Monarch V1

By SwarmTech

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Welcome to the Monarch Build Guide!

Please see STL Guides included in each readme folder for a quick view of each component, along with some details on each.

The project currently has over 1k rounds in 7.62x39 on a single high-heat material receiver, as well as 50 rounds of 450 Bushmaster. As such the action has proven it is reliable. Safety testing has been unable to stimulate conditions for an Out of Battery, but as with all 3dp designs and home made firearms, **Build At Your Own Risk**. Treat all designs with respect, and if you don't know what you are doing, PLEASE ASK. **Building firearms is an inherently risky activity, and as such the builder assumes all responsibility for any damage to persons or property.** On the note of safety:

This design should be printed in high heat materials wherever possible. The current >1k receiver is printed in Coex glass filled nylon. Nylons and ASA are highly advised for all heat bearing components.

The high heat components are the hand guard/receiver mating piece, threaded insert, upper receiver, and hand guards, and do not include the lower receiver. Again, please print these in high heat materials for the best experience.

Throughout the Alpha and Beta tests our goal was to try out the design and recommend ergonomic, buildability, and quality of life improvements. We believe that we have achieved this goal in addition to creating a few additional aesthetic and functional parts.

This project was intended to be silenced, and also envisions the use of machined linkages in a marriage of polymer and metal components. There is an additional goal to create cut codes for Ghost Gunner 3 owners to be able to machine metal components to strengthen the design beyond the current design. As of now these goals are still in the works.

Currently we are working towards a second file pack release that will be based around the 308 caliber receivers (already in Alpha) and any further updates to to the usability of the Monarch. Keep an eye out for the Monarch V2 for the 308 versions and updates to this version.

Crack a beer, fire up your printer, and let's have some fun!

The Gun Parts Bill of Materials (BOM) is as follows:
Links are for example, and are not absolutely required for a successful build.

Ar Barrel (Rifle caliber with rotating bolt/locking lugs)
https://www.primaryarms.com/diamondback-firearms-556-ar15-carbine-barrel-nitride-16

AR Bolt
https://www.surplusammo.com/products/saa-ar-15-m16-bolt-assembly-w-pins-nitride-9310-mpi-223-5-56-300aac.html

or any full bolt carrier group

Star Pattern AR Barrel Nut
https://www.surplusammo.com/products/saa-ar-15-barrel-nut-standard.html

Low Profile Gas Block
https://www.primaryarms.com/expo-arms-low-profile-gas-block-750

May be able to use a 3/4 inch shaft collar, a few testers have used these and have not had any complaints. Can typically get at a farm store or amazon for less than $4 a piece. Use this at your own risk.

AR Magazine Catch Assembly
https://www.surplusammo.com/products/saa-ar-15-complete-magazine-catch-assembly.html

Ar Fire Control Group
https://www.primaryarms.com/aero-precision-ar15-ar10-fire-control-group

AR Safety Spring and Detent

Ar Grip

Main BOM, non-gun parts, includes 2 M3 screws to attach stock to rear pic rail:
549.344mm (Start with 22” and cut to preference) ¼x20 All Thread rod
293.877mm (Start with 11.75” and cut to preference) ¼x20 All Thread
2-¼x20 hex nut (Nylon Locking nuts preferred(No, seriously, get the nylocks. You’ll be glad))
2-¼x20 connecting cap nut (E.g. Hillman 57148 Joiunt Connector Nut)
1-M5 Heatset
2-M3x25mm Socket Head Screws

Precision Folding Stock Will Need:
2-M3x8mm Screws
1-M3x25mm flathead countersunk screw
1-M3x40mm screw
2-M3 Nuts
1-M3 Nylon Locking Nut
2-M5x12mm Screws
2-M5x20mm Screws
2-M6x40mm Eye Bolt Screws
4-M5 Heatsets
1-Spring(no set one, will be for button to fold stock, get a variety pack or use ones laying around)

Fixed Triangle Stock Will Need:
2-M5x25mm Screw
1-M5x20mm Screw

Pump Version Will Need:
2-⅛”x¼”x1’ Steel Bar (E.g. Https://www.mcmaster.com/nav/enter.asp?partnum=8131K31)
4-M3x6mm Screws
6-M3x8mm Screws
2-M3x14mm Screws (You can grind 16mm down or use 2 M3 washers)
4-M3 Nylon Locking Nuts
2-M6x12mm Screws
1-M5x12mm Screw
1-M3x12mm Screw
M6 Tap
M5 Tap
M3 Tap
⅛” Drill Bit or Endmill (for untapped linkage side holes in bar stock)
3/32” Drill Bit or Endmill (for tapped M3 holes in foregrip bar stock holes)
11/64” Drill Bit (For M5 screw in bolt)
3/16” Drill Bit or Endmill

Bolt Action Charging Handle Will Need:
1-M5x12mm Screw
1-M3x12mm Screw
M5 Tap
M3 Tap
11/64” Drill Bit (for M5 screw in bolt)

Monarch Versions

Base Model:

Files to Print:

1. Lower Receiver (turtles lower or normal, turtles has a turtle on it)
2. Upper Receiver – Needs threaded insert
3. Upper Receiver Threaded Insert
4. Upper Receiver Threaded Insert Shroud
5. Receiver Hand guard Mating Piece
6. Mating Piece Spacer
7. Hand guard Receiver Side
8. Hand guard End Cap
9. Barrel Nut Shim
10. Push Button Safety (Turtle or normal)

Bolt Action:

Files to Print:

