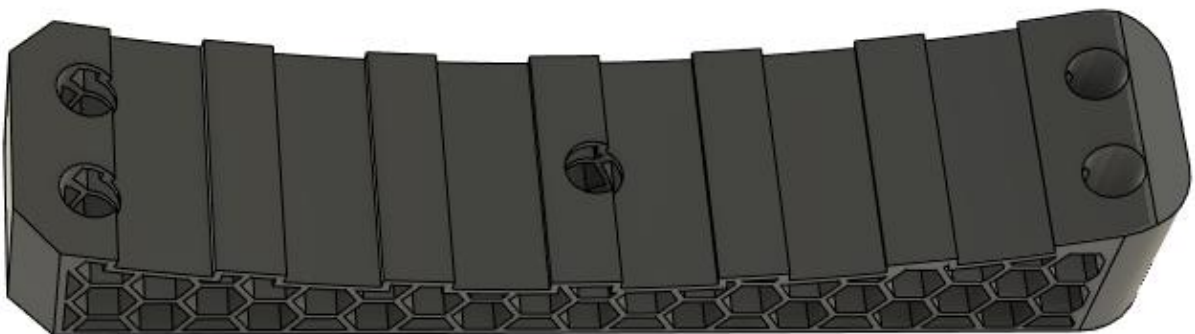
Notes: Print as shown

Stock Upper and Lower Color Inlay



Notes: Print as shown

Butt Pad



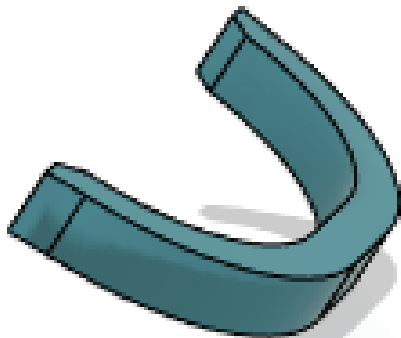
Notes: Printing in TPU highly recommended. Print laying on side.

Pistol Grip



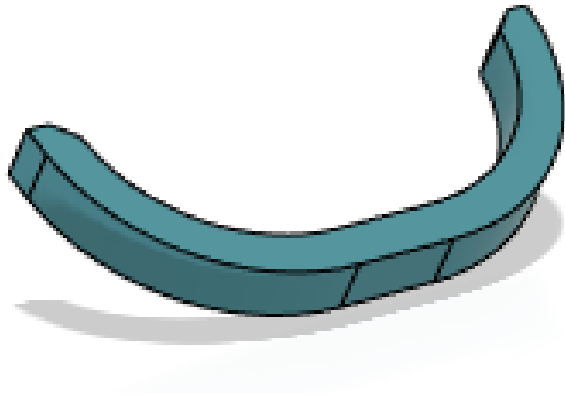
Notes: The best way to print this is on the edge pointing up as shown.

Grip Color Inlay Top and Middle



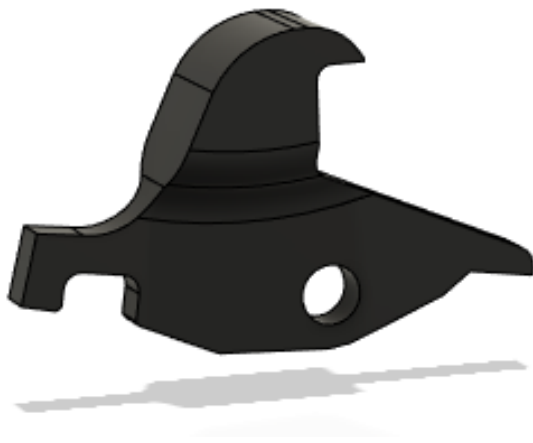
Notes: Print 2x

Grip bottom color inlay



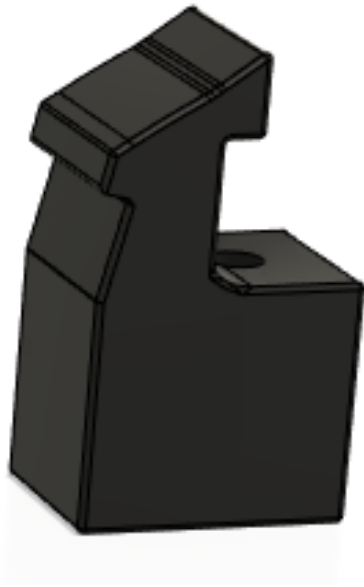
Notes:

Disconnecter



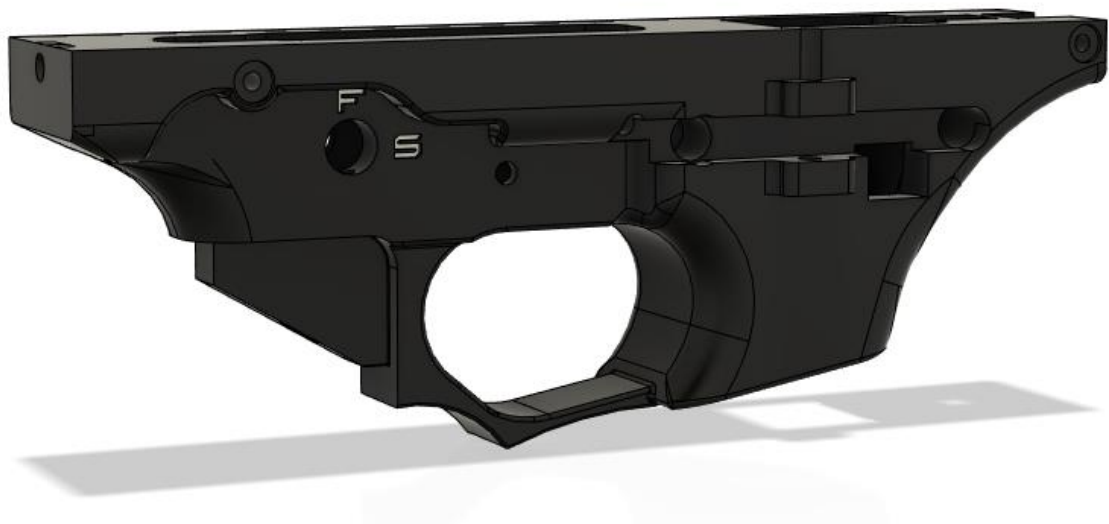
Notes: Print laying down on its side.

Feed Ramp



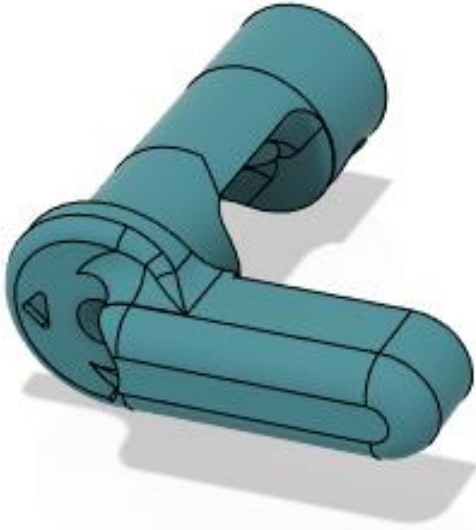
Notes: Print laying on side.

Lower Receiver



Notes: Print upside down, with trigger guard & mag-well at top.

Fire Selector Lever



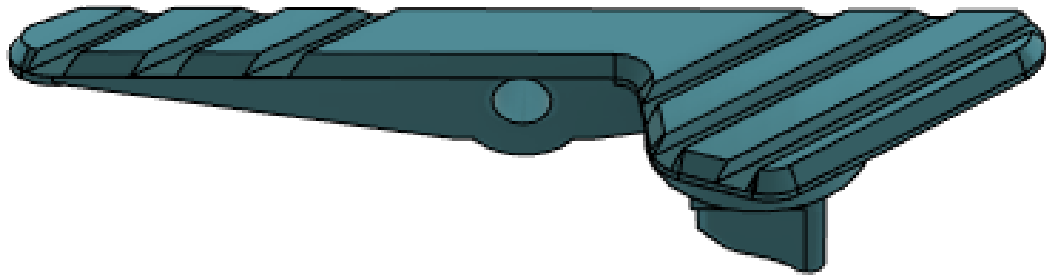
Notes: Print standing up with lever at top.

Hammer



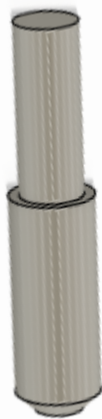
Notes: Print laying down on its side.

Magazine Catch Bar



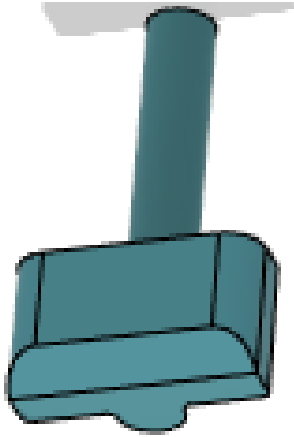
Notes:

Magazine Catch Button



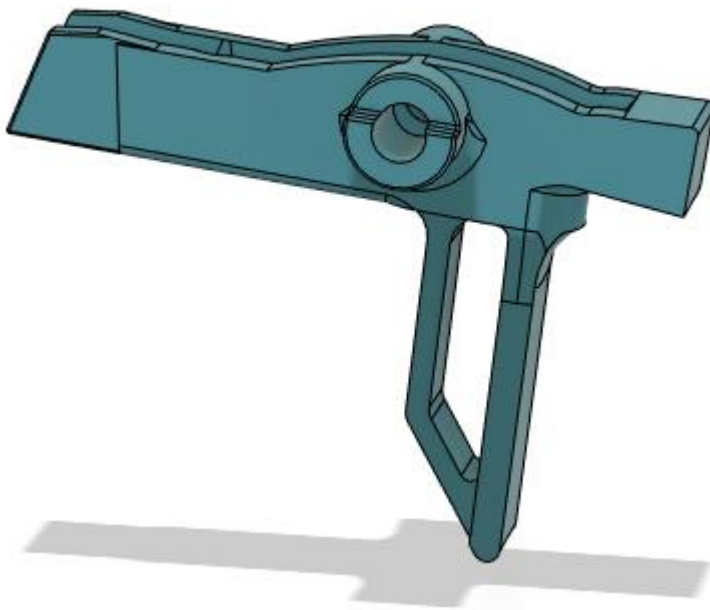
Notes: Print with the pointy end down as shown.

Magazine Catch Pivot Pin



Notes: Print as shown

Trigger



Notes: Print laying down on its side.

Magazine Body



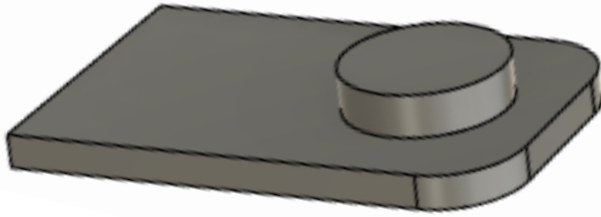
Notes: Print vertically as shown

Magazine Base Plate



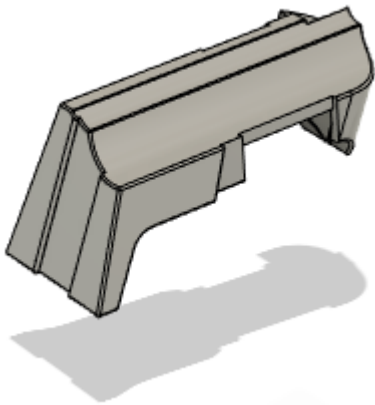
Notes: Print at the weird angle shown here.

Magazine Locking Tab



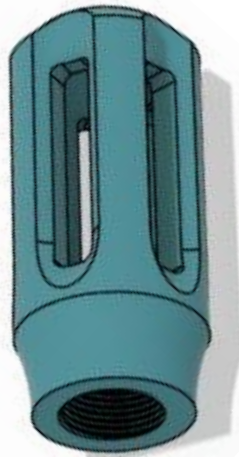
Notes: Print as shown

Magazine Follower



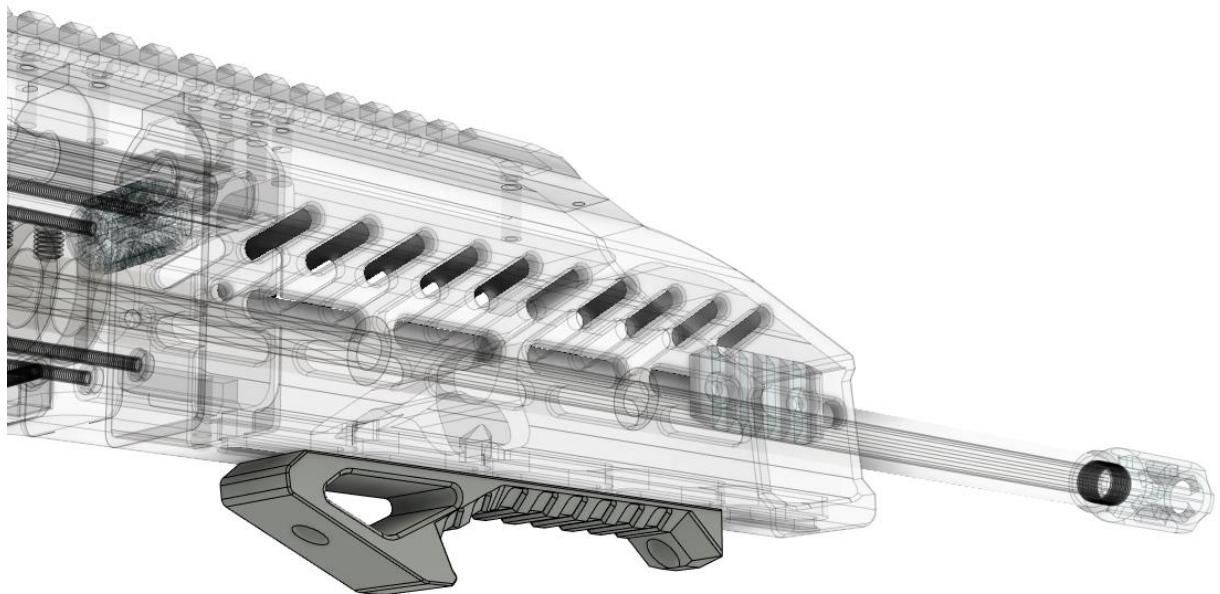
Notes: There is no good way to print this, just do whatever works for you.

Flash Hider



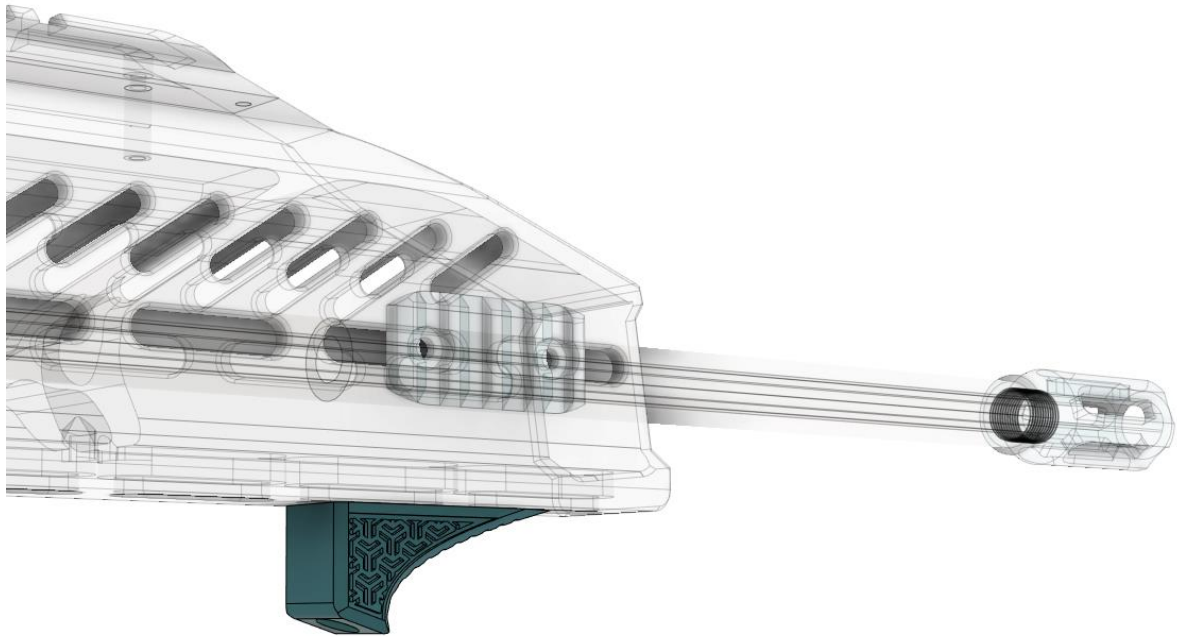
Notes: This must be printed in a high quality PLA+. Duramic3D is proven to work, Esun pla+ will not work for this part. This is an optional part. Print as shown.

Large Hand Stop



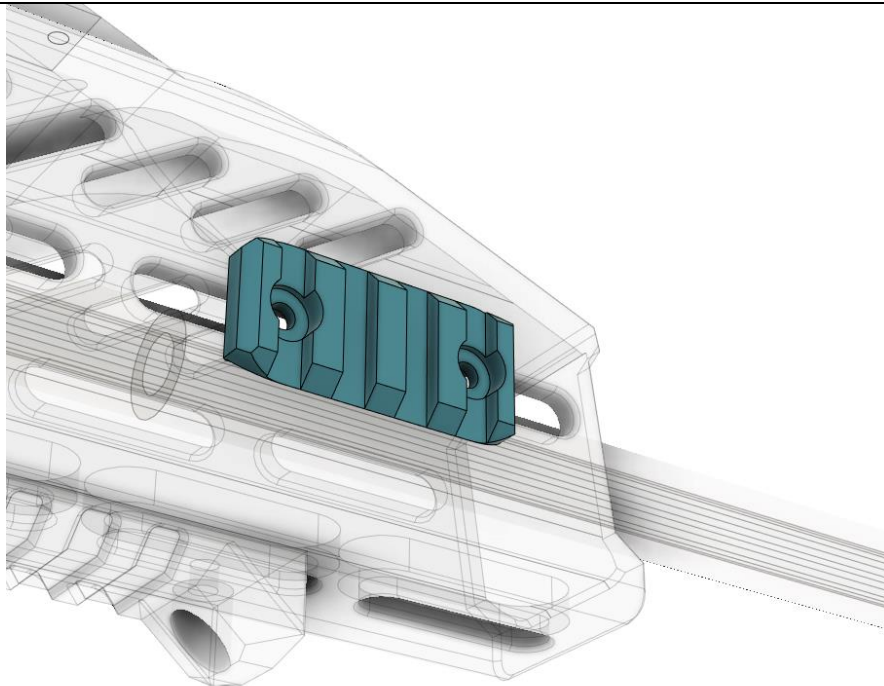
Notes: This is an optional part. Print on side.

Small Hand Stop



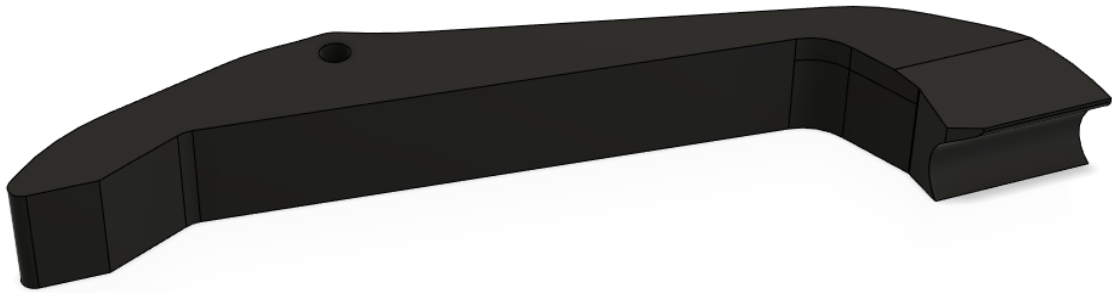
Notes: This is an optional part. Print with largest side down.

M-LOK to NATO Rail Adapter



Notes: This is an optional part. Print with bumps facing up.

Ejector



Notes: Print as shown

Charging Handle



Notes: Don't use supports to print. Print as shown.

Charging Handle Bushing



Notes: Print as shown.

Buffer Tube for Fixed Stock Option



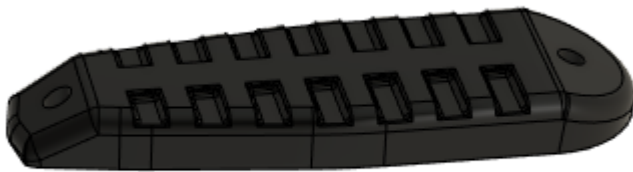
Notes: Print with base (largest end) on build plate.

Fixed Position Stock



Notes: Print as shown.

Fixed Stock Butt pad



Notes: Print with flat end on build plate as shown.

Materials Needed

- **Round steel stock for adjustable stock option.**
 - 6mm diameter, 400mm length
 - **OR** 2x 6mm diameter, 200mm length.
- **Round steel stock for DIY Bolt.**
 - 18mm Diameter, 1x 50mm long and 1x 216mm long or one piece longer than 300mm cut into two respective parts. (If you buy a prebuilt bolt, you do not need this)
- **Round steel stock for DIY firing pin.**
 - 3mm +- 0.01mm diameter, 70mm length. (This is used for the DIY firing pin. You do not need this if you buy a prebuilt firing pin)

IMPORTANT FOR ALL STEEL STOCK: The round steel stock must be non-hardened, so no tool steel for example! Uncoated! Use carbon steel (regular steel)! Any other steels are not recommended. For the Ø3mm and Ø6mm stock, stainless steel is acceptable.

- **8x LM6UU bearings for the adjustable stock/buffer tube.**
 - https://www.amazon.com/gp/product/B091342R6L/ref=ppx_yo_dt_b_asin_title_o00_s00?ie=UTF8&psc=1
- **JB Weld**
 - 1x package
- **Loctite thread locking fluid.**
 - Small bottle of removable Loctite 243/242
- **Grease**
 - Small bottle or container of standard grease. This will be used to lubricate all components that move or interact with other components.

Fire control group components.

In regard to the fire control group you have two options. Option one is to buy any AR-15 compatible fire control group. Option two is to print your own AR-15 fire control group. If you print your own fire control group, you will need to buy the springs and pins listed below.

Parts for use with the 3D-printed FGC-9 MkII fire control group:



- 1x AR-15 Hammer spring
- 1x AR-15 Trigger spring
- 2x AR-15 Fire control group pin
- 1x AR-15 Disconnect spring
- 1x AR-15 Fire selector spring - 1x AR-15 Fire selector detent

Available from Aliexpress: www.aliexpress.com/item/32916890199.html
www.aliexpress.com/item/1005001538560272.html (21 pcs option)
www.aliexpress.com/item/33008262340.html (T070 option)
www.aliexpress.com/item/33018833744.html (21 pcs option)
www.aliexpress.com/item/1005001451650916.html

General parts

Shaft collars DIN 705



- **3x Shaft collars DIN 705**, 16mm
Inner diameter: 16mm
Outer diameter: 28mm
Width: 12mm

This will be used to mount the barrel. If you buy a prebuilt barrel, you may not need these.

- **1x Shaft collar DIN 705**, 3mm Inner diameter:
3mm
Outer diameter: 7mm
Width: 5mm

This will be used to make the firing pin. If you buy a prebuilt pin, you will not need this. (Should include a set screw)

Alternatively, equivalent shaft collar: Inner diameter: 3mm, Outer diameter: 7mm-12mm, Width: 5mm

-Main Buffer Spring

- 1x AR-15/M4 Buffer Spring



-Firing Pin Spring



- 1x Spring for the Firing Pin

Remove springs from various ballpoint pens that you have and check them whether they meet these dimensions.

Outer diameter: 4.5mm \pm 0.5mm

Wire thickness: 0.4mm \pm 0.02mm

Initial length: 25mm \pm 5mm

Alternatively you can purchase a spring with those dimension online. Once you have a spring that meets the dimensions above, cut the spring down to a length of 12.5mm \pm 5mm.

-1x AR-15 Mag Catch spring

(Most likely already included in your fire control group spring kit ordered from Aliexpress)

Cut shorter at your own preference in case the mechanism is too stiff for you
OR

1x Regular compression spring Outer diameter: 8mm

Wire thickness: 1mm \pm 0.1mm Length/Cut to length: 20mm

-Secondary Buffer Spring

Outer diameter: 17mm

Wire thickness: 2mm \pm 0.5mm

Length: 80mm \pm 10mm

DIN 2095 option: Outer diameter: 17mm Wire thickness: 2.25mm Length: 75mm.

-Socket Head Screws:

Listed below is the bare minimum amount of hardware needed. However, I strongly, strongly suggest buying more than needed. Small hardware like this often comes in packs of 50. Many 3D Printed guns use M3 hardware, and you will likely use this hardware sooner than later. Plus, you will likely drop and lose a screw, washer, nut, insert, or something at some point in the build process. Having extras on hand will prevent this from becoming an issue.

Additionally, you can use longer M3 screws and cut them to length as needed. I don't recommend this, but it is possible.

