



POLYMER80

Universal Jig Instructions

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If your questions can't be answered here, call support at 1-800-517-1243 or email support@polymer80.com

Contents

Warnings!! – Issues that impact warranty coverage!!	2
Key Parts List.....	2
Universal Jig Product Description	2
RJ556U Images.....	Error! Bookmark not defined.
Methods to Finish the Lower Receiver	3
Drill Press vs. Milling Machine	3
Example Tools and Usage Notes.....	5
Jig Hole Descriptions & Purpose	6
Getting Familiar with the Jig and Lower Receiver	7
Miscellaneous Views of the RJ556U – Polymer80 Universal Jig	9
Procedure:.....	12
Tips & Tricks to Help in Final Assembly and Testing.....	14



Warnings!! – Issues that impact warranty coverage!!

Polymer80, Inc. stands by our product and offers an excellent no-hassle warranty coverage. However, there are limits to coverage, particularly when the customer damages the product through poor craftsmanship or control during the milling process. Additionally, after the milling is completed, the build process seems to be where most people get into trouble, particularly during assembly and cleaning. Here are some key areas that you need to watch for:

1. Chemicals: Generally, you do not need to lubricate polymer products. Basic gun oils are acceptable.
2. Do not utilize brake cleaner (it contains Acetone) or rust penetrants. They penetrate through polymer, similar to how they penetrate into metal.
3. **Do not put Acetone on polymer products.** Acetone will generally instantly destroy, tarnish, or weaken any polymer-based product.

Key Parts List

Part Description	ITEM	Qty per Lower
Universal Jig (right and left sides)	RJ556U	1 Set
Trigger Guides	BD-TriggerGuide	3
9mm HSS End Mill	P80-UnivEndMill	1
5/16 drill bit		1
3/8 drill bit		1
5/32 drill bit		1
P80 Sticker	P80-BumperSticker	1

Universal Jig Product Description

The RJ556U (Rifle Jig for 556/AR15 Lowers, Universal) or Universal Jig System is designed to fit 80% AR15 lower receivers. The Universal Jig is manufactured utilizing a long-fiber nylon composite material that achieves high rigidity. We also manufacture an ABS version of this product to be used as part of our kit sales, where our AR15 lower receivers and jig system are sold together. The ABS version is a single-use product, and the instructions for use of that product with our AR15 Lowers can be found on the How-To section of our website.

The product we're describing and using for these instructions is the *long fiber composite* version, generally sold separately. If carefully used, this will allow the customer to utilize the jig up to 3 times. This low-cost jig is the perfect alternative to the expensive and more complicated metal jigs, especially if you're just planning to build only a few AR15 lowers.

The jig is designed to provide a stable platform for milling, and therefore encompasses the entire AR15 lower receiver. Other competing jigs are more difficult to secure the lower in the vise and more likely to damage the lower receiver while milling.

To utilize the Universal Jig Kit, you'll need the following items (included in the kit):

- 2 sided jig
- 3 trigger guides
- 9mm HSS end mill
- 5/16 drill bit
- 3/8 drill bit
- 5/32 drill bit



Methods to Finish the Lower Receiver

The goal of finishing the lower receiver is to mill out the fire control pocket area, utilizing the jig as your guide. These instructions will guide you through the process of removing this material, utilizing the Universal Jig. Note that the instructions are applicable to nearly every AR15 lower receiver that will fit within our Jig System, which is designed to be utilized across the largest range of lowers available in the market place. In the rare case that the lower doesn't fit properly (example: the magwell on the lower is slightly too large), then examine the jig carefully and remove impeding material from the jig using a Dremel tool so the lower can be seated properly.

Generally, there are several techniques that a user can utilize to finish a Polymer80 lower receiver. In general, we're going to focus on utilizing a drill press, because a drill press combined with a cross vise creates superior results. Cross vises and drill presses are generally easy to utilize and configure, and they are affordable. Many people have drill presses already in their garage or shop; so you may be able to borrow one, if necessary. We won't go into much detail for those who have milling machines; the assumption is that a user at this level already possesses a strong sense of how to complete the milling process.