1. Use to Close Off Left Side of Receiver
2. Charging Handle (choose any style you want from folder)

Pump Action:

Files to Print:

1. Ejection Side Linkage
2. Pump Foregrip
3. Pump Rail BCG Linkage

Fixed Stock:

Files to Print:

1. Fixed Stock Adapter
2. Fixed Triangle Stock Buttpad
3. Triangle Stock Body

Precision Folding Stock:

Files to Print:

1. Buttpad Adapter
2. Buttpad Eyebolt Adapter
3. Buttpad Screw (2)
4. Buttpad
5. Cheek Piece Screw (2)
6. Cheek Piece
7. Main Stock Body
8. Stock Button
9. Stock Gears (4)
10. Stock Pic Rail Adapter

Print Layout Orientation

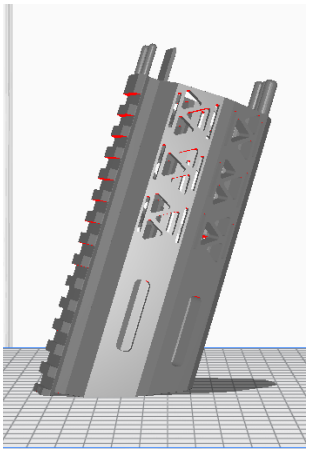
Note: this information is for reference only; every printer and filament will be different. All of the provided data in the following section is with use of Esun PLA+. Users have also had success with Duramic PLA+. Print the hand-guard, upper receiver, threaded insert, hand-guard/receiver mating piece in high heat material wherever possible.

Printer: Artillery Sidewinder X1 (stock, no upgrades or modifications)

Hand-guard End-cap Triple Triangle:

Print time and filament usage (Cura Estimate) 1 day 4 hours 39 minutes 189g

Layer Height	0.2
Line Width	0.4
Wall Line Count	12
Top/Bottom Layer Count	8
Infill % / Infill Type	60% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree Support

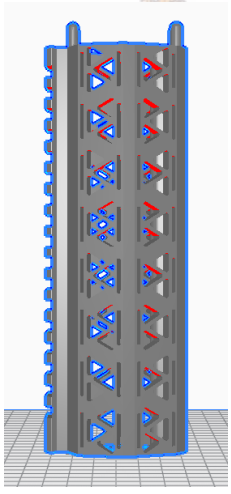


*Notes: Did not adjust wall count from previous print. Typically use 8 for larger prints, due to size of print having 8 lines for wall and top/bottom created more of a 95-99% infill. Can Print without supports

Hand-guard End-cap Triple Triangle:

Print time and filament usage (Cura Estimate) 1 day 13 hours 5 minutes 209g

Layer Height	0.2
Line Width	0.4
Wall Line Count	12
Top/Bottom Layer Count	4
Infill % / Infill Type	60% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree Support

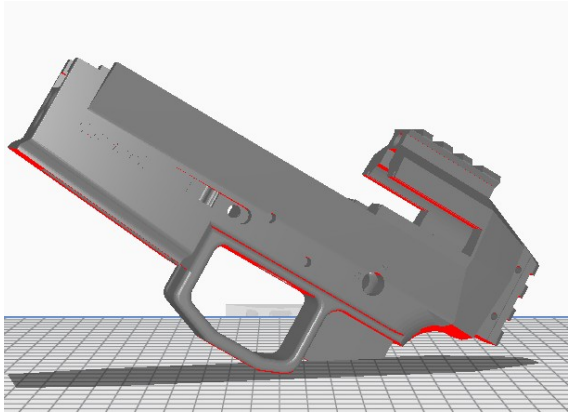


*Will print fine with no supports

Turtle's/Standard Lower:

Print time and filament usage (Cura Estimate) 2 day 2 hours 57 minutes 272g

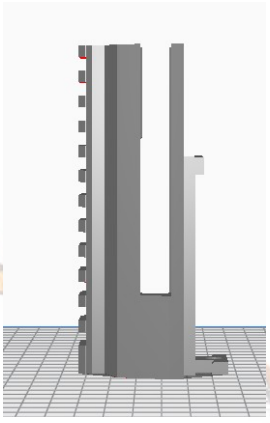
Layer Height	0.2
Line Width	0.4
Wall Line Count	12
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	80%
Support	Tree Support



Upper Receiver-Needs Threaded Insert:

Print time and filament usage (Cura Estimate) 19 hours 8 minutes 107g

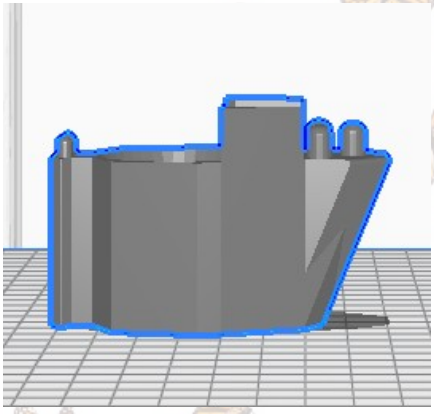
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree Support



Receiver Hand-guard Mating Piece:

Print time and filament usage (Cura Estimate) 14 hours 27 minutes 77g

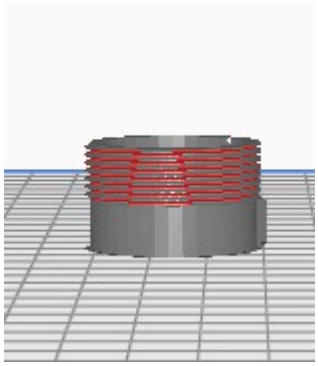
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	None