NAME	Minimum Amount	Recommended Amount
AR-15 Pistol Grip Screw. M6 x 25mm	1	2
M3 x 40mm	6	10
M3 x 20mm	2	10
M3 x 16mm	5	50
M3 x 12mm	10	50
M3 x 6mm	7	50
M3 x 5mm	3	50
M3 washers	11	50
M3 brass thread inserts	14	50
M3 Nuts	2	25
M4 Slot Head Screw	1 (only needed for printed fire control group)	2

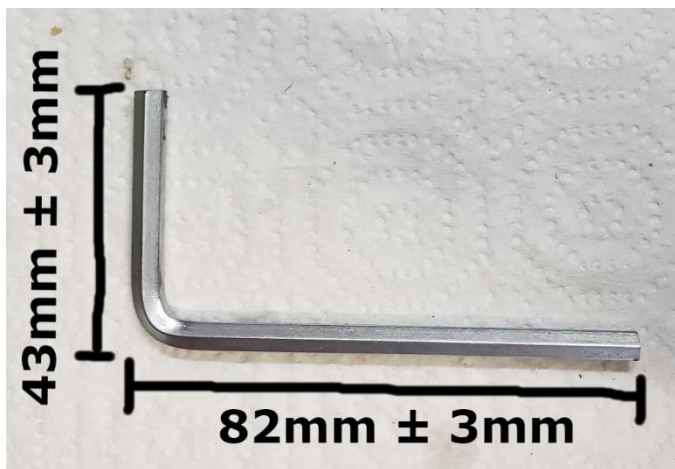
External-Tooth Lock Washer M6 DIN 6797	1	5 (In case you use a different grip that needs extra washers to take up space.)
---	---	---

-Extended Glock 17 Magazine Spring.

This is only needed if you print your own magazines. You can also use longer springs, and cut them to length.

-5mm Hex/Allen key.

It will be hard (read impossible) to find an Allen key with these exact dimensions. Instead, buy a 5mm Allen key with longer lengths, and cut it to length.



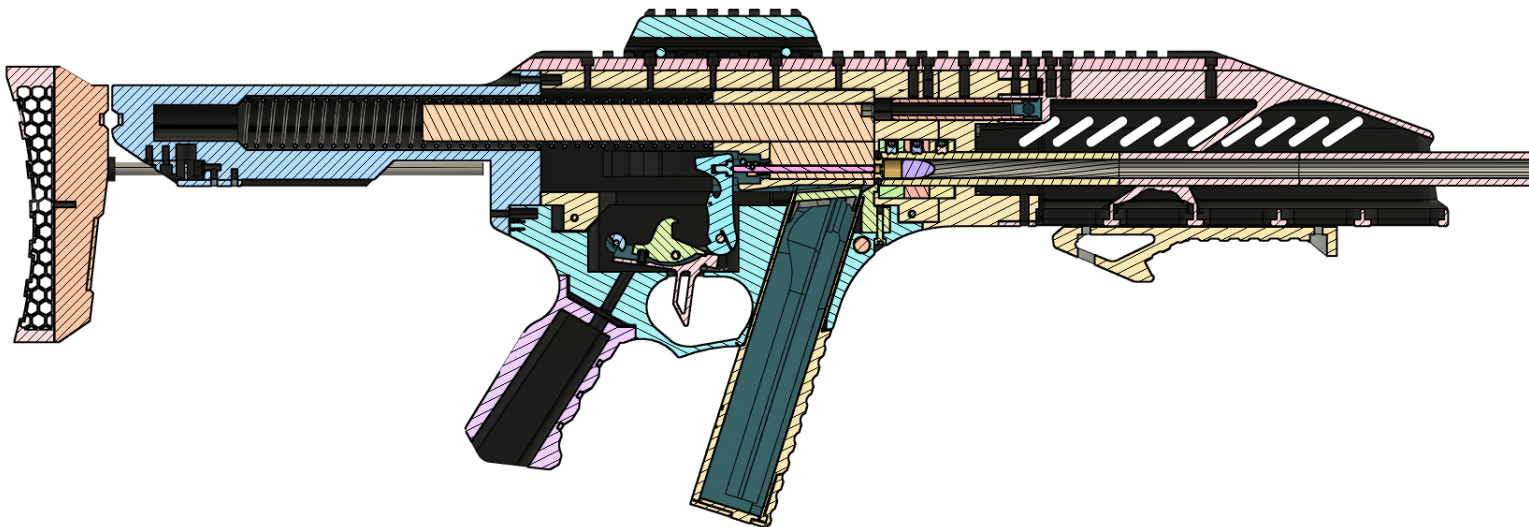
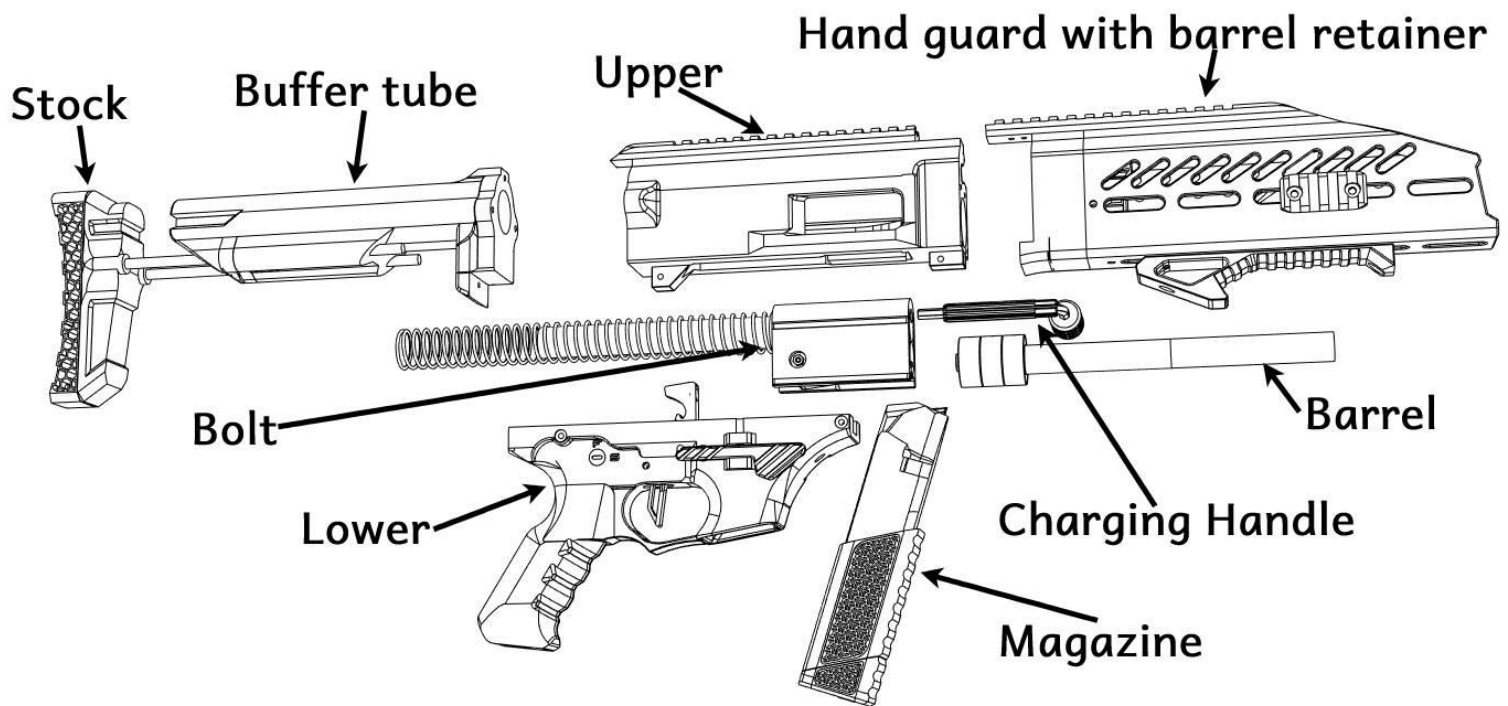
-Magnet

One 20mm x 10mm x 2mm magnet. Ebay is likely your best source for this.

-M-Lok Hardware

If you intend to use any accessories, you will need M-Lok hardware.

Visual overview of the components.



Making the barrel

You have two options to acquiring a barrel for this gun.
Option one is to build one yourself. Your second option
is the buy one. Below the basics of each option are
outlined, and options on how to proceed are given.

Build one Yourself (best option):

- **Electro-Chemically Machining a hydraulic pipe**

Buy a 16mm Outer Diameter, 8-8.6mm Inner Diameter Hydraulic Pipe / “Explosion-Proof-Pipe”, out of hardened steel and use “ECM” to bore, rifle and chamber it according to the included instructions.

This seems like a complicated process but is quite easy and anyone can be successful. For full instructions on how to ECM your own barrel, ImmortalRevolt has constructed a great guide on how to ECM and has provided the best and most up to date .stl files that will be needed. You can find that here:

https://odysee.com/@c0ld_d8rk_h8nd:8/ECM-Barrels-v3.5:e

Check to see if there is a more up to date version before downloading.

- **Button Rifling**

Buy a 16mm Outer Diameter, 8-8.6mm Inner Diameter Hydraulic Pipe / “Explosion-Proof-Pipe”, out of hardened steel and use a rifling button to rifle it. Assuming the inner diameter of your pipe is correct, using this method you will be able to rifle a barrel in just a few minutes.

After it is rifled, it will need to be chambered. To do so I recommend using ECM or a chambering reamer.

- **Using a simple steel pipe chambered with a drill bit**

Buy a 16mm Outer Diameter, 9mm Inner Diameter steel pipe and cut it to at least 10 inches length and then use a 10mm diameter drill bit that you cut flat beforehand, to ream the chamber to a depth of 15.95mm \pm 0.05.

- Machining a barrel out of a rifled barrel blank

Hire a gunsmith to do the following, or do this yourself:

- Buy a rifled barrel blank for 9x19mm
(In the US, for example on Brownells)
- Cut a 10-16 inch piece depending on your preferred barrel length.
- Turn down the piece on the lathe to the OD of 16mm \pm 0.02 - Use a 9x19mm chamber reamer to ream the chamber to a depth of 15.95mm \pm 0.05
- Add a chamfer with a tool or use sand paper to add a radius

The basics of the chamber reaming process are illustrated in this video: https://youtu.be/27Xz_oMZbbI?t=199

Buy one:

If you spend some time looking around the internet, you will find some companies selling pre made FGC-9 compatible barrels. Again, the **Stingray is compatible with all FGC-9 barrels. However, the difficult part is finding a barrel long enough. At a minimum, a 10 inch barrel is required.**

Glock barrels can also be used, with the FGC-9/Stingray platform. However, an adapter will also need to be printed to adapt from a Glock to a FGC-9 style barrel. These adapters can be found on any .stl hosting website.

Making the Bolt

IMPORTANT NOTE:

The stingray is compatible with FGC-9 MK1/MK2 bolts.

This bolt is also compatible with all mods designed for “FGC-9 bolts”. Notably, UntangleWorks is working on an extractor mod for FGC-9 bolts. When this is released, it will be also be compatible with the Stingray.

To acquire the bolt for your Stingray, you have two options. Build or Buy. Because the Stingray bolt is backwards compatible with all FGC-9 mk1/mk2 bolts, buying a premade bolt is incredibly easy, and relatively cheap.

DIY Bolt:

Use the DIY Bolt Guide included in this Stingray file pack.

Buy a Prebuilt Bolt:

There are an abundance of FGC-9 bolts available to buy online. A few recommended sources are listed below.

- Vanguard Arms
<https://webstore.vanguard-arms.com/FGC-9-MK1-MK2-CNC-Machined-Bolt-Assembly-p413862200>
- Parts Dispensed
<https://parts-dispensed.com/home/82-FGC9-Bolt>
- MAF Arms
<https://maf-arms.com/product/floral-goodtimes-chimes-mkii-bolt-no-firing-pin/>
- FGC Kits
<https://www.fgckits.com/?product=fgc9-mkii-gsengineering-bolt-and-firing-pin-kit>

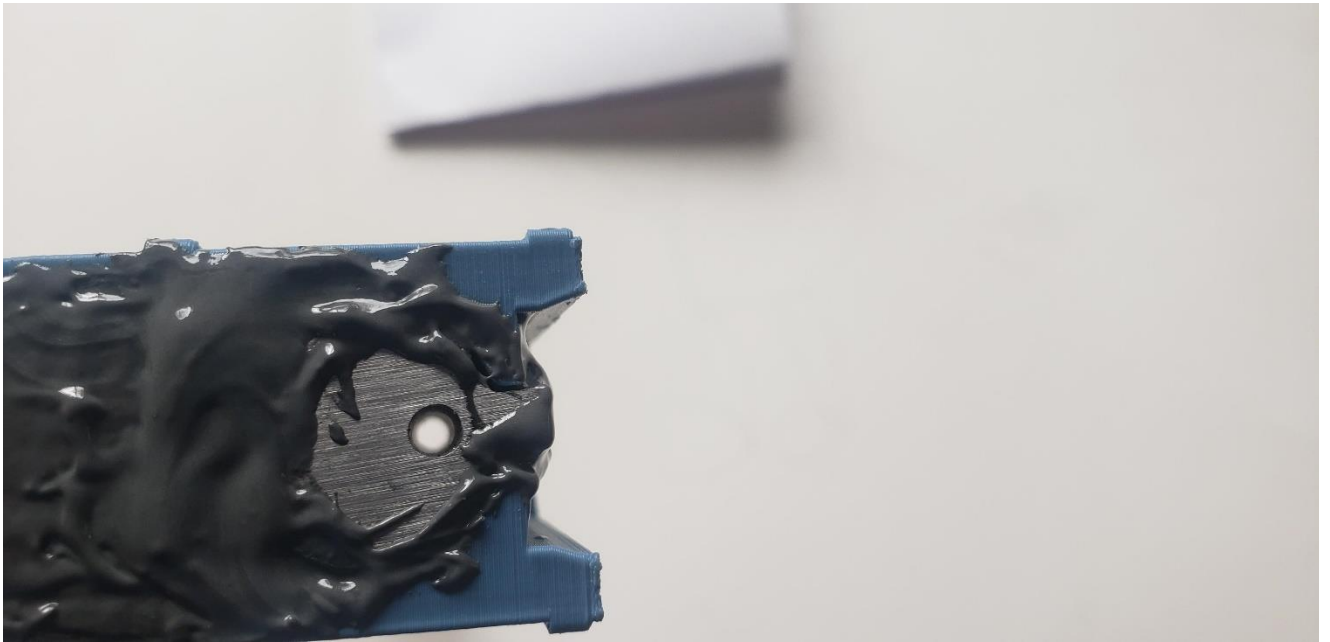
Regardless of which method you choose, you will need to install the bolt inside the Bolt Carrier. Follow the instructions below on how to do so.

This is incredibly easy, so I will keep this section brief.

All you need to do is to apply JB-Weld on the section of the bolt that goes inside the bolt Carrier. Slide the Bolt Carrier over the bolt, ensuring that the Carrier and the bolt will be securely bonded once the JB-Weld dries.

Next, cover the front of the bolt face in JB-Weld. Ensure that no JB-Weld Gets near or inside of the Firing pin hole. See picture Below for proper JB-Weld application.

You will also want to fill in any gaps between the ammo pickup nub on the bolt, and the bottom of the bolt carrier as shown in the picture below.



Let the JB-Weld dry for 24 hours before proceeding.

Now, file or sand the excess JB-Weld away to create a smooth bolt face. Additionally, file the Ammo pickup nub to expose the metal, but keep any JB-Weld that may be filling in gaps between the Bolt and the Bolt Carrier.

See pictures below for the end result after filing. Note the smooth bolt face.





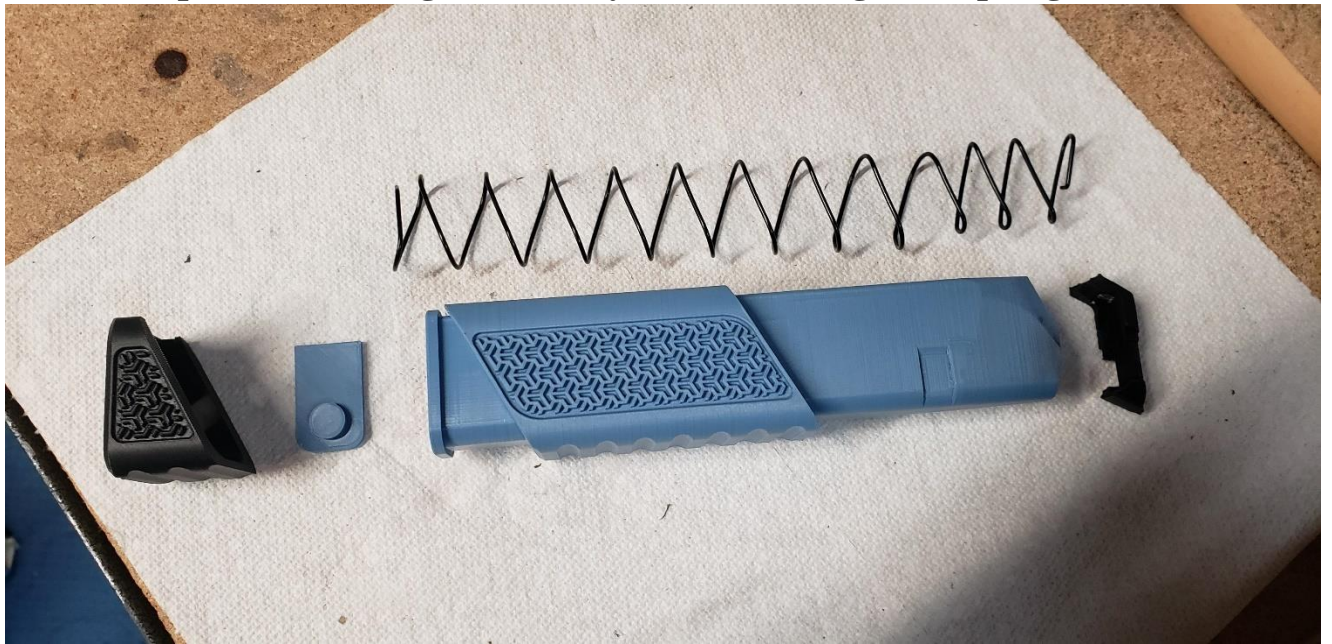
The Bolt has been secured inside the Bolt Carrier at this point. After the Charging handle is made, you will need to drill one more small hole into the bolt. This is detailed in the “Modifying the Bolt” section later on in this document.

Ammunition and How to Assemble a Magazine

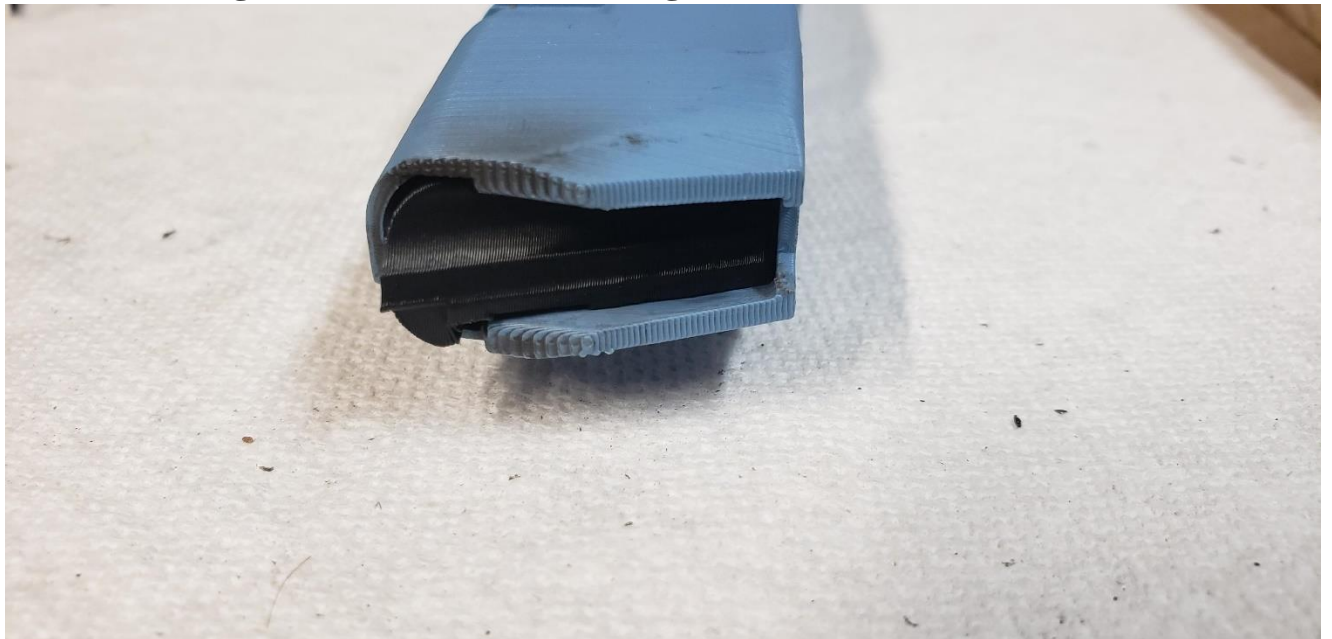
Ammo: The Stingray is designed to fire 9x19mm Luger. I recommend Full Metal Jacket (FMJ) ammunition, as it will feed the most reliably into the chamber.

Important Note: The stingray is compatible with all standard Glock magazines. However, if you wish to print your own magazines, follow the steps below.

Gather all parts of the magazine, and your Glock Magazine spring.



Insert the Magazine follower into the magazine as shown below.

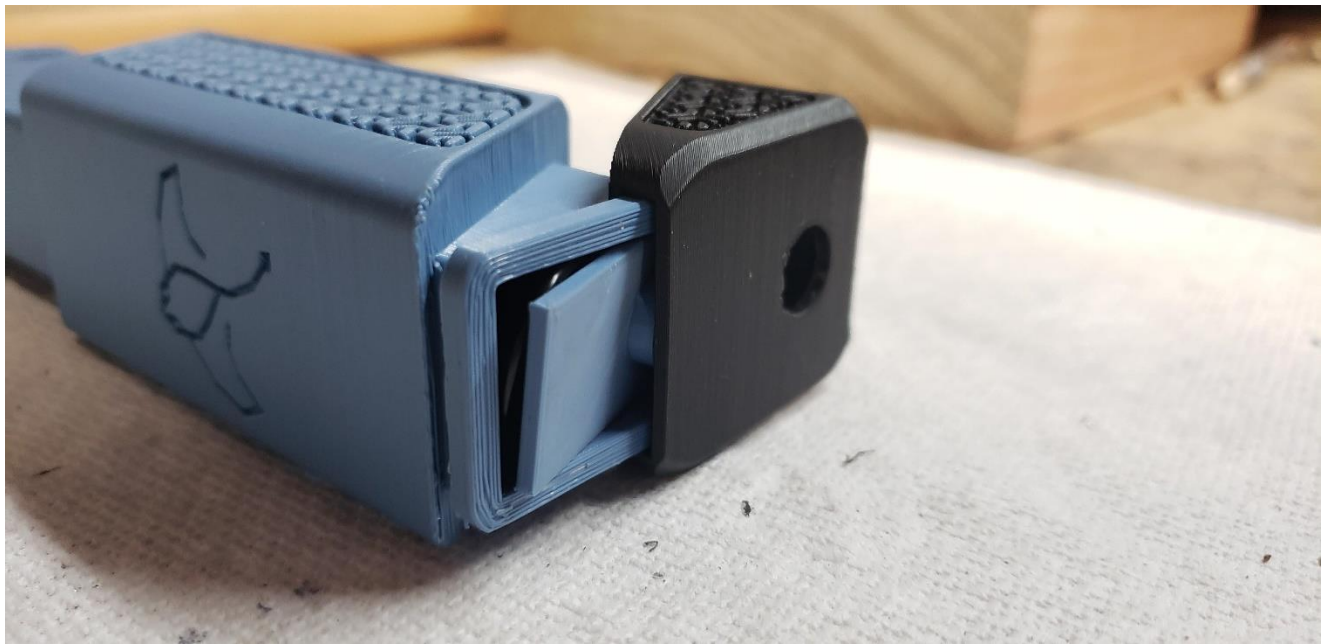




Place the spring into the magazine in the orientation shown below.



Push the magazine locking tab into the magazine so that the button is flush with the bottom of the Magazine. You will need to fight the spring pressure to do this. Then, slide the Magazine Base Plate onto the magazine from front to back.



Your Stingray Magazine is now complete.