Drill Press vs. Milling Machine



Figure 1 Drill Press



Figure 2 Milling Machine

Drill Presses are generally less expensive tools, and they don't feature tables that move left to right (during operation). A milling machine has a table (or milling platform) that moves left to right, forward and back, and is therefore more superior in terms of milling accuracy, which results in a far more expensive device.

We'll utilize a cross vise mounted on our drill press instead of a milling machine due to its affordability, and many of our customers utilize this methodology in lieu of an expensive milling machine.

Regardless of the chosen tool, we've provided exact measurements for all techniques; because even a person using the milling machine will need the depths to properly configure the machine. Different techniques will yield different qualities of finish. Utilize this grid based on desired end results and your own personal access to the tools available. In all cases, use the jig and drill bits and always level the jig in your vise:

Type of Finish	Tools Required
Excellent (recommended)	Drill press with vise, bench vise and basic tools like a Dremel tool and hand drill
Highest Quality (recommended)	Milling Machine, a hand held drill and bench vise for the pin holes.

Use a Dremel tool to do fine tuning after utilizing the Drill Press or Milling Machine. The challenge with the Dremel is to shave off small amounts; do not rush through the process. Use a cutter such as the 9904 cutter, link provided below. Do not attempt to utilize a Dremel tool as an alternative to mill out your lower, because the jig defines the angles, widths and depths to finish the product properly.

[http://www.dremel.com/en-us/Accessories/Pages/ProductDetail.aspx?pid=9904.](http://www.dremel.com/en-us/Accessories/Pages/ProductDetail.aspx?pid=9904)



Example Tools and Usage Notes

For these projects, extremely expensive or high-end tools are not required. All of these tools can be utilized for each Polymer80 receiver project that you will finish, including .308 Lower Receivers and Pistol Frames, so it's easy to justify the expense!

Example Tools	Web Link	Notes
Vise For Drill Press	http://www.northerntool.com/shop/tools/category/hand-tools+vises-clamps+drill-press-vises	It is best to find a vise that has 6" inch jaws, which will provide a wider grip on the jig and reduce vibration.
Drill Press	http://www.harborfreight.com/catalogsearch/result?q=drill+press	The speed for a drill press should be set to approximately 1850-2250 RPM.
Digital Calipers	http://www.harborfreight.com/6-in-digital-caliper-with-sae-and-metric-fractional-readings-68304.html or from MSC Industrial: Ironton 6" Calipers http://www.northerntool.com/shop/tools/product_200629284_200629284	Find calipers that convert ALL THREE conventions: Metric, Decimal and Fractions. Most calipers only do 2, mm and decimal. It's difficult to convert to fractions then, but it is necessary. If possible, let the calipers do the work for you.
Dremel Bit #9904	http://www.dremel.com/en-us/Accessories/Pages/ProductDetail.aspx?pid=9904	Use for minor clean up but be careful...these tools chew up Glass Filled Nylon very quickly. Remember, Dremels = WLDF(Whole Lotta Damage Fast!)
Level	http://www.northerntool.com/shop/tools/product_200309003_200309003	Utilize a small level to ensure you are drilling straight down and square to the jig.
Round machinists file	http://www.harborfreight.com/12-in-file-set-5-pc-60368.html	Look for the round machinist files, diameter .303 for fine tuning safety and takedown pin holes if necessary. Zoro Tools or Harbor Freight will have inexpensive sets or single units available for under \$7.
Non-marring vice jaws	http://www.homedepot.com/p/BESSEY-Non-Marring-Vise-Jaw-Accessory-for-Use-on-Vises-with-Jaws-from-3-in-to-6-in-Wide-BV-NVJ/204986223?MERCH=REC--PIPHorizontal1_rr--207008054--204986223--N	Bessey brand contains magnets so they adhere very well to vice jaws, but you can use these to prevent getting the vice jaws from marring your gun parts.
Lower Receiver Vice Block	Search for these on our website	
Upper Receiver Vice Block	Search for these on our website.	