Upper Receiver Threaded Insert:

Print time and filament usage (Cura Estimate) 44 minutes 5g

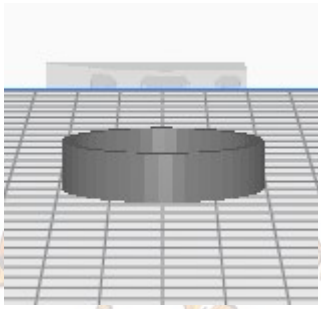
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	None



Upper Receiver Threaded Insert Shroud (Optional, useful as a heat sink):

Print time and filament usage (Cura Estimate) 37 minutes 3g

Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	None



Mating Piece Spacer :

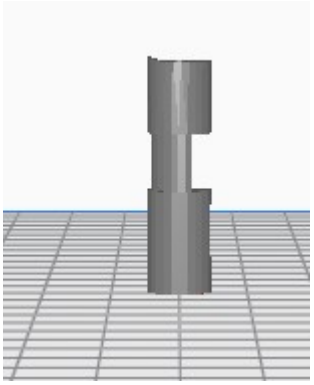
Print time and filament usage (Cura Estimate) 44 minutes 5g

Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	None

Push Button Safety:

Print time and filament usage (Cura Estimate) 36 minutes 2g

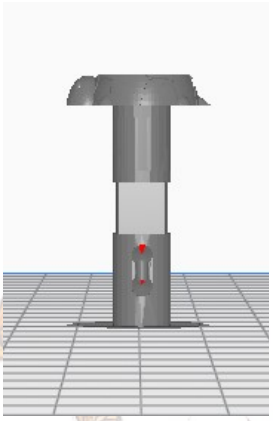
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Turtles Safety:

Print time and filament usage (Cura Estimate) 56 minutes 5g

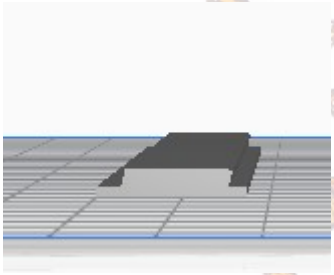
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Use to close off Left Side of Receiver (used for bolt action):

Print time and filament usage (Cura Estimate) 59 minutes 7g

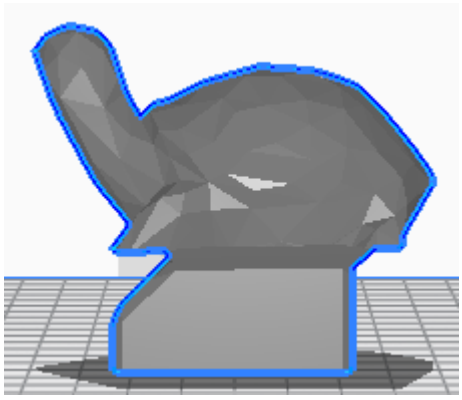
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	60% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	None



Tortoise Charging Handle (used for bolt action):

Print time and filament usage (Cura Estimate) 18 hours 5 minutes 94g

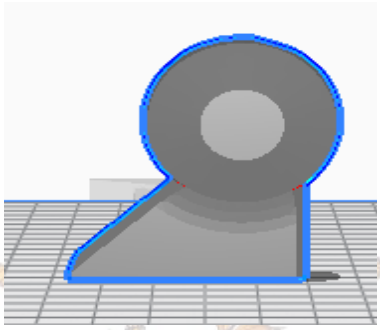
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Mini Flying Saucer Charging Handle (used for bolt action):

Print time and filament usage (Cura Estimate) 5 hours 57 minutes 33g

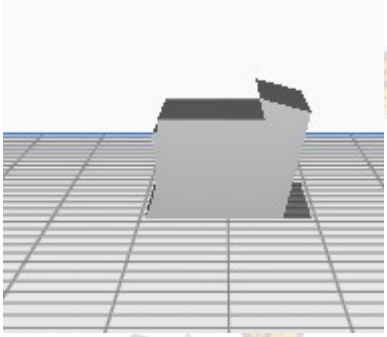
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Ejection Side Linkage (used for pump action):

Print time and filament usage (Cura Estimate) 2 hours 2 minutes 11g

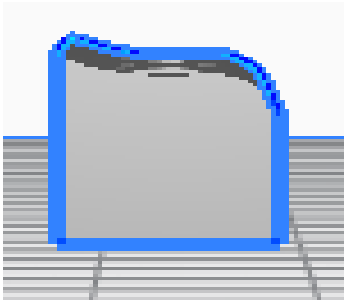
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Pump Rail BCG Linkage (used for pump action):

Print time and filament usage (Cura Estimate) 1 hours 11 minutes 7g

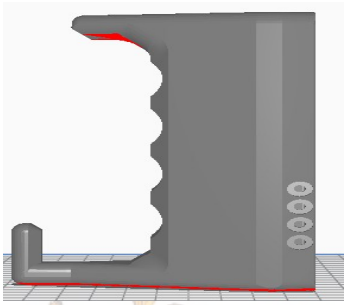
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	99% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	None



Pump Foregrip (used for pump action):

