The Gatalog Presents:

The UBAR3 & UBARX

REINFORCED 3D PRINTED AR15 LOWER

Preface

The UBAR3 is a 3D printable AR-15 lower receiver. It utilizes simple metal parts to greatly enhance the strength/durability of the lower – able to withstand pushup tests, drops, throws, kicks, and other hard abuse. At the core of its design is a U-Bolt to clamp the buffer tower down (preventing cracks), two humps to spread bending force at the rear of the receiver along the top deck of the lower, and two eye bolts to act as the front takedown lugs on the lower (which also help clamp the front of the lower together, enhancing strength further).

Note: While the UBAR3 is a very strong lower, it is not advised to shoot it without its metal reinforcements – without these reinforcements, the lower will not prove strong or reliable.

This documentation will walk you through the process of building your own UBAR3 lower – while many of the steps are standard to building out an AR15 lower, some fitting is required on the metal reinforcements for this lower, and some tasks are unique to this build. **Do not assume you know how to assemble your parts without reading the documentation.**

You can watch this assembly process on video here:
https://odysee.com/@Ivan's_CAD_Streams:c/UBARXBUILD

Make sure you refer to the README for basic info/print settings for this lower!

I recommend you use this document to supplement the video, having text-based steps helps keep things organized, being able to see things in real time helps clear up confusing instructions.

Do not be intimidated by the length of the build video/tutorial. If you run into issues, the troubleshooting section at the end of this document should help you out.

If you have found this tutorial useful, consider sending me Bitcoin to further development of this sort of thing – there is much more to explore in 3D printed guns, DIY guns, DIY ammo, etc.

https://ctrlpew.com/donate-to-ivanthetroll/

Is it Pronounced “U-BAR” or “OO-BAR”?

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.

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Printed Parts List/Nomenclature

The UBAR3 project is comprised of two different sub-projects – the UBAR3 itself, and the UBARX. The UBARX is a version of the UBAR3 that features an integral pistol grip. This is offered for several reasons, but chiefly due to the strength benefits of an integral pistol grip. However, traditional removable pistol grip builds do still hold up well enough, and as such the UBAR3 offers support for those traditional options.

Throughout this document, I'll use the term "UBAR3" to refer to both the UBAR3 and UBARX style lowers, and use "UBARX" when referring to specifically the UBARX.

The UBAR3 also offers support for rifle buffer tubes, anti-walk hammer pins, as well as a cutout for milspec forward assist plungers. Understanding which lower you want to print is made easy once you understand the file names of the lowers:

UBAR3_C_N_AW – UBAR3 lower, C = carbine buffer tube, N = no forward assist cutout, AW = anti-walk pin support.

UBARX_R_Y – UBARX lower, R = rifle buffer tube, Y = yes forward assist cutout, no AW suffix means that anti-walk hammer pins are not supported.

A total of 16 lowers are available to cover all permutations of features available.

Note: While previous versions of the UBAR had different reinforcing humps to support various different styles of upper receiver, the UBAR3 should be compatible with most/all uppers without needing to worry about figuring out which style of reinforcing hump you need.

Shopping List

Starting right off – the UBAR3 uses the same basic shopping list as the previous versions of the UBAR, though the UBARX will require an additional pin.

This list will cover what supplies you will need for a UBAR3 build. You will need some basic tools, such as a 1/8", 1/4", 5/32", 7/32", and 3/8" drill bit, a hammer, a 1/8" punch, a screwdriver or allen key to install your pistol grip screw (not required for UBARX), a battery drill, a Dremel tool with a cutoff wheel (or a metal file), a 1/4-28" tap (not required for UBARX), and optionally a pair of needle-nosed pliers (these are always handy).

For UBARX builds, installing the selector detent and spring can be a little tricky – I recommend you use a long 3/32" Allen Key and a tool magnetizer to aid in this process.

Allen Key: https://www.amazon.com/EKLIND-51506-Cushion-T-Handle-wrench/dp/B07BCJF7G4/

Magnetizer: https://www.amazon.com/Demagnetizer-Screwdriver-Klein-Tools-MAG2/dp/B074RMH9VL/

While these are optional tools, they will come in handy.

AR15 Parts

The UBAR3 is compatible with most/all AR15 uppers. Of course, some AR-15 uppers may require minor fitting or adjustment to some parts – but anything "milspec" in footprint should be a simple plug-and-play operation.

The UBAR3 has versions for both rifle and carbine buffer tube support. Obviously, don't go sticking carbine buffers into rifle tubes or rifle buffers into carbine tubes – but with the appropriate UBAR3 lower you can use the appropriate tube/buffer setup that you desire.

Broken down, you will need:

- A Complete AR15 Upper – any barrel length, gas system length, etc. I like PSA's uppers, and have tested the UBAR3 with everything from 3D printed uppers to T91 uppers to Colt SP1 uppers to M16A4 uppers, even LaRue uppers – and it's done great with all of them. *Note that you will need a bolt carrier group and charging handle with your complete upper – some uppers don't include them, make sure yours does.*
- An AR15 Lower Parts Kit
    - Fire control group – hammer, trigger, disconnector, plus the springs for these parts
    - Safety selector, detent, and spring
    - Magazine catch, catch spring, and button
    - Buffer retainer, buffer retainer spring
    - Buffer tube and buffer (again, make sure that if you have a carbine tube, you have a carbine buffer, and if you have a rifle tube, get a rifle buffer)
        - If you opt for a carbine buffer tube, you will need a buffer tube castle nut and locking plate
    - Bolt Hold-Open, bolt hold-open spring, bolt hold-open detent, bolt hold-open retaining pin
    - An AR15 stock – I like B5's Bravo stock – it's a bit pricey, but fits great on mil-spec buffer tubes and works great for me. There are some printable stocks out there.

    - If you print a UBAR3 and plan on using a removeable pistol grip, you'll need such a pistol grip. The UBAR3 should be compatible with most/all AR15 pistol grips, but may require minor fitting with some AR15 grips that feature extended backstraps.

  Note: You do not need the trigger guard or takedown pins/springs from an AR15 lower parts kit for this build – you can save these parts to have as extras for other builds, though.

  Note #2: If your fingers have a hard time reaching the safety due to the reinforcements on the UBAR, you may want to consider a push-button safety, as these solve the clearance woes that some fingers may have with the reinforcements.

Metal Reinforcing Parts

The UBAR3 uses a few metal reinforcements to make it strong – a U-Bolt and two rod-end eye bolts.

You can source these parts yourself, or buy these parts in a hardware kit.

- 1x https://www.mcmaster.com/3201T49/
    - The U-Bolt required is a 1/4"-20 thread, 1-1/8” ID. I prefer carbon steel to stainless steel (since there is a little grinding required on the u-bolt, and stainless steels can be annoying to file sometimes). You will also need two 1/4"-20 nuts and a nut plate for the U-Bolt, but your U-Bolt will usually come with these.
- 2x https://www.mcmaster.com/97135A210/
    - Two 1/4"-20 locking nuts – for securing the rod-end eye bolts
- 2x https://www.mcmaster.com/59895K11/
    - Two 1/4”x 1-3/16” Flat-Shoulder Rod-End Eye Bolts are required – these are a somewhat uncommon size bolt, are tricky for boltmakers to produce, and tend to be pretty expensive.

The UBAR3/X uses extended length pins in place of the standard takedown pins. You will need two pins – both are 0.250” in diameter. While you can use any sort of pin, my favorite method is to use a 1/4” sex bolt for the front pin and a spring detent push pin for the rear pin:

For the front pin, I use this: https://www.mcmaster.com/98002A206/

For the rear pin, I use this: https://www.mcmaster.com/90156A509/

Your options are open here, and ¼” bolts, dowell pins, and several other solutions will work. Pick what seems best to you, cut pins to length if you need to, and you’ll be good to go.

Hardware Parts (UBARX Only)

1x 1/8” x 1” Roll Pin/Spring Pin: https://www.mcmaster.com/91598A260/

You can also substitute a 3mm or 1/8” solid pin, cut down a 3mm or 1/8” bolt, etc. You don’t even have to use a coiled roll pin, split pins are fine as well (coiled pins are preferred, but the build tutorial will show use of a split pin – it’s the same idea regardless).

