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ROGUE-9 Super K

ROGUE-9 SD

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Introduction

The ROGUE-9 is a firearm that was designed with the intent to close the gap between traditional DIY printed guns and factory made production guns. It uses a bolt that appears to be milled with a CNC machine but in reality it is made with a handheld electric drill and a series of printed JIGs. The JIGs are designed to limit the probability of mistakes, user error and the need for the builder to have any skill in metalworking. Because of this the ROGUE-9 bolt is very easy to make.

The ROGUE-9 uses zero firearms parts except for the magazine spring, everything is DIY or off the shelf parts. It has a proper extractor, ejector and firing pin. It uses a progressive recoil spring system that enables it to have a relatively light bolt while still having an extremely smooth recoil impulse and low rate of fire. It also has an Anti Bolt Bounce system and an Out Of Battery safety mechanism.

It has a three position quick-deploy telescoping butt stock, an anti-unscrew charging handle and all pins in the gun are anti-walk pins. It has three m4 threaded rods that goes through the entire upper assembly clamping the whole gun together for increased durability.
It has a close to indestructible mounting solution for mounting the lower receiver to the upper assembly. The barrel uses an anti-rotation system that prevents the barrel from rotating when installing and removing a suppressor.

The ROGUE-9 uses an updated printed FGC (fire control group) which has been significantly beefed up and strengthened, it is very durable for being a printed FCG and it has a surprisingly light trigger pull.

The ROGUE-9 is designed to be equipped with a ported and threaded 5.4inch(137mm) barrel and an integral telescopic reflex suppressor that is specifically designed to reduce 124gr supersonic ammo to subsonic velocity without sacrificing ballistics too much and with no negative effects on accuracy.

It can also be built with two different special versions of the printed FTN3 suppressor. These versions of the FTN3 are integral suppressor available in two different lengths. The long version uses a 112mm long barrel and the short version uses a 102mm long barrel, both barrels are ported and non-threaded.

The ported barrel uses fifteen 2.3mm(2.5mm optionally) ports that are located within the rifling grooves approximately two inches after the chamber and reduces the velocity with about 80-100FPS which is enough to get 124gr bullets reliably down to subsonic speeds.
This is a lot different from the MP5SD for example which is massively over ported, too close to the chamber and will reduce the velocity with over 200FPS.

The ROGUE-9 can also be built without the integral suppressor using a non-ported barrel. There is a Kurtz version and a Super K version of the ROGUE-9. The Kurtz uses a 102mm long barrel and the Super K uses a 74mm long barrel, both barrels are non-ported and non-threaded.

All barrels are fully DIY and the ports are drilled using a special JIG that times the ports to the rifling to keep the accuracy the same as a non-ported barrel. Both the V2, V2.1 and V3 ECM 9x19mm barrels are compatible with the ROGUE-9. FGC-9 barrels with non-removable shaft collars are not compatible. The tools and instructions for making the different barrels and the SD integral suppressor are described separately in the V3 ECM Tutorial available in the ECM_v3.64_19x19mm folder.

There are five different barrel retainers for the ROGUE-9 depending on which version you want to build. The available barrel retainers are:

The SD barrel retainer - Uses a 137mm ported/threaded barrel and a solvent trap suppressor.
The Long FTN3 retainer - Uses a 112mm ported/non-threaded barrel and the long FTN3 CORE.
The Short FTN3 retainer - Uses a 102mm ported/non-threaded barrel and the short FTN3 CORE.
The Kurtz retainer - Uses a 102mm standard barrel.
The Super K retainer - Uses a 74mm standard barrel.

Be careful not to put your hand close to the muzzle or charging handle, it is recommended to grip the Super K version of the Rogue-9 by the magazine well and not by the hand guard.

There are two versions of the upper receiver, the SELECT and the SEMI version. The SELECT version of the upper receiver is only compatible with the SELECT lower receiver. The SEMI version of the upper receiver is only compatible with the SEMI and AR15 version of the lower receiver. Bolts that has the 2mm autosear/OOB trip pin installed are not compatible with the SEMI version of the upper receiver.

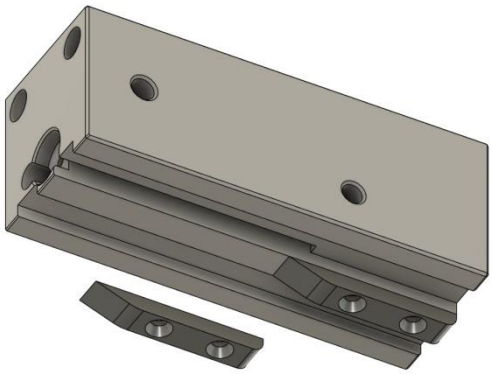
There are three different versions of the lower receiver available. The SELECT, the SEMI and the AR15 version. The SELECT version of the lower receiver has a three position selector with three different modes, SAFE, FIRE and FUN. It uses 3mm diameter FCG pins and a printed select fire FCG. This version uses the SELECT hammer, SELECT disconnector, SELECT selector and the OOB lever.

The SEMI version of the lower receiver has a two position selector with two different modes, SAFE and FIRE. It uses 3mm diameter FCG pins and a printed semi auto FCG. This version uses the SEMI hammer, SEMI disconnector, SEMI selector but it is not using the OOB lever and does not have the third hole in the lower receiver needed to install the OOB lever. If you build this version you should not drill the 2mm hole on the right side of the bolt.

The AR15 version has a two position selector with two different modes, SAFE and FIRE. It uses 4mm diameter FCG pins and a metal FCG. This version uses a standard milspec AR15 selector, selector spring, selector detent and an M4x10mm set screw to retain the selector detent and spring.

The AR15 version of the lower receiver uses a standard milspec AR15 FCG or cassette style drop in trigger. The AR15 version needs a custom AR15 bolt with a hammer reset lug welded onto the bottom of the bolt. This is because a standard milspec AR15 hammer is too short to be fully reset by the bolt unless material is added to the underside of the bolt. The hammer reset lug is made from a piece of 6x3mm flat steel bar that is filed to shape and then plug welded through two holes in the lug onto the bolt with a MIG welder. The lug can also be made by filing a bigger piece of scrap steel to the correct size. Look at picture below or at the CAD file for more details on the AR15 bolt.

The AR15 version does not use the OOB lever and does not have the third hole in the lower receiver needed to install the OOB lever. If you build this version you should not drill the 2mm hole in the right side of the bolt.



Here is the AR15 bolt, the hammer reset lug is 33mm long, 6mm wide and 3mm tall. It is slanted in the front so it does not catch on the hammer and rounded on the back so it rides smoother over the hammer.

The lug is welded to the bolt after the bolt slots and the ejector slot are cut. The lug is plug welded through the two holes with a MIG welder. The Lug needs to be smooth in order to run reliably over the hammer, it's a good idea to polish it.

ROGUE-9 FTN3 Long version

ROGUE-9 FTN3 Short version

Credits

Special thanks to Advanced.Payment who is a machinist and the designer who started the work on the ROGUE-9 in November 2023. I joined him on the project early in December 2023 to develop JIGs so the bolt could be made without a mill and other heavy equipment that the ROGUE-9 initially required. Unfortunately Advanced.Payment went missing in action in January 2024 and he never got to see the working ALPHA prototype of the ROGUE-9 or my JIGs in action.
I hope that you are okay brother wherever you are.

Thanks to Pla.Boi for the FTN3 suppressor design which is the basis for the integral FTN3 suppressors that the ROGUE-9 uses.

Big thanks to the BETA testers of the ROGUE-9 and for the people who believed in my crazy JIG ideas.

Thanks to Ivan the Troll, JStark1809 and 3socksandcrocs for the work they did on the FGC-9 and to Derwood for coming up with the Shuty AP9, which the FGC-9 is based on.

Massive thanks to Cskeju for recognizing electro chemical machining as a way to make DIY rifled barrels long before 3D printing was a thing for the common man, and to Jeffrod and Ivan the Troll for developing this method further. This is the foundation that makes all of this possible.

Credits to DannyMeatball for the “DMB 9x19mm Glock Magazine” which the ROGUE-9 uses.

SAFETY ADVISORY

NEVER FIRE THE ROGUE-9 WITHOUT THE SUPPRESSOR (if you use the ported barrel)
NEVER LEAVE OR CARRY THE ROGUE-9 COCKED (Unless it has a metal fire control group)

When firing your ROGUE-9 always take proper safety precautions! Wear safety glasses, hearing protection, and keep your hands away from the ejection port and muzzle.
Never use damaged or defective ammo. Always inspect your ammo before loading it into your ROGUE-9.

The ROGUE-9 is a safe and reliable firearm only when made properly with the specifications and instructions that are detailed in this guide.

Do not use out of spec components and materials in your ROGUE-9. To eliminate potential issues right from the beginning, thoroughly read this guide multiple times and build the ROGUE-9 as described, do not change specifications or divert from the instructions.

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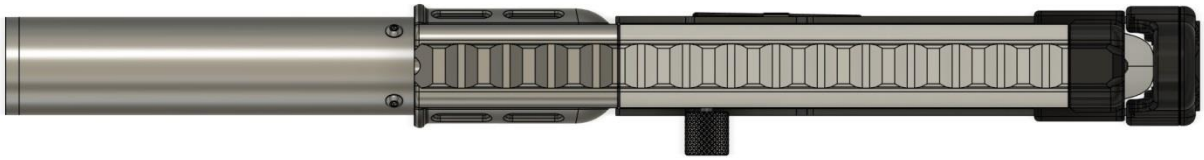
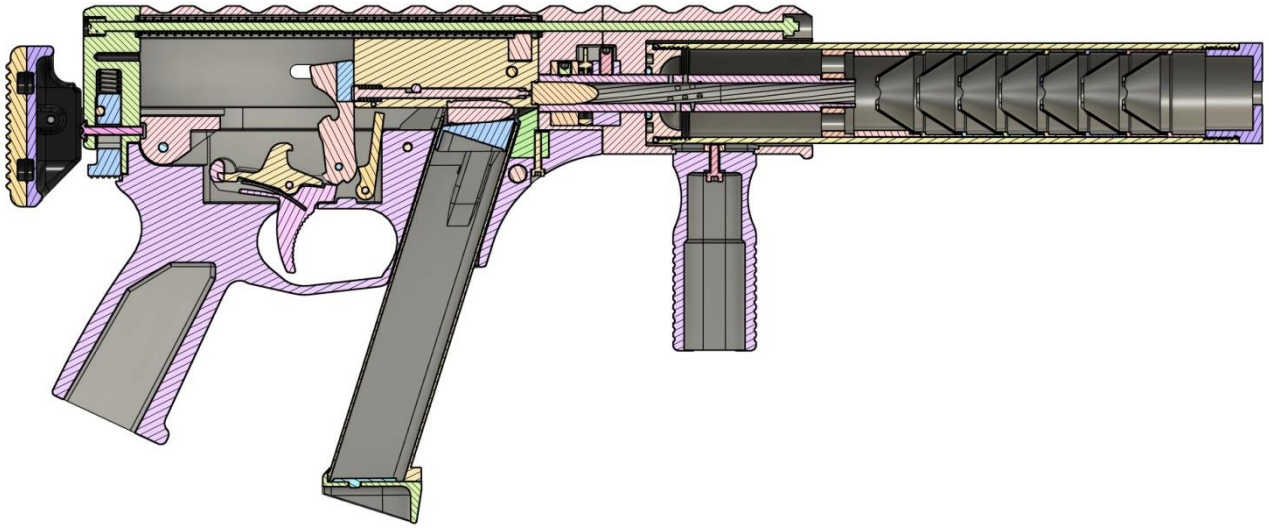
Technical specifications



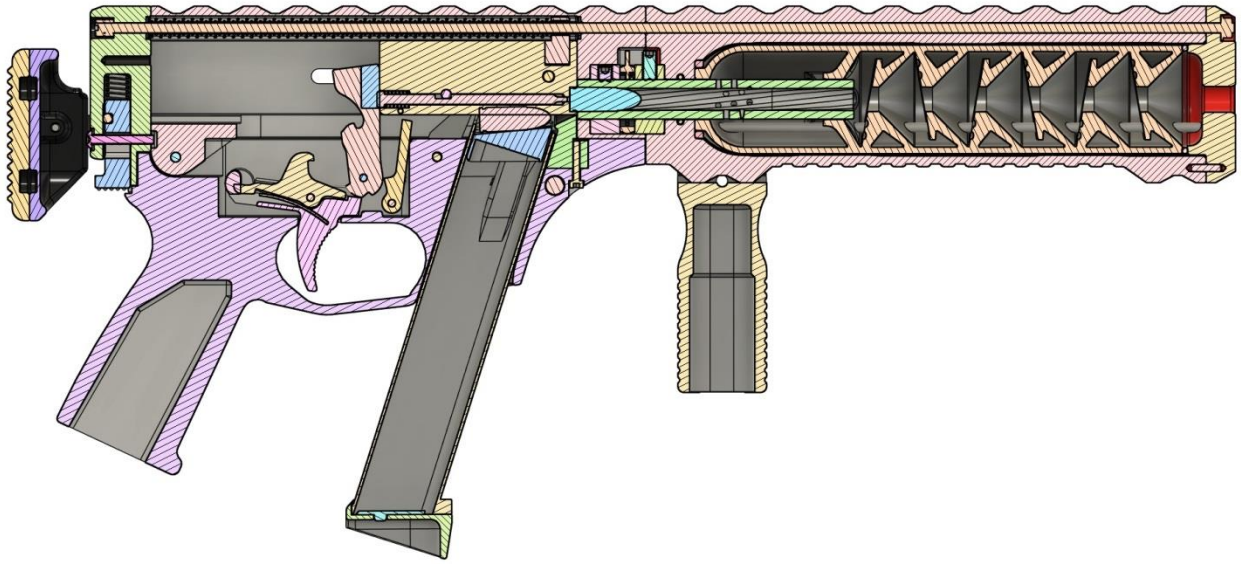
ROGUE-9

Type: PCC (Semi auto/Safe) or SMG (Semi-Auto/Safe/Full auto)
Designers: Advanced.Payment and ImmortalRevolt
Designed: November 2023 to August 2024
Bolt mass: 582 grams
Weight (unloaded): 2.0 to 2.3kg
Length: Super K - 304mm, Kurtz - 332mm, Short FTN3 - 456mm, Long FTN3 - 496mm, SD - 530mm
Barrel length: 74mm, 102mm, 112mm or 137mm
Caliber: 9x19mm LUGER
Action: Hammer fired, Closed bolt, Direct blowback
Feed system: 20rd, 25rd printed box magazine or 33rd OEM Glock magazine.

ROGUE-9 SD cut view



ROGUE-9 FTN3 Long cut view



ROGUE-9 Kurtz 3D view

3D printing

If you have never used a 3D-printer before, 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 have figured out how to print basic things that you can download from sites like thingiverse.com , you can go ahead with the ROGUE-9 build.
The next pages contain the general suggested settings for your printed parts. You can deviate from these settings based on your 3D-printer model, type of filament and general experience with 3D-printing.

These settings were optimized for the Creality Ender 3 in combination with the use of the Cura slicer program and Polymaker PLA Pro or PLA+ filament. The ROGUE-9 was designed to be printed in PLA+. Printing it in a material other than this could result in an unreliable, fragile or unsafe firearm. The ROGUE-9 is not suited to be printed in any type of nylon, when nylon absorbs water it gets soft and the threaded rods causes the entire upper assembly to bend.
ASA has shown to be an excellent material for the ROGUE-9 but it is much harder to print compared to PLA+ and requires a 65C heated print chamber and scaling the STLs to 100.35%.

Suggested print settings

Use these settings for best durability, fit and visual appearance.

Do not use too many walls, infill when printed correctly will always be stronger than walls and using too many walls will cause the print to be slightly off dimensionally and parts will not fit.
Four walls are perfect as it will allow for high amounts of infill without the risk of the infill showing through the outside wall.
Print at 220C nozzle temperature. Use 55C build plate temperature for the first layer and 50C for the rest of the print. Printing with a too hot build plate will soften the base of the print and allow it to flex, warp and even sag slightly from its own weight as the first few layers can compress over time.

To get the best adhesion on the build plate, mix 30% PVA based white wood glue with 70% water and apply it to the 30C temperature bed, use a piece of a sponge and rub the mix on the build plate. It might first act like water on wax, forming droplets but after rubbing it in for a while it will start to cover the bed. Wipe off the excess and let it dry then apply one more coat.

You have to let the bed cool completely before attempting to remove the prints from the build plate. Especially if you use a glass build plate, otherwise you may rip chunks of glass from the plate.
Use a stove cleaning razor scraper to remove the prints from the glass plate and BE CAREFULL not to cut yourself!
If you use a brim make sure to lift the brim all around the print to release the vacuum under the brim before trying to remove the print.
The included print removing tool that came with your printer will not work with this adhesion method when using a glass build plate.
Always save the sliced g-code to the computer first and then copy it to the SD card. Never save it directly to the SD card from CURA as there is a risk that the g-code gets corrupted.

These settings are the recommended general settings for CURA on a stock ender 3 but most of the settings should work for most printers.

If you suffer from weird clogs or under extrusion first check if your extruder arm is cracked, if it is intact then check out the image further down describing the Creality hotend spring MOD and enjoy clog free printing.

All STL files are correctly oriented by default, do not change the orientation of the parts.
Enable ALL settings in CURA, Expert mode!

Layer height - 0.16mm
Initial layer height - 0.2mm
Line width - 0.4mm
Wall line count - 4
Outer wall wipe distance - 0.4mm
Optimize wall printing order – YES
Print thin walls - YES
Z seam alignment – sharpest corner
Seam corner preference - smart hiding
Top surface skin layers - 0
Top layers - 2
Bottom layers – 2
Top/bottom pattern - lines
Top/bottom line directions - [ ]
Infill density – 100%
Infill pattern – lines
Connect infill lines - YES
Infill line directions - [45,90,135,180]
Infill overlap percentage - 25%
Infill overlap - 0.1mm
Printing temperature – 220C
Build plate temp - 50C
Initial build plate temp - 55C
Flow - 100%(may need tuning)
Support flow - 94%
Print speed Walls - 40mm/s
Print speed top/bottom - 40mm
Print speed infill - 40mm/s

Print speed Initial - 20mm/s
Print speed Supports - 50mm/s
Travel speed – 150 to 200mm/s
Enable print cooling Fan – YES
Fan speed – 80 to 100% (may need tuning)
MAX fan speed – 100%
Initial fan speed - 0%
Support overhang angle – 65 degrees
Support density – 15%
Support pattern - zig zag
Connect support zig zags - YES
Support brim - YES
Support brim width - 3mm
Support Z distance - 0.16mm
Support x/y distance - 0.5mm
Support interface - DISABLED!!!
Fan speed override –YES
Support skin fan speed - 100%
Nr of slower layers - 1
Enable Acceleration – YES
Print acceleration - 300mm/s
Travel acceleration - 1000mm/ s
Enable Jerk – YES (Set Print Jerk to 8)
Enable retraction - YES
Retract at layer change - YES
Retraction amount – 5mm (may need tuning)
Retraction speed - 45mm/s
Retraction MIN travel - 1.5mm
Z-hop when retracted – DISABLE!!!

Do not deviate from the general settings listed above unless it is required for your specific printer or the part specific print settings below tells you differently.

Only print one big part at a time, printing multiple big parts simultaneously significantly decreases the durability of the part and increases the risk of warping due to cooling in between layers.

Part Specific print settings

Use no supports and skirt:
JIG nr 1, JIG nr 2, JIG nr 3, JIG nr 4, JIG bolt bar cutter, JIG spring winder, JIG firing pin, JIG extractor, End mill depth spacer, Foregrip, CH knob inner/outer, Stock release button, Sights, Suppressor backcap tool, Suppressor tube drill JIG, Suppressor baffle drill JIG, Magazine locking plate, Mag catch bar and Mag release button (Print three mag release buttons at once to prevent overheating).

Use no supports, 5 walls, 103% flow, brim and Z-seam: user specified/back left:
Magazine housing.

Use supports to build plate only and skirt:
JIG worm gear reducer, JIG nr 6, JIG ejector, JIG bolt slot cutter, JIG ejector slot cutter, Splash guards, Collar spacer, FTN3 endcap, Stock, Butt pad and Suppressor backcap.

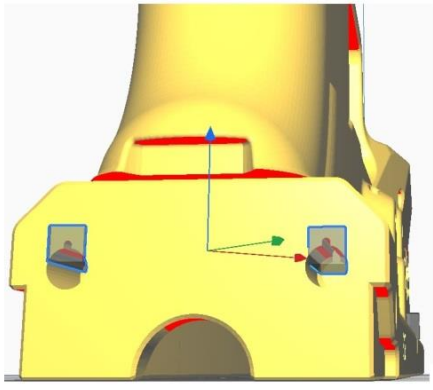
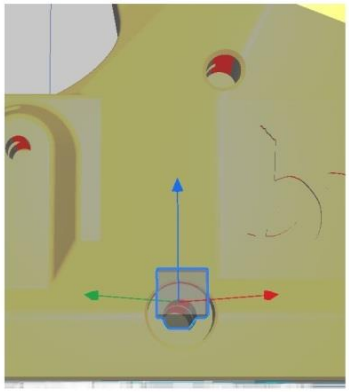
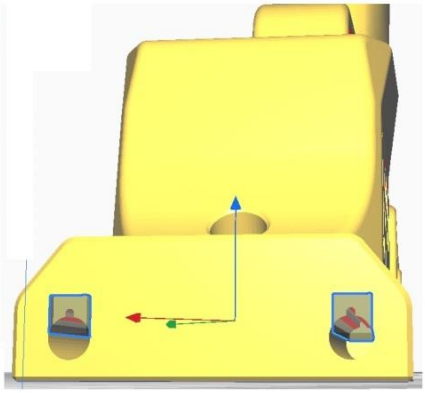
Use supports to build plate only, 25% support density and skirt:
Feedramp, Stock leg drill JIG, Magazine base plate, Magazine follower and Barrel retainer (Kurtz and Super K barrel retainers may need 55 degrees support overhang angle).

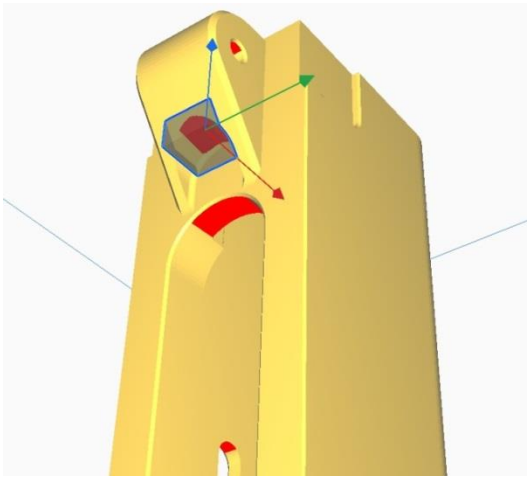
Use supports everywhere and skirt:
JIG nr 5, Headspacing JIG and Backcap.

Use supports everywhere, 30mm/s print speed, 25% support density, 104% flow and skirt:
Trigger, Hammer, Disconnector, OOB lever and Selector (Print two selectors at once to prevent overheating).

Use supports to build plate only, 8 walls, 45 degrees support overhang angle, 10% support density, 104% flow and brim:
FTN3 CORE.

Lower receiver - Use supports everywhere, 55 degrees support overhang angle and a 4mm brim. Place support blockers in the front and rear mounting pin holes and in the ejector screw hole as shown in the picture below. These holes are blind holes so there is no way to get the supports out. You first need to scale the support blockers to reach all the way to the bottom of the holes. Scaling is X: 50%, Y: 320% and Z: 50% for the front holes, X: 60%, Y: 290% and Z: 60% for the ejector screw hole and X: 50%, Y: 130% and Z: 50% for the rear holes. After you have scaled the blockers you need to rotate them in line with the holes and then move them so they protrude just slightly out of the lower.



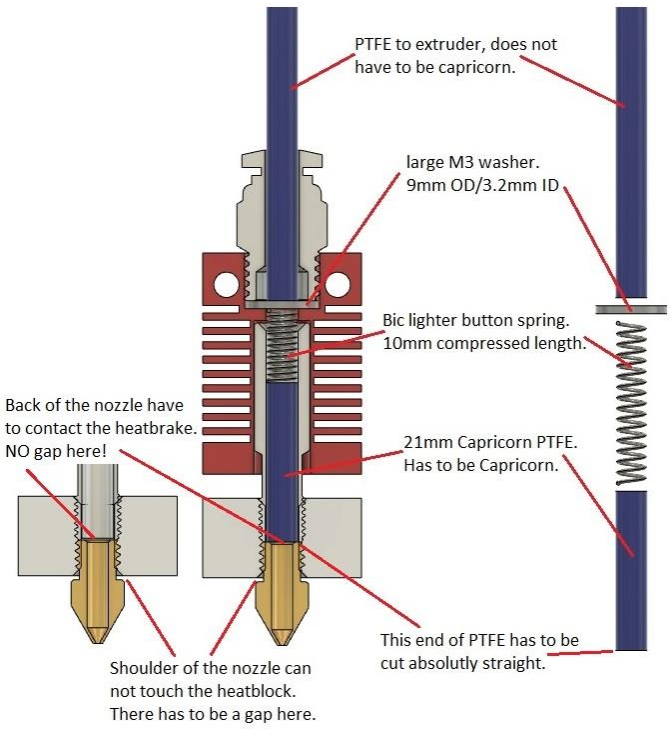
Upper receiver - Use supports to build plate only, 25% support density and skirt. Place a support blocker on the rear mounting lug as shown in the picture to the left.

The upper has a built-in support arc in the ejection port which is supposed to be removed after printing.

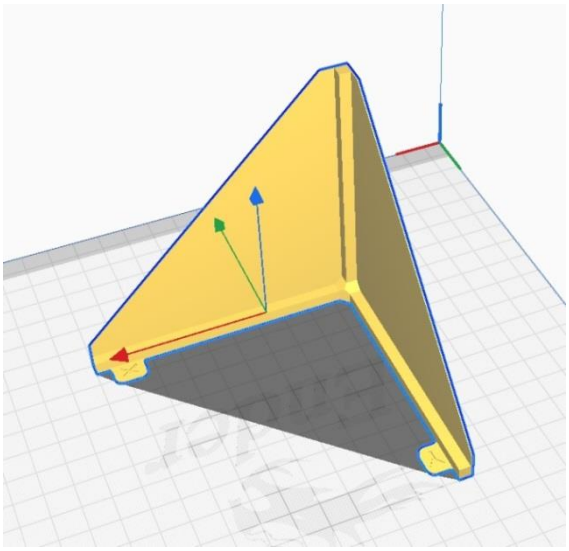
The image below illustrates the Creality hotend spring mod. On an unmodified hotend the PTFE tube is a single piece of tube that is held tight against the back of the nozzle by the PTFE coupler.
Over time the end of the original PTFE tube will deform and degrade due to heat from the nozzle and also the coupler's grip on the PTFE tube will weaken due to the coupler teeth slowly wearing down the PTFE tube.

This will cause the PTFE tube to slip in the coupler and backing out slightly, developing a gap between the nozzle and the end of the PTFE tube. The gap will fill up with molten plastic which get baked and hardens. The crusty, baked and burnt plastic in the gap will increase the drag on the extruding plastic, slowly reducing the flow and eventually completely blocking the nozzle.

The spring mod works by splitting the PTFE tube into two pieces. The upper PTFE piece is held by the PTFE coupler against an m3 washer directly below the coupler while the lower piece of the PTFE tube is actively and constantly pushed against the back of the nozzle by a compression spring. The spring is compressed between the m3 washer and the top of the lower PTFE tube.



Calibrating dimensional accuracy



Sometimes the printer's dimensional accuracy is not correct and a 20x20mm calibration cube is no good enough for fixing it. You need a much bigger calibration model which is why I designed this 100mm XYZ model.

Usually with PLA there is no need to calibrate but other materials like ABS and ASA will need it due to shrinkage of the material when it cools.

Use the setting called "scaling factor shrinkage compensation" to scale the XY and the Z until the printed model measures 100mm (+-0.05mm) in all three axis, use calipers and do not measure from the elephants foot.

Removing print supports

Removing print supports can be a nightmare but if you use the correct technique and print settings it is usually very easy. If the supports are inside a hole the best way to remove it is to use a rod or punch that is just slightly smaller than the hole and use it to punch the supports clean through the hole with a hammer.

If the support are inside a pocket or blind hole the best way to remove it is to push a flathead screwdriver down the middle of the support structure all the way to the bottom of the pocket and then wiggle it around, usually the support releases cleanly and pulls out in one piece when you remove the screwdriver.

If the supports are inside a narrow blind hole you can use a long board/skirting screw with small shank diameter and thread it into the middle of the supports. The torque from tightening the screw will often break the support loose from the bottom of the blind hole so it can be pulled out in one piece. For supports that are fully accessible like on the FCG parts pliers can be used to grab the support and rip it off cleanly, flathead micro screwdrivers are also good for getting in under the supports and prying them loose.

On the lower receiver you have what I call interlocking supports. That means that the main support structure in the FCG pocket is locked in place by the supports inside the FCG pin holes, in the selector hole and inside the trigger guard.

You first need to use a 2.5mm punch or similar to punch in all supports in the FCG holes, then use a 3mm or 3.5mm punch to punch in the support in the rear 4mm pin hole and a 6mm or bigger punch or rod to punch in the support in the selector hole. You can use a scrap piece of 3x10mm flat bar to punch the supports loose along the trigger guard bow.

Once these supports are no longer locking the main support structure in place you can use a flathead screwdriver and push it through the main support structure to the bottom of the FCG pocket and just pry the entire support structure out in one solid piece.