Print time and filament usage (Cura Estimate) 1 day 4 hours 6 minutes 180g

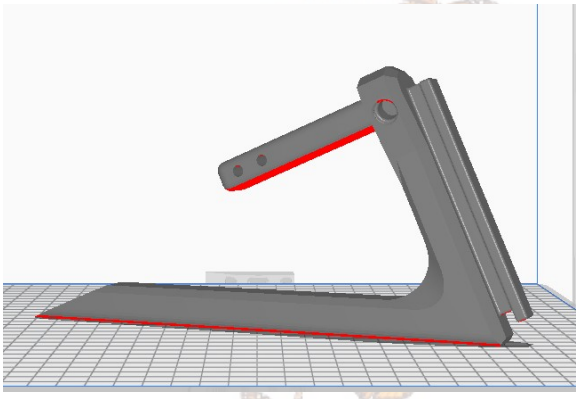
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	60% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	None



Triangle Stock Body (used for fixed stock):

Print time and filament usage (Cura Estimate) 20 Hours 47 minutes 119g

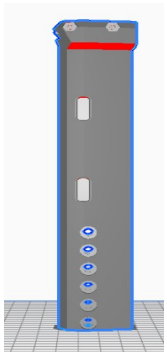
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	60% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Fixed Stock Adapter (used for fixed stock):

Print time and filament usage (Cura Estimate) 1 day 7 hours 22 minutes 181g

Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	70% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Fixed Triangle Stock Buttpad (used for fixed stock) (printed in Overture TPU):

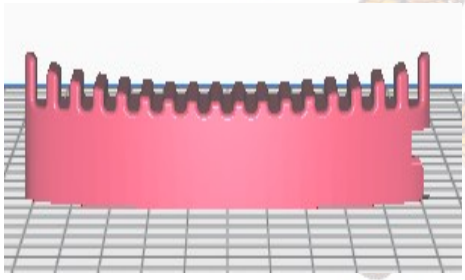
Print time and filament usage (Cura Estimate) 5 hours 58 minutes 30g

Layer Height	0.2
Line Width	0.4
Wall Line Count	3
Top/Bottom Layer Count	4
Infill % / Infill Type	20% / Cubic
Print Temp/Bed Temp	228ºC / 30ºC
Print Speed	30mm/s
Cooling Fan Speed	100%
Support	None

Butt pad (used for precision folding stock) (printed in Overture TPU):

Print time and filament usage (Cura Estimate) 2 hours 16 minutes 19g

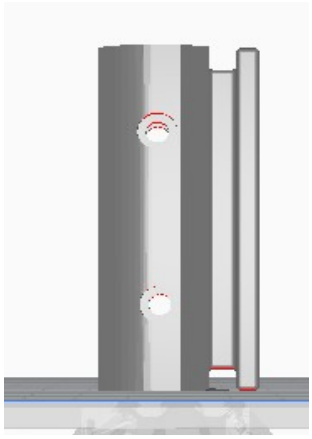
Layer Height	0.2
Line Width	0.4
Wall Line Count	3
Top/Bottom Layer Count	4
Infill % / Infill Type	20% / Cubic
Print Temp/Bed Temp	228ºC / 30ºC
Print Speed	30mm/s
Cooling Fan Speed	100%
Support	None



Butt Pad Adapter (used for precision folding stock):

Print time and filament usage (Cura Estimate) 5 hours 19 minutes 35g

Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	50% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	None



Butt Pad EyeboltAdapter (used for precision folding stock):

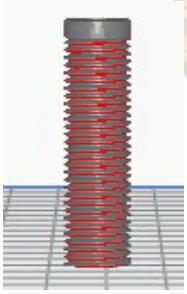
Print time and filament usage (Cura Estimate) 5 hours 3 minutes 33g

Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	50% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree

Butt Pad Screw (used for precision folding stock) (may need to print at 99% scale):

Print time and filament usage (Cura Estimate) 2 hours 35 minutes 6g

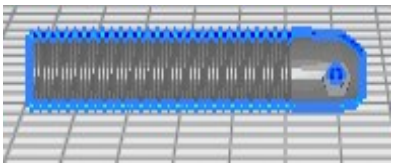
Layer Height	0.12
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	999999
Infill % / Infill Type	100% / Lines
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	50mm/s
Cooling Fan Speed	100%
Support	Tree



Cheek Piece Screw (used for precision folding stock) (may need to print at 99% scale):

Print time and filament usage (Cura Estimate) 2 hours 10 minutes 6g

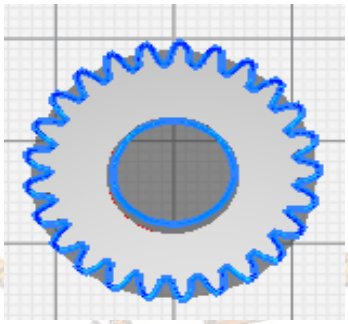
Layer Height	0.12
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	999999
Infill % / Infill Type	100% / Lines
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	50mm/s
Cooling Fan Speed	100%
Support	None



Stock Gear (used for precision folding stock) :

Print time and filament usage (Cura Estimate) 1 hours 16 minutes 2g

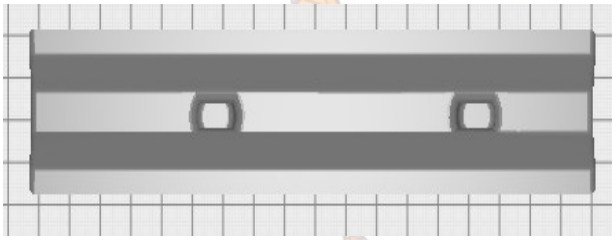
Layer Height	0.12
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	999999
Infill % / Infill Type	100% / Lines
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	50mm/s
Cooling Fan Speed	100%
Support	None