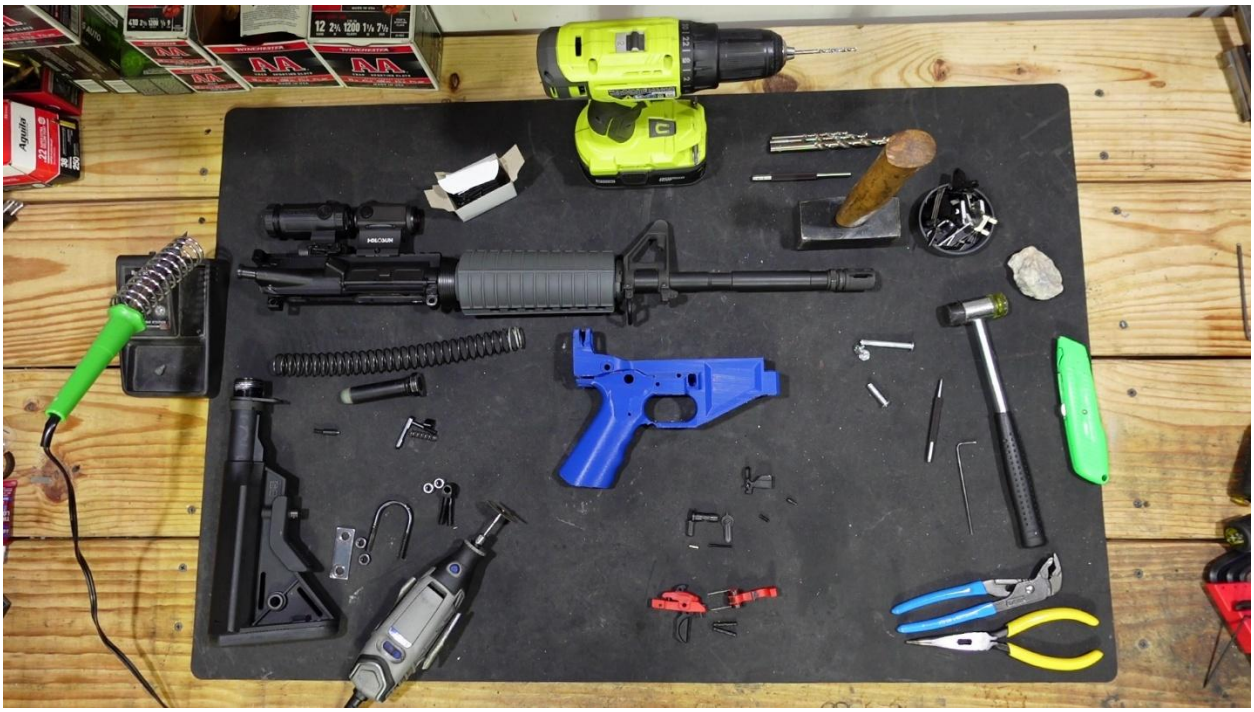
Build Tutorial

I recommend you read this section in its entirety, then watch the build video while you go about building your UBAR3. It's a fairly easy process but following the video (linked at the beginning of the document) should save you from wasting any time due to silly mistakes.

REFER TO THE README FOR BASIC PRINT INFORMATION

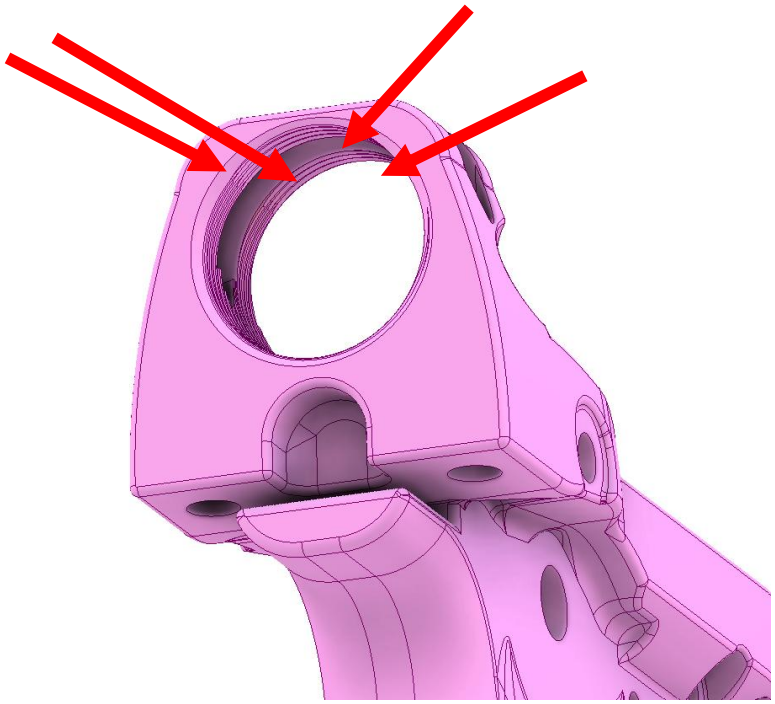
Step 0: Lay Out Your Parts/Prep Work

Begin by laying out all your parts, tools, and other equipment. Being at least sort of organized helps ensure no little parts get lost!



My Spread of Tools/Parts

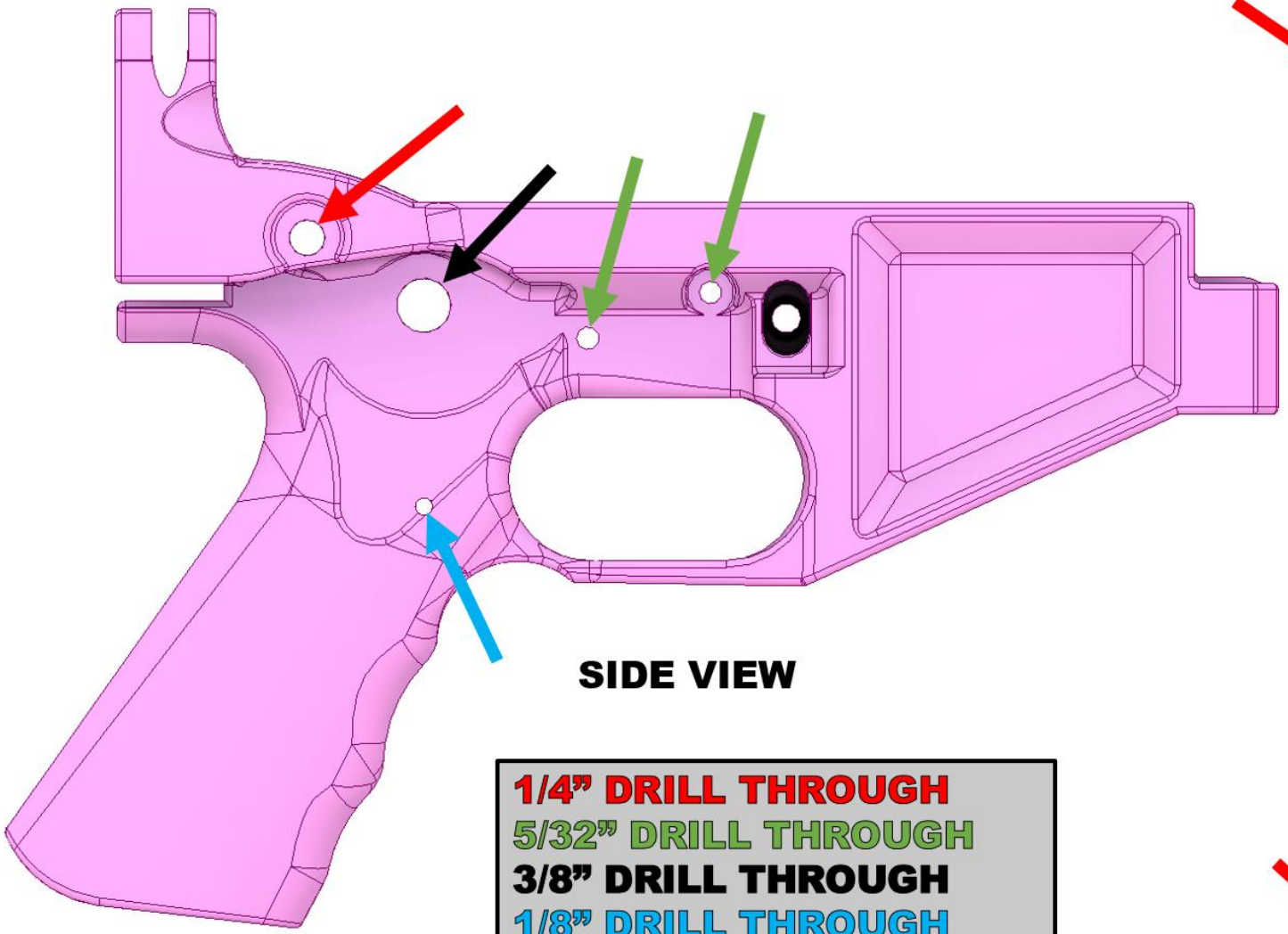
As usual, remove all support material from your receiver. Be through and remove it all – be gentle when removing the supports from the buffer tube threads, you don't want to damage the threads on accident! Note that there are no threads at the top of the buffer tube hole – you won't need to remove support material from there, so don't accidentally try gouging threads into the top of the hole.



The top of this hole doesn't have threads – don't make the mistake of thinking the threads are clogged with support material!

Finish your prep work by using your drill and drill bits to clear out the through-holes on the lower – your 5/32" drill bit will be used to clear out the hammer and trigger holes. Your 3/8" drill bit will be used to clear out the safety selector hole. Finally, your 1/4" drill bit will be used to clear out the rear takedown pin hole. Finally, use a 1/8" drill bit to drill out the selector hole. On a **UBAR3** build, you will drill this hole from the bottom. On a **UBARX** build, you will drill this hole from the top.

