

# Wisp

Designed by Kaewon



# BOM

Assorted M3, M4, M5 socket head cap screws

M3x8	(1) ejector
M3x12	(5) handguard, mag
M3x55	(1) firing pin
M3 nut	(1) firing pin
M4x6	(1) printed hammer (optional vs commercial metal hammer)
M4x12	(1) bolt
If using the included stock or brace:	
M4x20	(1) stock or brace button
M4x30	(1) brace hook
M4x35	(2) stock or brace hinge
M5x30	(1) stock or brace mount
M4 nut	(2) stock or (+1 more) brace
M5 nut	(1) stock or brace mount

M4x6x6 heat insert for bolt

Optional for grip: M5 heat insert and M5x20

Compression Spring Stock Music-Wire Steel, 11" Long, 0.36" OD, 0.298" ID for mag and stock/brace

<https://www.mcmaster.com/9637K38/>

<https://www.springsfast.com/products/compression-springs/part-detail-compression-spring/?part=626>

4mm x 15mm (2) compression spring for firing pin and ejector

AR lower parts or springs. Complete lower parts kit are \$40. All parts have printed versions available except for springs and fcg pins. Steel rods can be used as alternate fcg pins for printed fcg. I typically use 4mm rods. Lower/complete AR spring kit is cheaper than complete lpk. I've seen Anderson, Strike Industries lower spring kits aka whoops/oops kit for \$4-8. Aero Precision field repair kit for \$10.

22LR barrel liner. #1 (.228") drill bit or 22 LR reamer to chamber. JB Weld or equivalent epoxy to secure to barrel parts; original formula not the other kinds. Liner available at brownells, parts dispensed, and dixiegunworks. Others probably have them too. These are 5/16" OD. Drill bits are cheaper, \$5, but reamers, \$50+, will be a better quality chamber as it's a smooth transition from chamber to rifling. 22LR sporting will work with all ammo. Bentz or match will only work with certain ammo

Optional barrels; 12mm tube, Ruger 10/22 barrel, or Rossi/Mossberg barrel clones:

RS22, RB22, Mossberg 702 barrels confirmed as clones

Mossberg 715P, 715T, 802, Magtech 7022, Citadel Trakr unconfirmed as clones

Rossi/Mossberg barrel: 4mm x 44mm rod (2) to attach to upper

Extractor: 2.5mm stainless steel

2mm x 12mm rod for extractor

AR bolt catch plunger and spring (printed plunger available) for extractor

Optional for metal ejector: 2.5mm stainless steel

Optional for reinforced bolt face: 16ga (1.5mm) stainless steel

M3x8 countersink screw

M3x4x5 heat insert

Optional for bolt handle detent: 4mm x 10mm spring

Optional for reinforced stock risers: 2mm x 40mm rod (2), 2mm x 60mm rod (2)

Optional for reinforced bolt handle: M3x40

**Parts Kit** (this is a 3rd party and I don't get any money from them)

<https://www.print-a-22.com/product/kaewons-wisp-22lr-bolt-action-hardware-kit/>

## Donations

<https://liberapay.com/kaewon>

<https://ko-fi.com/kaewon>

<https://buymeacoffee.com/kaewon>

<https://www.subscribestar.com/kaewon>

# Print Settings

Temps, speed, fan etc is dependent on filament. You should be proficient at 3d printing and properly calibrated before printing any gun.