Cheek Piece (used for precision folding stock):

Print time and filament usage (Cura Estimate) 5 hours 43 minutes 40g

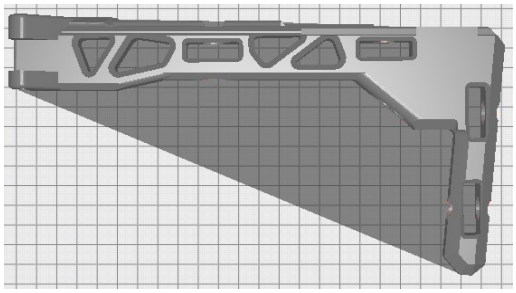
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	50% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Main Stock Body (used for precision folding stock):

Print time and filament usage (Cura Estimate) 18 hours 46 minutes 122g

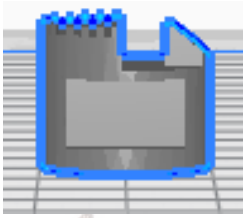
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	50% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Stock Button (used for precision folding stock):

Print time and filament usage (Cura Estimate) 30 minutes 4g

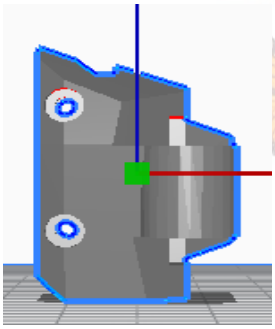
Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	50% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Stock Pic Rail Adapter (used for precision folding stock):

Print time and filament usage (Cura Estimate) 3 hours 15 minutes 20g

Layer Height	0.2
Line Width	0.4
Wall Line Count	4
Top/Bottom Layer Count	4
Infill % / Infill Type	50% / Gyroid
Print Temp/Bed Temp	225ºC / 60ºC
Print Speed	60mm/s
Cooling Fan Speed	100%
Support	Tree



Once parts are printed clean them up to remove any supports and sand where needed for proper fitment.

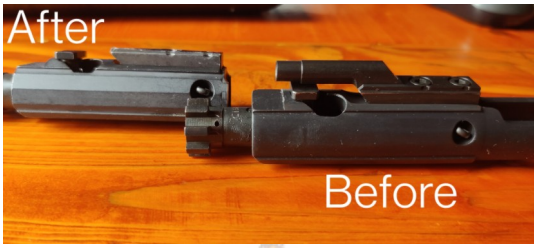
Bolt Preparation/Drilling

Print out the bolt drilling guide, recommended to use a high heat material as drilling the bolt will produce enough heat to warp and possibly melt PLA+.

Bolt
For the bolt you can use the 3dp bolt (STILL IN ALPHA USE AT OWN RISK) or use a standard ar15 bolt carrier group(BCG).

If using the standard BCG you will need to cut the rear portion of the bolt off and drill/tap holes for the charging handle/transfer bar to mount to. Start by disassembling the bolt to remove the internals, (can find more detailed instructions online). To disassemble remove the firing pin retainer pin, once removed the firing pin will slide out the back, with the firing pin removed push the bolt head to the rear and rotate the cam pin 90°, pull up on the cam pin to remove, once cam pin is removed can slide the bolt head out of the bolt carrier group. That is all the disassembling of the BCG you will need to do.

With the internals removed you will chop off the back of the BCG starting at the arms. To cut off the arms you can use a hacksaw, powered saw, or a grinder. Once the arms are cut off you will need to file/grind any of the stubs left flat. You will also need to cut off the gas key on the BCG so that it is flush with the rectangular piece it is mounted to the BCG with.



Now that the extraneous parts have been removed you can drill and tap the needed holes. When drilling it is advised to use a mill where possible, if it is not possible use a very rigid drill press. A hand drill is not recommended. Please do not attempt to use an endmill in a hand drill. If you do and you get hurt, it is your own fault. Depending on which set-up you choose to run determines what holes will need to be drilled. For bolt action you will need to drill out one preexisting hole larger and tap for M5 and tap 1 preexisting hole for M3. If you choose to go the pump action route you will need to drill 2 additional holes and tap for M6. See Bolt Carrier Tapping Guide. If the M5 hole and threads are too loose you can drill a bit larger and tap for M6. NOTE all holes should be tapped outside of the drilling jig to ensure holes are straight and true. Remember to use cutting oil and follow tapping best practices: 2 turns in 1 turn back.

Once you have drilled and tapped the bolt you can reassemble the bolt.

Construction

Once all the parts have been printed, bought, and properly prepared you may begin building the Monarch. There will be slight differences when building the pump action vs the bolt action version of the Monarch, but a majority of the build will be the same. There will also be some differences on the 2 stock options currently available at time of release. We will do our best to go over all the differences and how to build each version, but the longer the Monarch is out in the wild the more options that will be made available. See render for assembly order of operations and see assembly video for additional tips and tricks.

Lower Receiver

For all versions the construction of the lower receiver will remain the same. Since the Monarch platform is based off the AR15 construction of the lower will be almost identical for the majority of it.

Start by installing a M5 heat-set into the hole on the lower where the grip screw would typically screw in. This will provide threads for the grip screw to catch on and hold the grip in place. A standard ar grip screw IS NOT M5 so you will need to use an M5 bolt or skip and use proper heat-set for grip screw or thread straight into the lower.

Install the magazine catch and spring, the bar will go in from the left side and the spring and button will go in on the right hand side.