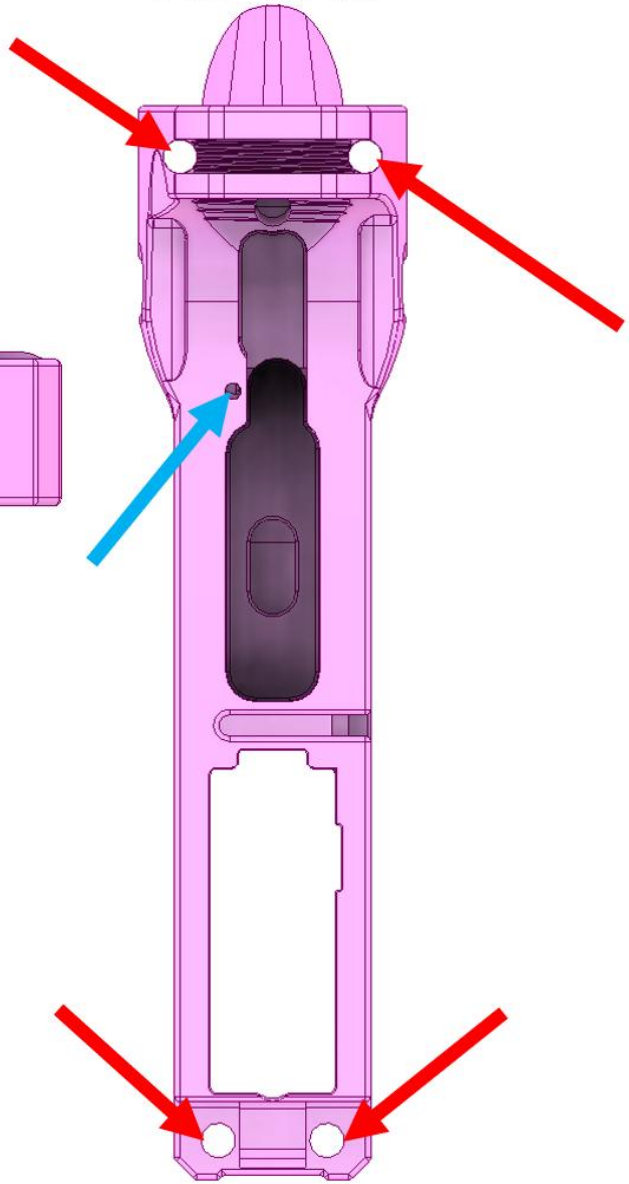
UBARX



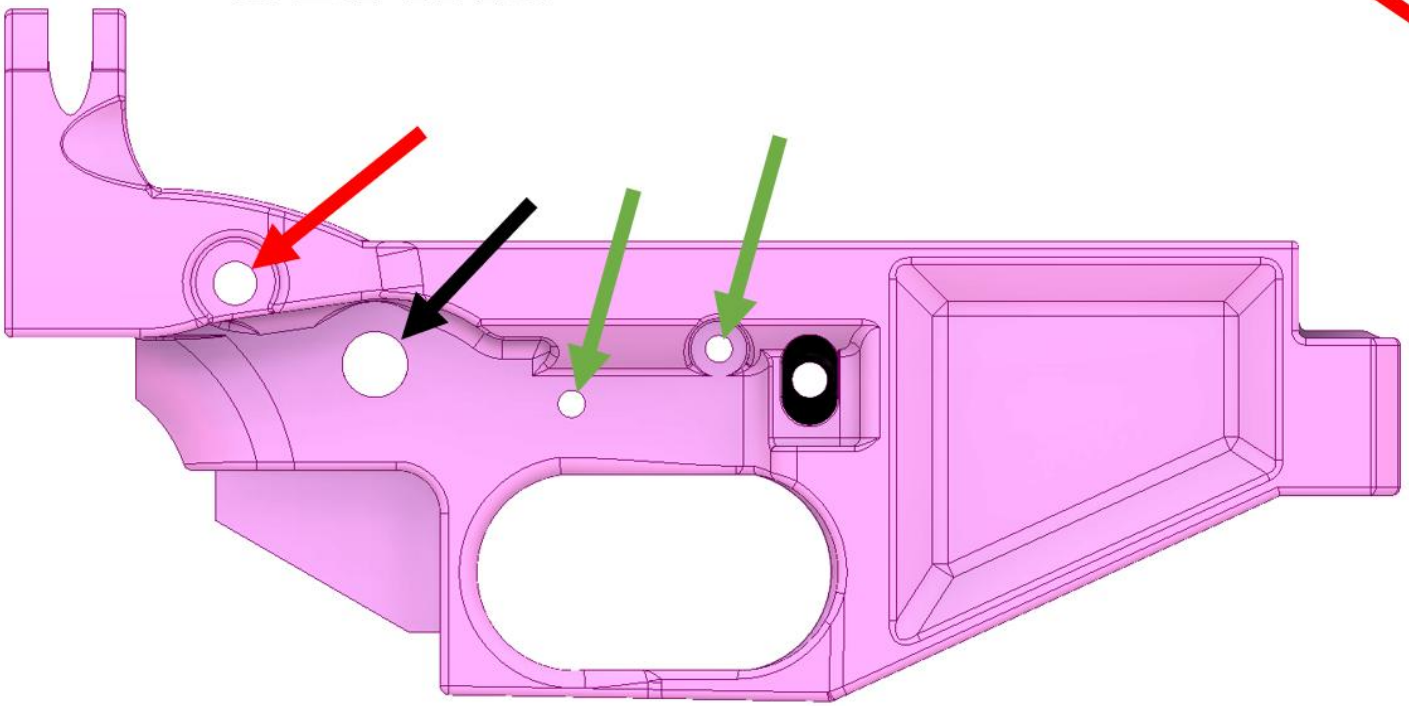
SIDE VIEW

1/4” DRILL THROUGH
5/32” DRILL THROUGH
3/8” DRILL THROUGH
1/8” DRILL THROUGH

TOP VIEW

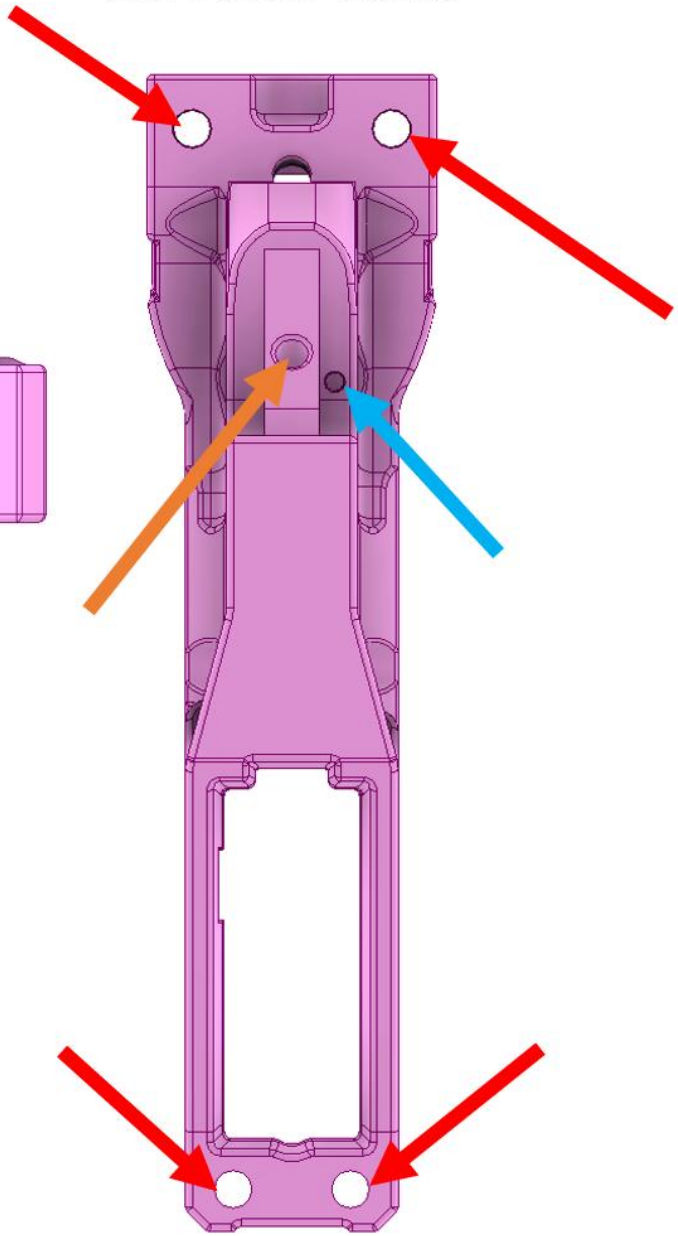


UBAR3



SIDE VIEW

BOTTOM VIEW



1/4” DRILL THROUGH
5/32” DRILL THROUGH
3/8” DRILL THROUGH
1/8” DRILL TO SELECTOR HOLE
7/32” DRILL, 1/4-28 TAP

REFER TO FAQ: “HOW TO I TAP THE PISTOL GRIP SCREW HOLE” IF YOU DON’T KNOW HOW TO DO THIS ALREADY.

Step 1: Smooth out Any Rough Areas

I recommend using a soldering iron to smooth out any rough surfaces on your lower. While this is optional, it's much quicker and easier than using sandpaper to smooth out these areas. A cheap soldering iron works fine, you're just using it remelt and smooth/shape the rough areas such as where the support material attached to the print. If you're using a material such as ABS which is known to potentially be carcinogenic, it would be a good idea to have a fume sucker and respirator.

Smooth out any rough areas, touch up any blemishes.

Take your time and make things smooth to your liking, but remember you can always go back and touch things up later on.