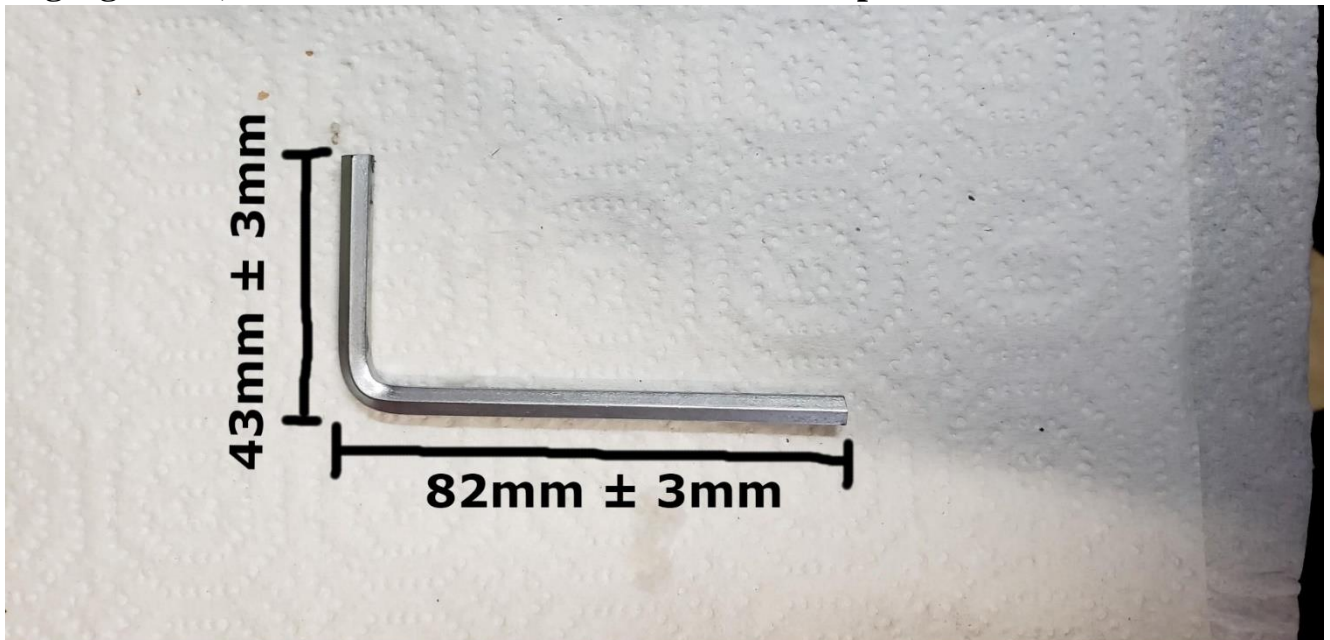
Note: If your printer is highly dimensionally accurate, or you feel the follower is too loose in the magazine, you may get better results by scaling the magazine follower up (using your slicer program) by 1-2% before printing.

Making the charging handle

If you bought an Allen/Hex key that looks like the one below, you will need to remove the plastic handle before proceeding. The easiest way to do this is to use a small chisel to split the handle in two along the injection molding seam.

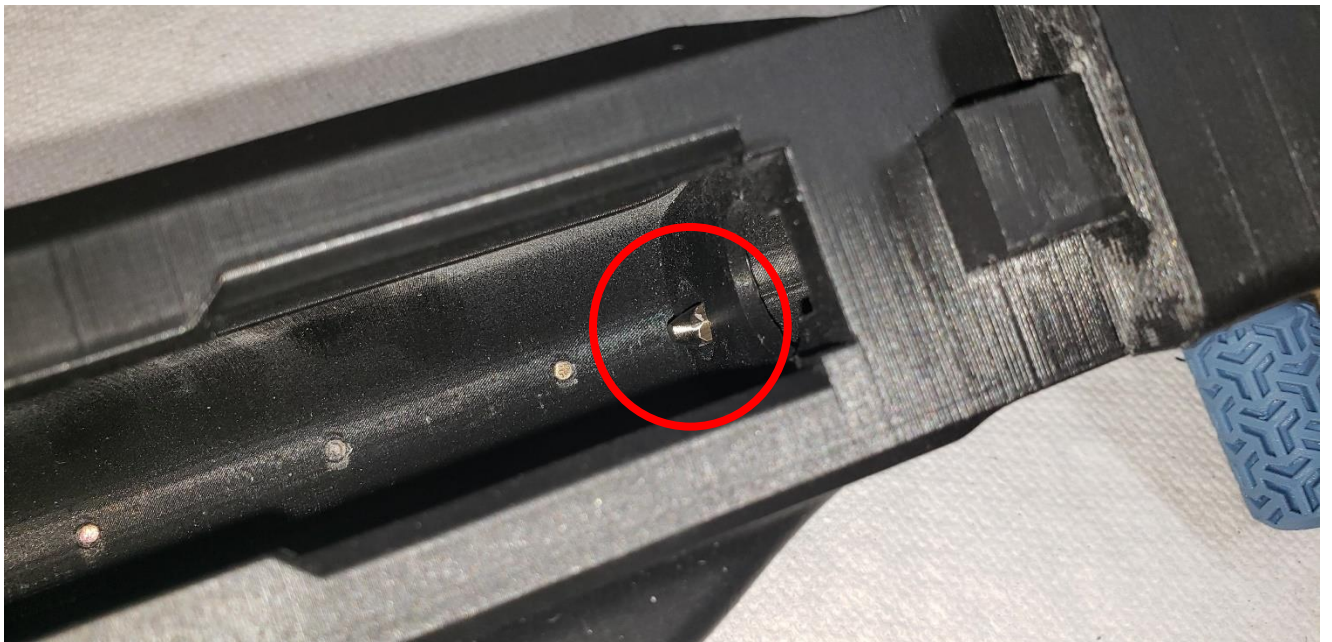
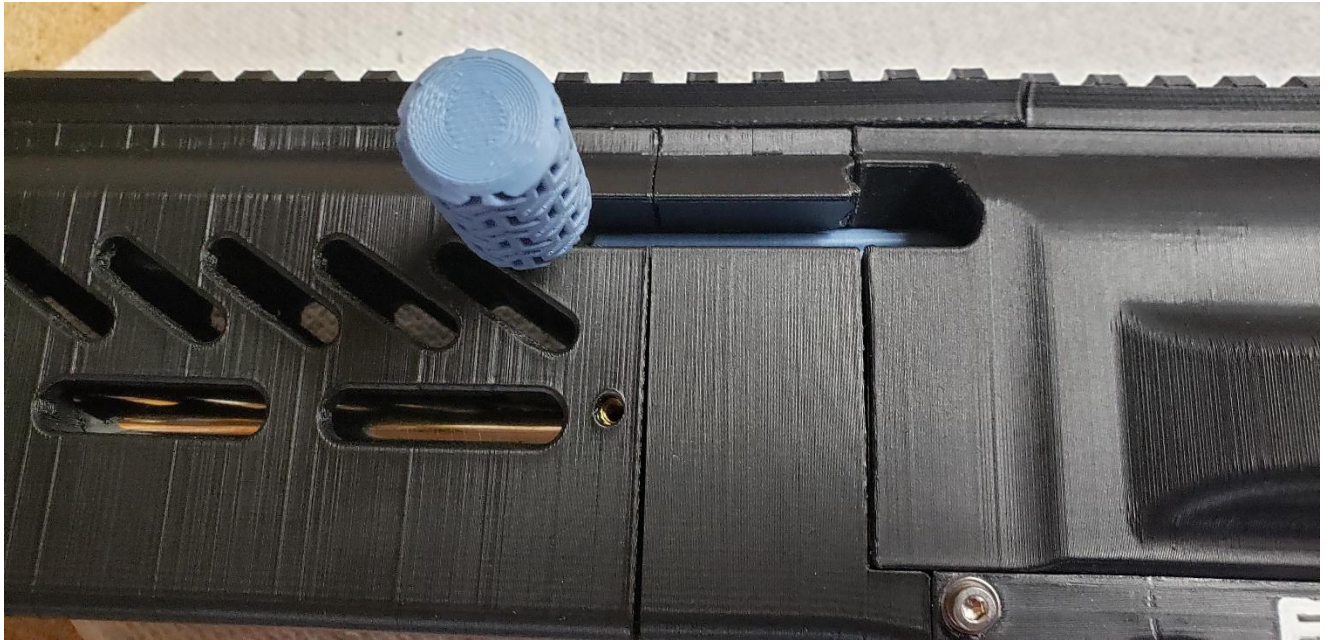


You will need to cut the Allen key to size. I recommend using a Dremel or angle grinder, however a hacksaw will also work in a pinch.



Next, test fit both printed parts to ensure they fit on the Allen key as designed. When inserted in the upper in the most forward/disengaged position (see image below) the Allen key should protrude by roughly 3-6mm into where the bolt will

be seated.



Once you are satisfied with the fitment, use JB-weld to glue the Charging Handle and the Charging Handle Bushing to the Allen key. Allow to JB-Weld to dry for 24 hours.



This is also a good time to add the 20x10x2mm magnet into the slot in the Handguard. It should be a snug press-fit however if you wish to JB-weld it into place as well, do so now. See image below for placement.



At this time, you can also add a slight taper to the exposed end of the Allen key. This is optional, but recommended. Image below shows the general shape you are trying to achieve.



Congratulations, your charging handle is now finished.

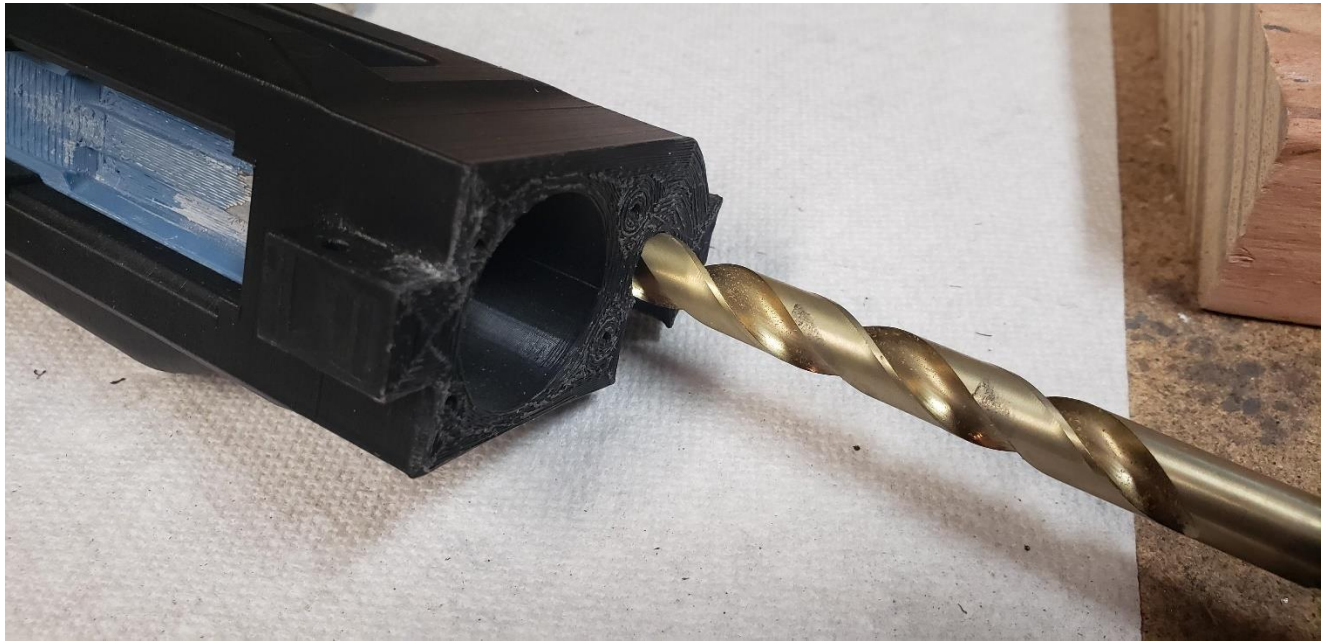
Modifying the bolt.

This section covers how to drill a small hole into the bolt, where the charging handle contacts it. This is important, as it ensures that the charging handle stays properly aligned under the force of the buffer spring when in the rearward “bolt hold open” position.

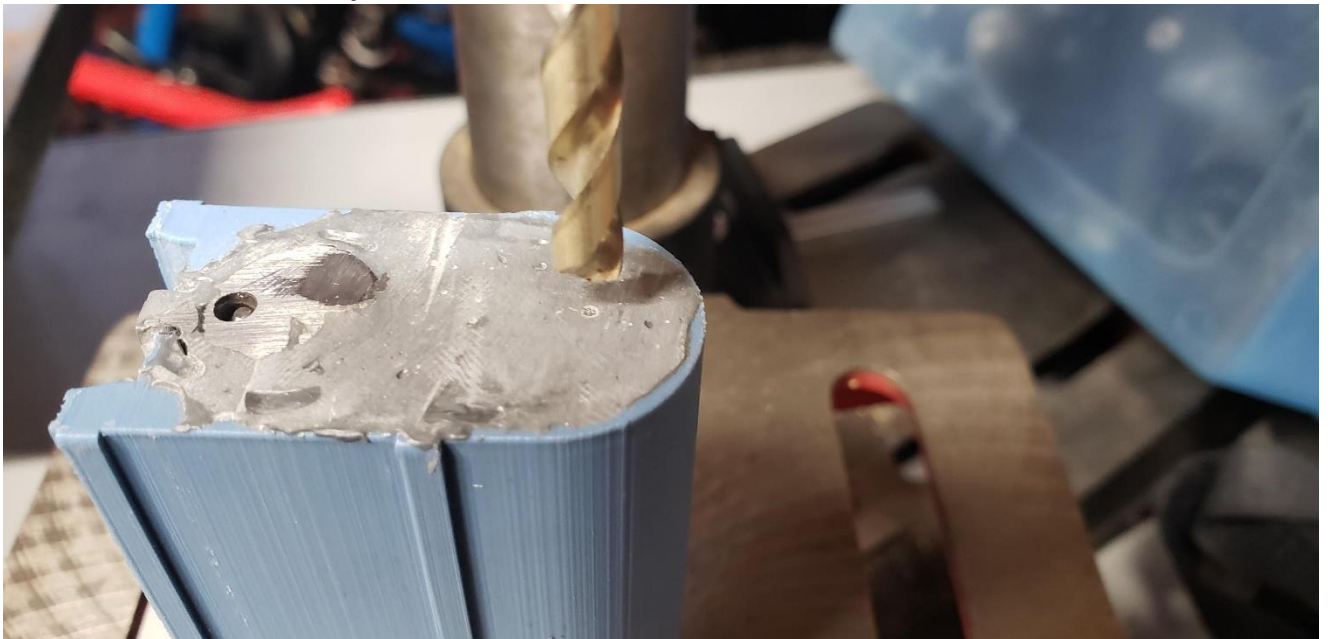
Observe how far your Allen key protrudes into the upper when in the forward most position. This is how deep you will need to drill a hole into your bolt.



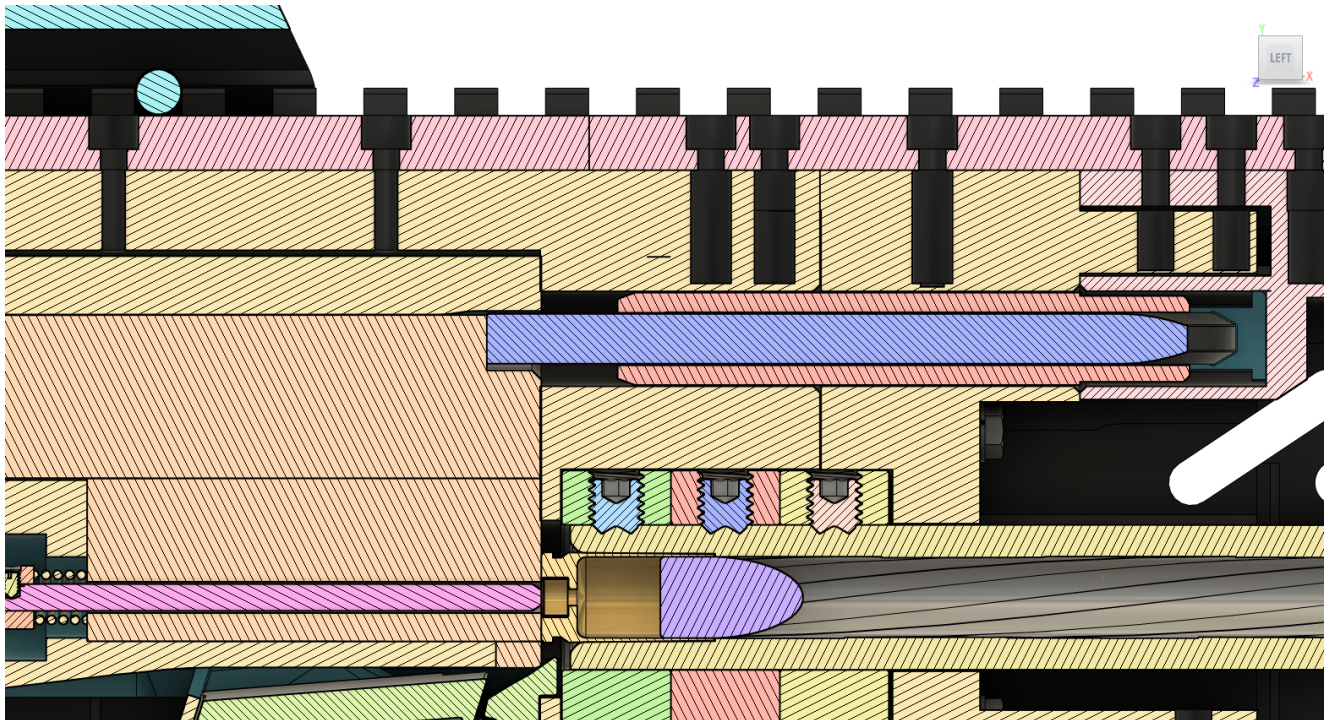
Now, with your bolt installed in the upper, remove the charging handle. Find a drill bit that fits snugly inside the charging handle slot. I used a .408" or 13/32" or 10.25mm bit for this. You do not want to remove plastic material from the upper, but rather ensure the bit is centered where the Allen key will be seated. Use your HAND to gently spin the drill bit. Your goal is ONLY to create a mark on the Bolt face in the center of the slot.



Once you have marked the face of the bolt, take the bolt out of the upper, and move it to your drill press or a vise to secure it. Get a drill bit that is just slightly larger than the diameter of your Allen key. I used a .219" or 7/32" or 5.5mm bit for this. Position your drill bit above the marking you made, and drill straight down. The drill bit that you use should be just big enough such that the Allen key can fit inside.



Your goal is to drill just slightly deep enough that the bolt can slide fully forward in the upper, without putting pressure on the charging handle. The picture below shows what you are trying to accomplish. Note the (blue) Allen key, and the (orange) bolt.



At this point, your bolt is now finished.

Making the firing pin

Note: If you wish to save some time, the firing pin shown in this guide (compatible with v1/v2 FGC-9 Bolts) can be bought online. Search for “FGC-9 Firing Pin”.

This section is written by JStark1809

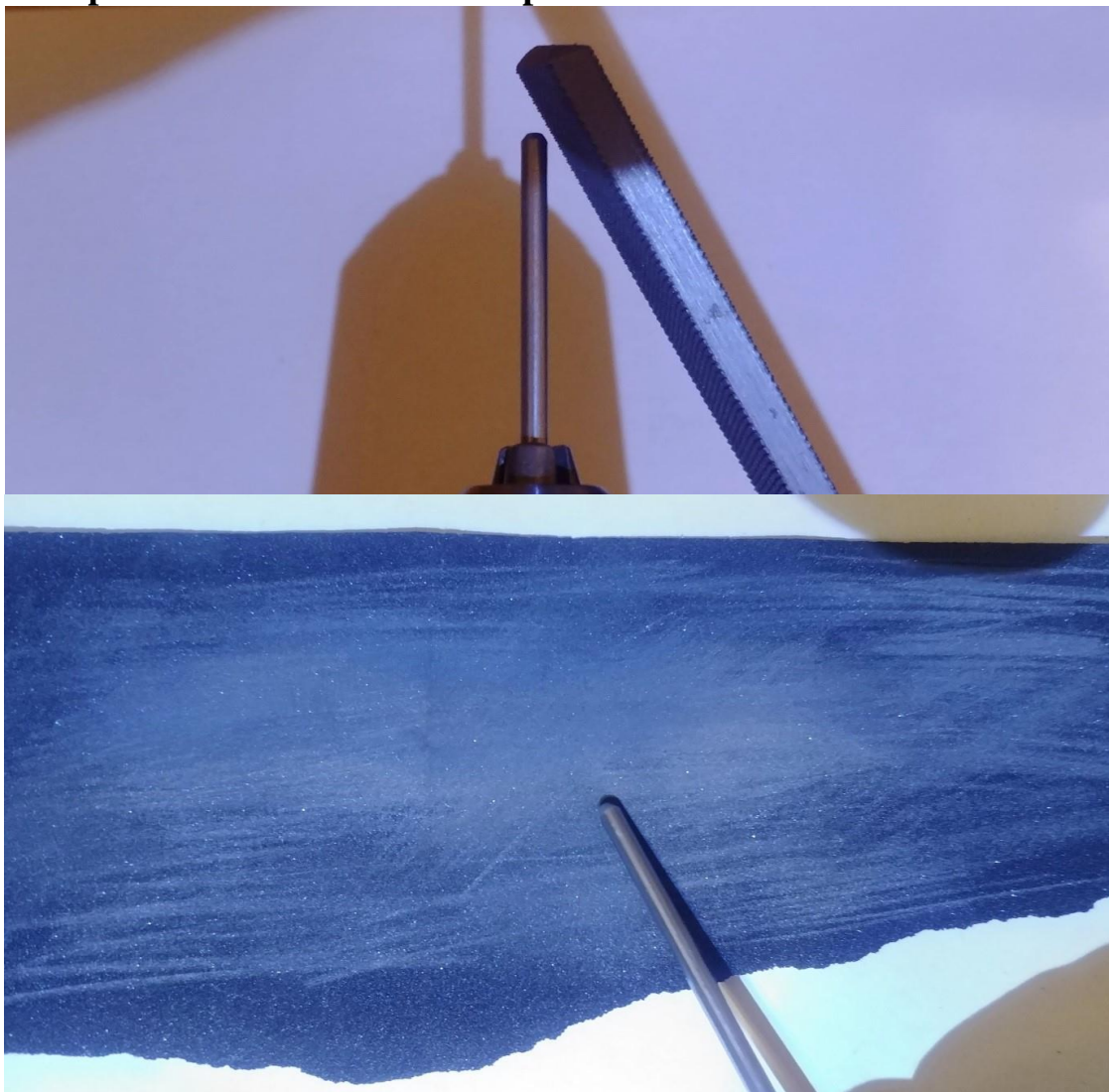
If you wish to make your own firing pin, follow the steps below.

**Cut off a 70mm long piece from your 3mm DIA steel bar with a Dremel tool
/angle grinder with a steel cutting disc.**

Make sure to remove any nasty edges by using sand paper or your metal file before inserting it into the power drill in the next step.



Put the bar into a power drill and rotate it while holding a metal file against it to form a chamfered circle end at the tip that is 2mm in diameter. Then use sandpaper to finish the shape of the tip so that it looks like in the picture.



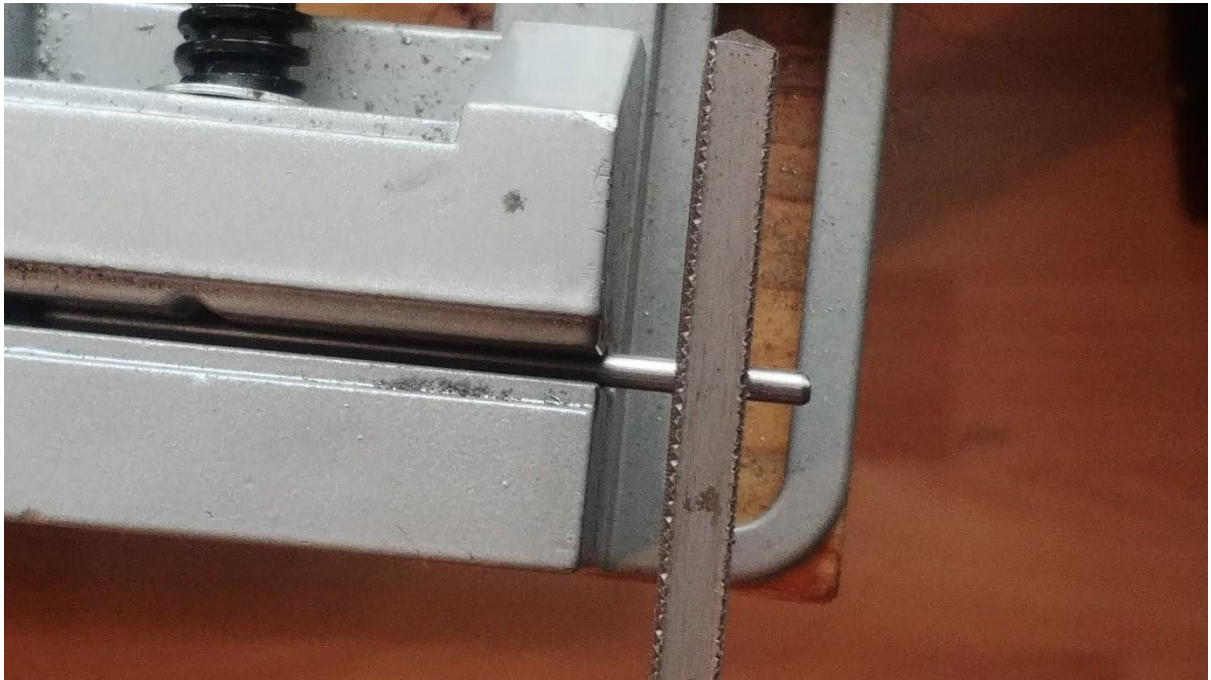


After you made sure the circle end point is 2mm in diameter, you then can approach to get the circle end point to the final diameter of 1.75mm by carefully grinding the tip against sandpaper. Make sure to hold the bar straight down.

