Deterrence Dispensed Presents

Mono-Poly

build documentation

MrBumpysBigIgloo

Version 1.00

Preface

The Mono-Poly is a 3D printable AR-15 lower receiver modeled after the likes of the KP-15, or originally the CAV-15. For those who are not familiar, these lower receivers were designed to be monolithic pieces of injection molded polymer, reducing the overall weight of the firearm while preserving as much strength as possible, if not producing a superior product in some cases. While this model may not be as strong as production models made with glass filled nylon, it still reduces the amount of weight and parts going into your AR-15 build, and is still a cost effective way to have your own monolithic AR-15 lower. The final strength of your build will depend on your material selection, print settings, print orientation, and whether you use the one piece or two piece model.

This document will cover the steps, tips, and advice for building your own Mono-Poly receiver – I recommend you read this document in its entirety before you begin assembling your receiver.

For those who said it could never be done.
For those who push the limits despite what is said.
A stone rolling downhill continues to gain momentum.

Remember that it is our shared responsibility to be safe and smart with firearms and show the world there is a peaceful way to own guns – take the time to get training, to learn basic (and advanced) safety rules, and to share the hobby with everyone interested – those most scared of guns in the hands of the people are often the ones who have no experience with guns in the first place.

TESTING RELEASE NOTICE

3d printed AR-15 lowers are rather well understood, and when built properly, are safe firearms to shoot, however they commonly suffer from weakness in the buffer tower. Many seek to solve this issue, but the Mono-Poly goes as far as removing any need for additional upper parts other than the upper receiver, bolt carrier group, buffer, and spring. This lower has been printed and tested many times, and it has shown great strength.

The Mono-Poly is released in good faith, with myself and others having demonstrated repeatable results and reliable function. If you have questions, comments, feedback for improvement, or interesting results from testing (or just a cool build to show off), you can leave these responses in the chat on https://chat.deterrencedispensed.com/.

Contents

Shopping List

This list will cover what supplies you will need for a Mono-Poly build. This is quite a generic AR-15 build, so you won't need to seek out any special parts except for the generic screws and pins, which you will be able to easily find on your own – Amazon changes links on these things often enough that they go dead (or link to the wrong thing). The fasteners required can be found at any hardware store, but BoltDepot is also a great source for high-quality screws.

AR-15 Upper Receiver with Bolt Carrier Group and Barrel

Any standard AR-15 upper will work with this receiver, in addition to a buffer and buffer spring. You will not need a complete upper kit, the pistol grip, pistol grip screw, buffer tube, end plate, castle nut, and stock are not necessary.

Example of a usable AR-15 upper

Lower Parts Kit

- Fire Control Group
- Magazine Catch
- Bolt Hold Open
- Buffer Retainer

Example of a usable lower parts kit

There are many lower parts kits that can be found online containing all of the items required for a Mono-Poly build, but some parts such as the grip and stock are not needed. The lower parts required for this build are, at minimum, a fire control group and a magazine catch.

The best longevity and reliability in any 3d printed firearm will naturally come with a self-contained fire control group, though a standard fire control group will work. You can even print your own fire control group (files for this can be found in the FGC-9 mkii package). All fire

control groups will benefit from the addition of an extended hammer pin, as with the original KP-15. A safety may need to be obtained separately and cannot be removed once installed.

A standard magazine catch will work, although some modification may be required for an ambidextrous magazine catch.

A bolt hold open is not required but as a great value-added feature is highly recommended. A standard bolt hold open will work, but modification may be required for an ambidextrous bolt hold open. Once installed, it will not be possible to remove the bolt hold open non-destructively.

A buffer retainer cannot be installed in a two piece lower, but it is possible to install in a one piece lower with the addition of a 5/64” x 1.5” roll pin. It is not required, not needed with a self-contained buffer, and not recommended by myself and many other users of the AR platform.

Receiver Takedown Clevis Pins: 1x 1/4"x1.75” and 1x 1/4”x1.25”

Printed AR receivers have need to be thicker than their aluminum brethren. This renders standard AR rear takedown pins ineffective (they will fit but will not be retained). Many 3d printing builders have taken to using 1/4"x1.75” clevis pins in the rear and 1/4"x1.25” clevis pins in the front, as standard AR takedown pins are usually purchased as a pair. These can be found many places such as at Amazon and Grainger, and at many hardware stores. Depending on what you get, your clevis pin may need to be cut to length and drilled for a cotter or ring retainer.