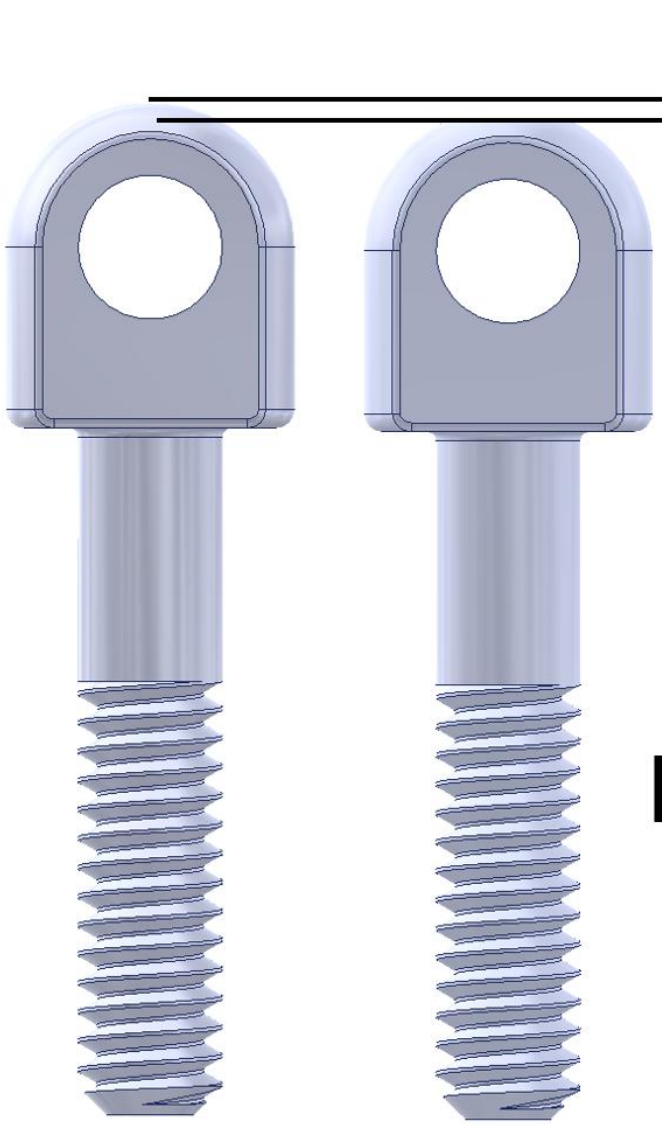
Step 2: Modify the Reinforcing Hardware

The UBAR uses a pair of steel eyebolts and a steel u-bolt for reinforcement. This hardware allows it to withstand serous abuse, including drops, throws, mortaring, etc.

The hardware used will require some minor modification in order to fit the lower correctly. This can be done with a hand file, a Dremel tool with a cutoff wheel, or other similar tool.

The two eyebolts will need just a little material shaved off their tops. Some eyebolts don't need this (it depends on the shape of your particular upper), but it doesn't hurt to do the modification. Don't worry about being very precise – you can always come back later and remove more if things don't fit, but also it's almost impossible to "overshoot" and remove so much material that the eyebolts won't work anymore.

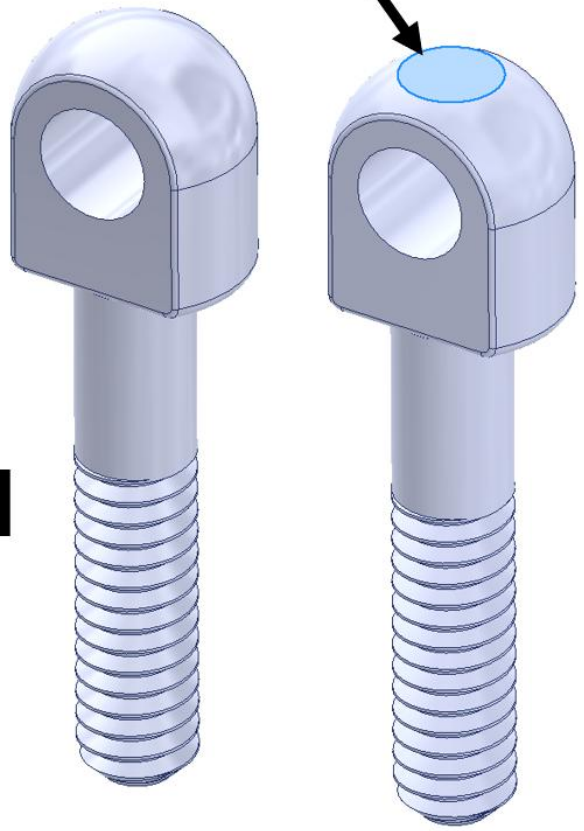
The u-bolt will need modification in three places – on each of its two legs, and at the top arch. On the legs, you'll need to remove material from the inside so that the u-bolt can fit around a buffer tube. At the top, you'll need to remove material so that the charging handle can fit over it.

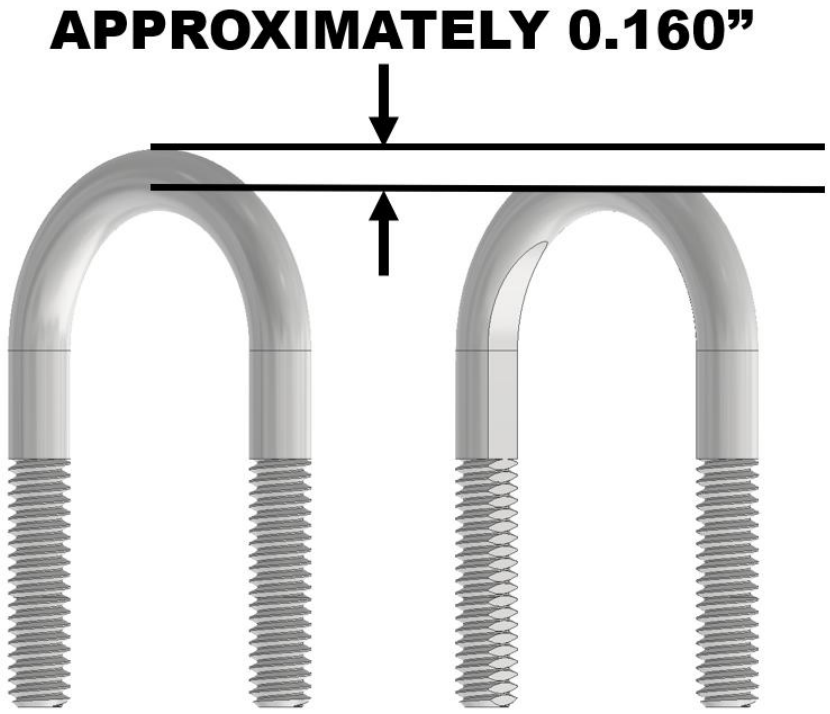


GRIND APPROXIMATELY
0.025” OF MATERIAL,
MAKING THE TOP FLAT

EYEBOLT MODIFICATION

MODIFIED BOLT





U-BOLT MODIFICATION

The tutorial video shows examples of how to use a Dremel tool or file to accomplish this fitting. Some vendors in the space also offer pre-fit hardware. The fitting process shouldn't take you much longer than 10 minutes, it's quite simple and you don't have to be very precise.

Fitting the eyebolts with a Dremel tool.

Using a pair of pliers to hold the U-bolt, a Dremel with a cutoff wheel makes short work of the modification to the legs.

For fitting the top of the u-bolt, first make sure that the u-bolt can fit down over the buffer tube completely – the inside of the top of the u-bolt should touch on the top of the tube. After you install the buffer tube in Step 4, you'll be able to visualize how much material has to be removed off the top of the u-bolt – I recommend that you wait to fit the u-bolt until that point, but will include pictures of that process now.

First, make sure the u-bolt fits down over the buffer tube.

Then use a Dremel or hand file to remove material off the top of the u-bolt so that it sits flush with the top of the lower. NOTE: I recommend you install the buffer tube first before doing this. Refer to Step 4.

Step 3: Installing the Eyebolts

Install the two eyebolts into the two holes in the front of the lower. Take two 1/4-20 locknuts (or regular nuts, installed with Loctite) and loosely install them. Later, once you mount the upper to the lower, you will tighten these nuts down all the way.

Install the eyebolts into the front holes

Secure the eyebolts with a pair of nuts. Do not tighten these nuts all the way, leave them loose so that the eyebolts have a little wiggle. We will tighten them after the upper is installed.

Step 4: Installing the Buffer Tube and U-Bolt

Begin by locating your u-bolt (with its legs modified as detailed in Step 2), the retaining plate and nuts for the u-bolt, your buffer tube, and your buffer detent and detent spring.

If you are using a carbine or pistol buffer tube, remember to first install your castle nut onto the tube, followed by the buffer tube rotation plate. If you are using a rifle tube, you will only use the tube itself.

If you are doing a UBARX build, begin by placing the u-bolt retaining plate above the rear end of the grip. If the plate fits tight in the slot, use the plate to scrape out any support material or debris that's in the way.

Next, install the buffer tube by threading it in to the lower. Pay close attention to make sure that that tube doesn't cross-thread. If it starts cross-threading, unthread it and re-try. You shouldn't need much force to get the tube to thread in – if it's fighting you, it's probably cross-threaded.

Be gentle while threading the tube in – the arches on the lower are not structural, and are not meant to take abuse. That's what the u-bolt is for! If you do crack or damage one of the arches, that's ok – you can use a soldering iron to re-attach it after assembly is completed.

Once the tube is started, place the buffer detent and spring into their hole. Depress the detent and thread the tube in until the tube retains the detent. For rifle tubes, you'll just tighten in the tube until it bottoms out. For carbine tubes, tighten until the tube bears up on the detent, then thread the tube out until the ridge to mount stocks is straight up and down.