Bill of materials

250mm length of 30x30mm cold drawn square mild steel bar (enough to make three bolts).

s235, e235,EN3B or A36 grade steel. Low carbon steel like 1018 will work too but it will be harder to drill, tap and machine.

The IMPERIAL version uses 1-1/4” x 1-1/4” steel bar.

1000mm of 10x3mm cold drawn flat steel bar (enough to make two stocks).

Mild steel or low carbon steel.

The IMPERIAL version uses 1/8” x 3/8” steel bar.

1000mm length of 3mm diameter stainless steel rod.

2X - 1000mm length of 4mm diameter stainless steel rod.

100mm length of 6mm diameter stainless steel rod.

250mm length of 8mm diameter stainless steel rod.

2X - 1000mm length of 1mm diameter piano/music wire.

(Optional) 1000mm length of 1.2mm diameter piano/music wire.

(Optional) 100mm length of 2mm diameter piano/music wire or a spare 2mm drill bit.

2X - 1000mm length of m4 threaded rod, 12.9 grade or stainless.

250mm length of M6 threaded rod, any grade will work.

1X - Stainless steel capillary tube. 5mm OD, 4mm ID or 4.2mm ID, length 200mm.

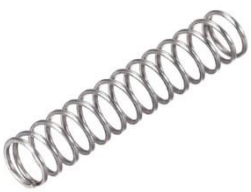
300mm length of 10mm OD, 6mm ID steel tube (mild or low carbon steel).

1X - Small diameter recoil spring: 7mm OD, 0.70mm wire diameter, length 300mm.

1X - Big diameter recoil spring: 9mm OD, 0.90mm wire diameter, length 300mm.

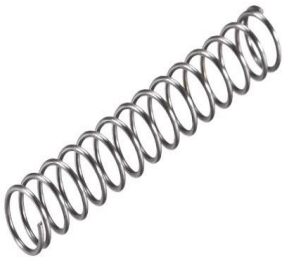
The recoil springs needs to be made from good quality spring steel like piano/music wire or manganese steel (65Mn).

2X - BIC Clic ballpoint pen, the spring inside the pen is cut in half to get two firing pin springs.



1X - Selector detent spring: 3mm OD, 0.4mm Wire diameter, length 15mm.

Stainless springs are okay.



1X - Mag release spring: 7mm OD, 0.7mm wire diameter, length 25mm.

Stainless springs are okay.

1X - Stock button spring: 10mm OD, 0.9mm wire diameter, length 30mm.

Stainless springs are okay.

3X - m3x16mm socket head screw.

3X - m4x20mm socket head screw.

1X - m4x100mm or M4x90mm socket head screw, 12.9 grade (for the firing pin, get some extras).

1X - m5x40mm socket head screw, 12.9 grade.

1X - m5x90mm socket head screw, 12.9 grade (for the extractor, get some extras).

2X – m6x70mm socket head screw, 12.9 grade.

5X - m4x25mm button head screw.

3X - m4x16mm countersunk screw.

1X - m6x12mm cup point set screw, 12.9 grade.

1X - m4x6mm flat point set screw (m4x10mm if you use the AR15 FCG lower).

8X - m4 washers, 9mm OD.

2X - m6 washers, 12mm OD.

4X – DIN 988 m6 washers/shims, 0.3mm thickness.

4X – DIN 988 m6 washers/shims, 0.5mm thickness.

11X - m4 nuts (regular standard nuts).

2X - m6 nuts (regular standard nuts).

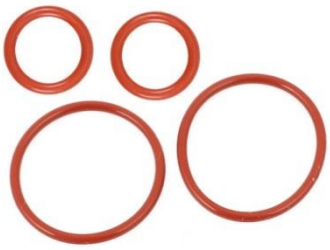
3X - m4 flange nuts.

3X - m6x30mm dowel nuts, 10mm OD with the threaded hole in the middle (get some extras).

2X - 16x28x12mm shaft collar with m6 set screw.

1X - 10x20x10mm shaft collar with m5 set screw.

1X - 6x12x8mm shaft collar with m4 set screw.



1X - O-ring 16mm ID x 2.5mm cross section (used on all integrally suppressed versions).

1X - O-ring 37mm ID x 1.5mm cross section (only used on the SD version suppressor).

1X - O-ring 40mm ID x 2mm cross section (only used on the FTN3 versions).

(Optional) Hardware for the printable sights.

1X - m3x28mm button head screw.

3X - m4x30mm socket head screw.

1X - m4x12mm set screw.

1X - m3 lock nut.

3X - m4 lock nut.

2X - m3x7mm washers.

1X - L'Oréal Paris Fix & Style Nr8 Hair Mousse 200 ml bottle or other brand that uses the same bottle, 190mm long and 44.8mm in diameter (only used for the FTN3 versions).

1X - Sawzall blade 24tpi or 25tpi (for the ejector, get some extras).

1X - Glock magazine spring from Ali Express or a complete OEM 33rd Glock magazine.

Some bicycle tires contains 1.3mm piano/music wire, you need approximately two meters of wire to make one extended magazine spring.

This manual does not cover making DIY magazine springs but it is possible to do so.

Polymaker PolyLite PLA PRO 1.75mm filament (you need two 1kg spools).

OR

Polymaker PolyLite ASA 1.75mm.

Polymaker supports 3D printed guns, show them some love back!

Tools and supplies

Decent quality digital calipers.

Bench vice.

Electric drill with chuck wrench, 220volt with variable speed control.

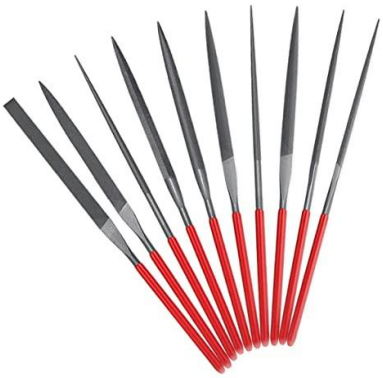
If your electric drill has a handle or fore grip, remove it since it will create uneven pressure when drilling leading to less straight holes.

Battery drill with high and low gear.

Cheap dremel tool knock-off with a few cutting discs.

(Optional) Angle grinder with a grinding disc.

Standard size flat metal file with medium double cut teeth.



Needle file set, it needs to include a 4mm diameter round file.

Sand paper, 80grit regular, 320, 400 and 800grit wet & dry.

2mm, 2.5mm, 3mm, 4mm, 5mm and 6mm allen keys.

Adjustable crescent wrench.

7mm and 10mm hex socket, extension and spanner.

Hacksaw with a new 24tpi metal blade.

Do not use crappy old blades.

Flathead screw drivers, micro, small and medium size.

Needle-nose pliers.

Strong wire cutters.

Snap blade knife

Safety glasses.

Info about the 4.5mm and 5mm DIN 340TF drill.

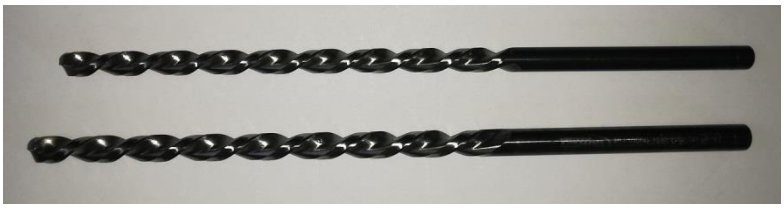
If you can you should get DIN 340TF drills with item number 10110450 (4.5mm x 126mm long) and 10110500 (5mm x 132mm long) from a brand named FORMAT or an equivalent premium quality drill manufacturer like Gühring. These drills are long HSS cobalt drills with a 38 degree flute angle specifically made for drilling deep straight holes in steel.

The DIN 340 drills are longer than standard DIN 338 drills. Because of the cobalt content, the drills needs to be manufactured by profile grinding instead of press and roll forming which makes the drills much more precise and better for drilling straight holes.

The TF drills has a 38 degree flute angle compared to the 35 degree flute angle of a regular drill, because of this they are much stiffer than regular drills which also helps them make straighter holes.

The end mills should be HSSE, HSS-CO or HSS-CO TiAIN, do not buy carbide end mill cutters as they are too brittle and not suitable for use in the milling JIGs.

Do not buy the HSS-CO drills, end mills or the drill bushings from Ali Express, they are bad quality, off spec and more expensive in the long run. Order them from a quality tool supplier.



4.5mm and 5mm DIN 340TF drills with 5% cobalt.

2mm, 4mm, 7mm and 10mm standard length DIN 338 high quality HSS-CO (5% cobalt) drills.

The HSS-CO drills are only used when making the bolt.

3mm, 3.5mm, 4mm, 6mm, 8mm and 11mm standard length HSS drills.

Optionally the 3mm, 4mm, 6mm, 8mm and 11mm HSS drills can be replaced with straight flute reamers.

12mm and 16mm countersink bits.

m5 and m6 threading taps.

Threading tap handle.

Pin punches 2.5mm, 3mm, 5mm and 8mm

Scrap pieces of steel rod and allen screwdrivers will also work as punches for light work like removing supports and punching out pins.

1X - DIN 844 (DIN 844K) standard length 10mm end mill with four cutters.

Cutting diameter 10mm, shaft diameter 10mm, cutting length 22mm and total length 72mm.

2X - DIN 844 (DIN 844K) standard length 2mm end mill with four cutters.

Cutting diameter 2mm, shaft diameter 6mm, cutting length 7mm and total length 51mm.

1X - DIN 844L long 7mm end mill with four cutters.

Cutting diameter 7mm, shaft diameter 10mm, cutting length 30mm and total length 80mm.

DIN 179 drill bushings, style A. Try to get the ones made by Ockert.

2X - 2.0x5x9mm (medium).

2X - 4.0x7x12mm (medium).

2X (4X is recommended) - 4.5x8x12mm (medium).

2X (6X is recommended) - 5.0x8x12 (medium).

1X - 6.0x10x10mm (Short).

1X - 6.0x10x16mm (medium).

2X - 7.0x12x16mm (medium).

3X - 10.0x15x20mm (medium).

Cutting fluid for drilling and tapping holes (motor oil will work).

Ballistol or WD-40 universal oil.

Silicone oil lubricant.

Wheel bearing grease or other type of thick lubricating grease.

JB weld or other brand of metal epoxy.

Flexible glue with a syringe applicator tip like E6000, B-7000, T-8000 or similar.

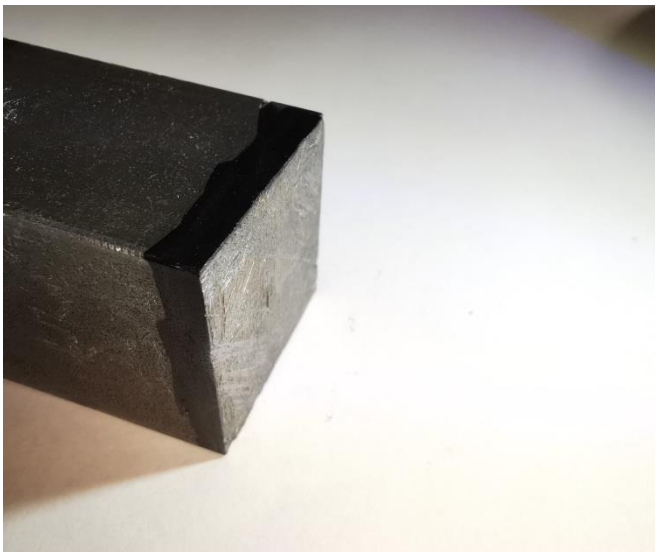
Recommended accessories

Cleaning kit for 9mm.

Red dot sight (some cheap Chinese copies will hold zero).

Cheap “Daniel Defence” iron sights clones.

Making the bolt



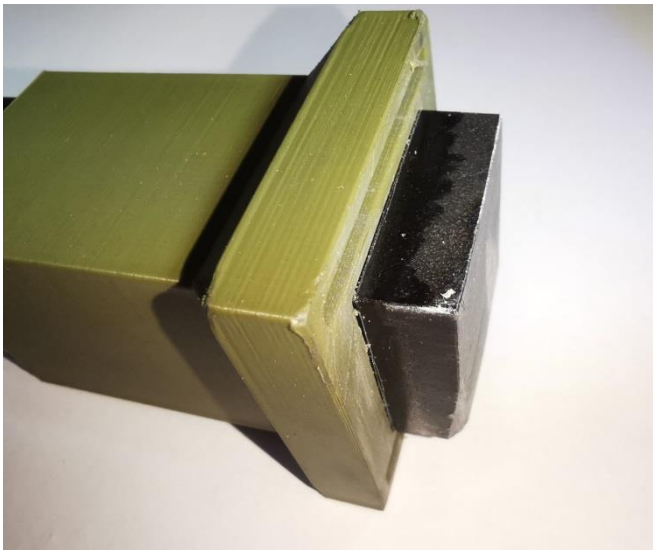
Use a file to file one end of your 30x30mm steel bar as straight as possible.

You can use a black marker, the Cutter JIG and a utility knife to scribe lines that can be used as reference lines when filing the bolt.

When you are done the end of the bar should look like this. If it is too far from being straight it might be better to cut the bar using the method described below.

Chamfer the edges at the end of the bar very slightly (no more than 0.2mm chamfers) and then file 1mm chamfers on the edges along the length of the bar, this makes installing and removing the JIGs much easier.

Use a black marker to lay down a band of ink around the bolt approximately 80mm from the straight end of the bar and then use calipers to scribe a mark 80.5mm from the straight end of the bar.

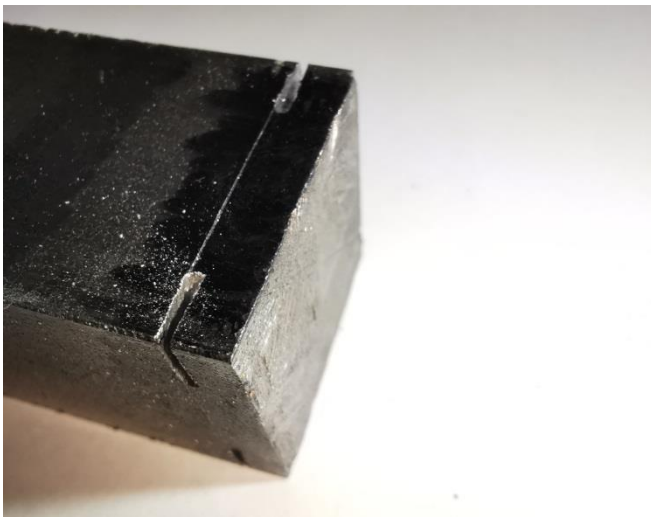


Slide the cutter JIG onto the bar until it is aligned with the mark you made previously.

If the JIG is tight you can hold a block of wood or steel against the end of the JIG and drive it using a hammer.

Use a utility knife to scribe a line against the JIG around all four sides of the bar.

Remove the JIG from the bar by driving it back with the wooden block and hammer so it does not shave off the ink and the line that you scribed around the bar previously.

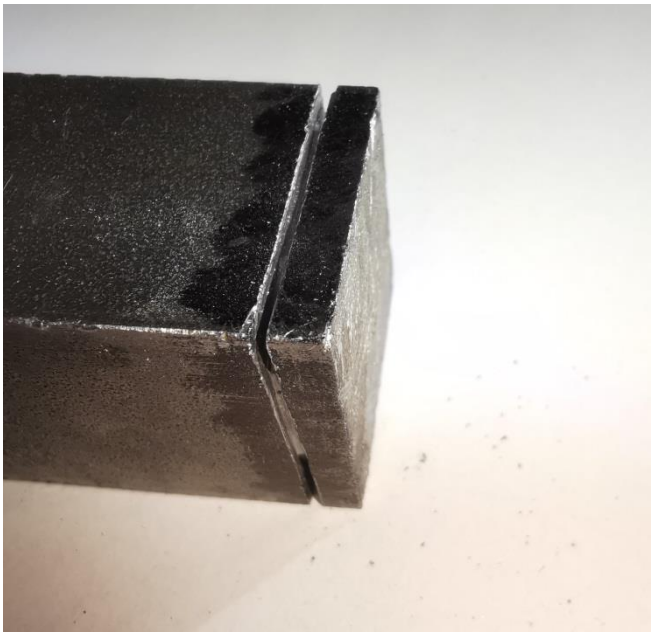


Mount the bar diagonally in the vice and use a hacksaw to cut into the corners.
Make sure you cut at the correct side of the scribed line so your bolt does not end up short.

When you start cutting initially it is easiest to hold a finger against the side of the blade to guide it and to pull the saw backwards.
Cut only a few mm into the corner and then repeat for the other three corners.

Once you have cut deep enough you can start doing back and forth motions with the saw.

Angle the saw at a shallow angle and cut approximately halfway across the bar.
Repeat for all corners.



Angle the saw in the opposite direction and cut from the other corner until the cuts meets in the middle.
Repeat for all corners.

You have now a straight cut around the entire bar. Use this cut to guide the blade and alternate between cutting straight across the bar and cutting into the corners.

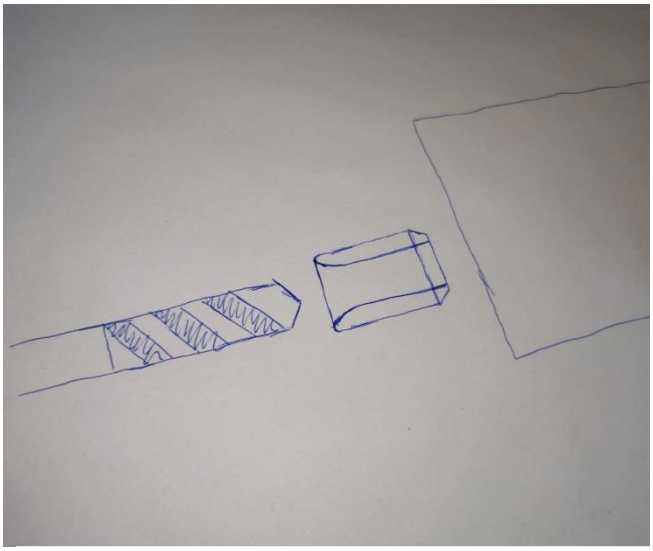
Turn the bar around in the vise as you cut deeper until the bar is completely cut through.

File the end of the bar smooth, take care to file it straight. It is easier if you turn the bar around in the vice and alternate between mounting it straight and diagonally while you file it, use a square to measure if it is straight.

Once it is smooth and straight, wright BF for “bolt face” on the straightest end of the bar.

This is going to be helpful for keeping track of orientation when you install the various drilling and milling JIGs on the bar.

Chamfer the top and side edges on the end of the bar with the BF text slightly (0.2mm chamfers) but leave the bottom edge un-chamfered.

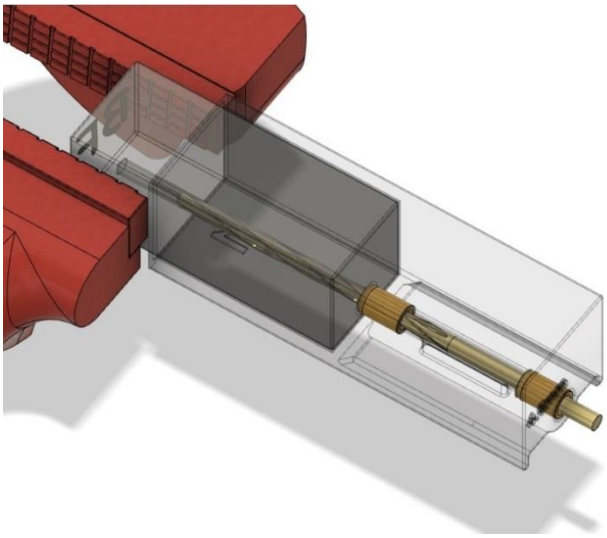


When installing the DIN 179 drill bushings in the JIGs, make sure you install them oriented as in the drawing.

The end of the insert that is chamfered on the outside should always be oriented towards the bolt bar and the end that is rounded on the inside should always be oriented towards the drill bit or end mill.

All JIGs have two bushings per drill guide hole, on some of the JIGs the bushings are installed from each side of the JIG and in some they are both installed from the drill side only. Sliding the inserts onto a small screwdriver and using it to guide the inserts into the holes makes it easier to install them from the inside of the JIG.

Make sure they are installed flush, you can use the bolt bar to drive the inner insert so it is flush with the inside of the JIG and a scrap block of steel and a hammer to drive the outer insert so it is flush with the outside of the JIG.

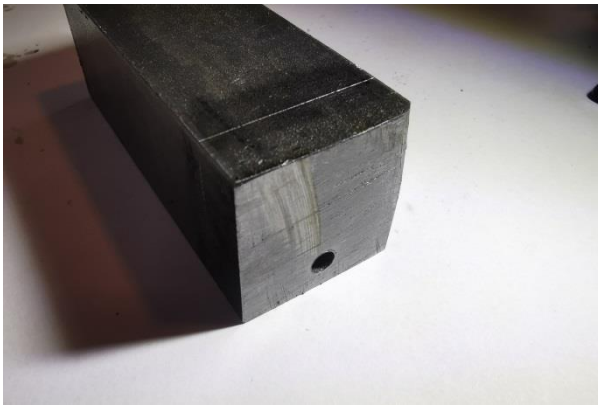


Install two 4.5mm bushings in JIG nr 1, you need to install the outer bushing from the outside and the inner bushing from the inside.

Install the bolt bar inside JIG nr 1 oriented as in the picture, notice how the letters ”BF” on the bolt face is used to keep track of the orientation.

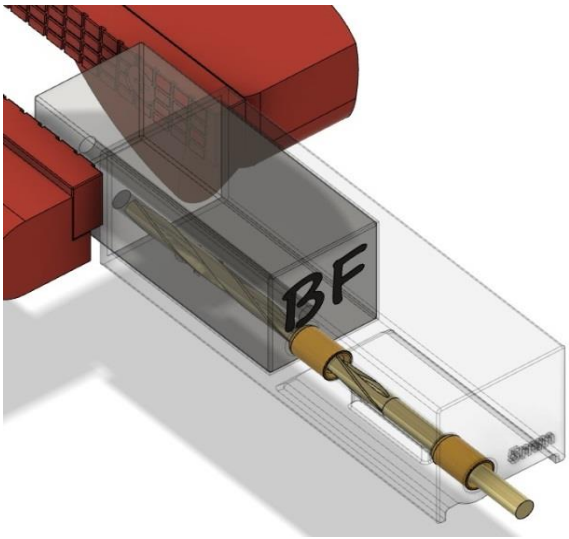
Use a 126mm long x 4.5mm hss-co drill bit and drill EXACTLY 75mm deep into the bolt, use the caliper depth gauge to measure this. Use very little pressure in the beginning. Do not drill too fast and do not push too hard, if the drill bit bends or bows the hole will not be straight.

Clear the shavings, wipe the drill bit clean with a cloth and dip it in oil frequently. Always start drilling with the drill bit chucked far into the chuck just behind the fluted section, this minimizes the flex in the drill bit resulting in a straighter hole. As you drill deeper, move the drill bit out further in the chuck bit by bit until it cannot be moved out any further. Drill as deep as possible with the JIG installed, then remove the JIG and continue to drill the last bit without it.



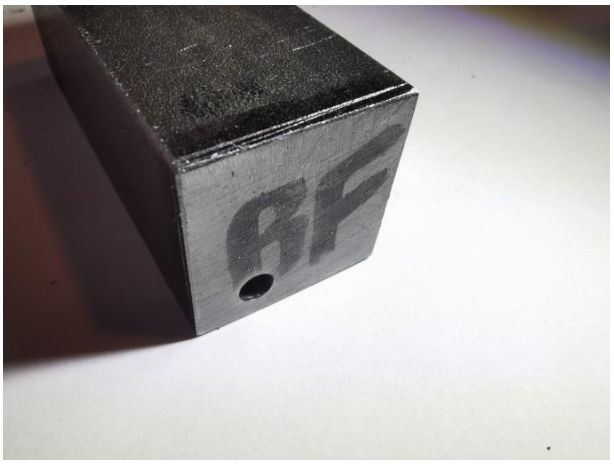
The backside of the bolt should now look like this.

The 4.5mm bushings can be punched out in reverse of how you installed them but it is a bit tricky, it is recommended to buy four 4.5mm bushings and leave the ones in JIG nr 1 installed.



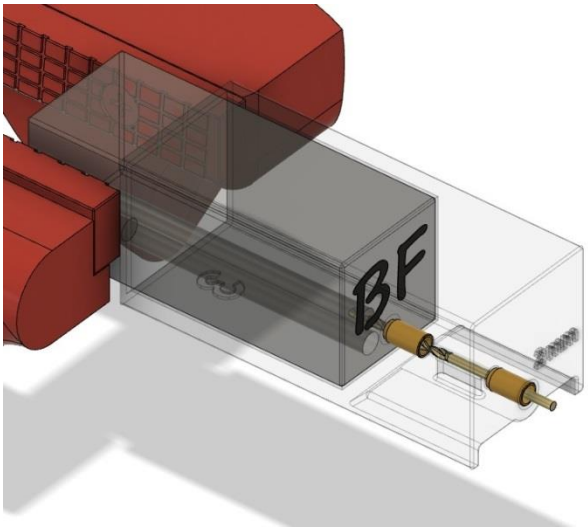
Install two 5mm bushings in the bottom hole of JIG nr 2, you need to install the outer bushing from the outside and the inner bushing from the inside.

Install JIG nr 2 oriented as in the picture. Use a 132mm long x 5mm hss-co drill bit and drill 61mm deep into the bolt, use the caliper depth gauge to measure the depth.



The bolt face side of the bolt should now look like this.

The 5mm bushings can be punched out in reverse of how you installed them but it is a bit tricky, it is recommended to buy six 5mm bushings and leave the ones in JIG nr 2 installed.

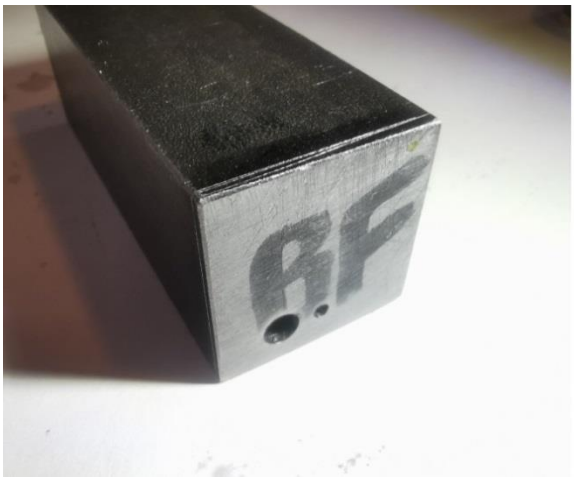


Install two 2mm bushings in JIG nr 3, you can install both bushings from the outside, make sure the inner bushing is fully seated in the JIG before installing the outer bushing.

Install JIG nr 3 oriented as in the picture. Use a standard length 2mm hss-co drill bit and drill through the bolt face.

The 2mm bushings can be removed easily by punching them through the JIG from the outside.

The bolt face side of the bolt should now look like this. Hold the bolt face up against a light source while looking through the hole in the back of the bolt and make sure that the 2mm hole in the bolt face is relatively centered with the 4.5mm hole.



Use the calipers to measure the thickness of the printed end mill spacer that is approximately 3mm thick. Place the spacer on a piece of 80 grit sandpaper and sand it on both sides with a circular motion until its 2.95mm thick.

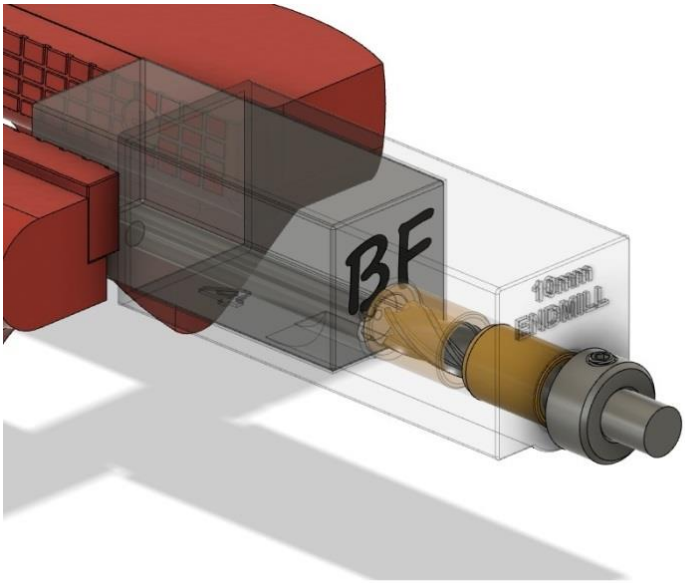
Install two 10mm bushings in JIG nr 4, you need to install both bushings from the outside. The bushings can easily be removed by punching them through the JIG from the outside.

Install the bolt bar into JIG nr 4 and make sure it is oriented correctly and fully seated in the JIG. Insert the 10mm end mill in the JIG and make sure it touches the bolt face, then place the printed spacer on the end mill shaft and push it against the JIG.

Place the 10mm shaft collar on the end mill shaft and align the setscrew 90 degrees to the end mill mounting notch so it does not disturb the setscrew hold on the end mill, push on the shaft collar and on the end mill simultaneously while tightening the shaft collar set screw. The set screw needs to be tightened fairly hard but do not strip the setscrew or allen key as you need to be able to remove the shaft collar from the end mill later.

Remove the end mill from the JIG and slide off the printed spacer, the end mill is now set to mill 2.95mm deep.