Use your caliper blades to scratch a line around the circumference of the bar at a distance of 58.35mm from the tip.



At that exact distance you will have to drill a divot into the pin later on so make sure you have that spot marked by having a clearly visible belt at the distance of 58.35mm from the tip.



Put the bar into a vise and use the edge of your metal file to create a flat section around the previously marked position.

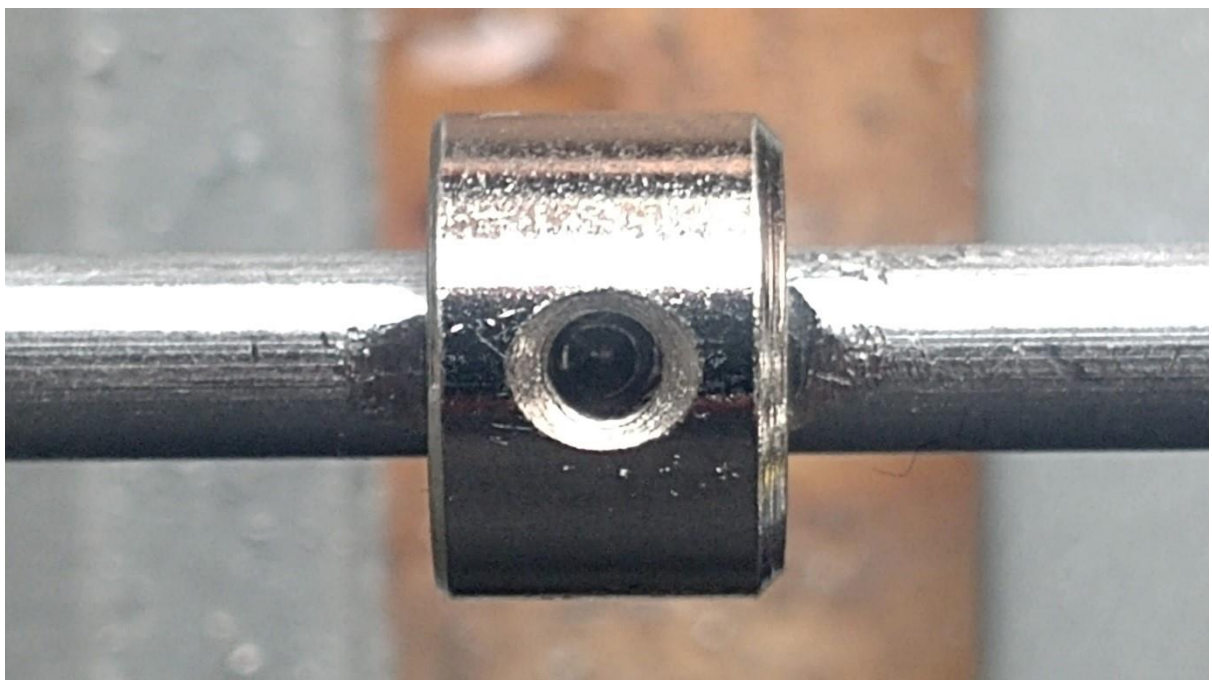
Only file so much that you have a flat area to drill into for the divot later on.



Use your power drill and a 1mm drill bit and then afterwards go deeper with a 2mm drill bit, to create a divot deep in the bar that is in the center of the flat area you created, that is aligned with the previously created line which is 58.35mm from the tip.

Instead of the 1mm drill bit you can also use a punch and a hammer to mark the spot before using the 2mm drill bit.

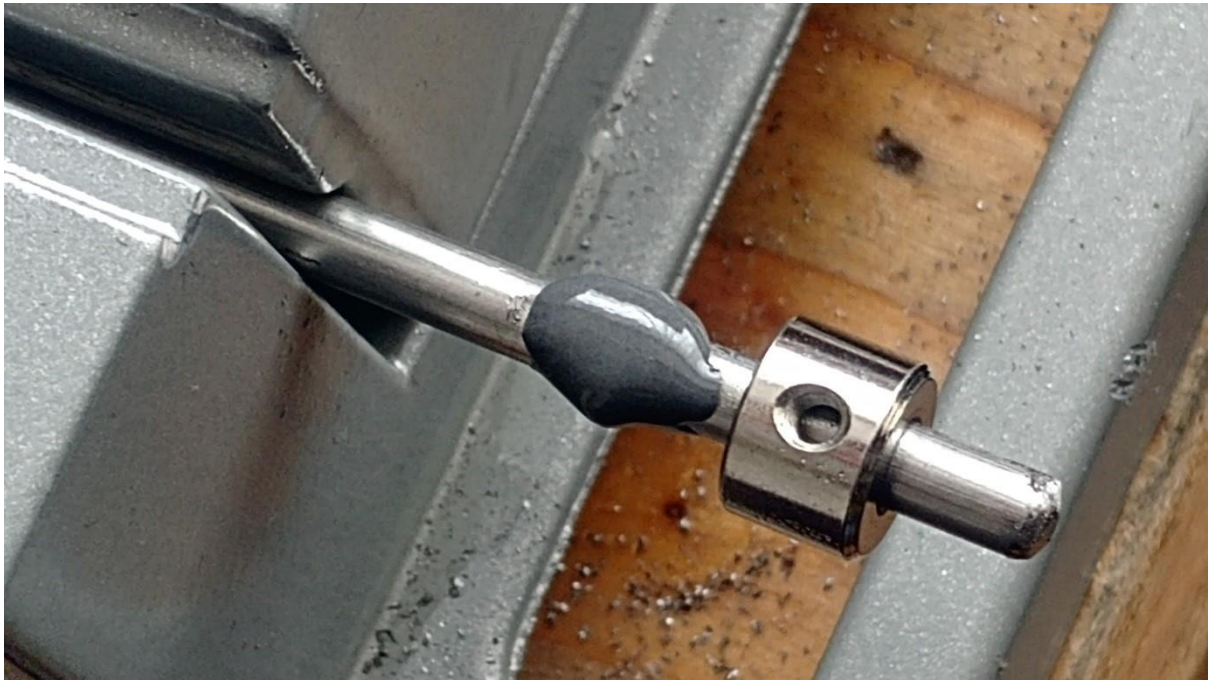
**Note: The divot is not center in the picture.
You should do a better job than that ;)**



Remove the grub screw from the shaft collar and put the shaft collar onto the bar aligning the hole of it with the divot to get an idea where the shaft collar should be for the later steps.



Mix up some JB weld with a tooth pick.



Remove the shaft collar and put some JB Weld onto the flat area that you filed and fill up the drilled divot. Then slide the shaft collar to that position and try to line up the hole with a tooth pick through the hole of the shaft collar.

Try to remove the JB weld out of the shaft collar screw hole so you can see that the shaft collar hole is centered with the divot.



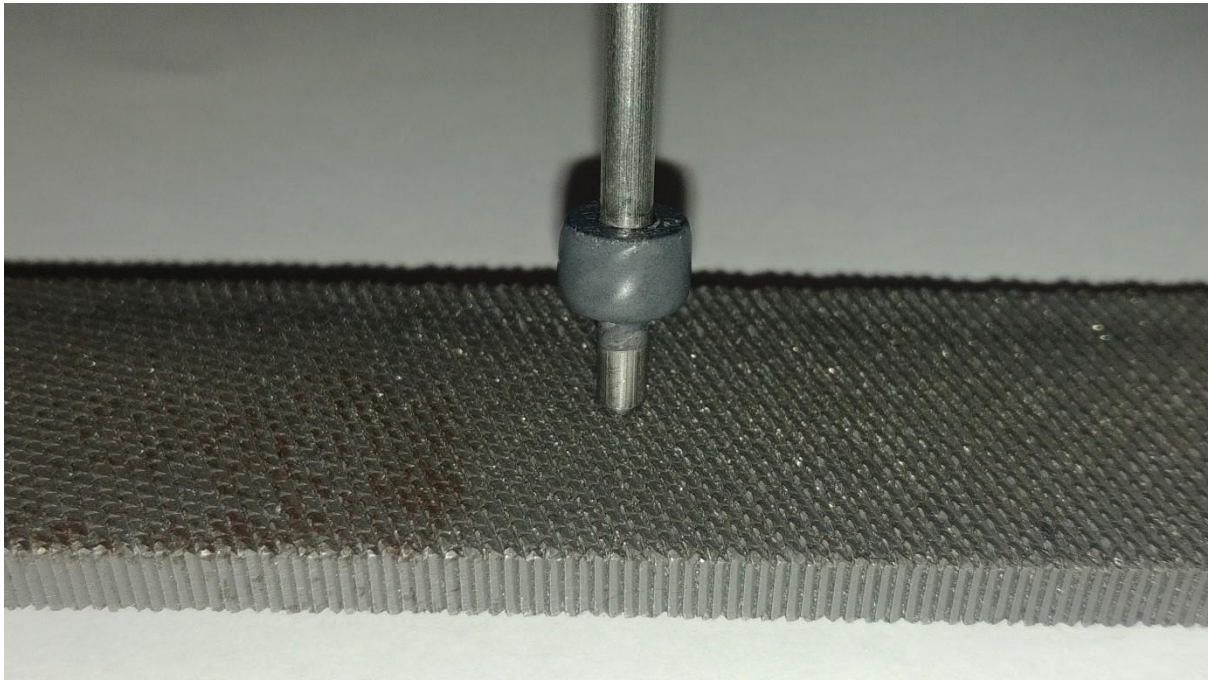
Once you have made sure the shaft collar screw hole is lined up with the divot you previously created by probing with a toothpick, you can fill the hole with JB weld. Be careful not to move the shaft collar away from its position at this point.



Take a razor blade or the hex key depending on your type of 3mm shaft collar and apply a drop of grease along the shorter edge of the tool to have the grub screw stick to it. Screw the grub screw into the JB Weld-filled shaft collar screw hole. Cover the entire shaft collar and the area behind the shaft collar with JB Weld.

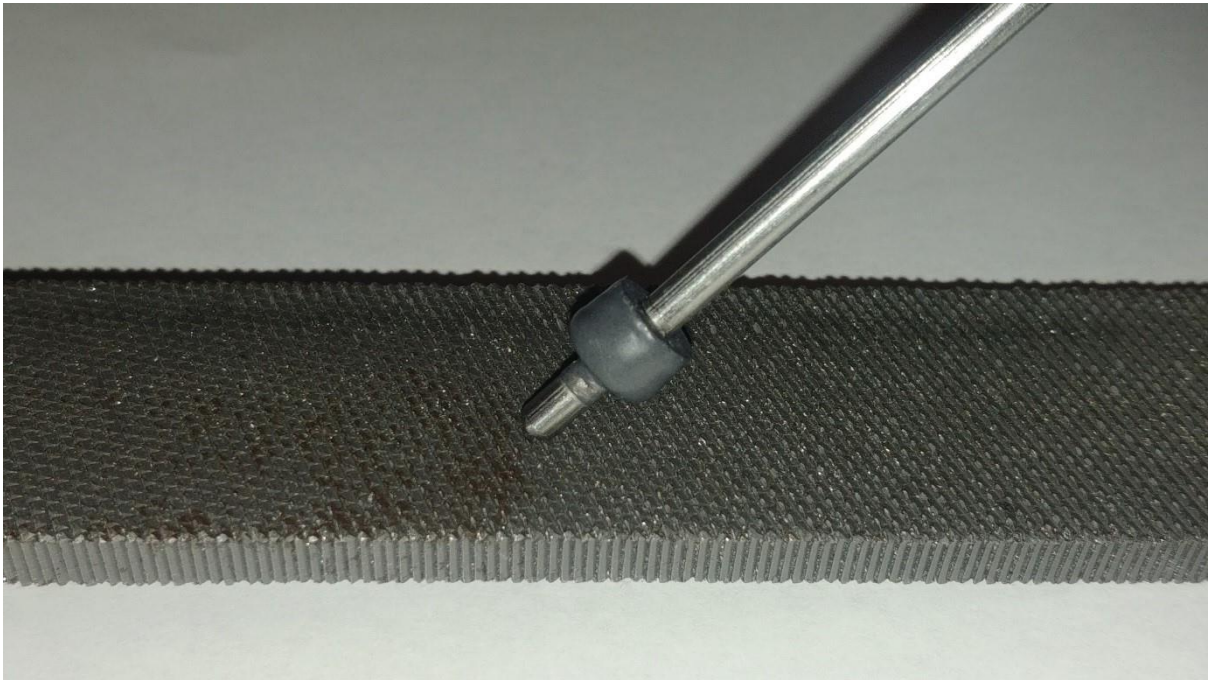


Clean the flat side of the shaft collar that is towards the tip from any JB weld. After you have applied JB weld and cleaned it from the places that should be free of JB weld, as you can see in the picture, let the firing pin cure in a vertical position for at least 24 hours.

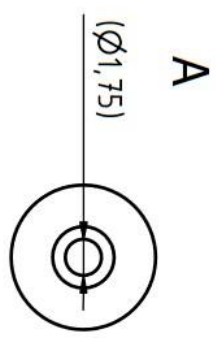
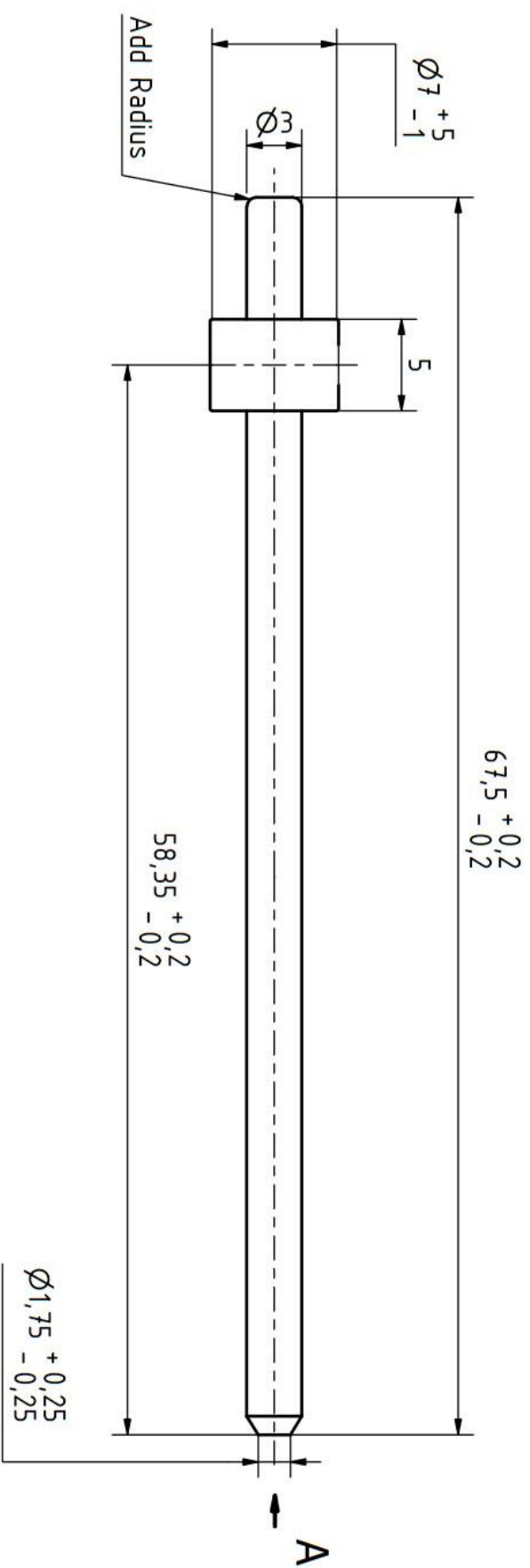


Using a metal file shorten the firing pin by grinding the back end of the firing pin to reach an overall length of 67.50mm.

Make sure to do this carefully and measure often during the filing process.



After you reach the final length, chamfer the end of the back a little as you see in the picture.

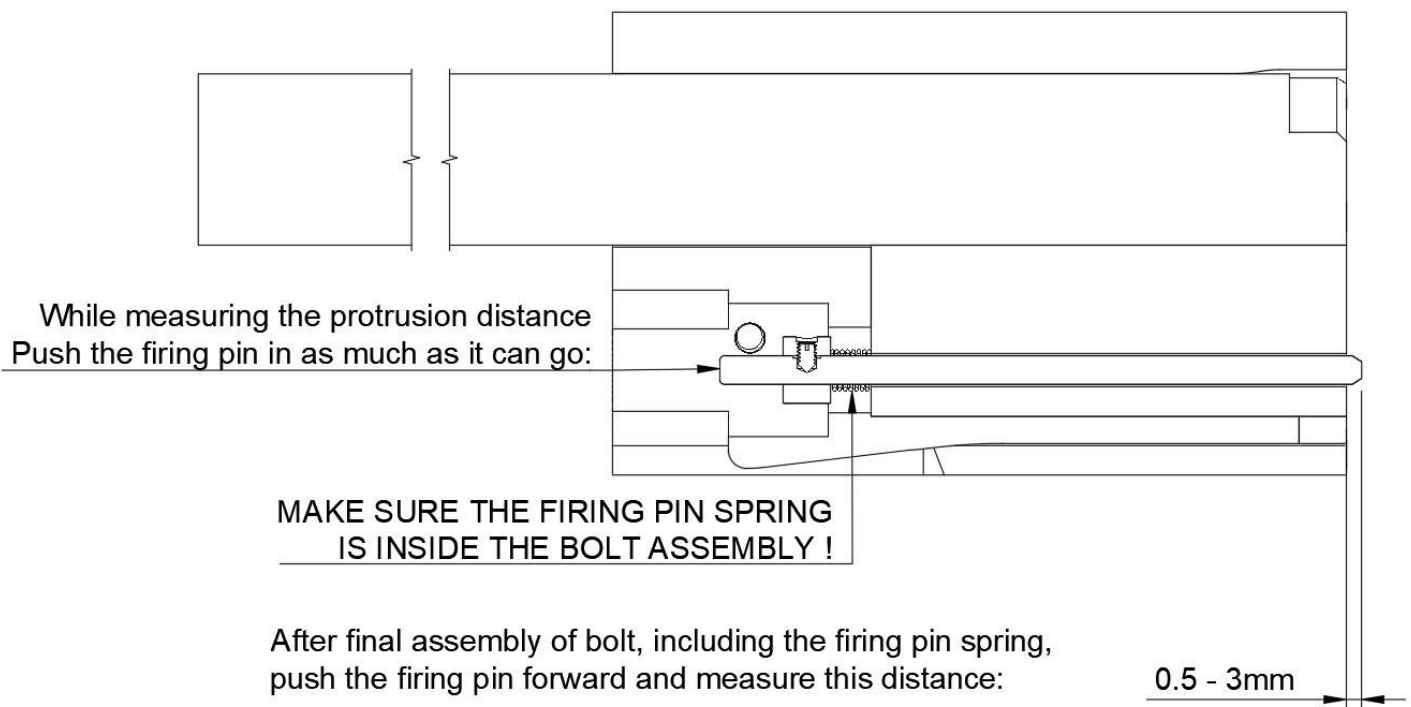


Material: Steel	Author:	JStark1809		Scale:	1:1	Unit:	Millimeter	
	Document type:	Released						
	Component schematic	Signature:						
	Title:	JStark1809						
Weaponized Autism Inc.	FGC-9 Firing Pin		Rev. Date:	0	14.04.2021	Sheet		
						1		



NOTE, FOR LATER, WHEN YOU FINISHED MAKING THE BOLT !

After you have made your firing pin and the bolt assembly has been made, measure the protrusion distance of the firing pin tip to the bolt face:



At the absolute minimum 0.5mm!
If it is shorter -> Make a new firing pin!

At absolute maximum 3mm!
If longer -> Shorten slightly from the tip!

Installing the Fire Control Group

BEWARE:

YOU NEED TO MAKE SURE THAT THE PARTS FOR THE 3D-PRINTED FIRE CONTROL GROUP ARE PRINTED PROPERLY ON A CORRECTLY ASSEMBLED PRINTER.

FOLLOW THE ASSEMBLY INSTRUCTIONS CAREFULLY!

AN IMPROPERLY PRINTED OR INCORRECTLY INSTALLED

FIRE CONTROL GROUP CAN LEAD TO UNSAFE FUNCTION OF THE FIREARM INCLUDING ACCIDENTAL FIRING OF THE FIREARM.

Start by gathering all parts necessary. You will need: AR-15 trigger spring, AR-15 hammer spring, 2x AR-15 fire control group pins, hammer, trigger, disconnecter, disconnecter spring (not pictured), fire selector lever, and Stingray lower.



Start by ensuring all holes are the right dimensions. Due to printer inaccuracy, you will likely need to ream and/or file out the holes in the fire control group and lower. See below for specifications on correct diameters.

Hammer/respective hole on lower: 4mm, or until hammer pin is a snug fit.

Trigger/respective hole on lower: 4mm, or until trigger pin is a snug fit. **It is important that the fitment for the trigger pin is tight inside of the trigger hole and lower hole. If it is loose, it can lead to accidental binary fire.**

Disconnecter: 4mm

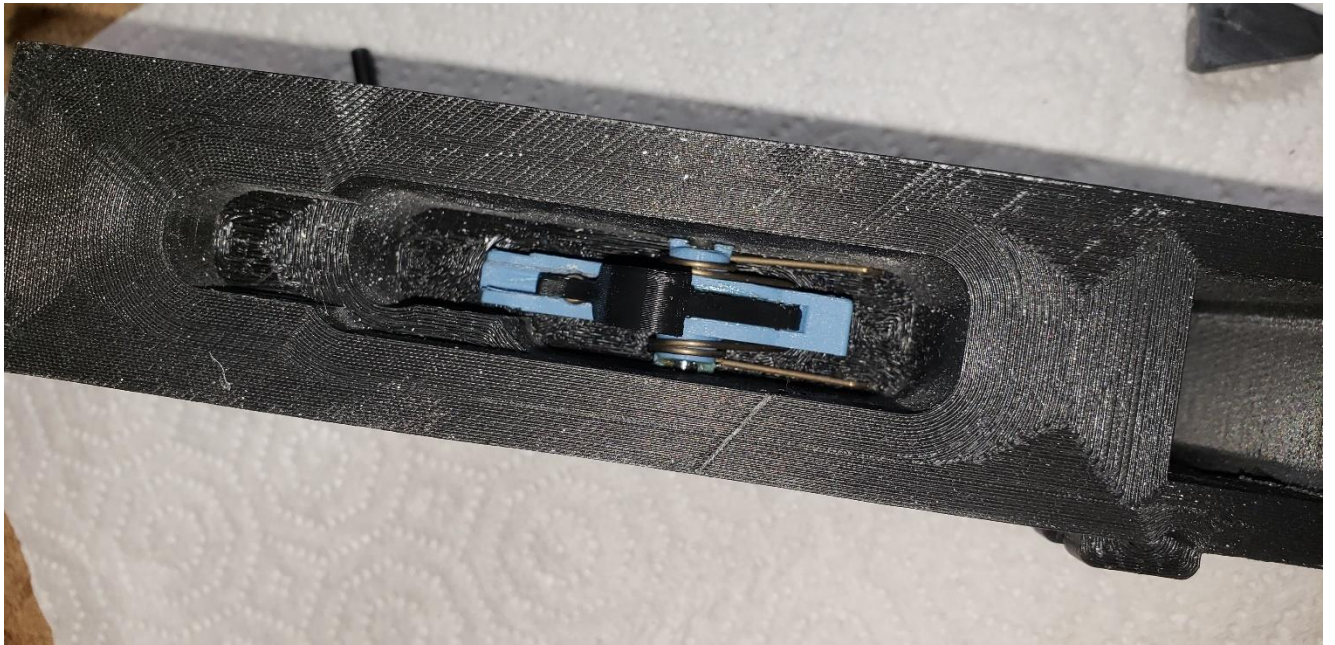
Fire selector lever/ respective hole in lower. 9.5mm

Next, place springs on the trigger and hammer as shown below. If your disconnecter spring has a larger end to it, place that end down into the trigger. This will prevent it from falling loose after installation. Additionally, ensure your hammer spring is installed correctly, as failing to do so can lead to light strikes and failure to fire.