Jig Hole Descriptions & Purpose

Jig Hole	Function	Depth from top of Jig to floor of Fire Control Pocket	Depth from top of Receiver to floor of Fire Control Pocket
Hole #1	Mills out the upper platform section that divides the fire control pocket from the rear take down pin area.	45mm to 45.5mm	(use the floor of the rear take down pin area as the guide)
Hole #2	This hole opens up a pocket for the rear side of the trigger mechanism. Ignore this hole, go back only as far as you need to on Hole #1, and leave a 2-3mm wall between Hole #1 and the Rear Take Down Pin pocket.	45mm to 45.5mm	1.25in
Fire Control Pocket	The fire control pocket is the larger area to be milled out.	45mm to 45.5mm	1.25in
Trigger Hole	Drilling this hole opens up the trigger hole. This is one of the first steps using the 5/16ths drill bit.	Drilled through completely	Drilled through completely

Note how the jig with the End Mill bit set at 45.5mm creates a consistent drilling depth. Just move the drill press table up or down to position properly as you move from holes 1&2 to the Fire Control Pocket.

Many hardware stores have fairly inexpensive drill presses (Lowes, Home Depot, Harbor Freight, Granger, etc.).

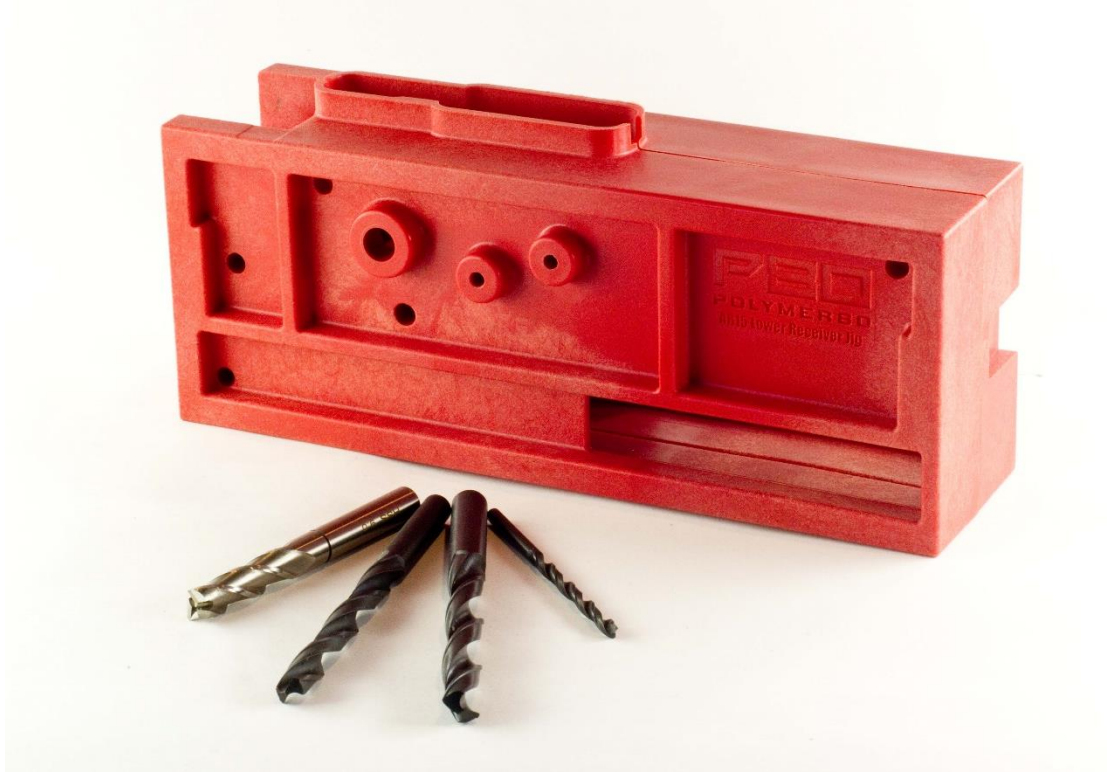


Getting Familiar with the Jig and Lower Receiver

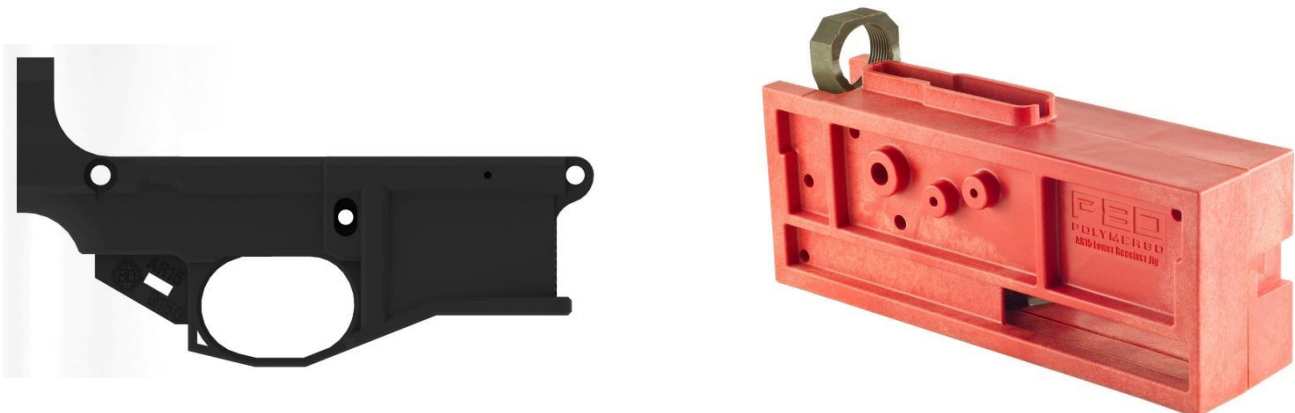
The goal of finishing the lower receiver is to mill out the fire control pocket of the receiver to the proper depth, and to utilize the jig to achieve correct placement on the side holes (trigger, hammer and safety holes). The solid core fills the entire fire control pocket.

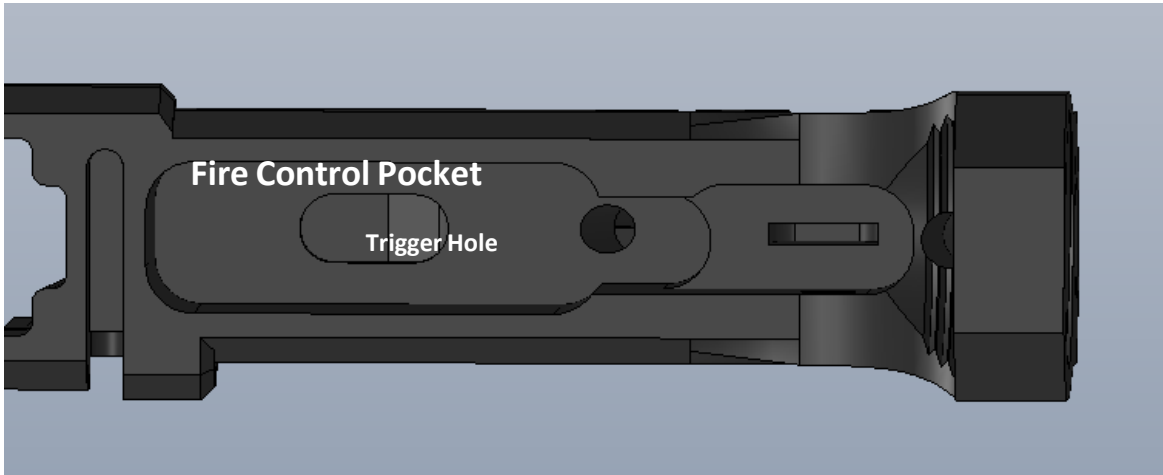
It's important to note the features of the jig and the lower before you start working on the unit.

