Build Instructions - Readme.md

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SpaceGat 22

by booligan

A Printable Sci-Fi Style .22 Pistol utilizing a CMMG BCG and Barrel and standard AR FCG

Release 1.0

Description

The SpaceGat 22 is an AR pattern pistol utilizing a printable upper and lower receiver. It is lightweight but sturdy and suitable for .22LR firing using a CMMG BCG kit and standalone barrel.

WARNING!

The designer, and any affiliated or non-affiliated groups, cannot be held responsible or liable for any injuries or damages that occur with your use of this model. This receiver set is designed for .22 LR use ONLY using a CMMG style bolt carrier. Use with other calibers or bolt carrier types will result in catastrophic damage and injury/death to the user.

It is imperative you read this entire document before beginning this project.

Materials Required

For the base gun build:

1. **CMMG Bolt Carrier Group with 4.5" Barrel (22D5B6E)
2. **AR LPK - Do not need Bolt Catch, roll pin, or spring, as well as buffer detent and spring - can use Ivan's printable FCG
3. **AR Charging Handle - Preferrably CMMG model designed to prevent .22 casings from getting jammed inside. If normal, print included charging handle insert
4. **CMMG style magazine if you do not wish to print your own
5. ** 1/4", 5/32", 15/64", and 3/8" drill bits
6. ** 1/4-28 tap STRONGLY recommended

For the brace:

1. **1/4"x 2" Clevis Pin for hinge
2. **1/16" Cotter Pin or key ring to secure the bottom of the pin
3. **Stock Ender 3 bed spring OR 5/16x1-11/16 compression spring. Part # 88247
4. **M6 or M5 x 30 socket head bolt for the hinge to picatinny mount. It'll cut its own threads as you screw it in, so find something that threads up tightly. You can realistically drill this out for any similar size, Metric isn't required
5. **1/4" Drill bit
6. **Strap and strap adjuster of your choice to wrap around your arm

Print Instructions

Receiver Instructions (Print at 100% infill):

1. Print lower receiver with the trigger guard laying flat on the print surface. Use all supports, and possibly a brim or raft to ensure bed and support adhesion. With the magwell overhang, proper supports are crucial.
2. Print upper receiver with the rear on the bed, oriented vertically, with the barrel nut threads pointing up. Use all supports, and a brim or raft is STRONGLY recommended due to the relatively small bed area compared to the height and weight of the receiver.
3. Print barrel nut vertically with the threads pointed up. You will likely need to use a pipe reamer to chamfer the first few threads, but some degree of chamfering is built into the file.

Grip Instructions (Print at 5+ walls and 35%+ infill)

1. Print pistol grip upside down, supports touching bed to help clear the bridge where it mates with the receiver.
2. Print handguard nose side down on the bed. Supports enabled which will help for the rail segments on top as well as the holes near the muzzle.

Optional Accessories (Print at 5+ walls and 35%+ infill)

1. Print Sling Mount vertically with the bottom of the sling mount flat on the bed. Supports enabled for cleaner holes and support of the screw extension.
2. Print Carry Handle right side up, angled on the bed to fit. This will be a tight fit on an Ender 3, basically going edge to edge with a skirt. Supports enabled (it will be a LOT of support, but it's not too difficult to clear them up.
3. Print short magazine right side up, tree supports preferred. Tree supports will be much, much easier to clean out of the inside compared to standard supports.

Brace Instructions:

1. Print brace "arm" upside down with the fin facing up. You will likely need to angle the blade on the bed to fit. Supports are needed for the inner structural triangles and strap holes.
2. Print the hinge in your desired orientation. I had good luck printing picatinny mount side up with supports. This gave the rail mounting interface the best accuracy and the hinge in the strongest layer orientation in my use.

Assembly

Lower Receiver Prep/Assembly:

1. Remove all support material. Minimal, if any, sanding should be required.
2. Drill out the takedown pin holes with a 1/4" drill bit.
3. Drill out the trigger group pin holes and safet selector detent hole with a 5/32" drill bit
4. Drill out the selector switch hole with a 3/8+ bit, or just file any leftover support material carefully to ensure smooth selector movement.
5. Tap the grip screw hole with a 1/4x28 tap. You CAN just drill it out with a 15/64 drill bit and carefully cut threads with the mounting bolt, but for best longetivity,

use a proper tap.