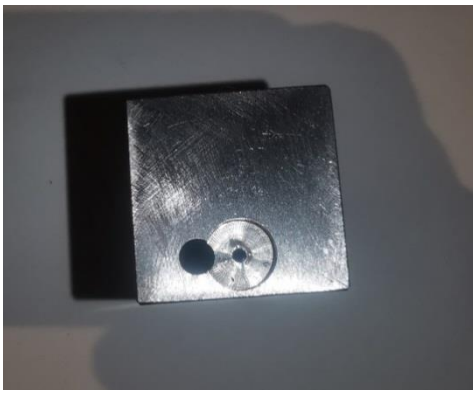




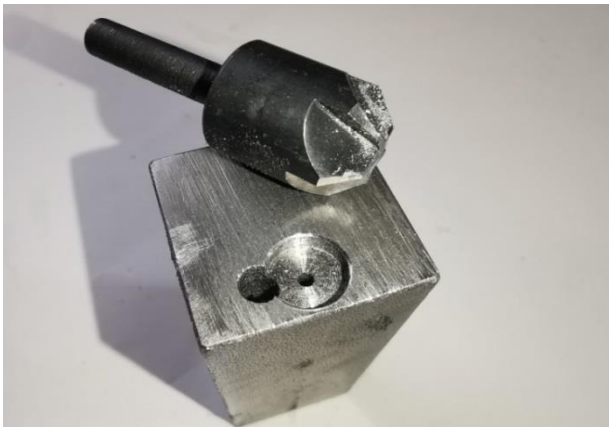
Install JIG nr 4 oriented as in the picture. Use the 10mm end mill to mill into the bolt face using light pressure.

Clean the metal shavings from the hole and from the end mill and apply oil to the end mill frequently, stop when the shaft collar is touching the JIG and you can feel that the end mill is no longer cutting.

Use the caliper depth gauge to confirm that the depth is between 2.95mm and 3.00mm. If it is more than 3.05 mm you might need to file material off the bolt face.



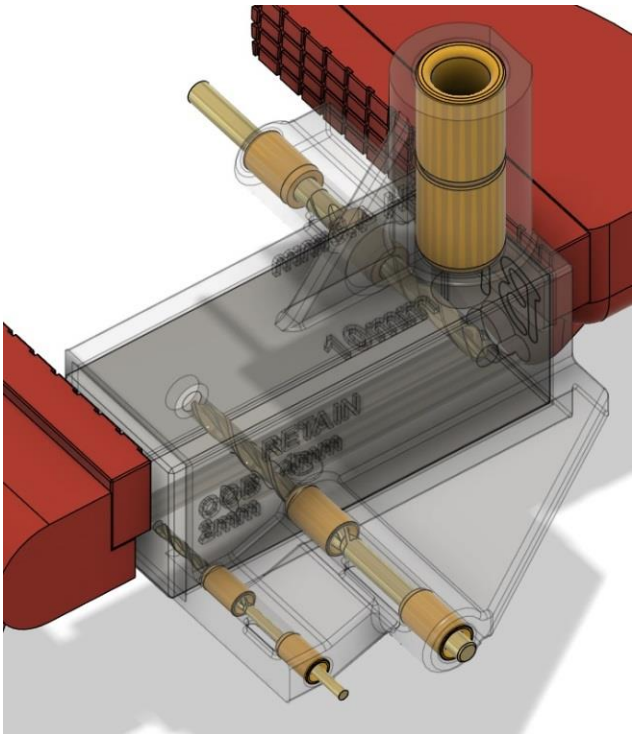
The bolt face side of the bolt should now look like this.



Use an angle grinder to grind down the tip on the 16mm countersink bit while spinning it in the battery drill until the new flattened tip is approximately 8mm in diameter. Use the modified countersink bit to slightly chamfer the edge around the milled 10mm recess.

Be very careful and apply only very light pressure when you chamfer the edge.
The chamfer increases feeding reliability as the cartridge rim can slide into the recess easier.

On JIG nr 5, install two 2mm bushings, two 4mm bushings and two 4.5mm bushings on the sides of the JIG and then install two 10mm bushings on the top of the JIG. You need to install all bushing from the outside on JIG nr 5, all bushings in JIG nr 5 can be removed by punching them through the JIG from the outside.

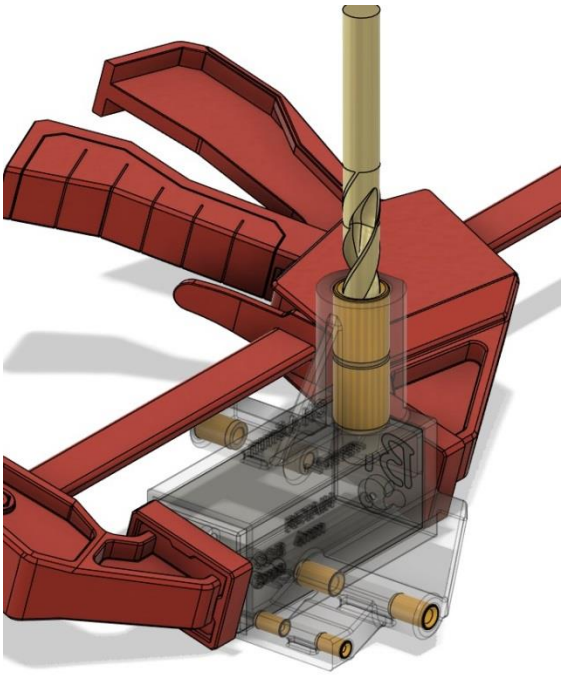


Install JIG nr 5 onto the front of the bolt oriented as in the picture. Use a 4.5mm standard length drill bit to drill 27mm deep into the left side of the bolt. Use the caliper depth gauge to measure the depth.

Use a 2mm standard length drill bit to drill 15mm deep into the right side of the bolt, use a piece of piano wire or similar to measure the depth. Do not drill the 2mm hole if you are building the SEMI or AR15 version.

Use a 4mm standard length drill bit to drill completely through the bolt from the right side. Because the 4mm drill goes through both the extractor channel and the firing pin channel you need to drill very carefully with very low pressure after breaking through into the channels so the drill bit does not bow and wander against the curvature inside the channels.

The rear right side of the bolt should now look like this.

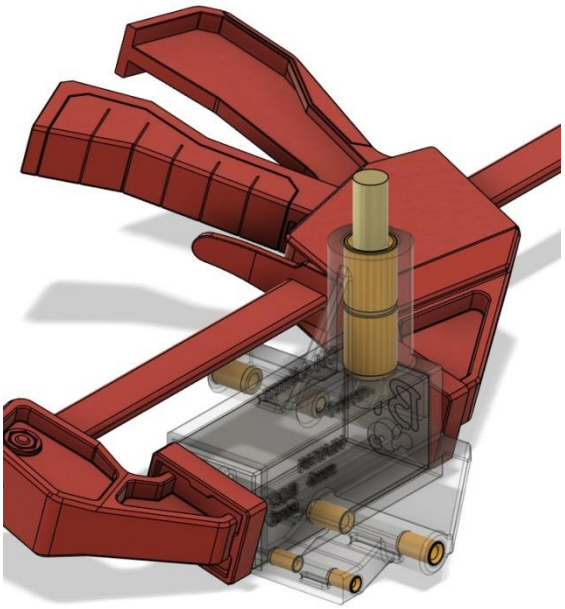


Use a clamp to hold the bolt and JIG together as in the picture. By doing this you can place the JIG on the floor and get much stronger down force when drilling the 10mm hole. Put the JIG between your feet to prevent the JIG from spinning.

Use a 10mm standard length drill bit to drill 10.5mm deep into the top of the bolt.

Use the caliper depth gauge to measure the depth from the top of JIG column to the bottom of the 10mm diameter hole in the bolt.

Measure at the center of the 10mm diameter hole and when the distance measured is 50.5mm the deepest point of the hole in the bolt will be 10.5mm deep.

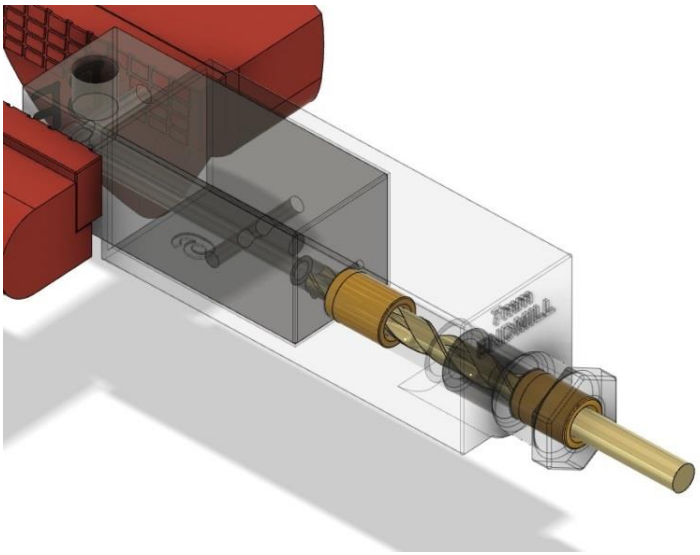


Use a 10mm end mill to square off the bottom of the 10mm diameter hole in the top of the bolt.

You can tell when you are deep enough by looking at the remaining dimple at the center of the hole that the tip of the 10mm drill bit made during the previous step.

When the dimple is approximately 2.5mm in diameter you are deep enough.

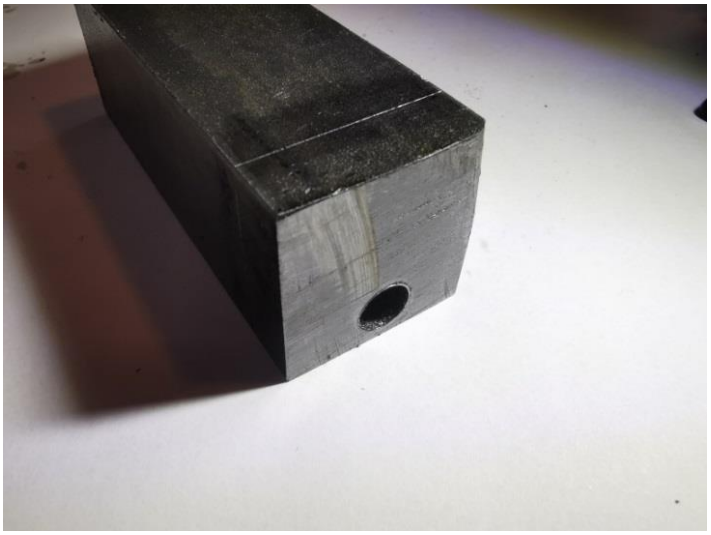
The left side and top of the bolt should now look like this.



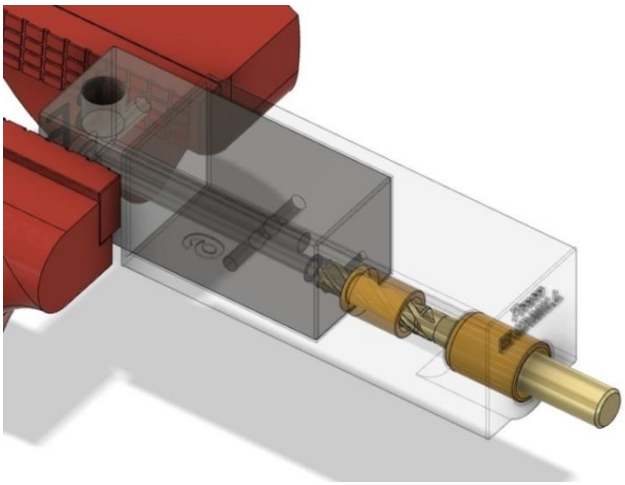
Install one 7mm bushing in the inner position of JIG nr 6 and one 7mm bushing in the separate bushing adapter.

Install JIG nr 6 onto the back of the bolt oriented as in the picture and then install the bushing adapter into the outer bushing position of the JIG.

Use a 7mm standard length drill bit to drill 10mm deep into the previously drilled 4.5mm hole in the back of the bolt. Remove the bushing adapter.



The back of the bolt should now look like this.



Remove JIG nr 6 from the bolt and install a 10mm bushing into the outer bushing position of the JIG.

Re-install JIG nr 6 onto the back of the bolt the same way as before and use a 7mm end mill to mill 12mm deep, use the caliper depth gauge to measure the depth.

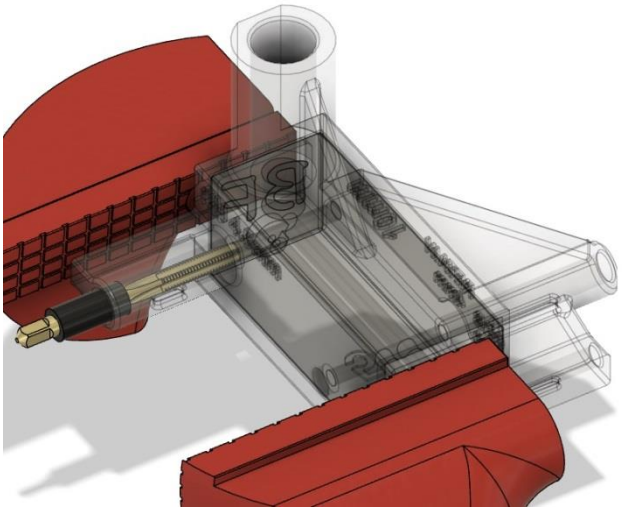
This is done to square the firing pin spring pocket so the end of the spring rests on a flat surface.

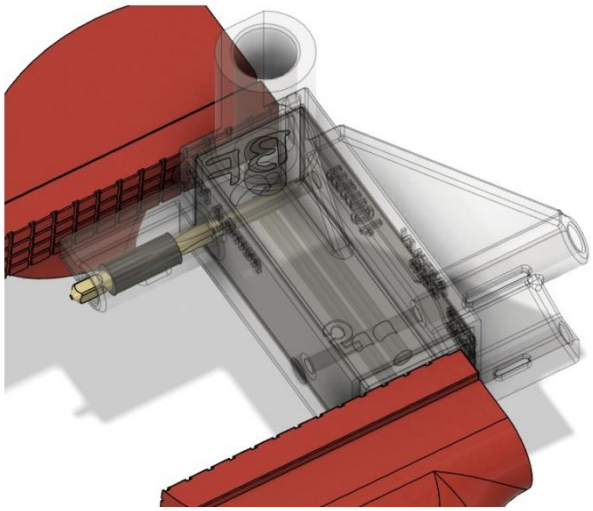
The 7mm bushings in JIG nr 6 can be removed easily by punching it through the JIG from the outside through the 10mm bushing, after that the 10mm bushing can be punched out from the inside of the JIG. The 7mm bushing in the bushing adapter can be punched out from the small end of the adapter.

Remove all inserts from JIG nr 5 and install the JIG on the front of the bolt oriented like in the picture below. Use electrical tape to tape up the shaft of the M5 threading tap until it has a snug fit in the 4.5mm drill guide of the JIG. This ensures that the tap cuts the threads for the charging handle perfectly straight.

Cut the threads by hand carefully using a thread tapping handle and plenty of oil on the tap, turn the tap half a turn at the time and then back it out slightly to break the shavings off. Repeat this until you cannot go deeper due to the JIG getting in the way.

If it seems like the tap is hard to turn at any time, STOP before the tap breaks. The tap should never be hard to turn, it should turn with not a lot of resistance due to the charging handle hole being 0.3mm oversized compared to the standard M5 recommended hole specification of 4.2mm.





Remove the tap and then remove the JIG from the bolt. Clean out the shavings and re-insert the tap and continue to thread the hole deeper without the JIG until the threaded section of the tap is fully inside the hole. Clean out the shavings frequently.

The bolt should now look like this.

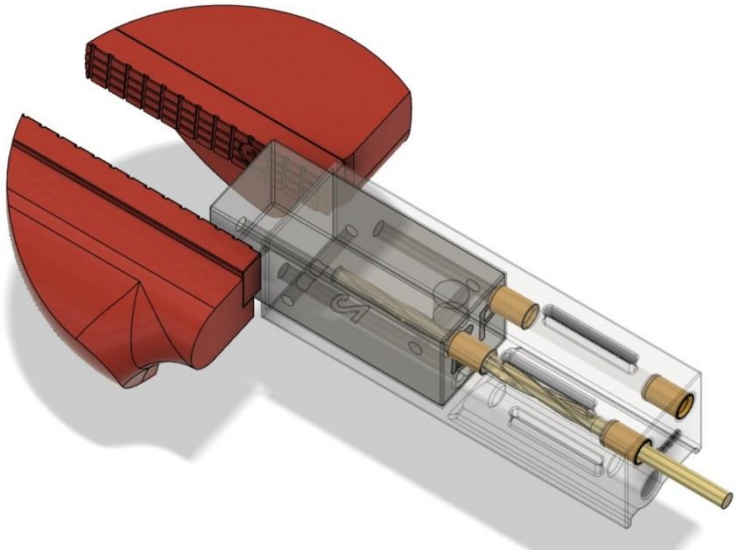
Now it is time to drill the two holes for the anti-bolt bounce system (ABB). The ABB brings the bolt weight up +50 grams and besides working to reduce bolt bounce it also works as a cyclic rate stabilizer and rate reducer.

The ABB system is optional and is not needed for the gun to function but it is worth the time as it improves the recoil impulse and the smoothness. It also increases reliability in full auto mode.

The ABB system is super simple and consists of one 35mm long and one 33.5mm long, 10mm OD and 6mm ID steel tubes that slides with 3mm and 1.5mm of play on two m6x70mm socket head screws that are mounted in the two ABB holes in the bolt face.

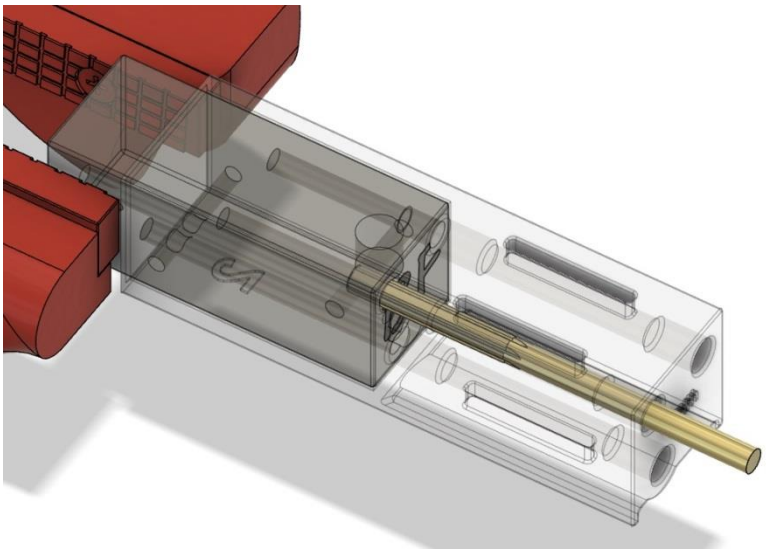
The sliding tubes of the ABB acts as two independent dead blow hammers that slams into the socket heads of the screws milliseconds after the bolt has slammed into battery. The inertia force of the tubes counteracts on the bolt when it tries to bounce back and forces it into battery again.

Install two 5mm bushings in each one of the two top holes of JIG nr 2, you need to install the outer bushing from the outside and the inner bushing from the inside. If you only have two 5mm bushings you need to move them to the second top hole after you drilled the first hole.



Install JIG nr 2 oriented as in the picture. Use a 132mm long x 5mm hss-co drill bit and drill 44mm deep into the bolt.

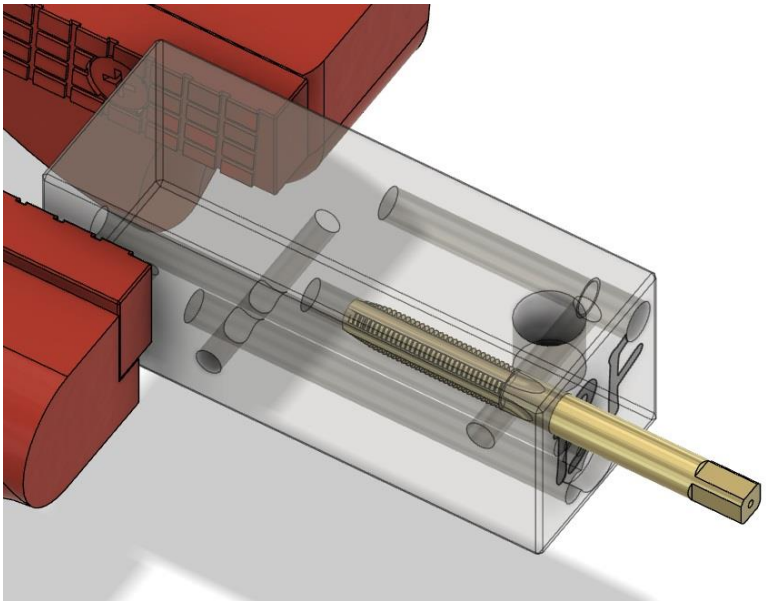
Use the caliper depth gauge to measure the depth, repeat for the second hole.



Remove the 5mm bushings from JIG nr 2 and re-install the JIG on the bolt. They can be punched through the JIG from the outside (this only applies to the top bushings in the JIG).

Ream or drill out the holes 12mm deep with the 6mm reamer or drill bit.

This is done so the unthreaded section of the m6x70mm socket head screws will fit partly into the holes.



Remove the JIG and then thread the holes with a M6 tap as deep as the tap can possibly reach.

Just like with the charging handle hole that you threaded previously you will not be able to thread the ABB holes all the way to the bottom but that is fine and we have a solution for that later.

Use oil and be careful, remove shavings frequently.

The bolt should now look like this.

Now it is time to cut the bottom slots in the bolt which will make the bolt able to clear the magazine feed lips and create the cartridge pickup. We will start by making the feed mechanism for the bolt slot milling JIG.

Cut a 220mm long piece of m6 threaded rod and then chamfer both ends of the rod.

Install two m6 nuts on one end of the rod with a bit of JB weld on the threads, and then tighten the nuts hard against each other until the flats of the both nuts are aligned. This is called a jam nut.

Drill out the threads on one of the m6x30mm dowel nuts with a 6.5mm drill bit. Try to drill it as straight as possible.

Cut down another m6x30mm dowel nut in length so one end is 6mm long and the other end is 10mm long, counting from the center of the threaded hole. Do not drill out the threads on this dowel nut. Chamfer both ends of the dowel nut.

Install two m6 washers on the threaded rod, then slide on the drilled dowel nut and last thread on the shortened dowel nut.

The feed mechanism is now done.

Now we need to make the reducer gearbox, its job is to reduce the speed of the feeding mechanism which is driven by a battery drill. Print the parts for the gearbox reducer, it is two gearbox housing halves and two gears all included in one STL file.

Cut a 70mm long piece of 4mm OD stainless rod and chamfer both ends.
File a 35mm long flat on one end of the rod until the distance from the round side to the flat side is 3.4mm.

Cut a 160mm long piece of 8mm OD stainless rod and chamfer both ends.
File a 18mm long flat on one end of the rod until the distance from the round side to the flat side is 6.9mm.

File the other end of the 8mm rod square, make the square section 10mm long and with a flat to flat distance of 6.2mm.

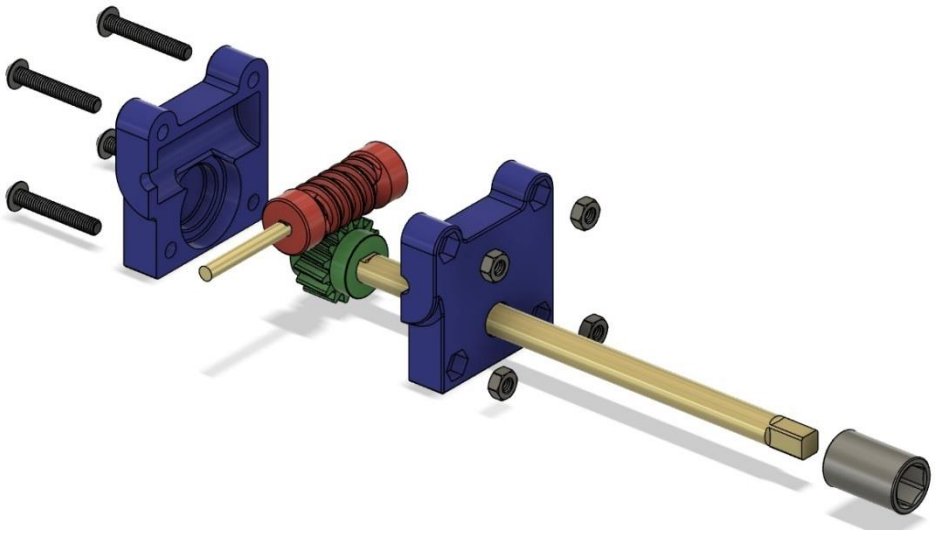
Test fit a 10mm hex socket on the square side of the 8mm shaft, if it does not fit then file it more.

Heat the D-Shaped section of the 4mm rod to around 50 or 60 degrees C and then press it fully into the D-shaped hole in the worm gear. Now heat the 8mm rod and press it fully into the other gear.

Pack the gears and the gearbox housing full with grease to prevent friction and heat from melting the gearbox, do not skip this step. Follow the picture below to assemble the reducer gearbox.

Insert four m4 nuts in the output half of the gearbox housing (8mm side) and then install the 8mm shaft. Install the worm gear with the 4mm shaft and then close up the gearbox with the other half of the gearbox housing.

Install four m4x25mm screws and tighten them just past snug, do not over tighten the screws. The gearbox should only be operated from the 4mm input shaft, do not turn the 8mm shaft as this can damage the gearbox. Chuck your battery drill to the 4mm shaft and make sure the gearbox works smoothly. The gearbox has an expected lifespan of a couple of bolts and will eventually get heavy to drive and then break down due to melting of the bearing surfaces, reprint the gearbox parts and use the old hardware to build a new gearbox if needed.



Connect a 10mm ID hose to the hose fitting on the slot milling JIG, sometimes heating the end of the hose slightly makes it easier to install it. The hose is for water cooling the JIG, end mill and also for flushing out the shavings when we are milling the slots in the bolt.

The hose will later need to be connected to a stabile water source like a faucet, garden hose or similar. You will probably need an adapter fitting that fits your water supply.

Insert the bolt in the slot milling JIG and push it through the JIG a few times until it slides freely inside the JIG. If it does not fit or if it is hard to slide through the JIG, heat the bolt with a hot air gun to 50 or 60 degrees C and then push it through the JIG. This should loosen up the fit and make it slide easily.

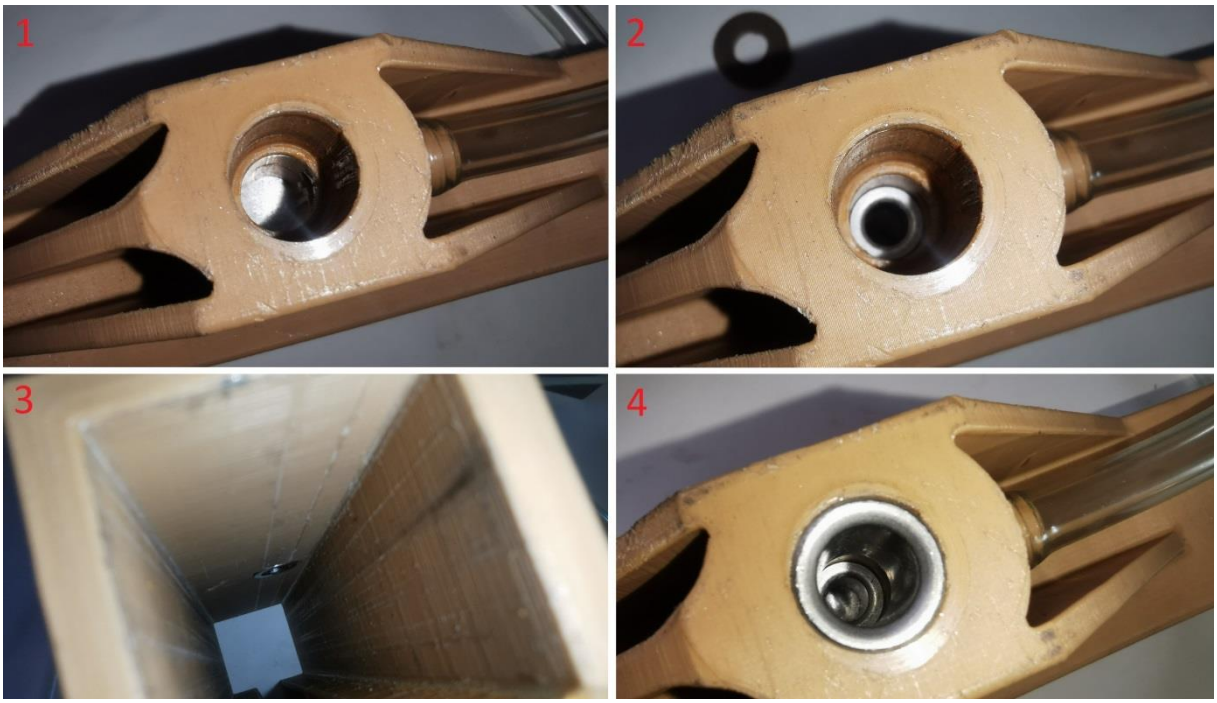
Insert the bolt in the JIG again so it blocks the bushing pocket from the inside then insert the 7mm bushing and press/punch it in until it touches the bolt. Make sure the bolt is still easy to slide inside the JIG.

If the bolt is no longer easy to slide you need to remove the bolt and punch back the bushing slightly with a 6mm rod or similar through the hole on the underside of the JIG and then re-insert the bolt and more carefully punch the bushing against the bolt again.