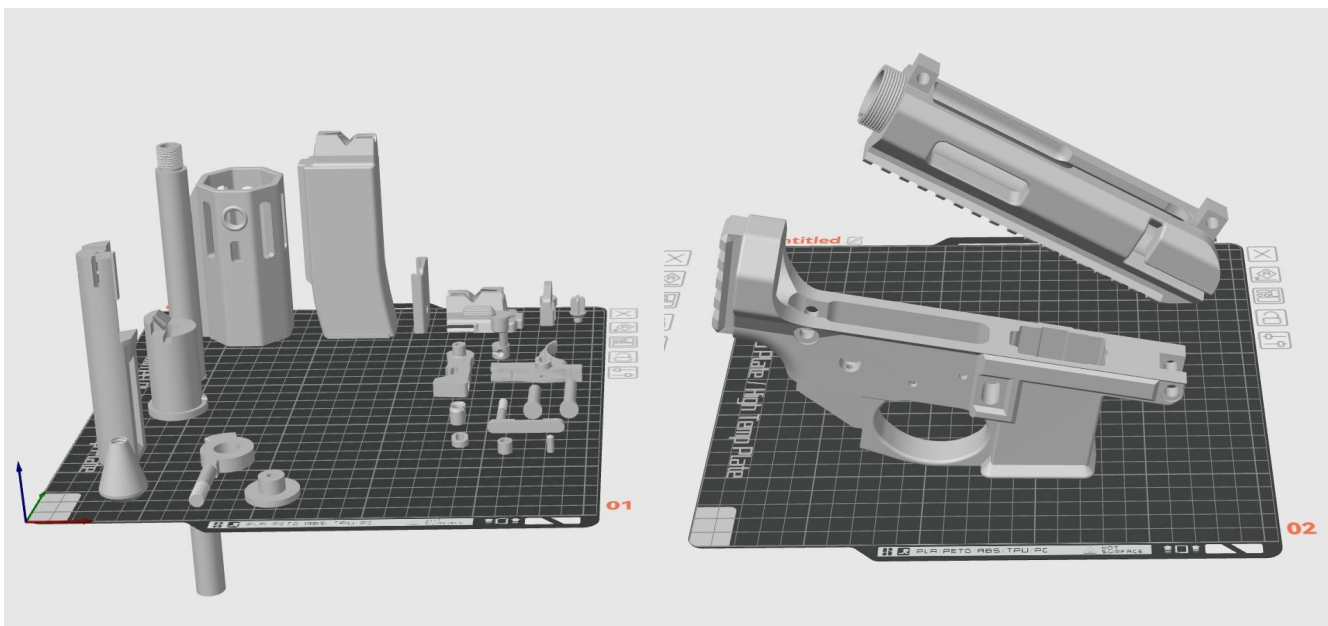
Most parts are thin enough that they will print solid. Filament usage and weight is negligible so you could just print everything solid. At minimum I'd recommend the load bearing parts be solid. That pretty much just leaves the mag, grip and stock/brace that can be 2-3mm wall/top/bottom thickness (5-7 walls) 15-25% infill.

## Orientation

These are just suggestions and you can print them in other orientations if you want but if you do stray from this, you should understand how orientation affects strength. You will need to add manual supports for the upper in this orientation.

I have printed the upper vertical and it surprisingly didn't break on the layer lines but you will want to be very confident in your layer adhesion.

The barrel liner parts can be lowered under the build plate to get any barrel length you want. Use multiple sections if needed. Example: The barrel extension is 1.75" (44.55mm to be exact) and the build pics are a 5.5" liner so the threaded barrel part is 3.75" long.  $3.75 + 1.75 = 5.5$



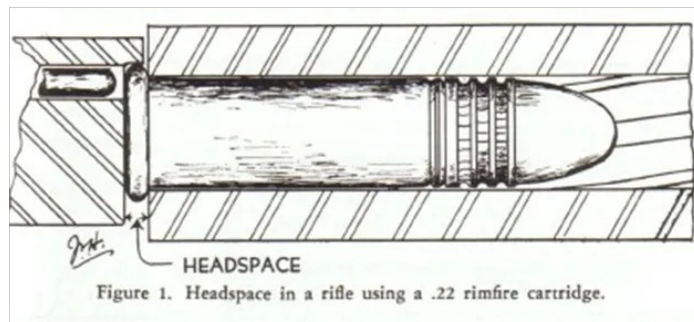
# Assembly

Before doing any assembly, you may want to sand the outside of the bolt and inside the bolt channel on the upper so it will cycle nice and smooth. Add lube later.