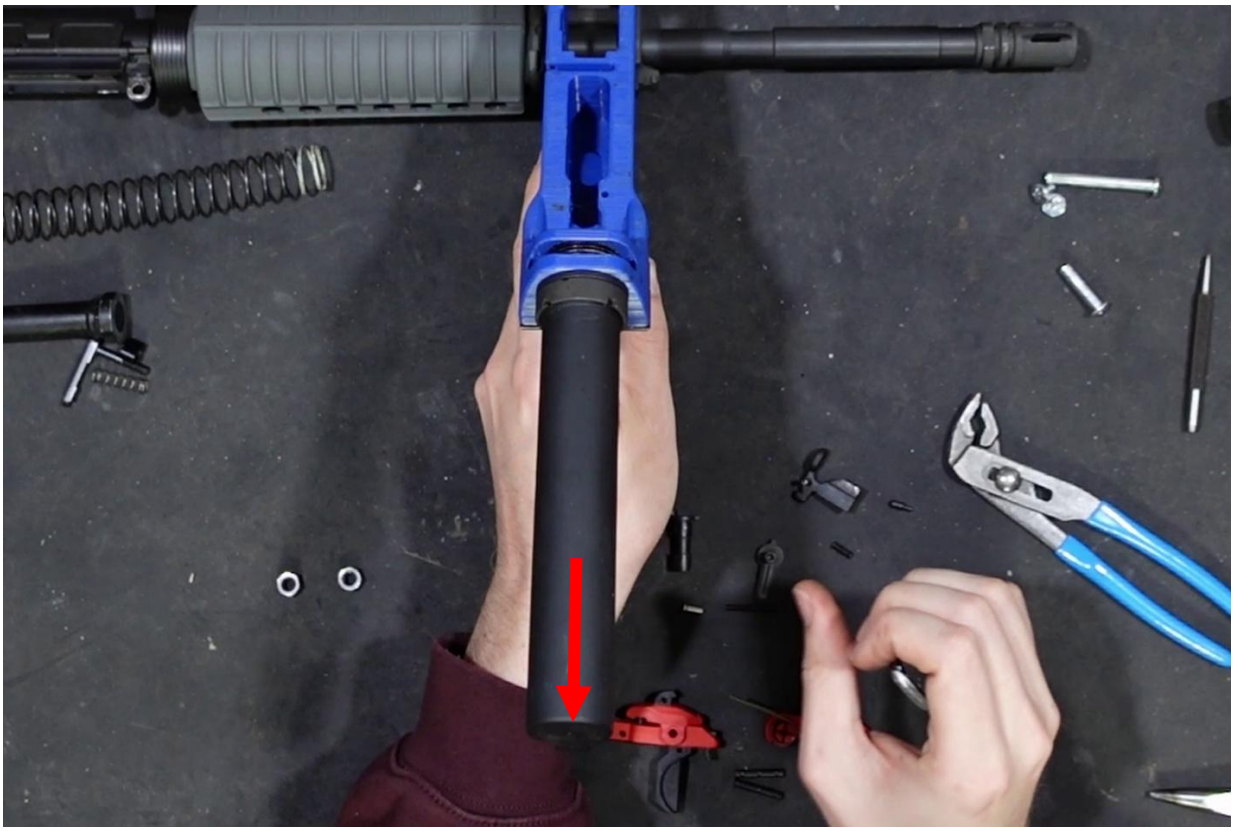
Place the retaining plate into this slot first if you're doing a UBARX build! For UBAR3 builds, you can place it later.

Thread the tube in straight. If you're doing a carbine tube, make sure that you install the castle nut and rotation plate first.

Install the buffer detent into its hole. You can do this before or after starting the tube.

Thread the tube in. Once it gets to the detent, hold the detent down.

With rifle tubes, thread them in until they bottom out. Do not tighten them beyond hand tight. With carbine tubes, tighten them until they touch the spoke on the detent, then rotate the tube backwards until the stock spine on it is vertical.



Make sure the stock spine on carbine tubes is vertical. You can hand-tighten the castle nut for now. After installing the u-bolt, you can use a castle nut wrench to get the nut tight, but you don't have to go crazy – the u-bolt will keep the stock in place.

With the tube installed, you're now ready to install the u-bolt. Place the u-bolt down from above. As described in Step 2, it should fit down around the buffer tube without much resistaince. With the u-bolt in place, not how much of the u-bolt sticks up above the top of the buffer tower – you will need to grind this material off in accordance with Step 2. DO NOT GRIND ON THE U-BOLT WHILE IT IS INSTALLED IN THE LOWER. Once you have the u-bolt sitting flush, ensure the retaining plate is in place and install the u-bolt nuts. I typically install them with loctite. Tighten the two bolts evently – a quarter turn on one, a quarter turn on the other. These nuts don't need to be extremely tight (some people have previously tightened them to the point the u-bolt starts crushing the buffer tube – that's way too tight!), but you don't want them to be too lose – the pressure from this hardware is where the strenght of your buffer tower comes from. In general, I shoot for about a full turn of the nuts past the point that they first pick up resistance.

Place the u-bolt down onto the tube

Make sure that the top of the u-bolt is ground down so that it sits flush (or slightly below) the top of the buffer tower. Refer to Step 2 for instructions on this. Do not grind on the u-bolt while it is installed in the lower!

Secure the u-bolt with the retaining plate and nuts. I recommend you put Loctite on the threads.

Finally, you can install your buffer/buffer spring and stock.

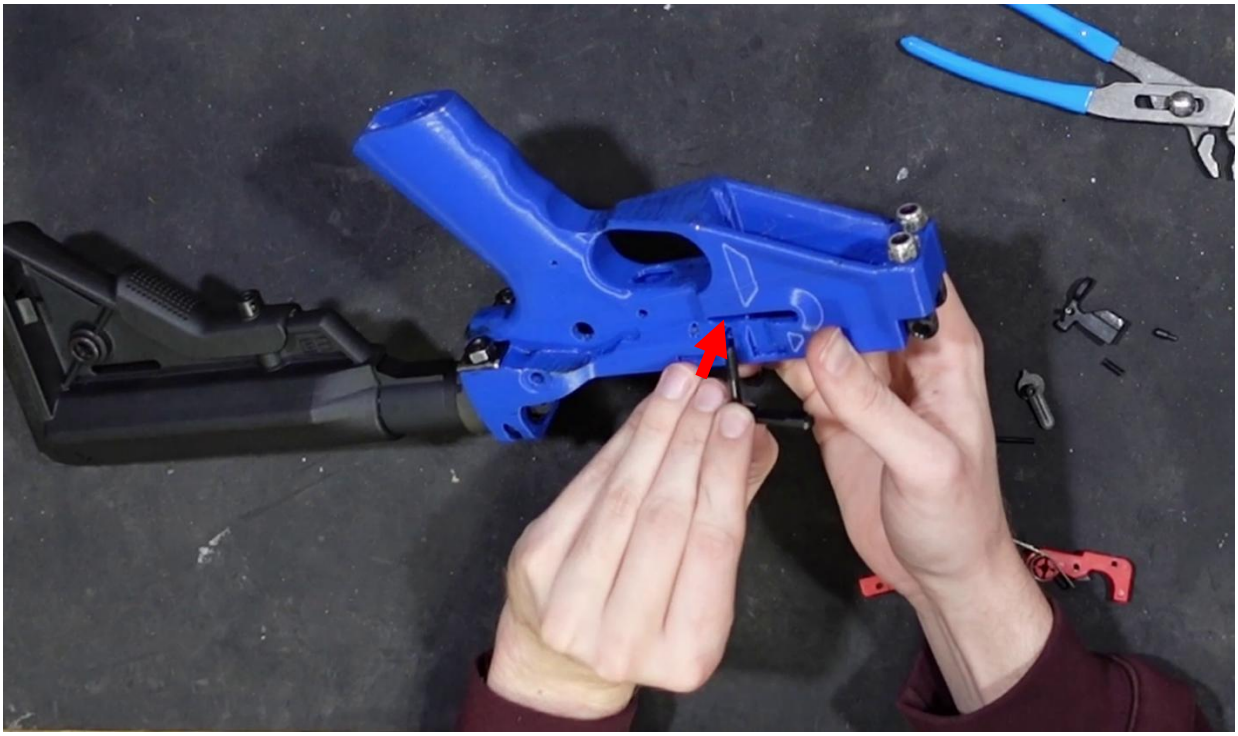
Install your buffer and spring

Install your stock. Carbine and rifle stocks install differently, of course, but either can be installed on their respective tubes now.

Step 5: Magazine Catch Install

This process is identical to a typical AR15 build. Depending on your print settings, you may need to file/scrape the recess for the magazine catch bar itself to get a good fit. Once the bar fits nicely (with minimal drag but also minimal wiggle), install it, peg first, into its hole. Then, place the magazine catch spring in from the other side of the lower. Take the magazine catch button, compress the spring with it, and push the button down into its hole. This will begin to push the catch bar out of the first side of the lower. Spin the catch bar to thread it into the button. You can use a screwdriver to help depress the button while you screw the catch bar in. I typically screw the bar in until its tip is flush with the face of the button.

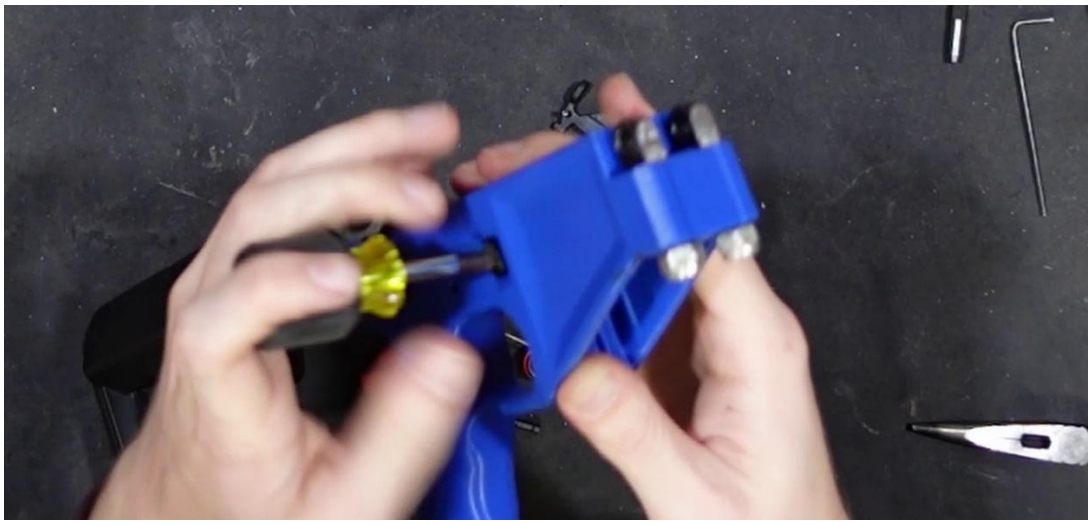
You can use the magazine catch bar itself to scrape debris/support material out from the mag catch slot in the lower.