After the magazine catch install the trigger group, for this you can use a standard ar trigger group or a one piece drop in trigger. You can use standard ar trigger and hammer pins or use anti-walk/anti-rotation pins. Being a printed lower it might be more advisable to use anti-walk pins to avoid wallowing out the holes which could lead to problems in firing. If you decide to use the anti-walk pins using the type that has a screw on both ends or extended would be preferred due to the width of the lower and how far inset the standard pins are. If you use an anti-walk pin with screws on each end you may need to use longer screws as well, from the ones I've tested they use a standard M2.5 or M3 screw. While standard Trigger and hammer pins will work extended pins will allow the pins to extend farther through the print allowing for it to have more of the lower to rest in, standard length pins are short on going all the way through. Additionally you may use an M4 bolt for the hammer and trigger pin.

Install the safety into the lower, the side with the indentations go towards the right and will face down towards the grip. These indentations are what the safety detent catch in.

Once the safety selector is installed flip the lower over and install the safety detent and safety detent spring in the small hole by the grip.

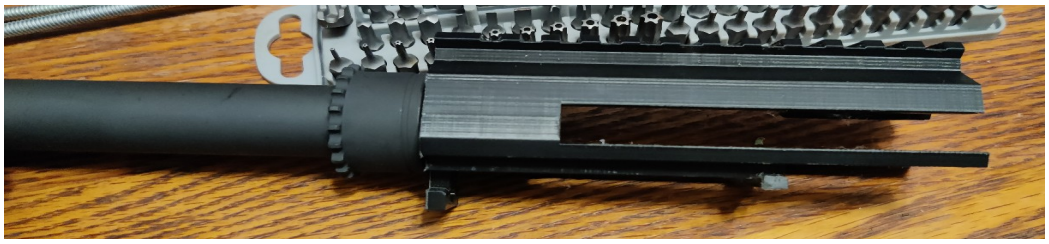
Finally install the grip onto the lower and insert an M5 screw to hold it and the safety spring/detent in place.

Barrel

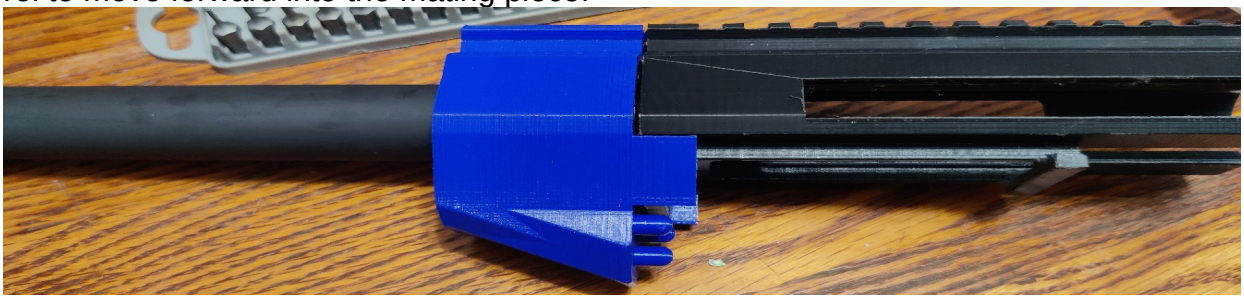
Place the upper threaded insert onto the barrel, make sure the cut-out in the threaded insert aligns with the pin on the rear of the barrel. This should be a snug fit to the barrel and may require a nylon hammer to fully seat.

Install the barrel nut onto the barrel and threaded insert. A barrel nut wrench can be used to tighten the nut. Be careful you do not cross thread the nut.

Insert the barrel into the upper receiver.



Place the receiver mating piece over the barrel/barrel nut. If there is any space, you may need the barrel nut spacer included in the stl's. File/sand to fit. There should be no room for your barrel to move forward into the mating piece.

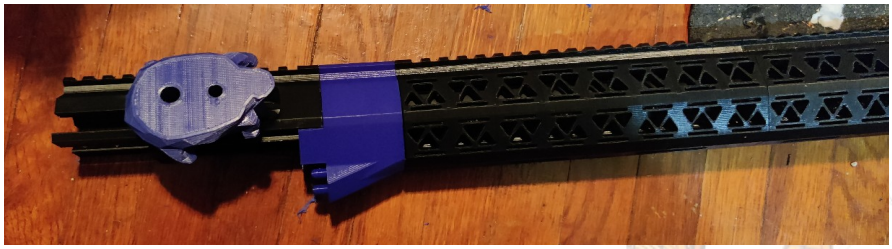


Install the gas block at approximately 160° of its normal orientation. This should allow it to block off the gas port in the barrel. You may also be able to use an adjustable gas block and turn it down so that the gas is turned off. As long as the gas port is blocked and the hand-guard can fit over it, you are good to go.

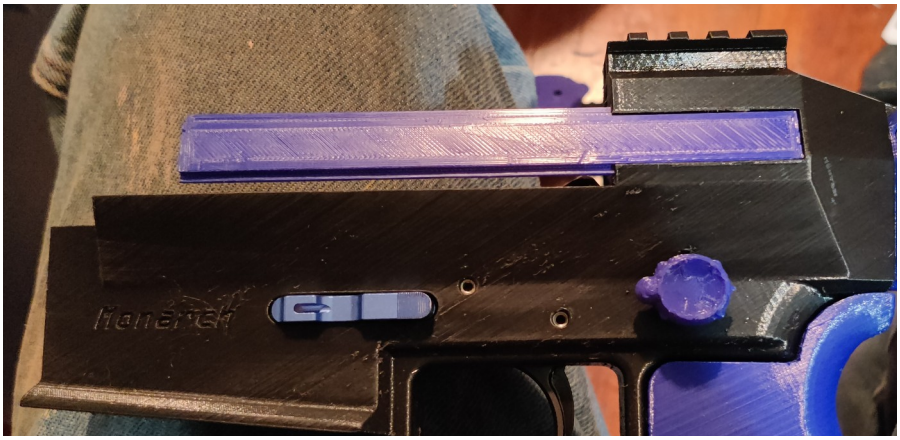
Install the hand-guards over the barrel.