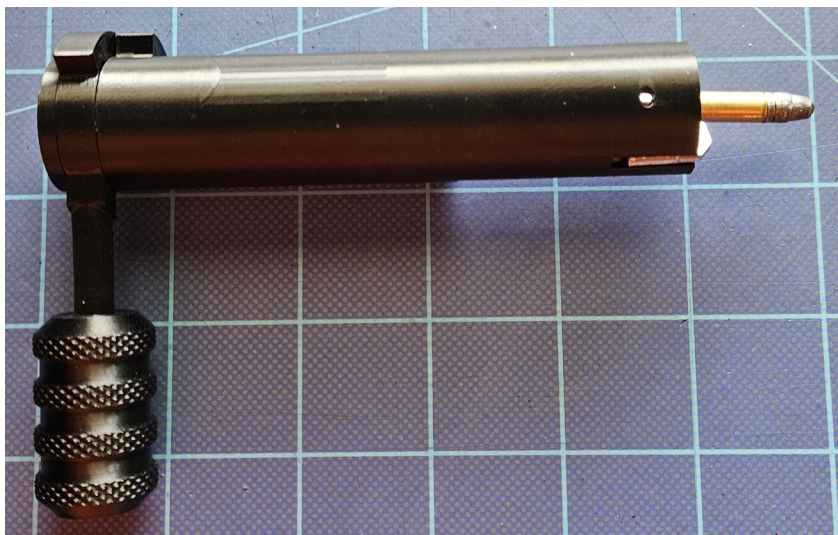
## Bolt

There are 2 different bolts; fully printed or reinforced bolt face. Subs have had bulging on the rear of spent casings on some softer filaments so it is highly recommended that you use the reinforced bolt face. Reinforced bolt uses 16ga (1.5mm) stainless steel plate cut/drilled to shape. Heat the insert into the bolt and screw on the plate and rim with M3x8 countersink screw. Loctite it. File an angle on the bottom of the reinforcement plate or it will hit the feed ramp.

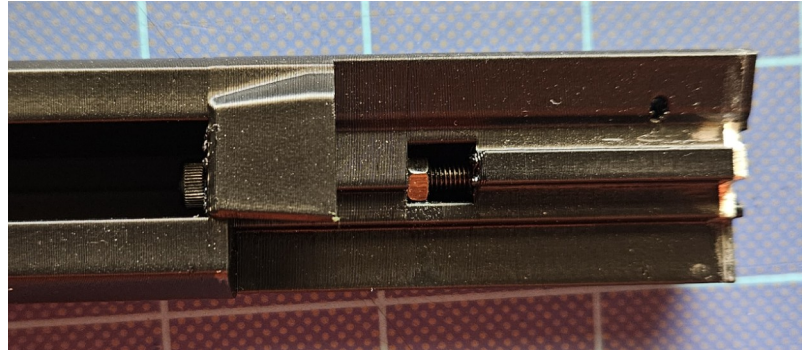
Headspace for 22LR is 1.09mm to 1.3mm. The bolt rim is sized at 1.09mm but may differ based on your printed layer height. If it's too much, the bolt handle will not be able to turn to lock. The extractor will also hit it and not work.



Extractor: You could print the extractor but you could have a difficult time to make it work. Do not drill out the pin hole all the way on the bolt. It is tapered on the bottom so the pin doesn't fall out. Insert the AR bolt catch spring, plunger, then extractor. Insert the 2mm pin from the top. Check to make sure the extractor can hold a round. The extractor hook may need to be shortened.



Firing Pin: Drill out the firing pin hole so it's smooth to prevent hangups. 1/8" or 3mm drill bit. File/dremel the M3x55 end to a cone shape with a flat top. Do not make it too pointy or it can pierce the primer. Some people have left the screw as is and have not had issues. Put the 4x15mm spring on the firing pin and thread the firing pin through the M3 nut in the middle of the bolt til the firing pin is flush with the bolt face or slightly recessed into the bolt when in the back position. Loctite the nut.