The RJ556U – Universal Jig pictured with the drill bits and end mill

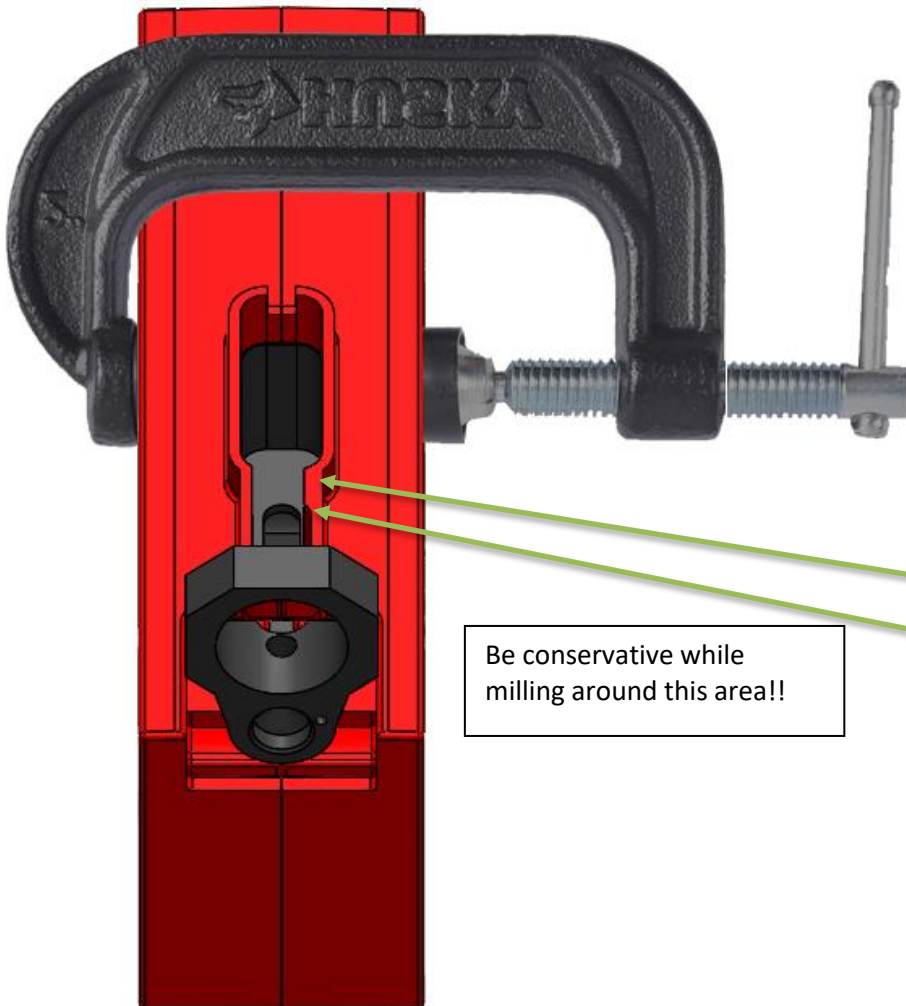


Side View of the Polymer80, 80% Lower Receiver, G150 Phoenix Version (not included with the Kit) and the UJig with the lower receiver inserted