Mating the receivers

Insert the bolt carrier into the upper receiver. If you are installing the bolt action it is recommended to install the charging handle at this time. If you are going with a pump action you will need to install the linkages at this time. For each one see the respective installation sections.

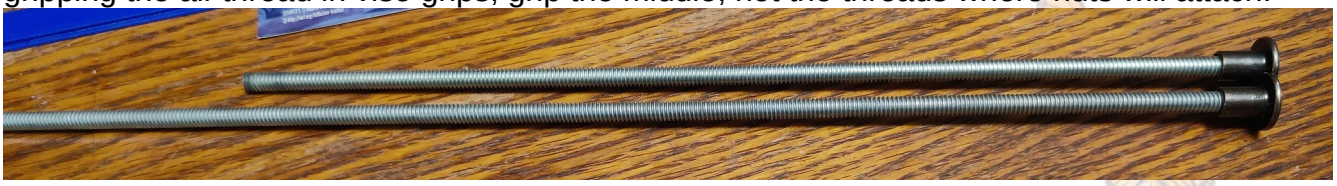


If going the route of a charging handle insert the piece used to close off the left side of the upper receiver. It may be easier to install on lower half first then maneuver it into the upper half as you install. You do not need to worry about this piece if you are planning on doing the pump action.

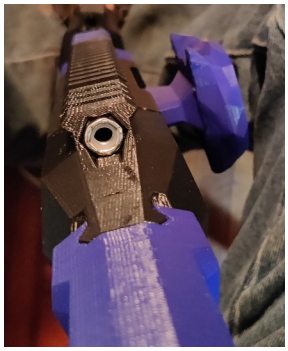


Insert the upper assembly into the lower receiver. The upper assembly will slot down into the lower, and then slide back into place. The fit should be flush, but a small gap may be present. That will be snugged up by the all-thread.

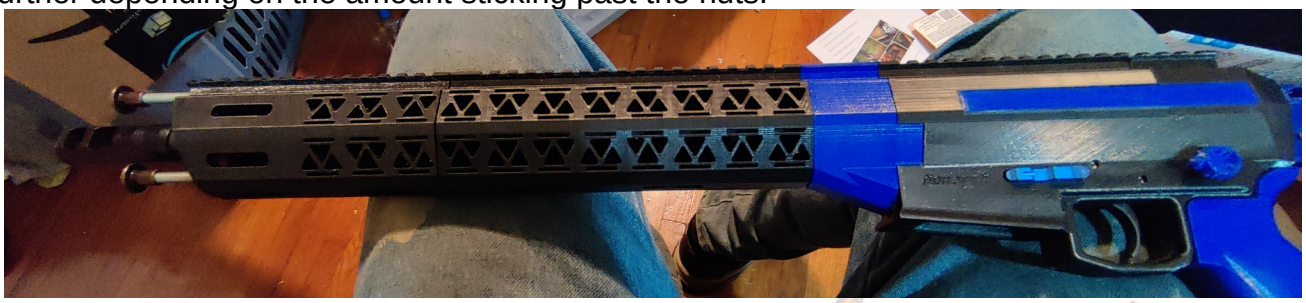
Attach connecting cap nuts to all-thread rod. This is most easily accomplished by grabbing the all-thread in the middle and threading the nut on before tightening. When clamping or gripping the all-thread in vise grips, grip the middle, not the threads where nuts will attach.



Insert nylon locking nuts into their cut-outs on the lower receiver, the cut out in the magazine well may need to use a regular nut depending on how far it sticks out into the magazine well. You may also grind down a nylon locking nut if necessary.



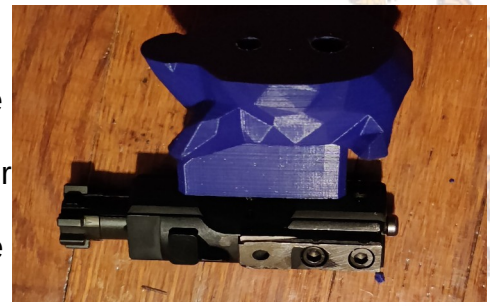
Insert threaded rod into appropriate holes, hand screw into the nuts to get them started, and tighten to a moderate tension. You do not need to hulk ham hands this thing, just make sure she is good and tight. If you are too tight on one side or the other, your barrel may be tilted up or down and will be very obvious to see. You may need to remove and trim the all-thread further depending on the amount sticking past the nuts.



Ensure final tension on the rods is appropriate, check that magazines will insert and release from the mag well, and install you muzzle device to the end of the barrel.

Bolt Action Install

Install the bolt action handle onto the bolt by lining up the holes on the handle with the bolt. Then install a M3x12mm and M5x12mm screw to hold it on.



Bolt install is done and rifle can now be fired once the rifle is fully assembled. Extensively dry cycle your action. If your action is tight at first, work your bolt a number of times and blow out any plastic shavings that might come off. Some Hoppe's lube can work wonders in breaking in the action. You will clearly feel proper lock up and release.