Connecting Bolt and Nut: 1x 5/16”x1.5” (M8x40)

This bolt and nut helps hold the two piece version together. These can be found online or at hardware stores. A hex bolt is not recommended, as a socket will have a hard time driving it in place. A hex socket, flathead, or Phillips head with an accompanying screwdriver is best.

Connecting Pins: 2x 1/8”x2” (3x50mm)

These pins will be glued or epoxied in place to help hold the two piece version together.

5/64” x 1.5” Roll Pin (2x38mm)

This pin is only necessary if a buffer retainer is being installed.

Tooling:

You will need a 3/8”, 1/4", 5/32”, .128” and #29 drill bits, as well as a drill to use them with. Flush cutters and pliers will help with post processing your print. A hammer and punch set can also be helpful for installing pins. A screwdriver with 9” (230mm) of reach will be needed to install the connecting bolt on the two-piece version. A two part epoxy or industrial strength adhesive will also be required for assembly.

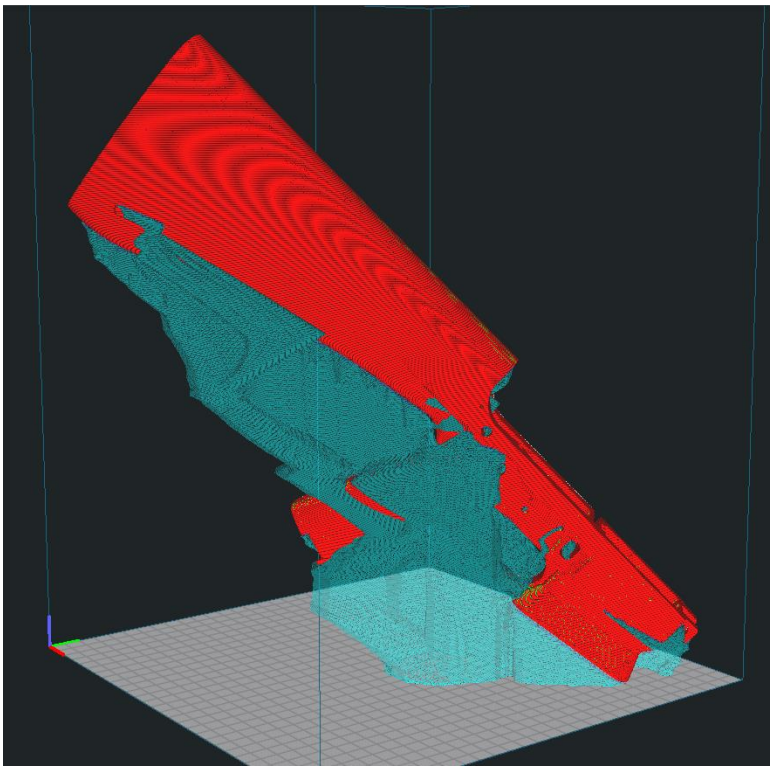
Print Guide

The Mono-Poly, especially the one piece version, is a very challenging print. You will need to pay careful attention to how your supports are being generated in relation to how the part is oriented in your slicer software, though I have tried my best to pre orient the parts in a way I have found them easiest to print. I highly recommend watching this video on supports by The 3D Print General before you get started as well:

https://www.youtube.com/watch?v=3EebP-z5qJ8

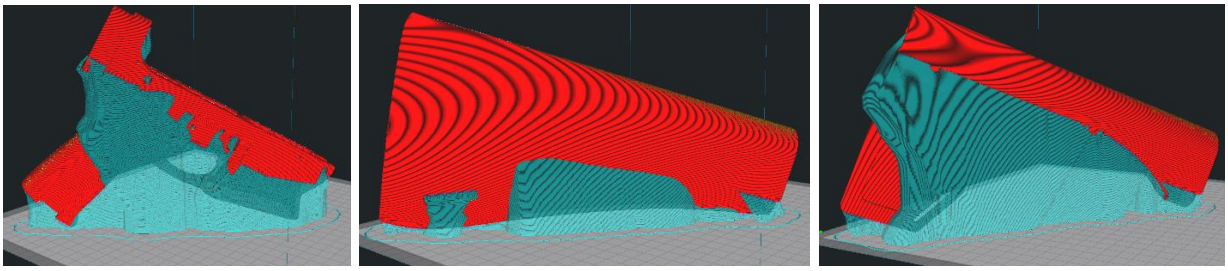
One Piece Version

If you have a Creality CR-10 or similarly sized printer, you will be able to print the one piece version. The best way I have found to slice this is to orient the part at a 45° angle and placed diagonally on your build plate. It should be oriented this way when you open the file. It should be printed with 99% infill at a strength appropriate temperature for your material (215° to 220° C is best for dry PLA+). It is important that your supports will be able to hold the entire print up by the time it has finished printing, and make sure that little to no support is being generated inside of the buffer tube. This is a large part taking a large amount of time; ensure that your printer is in excellent condition before attempting this print.



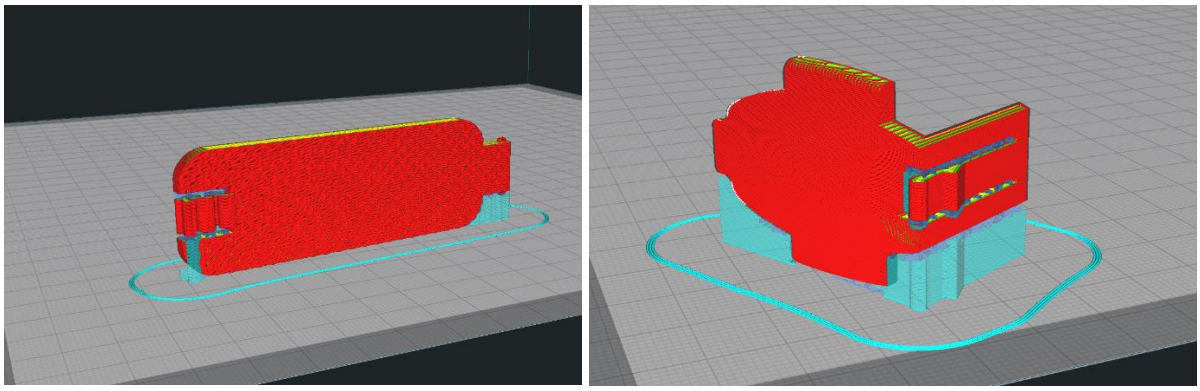
Two Piece Version

The two piece version was designed in order to fit the Mono-Poly into smaller printers such as the Creality Ender 3. The end result may not be quite as strong, and it will not be able to accept a buffer detent, but it is still very durable and some builds have even survived multiple pushup tests. The orientations and settings for the two piece version are going to be similar to those of the one piece version. It should be oriented at a 45° angle and placed diagonally on your build plate when you open it. It may need to be adjusted if you have a smaller printer. Again, it should be printed with 99% infill at a strength appropriate temperature for your material (215° to 220° C is best for dry PLA+). It is important that your supports will be able to hold the entire print up by the time it has finished printing, and make sure that little to no support is being generated inside of the buffer tube. Print one receiver front and one stock or brace.



Accessories

There are two printable covers, one trap door for the stock and one baseplate for the pistol grip. These should be printed on edge, as they should be oriented when they are opened. These are not load bearing parts, so printing with 3 walls, 20% infill of choice, and 220° Celsius should be acceptable.