IMPORTANT

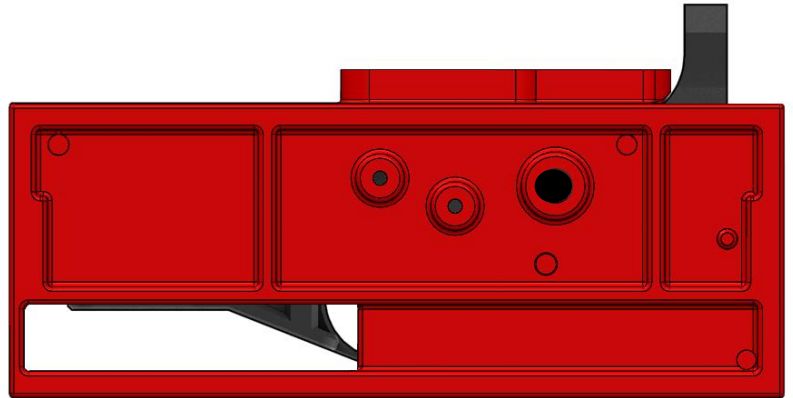
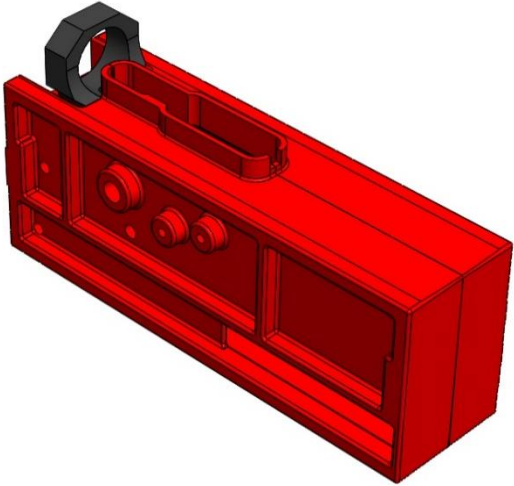


Note the area of the jig that is **off-centered slightly (indicated by the green arrows)**. Below this area is where the safety selector detent and spring hole are located. You can see the hole from underneath the receiver where the pistol grip is attached. This area is extremely close to the edge where you will be milling the interior.

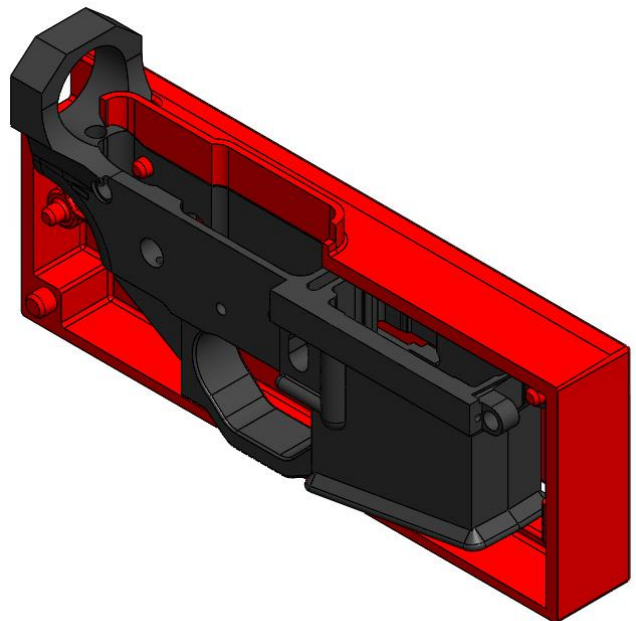
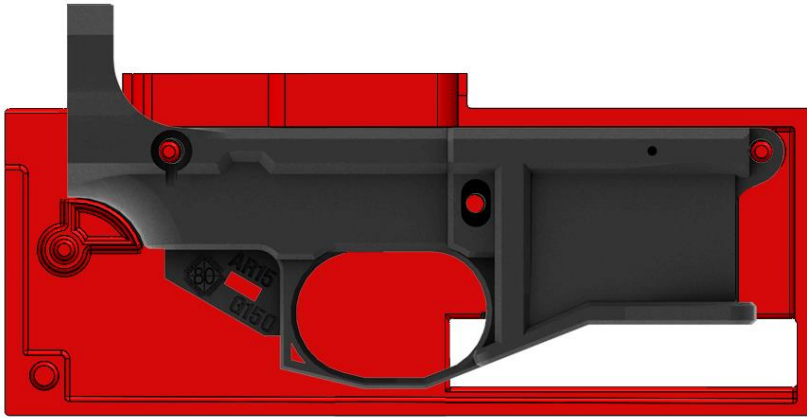
Do not put extensive milling pressure against this side of the jig in this area. Use a C-Clamp to keep things tight across the top to prevent over extending. If you expose the safety detent & spring hole, the lower receiver will not operate properly.