Insert the magazine catch bar into its hole in the lower. It shouldn't have much drag between the catch bar and its slot. If it does, perform more scraping. You can also use a soldering iron or file to aid in making sure the magazine catch bar moves correctly.

Insert the magazine catch spring into the other side of the lower.

Depress the magazine catch spring using the magazine catch button.



A screwdriver can help to get the button fully depressed against the spring.

While holding the button depressed, screw the magazine catch bar into the button until the tip of the magazine catch bar is about flush with the face of the button.

With the catch assembly installed, try inserting a magazine. Make sure the catch works properly. If the magazine catch bar has too much drag, remove the parts and scrape a little more.

Step 6: Bolt Catch Install

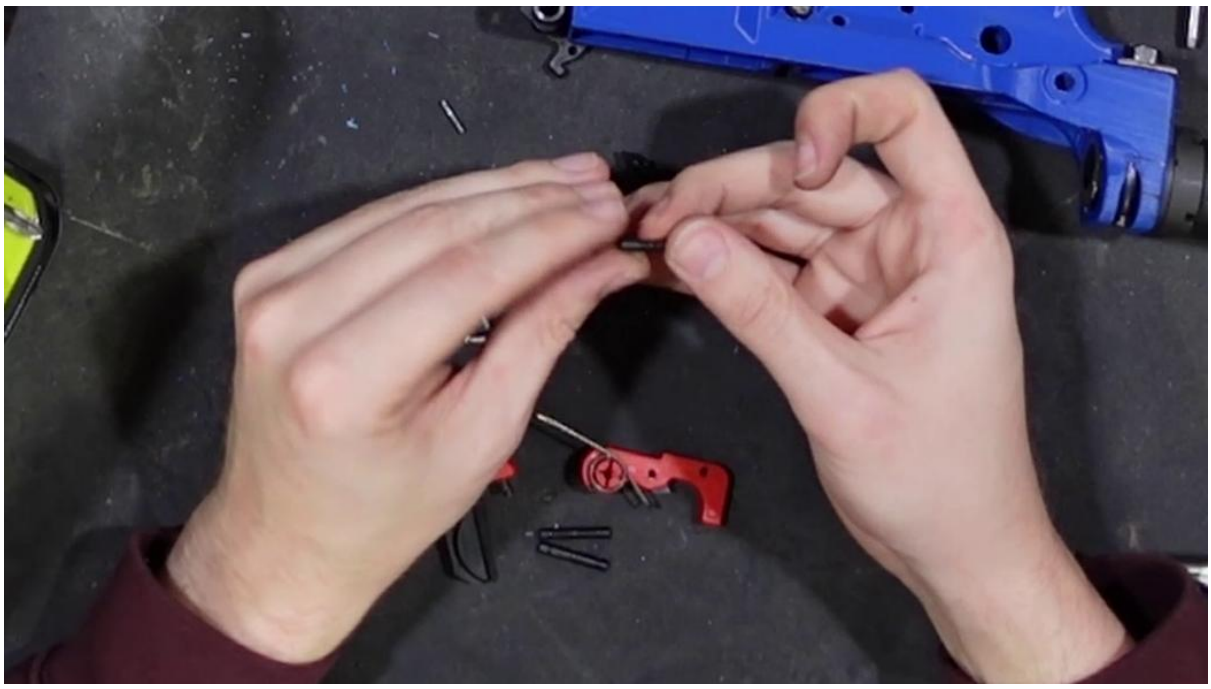
Bolt catch install is like with a standard AR15. Begin by locating your bolt catch detent, bolt catch spring, bolt catch roll pin, and bolt catch itself. Take a 5/32” drill bit, and use it to ensure that the bolt catch detent hole is free of debris. You should be able to do this by hand. If you need to clear out the hole with a drill, be careful to not drill the hole any deeper.

At this point, I recommend you take the bolt hold open and place it into its slot. Slide it back and forth to verify that it fits with minimal drag. A little friction is ok, but heavy resistance is not. You can use the bolt hold open to scrape inside of the slot to obtain a looser fit.

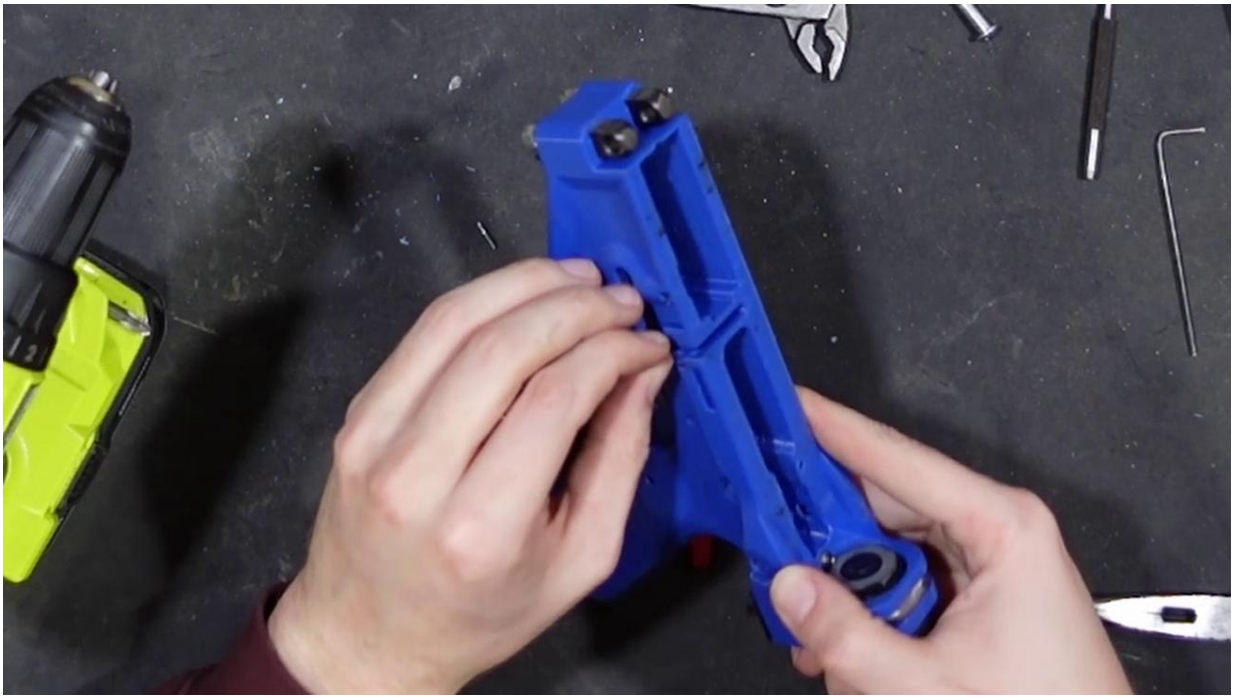
With the hole cleared out and fit of the bolt hold open verified, take your spring and detent. Install the spring first, then the detent. Next, place the bolt hold open itself into the slot on top of the spring. While compressing the spring with the bolt hold open, take the roll pin and insert it into the lower. The wall of the lower will hold the pin in the correct location, meaning you only need to push it in. You can use a screwdriver to push or a punch and hammer to accomplish this.

Use a 5/32” drill bit by hand to ensure the detent hole is clear of debris. Support material shouldn’t be present in this hole, but if it is, clear it out.

Slot the bolt catch into the lower. It should fit with minimal (or no) dragging. If it has excessive drag, scrape the slot using the bolt catch in order to loosen the fit a little.



Take the detent and spring…



And insert them into their hole

View of the installed detent and spring

Place the bolt catch down onto the detent. Place the roll pin into its trough.

One method for seating the roll pin is simply by pushing with a screwdriver.

Another option is to use a punch and hammer. It can be tricky to hold the bolt catch in place while also holding the punch and hammer. If you have trouble, you can use tape to hold the bolt catch in place while you drive the pin in.

With the roll pin seated, the bolt catch is installed. Ensure it can move freely, and that the detent properly returns the bolt catch to its lowered position. If you are worried about your roll pin backing out during firing/use, you can use a soldering iron to melt a little plastic over the back of the roll pin.

On the UBAR3 and UBARX, it is possible to remove the bolt hold open by using a punch – however, repeated removal and install may damage the hole, and should be avoided if possible.

A quick touch with a soldering iron can retain the roll pin better than just the roll pin's typical tension.

Step 7: Fire Control Group, Safety, Pistol Grip Install

For a UBAR3 build, these steps will be identical to a standard AR15 build. For the UBARX, because the pistol grip is printed integral, the install of the safety will be different.

If you are doing a UBAR3 build, make sure you have tapped your pistol grip screw hole before proceeding – refer to the FAQ if you need help understanding how to do this.

Begin by installing the trigger and disconnector, then the hammer. Cock the hammer, install the safety, then rotate the safety to the "fire" position and pull the trigger while easing the hammer forward – with the hammer down, the safety will be retained.

Install the trigger and disconnector – this process is just like on a standard AR15.

Install the hammer – again, just like a standard AR15 build.