Build Tutorial

AR-15s are possibly the most common home-built firearm, and there are appropriately a plethora of tutorials and videos online delving into their assembly in great detail. Feel free to follow one of these if you are doing a one piece build, such as this one: https://www.youtube.com/watch?v=pGPHgkH96NI

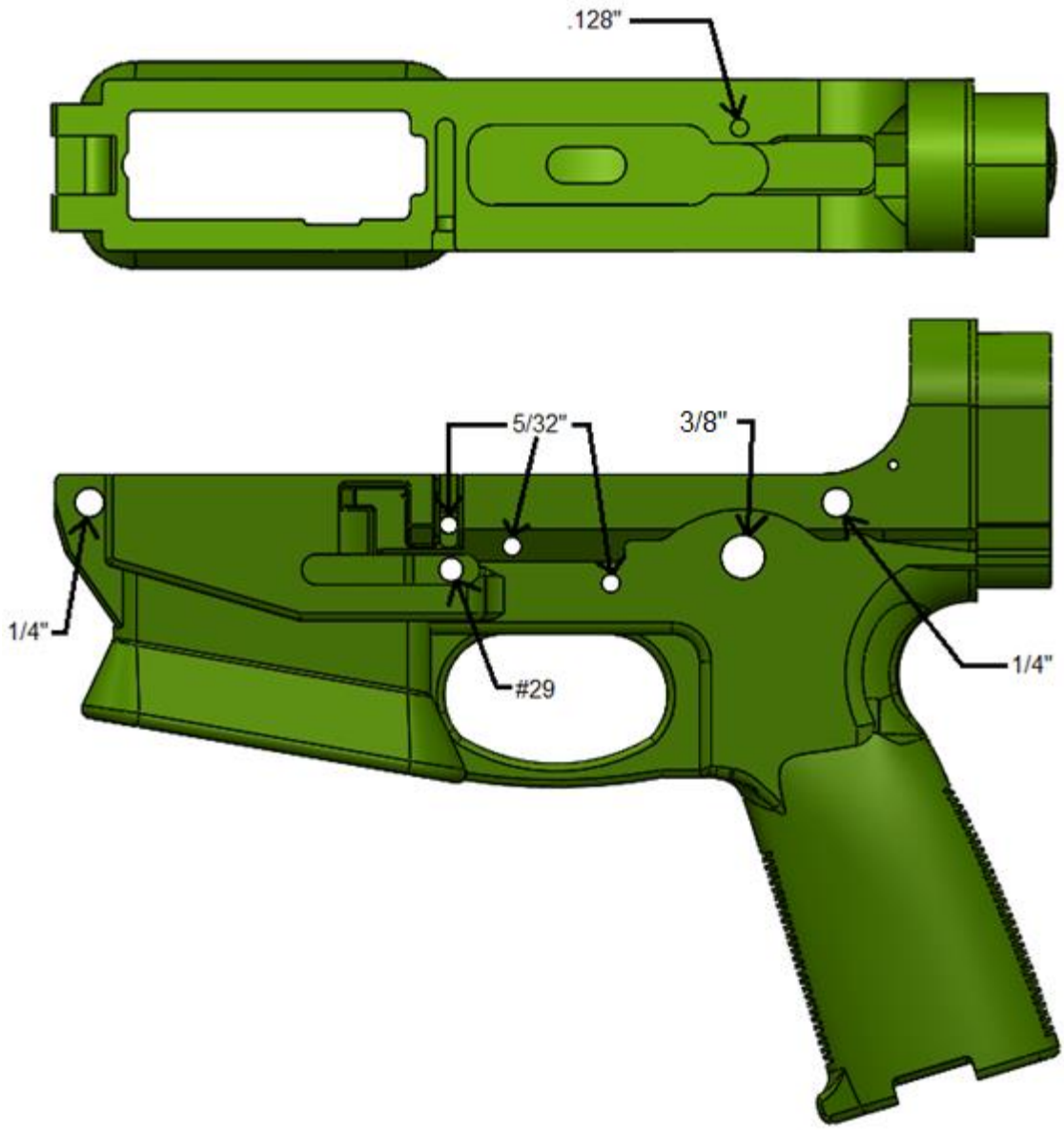
I also have basic instructions included below for the two piece build as well as all of the other parts that need to be installed.

Step 1: Lay Out Your Parts

This step is simple – gather up all your parts and lay them out. Make sure you have all the parts you need. If you are going to be cutting down any bolts or pins, go ahead and do so now. If you cut down a bolt, remember that you will need to apply a chamfer around the end you cut down and will need to ensure that nuts can still thread easily on to the bolt.

Step 2: Clean Up Prints

Remove supports and trim or sand any rough spots, stringing or other print artifacts. Carefully drill holes to size.