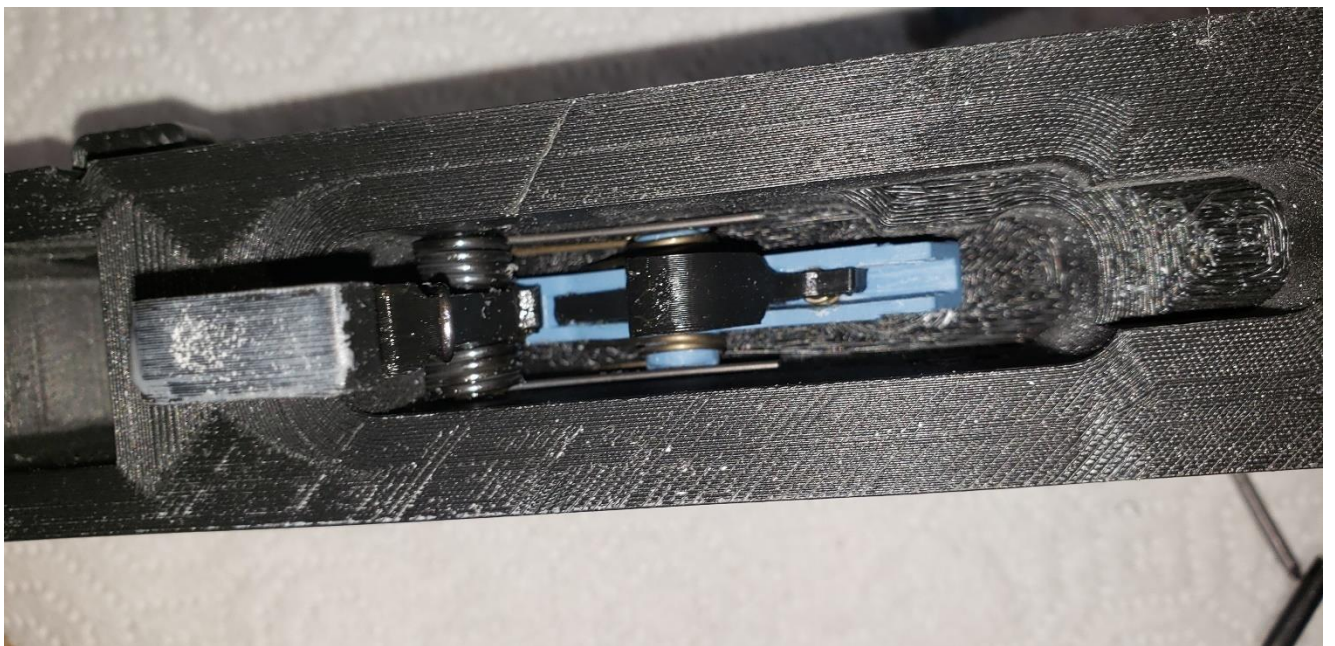
This is also a good time to add grease/ lubrication to all surfaces that have plastic on plastic contact, or where components interact with pins. This is not mandatory but recommended to create a better feeling trigger action when firing.



Install the trigger and disconnecter first. Place the disconnecter into the trigger, and install both parts as one component.



Install the hammer next. This is the most difficult part to install, and if possible, having an extra set of hands available will be of help. Regardless, the most important part of this step is to ensure that the ends of the hammer spring rest on TOP of the trigger pin, and not below. See picture below for an example of correct installation.



Lastly, push the fire selector lever through the selector hole in the lower, and ensure all parts are working properly. If something doesn't work, you want to find out now, not later when you go to test fire.

Assembling the lower

- At this point, the fire control group should be installed in your lower. You will also need the grip, magazine release lever, magazine release button, magazine catch pivot pin, feed ramp, 1x Socket Head Screw M6 25mm, Lock washer DIN 6797, fire selector spring and detent, 1x Socket Head Screw M3 16mm, AR15 magazine release spring.



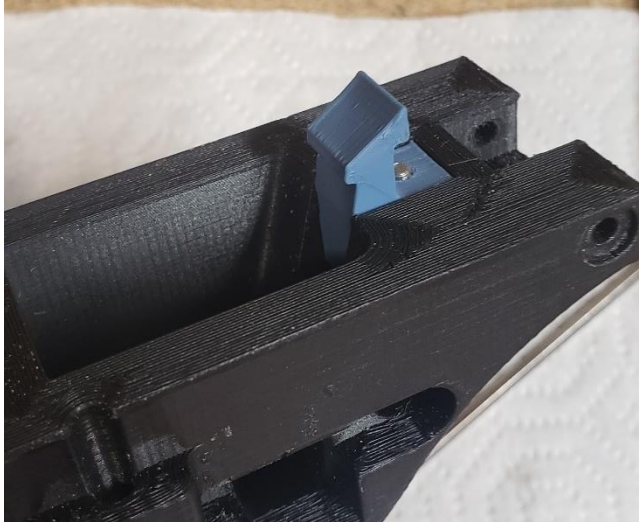
Start by installing the fire selector detent (sharp side in first) into the hole in the lower, and the spring into the hole in the grip. Add lubrication to the detent before installation.

Add lubrication inside this hole before installing the detent.



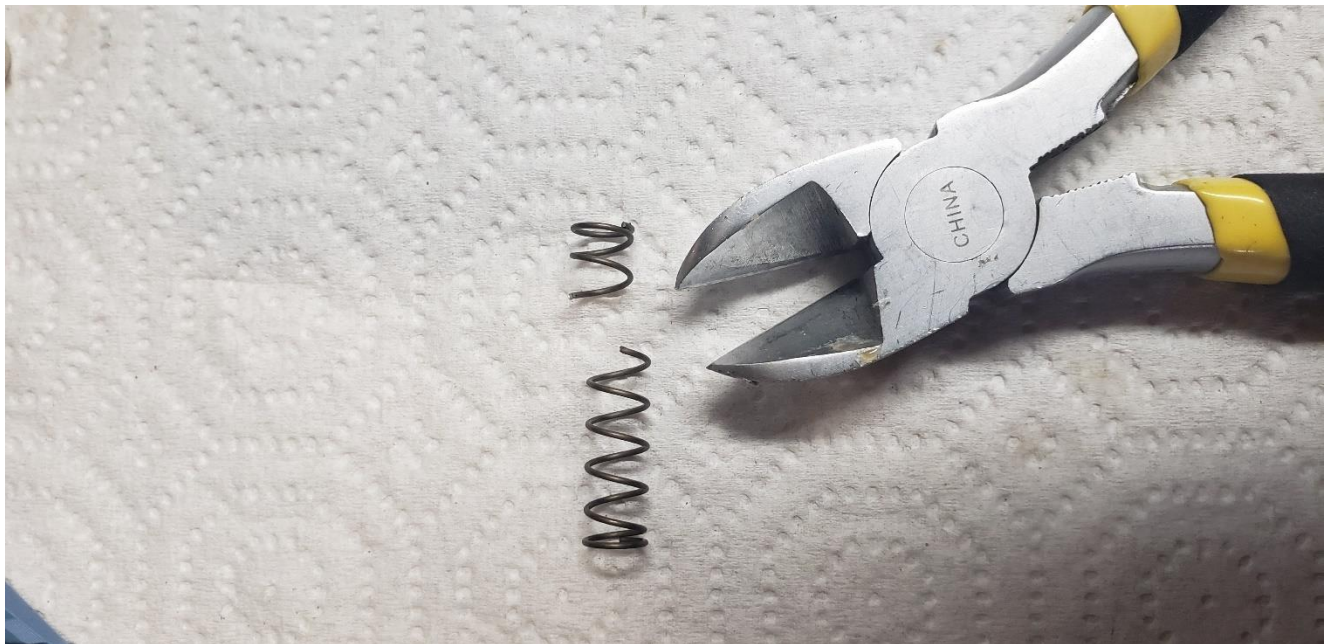
Install the grip next. As you push against the fire selector spring pressure hold the pistol grip in place and use the Socket Head Screw M6,25mm along with the External-Tooth Lock Washer M6 DIN 6797 to screw the pistol grip into the lower receiver.

Install the feed ramp after the grip is installed. Secure it with the M3 x 16mm screw. See image below for proper installation.

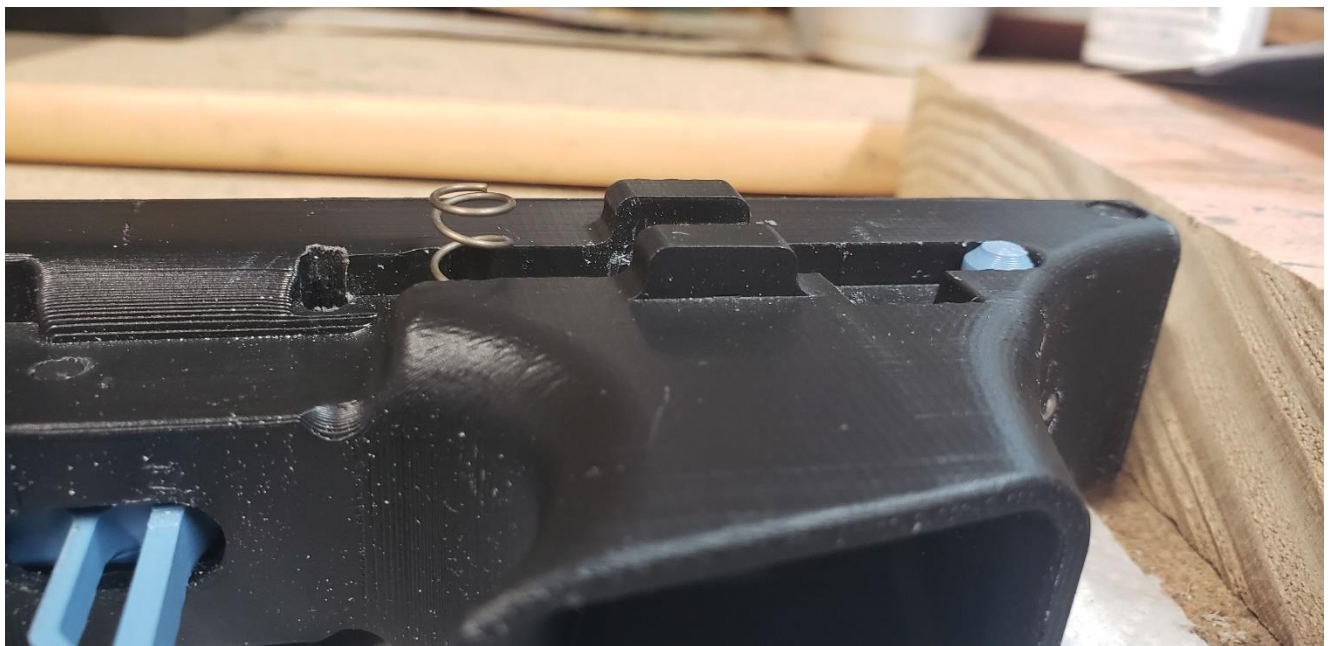


Depending of what AR15 magazine catch spring you have and the stiffness of it, you may need to cut it down to a more appropriate length. 22mm is the standard length for the spring. However, if your spring is stiffer, it will need to be shorter, and if your spring is less stiff, it will need to be longer.

Ultimately, you are aiming for a nice easy to actuate magazine release. If the magazine catch bar is bending, it is too stiff.



At this time, Install the spring, and the magazine catch button. Add lubricant to both parts before installation.



Lastly, install the magazine release lever and the magazine release pin. As always, add lubrication to all contact points before installation.



Congratulations, your lower is now complete.

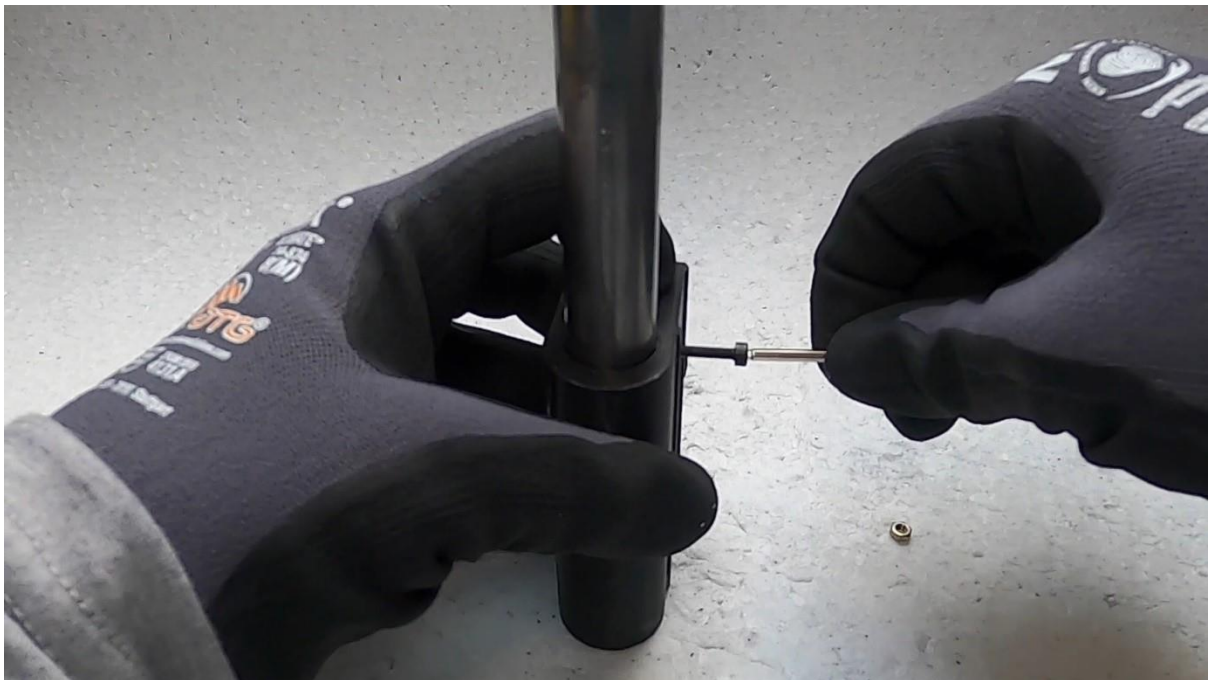
Assembling the bolt assembly

This section was written by JStark1809



Take your firing pin spring and shove it onto the firing pin.

You can now go ahead and shove the firing pin into the back of the bolt assembly.



While making sure that the firing pin and spring do not fall out, tip the bolt assembly with the bolt face down and push against the back of the firing pin with your finger and insert the 20mm M3 socket head screw into the small hole on the left side of the bolt.

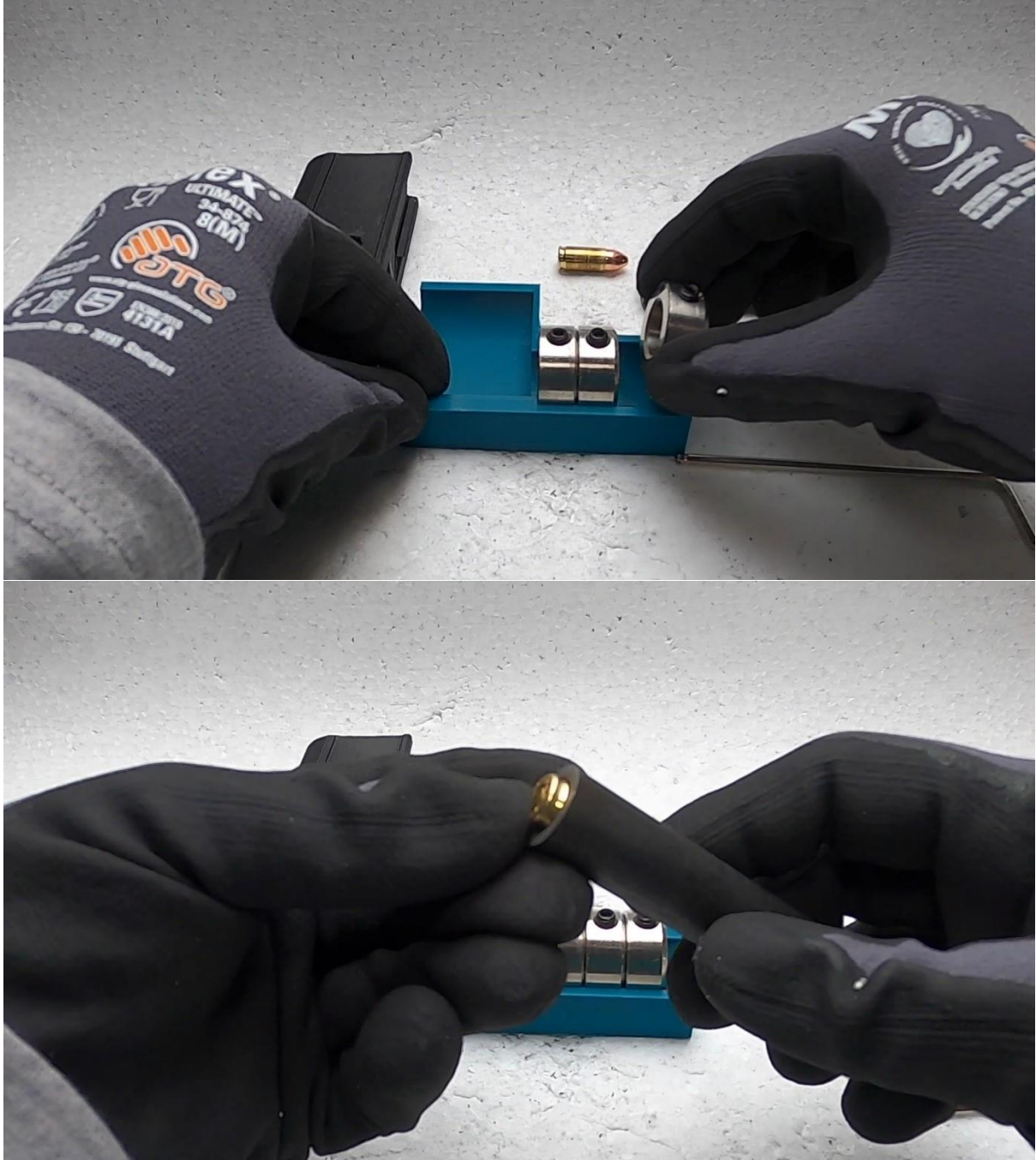
Use the appropriate hex key tool to screw the socket head screw as deep in as possible. Get your LOCTITE fluid/glue now and apply it to the threads of the screw that are sticking out, as well as on the inside of a M3 nut. Now screw the nut onto the screw properly with your socket tool while keeping the screw in place with the Allen key/appropriate hex bit tool.

If you don't apply Loctite and don't tighten the nut properly, it may lead to the screw backing out and cause severe issues during the operation of your firearm, up to severe damage to the printed parts.

Assembling the barrel assembly

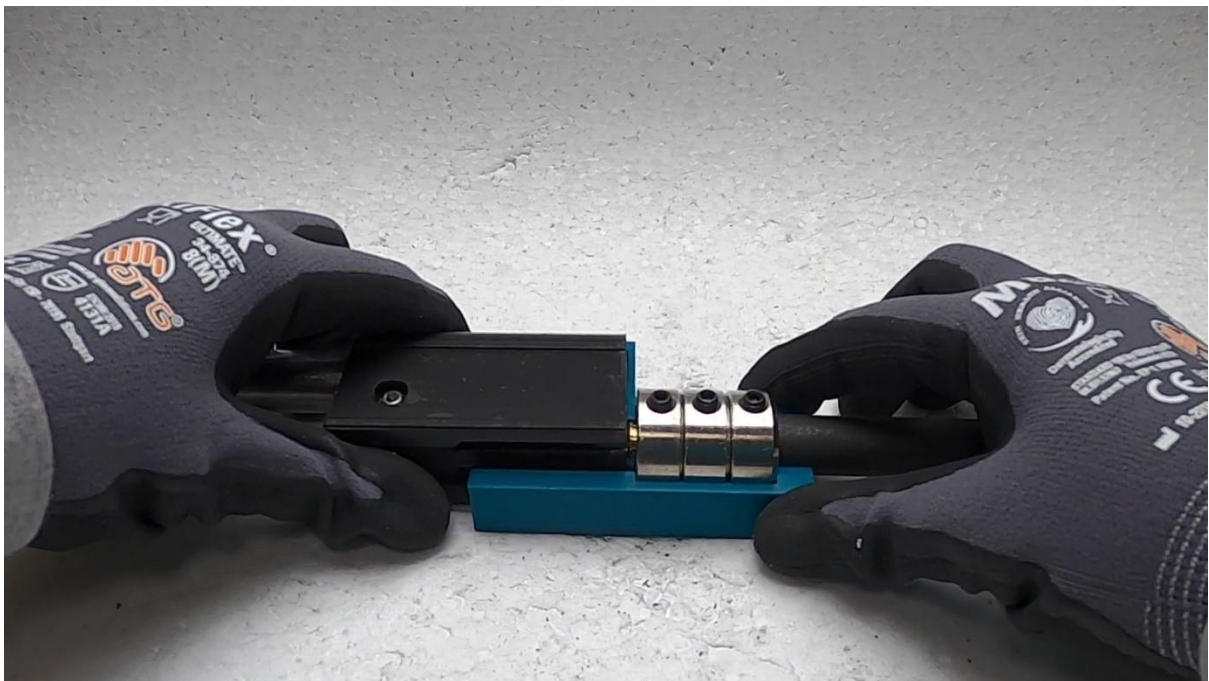
This section was written by JStark1809

If You made your own barrel, or the barrel you bought does not have shaft collars included, you will need to follow the steps below on how to properly headspace your barrel assembly.



Get your headspacing jig and insert the three 16mm shaft collars into the shaft collar pocket.

Get your barrel and insert a case or cartridge into the chamber and make sure it is as deeply seated as possible. Make sure it does not back out.



Insert the barrel through the shaft collars from the right and let it stick out into the main cavity of on the left side as you can see in the picture.

You will then take your bolt assembly and slowly and carefully move it into the cavity until the bolt face makes contact with the inside of the cavity wall. Be sure to do this as slowly and meticulously as possible as to not move the case/cartridge and thus barrel further than it was than at the exact moment when the bolt face touched / kissed the end of the inside of the cavity.

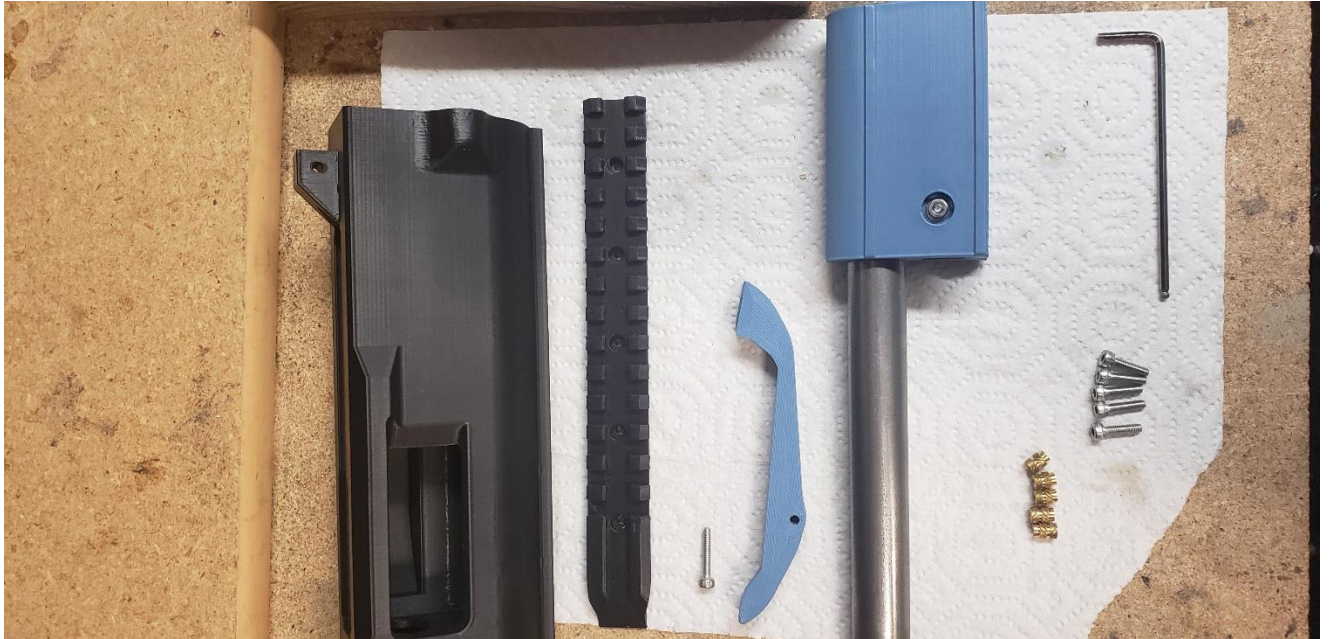


Being extremely careful that you don't move anything apart from the bolt assembly, slide the bolt assembly out of the setup and immediately tighten the grub screw of the center shaft collar.

Then go ahead and tighten the first and third shaft collar to the same degree. Make sure you press the first and third shaft collar as close to the center shaft collar as possible as to keep everything as closely as possible so that the stack maintains its shortest possible length. Once the center shaft collar can not be moved anymore you then can go ahead and lift the barrel assembly out of the jig and tighten the grub screws as hard as you can. The barrel assembly is now assembled properly and your headspacing should be properly set.

Assembling the upper

Start by gathering all needed parts. The necessary hardware required is five m3 thread inserts, five 12mm m3 screws, and one 16mm m3 screw. Use the picture below for reference.



Start by melting the m3 thread inserts into their respective holes. You will need three for the back of the upper receiver, and two for the top rail located at the front of the upper receiver.

To melt the threaded inserts into the plastic, use the pointy tip of a soldering iron to press the brass inserts into the holes in the upper.

Ensure any excess plastic is filed away, especially on the front two inserts. Otherwise the top rail will not fit flush on the upper receiver. See picture below for proper installation.



Next, install the ejector into the upper receiver. Use the M3 x 16mm screw to secure it. See picture below for correct installation.