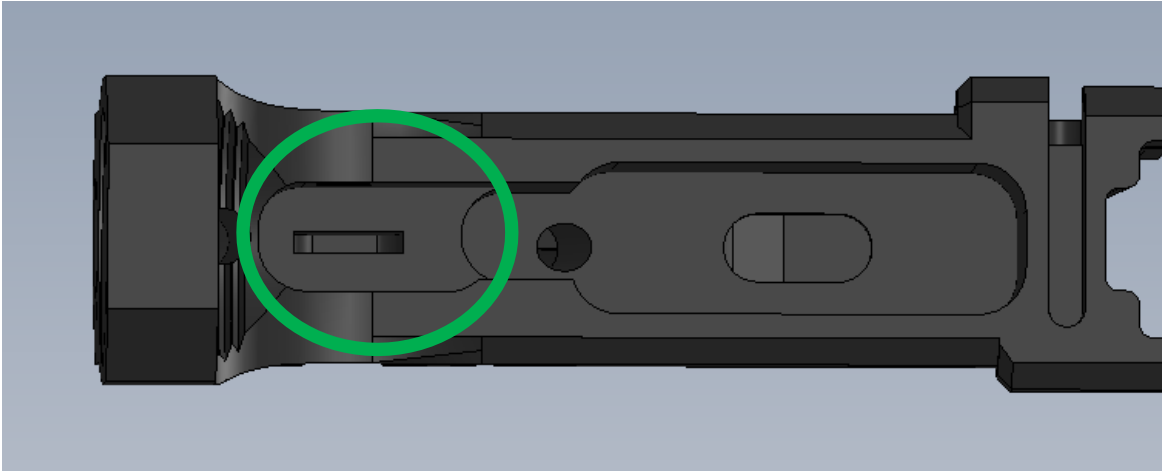
Miscellaneous Views of the RJ556U – Polymer80 Universal Jig



You'll drill the 3 side holes on each side separately
Do not attempt to drill all the way through to the other side.



Looking Down into an example FINISHED Fire Control Pocket

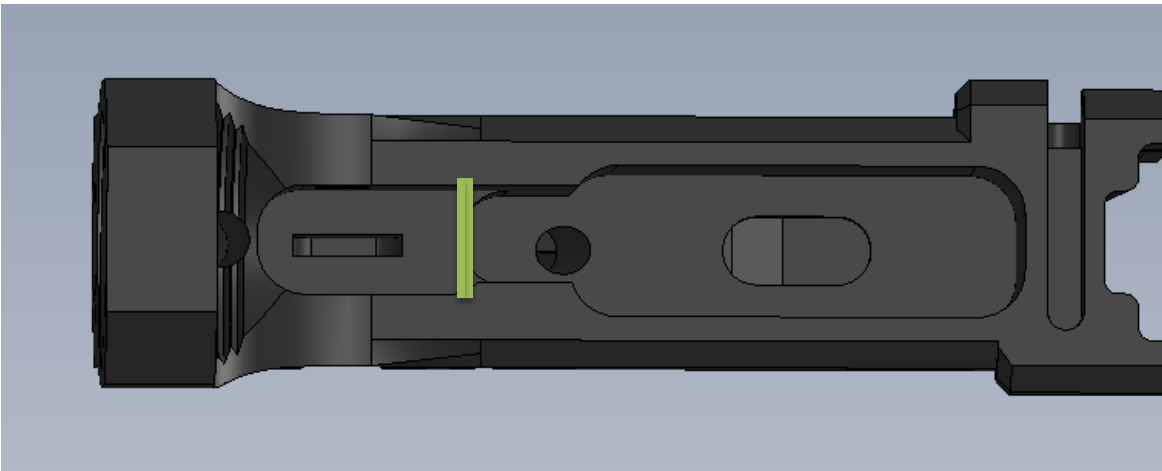


This area near the rear of the Fire Control Pocket is higher or stepped up (for the Rear Take Down Pin Boss that's on the Upper Receiver) compared to the fire control pocket. If you have a finished lower receiver from a previous gun, it might be helpful to compare. You don't need to mill the stepped up area at all, it's completed for you on the Polymer80, 80% Lower.