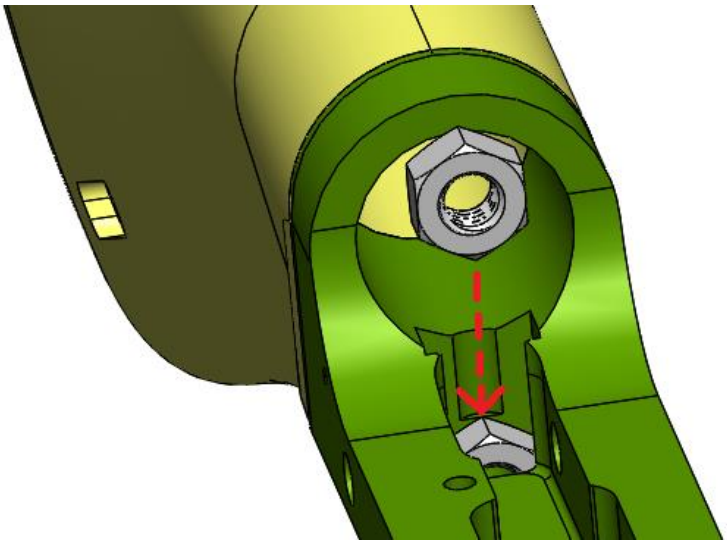


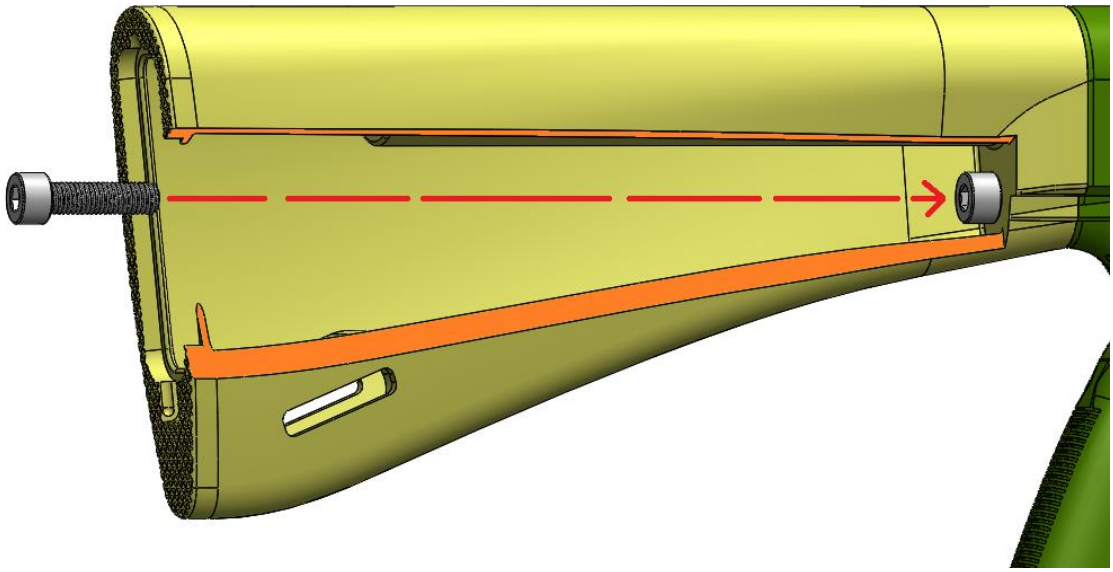
Step 3: Join Pieces (TWO PIECE ONLY)

First, apply your epoxy of choice to your two 1/8”x2” pins and insert them into the front receiver piece. Next, cover the exposed portion of the pins and mating surface of the front receiver piece in epoxy and join it to the rear receiver piece. Wipe up excess adhesive.

The nut is then inserted into the pocket behind the fire control group of the receiver, and the bolt goes into the rear of the stock or brace. Any bolt head should work as long as you possess a matching bolt driver with an appropriate length of reach (when using a stock, the screwdriver or fastening tool will need 9”, or 230mm, of clearance to reach the bolt). There may be some difficulty if using a hex headed bolt, as there is limited clearance inside of the stock for a bolt driving socket. Personally, I cut a flat head in my hex bolts and use an extended flat head screwdriver to connect them. Tighten the bolt down snugly, and make sure there isn’t any wobble in the two parts.