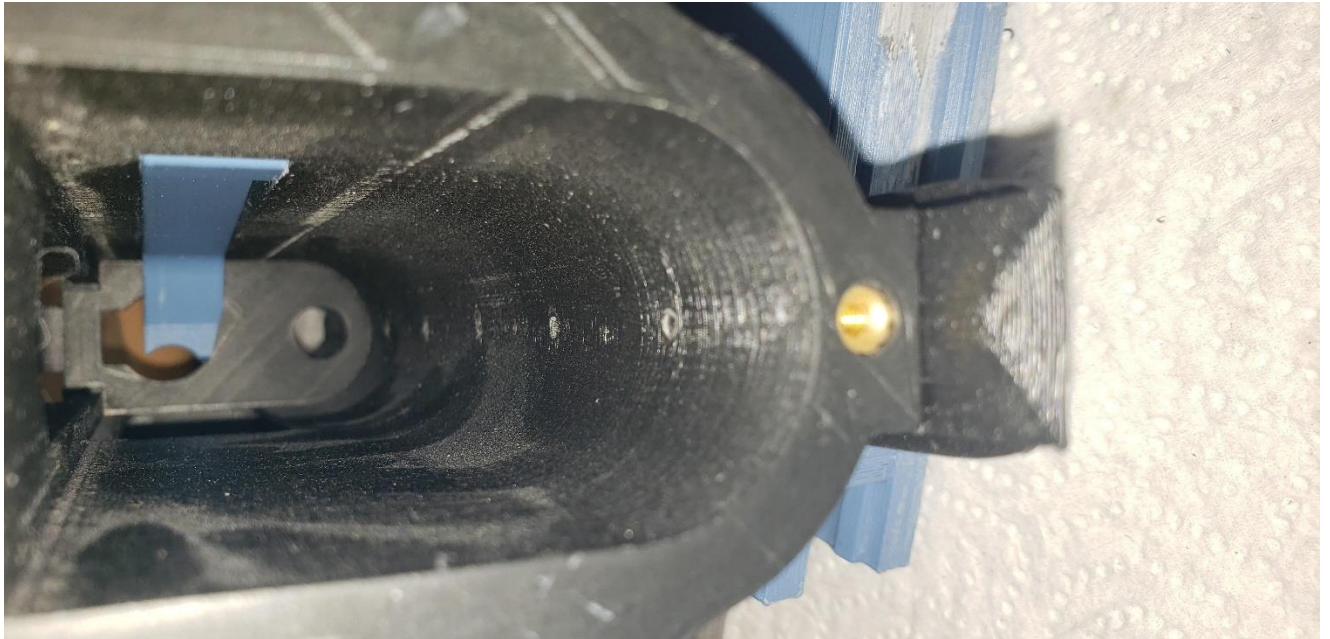
After the ejector is installed, proceed by installing the back half of the top rail. Use the 5 m3 x 12mm screws to attach it to the upper receiver as shown below.



IMPORTANT: Look inside the area where the bolt carrier will go. Check to see if any of the screws from the top rail have protruded into the inside of the Upper. If

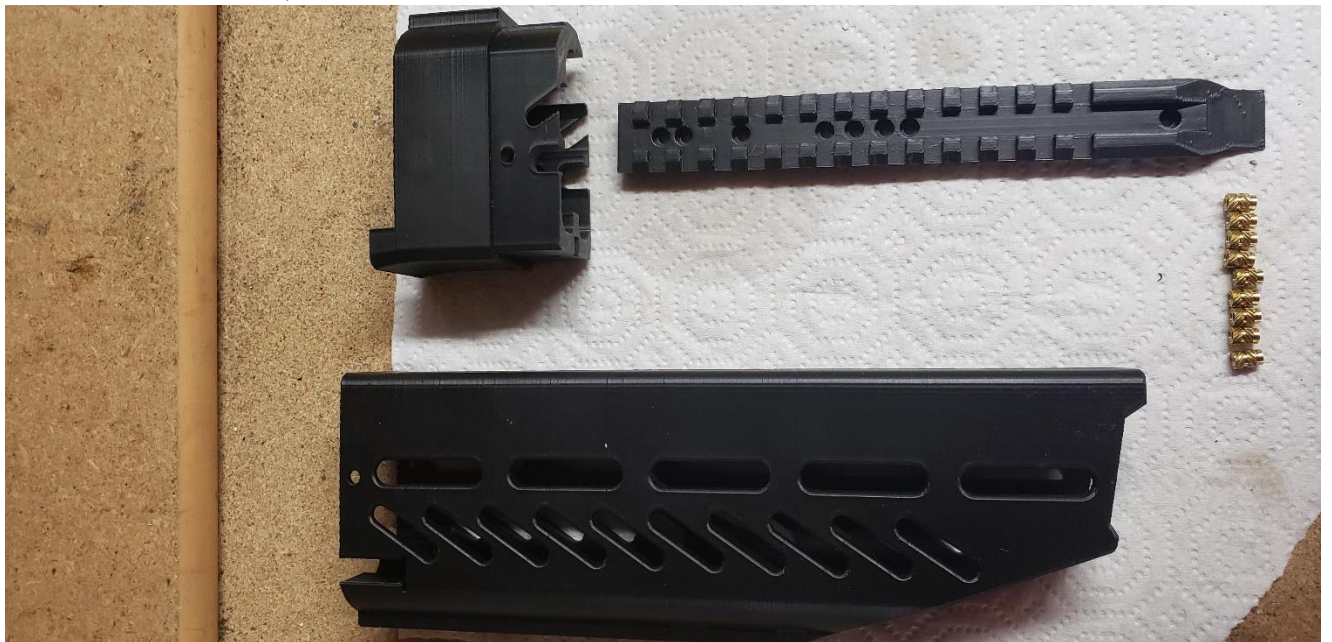
so, remove the screws from the top rail, file them 1-2mm shorter, and reinstall. If the screws still protrude, repeat this step until they are flush or recessed.

Note how in the picture below no screws are protruding. Failure to comply with this step will lead to damage to your bolt carrier, and failure to function.



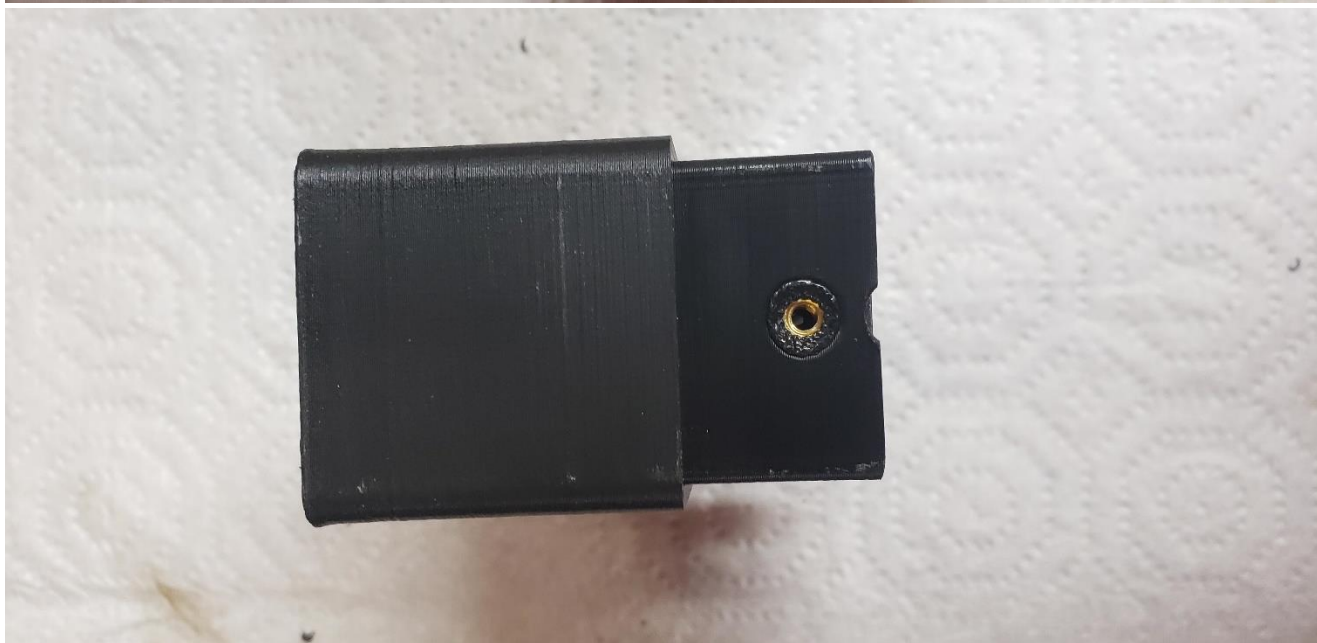
Assembling the Barrel Retainer and Handguard.

You will need the Barrel Retainer, Handguard, Forward half of the Top Rail, nine m3 thread inserts, and 3 m3 x 12mm screws.



Start by melting all threaded inserts into their respective holes. Use the pictures below to guide you. Again, it is important that all excess melted plastic gets filed away, and that the parts are not excessively deformed while melting in the inserts.



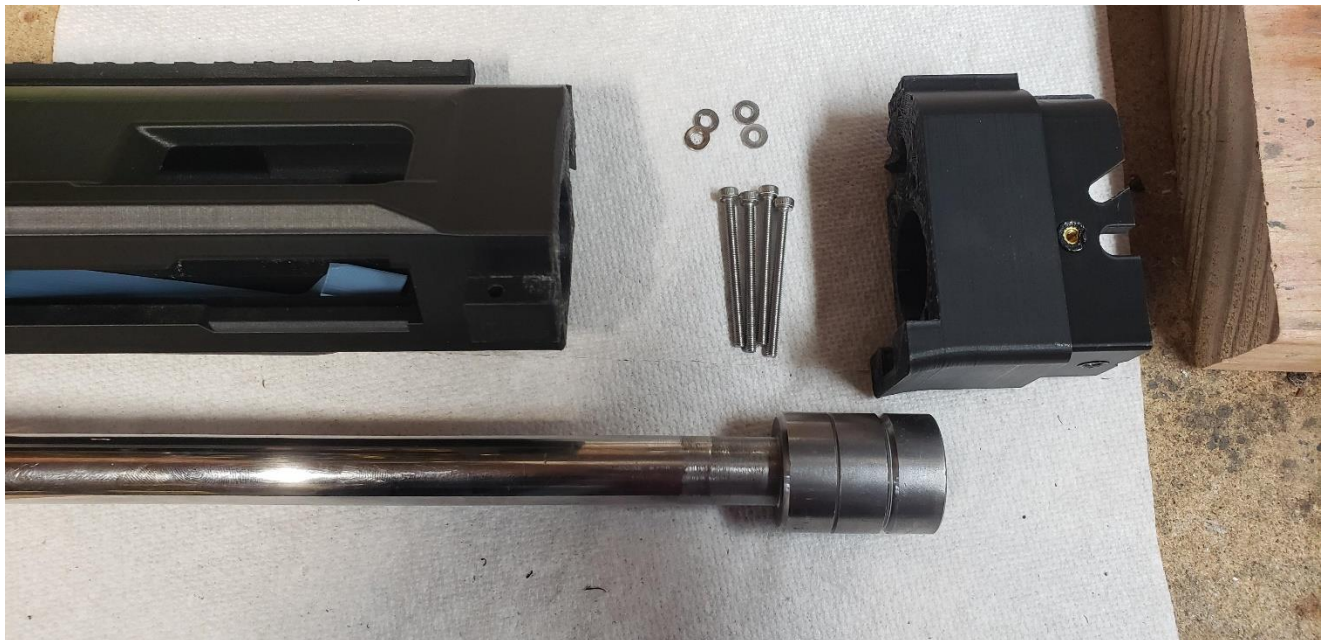


Lastly, attach the front half of the top rail using three m3 x 12mm screws as shown below.

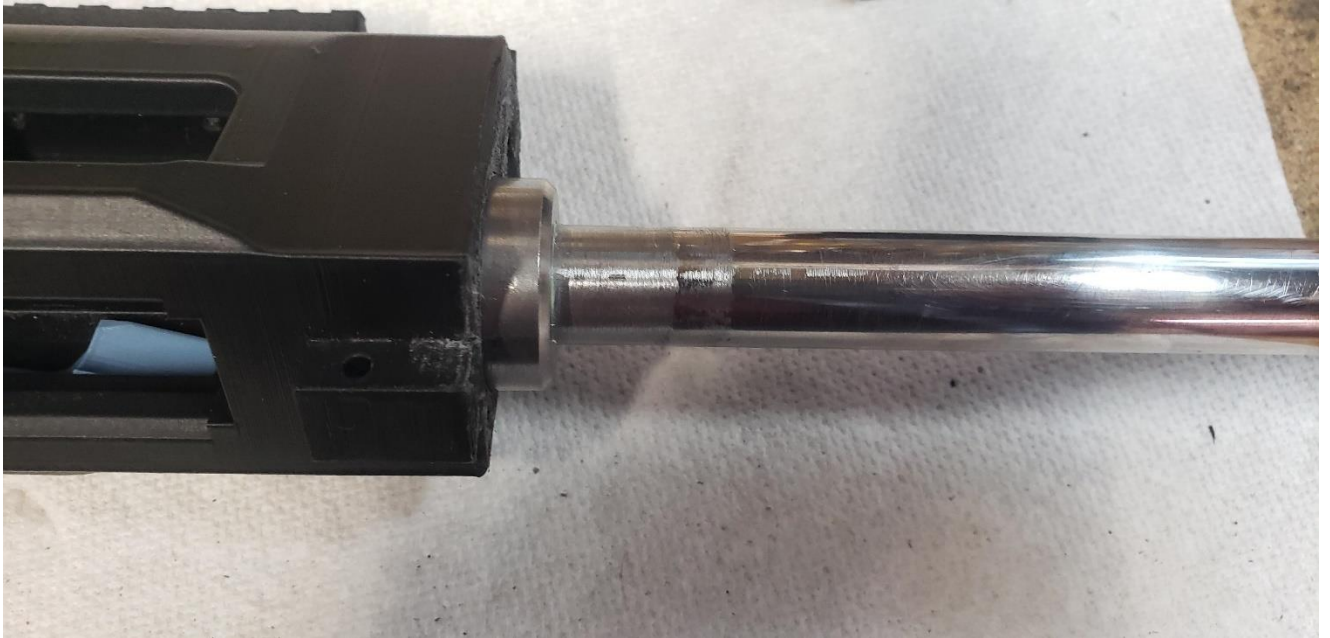


Attaching the Barrel and Handguard to the Upper.

Start by securing the barrel to the upper using the Barrel Retainer. You will need four 40mm m3 screws, and four m3 washers.



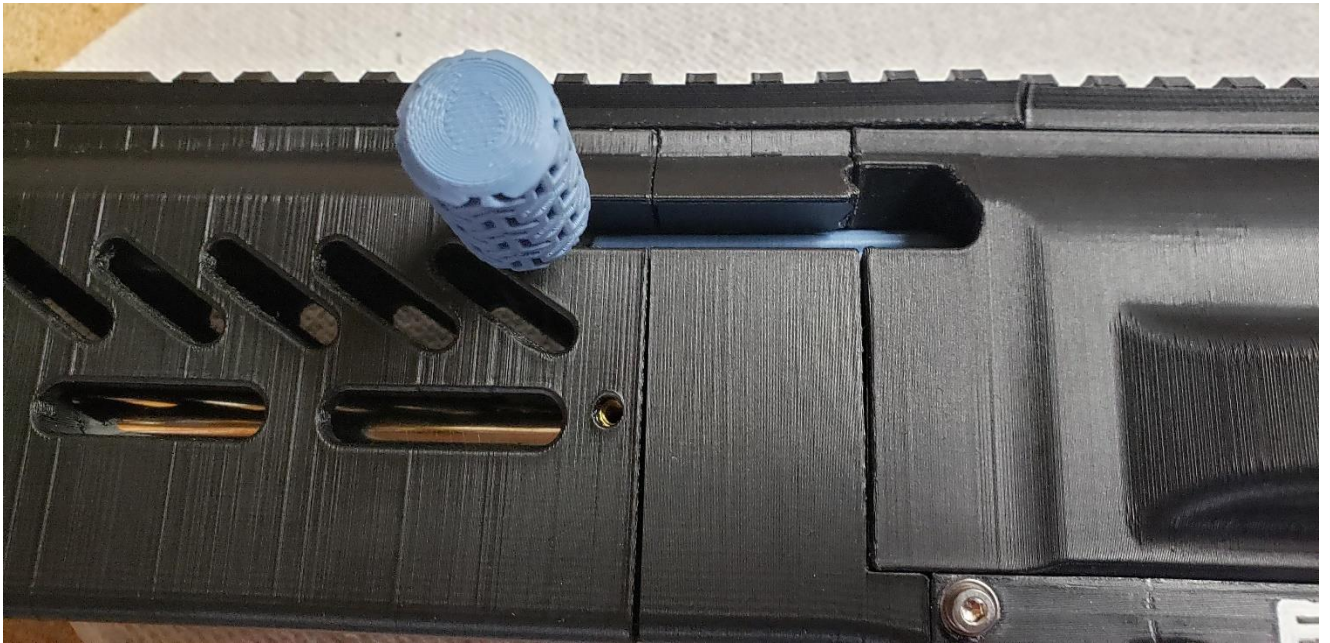
Insert the barrel into the Upper.



Slide the Barrel Retainer over the barrel, and secure it to the upper with the 40mm m3 screws. Don't forget to place the m3 washers onto the screws before screwing them in.



Next, place the charging handle into its slot, and slide the handguard over the barrel and barrel retainer.



On the top use m3 x 12mm screws to secure everything in place (pictured below). On the sides and bottom, use m3 x 10mm screws to secure the handguard to the barrel retainer. You can use 12mm screws that have been filed down to size for this part. Additionally, use m3 washers on the side and bottom screws.



Making the Locking Tabs.

We will start by making the locking tabs. These are small tabs made from metal that are responsible for locking the stock into place.

You will need some metal stock that is $1.2\text{mm} \pm .1\text{mm}$. You will need to find steel for this, aluminum is too soft for this application. Look around your local hardware store. Mounting brackets, L brackets, large washers, and clamps are a good source of metal. I used a “U” shape mounting bracket for my source of metal (pictured below).



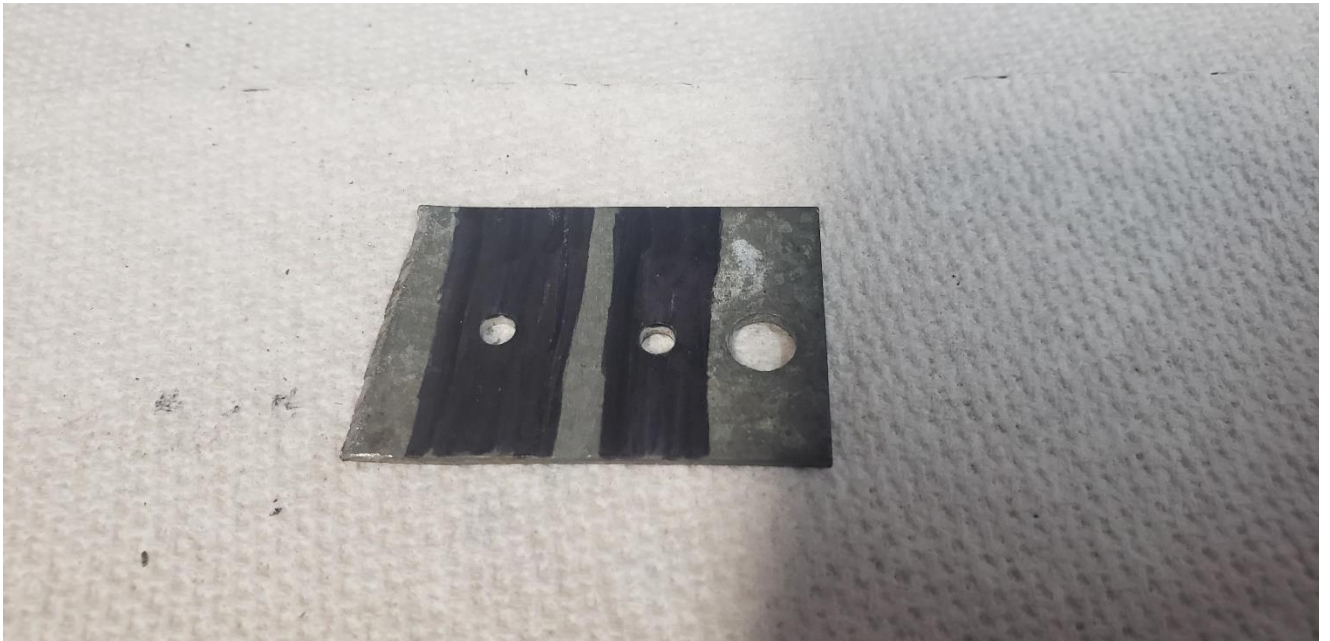
Cut off a section of metal, and ensure it is the right thickness. It should be flush, or shorter than the step on the printed Locking Tab Spacer part.



I used a hammer to flatten this piece of metal to make it easier to work with. Drill two holes in the center of the metal. This hole should be just large enough to allow the threaded part of an m3 screw to freely pass through.



Use a marker to color the metal in the general shape of a rectangle. This is to make it easier to mark dimensions using your calipers.



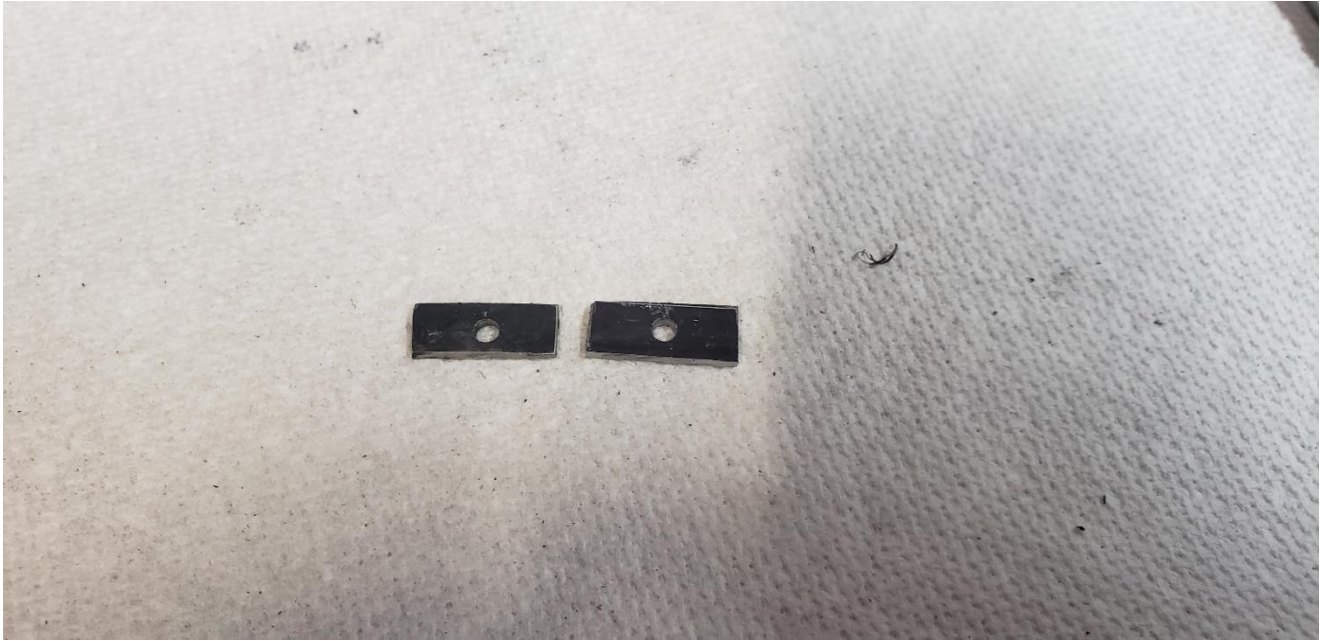
Use the holes you drilled as center. Make a mark at 8.5mm to either side of center.



Then, add horizontal lines that are 7mm long.



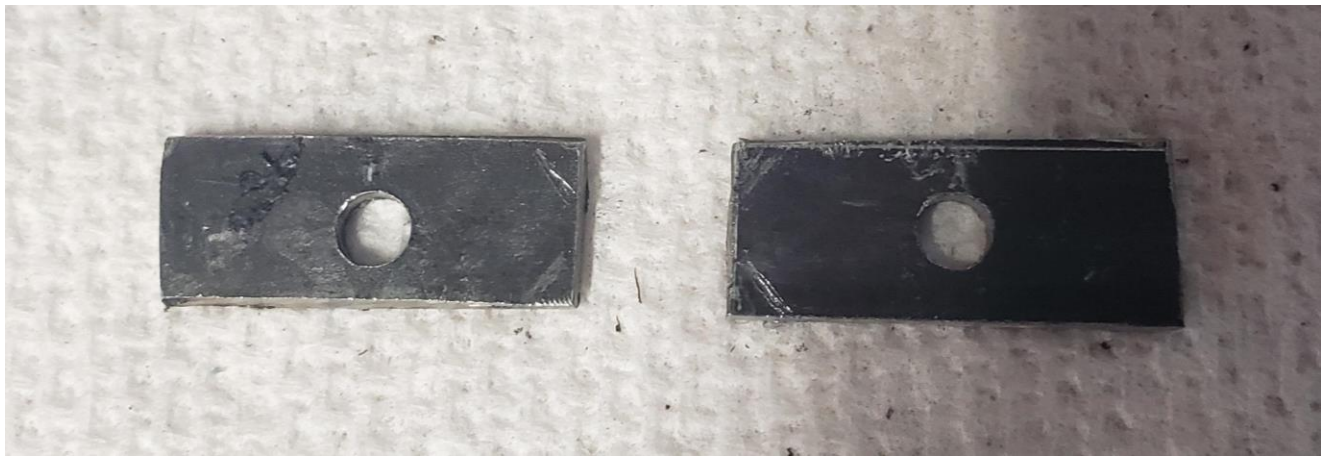
This is the general shape of the Locking Tabs. Use a Dremel or hacksaw to cut out these shapes.