Heat the M4 heat insert into the back of the bolt center hole. You may need to file down the back of the bolt to make it flat again. You should be able to put in the firing pin after putting in the heat insert but it is recommended to put the firing pin in before. Screw on the bolt handle knob onto the bolt handle. Make sure this can rotate freely on the bolt handle cap. Connect the handle onto the bolt with M4x12. Loctite the screw.

\*Optional bolt handle detent: Insert the 4x10 spring and detent before connecting the handle.

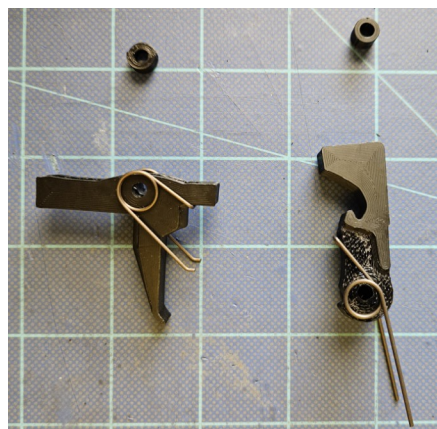
\*Optional reinforced bolt handle: screw in the M3x40 before putting on the knob.

### Lower Receiver

The lower goes together like a standard AR lower minus a few parts. There's tons of videos of AR assembly so you can skip this section if you want.

If using the printed fcg, the M4x6 screw is JB Welded into the hammer. The studs do not need to be glued on. There are alternate versions of the safety selector and detent if they don't turn well. You can also try cutting the selector spring shorter. AR fcg pins are 3.91mm so if using 4mm rods, you'll need to drill out the holes on the lower, trigger, hammer and studs.

Ensure the fcg pins will fit in your lower and drill if needed. Attach the trigger and hammer springs. Trigger disconnect is not needed since this is a bolt action. Insert the trigger into the lower and insert the trigger pin. Insert the hammer and hammer pin.



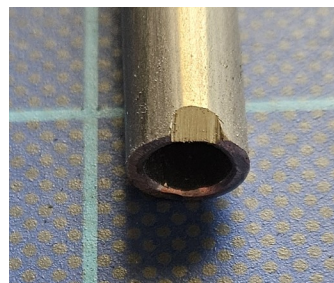
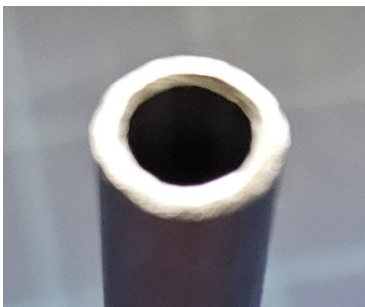
The grip hole needs to be drilled bigger if using the standard AR grip screw or it will crack. I suggest M5 heat insert and M5x20. Insert the safety selector. You may need to cock the hammer to be able to insert it. Insert the selector detent and spring. If you are using a lower with takedown detents then you will need to insert them and the takedown pins. Attach the grip and screw it on.

Insert the mag catch spring into the lower and the mag catch button. You need to push the button in and screw on the mag catch from the other side. Screw it in til the mag catch is flush to the texture of the mag button.

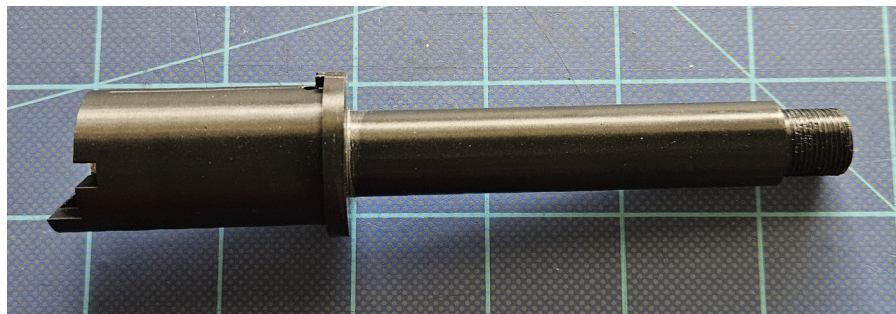
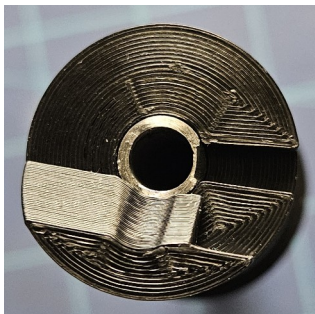