Once the adhesive is cured, your receiver is complete.





Step 4: Install Fire Control Group

Drop the trigger, with proper springs attached, down into the trigger cutout of the receiver. Ensure the spring legs rest on top of the receiver interior and don’t get caught in the cutout for

the trigger. Place the disconnector in its proper orientation on top of the trigger and ensure the disconnector cutout is placed over the disconnector spring. At this point, it can help to insert a small punch or nail through the trigger pin hole, passing through the disconnector. This will lock the trigger and disconnector in place. Drive the trigger pin through to install the trigger.

Next, place the hammer spring legs across the top of the trigger in and bend the hammer into place, securing it with a small punch or nail through the hammer pin hole. Drive the hammer pin through to install the hammer.

For the safety selector, carefully ream out the safety detent hole with the .128” drill bit. Load the selector spring through the top of the receiver, then load the detent. Insert the selector from the left side and use a punch or other tool to push the detent down into place as you slide the selector over it. Install the trigger pin, then install the hammer/hammer pin. Function test the selector. DO NOT DRY FIRE THE HAMMER WITHOUT EASING IT DOWN OR USING A TEST BLOCK TO DROP IT. The safety selector cannot be removed without damaging the lower.

Step 5: Install Magazine Catch and Bolt Hold Open

WARNING: Install the magazine catch prior to installing the bolt catch. Reversing this order makes the magazine catch much harder to install.

Carefully ream the magazine catch hole with the #29 drill bit. Install the magazine catch, place the spring over the shaft, and thread on the magazine catch button. Use a punch or other tool to press the button all the way in. Rotate the magazine catch until the end of the threaded portion is flush with the button.

Carefully ream the bolt hold open spring hole with the 5/32” drill bit and insert the spring and plunger. Install the bolt hold open and drive the roll pin through with a hammer and punch. If you use pliers to squeeze the roll pin in, you may damage your lower. The bolt hold open cannot be removed without damaging the lower.

Step 6: Install Buffer Retainer (ONE PIECE ONLY)

Get the 5/64” x 1.5” roll pin started by hammering it part of the way in. Insert the buffer detent and spring. Drive the roll pin in the rest of the way with a hammer and punch while holding the detent down.

Step 7: Install Upper Receiver

This is straightforward, but if you have any issues inserting the front or rear lug, the lower may need to be sanded or filed to fit. These parts are designed to be tight for strength and accuracy.

Step 8: Performing Function and Safety Check – PRE FLIGHT CHECK

Ensure the firearm is unloaded, then rack the bolt and pull the trigger several times. Hold the trigger down and pull the bolt back, let go of the bolt so it springs forwards, then release the trigger and pull it again. Check for these things:

- When you pull the trigger, the hammer falls fully and hits the bolt.
- When you pull the bolt back, it does not require excessive force (the bolt should not feel like it is sticking)
- The bolt returns all the way forward under spring tension when release.
- When you release the trigger, the hammer does NOT fall, and is caught by the trigger. (It resets for the next shot).

After this first test, grab a magazine and try installing it. If you have a brand-new mag catch. If your magazine locks in, you are all set. Give it a wiggle and swap the mag in and out several times to ensure the latch is working properly.

The next item to check is that your ejector works and that the gun will cycle rounds. Make sure that the safety is on during this test. Load a magazine, then rack the gun – it should be able to chamber a round fully from the magazine. Yank back briskly on the charging handle – the ejected round should go flying. You can perform as many dry cycles like this as you would like, but usually if it does well on one or two rounds here it will be safe to fire.

Your next check will be to actually fire the gun – I recommend you wear safety glasses at least for the first couple hundred rounds. Fire your first mag slowly, checking for cracks on the receiver. If there is a hidden anomaly in the print, it will usually show up right away. If you think you see a crack, mark it with a sharpie or pencil and fire another couple rounds. Did the crack grow or move? If not, it is probably not a crack, but just a scratch. After your first mag of slow fire, if no cracks have shown up, your Mono-Poly should be safe to fire for hundreds if not thousands more rounds.