Test the fit of the Locking Tabs on the Locking Tab Spacer. Pushing forward where the two tabs meet should allow them to rotate, exposing the hole where the Stock adjustment rods will go.

This may not be possible with the sharp corners on the Locking Tabs, so I recommend adding a small chamfer to each corner. The tabs below have been marked with an appropriate chamfer angle.





Debur any sharp edges, and adjust the size of the Locking Tabs by filing away small amount of material at a time to ensure the tabs can actuate freely When installed between the Locking Tab Spacer, and the Locking Tab Endcap.

Making the Stock Adjustment Rods.

Take your 6mm rod and cut it in half (if needed). Each half should be 200mm in length.



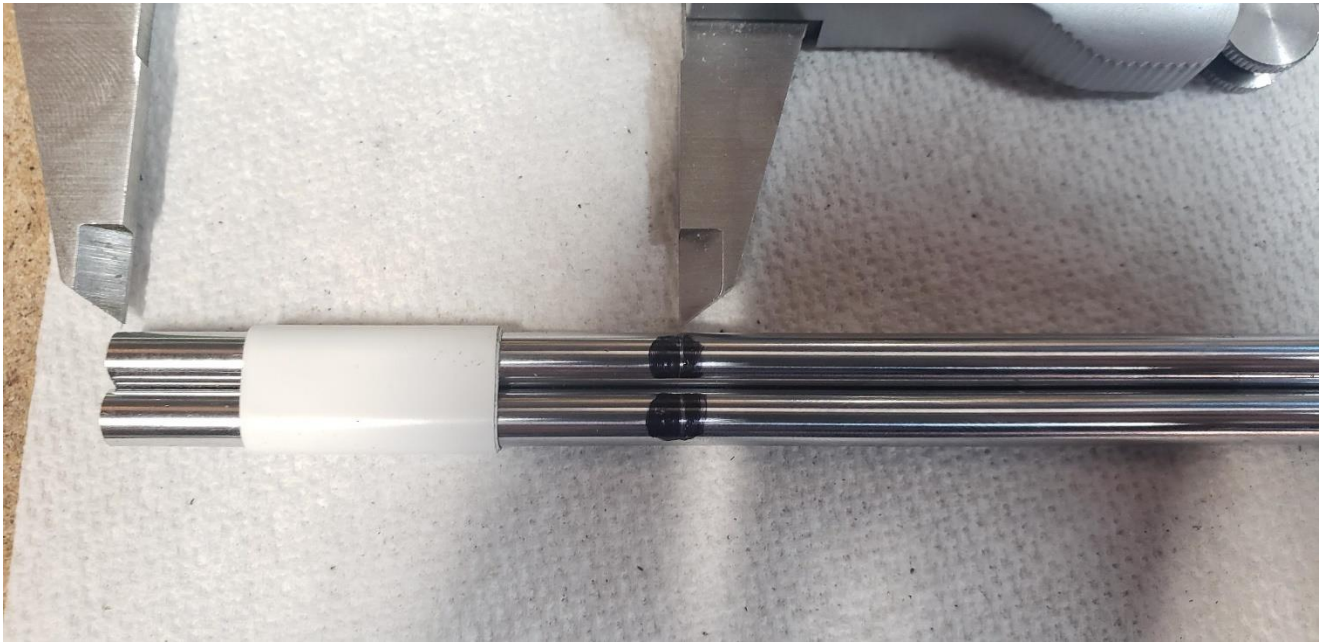
Use tape to tightly secure the two rods together in at least two spots.



Measure $58.6\text{mm} \pm .5\text{mm}$ from the end, and mark it using your calipers.



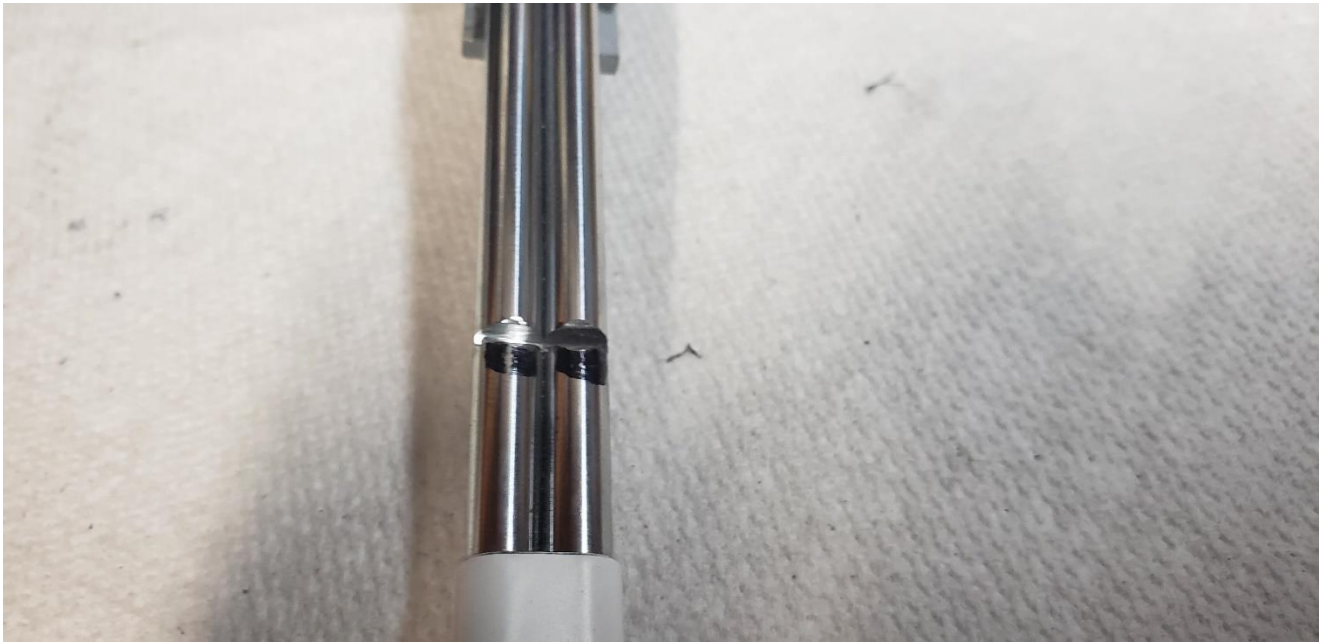
This will be the ‘Collapsed/Closed’ position for the stock.



Securely attach the two rods to a flat piece of metal. I used a file. This will ensure that the rods stay in a fixed position during the next few steps and make it easier to secure in a vice.



Start cutting at the location you just marked. You want to cut between 2.5-3mm deep into the rod. Of you cut past halfway, the structural strength of the rod will be compromised too much. The slot that you cut should be just wide enough for your Locking Tabs to sit inside of.



Note how I did not cut past halfway through the thickness of the rods.



While a hacksaw can be used for this, A Dremel makes life much much easier.

Next, cut two more slots in the exact same manner. You can space them out by whatever distance you want. However, these slots will be used to lock the stock in multiple “extended/open” locations, so use proper judgement.

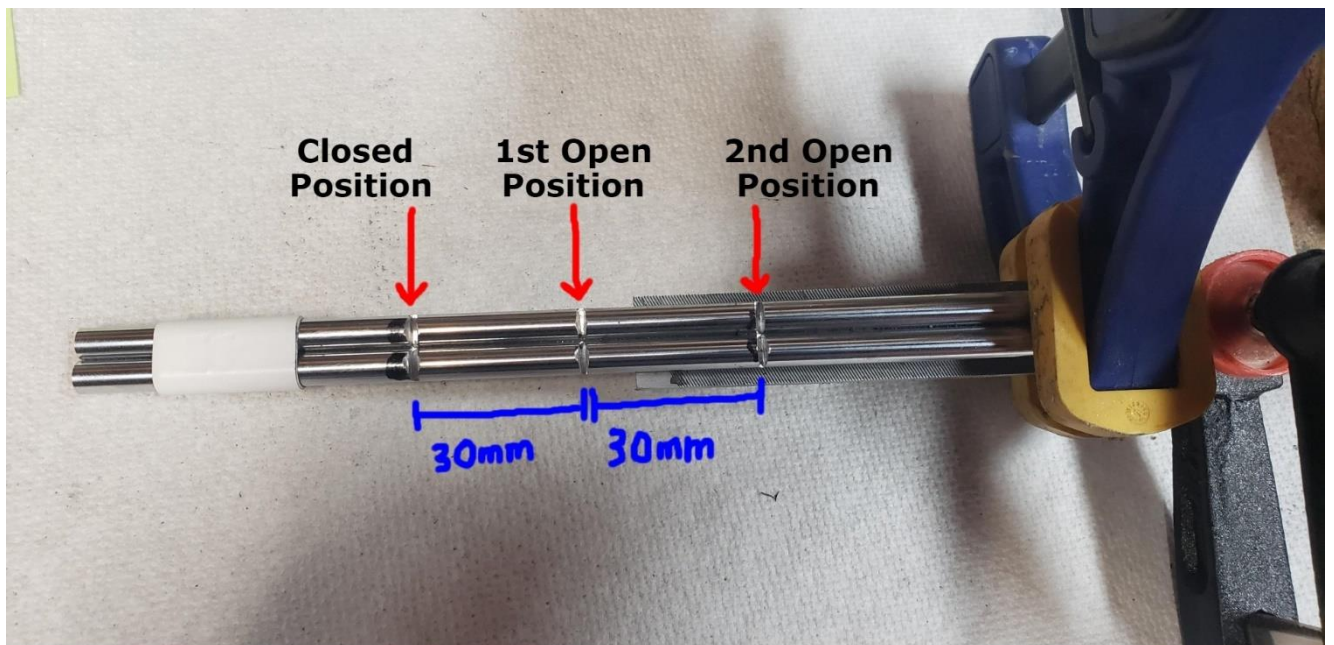
If you are unsure of how far you want to have your stock extend use the guide below for proper slot spacing.

For people with short arms – 10mm gaps between slots.

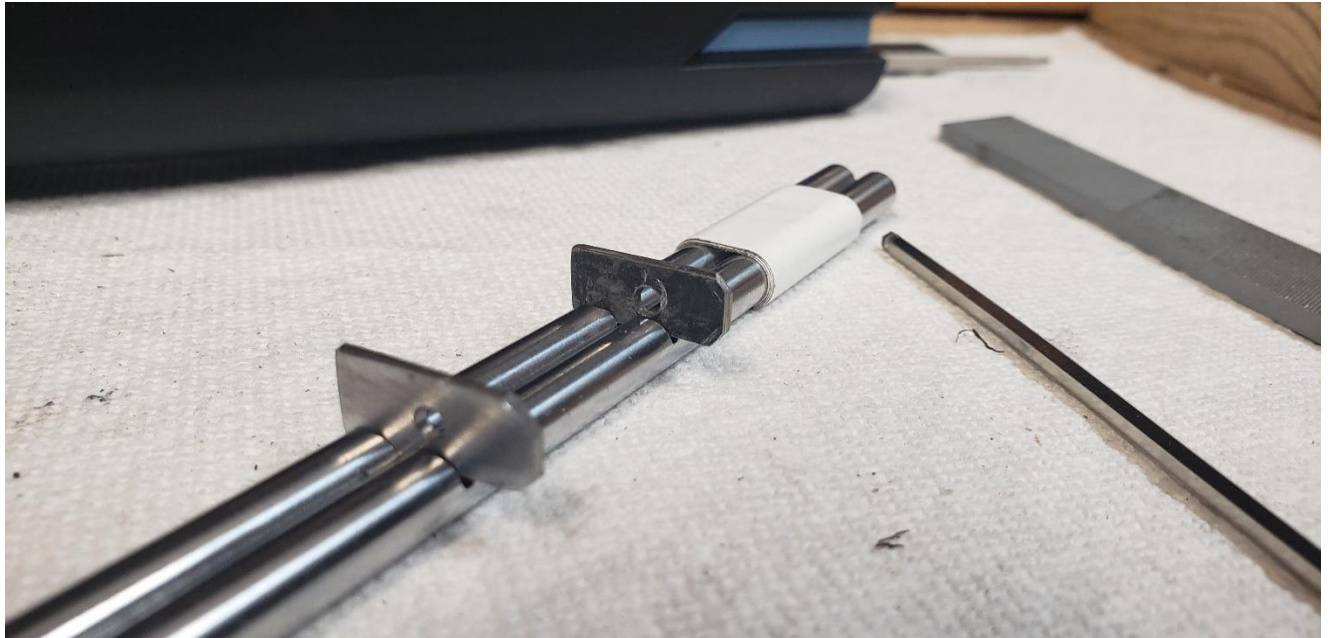
For people with medium arms – 20mm gaps between slots.

For people with long arms – 30mm gaps between slots.

I recommend cutting two open/extended position slots. See the picture below for an example.



Before removing clamps and tape, ensure your locking tabs can fit into each of the slots you cut.



Remove the clamps and tape. Add a rounded chamfer to each end of the rods. See image below for an example.



Assembling the Buffer Tube.

Start by gathering all parts. If you haven't already, glue the Buffer Tube Color Inlay into place as shown below. The hardware needed for this section is as follows: 8x LMU66 bearings, 1x Secondary buffer spring Outer diameter: 17mm Wire thickness: 2mm +-0.5mm Length: 80mm +-10mm, Locking Tab Spring 25mm long and 10-11mm in diameter, 2x m3 x 12mm screws, 2x m3 x 6mm screws, 3x m3 x 5mm screws.

The smaller length screws can be cut down to length from longer screws.



Insert all 8 bearings into the two slots. 4 bearings per side.



Attach the Locking Tab Spacer to the buffer tube with 1x m3 x 5mm screw.



Install the Locking Tab Spring into the slot, and ensure it can be compressed without too much friction between the spring and the sides of the hole it is sitting in.



Install the Locking Tab End Cap using 2x m3 x 6mm screws to secure it to the Buffer Tube.



Next, slide the Locking Tabs into their slots, and secure them with 2x m3 x 12mm screws. You will need to fight the spring pressure as you install the tabs in order to align all holes properly for the screw to pass through. Add lubricant to the slots before installing the Locking Tabs to help them actuate freely once installed.

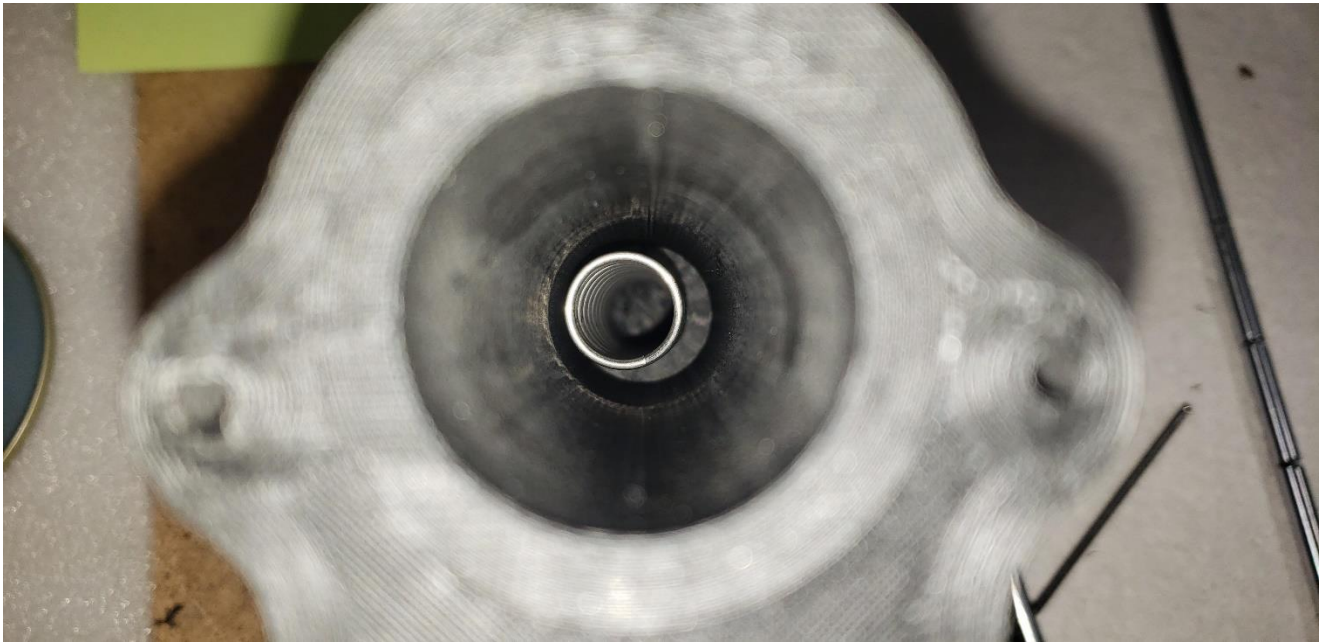


Install the recommended (but optional) TPU push button next. Use 2x m3 x 5mm screws to attach it to the Buffer Tube.



At this time, you can install the stock adjustment rods, and insure the locking tab mechanism is working properly. Push the center of the locking tabs into the buffer tube to disengage the lock. When released, the Locking Tab Spring should push the locking tabs back into the locked position.

Lastly, install the secondary buffer spring by pushing it all the way into the back of the Buffer Tube.



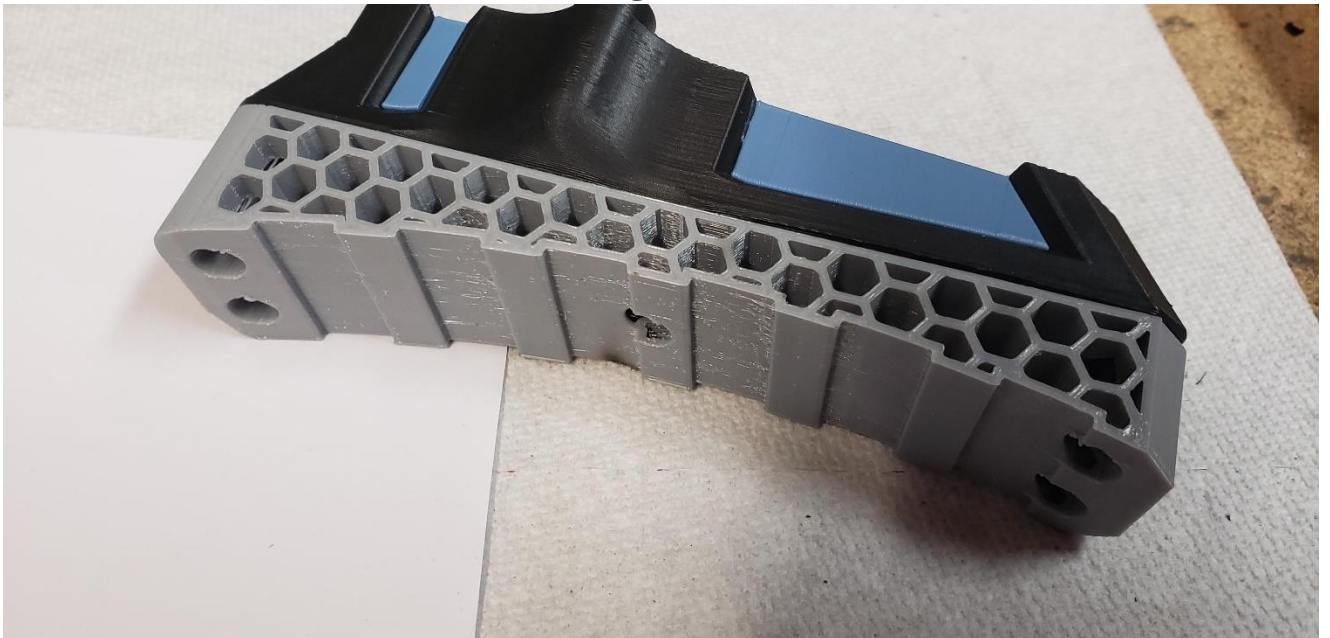
Assembling the Stock.

If you haven't already, glue the stock Color Inserts onto the stock body. The lower one will need to be bent slightly to get it onto the stock.

The parts needed for this section is the Assembled Buffer Tube, Stock Body, TPU Butt Pad, Stock Adjustment Rods, 5x m3 x 7mm \pm 3mm screws, and a little JB-Weld.



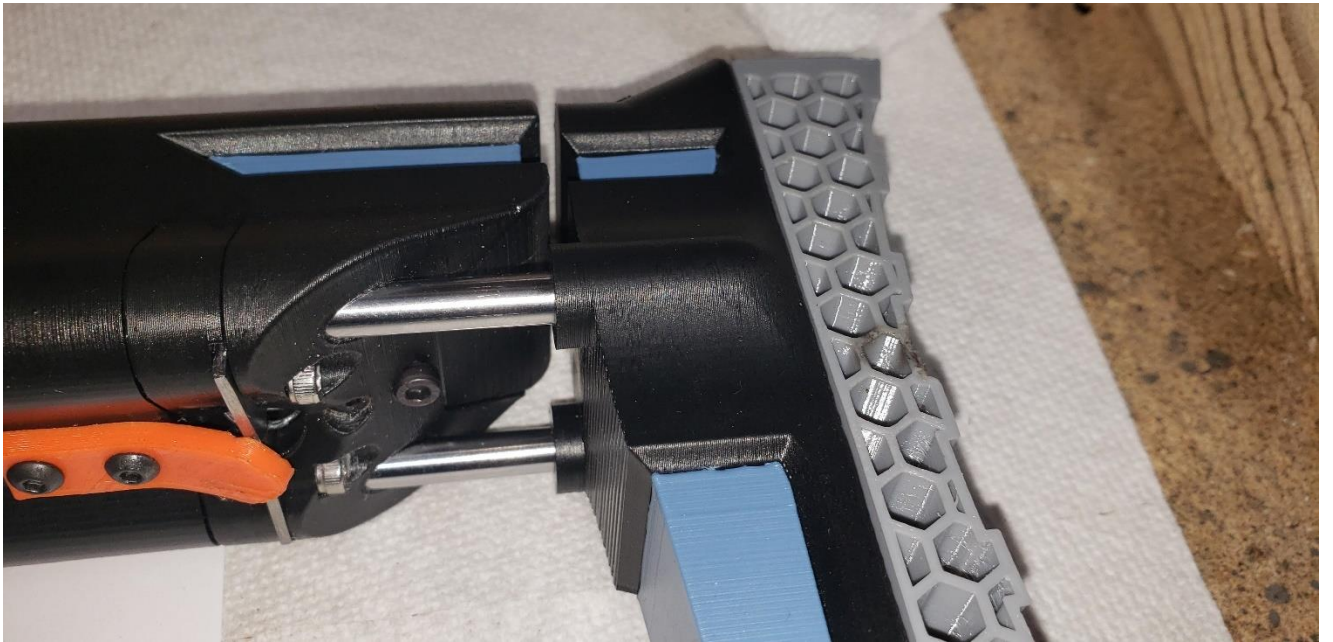
Attach the Butt Pad onto the stock using the 5 m3 screws.



On the end of the Adjustment rods that will be inserted into the stock body, scuff up the area that will be inserted fully into the stock. Additionally, scuff up the inside of the stock holes where the rods are inserted into. This is so that the JB-Weld can bond fully with the rods and the stock.



Place both Adjustment rods into the Buffer Tube, and push them into the closed position. Ensure that the locking tabs are in the full locked position, and are fully engaging the slots you cut into the rods. Add a little JB-Weld to the ends of the rod, and press the stock body onto the rods.



Wipe away any excess JB-Weld, and allow to dry for 24 hours.

Attaching the Lower Receiver to the Upper Receiver.

Take the Lower Receiver, and push it up and forward, securing it to the Upper Receiver. Lock it into place with 2x 40mm m3 screws. Use m3 washers and m3 nuts to secure the screws into place.

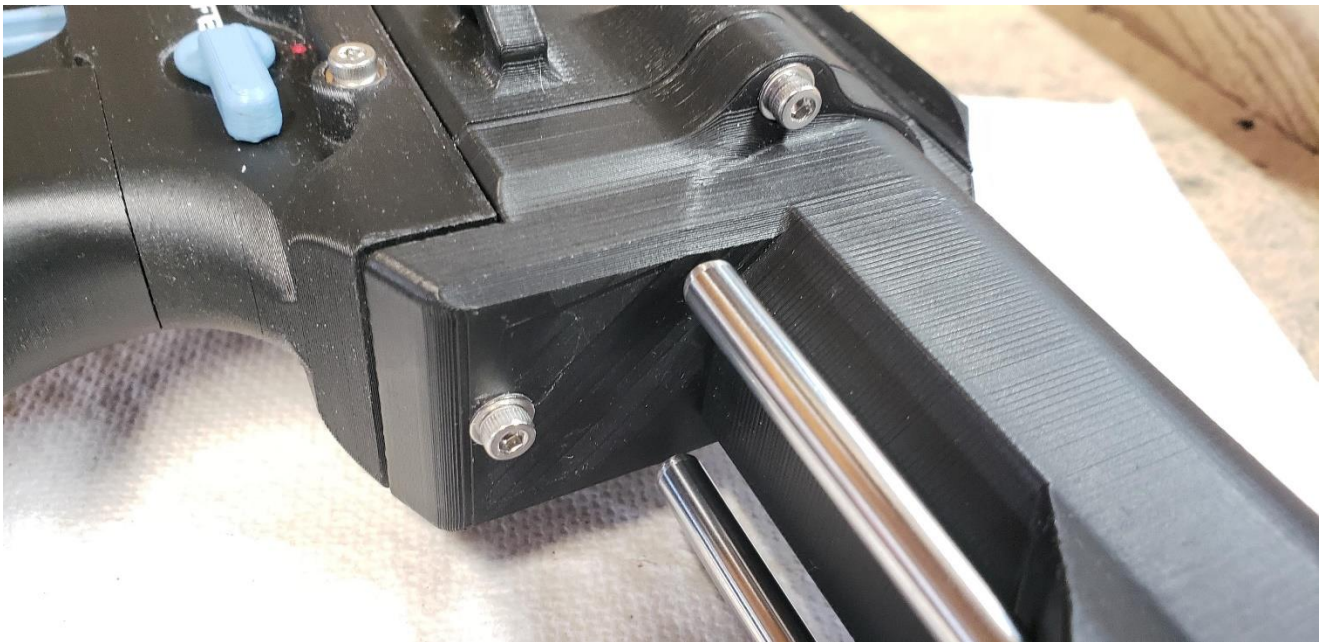


Attaching the Stock and Buffer tube to the Upper.