## Barrel

Barrel Liner: The barrel liner will need to be chambered. Put a piece of tape on the drill bit to mark a depth of 19.69mm. Reamer will already have a notch for depth. Go slow and drill the liner. Add a small chamfer with a 5/16 drill bit on both ends of the liner. If you don't chamfer then the round will catch when you try to chamber it. Then file a notch for the extractor.

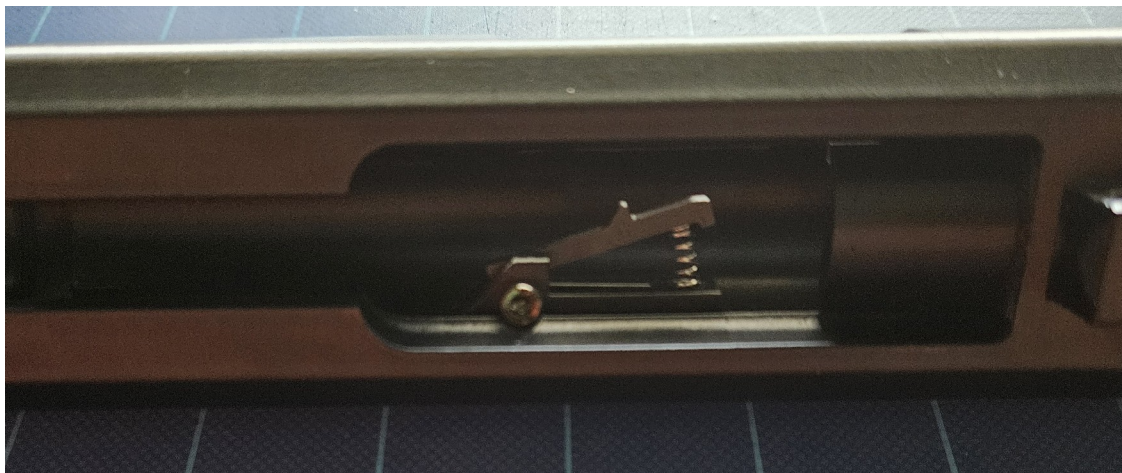


The barrel parts needs to be JB Welded to the barrel liner. If using threaded barrel parts, make sure there is plenty of JB Weld under the threads. Roughing the surface of the liner with 150 grit or rougher before JB Welding can also help.



### Upper Receiver

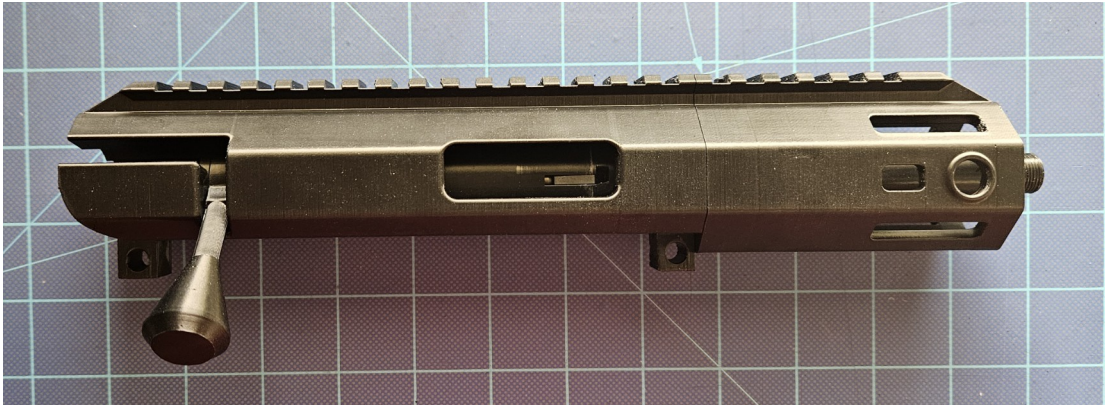
Ejector: Insert the ejector spring in the hole inside the upper. Insert the ejector into the slot and screw on the M3x8. Check to make sure it moves freely. It will stop when it is angled about 10° so the spring doesn't come out. If you are using the reinforced bolt or metal ejector, you will want to smooth any sharp edges where they contact each other to prevent wear.