Look into the JIG to visually to confirm that the bushing is seated all the way.

Now install the 10 mm bushing in the JIG and use a scrap piece of steel bar and a hammer to fully seat the bushing. It should be close to being flush with the top of the bushing tower of the JIG.

The bushings can be removed from the JIG by first punching out the 7mm bushing inwards using a 9mm rod or similar through the 10 mm bushing and then you can punch out the 10mm bushing by using a 6mm rod to punch around the edge of the bushing from the hole on the underside of the JIG.



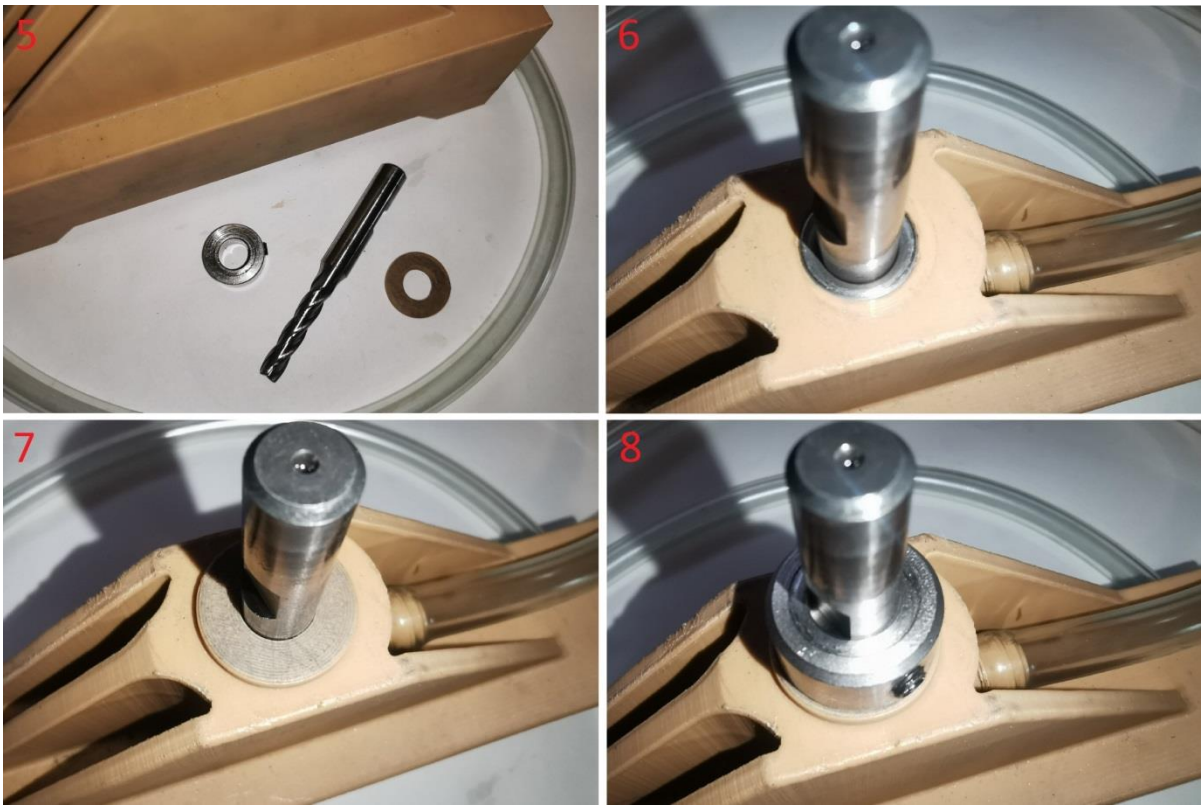
Now it is time to set the milling depth of the 7mm DIN 844L end mill, we need to set the depth to approximately 2.5mm. Use the calipers to measure the thickness of the printed end mill spacer to confirm that it is approximately 2.5mm thick. We do this just to make sure we use the correct spacer.

Install the bolt bar into the JIG again and make sure it blocks the bushing pocket completely.

Insert the 7mm end mill in the JIG and make sure it touches the bolt, then place the 2.5mm printed spacer on the end mill shaft and push it against the JIG/bushing.

Place the 10mm shaft collar on the end mill shaft, align the setscrew 90 degrees to the end mill mounting notch so it does not disturb the setscrew hold on the end mill.

Push on the shaft collar and on the end mill simultaneously while tightening the shaft collar set screw. The set screw needs to be tightened fairly hard but do not strip the setscrew or allen key.



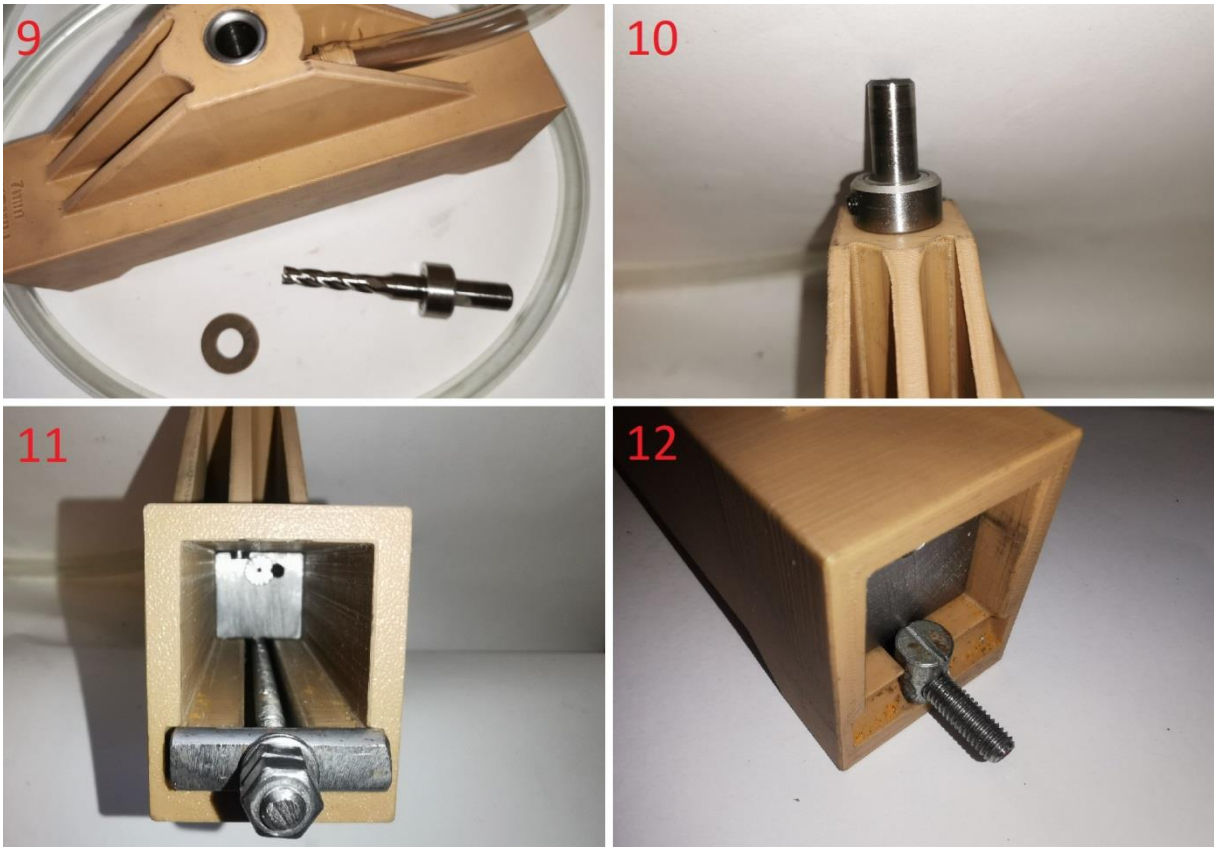
Remove the end mill from the JIG and slide off the printed spacer, the end mill is now set to mill 2.5mm deep.

Insert the end mill in the JIG and then insert the bolt from the hose side of the JIG with the bolt face side first and the cartridge recess pointing up just like the picture 11 shows.

Remove the shortened dowel nut from the feed mechanism and then insert the feed mechanism from the end of the JIG with the “7mm endmill” text. The long drilled out dowel nut, the two washers and the jam nut side of the feed mechanism threaded rod should sit on the end of the JIG with the “7mm endmill” text.

Install the shortened dowel nut on the m6 threaded rod on the hose end of the JIG and hold the dowel nut so the longer side points up, then turn the feed mechanism threaded rod until the shortened dowel nut is engaged in the feed track on the bottom of the JIG like picture 12 shows.

The shortened dowel nut is responsible for pulling the bolt through the JIG and into the end mill when you spin the jam nut on the feed mechanism.



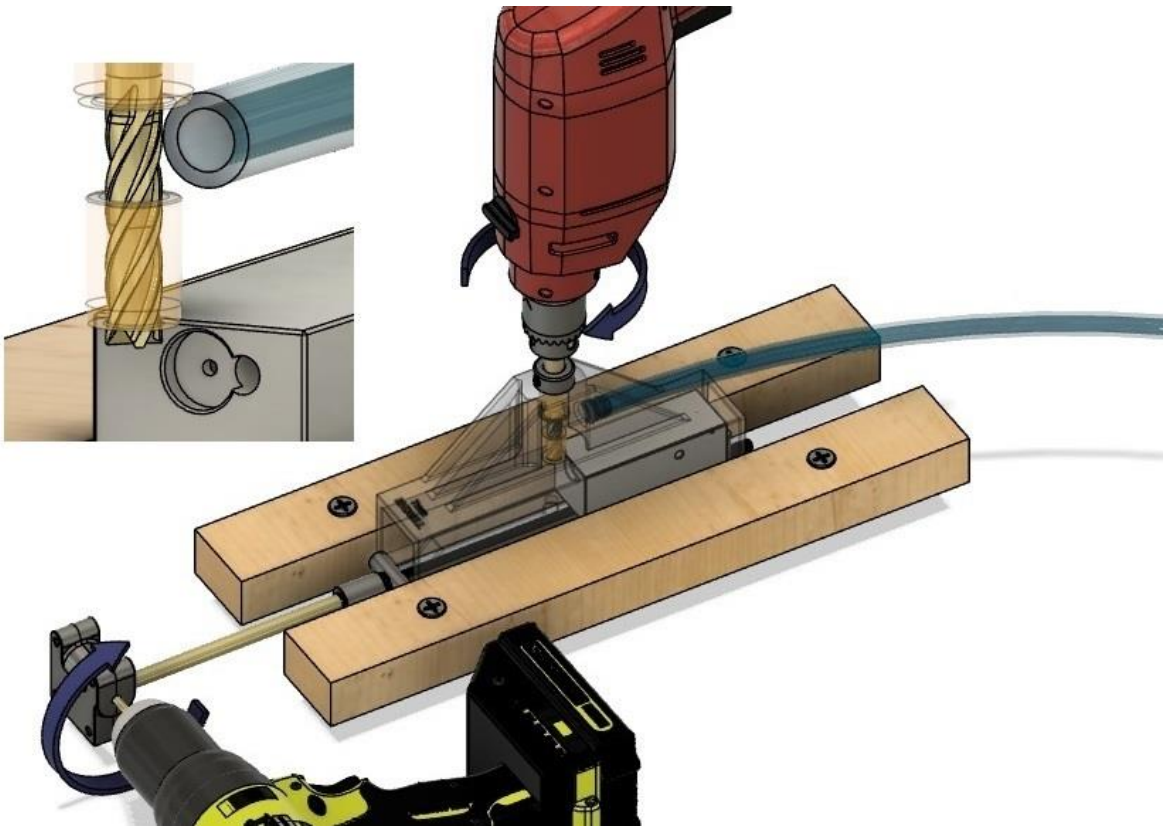
Screw two pieces of 28x45mm or 1x2inch wooden studs or similar to a sturdy board or outside deck that the JIG can sit in-between, this is just to hold the JIG steady during the milling operation. Chuck the 7mm end mill really hard in the corded electric drill so the chuck yaws grabs the end mill above the end mill mounting notch, set the speed of the drill to 1/2 of the drill max speed (around 1500 RPM).

Connect the JIG hose to your water source and pump water through the JIG, when the end mill is not inserted and the bolt does not block the bushing hole you want the water to fountain out the top end mill hole about 50mm or 2 inches high.

Chuck the reducer gearbox 4mm input shaft in the battery drill and install the 10mm hex socket onto the square end of the 8mm output shaft. Lay the battery drill on its side and slide the 10mm socket over the feed mechanism jam nut. Before you start milling the bolt slots make sure the end mill does not touch the bolt! There is an optional splash guard that snaps into the 4mm holes in the side of the JIG that can be used to redirect the water spray to protect the battery drill.

Insert the 7mm end mill in the JIG and speed up the corded drill to 1500 RPM. Now run the battery drill slowly to feed the bolt through the JIG. You will feel the torque increase in the hand holding the corded drill when the end mill hits the bolt and you will hear the RPMs decrease.

Apply only very slight down pressure on the corded drill with the end mill (the weight of the drill and your hand basically) and keep it straight and steady. Stop just before the bolt hits the drilled out horizontal dowel nut next to the jam nut. You will hear the RPMs increase as the end mill leaves the bolt.



Remove the corded drill with the end mill from the JIG then reverse the battery drill and run the feeding mechanism backwards until the shortened dowel nut falls out the back of the JIG. Remove the battery drill and gearbox then pull out the feeding mechanism from the JIG.

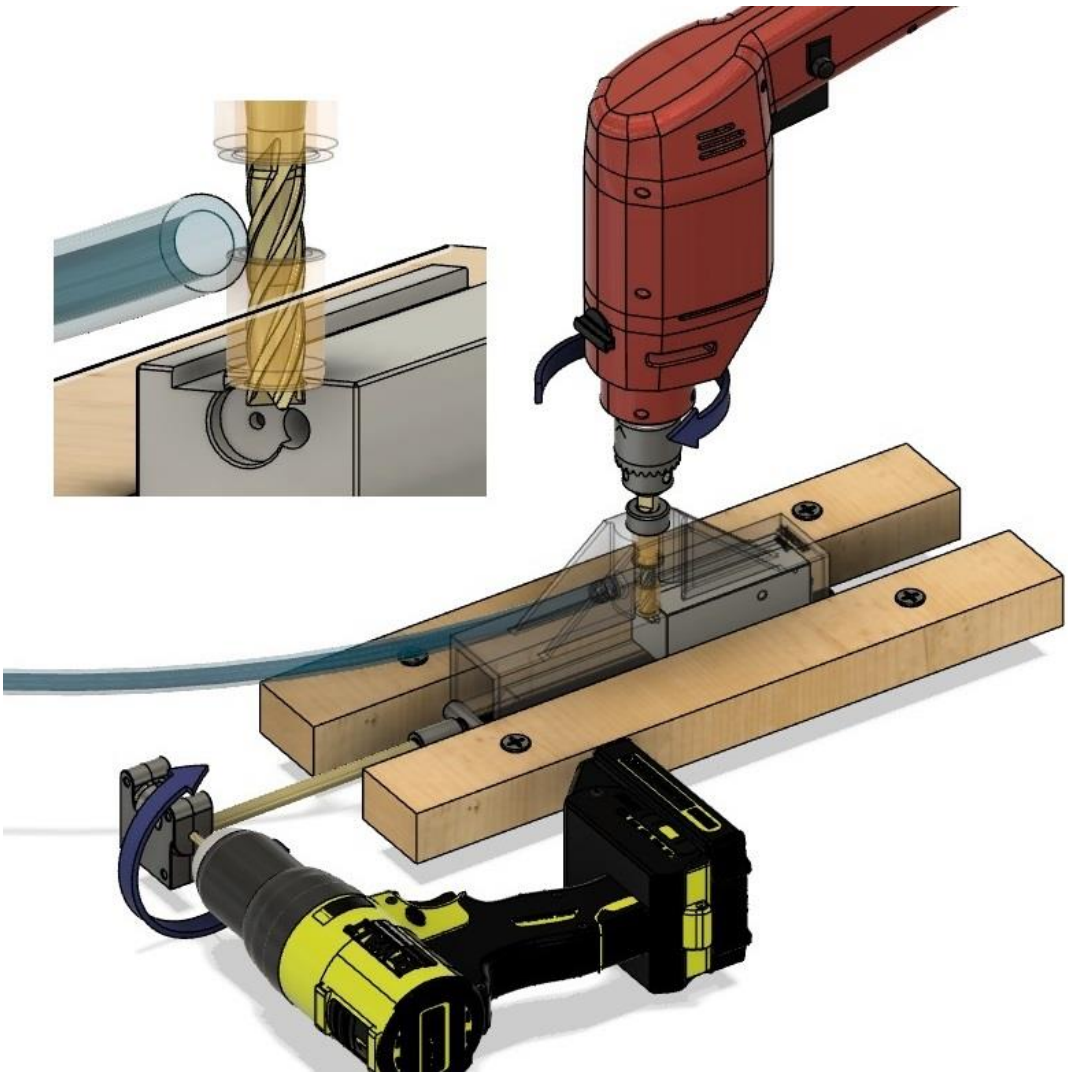
Flip the JIG around 180 degrees so the hose side is facing the battery drill and gearbox. Insert the bolt oriented in the JIG like you did previously but this time inserted from the end of the JIG with the “7mm endmill” text.

Install the feed mechanism through the JIG from the hose end of the JIG and then install the shortened dowel nut behind the bolt like you did previously.

Connect the gearbox to the feed mechanism like the picture below shows.

Now repeat the milling operation exactly like you did earlier.

Once you are done cutting the slots, OIL the bolt really well both on the outside and inside all holes to prevent it from rusting. Use a lot of oil as all holes in the bolt will have trapped water inside.



Now it is time to cut the ejector slot in the bolt, the ejector slot is cut almost in the same way as you cut the bottom slots but with a different JIG and using a 2mm end mill. Make sure that the bolt does not bind in the ejector slot milling JIG by pushing it through the JIG a few times like you did with the bolt slot milling JIG earlier, the bolt should move through the JIG without a lot of friction.

First install the long 6mm drill bushing in the ejector slot cutting JIG until it is fully seated against the ledge in the bottom of the bushing pocket, then install the short 6mm bushing on top and use a piece of scrap steel bar to seat it flush with the top of the bushing tower of the JIG.

Before using the 2mm end mill you need to polish the 6mm diameter section of the end mill shaft with 800grit sandpaper, this reduces the friction between the end mill and the bushings and reduces the risk of the end mill seizing inside the bushings.

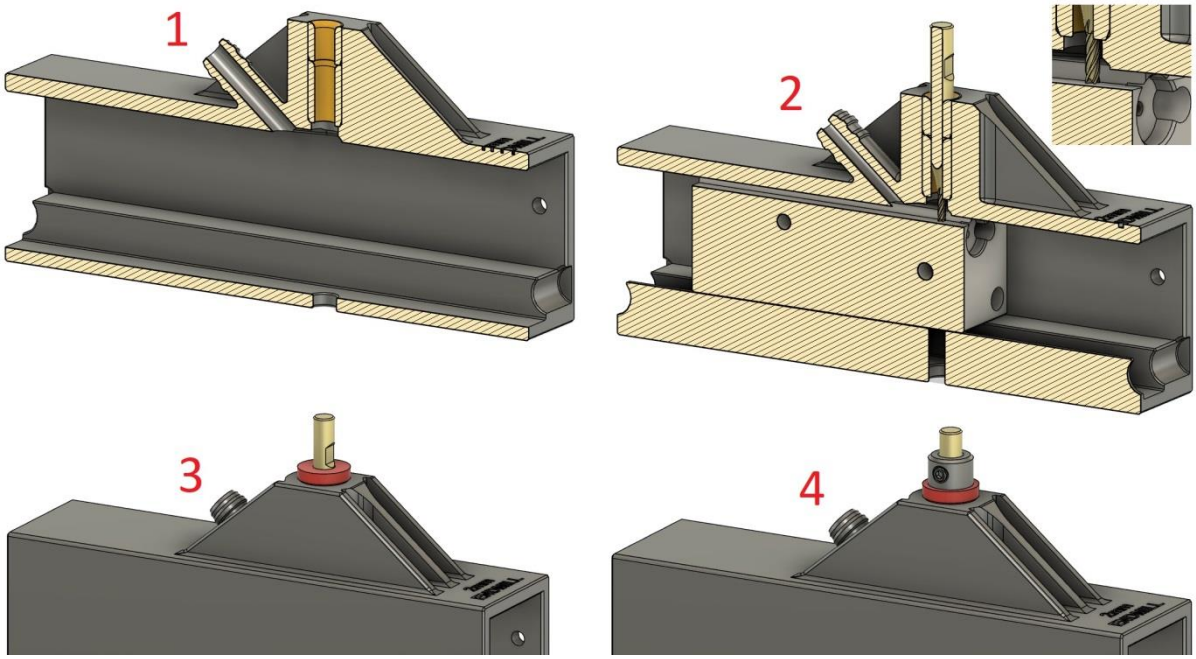
Now it is time to set the milling depth of the 2mm DIN 844K end mill, we need to set the depth to approximately 3.7mm counting from the bottom of the bolt slot. Use the calipers to measure the thickness of the printed end mill spacer to confirm that it is approximately 3.7mm thick.

Install the bolt bar into the JIG and make sure it blocks the bushing pocket completely. Insert the 2mm end mill in the JIG and make sure it touches the bottom of the bolt slot, make sure it does not get stuck on top of the cartridge pickup rail in the middle of the bolt.

Place the 3.7mm printed spacer on the end mill shaft and push it against the JIG/bushing. Place the 6mm shaft collar on the end mill shaft, align the setscrew 90 degrees to the end mill mounting notch so it does not disturb the setscrew hold on the end mill.

Push on the shaft collar and on the end mill simultaneously while tightening the shaft collar setscrew. The setscrew needs to be tightened fairly hard but do not strip the setscrew or allen key.

Remove the end mill from the JIG and slide off the printed spacer, the end mill is now set to mill 3.7mm deep. Now connect the water hose to the JIG.



Insert the bolt from the hose side end of the JIG with the bolt face side first and the cartridge recess pointing up just like you did when you milled the first of the two bolt slot. Assemble the feed mechanism in the JIG like you did earlier, the jam nut side should sit on the end of the JIG with the “2mm endmill” text. Connect the gearbox to the feed mechanism like you did earlier.

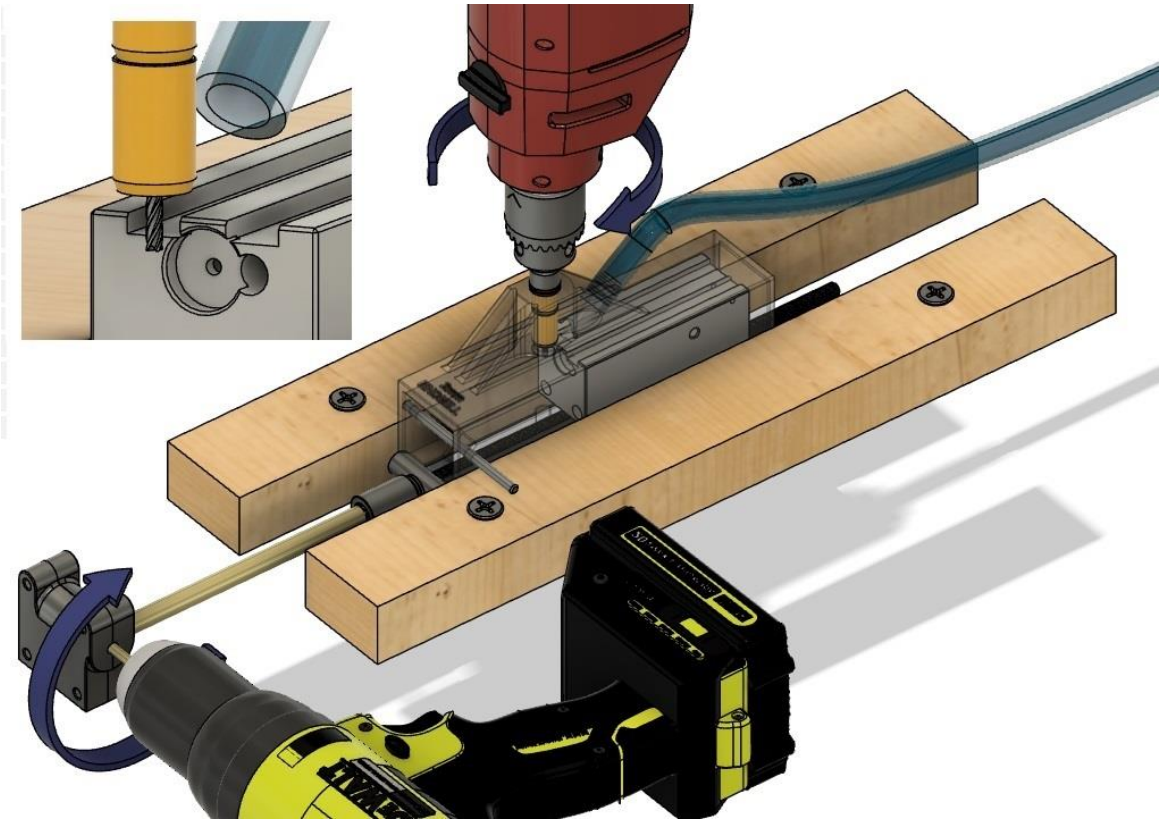
Install the 2mm end mill in the corded drill so the jaws of the drill chuck butts up against the shaft collar on the 2mm end mill and tighten the chuck really hard.

There is an optional splash guard that slides over the JIG that can be used to redirect the water spray to protect the battery drill. Install a 4mm diameter steel rod through the holes on the text end of the JIG, this rod acts as a stop that limits the travel of the bolt inside the JIG to set the length of the ejector slot. This rod is also what holding the splash guard in place.

Place four 0.5mm thick and four 0.3mm thick DIN 988 m6 shims on the 2mm end mill shaft, the shims limit the cutting depth of the very fragile 2mm end mill. Connect the hose to your water source and pump water through the JIG like you did before.

Run the end mill at maximum speed (3000rpm or more) and the battery drill as slow as possible. Stop as soon as the bolt face hits the 4mm steel rod. Remove the drill with the end mill and reset the feed mechanism and bolt in the starting position.

Remove one 0.5mm thick and one 0.3mm thick shim from the end mill and repeat the milling operation again. You need to remove 0.8mm worth of shims after each milling pass and do a total of 5 passes to reach the final ejector slot depth. The ejector slot is now finished.



Once you are done cutting the slots, OIL the bolt really well both on the outside and inside all holes to prevent it from rusting. Use a lot of oil as all holes in the bolt will have trapped water inside.

Making the extractor

Cut the screw head off the 12.9 grade M5x90mm socket head screw.

Make a 1.5mm deep cut with a hacksaw, the cut is 5mm in from the side of the cut off screw head.

Use "half round" needle file to cut 2mm deep into the hacksaw cut, take care to make the side facing the cut off screw head straight.

File the end of the screw 45 degree so you get a sharp hook.

File the sharp point of the hook down flat until the width of the screw is 4.4mm between the flat and the round section of the screw.

File down the face of the screw so it does not interfere with the face of the barrel later.

From now on we will refer to the screw as the extractor.

Loosely clamp a piece of leather or folded cloth in the vice so you get a crease in the leather between the almost closed vice jaws.

Chuck the extractor in the corded drill and then rest the extractor against the leather in the crease.

Spin the extractor with the drill while using a 4mm round needle file to make a groove approximately 2.5mm from the half round cut.

Use the round file to make the groove deeper.

Stop when the groove is approximately 1mm deep, use calipers to measure the extractor diameter inside the grove.

It should be approximately 3mm in diameter.

Make another groove, there should be 34mm between the outside of the two grooves.

Use a standard size flat file to file the top of the extractor flat from the tip to the second groove, repeat on the bottom.

The extractor should be 3mm thick between top and bottom when you are done.

File between the two grooves on the hook side of the extractor, file 2mm deep.

Repeat on the backside of the extractor but file all the way from the second groove to the tip.

Stop when the thin and springy section is approximately 1.5mm thick.

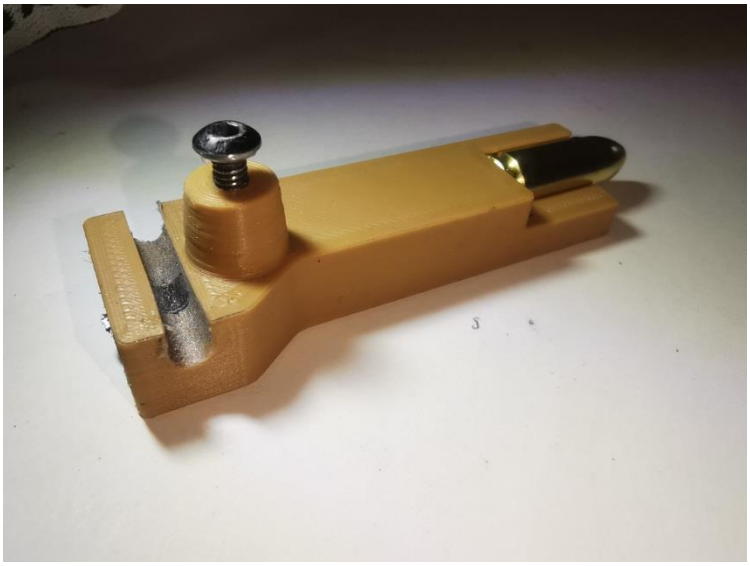
Install an m4x20mm screw in the extractor JIG and then install the extractor in the JIG from the back.