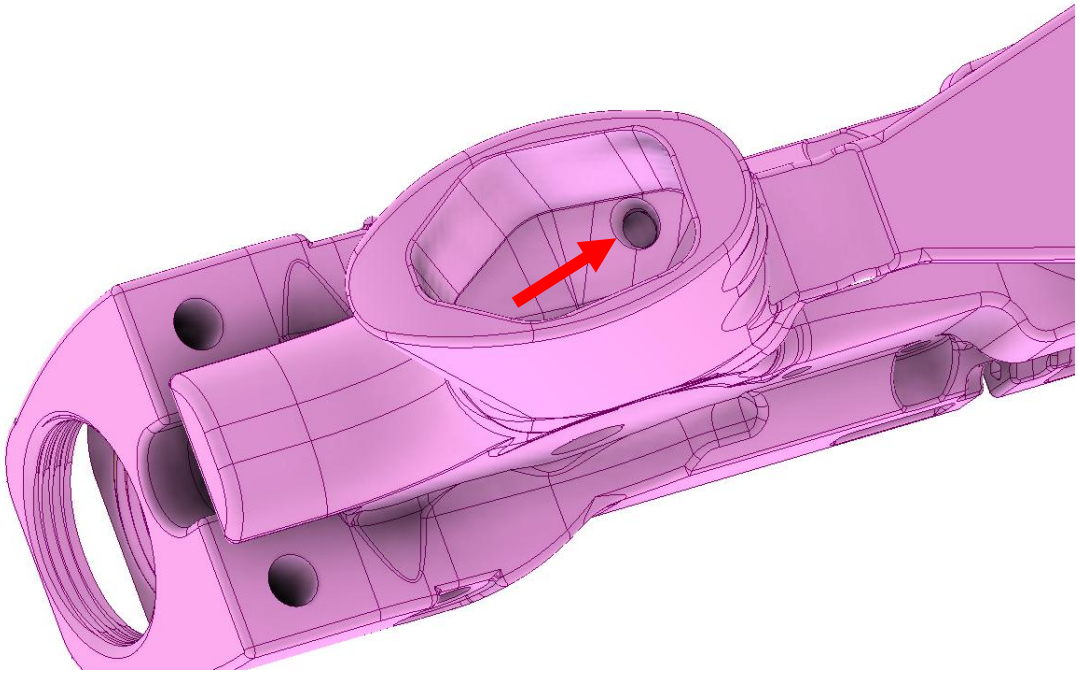
Install the safety – just like on a typical AR15 build, you'll need to cock the hammer first. After installing the safety, you can pull the trigger and ease the hammer forward by hand. This will prevent your safety from falling out during the next steps.

There are now two sets of steps to finish installing the safety – one for UBARX, one for UBAR3. Follow the section that reflects which build you are doing!

If you are doing a UBARX Build

Ensure that you have drilled down from above with your 1/8" drill bit. Ensure that the inside of the pistol grip has supports scraped out and removed. Next, you'll need to insert the safety. With the safety inserted, you'll then install the safety detent. **This can be tricky** because the UBARX has an integral grip. I recommend you use a long 3/32" Allen key (or similar tool) in addition to a tool magnetizer. Examples of these can be found in the shopping list section at the beginning of this document. If you use these recommended tools, slipping the magnetizer onto the Allen wrench will allow you to magnet the safety detent onto the end of the wrench, which makes placing the detent up into the pistol grip easy. After placing the detent, place the spring next. Finally, you'll take your 1/8" roll pin (or a 3mm screw cut to 1" overall length, or similar hardware), and while compressing the detent spring (again, the Allen key works well for this), drive the pin through to retain the spring. Function check the safety at this point (ensure it clicks correctly, doesn't bind up, etc). If you ever need to remove the safety, simply drive out the pin first.

Up inside the pistol grip hole, you'll be able to see the hole that the safety detent needs to go into.



The detent hole. Make sure to remove any support material that exists inside this area.

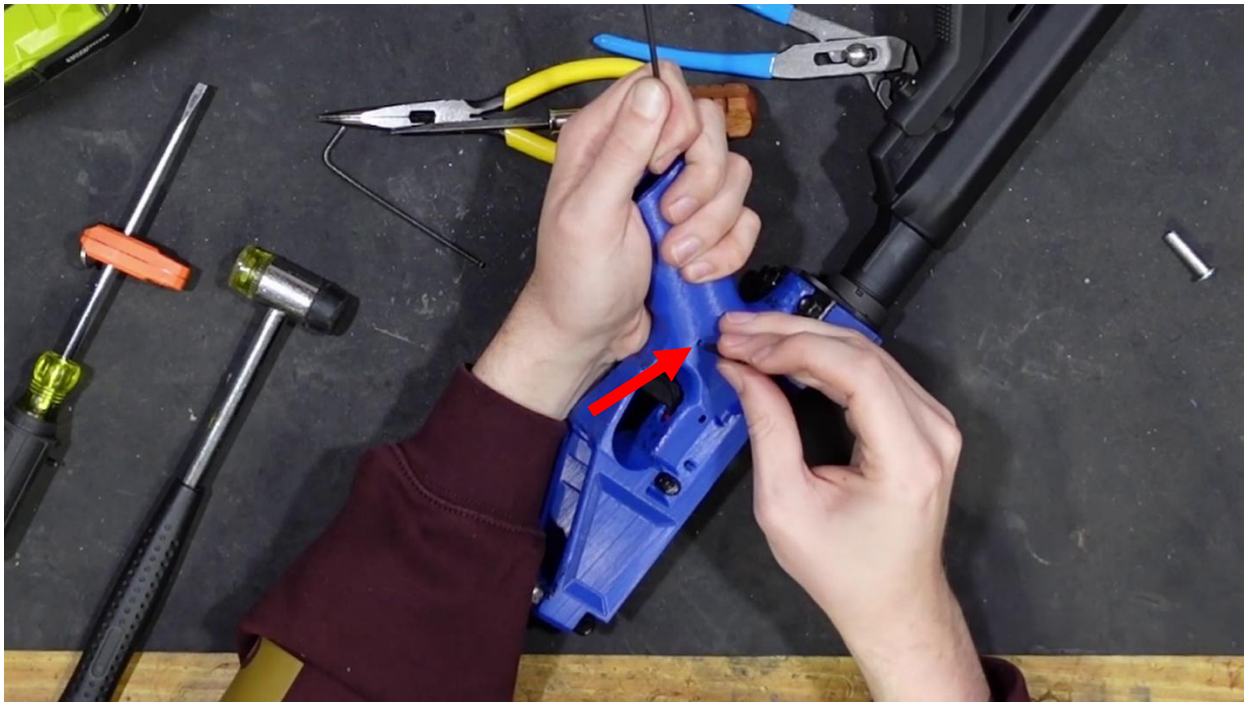
You can use whatever tools you want, but I like to use a magnetizer and either a screwdriver or a 3/32" Allen wrench to install the detent and spring. Note the detent held in place by magnetism at the tip of the screwdriver – with this setup, you can easily insert the detent.

It helps to have a flashlight handy to help see down into the hole!

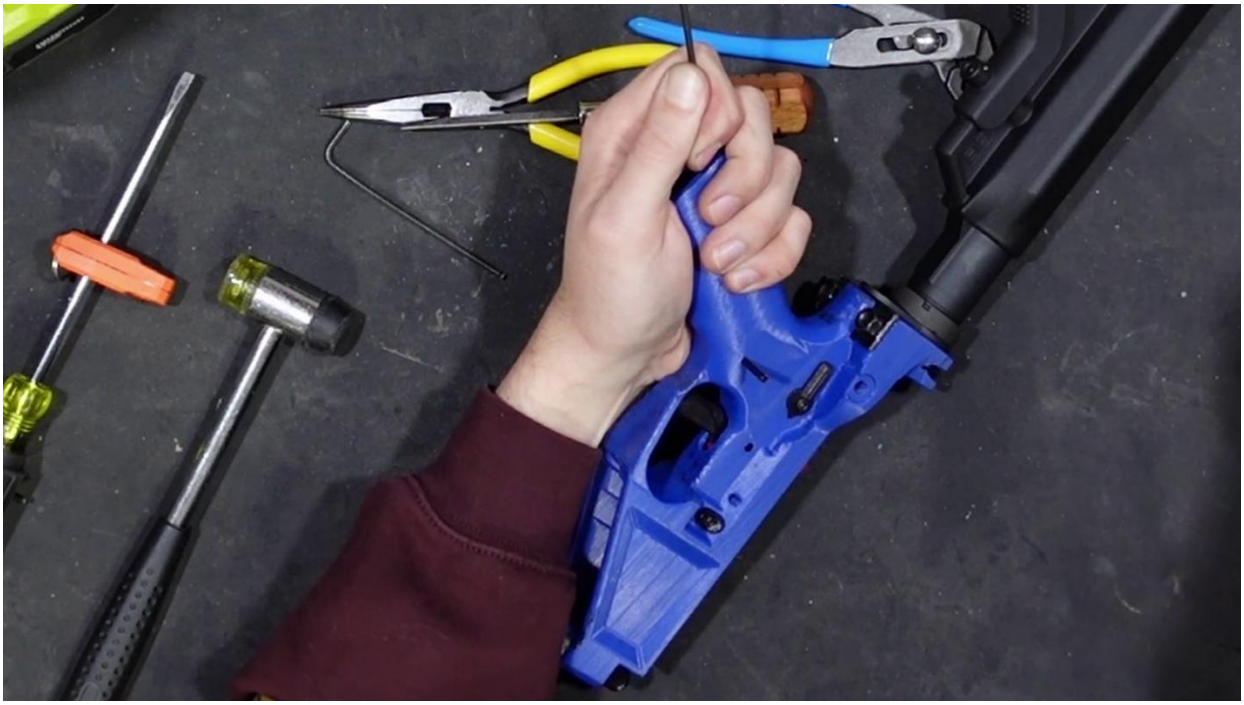
After installing the detent, install the spring. You can use the same trick as before.