Lubricate the areas of the bolt that contact the Upper Receiver, and slide it into the Upper Receiver. Install the AR-15 Buffer Spring onto the bolt.



Attach the Buffer tube to the rest of the gun using four m3 x 16mm screws. The top screw does not require a washer, however the sides and bottom screw need an m3 washer installed on the screw before installation of the Buffer Tube.





Congratulations, your Stingray is now complete!

**I hope this document was helpful, and you were successful in making an FGC-9
mkII Stingray Edition.**

**Don't forget to install any accessories you may want. Sights, lasers, flashlights,
slings, fore grips, etc. are all worthwhile investments.**

Now, go make JStark1809 proud, and learn to defend yourself!

Test firing and maintenance

This section was written by JStark1809

One of the questions you will ask yourself once you have completed assembly is where you will fire the first dozen shots to test your FGC-9 Stingray build.

Ideally you have a patch of land, a building, garage or similar facility that is very far from inhabited areas.

If you do not have access to a remote firing area you can use a basement.

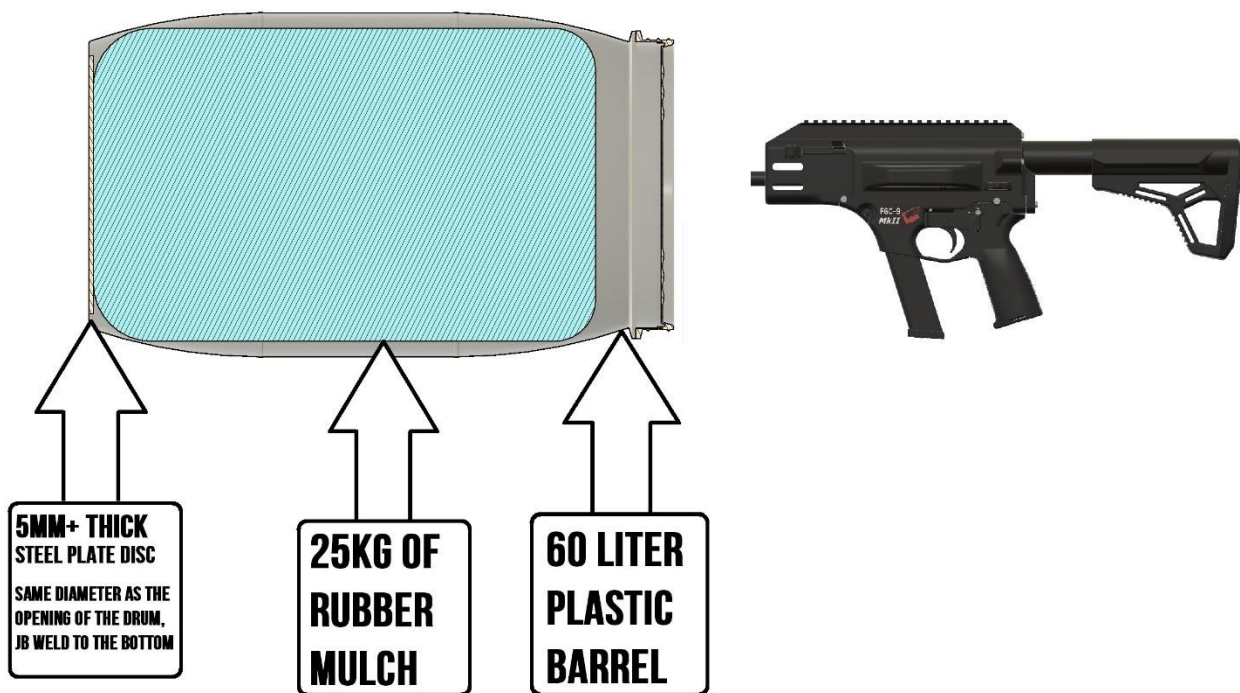
The next question will be what you will shoot into.

This becomes especially tricky when firing in a basement.

One needs to fire into a so called bullet trap in that case.

A portable and easy to build solution is the following, a video of one being used is included in the media folder.

Take a 60-liter plastic barrel and fill it with around 25kg of rubber mulch. Before the rubber mulch is poured into the barrel you can JB weld a 5mm+ thick steel disc that has the appropriate diameter down at the bottom, inside the barrel, to guarantee that no pistol caliber projectile can leave the bullet trap. Use a plastic barrel that has a plastic lid so that you can simply use strips of electrical tape to cover the bullet hole entrances.



Test Firing

For the first few test shots I recommend you wear gloves and ballistic eyewear or a welding helmet.

Only load one cartridge for the very first test shot.

Make sure to check that the bullet has left the FGC-9 barrel and check that there are no cracks or damage of any form on the gun after each of the first dozen shots. Inspect the firearm very closely after each shot. If you encounter any issues while testing the firearm or later down the line refer to the troubleshooting page.

Maintenance & Repairs

When you have the spare time, brush the inside of your barrel with an appropriate brush from a cleaning kit and afterwards make sure that you have a film of lubrication oil inside the bore.

Use the occasion when cleaning your barrel bore, to also spray some silicone spray into the inside of your firearm (mainly inside the upper receiver where the bolt rides on), so that the parts that are printed, interact smoothly.

If anything breaks on your Stingray, first try to replace the part by 3D-printing it again.

If that is not possible for you because of convenience or serious issues like time constraints and urgent need on the use of your Stingray you can resort to a technique called “PLA welding”.

Essentially you will take some PLA filament string and have it act like soldering material and use your soldering iron to melt the new PLA filament into a crevice or crack on your broken part. This is a very effective solution for repairing your 3D-printed parts quickly.

If you can wait a day before you need the part, resort to using JB-Weld as a filler material/glue for broken areas. Using JB-Weld will result in a stronger repair. After it dries(12-24h) you can sand the repaired area first with rough, then fine grit sandpaper to ensure smooth function.

Troubleshooting

Text and diagrams by IvanTheTroll

Check your primers to determine, whether your FGC-9 is functioning properly.

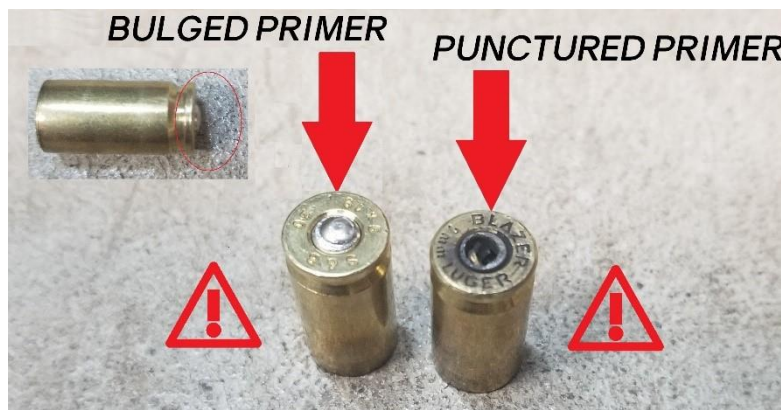


Good Primer Hits - Note the little to no bulging

Note these hits are a little off-center, this is about the furthest off-center the hits can be before the gun won't work!



Slightly Bulged Primers, these might be ok, but if the gun has extraction issues, consider these primers to be bulged and follow the steps.



Dangerous degree of bulging or punctured/ruptured primers, refer to the diagrams to identify the causes of these issues.

When it comes to the issues the FGC-9 may face, two stand out as most common:

Failures to extract (the fired casing does not leave the chamber)

Issues with the firing pin(the primer on the cartridge is hit but does not ignite, or the firing pin is poking holes all the way through primers)

These steps will walk you through the tips and tricks that have been shown to help alleviate or completely solve these issues

Troubleshooting Failures to Extract

**The most common causes of FTEs(Failures to Extract) are:
a poorly cut/misshaped chamber and/or an issue with headspacing.**

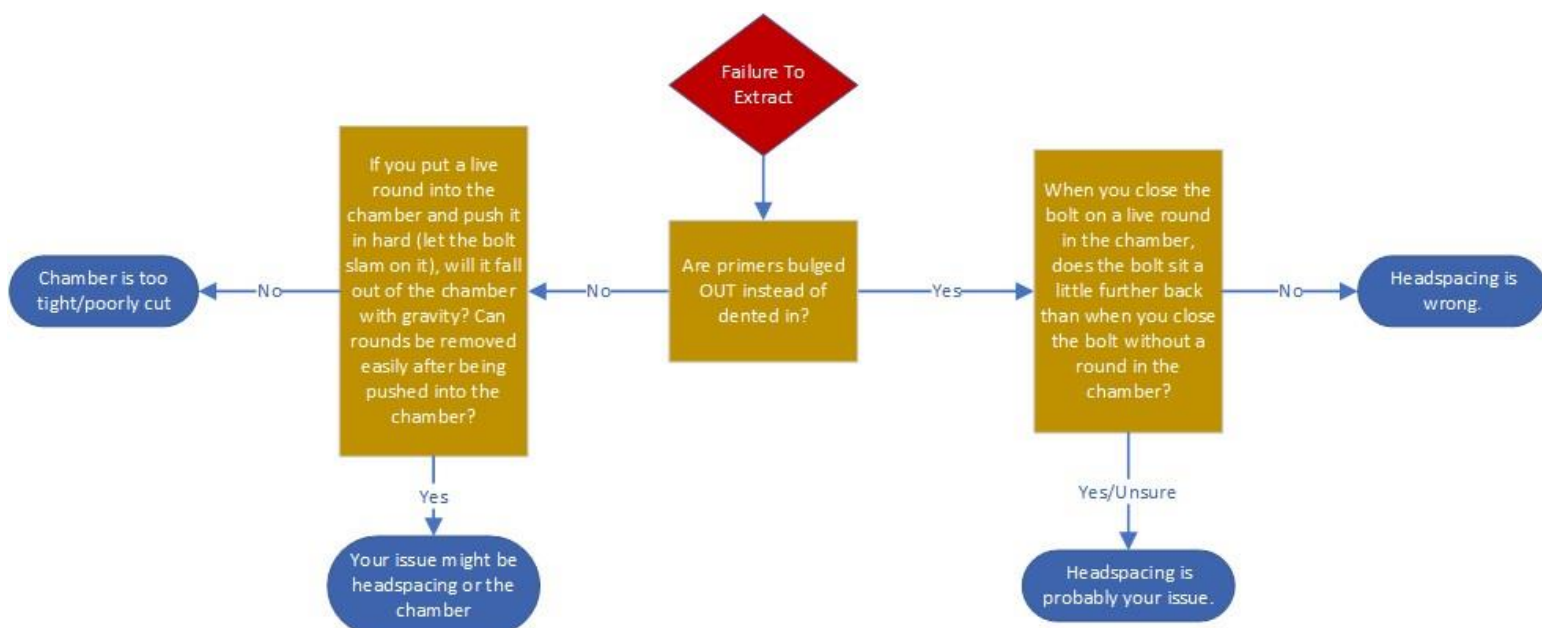
The frustrating part about solving this issue is that it's hard to be sure exactly which part (the chamber or headspacing) is to blame for your FTEs.

Do note that these steps/instructions are meant for troubleshooting guns that are using barrels made via the ECM process –if you have these issues using a factory or reamed chamber, then your issue might be due to your firing pin.

Skip to the section about firing pin issues and follow those steps.

This flow diagram should help you identify what your issue might be.

Based on which answer you arrive at in the flowchart, follow the instructions after the flowchart.



Chamber is too tight/poorly cut

First off –if you made your barrel following the ECM process and you didn’t use a tapered chambering rod, understand that this issue is usually best resolved by using a tapered chambering rod. If you didn’t use the ECM process to make your barrel and the flowchart lead you here, there are two things that can be wrong with your chamber that can cause FTEs.

One is that the chamber itself being too tight –this can best be resolved by cutting for 10 more seconds on the chamber (assuming you used the ECM setup to make your barrel). The other thing is that your chamber seat is very curved/poorly defined. You will be able to tell which of these two things is happening by taking a live round and letting the bolt slam it into the chamber. Take the round out and look at it. If the round is shiny around the case mouth (where the bullet sits inside the case), then your chamber seat is poorly defined. If the case mouth looks good, then it’s most likely that your chamber is just too tight (especially if anywhere on the case that isn’t the case mouth is shiny).

If you determine that your chamber is just too tight, go back to your ECM setup and cut for 10 more seconds, then repeat the process of checking if the chamber is too tight. If you determine that your chamber seat is to blame, you probably cut your throat too wide during the ECM process (stick closer to the specs in the documentation next time). You will probably have to redo you barrel.

However, you can still try the troubleshooting tips in the “Headspacing is wrong” section if you would like to make absolutely certain it is your chamber that is the issue.

Your issue might be headspacing or the chamber

This is the worst spot to be in. I recommend you follow the steps from the next section first, and if that doesn’t solve your issue, follow the steps in the section above this one. There’s no good way to tell what’s going wrong with your build, so you’ll have to check both– however, the only time one of my builds ended up in this spot is when I had a proper chamber, but I had too little headspacing (read the next section to understand what this means). There is also a small chance your issue is your firing pin itself–refer to the “Firing Pin Troubleshooting” section below if you suspect this is the case.

Headspacing is wrong / Headspacing is your issue

This is probably the easiest issue to check/resolve. First, you'll need to understand what "headspacing" is. Headspacing refers to the distance between the face of the bolt and the rear end of the cartridge case. When speaking in terms of the FGC-9, LESS headspace means that the barrel is moving rearwards (towards the bolt), MORE headspace means the barrel is moving forwards (away from the bolt). Too little headspacing means that that bolt will ram a cartridge hard into the chamber, and it will be the cartridge itself in the chamber the stops the bolt. Too much headspacing means that the bolt won't actually be touching the rear end of the cartridge (or it will only barely be touching it) –this is what would cause bulged primers and could potentially be dangerous. Perfect headspacing is where the bolt will push the cartridge fully into the chamber and be resting against both the rear end of the cartridge AND the front wall of the upper receiver at the same time. The steps that follow describe how to help make sure your headspacing is where it is supposed to be.

On the FGC-9, you'll want your headspacing to be 0.00mm or less (meaning the bolt is resting against the rear end of the cartridge). However, you want your headspacing to be as close to 0.00mm as possible. You can establish this using the FGC-9 headspacing jig, but sometimes the headspace you set with that tool won't be quite perfect –you may still need to decrease headspace some.

Always start with the headspacing that you set on the jig, and after testing you can adjust from there.

The jig should never be causing too little headspace –if you suspect your issue is having too little headspace, reset your barrel using the jig and confirm it before moving the barrel forward.

NOTE: If you suspect you have too much headspacing (which can happen sometimes after using the jig), first check that the bolt is not getting stopped by the charging handle –when the bolt is all the way forward, the charging handle should NOT be touching the bolt face. The easy way to check this is to let the bolt and charging handle go all the way forward.

The charging handle should be able to move forward and backward a little without moving the bolt at all. If your charging handle is touching the bolt when the bolt is closed, you should grind down the long leg on your charging handle or drill the recess in the bolt face a little deeper.

Finally, if you've made sure that you started with a barrel that was set up on the headspacing jig, and that the charging handle is not touching the bolt face when the bolt is closed, you are ready to make a change to your headspace. Remove the barrel and shaft collar assembly. Make a visual note of where the barrel sits in relation to the shaft collars. Loosen the set screws on the shaft collars. Move the barrel rearward (towards where the bolt would be) relative to the shaft collars. If the shaft collars feel tight or the barrel won't move in them, make sure the set screws are loosened and tap the barrel with a hammer to move it.

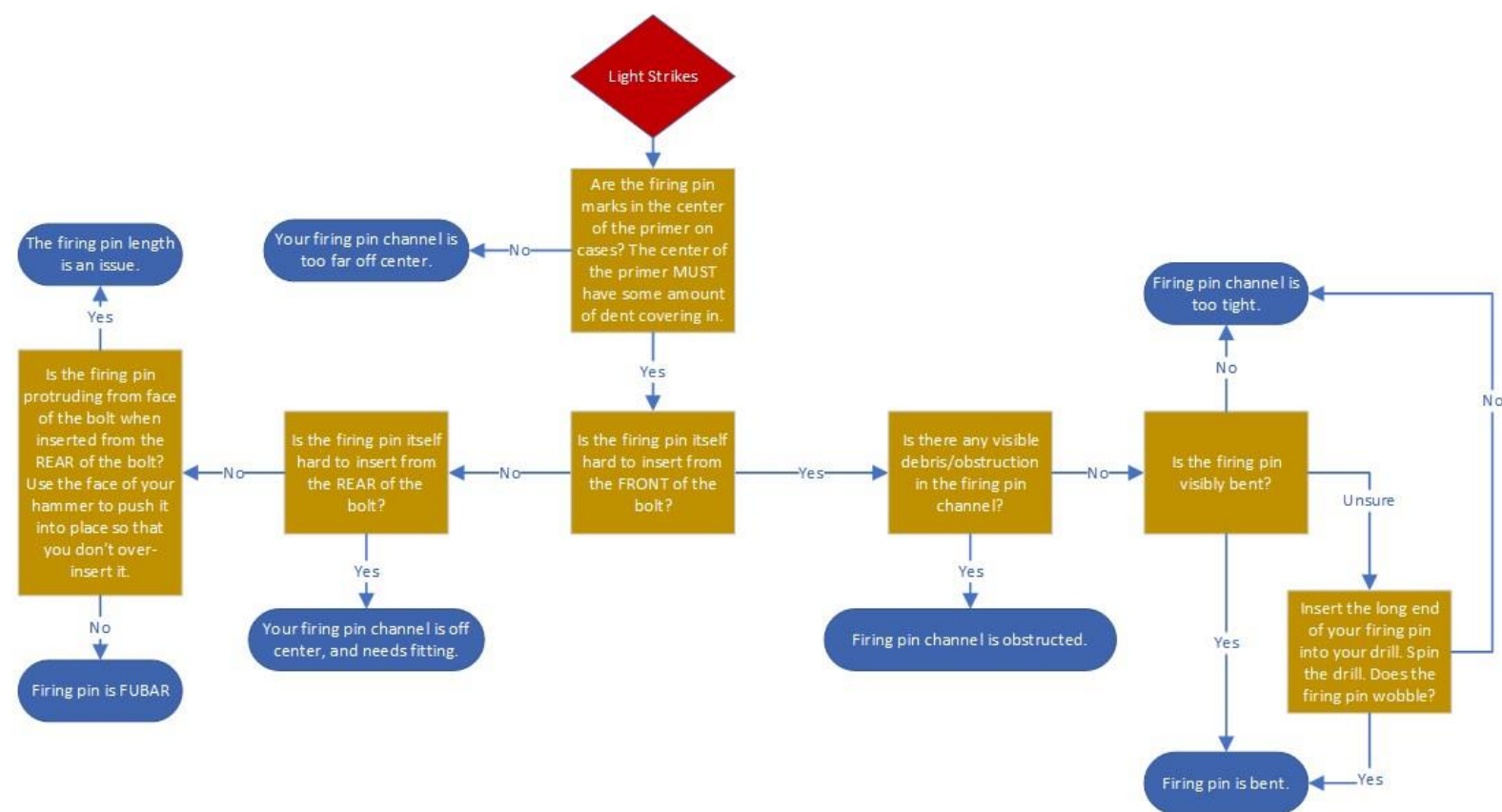
After ensuring that the barrel has moved backward a little (when I say a little, I mean like 0.5mm –it only needs to move a tiny amount), tighten the shaft collars and reinstall the barrel. If primers are still getting bulged or you are still having FTEs, follow the flowchart again.

Firing Pin Troubleshooting

If you are experiencing light primer strikes, ruptured primers, or a failure to extract that you could not solve by following steps from the flowchart above, this section should be able to help you. First off –the FGC-9 runs best with about 2mm of firing pin extension. This value does not need to be very precise, and depending on your setup and ammo used, a firing pin with as little as 1mm of extension or as much as 3mm of extension might work fine. This section will help you fix issues with your firing pin.

Light Strikes

The most common cause for light primer strikes (the primer get hit but the round doesn't go off) is that something is wrong with the firing pin. There is a small chance that the issue is headspacing (covered in the "Troubleshooting Failures to Extract (FTE)", so be aware your barrel might be set too far forward in the shaft collars – but don't worry about changing this until you've made sure your firing pin is correctly set up. This flow diagram should help you identify what your issue might be. Based on which answer you arrive at in the flowchart, follow the instructions after the flowchart.



Your Firing Pin Channel is too far off Center

This is an annoying situation to be in. I've tried a huge number of things to try and fix this problem, but the only real solution is to make a new bolt. Pay very close attention to drilling the firing pin channel straight and ensure that the end of the lower bolt rod (the one with the firing pin channel) that you drilled into (the side facing up in the jig) is the side of the rod that faces forward whenever you mate your rods together.

The Firing pin Length is an Issue

First thing –check that your firing pin has the correct overall length(about 67.50mm).

If your firing pin is too long or too short, you can have light strikes. Go back to the firing pin documentation and ensure all the dimensions in the instructions line up with your firing pin. If either end of your firing pin is too long, you can trim it down slightly and check if that fixes your issue. If either end of your firing pin is too short, you will need to make a new firing pin and pay closer attention to the instructions –more often that not, it's getting the shaft collar in the right spot that is the issue.

Firing Pin is FUBAR

If you ended up here, your firing pin channel is either over 3mm off or your firing pin is totally wrong. Assuming your bolt isn't way off, then you need to redo your firing pin and slow down to read the documentation/get the measurements right.

Firing pin Channel is too Tight

Take the drill bit you used to drill out your firing pin channel. Using your drill, drill from the front of the bolt, spinning the drill at a high speed while moving it in and out of the hole. Apply a little silicone oil to the firing pin hole and test again.

Your Firing Pin Channel is off Center and Needs Fitting

So –your firing pin channel is off center, but at least some portion of your firing pin indent is still hitting the middle of the primer. You may be having inconsistent primer hits because your off-center firing pin channel is causing the shaft collar on the firing pin to drag against the internal cavity of the bolt carrier. Inspect your firing pin/bolt carrier and look to see if the shaft collar is in contact with the bolt carrier. If it is, you can use a rotary tool/Dremel tool/drill to try and remove a little material from the bolt carrier so that the firing pin shaft collar won't be dragging against the bolt carrier. Just be careful not to remove too much material!

Firing pin Channel is Obstructed

Take the drill bit you used to drill out your firing pin channel. Using your drill, drill from the front of the bolt, spinning the drill at a high speed while moving it in and out of the hole. Apply a little silicone oil to the firing pin hole and test again.

Firing pin is Bent

This is an indicator that your headspace might be wrong or your firing pin might have been too long –a firing pin that is too long, especially when headspace isn't right, can puncture primers, which can bend firing pins. If your firing pin has bent, you can try to straighten it back out (and then shorten it to the specs called out in the documentation), but I recommend you make a whole new firing pin. Refer to the previous section (Troubleshooting Failures to Extract (FTE)) to check your headspace, and refer to the documentation for making a new firing pin/straightening your old one.

Punctured Primers

If you are having punctured primers, you should stop using your FGC-9 and fix this issue. The two things that could cause punctured primers are an issue with headspace and a firing pin with too much extension(too long). If you have punctured primers, first make sure headspace is set correctly - refer to the previous section (Troubleshooting Failures to Extract (FTE)). If you still have punctured primers after ensuring headspace is good, then you will need to make a new firing pin (or identify which end of your firing pin is too long and trim it down to size according to the instructions for making your firing pin).

Failure to Extract due to Firing Pin

This issue is rather uncommon, but I have noticed it before. You can have failures to extract because a firing pin has too much extension. The quick and easy way to check this issue out is to measure how much extension your firing pin has. The best way to do this is to remove the barrel from your gun and let the hammer hit the firing pin –when it comes to a rest, it will be pushing the firing pin to its extended position. While looking from the front of the gun (with the barrel removed), take a note of how far the firing pin is sticking out past the face of the bolt –it should only be 1 or 2mm. If it is sticking out a long distance, you might want to make sure that the tip of the firing pin isn't pointed (it should be a flat shape on the tip), and make sure to grind it down a little so that about 2mm of the firing pin is sticking out past the bolt face.