Place a live cartridge in the JIG and seat it all the way to the simulated bolt face so it snaps over the extractor claw.

Turn the extractor so the claw is aligned vertically with the cartridge then pull back on the extractor so the claw touches the rim. Tighten the m4 screw so it locks the extractor in place.

Use a 4mm round needle file to file into the extractor until the cutout in the extractor matches the cutout in the JIG.

Try to not file into the plastic JIG itself too much.



Cut off the extractor with a hacksaw flush with the back of the JIG.

Loosen the m4 screw and then remove the cartridge from the JIG.

Remove the extractor from the JIG then file the back of the extractor slightly to clean it up.

Chamfer the back of the extractor slightly so it fits into the bolt easier.

Place the extractor in the vice and bend it slightly in the direction shown by the picture.

Be very gentle and try not to bend it too close to the claw section or back section.

You want the bend to be applied to approximately 30mm along the middle of the thin section.

We will use a 4mm x 29.8mm stainless pin to retain the extractor, chamfer both ends of the pin.

Insert the extractor in the bolt and drive in the retaining pin halfway. Look straight at the bolt face and check if the extractor claw is aligned correctly.

If not remove the extractor and hold it in the vise while twisting the claw slightly with a crescent wrench. Install it in the bolt and look again. Repeat until the claw is aligned.

Measure the thickness of a piece of masking tape or electrical tape with the calipers, you need the tape to be approximately 0.10mm to 0.15mm thick.

Using two layers of tape might get you the correct thickness.

Place the tape over the case head on a live cartridge and cut the tape around the rim with curved nail scissors.

The tape simulates the headspacing clearance of 0.10mm to 0.15mm.

Place the taped cartridge into the bolt face to see if the extractor snaps over the rim.

There should be a slight gap between the rear face of the extractor claw and the rim and you should be able to wiggle the cartridge slightly between the breech face and the claw.

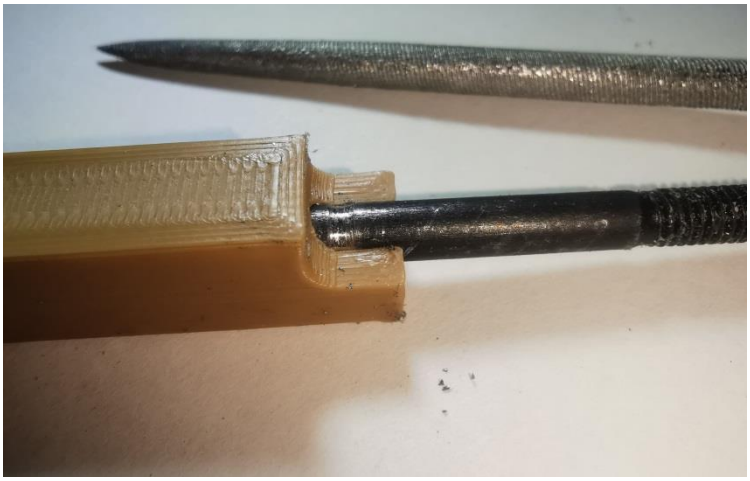
Making the firing pin

Now we will make the firing pin.

Install two m3 screws in the firing pin JIG and then clamp the JIG shallowly in the vice by the front narrow section of the JIG.

Make sure the m3 screws are not blocking the hole through the JIG.

Insert a 12.9 grade m4x90mm socket head screw in the JIG and then chuck the head of the screw in the corded drill.



Place the 4mm round needle file against the screw and hold it against the shoulder of the JIG.

Spin the m4 screw with the corded drill while pushing the file down and doing back and forth motions.

You only need to form a small groove in the m4 screw so do not go crazy with the file or you will melt the JIG.

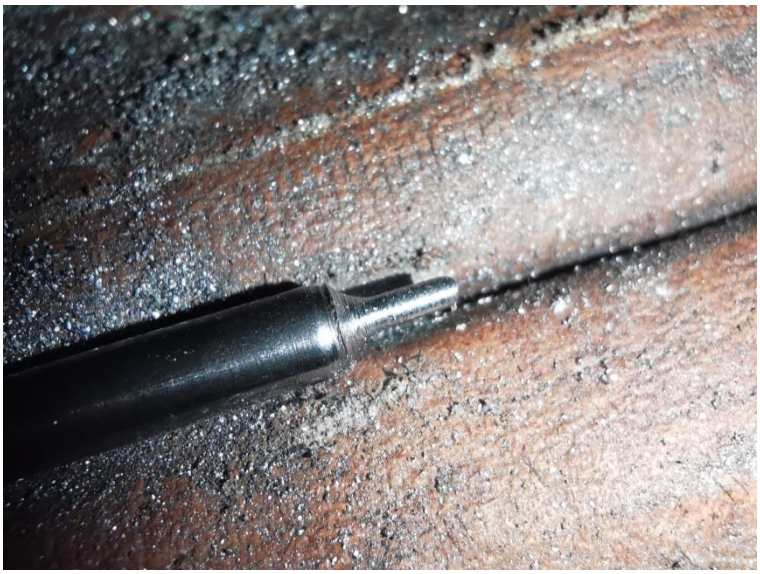
Tighten the two m3 locking screws on the JIG and then cut off the m4 screw with a hacksaw and file it flush with the JIG.

Loosen the m3 locking screws and remove the m4 screw from the JIG.

Loosen the drill chuck and push the m4 screw into the chuck fully then tighten the chuck again so the chuck holds the m4 screw more secure and closer to the screw tip.

Loosely clamp a piece of leather or folded cloth in the vice like you did earlier for the extractor.
Rest the m4 screw in the crease and spin the screw with the corded drill while using the round needle file to make the groove deeper.

Use calipers to measure the diameter inside the groove, it should be 2.0mm.
Now use a flat needle file and file down the section of the screw in front of the groove until its 1.9mm in diameter.



From now on we will refer to the m4 screw as the firing pin.

Use the flat needle file to round the tip of the firing pin without shortening it.

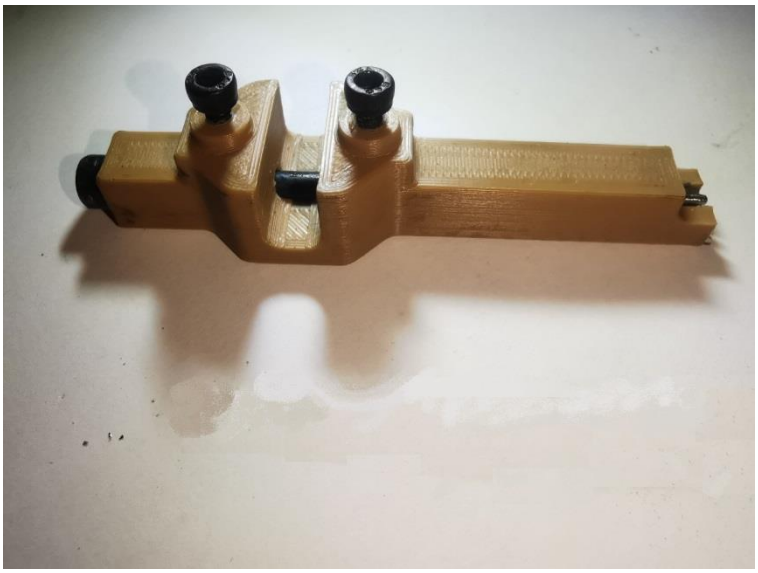
It should only be slightly rounded, do not make it pointy or sharp.

Hold the firing pin in the vice and use a standard size flat file to file the screw head from the allen key side until the screw head is 3mm wide.

Chuck the firing pin in the corded drill with the screw head side facing out.

Place the screw head in the leather crease and use the standard flat file to file down the diameter of the screw head to 6.2mm.

Use the flat needle file to chamfer the screw head slightly on the front side and a bit more on the back side.



Install the firing pin in the JIG again and tighten the m3 locking screws against the firing pin to prevent it from rotating in the JIG.

Make sure the firing pin is fully seated in the JIG.

Use the edge of the standard size flat file to file a notch into the firing pin that matches the cutout in the JIG.

Try not to file into the JIG itself too much.

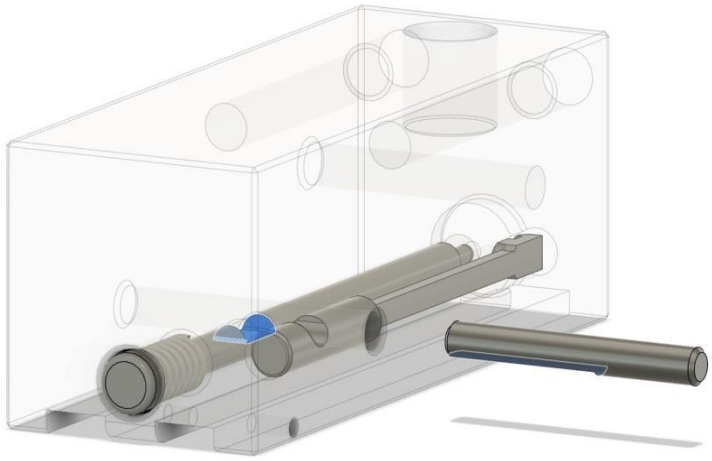
Optionally you can use a square or triangular needle file to clean up and smoothen the notch.

Your firing pin is now finished. Optionally you can use 400 and 800grit sand paper to polish it.

Remove the 4mm x 29.8mm pin from the bolt and hold it in the vise horizontally so half of the pin is above the vice jaws.
Use a standard size flat file to file the pin flat along exactly 17.8mm of its length.

Use calipers to measure across the flat side and the round side of the pin, it should be 3.4mm exactly.

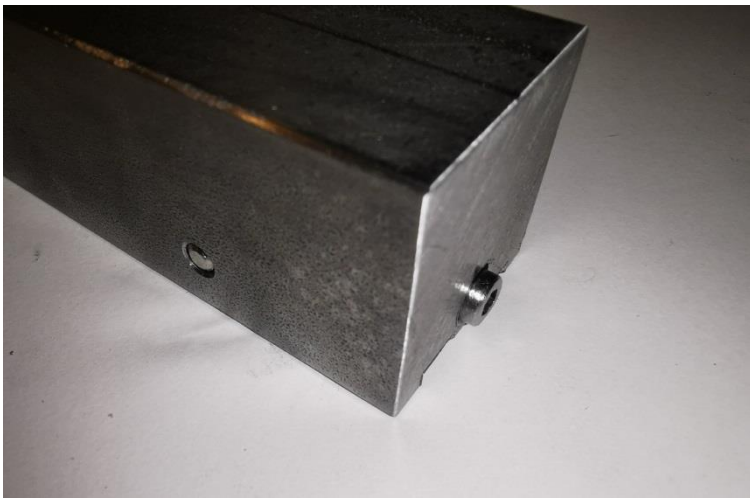
Cut the BIC pen spring in half and slide it over the firing pin with the cut side towards the screw head.



Install the firing pin into the back of the bolt with the notch facing upwards.

Press in the firing pin until it is flush with the back of the bolt and look into the retainer pin hole and make sure the notch aligned correctly.

Insert the retainer pin from the extractor side of the bolt with the flat side first and facing down.



Use an allen key or similar to push in the firing pin fully while looking at the bolt face. Make sure the firing pin tip protrudes at least 1.5mm.

If it does not protrude at least 1.5mm remove the firing pin and file the back of the firing pin notch 0.5mm wider.
Install the firing pin and retainer pin in the bolt and try again.

If you are building the select fire version, insert a 14mm long and 2mm OD hardened steel pin in the 2mm hole on the right side of the bolt and use a punch to peen the hole so the pin cannot fall out. Cutting a 14mm long piece from the back of a 2mm drill bit is a good source for the pin. Piano wire is

Making the Anti Bolt Bounce system (ABB)

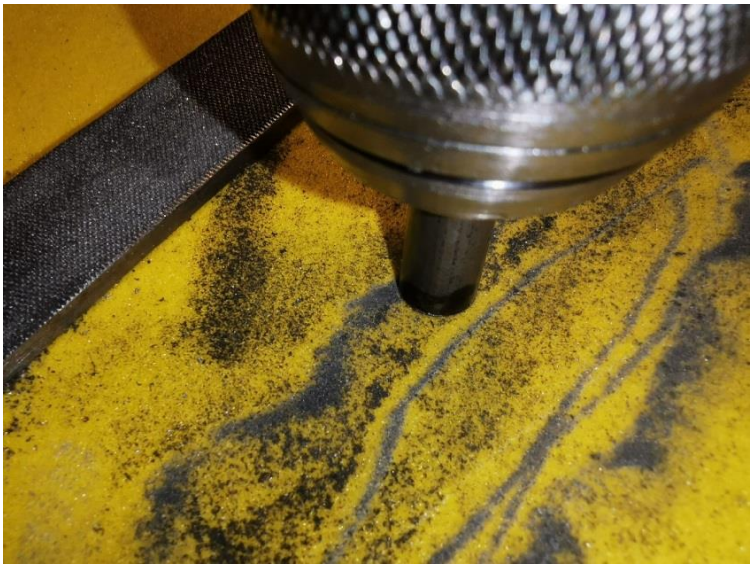
Cut one 34mm long and one 35.5mm long piece of the 10mm OD x 6mm ID steel tube.

Use a 6mm reamer or drill to drill through the center hole to clean out the inside of the tubes.

Place a sheet of 80grit sandpaper on a hard and flat board and then place a standard size flat file on the sandpaper with the file handle hanging off the board's edge so the file can lay flat.

Install the tube in the drill chuck and hold the drill straight and vertical against the file.

Step on the file with your foot and support the drill with your hand against your ankle then spin the drill to file the end of the tube straight.



Repeat the process but on the 80grit sandpaper until the end of the tube is straight and relatively smooth.

Angle the drill 45 degrees and run the tube against the sandpaper to chamfer it.

Measure the length of the tubes. One should be 33.5mm long and the other should be 35mm long when you are done.

Repeat the steps on the previous page for the other end of tube and on the second tube.

First shorten the tubes to the correct length by running them against the file.

Use the 12mm countersink bit to chamfer the hole on both ends of the tubes. Make the chamfers approximately 1mm.

Install the tube shallowly in the drill chuck and use 320grit, 400grit and 800grit sandpaper to polish it on the outside.

Flip the tube around in the chuck and repeat for the other end of the tube.

Repeat for the second tube.

The tubes should now look like this.

Install the m6x70mm socket head screw in the drill chuck and use a file to chamfer the screw head. Make the chamfer 45 degrees and 1.5mm.

Repeat for the second screw.

Move out the screw in the drill chuck so it is held by the threaded section and then use 400grit and 800grit sandpaper to polish the un-threaded screw shaft.

Repeat for the second screw.

Slide the tubes over the screws and make sure the tubes can slide freely on the screw shaft without binding.

Forcefully strike the screw heads with the tubes to make sure they are not sticking, if they stick chamfer the hole of the tubes slightly more.

The ABB system is now ready to be installed in the bolt.

Cut two 12mm long pieces of 4mm OD stainless rod and chamfer both ends of the rods slightly.
Insert one 4mm OD rod in each of the two ABB holes in the bolt.

Install the ABB screws in the bolt and tighten the screws hard.

The 4mm OD rod acts as a bottom out stop that the screw can tighten against, without it the screw would loosen over time unless the hole were threaded all the way to the bottom.

Use calipers to measure from the bolt face to the end of the screw head (allen side face). It should be 44mm exactly.

If it is more than 44mm you probably need to thread the ABB hole deeper. If this does not help you need to shorten the 4x12mm rod slightly.

If it is less than 44mm you need to replace the 4x12mm rod with a slightly longer rod.

Making the charging handle

Print the inner and outer knob for the charging handle and grab an m5x40mm socket head screw. Insert the screw with the head first into the outer knob, and then drill out the hole in the inner knob with a 5mm drill or reamer.

Slide the inner knob over the screw with the side that was printed against the bed facing out and the slightly chamfered side facing the screw head. Push the inner knob against the outer knob and then apply some glue or epoxy around the outside of the inner knob, do not get any glue on the screw or inside the outer knob.

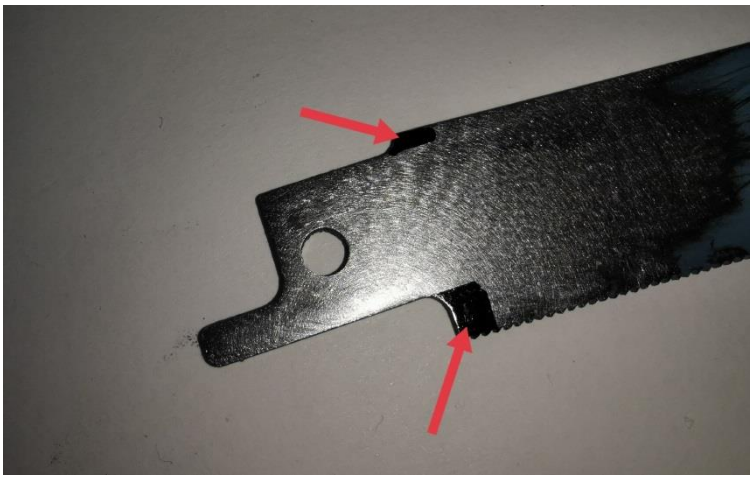
Use a scrap piece of the 10mm OD x 6mm ID tube or a long 7mm hex socket and a hammer to punch the inner knop into the outer knob until it is fully seated.

Wipe off the excess glue and install the charging handle in the battery drill by chucking it by the screw thread, run the drill for a couple of seconds while holding the charging handle knob with your hand to loosen up the knob on the screw.

This charging handle is designed to not unscrew unintentionally, for this to work the knob has to be able to spin on the screw. You can access the screw head with an allen key through the hole on the outside of the knob when you need to install or remove the charging handle from the bolt.

Cut a 5mm long piece of 4mm OD stainless rod and chamfer both ends of the rod slightly. The 4mm rod is later inserted into the hole in the bolt before you install the charging handle itself.

Making the ejector



Now we will make the ejector, the ejector is made from a 24tpi or 25tpi sawzall blade.

First drill out the hole in the blade with a 4mm drill bit.

Some blades need to be filed slightly to fit fully into the ejector JIG.

The black area indicated by the arrows is usually where you need to file.

The teeth of the blade are hardened and it will not be possible to file into them unless you use an angle grinder or dremel with a cutoff disc.

Remove the black areas pointed out in the previous picture.

Cover the blade with ink from a black marker and then install the blade into the ejector JIG until the hole in the blade aligns with the hole in the JIG.

If the JIG is tight you can hold the blade in the vice and use a hammer to tap the JIG onto the blade.

Install an m4x16mm screw through the hole in the blade to hold the blade in the correct position.

Then use a needle to trace a line around the JIG onto the blade.

Remove the screw and then remove the blade from the JIG.

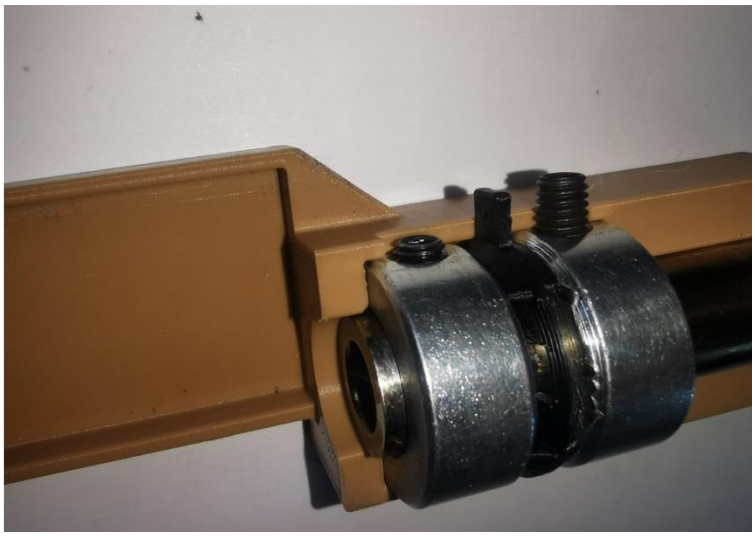
You can see the outline of the ejector traced onto the blade.

Mount the blade in the vice and use an angle grinder or dremel with a cutoff disc to cut roughly around the outside of the traced line.

Then use a standard size flat file to finish filing all the way up to the traced line.

The very tip of the ejector will most likely be hardened as it is very close to the teeth of the blade, you may need to use the dremel to reach the line here.

Head spacing the barrel



Install one 28x16x12mm shaft collar onto the chamber end of the barrel and slide it in a bit.

Slide on the printed collar spacer onto the barrel and then install the second 28x16x12mm shaft collar.

Replace the short m6 setscrew in the front shaft collar with an m6x12mm cup point set screw, make sure the set screws are loose. Install the barrel in the head spacing JIG like in the picture.

Remove the retainer pin from the bolt and then remove the firing pin and re-install the retainer pin.

Remove the left ABB screw from the bolt.

Insert the same live round that you placed tape over the case head previously into the cartridge recess on the bolt so the extractor snaps over the case rim.

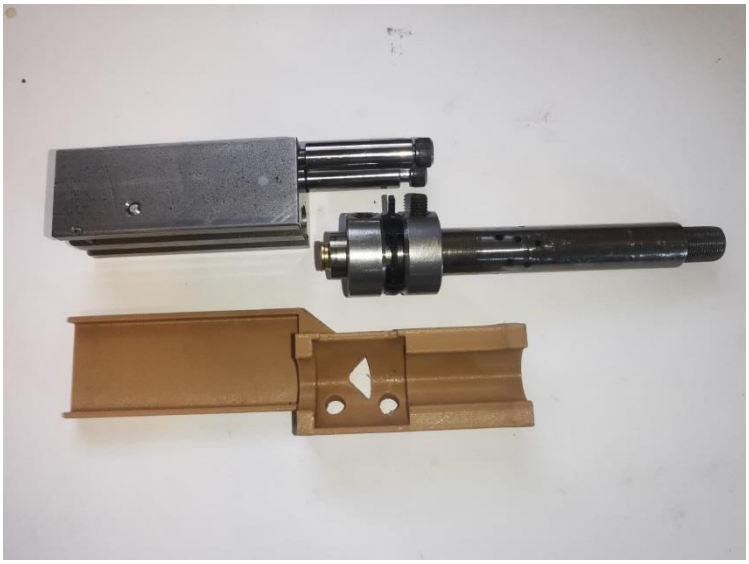
Push the setscrews and the lip of the collar spacer against the cutout in the JIG to align the shaft collars and collar spacer correctly.

Place the bolt into the head spacing JIG with the live round in the bolt face.

Push the bolt fully against the wall of the head spacing JIG.

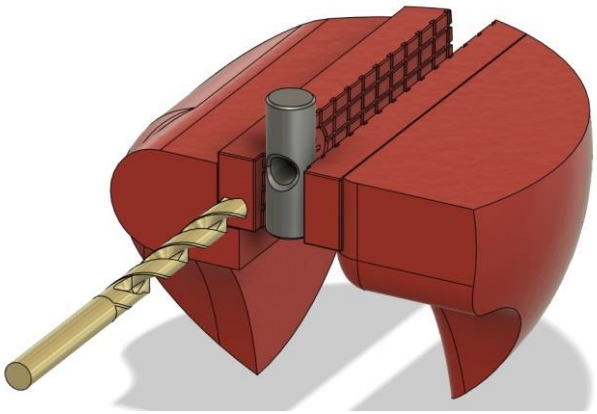
While holding the bolt against the wall, push the barrel against the bolt hard until it cannot be pushed in any further.
If the barrel is hard to slide through the shaft collars you can lightly tap the muzzle of the barrel with a plastic hammer or similar.

It is normal for the barrel to not touch the bolt face, it is the case mouth seating against the chamber mouth that should stop the barrel from going in any further.
Now tighten the setscrews hard.



The barrel is now correctly head spaced to the bolt. The piece of tape that was placed over the case head ensures that when the bolt is slammed into battery during operation there will be a 0.10mm to 0.15mm gap between the case mouth and the chamber mouth. Without this gap the case mouth would be crushed against the chamber mouth by the weight of the bolt.

Re-install the ABB screw and firing pin in the bolt.

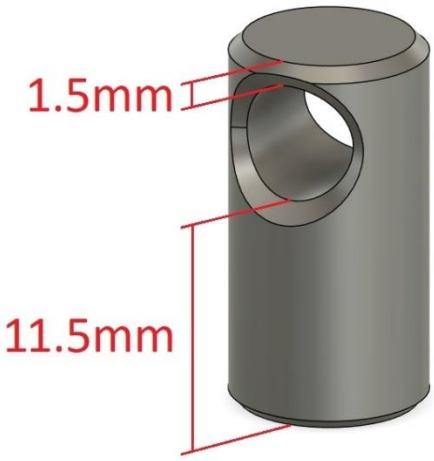


Now we will make the recoil spring lug, it will sit inside the 10mm hole in the bolt and provide a surface that the recoil springs can rest against while letting the guide sleeve pass through. The recoil spring lug is free floating and self-aligning in the bolt which makes the bolt very smooth to operate.

Mount an m6x30mm dowel nut in the vise like in the picture and drill out the threads with a 6mm drill, try to drill it as straight as possible.

Use a hacksaw to cut the top of the dowel nut 2mm above the top of the hole and then use a standard size flat file to file it down until its 1.5mm, try to file it as straight as possible then chamfer the cut side of the dowel nut slightly.

Use calipers to measure from the bottom of the hole to the bottom of the dowel nut, it should be 11.5mm. If it is more file it down until it is the correct length.

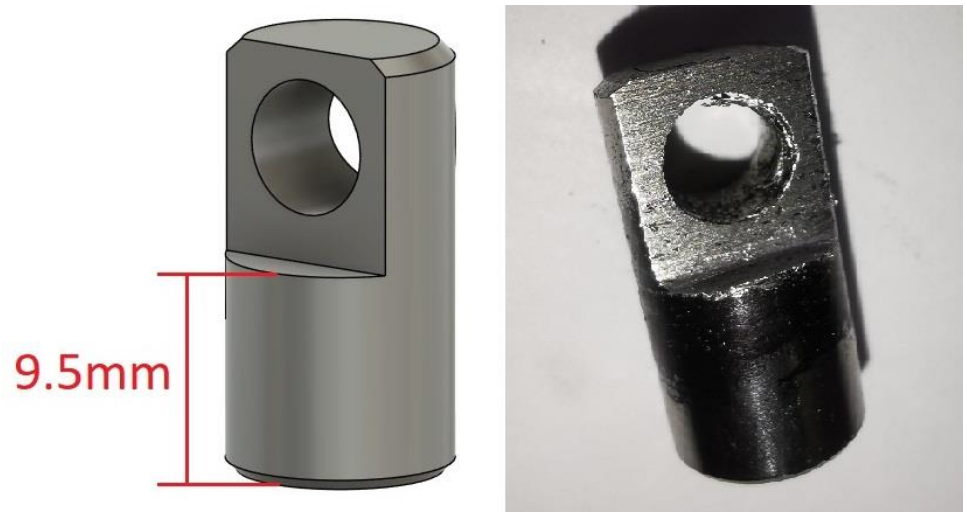


Use a black marker to lay down a band of ink around the dowel nut and then use the calipers to scribe a line 9.5mm from the bottom all around the dowel nut.

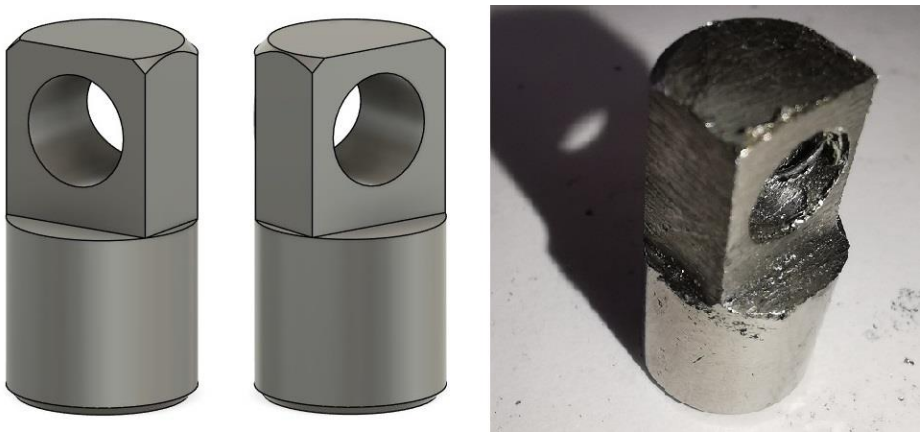
When you file the dowel nut in the next step it is easier to be accurate with the file if you first file into the dowel nut 1mm away from the line and then use the edge of the file to file the last bit up to the line.

This way the file will not skip on the nut and go past the line unintentionally.

Use the standard size flat file to file 2.5mm deep into the dowel nut from the top to the scribed line like in the picture below, try to file straight so the material thickness on both the left and right side of the hole is equal.



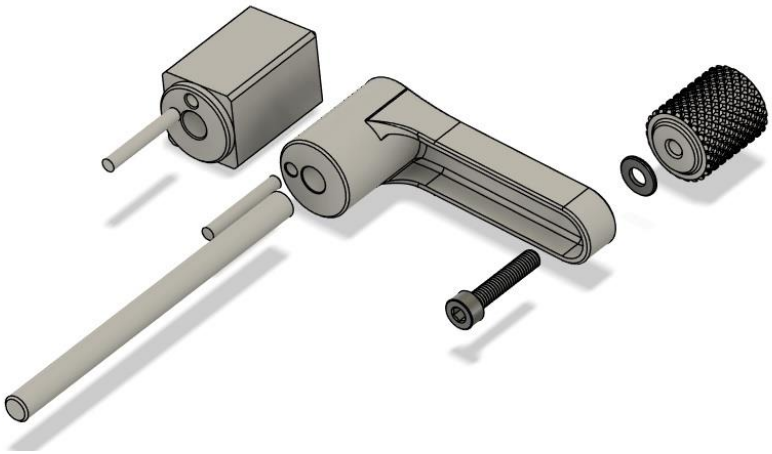
File into the side of the dowel nut 0.7mm deep like in the picture below, try to file straight. Now repeat for the other side. The Recoil spring lug is now finished.