After putting the spring down in the hole, you'll need a tool you can compress the spring with – a long 3/32" Allen wrench works really well.

Compress the spring…



While keeping it compressed, stick your 1/8” roll pin (or 3mm pin, or whatever hardware you plan on using) into the cross hole.



Use a hammer to install the pin. The pin will contact whatever tool you're using to depress the spring – once the pin is retaining the spring, you can remove the tool you're using depress the spring. As you remove the tool, verify that the pin is holding the spring before hammering the pin fully into place. Avoid pinching the spring with the pin, as this can damage the spring.

If you have trouble getting the pin to retain the spring, you can always use a slave pin system – take a punch that's smaller than 1/8", and while depressing the spring through the grip, stick the punch through the cross-pin hole and hold the spring down with it. Knock this punch out by driving the retaining pin in.

This process can be a little tricky at first, but with the right tools, it can get to be a quick and easy.

If you use a pin that isn't self-retaining, you will want to melt plastic over the ends of the pin to retain it. With a typical 1/8" roll pin, the pin will hold itself in place and melting will not be required.

If you are doing a UBAR3 Build

For a UBAR3 build, the install process will be just like on a typical AR15 build. If you haven't already tapped your pistol grip screw hole, you will need to remove your fire control group before you can do so. Refer to the FAQ for instructions on how to tap the hole if you don't know how.

Begin by placing the safety detent into its hole. Next, take your pistol grip, the detent spring, and your pistol grip screw. Place the spring into its hole in the pistol grip, and the pistol grip screw into its hole.

Line the grip up so that the spring pushes on the detent, then push the grip onto the lower. Use whatever tool your pistol grip requires to fasten it in place.

Insert the detent into its hole.

*With the **spring** and **screw** inserted into the pistol grip, mate the grip up with the lower.*

Make sure the spring pushes onto the detent.

Tighten up the pistol grip screw.

With the grip installed, test the function of the safety.

Step 8: Installing the Upper

Just like with a standard AR15, line up the front lug. If your upper is having trouble fitting between the eyebolts, make sure that you haven't overtightened the eyebolt nuts – the eyebolts should be loose enough to rotate at this point. Once the front lug is aligned, stick your choice of pin through. Close the rear end of the upper down onto the lower and stick the rear pin in. Finally, tighten up the nuts on the eyebolts – they don't have to be extremely tight, usually just a quarter to a half turn past the point the nuts start bearing on the plastic of the lower itself. After tightening the eyebolts, loosen the nuts just a small fraction of a turn – about 1/16 of a full rotation – in order to make sure the eyebolts won't bind up on the front lug of the upper. With this done, you should be able to pull the rear pin out and hinge the upper open far enough to remove the bolt from the upper.

And with that done, you're ready for function checks and then test fire!

Line up the front holes

Stick a pin through the front holes

Close the upper and stick the rear pin in.

Both pins installed – almost done!

Tighten up the front eyebolt nuts – about 1/4 to 1/2 turn past the point that the nuts touch the plastic of the lower itself. Back the nuts off slightly after tightening to ensure that the upper can still hinge open without excessive drag.

You're ready for function checks and test fire!

FAQ/Troubleshooting

Q: What sort of round counts should I expect? What ends up breaking?

A: Moreso than with other prints, this will depend on the quality of your print and the material used – with a solid PLA+ print, this lower should last a long time – more likely to break from hard abuse than regular use.

Q: What sort of reliability should I expect?

A: I haven't had any reliability issues – all the important geometry on this lower is mil-spec (or adjusted slightly from mil-spec to make things easier to print). Magazines, your choice in upper/parts kit, and your ammo will end up determining the reliability of your build more than anything.

Q: What can I do about the rough finish where supports were touching the lower?

A: If the few places this happens bothers you, you can use a soldering iron to melt these areas smooth.

Q: Why can't I get the upper on? Why won't the pin holes align?

A: Two things – first, note that the rear pin hole in the upper is oblong – as a result, it might look like the front pin hole isn't lining up, when in reality you just need to push the upper towards the butt of the rifle after inserting the rear takedown pin. Secondly, if you don't clearance the top of the rod ends, some uppers will contact the rod ends and will be unable to sit flat on the lower. If your pin holes still don't line up, your issue lies in your printer calibration.

Q: What parts work?

A: Refer to the shopping list – but in general, any AR15-compatible upper should work on this lower.

Q: What mags work?

A: I like PMAGs. I have tested with many different sorts of magazines, and haven't noticed any lower-specific issues.

Q: Why the cross-pin spring retention for the safety?

A: I tried several different methods for this over the couple years the UBARX was in development – I wanted a solution that didn't rely on cutting threads into plastic, and also wanted one that would provide the strongest solution. My testing lead me to this solution.

Q: I'm having short stroking/hard charging issues – what's the problem?

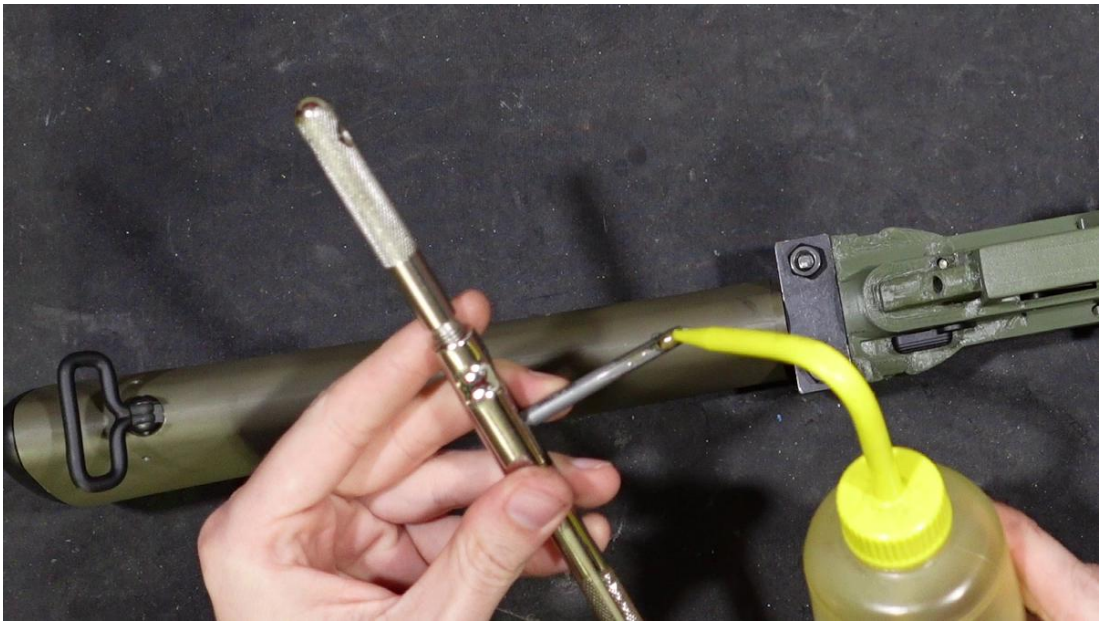
A: I've seen a few UBAR builds over the years that had buffer tubes installed slightly crooked – this can cause excessive drag when charging, which also means short stroking when firing can result. Typically, these issues seem to result from a u-bolt that isn't tightened enough. However, a cross-threaded tube or improperly clearanced ubolt (refer back to the instructions on fitting the u-bolt!) can also cause these issues.

Q: How do I tap the pistol grip screw threads for the UBAR3?

A: This is a simple process. Before you begin, make sure your stock is removed if you're already installed it. Take your 7/32" drill bit, 1/4-28 tap, and your tap handle. Drill the pistol grip screw hole out with the 7/32" drill bit. Take your 1/4-28 tap and place a little oil on it (for tapping in plastic, motor oil or gun oil is fine if you don't have tapping oil – we care more about friction reduction than heat absorption). Line the tap up square to the hole, and spin the tap in until you feel it begin to cut. Go one full turn forward, then 1/4 turn back. Then, go 1/2 turn forward, then 1/4 turn back. Repeat this 1/2 forward, 1/4 back until the hole is fully threaded. Finally, unscrew the tap completely. Note that the tap may be very hot after cutting threads!

Begin by drilling out the hole with a 7/32" drill bit – this is an important step, as some taps won't cut plastic efficiently. We want a nice, round hold to cut threads into.

Drill as straight as you can.



A little oil on the tap will help a lot – motor oil, gun oil, or proper tapping oil will all work for this application.

Start the tap as straight as you can. Once you feel the tap start to bite, go one full rotation past that point, then back the tap off 1/4 turn.

Proceed to go 1/2 turn in, 1/4 turn out, and repeat until the tip of the tap is through into the inside pocket of the lower.

Remember, once the threads are cut, you will want to back your tap all the way out of the lower. The heat built up in the tap from cutting can begin to soften a lower printed in PLA – if you run the tap in, then back out, everything will be fine. If you let the tap sit and transfer its heat into the lower, you risk damaging the threads you just cut as you screw the tap back out.

The benefits of having tapped threads are twofold – firstly, the chances of cross-threading or otherwise messing up the angle when threading your pistol grip screw in are minimized. Secondly, the threads you cut this way will ensure that your pistol grip screw bears up evenly and completely on the threads – which reduces the chance for threads to pull out or strip off.

Metal threadbearing inserts are another option, and while I experimented with them quite a bit, I found that they end up weakening the lower itself too much – the threads aren't actually the weak part, it's where the "fin" section that the grips mount to meets up with the "bottom deck" of the lower. Thus, having a metal part to reinforce the threads necessarily weakens the already weakest point on the lower.

This is why I went and made the UBARX – while the downside is the grip becomes "like it or love it" (you have no choice of other grips), the lower itself becomes much stronger.