Barrel liner: Insert the assembled barrel into the upper and thread on the handguard. Secure with M3x12 on the top.

RS22 barrel: Put the barrel adapter on the barrel and line up the pin slots. Insert this into the upper and insert the 4mm rods. Thread on the handguard and secure with M3x12 on the top.

Insert the bolt and make sure it can lock. Also cycle it and make sure the ejector is not catching on the reinforcement plate on the bolt. You can also check function of the extractor and ejector.



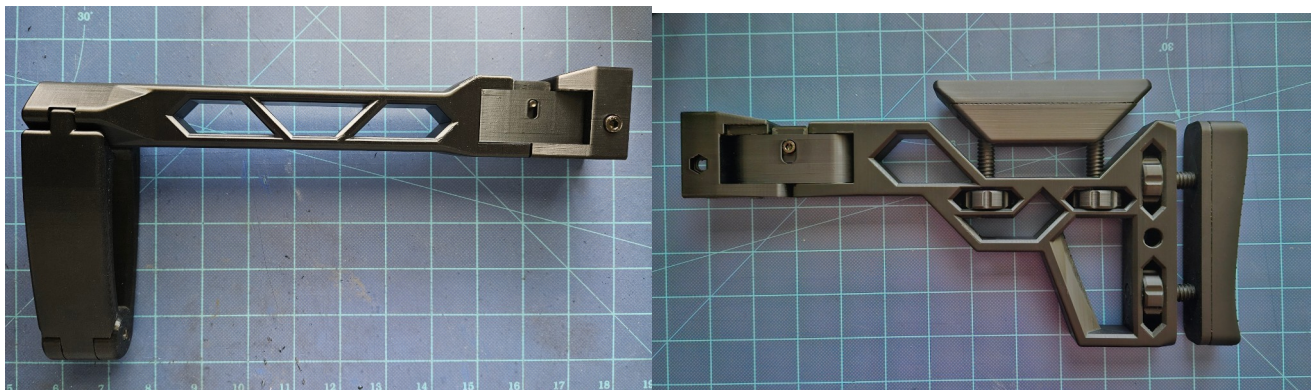
## Stock/Brace

Cut the spring to 1" and insert into the button and put this into the hinge. Make sure it can be pushed down so the top of the button is flush to the hinge and that it moves freely. Screw in the M4x20 to keep it in. Insert the hinge into the mount and brace/stock. Screw in the 2 M4x35 and nuts.

Brace: Connect the hook with M4x30 and M4 nut.

Stock: Connect buttpad to riser and cheek pad to riser. Insert the wheels and risers. Rotate the wheels to screw in the risers. \*Reinforced versions simply slide in the 2mm rods. If they wiggle then add a little glue. They are held in with the pads. Holes can be drilled out for bigger rods, all thread, or screws.

Slide the assembled stock/brace onto the lower receiver rear rail then secure with M5x30 and nut.



## Final Assembly

Connect the upper and lower with the pivot and takedown pins.

## Magazine

There are 2 different kinds; regular AR sized mags from M4gery or slim mags (same as previously designed for hd/ez). The slim mags have 2 subvariants (separate top or bottom) to choose depending on what you prefer.

### Spring length

25 round - 8"

15 round - 5"

10 round - 4.5"

Separate top: Cut spring to length and attach to follower. Insert into body and secure the top with 4 M3x12.

Separate baseplate: Cut spring to length and attach follower and baseplate retainer. Insert into body and slide on the baseplate.

\*It is difficult to load the last few rounds so you may not want to fully load them.