Making the OOB and hammer springs

The ROGUE-9 uses DIY fire control group springs, the disconnector and trigger springs are just straight piano wire while the hammer and OOB lever springs are torsion springs. All FCG springs are made from 1mm piano/music wire.

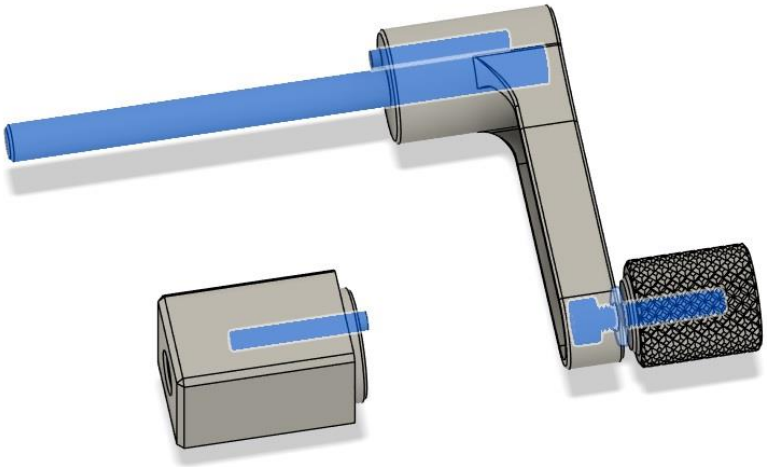
The recommended piano wire is the kind that you can buy from RC hobby stores in straight 1 meter lengths. We will use a printed spring winder to wind the torsion springs.



Cut a 100mm long piece of 6mm OD stainless rod and chamfer both ends.

Cut two 22mm long pieces of 3mm OD stainless rod and chamfer one of the ends on both rods.

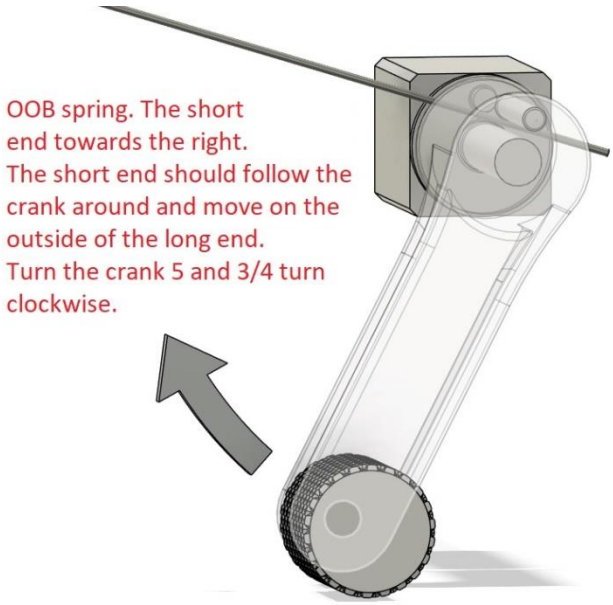
Install the m4x20mm screw through the crank and into the crank handle knob, do not forget the m4 washer.



Press the 3x22mm rods with the chamfered side first into the holes in the crank and into the square part of the winder, make sure they are seated fully.

Use a file to file down the rods until they are sticking out 1.5mm from the face of the crank and square part.

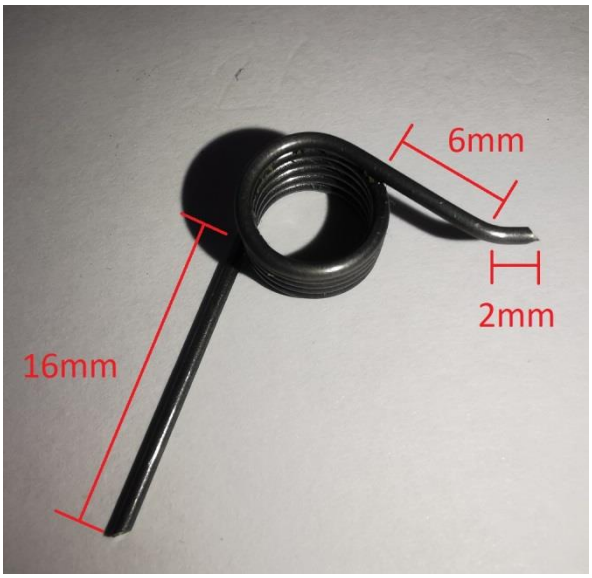
Now press the 6mm rod fully into the hole in the crank.



Hold the square part of the winder in the vise so the 3mm pin point up or at the 12 o'clock position and then insert the crank into the square part so the 3mm pin in the crank is on the right side of the 3mm pin in the square part.

Insert the 1mm diameter piano wire between the 6mm pin and the two 3mm pins from the left side and feed it through until you got approximately 25mm of stick-out on the right side.

Follow the directions in the picture.

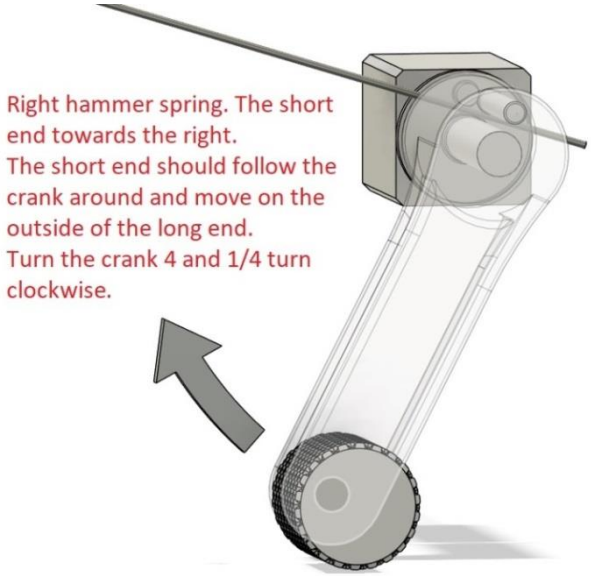


Use pliers to bend the short leg of the OOB spring approximately 30 degrees upward, make the bend 6mm from where the short leg leaves the outside diameter of the coil.

Cut the short leg so the bent section is 2mm long.

Cut the long leg off 16mm from where the long leg leaves the outside diameter of the coil.

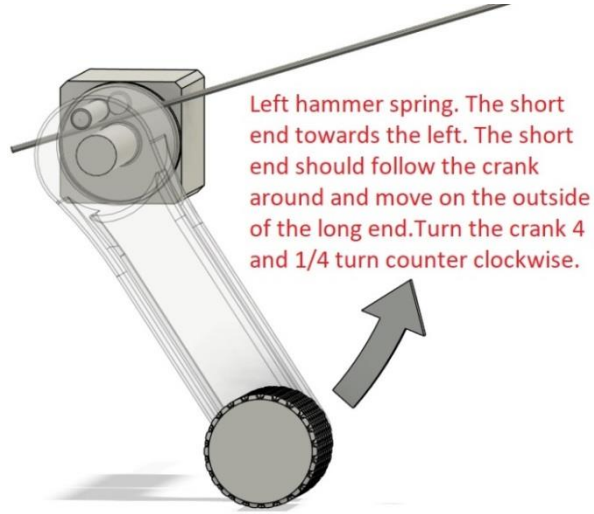
The OOB spring is now done.



Hold the square part of the winder in the vise so the 3mm pin point up or at the 12 o'clock position and then insert the crank into the square part so the 3mm pin in the crank is on the right side of the 3mm pin in the square part.

Insert the 1mm diameter piano wire between the 6mm pin and the two 3mm pins from the left side and feed it through until you got approximately 25mm of
stick-out on the right side.

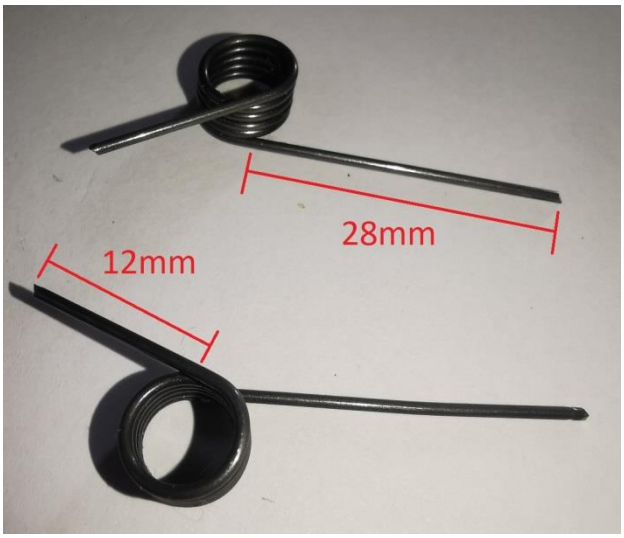
Follow the directions in the picture.



Hold the square part of the winder in the vise so the 3mm pin point up or at the 12 o'clock position and then insert the crank into the square part so the 3mm pin in the crank is on the left side of the 3mm pin in the square part.

Insert the 1mm diameter piano wire between the 6mm pin and the two 3mm pins from the right side and feed it through until you got approximately 25mm of
stick-out on the left side.

Follow the directions in the picture.



Use strong wire cutters to cut the short leg of both hammer springs approximately 12mm from where the short legs leave the outside diameter of the coil.

Cut the long legs off approximately 28mm from where the long legs leave the outside diameter of the coil.

The right hammer spring is in the top and the left is in the bottom of the picture.

Both hammer springs is now done.

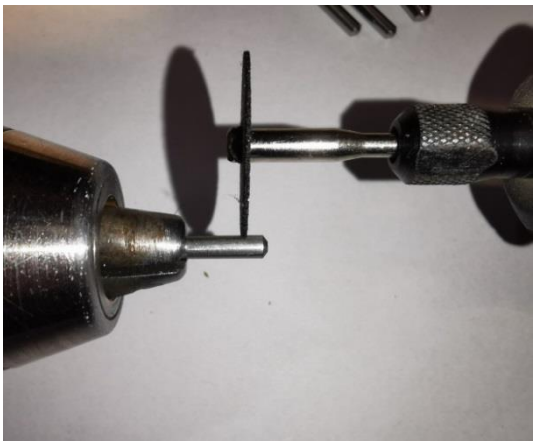
Assembling the lower receiver

Cut two 39mm long, one 37mm long, one 26mm long and two 17mm long pieces of 4mm diameter stainless rod then chuck the pins in the battery drill and use a file to chamfer both ends of all 4mm diameter pins. The chamfers on the 37mm long pin need to be large, make it almost pointy.

Cut one 37mm long, two 33mm long and one 6mm long pieces of 3mm diameter stainless rod. Round one end of the 6mm long pin with a file and use some 400 and 800grit sand paper to make the rounded end smooth, leave the other end flat.

Chamfer both ends of the other 3mm diameter pins. The chamfers needs to be large and the pins should almost be pointy.

Now cut four 21mm long pieces of 1mm diameter piano wire.



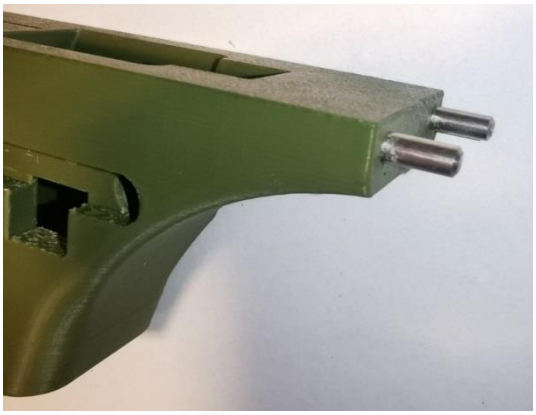
Chuck the 4x37mm pin in the battery drill and use a 1mm wide dremel cut-off disc to cut a groove in the pin approximately 3.5mm from one of the ends.

Make the groove no more than 0.6mm deep.

Repeat this on the 3x37mm pin and both 3x33mm pins.

Do not cut the grooves to deep, the pins will be very hard to remove later if you do.

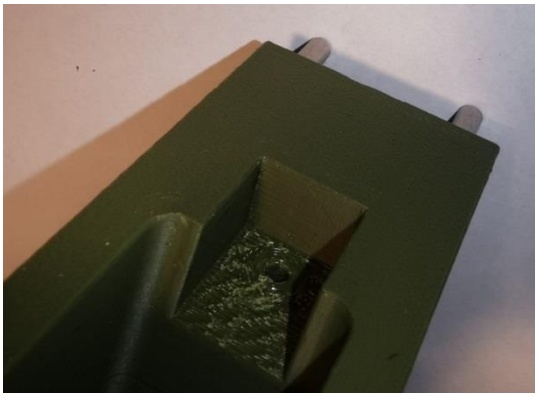
The anti-walk pins are now done.



Use a 4mm reamer or drill to clean out the holes in the front of the lower receiver.

Apply a small amount of the flexible glue inside the two holes in the front of the lower receiver. Do not add any glue on the pin itself.

Press the two 4x39mm pins fully into the holes and wipe off any glue that squirts out around the pins.



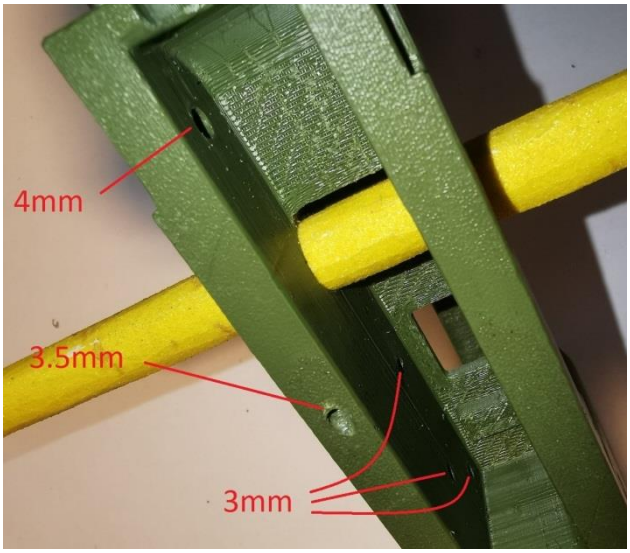
Hold the lower receiver with both hands and push the pins against the floor or a hard surface to force them in as far as possible.

More glue will squirt out, wipe of the glue from the pins.

Use a 4mm reamer or drill to clean out the holes in the back of the lower receiver.

Apply a small amount of glue into the rear holes in the lower receiver and press the 4x17mm pins into the holes.

Push the pins against the floor like you did previously and wipe off the glue that squirts out around the pins.



Roll up some 80grit sand paper and use it to clean out the selector hole, install the selector and make sure it turns without a lot of friction. Use a 3.5mm drill to clean out the selector detent channel.

Cut a 70mm long piece of 3mm and 4mm diameter stainless rod and chamfer both ends. Chuck the 4x70mm rod in the battery drill and use it to clean out the 4mm hole in the rear of the lower receiver. Go through both holes from one side of the lower receiver.

Use the 3x70mm rod to clean out the three FCG holes using the same method.

Place the lower receiver upside down and use pliers to insert one 1x21mm piano wires into each of the four anti-walk pockets in the lower.

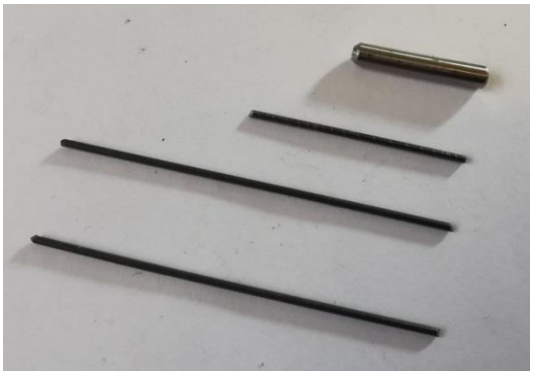
There is one pocket on the underside of each of the three lugs for the 3mm FCG pins and one for the 4mm pin in the rear of the lower receiver.

Use the pliers to push the piano wires as deep as possible. Make sure the wires are installed 90 degrees vertically and not at an angle.

Use a small punch or a 2mm allen screwdriver to punch in the piano wires the last bit until they are flush with the lugs.

Now take the 3mm and 4mm pins and punch them through the holes in the lower receiver a few times from the side with the anti-walk wires to loosen up the fit and the anti-walk wires.

The installation of the fire control group parts will be much easier if the holes have been wore in.



Cut a 15mm long piece of 3mm diameter rod and chamfer both ends, this is the trigger installation aid pin.

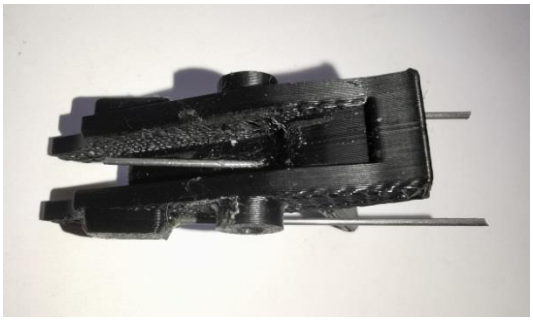
Cut one 28mm long and two 50mm long pieces of 1mm diameter piano wire.

Use a 3mm reamer or the 3x70mm rod to clean out the FCG pin holes in the trigger, disconnector, hammer and OOB lever.

Use the syringe applicator tip on the flexible glue tube to press glue directly into the holes in the trigger spring lugs at the back of the trigger.

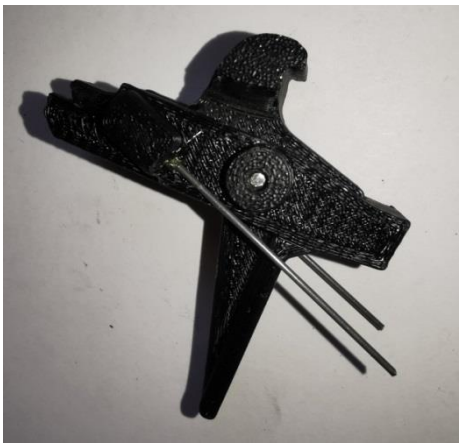
Apply a thin coat of glue on the ends of the two 1x50mm long piano wires and push them into the holes in the spring lugs.

Hold the trigger with your hand and press the wires against a hard surface so they seat fully into the holes then clean off the excess glue.



Use the syringe applicator tip on the flexible glue tube to press glue directly into the disconnector spring hole in the trigger.

Push the 1x28mm piano wire into the hole, use needle nose pliers to push it in fully then clean of the excess glue.



Once the glue has dried, install the disconnector into the trigger. Make sure that you removed the supports inside the disconnector spring groove in the disconnector.

Press down on the disconnector and hold it in the trigger so the holes line up and then install the 3x15mm trigger installation aid pin.

Press the back of the disconnector down to make sure it moves freely.

The trigger assembly is now finished.

Install the trigger assembly in the lower reciever and hold it so the holes in the lower lines up with the hole(aid pin) in the trigger assembly.

Install the 3x33mm pin from the left side of the lower receiver, you might have to tap it with a hammer to get it past the anti-walk wire.

Tap in the pin until its the anti-walk wire snaps into the groove in the pin, the aid pin will fall out.

Install the selector from the left side of the lower receiver, you need to push down on the back of the disconnector to get the selector seated all the way.

Set the selector in the SEMI position and keep it there when installing the hammer and OOB lever later.

Install the 3x6mm pin with the rounded side first into the selector detent hole, then install the selector spring.

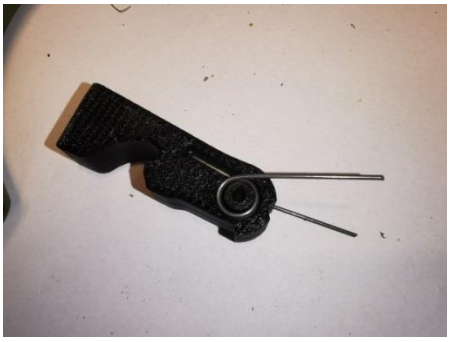
Screw in the m4x6mm flat point set screw into the selector detent hole, tighten it fully but not hard or you could crush the spring.

Now back out the set screw four full turns and then test the selector to confirm that it does not bind.

File a 4mm wide and 20mm long flat on one side of the 8mm stainless rod and then chamfer the end of the rod slightly.

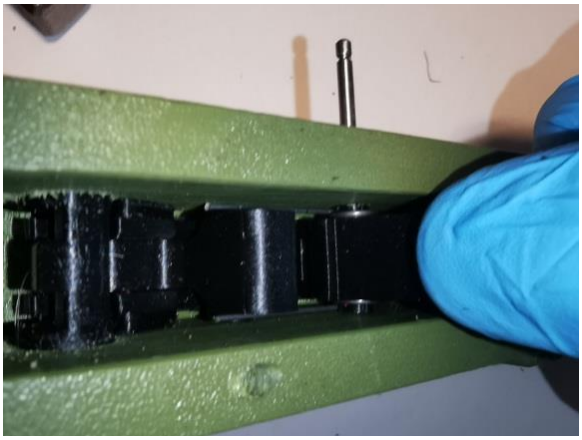
Cut the rod to 18.5mm in length and glue it into the pocket of the hammer with the chamfer down and the flat facing forward and aligned with the hammer face, use the flexible glue.

After the glue has cured use a file to shape the rod to match the hammers profile and round the top forward edge, let the rod cool as you file it or the heat may cause the glue to soften and the hammer to melt.



Install the left and right hammer springs in the hammer, the short leg should sit inside the groove in the hammer.

If it is too long then cut it slightly.



Hold the hammer between two fingers so the springs cannot fall out, angle it horizontally so the long spring legs points backwards then insert it in the lower so the spring legs rests on top of the trigger pin bosses.

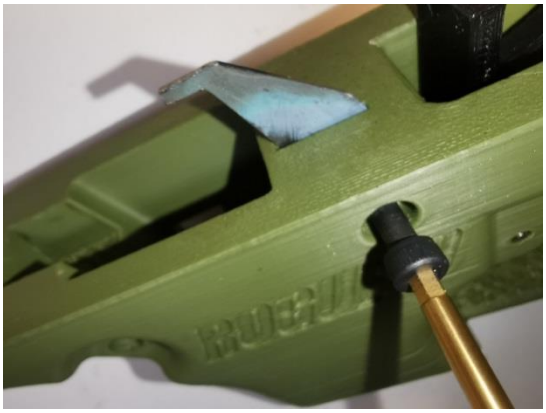
Angle the hammer backwards as you would if you would cock it and then push the bottom of the hammer down and forward until it lines up with the hammer pin hole in the lower. Install the 3x37mm pin from the left side of the lower receiver the same way as with the hammer pin.

Install the OOB spring onto the OOB lever with the bent leg facing inwards and up.

Make sure you removed the support in the notch where the bent leg of the spring rests.

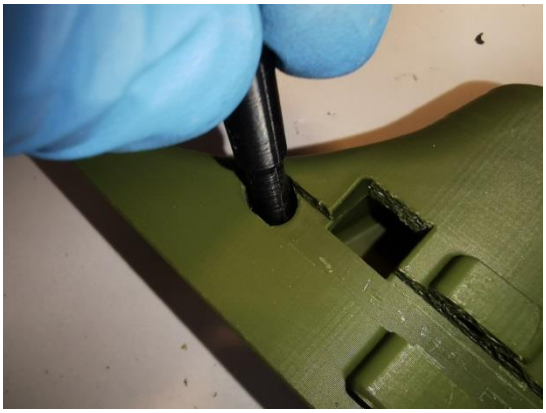
Install the OOB lever into the lower receiver with the spring facing the left side. The straight leg of the spring should rest on the forward left corner of the FCG pocket.

Hold the OOB lever so the hole lines up with the OOB pin hole in the lower. Install the 3x33mm pin from the left side of the lower receiver the same way as with the trigger and hammer pins.

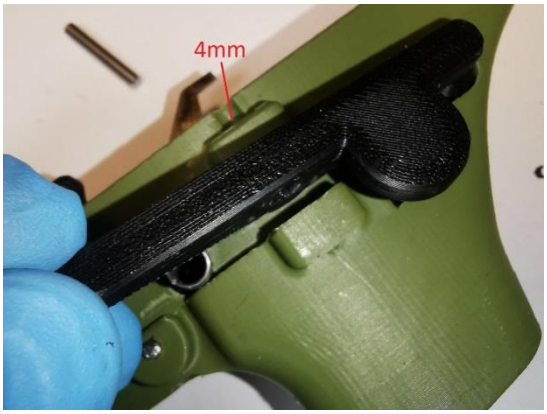


Chuck the m4x20mm socket head screw in the battery drill and use a file to chamfer the tip of the screw, this helps with pulling down the ejector and aligning it if the ejector pocket is tight.

Install the ejector into the lower receiver and push the down as far as possible. Install the m4 screw and tighten it fairly hard. Hold the lower receiver horizontally and look at the face of ejector tip.
It should be 90 degrees vertical, if it is not vertical use a file to make it 90 degrees.



Use an 8mm reamer or drill to clean out the magazine release button hole from the right side of the lower receiver, be careful not to drill out the hole too deep as it is a stepped hole, only drill up to the shoulder inside the hole.
Use a 6mm drill to clean out the magazine release button hole from the left side of the lower receiver. Remove the built-in supports on the magazine release button and then install it from the right side of the lower receiver with the small diameter end of the button first.



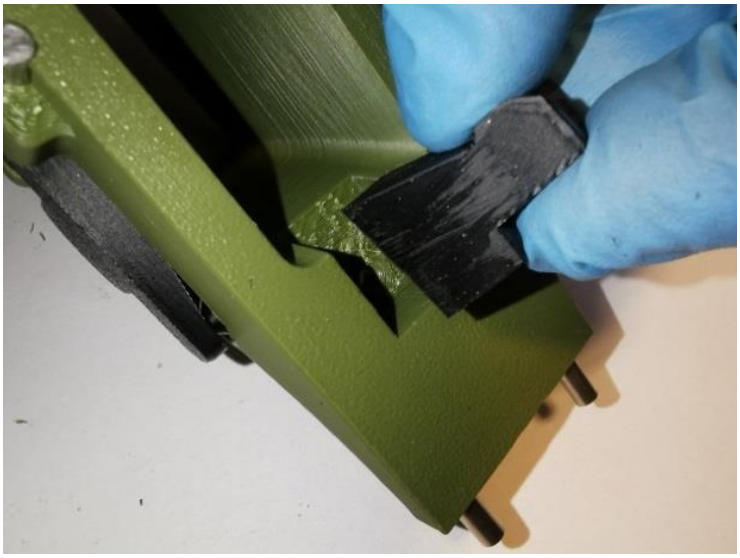
Use a 4mm reamer or the 4x70mm rod to clean out the magazine release pin hole in the magazine catch lug from the top side of the lower receiver.

Install the magazine release spring in the blind hole on the right side of the lower receiver. You might have to clean out the hole with an 8mm reamer or drill first.

Install the magazine catch bar into the slot and then install the 4x26mm pin in the magazine catch lug.

The magazine catch pin can be pushed out with a piece of piano wire or similar through a small hole on the underside of the magazine catch lug in case you need to replace the magazine catch at some point.

This is a part that often breaks over time when printed in PLA because of the material's creep tendency and the constant spring pressure on a relatively thin part. This does not happen with materials like ASA.



Tape some 400grit sandpaper on a short 6mm diameter rod or dowel and wrap it two turns around the rod. Chuck the rod in the battery drill and use it to polish the feedramp.

Use arcing motions from side to side so the sandpaper polishes the entire feeding surface of the feedramp even and equally.

Install the feedramp in the lower receiver and push it down and forward until it is fully seated.

Push down on the feedramp and install the m3x16mm socket head screw through the hole on the underside of the lower receiver. Tighten the screw fairly hard.

There is also an optional feedramp called the JHP feedramp which is designed to improve feeding with JHP and flat nose ammo, use the one that suites your needs best.

The lower is now fully assembled. Now is a good time to test the FCG.

Always shield the hammer with your hand when testing the FCG outside of the upper assembly to prevent the hammer from slamming into the OOB lever.

Follow the FCG testing instructions below.

The SAFE position on the ROGUE-9 cannot be engaged unless the hammer is cocked first, never force the selector to the SAFE position when the hammer is not cocked or the selector may break.

Put the selector in the SEMI position and cock the hammer. Push and hold the OOB lever forward and pull the trigger, the hammer should fall. Keep holding the trigger and OOB lever and cock the hammer again, the hammer should stay cocked. Pull the trigger without touching the OOB lever, the hammer should not fall.

Put the selector in the FUN position and pull the trigger, the trigger should not drop. While holding the trigger push the OOB lever forward, the hammer should fall. Release the OOB lever and hold the trigger then cock the hammer, the hammer should stay cocked.

Cock the hammer and put the selector in the SAFE position. Hold the OOB lever forward and pull the trigger, the trigger should not move and the hammer should not fall.