Pump Action Install

For assembling the pump action it is recommended to print out the included jigs to facilitate the drilling of the holes needed for the assembly of the pump action parts. Alternatively you can jut print out the pump fore grip and the BCG linkages and drill the appropriate holes using the parts to line up the holes. It is not recommended to skip using the jigs due to the high chance of drilling the holes in the wrong location, but you are an adult so you do you and remember not to complain to Swarm or anyone else when it doesn't line up or work properly.

Start out with 1 of your ⅛"x¼"x1' Steel Bars and insert one end all the way into the Ejection Port Pump Bar Jig and drill out the 4 holes with a 3/32" drill bit. Be careful to avoid having the bar move in between drilling the holes.

After those holes are drilled insert the other end of the bar all the way into the Ejection Port BCG Bar Jig and drill out the 2 holes with a ⅛" drill bit, again being careful to not allow the bar to move between drilling the holes. Once the holes are drilled either mark it and set aside or insert into the right hand side of the pump fore grip so you don't mix the bars up once the holes are drilled.

Take the other ⅛"x¼"x1' Steel Bars and insert one end all the way into the Left Side Pump Bar Jig and drill out the 4 holes with a 3/32" drill bit. Once again being careful to avoid having the bar move in between drilling the holes.

After pump bar side holes are drilled insert the other end of the bar all the way into the Left Side BCG Bar Jig and drill out the 2 holes with a ⅛" drill bit, being careful to not allow the bar to move between drilling the holes. Once the holes are drilled either mark it and set aside or insert into the left hand side of the pump fore grip so you don't mix the bars up once the holes are drilled.

Take each bar out of the fore grip and tap the 4 holes in front with an M3 tap the replace the bars into the fore grip.

Attach the left side pump bar to the fore grip by inserting it into the cutout on the inner side of the fore grip and secure it using 4 M3x6mm screws.

Attach the right side bar to the fore grip by inserting it into the slot in the inner side of the fore grip and secure it using 4 M3x8mm screws.

In both the Ejection Side Linkage and the Pump Rail BCG Linkage tap a M3 Nylock nut into each of the hexagonal holes, there should be 4 of them.

Attach the Ejection Side Linkage to the right hand side of the BCG using 1 M5x12mm screw and 1 M3x12mm screw. The angled lip will be facing down.

Attach the Left Side BCG Linkage to the left hand side of the BCG using 2 M6x12mm screws. The curved radius will be facing towards the bottom of the BCG while the curved overhang will be facing the top of the BCG.

Once the Linkages are installed onto the BCG you can install it into the upper receiver.

With the BCG installed into the upper receiver slide the pump fore grip over the end of the stock and line up the holes in the end of the bars with the corresponding holes on the linkages. Attach the right side bar to the linkage using 2 M3x8mm screws and to the left side linkage using 2 M3x10mm screws.

Your pump action is now ready to be cycled and can be fired once the rifle is fully assembled.

Fixed Stock

Install the fixed stock adapter onto the rear vertical pic rail and attach with 2 M3x25mm screws and nuts.

Install the triangle stock body onto the adapter by sliding it into the recess in the adapter and secure it in place at the desired length. Secure it with 2 M5x25mm screws on the horizontal part of the body and 1 M5x20mm screw at the base. They will thread into the adapter without using heat-sets but if you want a more permanent threads to adjust the length of the stock.

Install the TPU printed butt-pad onto the stock body.

Precision Folding Stock

Install the Stock Pic Rail Adapter onto the rear vertical pic rail and attach with 2 M3x25mm screws and nuts.

Attach the stock button onto the main stock body by placing a spring under the button and into the cavity (uses whichever spring you have on hand to give a good return and engagement. With the button in the body insert a M3x25mm flat head countersunk screw into the hole in the front of the stock body to capture the stock button. May need to countersink the hole so it sits flush.

Attach the main stock body onto the picatinny rail adapter with a M3x40mm bolt and nylok nut to act as the hinge.

Place 2 of the stock gears in the slots along the top of the stock body and begin threading on the cheek piece screws.

Attach the cheek piece to the cheek piece screws on the stock body with M3x8mm screws and M3 nuts.

Insert the other 2 stock gears into the vertical slots at the rear of the stock.

Epoxy the M6x40mm eye bolt screws into the butt pad screws. Once epoxied on start threading the eye bolt screws into the stock through the stock gears.

Install 2 M5 heatsets onto the butt pad eye bolt adapter and attach to the stock by sliding onto the eye bolts and running a M5x12mm screw

into the holes. The screw should go through the hole on the eye bolt and capture into the heatset you installed.

Install 2 M5 heatsets into the butt pad adapter and attach onto the back of the stock body and insert 2 M5x20mm screws and tighten down.

Install the TPU printed butt-pad onto the stock body.

To adjust the stock and fit it to you and your shooting position turn the gears under the cheek piece to raise or lower it to the appropriate height for a good cheek weld. Adjust the length of pull by turning the vertical gears at the rear of the stock to move the butt pad in or out. You can loosen the screws on the butt pad adapter to slide the butt pad up or down to get it in the best position.

A special thanks to 0A, Sloth, EyeLikeTurtles, Krrawn, ManyEnemiesBringMuchHonor, MiddletonMade, 3D Arms, Dom V and many others. Swarm would like to especially thank Wasmotumble for creating this Readme. The folks listed have helped in innumerable ways and you should buy them a beer.

-SwarmTech