6. Install magazine release, FCG, selector switch, pistol grip, and front takedown pin using AR assembly guides. The rear takedown pin no longer utilizes a detent, so that can go on after upper installation.

Upper Receiver Prep/Assembly

1. Remove all support material. Minimal, if any, sanding should be required.
2. Slide barrel from CMMG kit into the front of the receiver. It should be a tight fit, you may need to tap it in gently using a rubber mallet. The pin at the top of the barrel should slot into the slot in the receiver threads.
3. Slowly install the barrel nut. You want the threads to positively engage without stripping. Some silicone lubricant would be helpful here. Tighten until hand tight, then 1/8 turn more. Don't go crazy torquing this on there, you will strip threads.
4. Slide the handguard over the barrel nut. This should be a fairly tight fit, and if not, put a single wrap of electrical tape over the barrel nut to tighten it up. Do not tap the handguard all the way down yet!

Joining the Receivers:

1. You can now test fit the upper onto the lower before fully installing the handguard. Slide the charging handle and CMMG BCG into the upper receiver and push it forward until it clicks in place. Install the upper onto the lower and tap in the pins. They will be tight the first few times.
2. With the upper installed onto the lower, you can finish tapping the handguard down into place. It will likely meet the lower receiver first, and this is fine. You may have a very small gap between the handguard and the upper receiver, this is also fine. Tap the handguard gently into place. You can optionally thread a grub screw into the hole on top of the handguard to secure it better against the barrel nut.
3. Ensure proper functionality. Charging handle should easily pull back and cock the weapon. Safety should function properly. Trigger pull and reset should be normal. Dry fire and manually cycle empty pistol to help smooth out any burrs prior to range testing.

Optional Accessories:

1. If you wish to run the rail cover/sling mount, just slide it onto the rear Picatinny rail and thread a screw into it. It will cut threads into the material as it goes.

2. If you wish to run the carry handle with RMR style mount, tap it onto the top rail. It will be a VERY tight fit, but will help secure everything together nicely. Once in place, secure screws if desired. To install an RMR, thread the holes for the appropriate screws with your sight and mount it up. I'm using a knockoff Ebay RMR, so the holes may not line up perfectly on your sight.
3. Included in the files is a carry handle without any optic mount. This is a good option as well if you don't want to run an optic.
4. Included in the files is an insert for a standard charging handle with CMMG kits. This is recommended, as it prevents spent shells from ending up lodged in the charging handle.

Brace Assembly Instructions:

1. Test fit hinge and brace and clean up any support material or spots where it's binding up.
2. Drill out hole through hinge and brace with 1/4" drill bit. Go slow, you just want to open it up a bit to fit the pin.
3. Cut spring to length if needed where it will fit inside the hole in the brace pressing against the top of the hinge. It needs to have room to compress.
4. Assemble all together, sanding as needed for smooth folding.
5. Install onto rear mount on lower receiver and secure with an appropriately sized screw.

Magazine Assembly Instructions:

1. Clean up any support material. Minimal sanding should be required.
2. Install spring (Black Dog Magazine Spring fits well) onto follower and spring insert.
3. Slide follower and spring into magazine body, and secure with floor plate which slides in from the rear.
4. If any magazine is loose in the receiver to the point of having excessive wobble, wrap a few strips of electrical tape around the top where it sits inside the lower receiver.

Printing Tips

- eSUN PLA+ is the *recommended* filament, required for the receivers and barrel nut. Standard high quality PLA is usable for the other components.
- Print HOT and SLOW for maximum bonding and strength. (50 mm/s and 230 C is recommended.)
- It is strongly recommended that your x-axis, y-axis, and z-axis stepper motors are calibrated 100%.

Credits/Resources

- Lower receiver based on Vanguard U-Bolt Lower by Ivan
- Upper receiver/barrel nut based on Daichi upper from nguyenkvvn
- 5 degree pistol grip designed by Patch1995 on Thingiverse
- CMMG charging handle insert by beefcafe on Thingiverse

Changelog

- Public Release V1.0

  > - *Thickened barrel nut for tighter fit*
  > - *Tighted up magwell for tighter fit*
  > - *Small tweaks to various holes in parts for more clearance and better fit*
  > - *Added V2 brace arm and carry handle without RMR mount*

- Public Release Beta v1.0

  > - *Initial release*

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