Making the through assembly rods

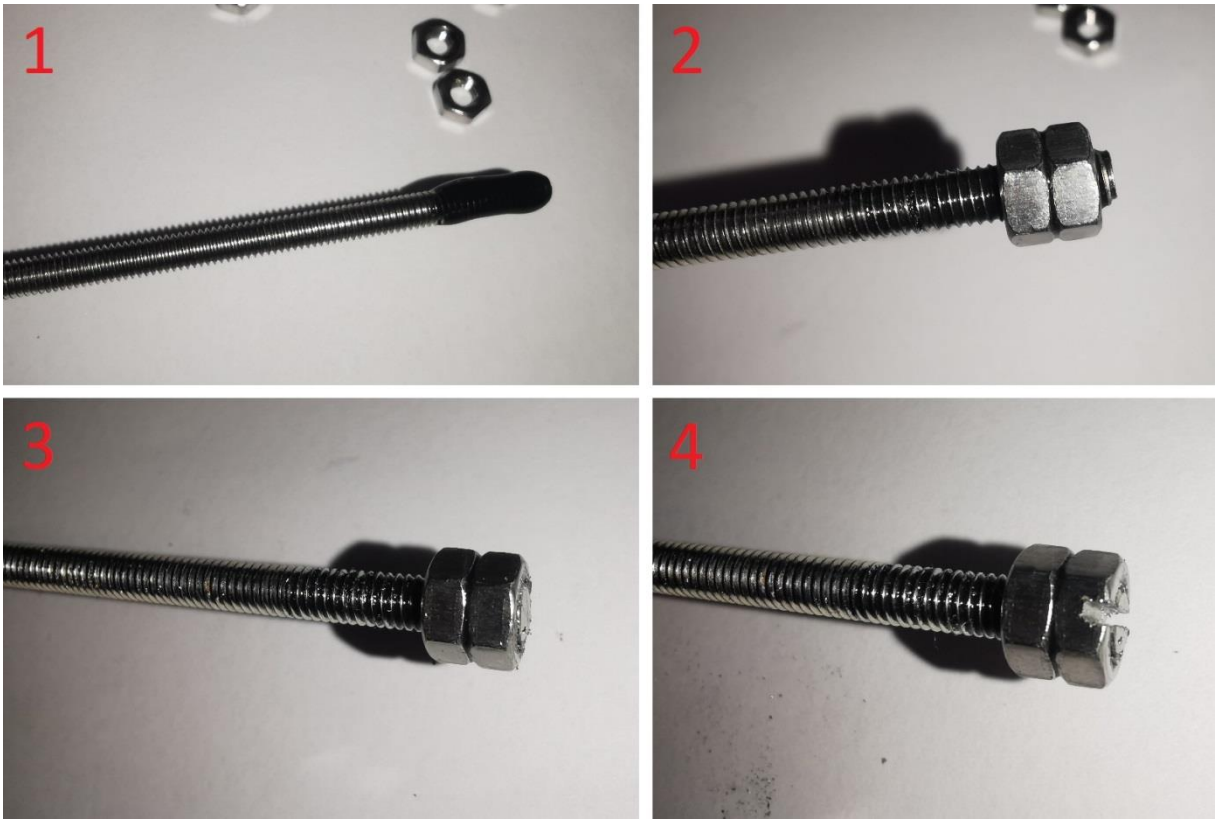
The Rogue-9 has three m4 threaded rods that run through the entire assembly and that holds everything together, this is part of what makes the platform so durable compared to most other 3D2A platforms. For most versions, one of the threaded rods is longer than the other two.

Clean one end of your m4 threaded rod and two m4 hex nuts with some alcohol and mix up some JB weld. Cover the end of the threaded rod with the JB weld and then smear some JB weld inside the threads of the two m4 hex nuts.

Install one nut on the threaded rod then install a second nut and thread it in so approximately 1mm of threaded rod is sticking out. Back out the inner nut until it touches the outer nut and then use a rag to clean off the JB weld. Use two crescent wrenches to tighten the two nuts against each other hard until the flats of the two nuts align.

Hold the threaded rod in the vise and use a standard size flat file to file down the end of the threaded rod that sticks out until it is flush with the outer nut. Now use a hacksaw to cut a 1mm deep slot across the flats in the outer nut like picture 4 shows.

If the hex pockets in the backcap would ever strip you can use a screwdriver in the slots to hold the threaded rods so the gun can still be disassembled.



Now we need to measure and cut the threaded rod to the correct length depending on which version of the Rogue-9 you are building.

You need to measure from the inside of the inner nut.

Check which lengths your threaded rods needs to be in the list below and then make two more rods and cut them all to the correct lengths.

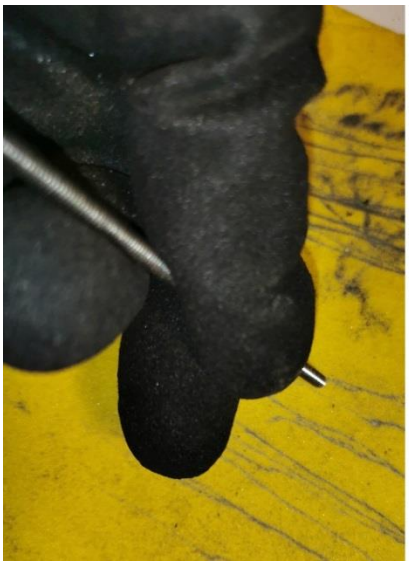
The Super K version uses one 260mm long and two 254mm long threaded rods.

The Kurtz version uses three 280mm long threaded rods.

The SD version uses one 300mm long and two 226mm long threaded rods.

The FTN.3 Short version uses one 415mm long and two 409mm long threaded rods.

The FTN.3 Long version uses one 455mm long and two 449mm long threaded rods.



Insert the threaded rod with the nut side first deep into the chuck of the corded drill so the chuck jaws grips the rod by the threads and not by the nuts.
Place a sheet of 80grit sandpaper on a hard and flat surface. Put on a glove and hold the threaded rod close to the tip to support it.

Angle the rod 45 degrees and spin the drill while dragging the tip of the threaded rod across the sandpaper to chamfer it. Repeat for the other two rods.

Use needle nose pliers and a flat tip micro screwdriver to clean out the supports from the stock button pocket in the backcap.

Be careful when removing the supports in the stock locking rod channel, do not pry against the thin side walls of the backcap with the screwdriver.
Remove the supports inside the three hex shaped pockets in the backcap.

Use a 4mm or 4.2mm reamer or drill to clean out the two blind holes at the bottom of the backcap.

Glue in an m4 washer inside the recessed hole at the top of the backcap with the flexible glue.

Cut a 43mm long piece of the stainless 4mm OD rod and chamfer both ends slightly.

File a flat along the rod's entire length. Use calipers to measure between the flat and round section of the rod, it should be 3.8mm.

Press the 43mm long rod into the notch in the stock locking button with the flat side facing out.

First install the stock button spring into the backcap and then slide in the button, make sure that the flat side of the rod faces the backwards.

Install a m4 washer on a m4x25 button head screw and then install the screw into the hole in the backcap while holding the button fully pressed in.

Fully tighten the screw and then back it out half a turn. Make sure the button operates smoothly.

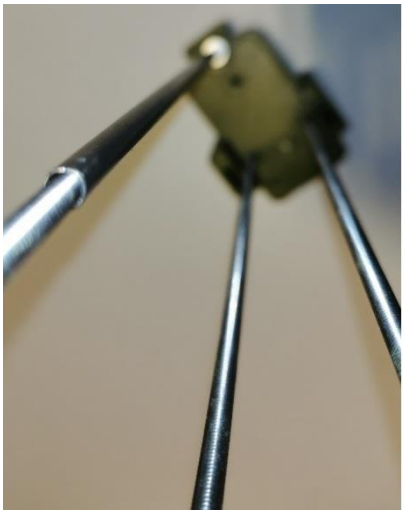
Make sure the stock locking bar fully clears the stock leg channels when the button is fully pressed, if not cut one full coil off the spring and try again.

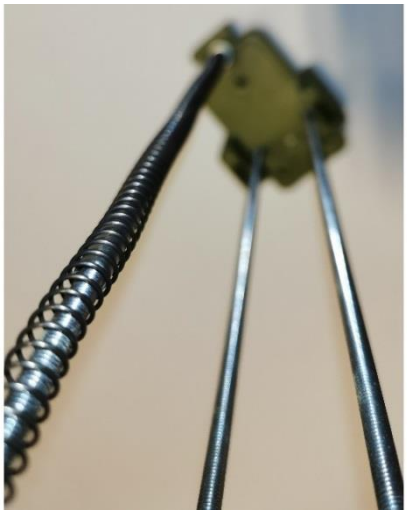
Install the longer threaded rod into the top hole in the backcap, press it in so it seats fully in the hole.

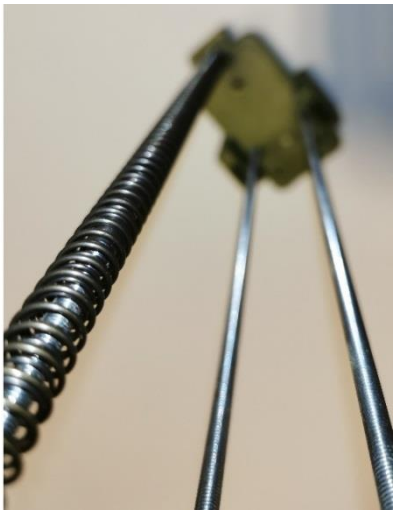
Install the two shorter threaded rods into the bottom holes in the backcap. Hold in the stock button fully so the locking rod does not block the hex pockets and then press in the threaded rods so they seats fully in the holes.

The stock locking rod will keep the two bottom threaded rods from coming out unless the stock button is pressed in.

Cut the 4mm/4.2mm ID x 5mm OD stainless steel capillary tube to 173mm in length and then slide it over the top threaded rod. Slide on the small OD spring over the stainless tube and then slide the big OD spring over the small OD spring.







Set the backcap assembly aside while we work on the upper receiver and barrel retainer.

Use pliers to break off the built-in support structure in the ejection port on the upper receiver.

Remove any remaining supports using a snap blade knife.

Glue in an m4 washer inside the recessed hole at the top of the upper receiver firewall with the flexible glue.

Chuck the 11mm drill bit in the battery drill and use an angle grinder to grind down the tip of the drill until it is flat.

Carefully drill out the ABB holes in the upper receiver with the modified 11mm drill.

Use a 4mm reamer or drill to clean out the holes for the three through assembly threaded rods in the upper receiver.

Go as far as you can reach with reamer or drill from the front of the upper receiver then repeat from the back of the upper receiver.

Drill out the ABB holes in the barrel retainer with the modified 11mm drill.

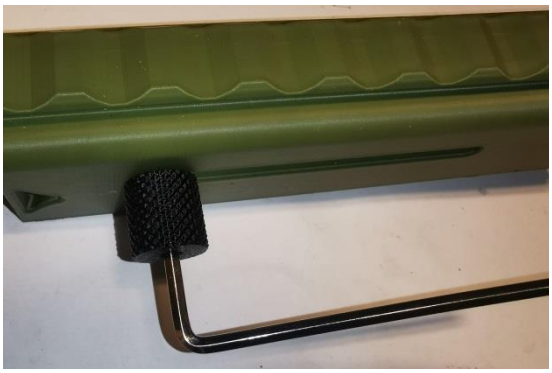
Use a 4mm reamer or drill to clean out the holes for the three through assembly threaded rods in the barrel retainer.

Use a 4mm or 4.2mm reamer or drill to clean out the two blind holes at the bottom of the barrel retainer.

Install the recoil spring lug into the bolt and orient it with the flat side facing backwards.

Drop the charging handle spacer (4mm diameter, 5mm long pin) into the charging handle hole in the bolt.

Install the bolt into the upper receiver carefully so the charging handle spacer does not fall out.



Use a 5mm allen key to install the charging handle into the bolt through the charging handle slot in the upper receiver.

Tighten it loosely for now, we will fully tighten it later.

Push the bolt forward and hold it in place while shaking the upper back and forth. The ABB weights should be able to slide and you should hear them impacting on the bolt face and on the ABB screw heads.
If the ABB screws are not centered enough in the ABB holes, mark the screw heads at the o'clock position they need to bend towards then remove the bolt from the upper and clamp it in the vice. Do not lose the charging handle spacer.
Use a pipe or similar over the screw head and bend the screws slightly until they are more centered.

Go back and tighten the charging handle fairly hard. There should be 1mm to 1.5mm gap between the charging handle knob and the outside of the upper receiver when the charging handle is fully tightened.

Make sure all supports remains are removed inside the collar pocket on the upper receiver and then install the barrel in the collar pocket with the collar spacer tab and long set screw aligned with the slot in the collar pocket. Make sure the barrel is fully seated.

If you are building one of the FTN3 versions you need to scroll down and follow the FTN3 specific instructions before continuing the build.

Make sure all supports remains are removed inside the collar pocket on the barrel retainer and then install the barrel retainer over the barrel.

Place the upper receiver upright with the backside against the floor and press down on the barrel retainer to seat it fully against the upper receiver.

Pull the bolt back and cock the hammer then insert the front pins of the lower receiver into the holes in the barrel retainer.

Push the lower receiver forward against the barrel retainer.

Install the backcap assembly into the upper receiver. Make sure the top threaded rod goes through the recoil spring lug and into the hole at the top of the firewall in the upper receiver.

To get the guide rod sleeve through the recoil spring lug you might need to repeatedly pull back on the charging handle.

If the guide sleeve does not go through the recoil spring lug the backcap will not fully seat.

Pull the bolt back approximately 25mm and push the rear of the lower receiver up against the upper receiver and hold it in place. If the bolt is not pulled back the OBB trip pin in the bolt will end up in front of the OOB lever and the bolt will be stuck.

Fully seat the backcap against the back of the upper receiver, the pins on the back of the lower receiver will seat into the holes in the backcap. Place the gun upright with the backcap against the floor and then let the bolt go forward.

Use a 7mm socket on an extension to install the three m4 flange nuts onto the threaded rods in the barrel retainer. First install the top nut loosely to keep the gun from flying apart under the spring tension from the recoil springs.

If you are building the SD version you can use a 3mm allen key to hold the nuts temporary so you can reach down to the recessed threaded rods and get the nuts started on the threads.

Do not over tighten the flange nuts, tighten them gradually in a star pattern with the 7mm socket and extension held directly in your hand. Do not use the spanner yet.

Tighten them as hard as you can with your bare hands and then use the spanner to tighten them 1/8 of a turn more.

Over tightening the flange nuts will cause them to seize on the threaded rods.

If you are building the SD version go ahead and place the 16x2.5mm O-ring over the barrel and push it down to the bottom of the barrel retainer.

Use a 4mm reamer or the 4x70mm rod to clean out the hole through the lower receiver again, this will match the hole in the upper receiver lug with the hole in the lower receiver.

Install the 4x37mm pin into the hole from the left side of the gun. The pin is not really needed to hold anything together but it ensures alignment between the upper and lower receiver.

If you are building the Kurtz or Super K versions, your ROGUE-9 is now finished.

Building the FTN3 versions

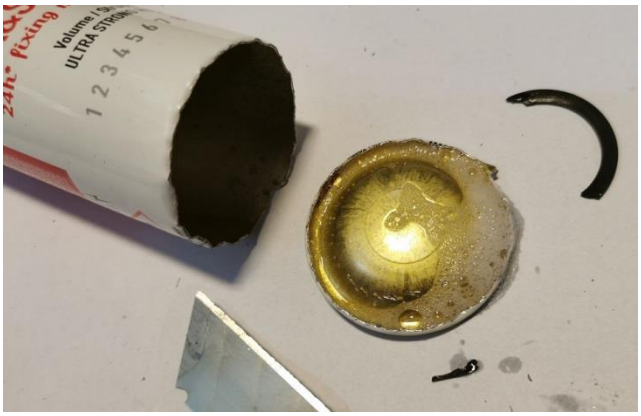
Empty the content of the spray can completely, I usually spray it into a paper bag outdoors.

Remove the spray cap from the can.

Use wire cutters to carefully peel back the lid around the shoulder rim of the spray can.

Do this around the entire shoulder rim.

Place the spray can on the floor upright and punch the lid into the spray can with a socket or punch and a hammer.



Use a snap blade knife to carefully cut the bottom off the spray can. Be careful not to cut yourself or deform the spray can too much.

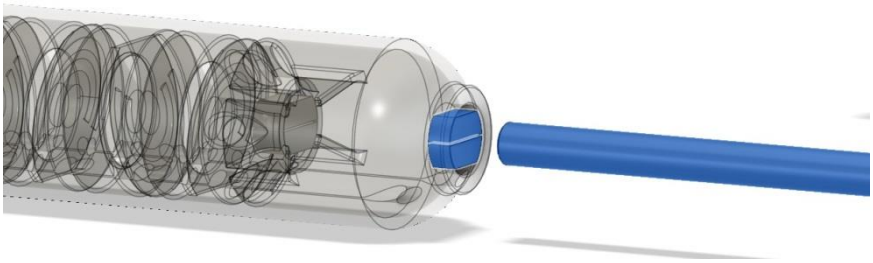
Dump out the lid from the spray can the use scissors to cut the jagged edge of the can.

Wash the inside of the spray can to remove the remaining hair mousse.

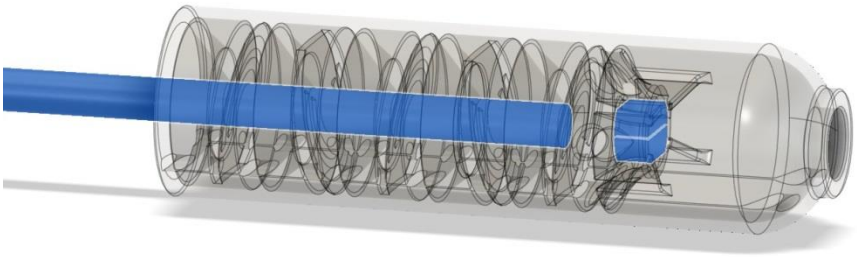
Use a tube or round object to straighten the edge around the spray can so the FTN3 core can be inserted easily later.

Place the FTN3 barrel retainer upright with the backside against the floor and push down the spray can inside the barrel retainer.

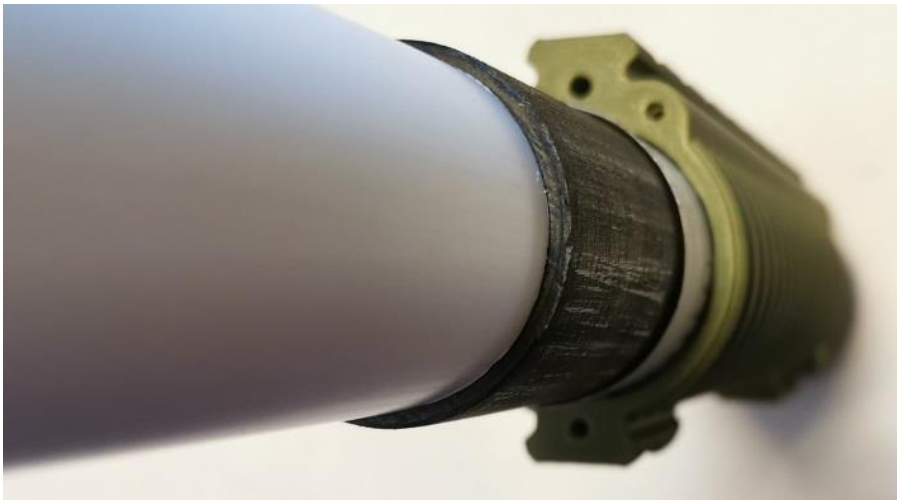
Make sure the spray can is fully seated into the barrel retainer.



Use a left over piece of the 10mm OD steel tube as a punch and punch in the built-in supports at the rear of the FTN3 core. Shake the core to get the supports out.



Use the 10mm OD steel tube from the front of the core to punch out the built-in supports from the barrel support inside the FTN3 core. Shake the core to get the supports out.



Insert the FTN3 core into the spray can with the domed side first and use a 40mm to 43mm diameter tube or socket to push it down.

This has to be done inside the barrel retainer, otherwise the domed part of the spray can will be crushed.

Make sure the FTN3 core is fully seated in the spray can. Pull out the spray can from the barrel retainer and look at the back side of the can.

Check so the shoulder on the domed side of the FTN3 core has seated into the shoulder rim of the spray can.

Use scissors to cut the excess off the spray can flush around the FTN3 core.

If you are building the long FTN3 version the spray can will be slightly shorter than the long FTN3 core.

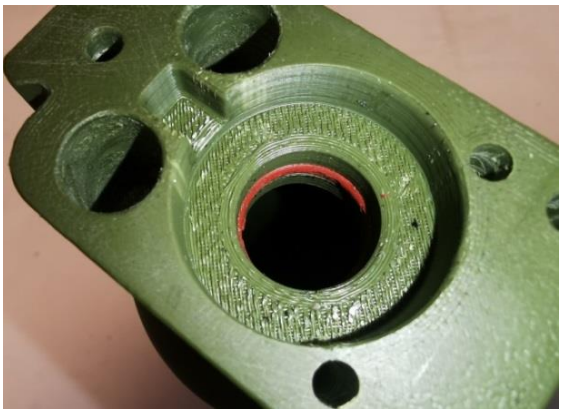
This is not a problem because the gas pressure has reduced significantly when it reaches the end of the core.

Cut a 220mm long piece of 4mm diameter stainless rod and chamfer one end slightly then file a 20mm long flat at the chamfered end.
File the flat 2mm deep which is half the rods diameter.

This rod can also be used to clean out the holes in the upper receiver if the threaded rod does not fit.

Chuck the 220mm long rod in the battery drill and insert it into one of the two 4mm holes in the front of the FTN3 core. Spin the drill and ream out the hole until the drill eats through the domed side of the spray can. Repeat for the second hole.

Use the snap blade knife to clean up the holes in the spray can so the threaded rods can be inserted through the holes easier.



Install the 16x2.5mm O-ring into the groove inside the barrel hole at the back of the FTN3 barrel retainer.

Install the FTN3 barrel retainer on the upper receiver by using the general instructions above.

If you are making the short FTN3 version use a 102mm long ported and non-threaded barrel, for the long FTN3 version use a 112mm long ported and non-threaded barrel.

Insert the two threaded rods sticking out of the FTN3 barrel retained into the holes in the spray can reinforced FTN3 core and slide the core into the barrel retainer.

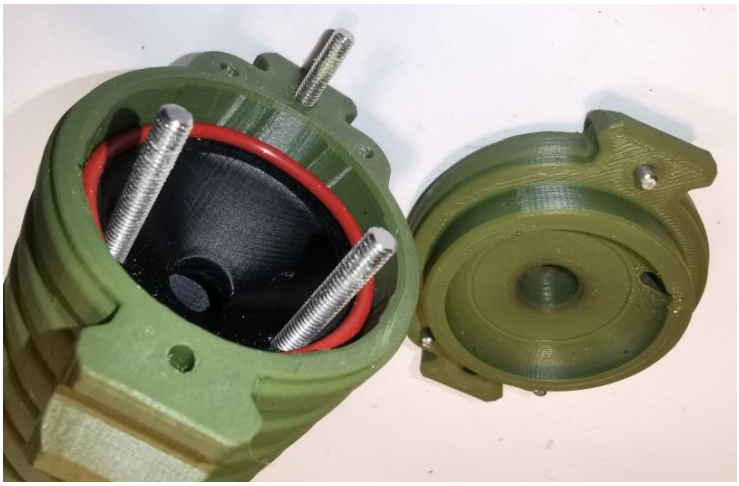
Make sure the FTN3 core is seated fully into the barrel retainer.

There are three blind holes in the FTN3 barrel retainer, use a 3mm reamer or drill to clean out the blind holes.

Cut three 12mm long pieces of the 3mm diameter stainless rod and chamfer both ends.

Use a 3mm reamer or drill to clean out the blind holes in the FTN3 endcap.

Install the 3x12mm pins into the blind holes in the endcap. The pins only job is to ensure alignment between the barrel retainer and the endcap.



Install the 40x2mm O-ring into the barrel retainer on the outside of the two threaded rods.

Install the FTN3 endcap on the barrel retainer.

Place the gun upright with the backcap against the floor and use a 7mm socket to install the three m4 flange nuts on the threaded rods and tighten them loosely.

Tighten the flange nuts gradually in a star pattern with the socket held directly in your hand while pushing down on the FTN3 endcap to compress the O-ring. Tighten the flange nuts as hard as you can with your bare hands without using the spanner. Do not over tighten the flange nuts!

Use the spanner to tighten the flange nuts 1/8 of a turn more.

Over tightening the flange nuts will cause them to seize on the threaded rods.

Making the butt stock

Use the 80grit sandpaper to sand the backside of the butt stock half and the butt pad so the glue adheres better.

Insert the alignment studs with the side of the studs that was oriented towards the printer's build plate down into the pockets on the butt stock half. Make sure the studs are seated fully.

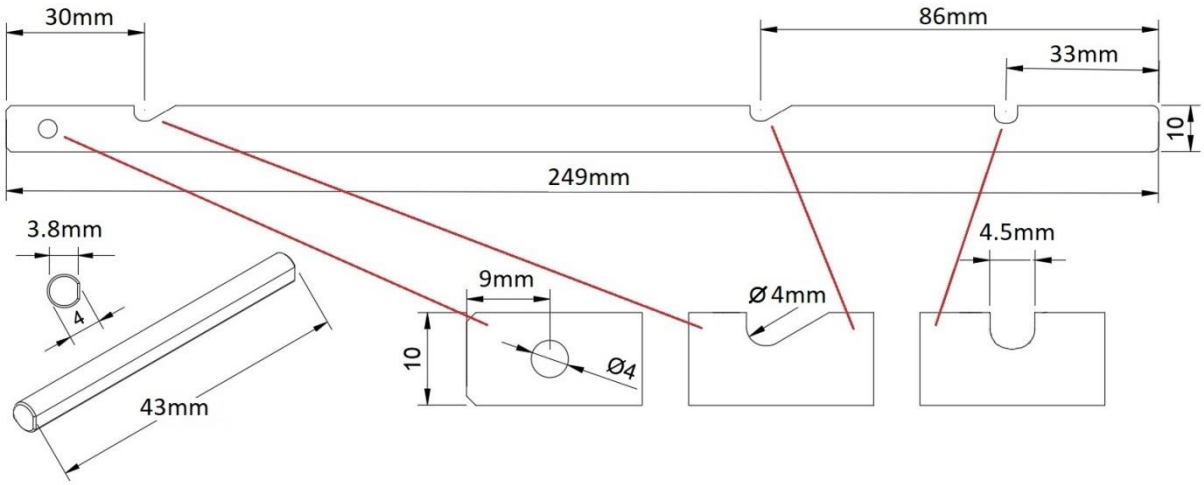
Apply the flexible glue to the to the butt stock half in a similar pattern as in the picture.
Do not apply the glue too close to the edge or it will ooze out and make a mess.

Install the butt pad on the butt stock half and use a clamp or the vice with some wood as padding to compress the two halves together.

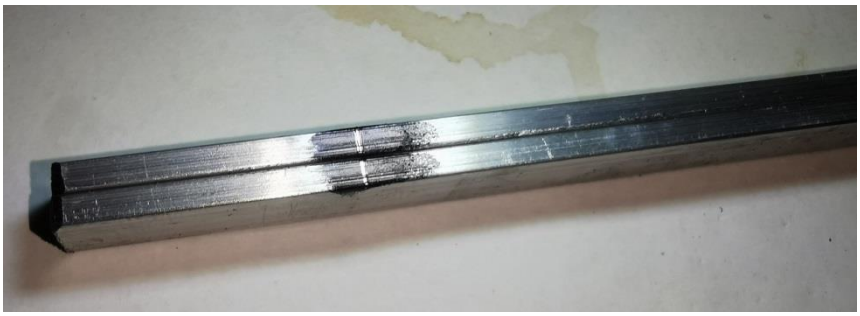
Leave the butt stock clamped for a few hours so the glue has time to cure.

If any glue oozes out do not try to clean it off, wait until its cured then pick it off with tweezers.

Now we will make the two stock legs from 10x3mm cold drawn flat steel bar, the drawing below shows the details and measurements but we are going to use a JIG to simplify the process. The IMPERIAL version uses 1/8” x 3/8” steel bar.



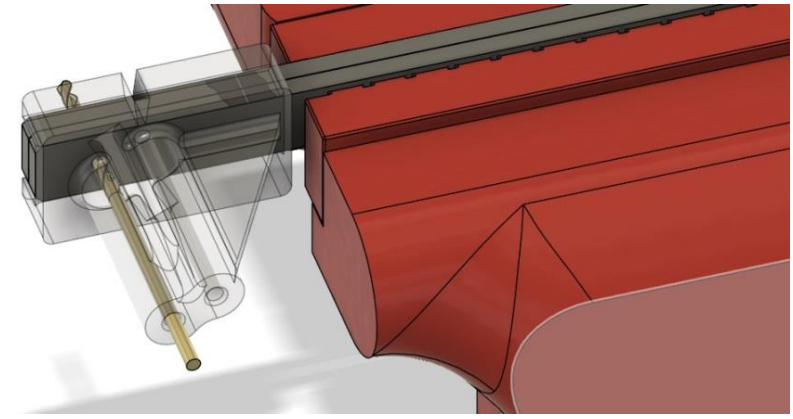
Cut two 249mm long pieces of the 10x3mm flat steel bar. Chamfer or round off the corners on both ends slightly.



Tape the stock legs together side by side so the ends are aligned. Use a marker to lay down some ink on the top of the legs 30mm from the left side end. Set the calipers to 30mm and score a line.

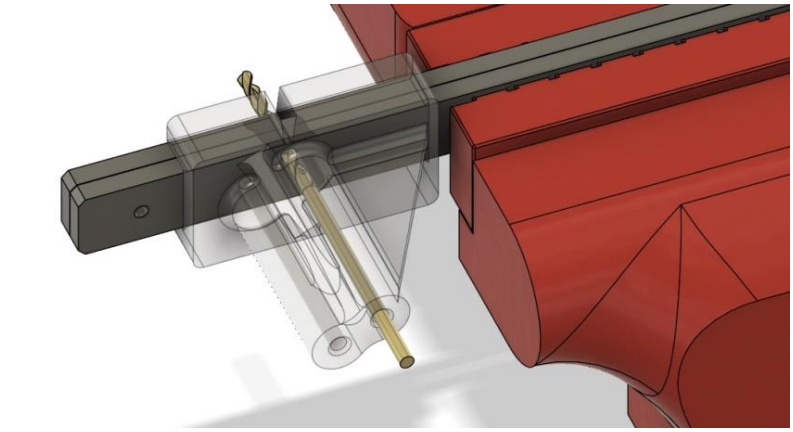
Use the marker to lay down some ink on the top of the legs 33mm and 86mm from the right side end of the stock legs.

Set the calipers to 33mm and score a line then set it to 86mm and score another line.



Clamp the stock legs in the vice and install the stock leg drilling JIG on the left side end of the stock legs. The short end of the JIG should be flush with the left side end of the stock legs.

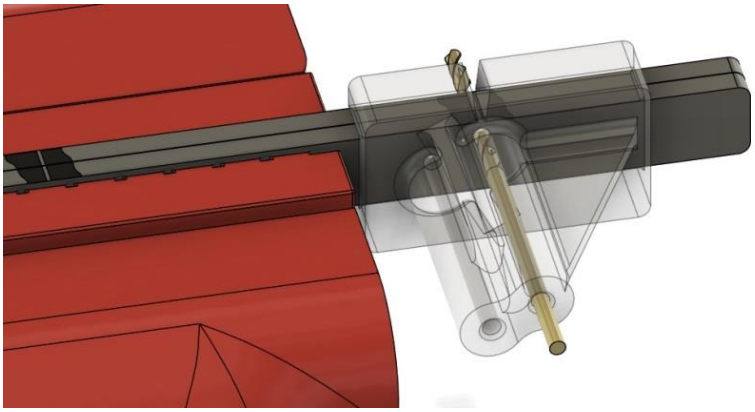
Use a 2mm drill bit to drill through both stock legs, use the left center hole in the JIG.



Move the stock legs out slightly in the vice, we want to avoid flex in the stock legs when we are drilling them.

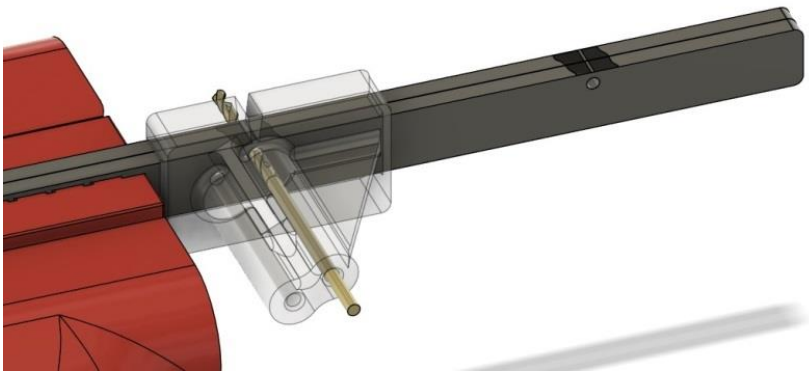
Slide the JIG over so the sighting notch in the JIG aligns with the scored line in the ink.

Use the 2mm drill bit to drill through both stock legs, use the top right hole in the JIG.



Move the JIG over to the right side end of the stock legs and align the sighting notch in the JIG with the scored line in the ink.

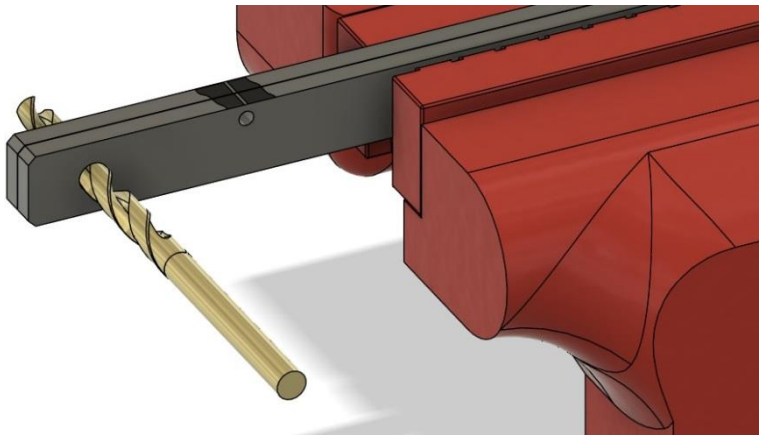
Use the 2mm drill bit to drill through both stock legs, use the top right hole in the JIG.



Move the stock legs out in the vice to avoid flex in the stock legs and then slide the JIG over so the sighting notch in the JIG aligns with the scored line in the ink.

Use the 2mm drill bit to drill through both stock legs, use the top right hole in the JIG.

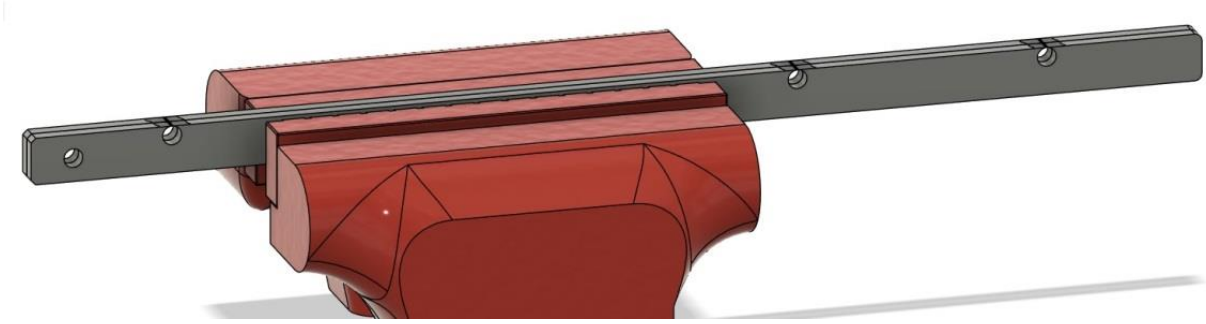
The stock legs should now look like this.

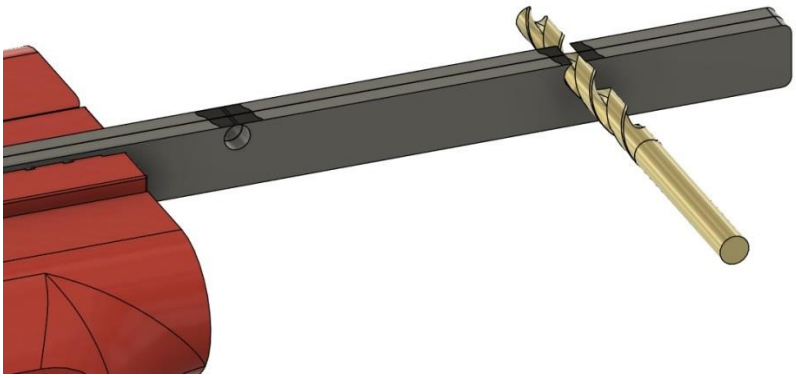


Use a 4mm drill to drill through the first 2mm hole on the left side end of the stock legs.

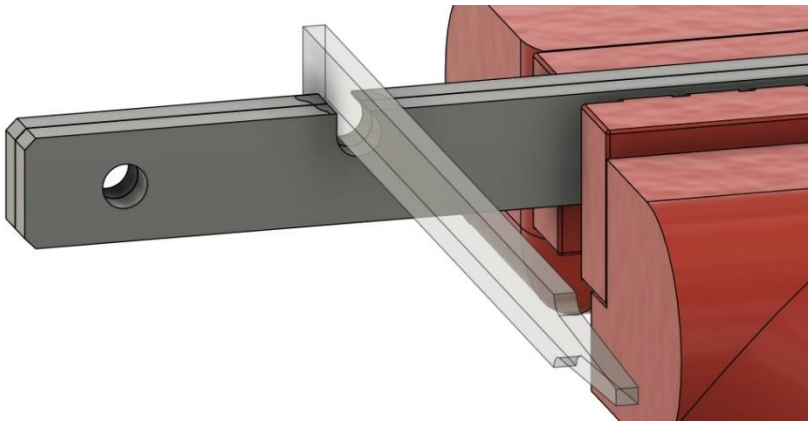
Take care to drill straight.

Drill out the remaining 2mm holes with the 4mm drill.



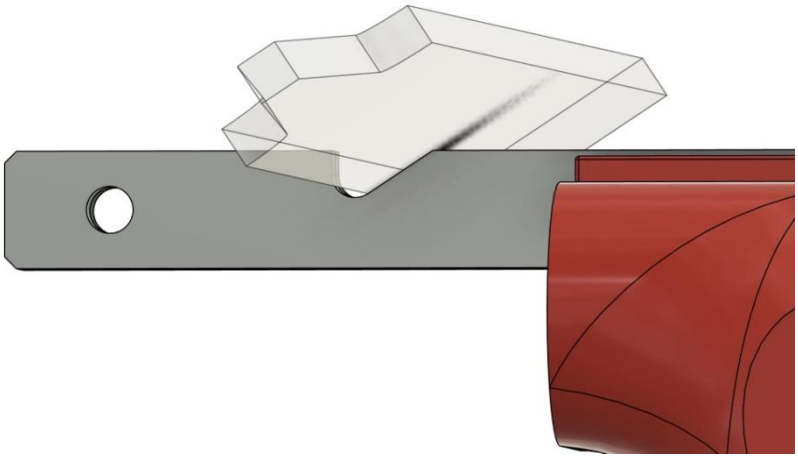


Use a 4.5mm drill to drill out the hole closest to right side end of the stock legs.



Use a suitable needle file to open up the second hole from the left side end of the stock leg. File down from the top to open the hole up.

Use a flat needle file to make the left side wall of the upper half of the hole straight as shown in the picture.

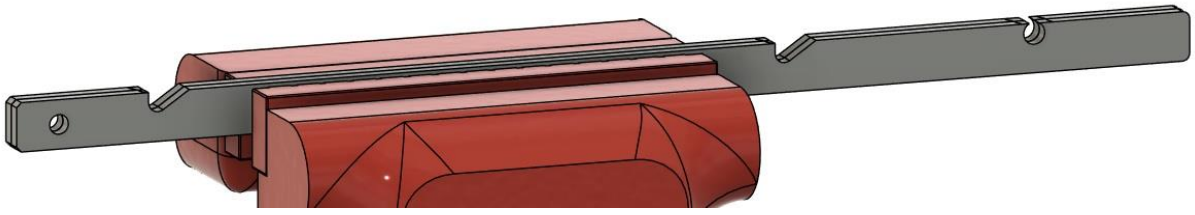


Use a regular size flat file held at an angle and file down into the stock leg at the right side of the hole as shown in the picture.

Take care to not file into the left side wall of the hole.

If your file has a smooth edge on one side, turn that side towards the left side of the hole.

Repeat the two previous steps on the hole at the 86mm mark. Note the direction of the angled cuts.



Use a suitable needle file to open up the 4.5mm hole from the right side end of the stock leg. File down from the top to open the hole up.

Use a flat needle file to make both side walls of the upper half of the hole straight until you have a U-notch as shown in the picture.

Use 400grit sandpaper to remove any burrs and rough or sharp edges on the stock legs.

Install the stock legs into the butt stock with the side that has the centered 4mm hole close to the end first.

Make sure the orientations of the legs are the same as in the picture.

Make sure holes in the legs are aligned with the holes in the butt stock. You might need to tap the legs into the butt stock carefully with a hammer.

Install the two m4x16mm countersunk screws into the holes in the butt stock and tighten them fairly hard.

If you seated the stock legs to deep you can clamp one leg at a time in the vice and tap out the butt stock slightly.

Use the flat needle file to file a small degree chamfer on the inside of the stock leg ends to prevent the ends of the stock legs from biting into the upper receiver when collapsing the stock.

If the butt stock is too tight in the backcap of the gun, heat the stock legs slightly and then install the stock.

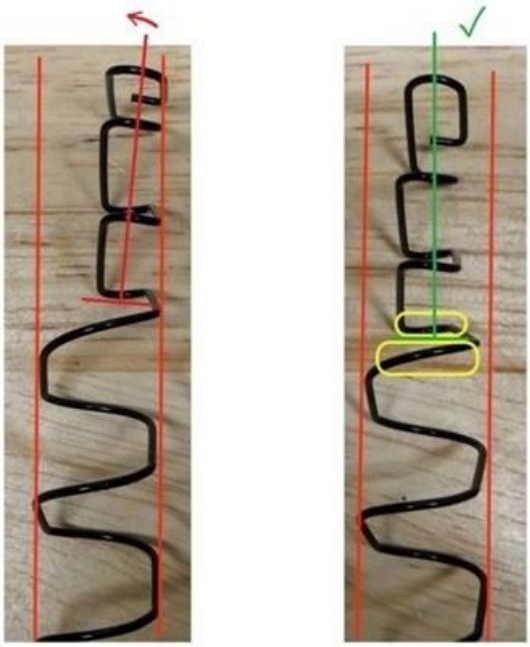
Assembling the magazine

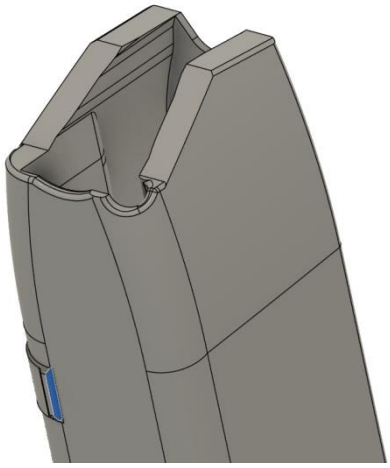
The ROGUE-9 uses a custom 20 round or 25 round version of the DMB 9x19mm Glock magazine which is the most reliable 3D printed 9x19mm Glock magazine available to this date.

Credits to BoostWillis for making the instructions on how to modify the Chinese Glock magazine spring.

Instead of leaving the top of the spring flat like in the picture on the left, bend the top coil slightly with your pliers upward to match the pitch of the coils below it like shown in the right picture.

As you can see from the red guide lines, the spring in its unmodified state on the left has a bias toward one side. Refer to the marked yellow boxes for where to bend the spring with your pliers to correct it. You want the top narrower coils to be centered on top of the spring.





Remove the built-in support inside the magazine catch notch on the magazine housing.

The easiest way to remove it is to punch it out with a screwdriver by the corner of the support that is sticking out slightly from the housing (marked blue).

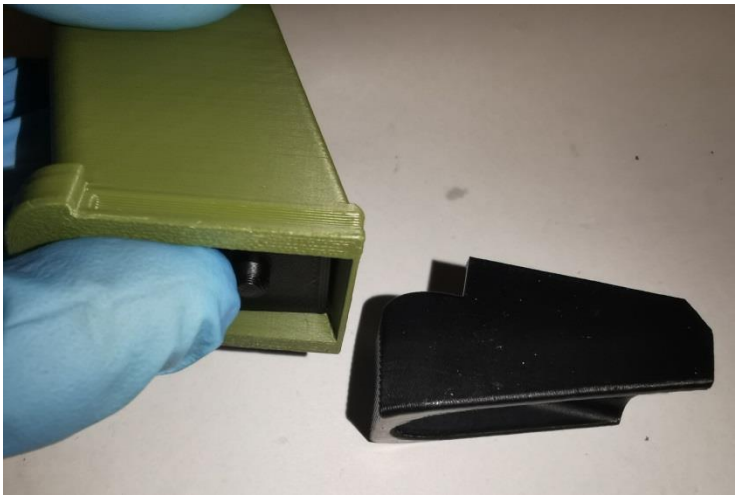
Do not use a screwdriver to pry it off as the walls of the magazine housing are thin.

Install the magazine follower onto the magazine spring.

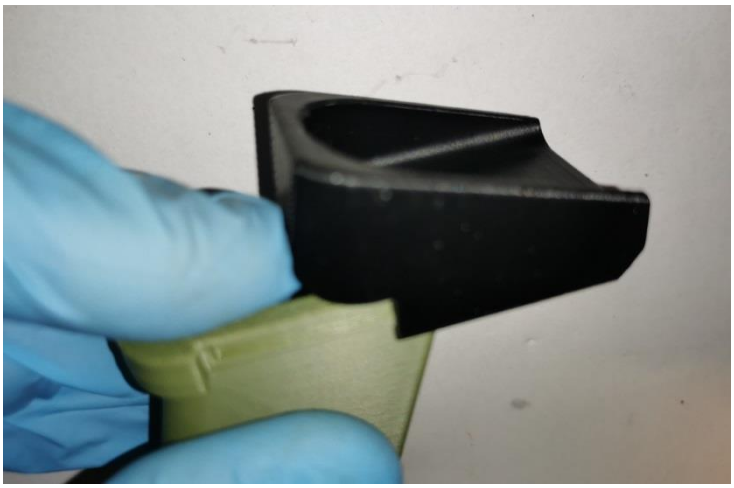
Insert the follower and spring into the magazine housing.

Hold the magazine locking plate with the peg facing the back of the magazine housing.

Use the locking plate to push the magazine spring into the magazine housing.



Push the locking plate into the magazine housing with your finger.



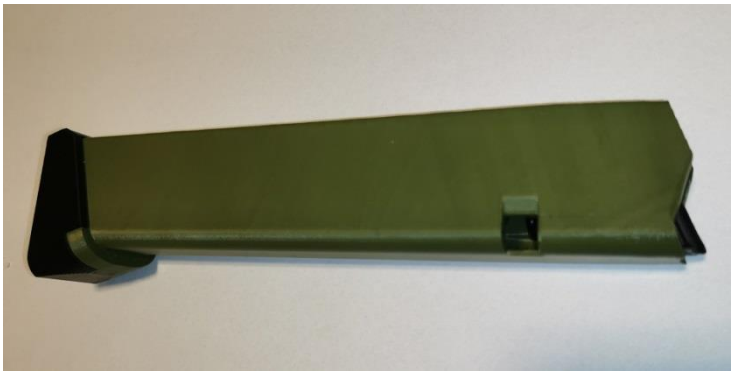
While holding the locking plate, slide the magazine base plate onto the magazine housing.

Remove your finger from the locking plate and slide on the base plate fully.

The peg on the locking plate should pop into the hole in the base plate.

To disassemble the magazine, push in the peg with an allen key and slide the base plate off the magazine housing.

Hold your hand over the spring when you slide off the base plate to prevent the locking plate and spring from flying out of the magazine,



Spray some silicon lubricant on and around the magazine follower.

Use a paint stirring stick or similar to push the follower all the way to the bottom 30 times or so to break in the magazine.

The magazine is now finished.

Assembling the printed sights

The ROGUE-9 uses a slightly modified version of the EmSix adjustable sights designed by the user “Creative-Extension11” on odysee, credits to him for the sight.

The rear sight is adjustable for windage and the front sight is adjustable for elevation by the use of a 2mm allen key. There are two different apertures for the rear sight, one has a 3mm peep hole and the other one has a 4mm peep hole.

Try both apertures and use the one that works best for you, it is just personal preference. The rear sight body, front sight body and both apertures are all included a single STL file.

Use a 3mm reamer or the 3x70mm rod to clean out the adjustment screw holes in the rear sight body.

Use a 4mm reamer or the 4x70mm rod to clean out the three mounting screw holes in the rear and front sight body.

Heat the m3x28mm screw for 3 seconds with a lighter and then screw it through the apertures to form threads without the risk of cracking the aperture. Make sure you screw it in straight. Remove the screw from the aperture.

Place the aperture in the rear sight body and then slide an m3x7mm washer onto the m3x28mm button head screw.

Install the m3 screw from the right side of the sight and thread it through the aperture and fully through the entire sight body.

Install an m3x7mm washer on the left side of the rear sight body and then install the m3 lock nut on the screw.

Do not tighten the nut too hard, it should be fairly loose so both the m3 screw and nut can rotate together against the washers but you also do not want any play in the screw from side to side.

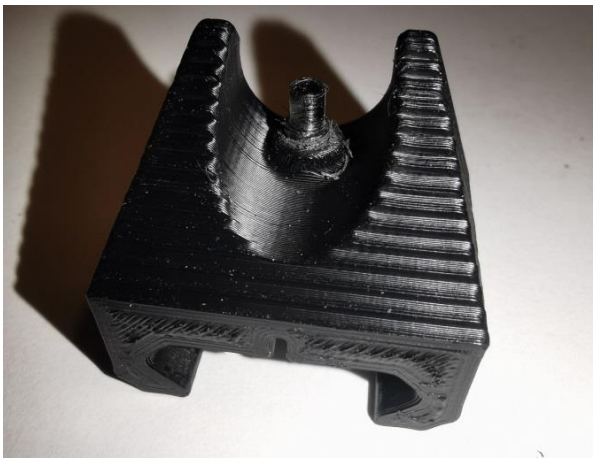
When the m3 screw is turned clockwise the aperture will slide to the right, turn the screw clockwise until the aperture is centered in the sight body.

Insert the m4x12mm setscrew in the chuck of the corded drill with the allen key side out. The set screw should protrude 4mm out of the chuck.

Use a standard size flat file to file most of the threads down then use a flat needle file to file the last bit of the threads away so you get a smooth pin.

The m4x12mm screw should now look like this. It will be used as the front sight post.

Use a black marker to color the post black.



Install m4x12mm screw into the hole in the front sight body, make sure it is screwed in straight.

Place both the rear sight and the front sight on a straight and level surface.

Look at the front sight post through the peep hole on the rear sight and screw in or out the front sight post until the top of the post is centered in the peep hole.

Slide the rear sight onto the picatinny rail from the back of the gun until the two screw holes align with the two most rearward rail slots.

Install two m4x30mm socket head screws from the right side of the rear sight.

Install the m4 lock nuts but do not fully tighten the screws yet.

Push the rear sight forward until the screws touches the slanted surfaces forward of the rail slots and then fully tighten the m4 screws. When the gun itself recoils backwards the sights will move forward if the screws are not in contact with the slanted surfaces and the zero will shift.

Slide the front sight onto the picatinny rail from the front of the gun until the screw hole align with the most forward rail slot.

Install the m4x30mm socket head screw from the right side of the front sight.

Install the m4 lock nut but do not fully tighten the screw yet.

Push the front sight forward until the screw touches the slanted surface forward of the rail slot and then fully tighten the m4 screw.

Use a 2mm allen key to adjust the windage of the rear sight. Turning the windage adjustment screw clockwise will move the impact of the bullet to the RIGHT.

Use a 2mm allen key to adjust the elevation of the front sight. Turning the front sight post clockwise will move the impact of the bullet UP.

ROGUE-9 Kurtz with a 20 round magazine and the printed EmSix sights.

Functionality testing

To make sure that your ROGUE-9 functions properly when it comes to the bolt picking up cartridges from the magazine and feeding them into the chamber reliably, you need perform this test before trying to fire your ROGUE-9 with live ammo.

Follow the steps below to complete this test to see if your ROGUE-9 is functioning correctly.

MAKE SURE THAT YOU REMOVE THE FIRING PIN FROM THE BOLT BEFORE PERFORMING THE CARTRIDGE FEED TESTING!! The firing pin retainer pin has to be installed back in after the firing pin and firing pin spring has been removed as it also retaining the extractor.

Load ten live cartridges into the magazine and insert it in the mag well. Aim the gun in a safe direction and then pull the charging handle back fully and release it. Keep cycling the bolt swiftly until the magazine is empty.

If any of the ten cartridges fail to properly feed into chamber or eject out of the ejection port of the gun you need to investigate what is causing the issue.

If your ROGUE-9 has feeding issues, start by making sure the bolt runs smoothly in the upper and that it does not bind. Next check that the feed ramp is undamaged (a small indentation on the feedramp from the bolt is normal) and then retry the feeding test with a different magazine.

There is an optional JHP feedramp included that was designed to increase reliability with jacketed hollow point and flat point ammo, you can try this feedramp as well even if you are using FMJ ammo to see if feeding improves. The JHP feedramp is marked with two dots for easy identification when its installed in the lower receiver.

Also make sure there is no warping in the lower receiver, even just a slightly warped lower receiver can cause feeding issues. If your lower is warped, level the bed on the printer and increase the room temperature in the room where your printer is, then print a new lower receiver with an 8mm brim to enhance bed adhesion even further.

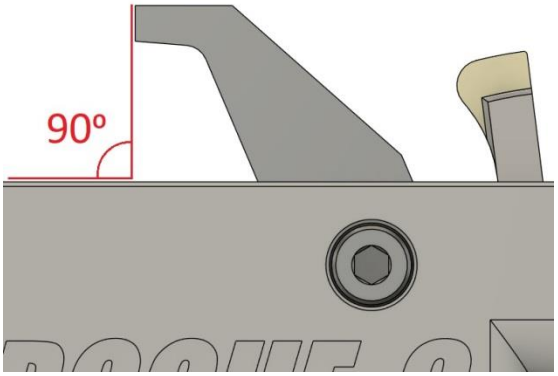
If you are using ABS or ASA for the lower receiver you need to print it with 6 walls, 6 top layers,6 bottom layers and 35% gyroid infill. Printing the lower receiver in ABS or ASA with 100% infill will almost always cause warping. All other parts prints fine with 100% infill in both ABS and ASA.

If you have extraction or ejection issues you should test if the chamber is good and that the cartridges does not stick inside the chamber. Remove the magazine then pull back the bolt and hold it to the rear while inserting a live round directly into the chamber with your fingers.

Push the round with your finger fairly hard so it gets seated fully into the chamber then tip the muzzle of your ROGUE-9 upwards. If your chamber is made well, the cartridge should fall out by itself or with a little manipulation by pulling lightly on the rim of the cartridge with your finger nail or a small screwdriver.

If you need to use the screwdriver to pry the cartridge out of the chamber with force, the chamber is too tight and your ROGUE-9 will likely have extraction and ejection problems.

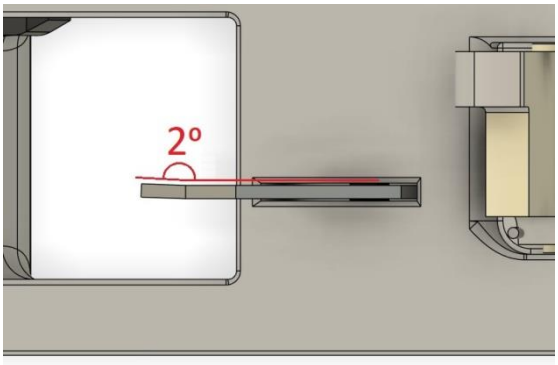
If the chamber is good and you still have extraction issues you can try removing the extractor and bending it slightly more. Re-install the extractor in the bolt again and see if the issue is solved. If you still have extraction issues you should make a new extractor and take extra care to follow the instructions meticulously.



If you have ejection issues you should first check the angle of the tip of the ejector, the face of the ejector tip that the cartridge case impact against should be straight vertical.

Remove the lower receiver from the upper assembly and use a flat needle file to file it straight if it is not already straight.

Re-assemble the gun to see if the issue has been resolved.



If you still have ejection issues, try to bend the tip of the extractor very slightly to the right.

Remove the lower receiver from the upper assembly and use a crescent wrench to bend the tip of the ejector 1 or 2 degrees to the right.

Re-assemble the gun to see if the issue has been resolved.

Once your ROGUE-9 feeds, extracts and ejects the cartridges reliably you should install the firing pin and firing pin spring back into the bolt and proceed to do live fire testing.

Primer and firing pin testing

You should test the firing pin spring by loading the magazine with one cartridge. While pointing the gun in a safe direction (because it could possibly fire), pull back the bolt fully and release it swiftly so the bolt strips the round from the magazine and slams it into battery hard.

If the firing pin dents the primer from the inertia of the bolt slamming into battery you should use a longer firing pin spring. A very tiny dent is quite normal and nothing to worry about.

If the dent is bigger than acceptable by your own risk assessment you should cut a new spring from the spare BIC Clic pen that has four more coils than the old spring and replace the old spring with the new one.

Make sure the firing pin can still protrude far enough out of the firing pin hole by pushing on the back of the firing pin with an allen key or similar.

By using a longer firing pin spring you might also need to replace one of the two hammer springs with a hammer spring made from 1.2mm diameter piano wire to prevent light primer strikes caused by using a stronger firing pin spring. Assemble the gun and repeat the test again.

The four spent casings on the left in the picture below shows optimal primer strikes. A properly struck primer will work harden and become much stronger after it has been hit. The four casings on the right show primer strikes where the hammer springs where not strong enough.

The primer cups on the right side is showing some signs of over pressure but in this case it is because when the primer is not hit with sufficient force the firing pin will not dimple the primer cup deep enough for the brass primer cup to work harden and the dimple in the cup will be pushed back against the bolt face by the chamber pressure.

If your primers look like the ones on the right, first check your firing pin diameter to see if there is excessive play between the firing pin and the 2mm diameter firing pin hole in the bolt face. If there is no excessive play you should replace one of the hammer springs with a 1.2mm wire diameter spring.

If your primers look like the primers on the right there is no real safety concern, the gun will still be perfectly safe to fire but you will most likely experience occasional failures to fire due to light primer strikes.

Congratulations to your new ROGUE-9 build.

Have fun and stay safe.