TIP:

Optional: YOU MAY LEAVE A SMALL 2 TO 3MM WALL BETWEEN THE FIRE CONTROL POCKET AND THE STEPPED UP ARE OF THE TAKE DOWN PIN AREA.

The green area below indicates where you can leave a few mm or more of material. Take a black sharpie and mark the top of the JIG to indicate where to stop milling (You can do this now prior to proceeding if you choose this option)



Preparation (For use with a Drill Press)

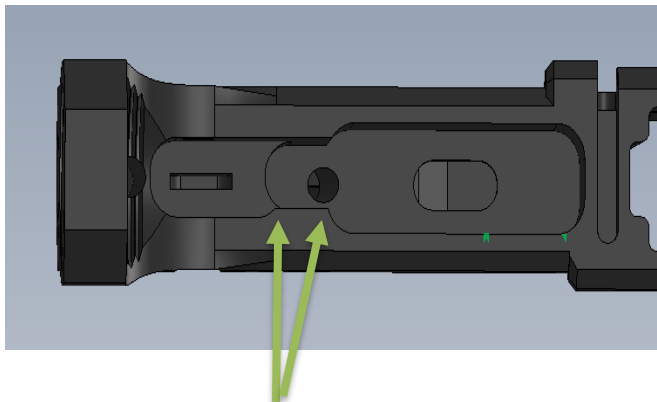
1. Prep the drill press. When using a drill press, the spinning head of the drill press needs to be firmly attached by slamming it with a mallet up into the press, or the vibration of the procedure below can sometimes make the entire head fall out (spinning and ruining things in the process). Take any drill bits out and use a mallet to hit upwards to securely implant the head.
2. Level: Must have a level to create a level interior fire control pocket
3. The end mill slide vise on the drill press (a link is provided above) is the absolute fastest and most secure way to finish this part. Using a tool like this as opposed to just using a Dremel tool, you're going to be done much sooner with outstanding results. We utilize the slide vise in various ways around the shop, it's great tool that can be mounted on the drill press table directly, or on your bench underneath a smaller bench drill press and utilized for many other projects.
4. Final Mental Prep: Building a firearm takes craftsmanship and pride, **so don't be in a hurry!** Slow down and work precisely and methodically **Measuring Twice and Cutting Once!!** After you drill something out, you can't put it back, so approach things conservatively. In my personal experience, if I'm feeling like I have no patience, I just stop. I'll put the tools down and walk away from the bench and go take care of whatever caused me to be in a hurry in the first place. This sounds simple, but I've destroyed too many things in the past from my lack of patience; and if you do it on this part, it's going to cost much more time and money (and yes, I have ruined some lowers).

Again, YOU NEED TO SET THE DRILL PRESS DEPTH PROPERLY. The end mill is marked at 45.5mm with a black line. Don't rely on the drill press depth stop 100%, utilize the drill stop while also watching the black line on the end mill to make sure you don't go too deep. "Measure twice, cut once!" In other words, keep checking the depth at every drill point.



Procedure:

1. Put the Lower Receiver in the Jig and snap them together. Set the small red trigger guide aside for the moment.
2. The first step is to drill the side pin holes (Hammer, Trigger and Safety Selector Switch Holes) using the lower receiver in the Jig. Drill a ¼ inch into each side, **BUT DON'T ATTEMPT TO DRILL ALL THE WAY THROUGH – THE DRILL BIT WILL DRIFT AND FAIL TO PENETRATE THE OTHER SIDE IN THE CORRECT LOCATION.**
 - Put the jig & lower in a regular vise on your bench, select the proper bits provided and **drill on one side only**. Then, flip the jig around in the vise, and drill the holes on the opposite side.
 - **DON'T try to drill through both sides at one time. THE BIT WILL DRIFT AND MISS THE TARGET ON THE OTHER END!!**
 - These holes have to be precise. Start the drill full speed with the proper drill bit sizes designated on the side of the Jig, feed it into the hole steady and square with the Jig, drill into the lower material only a 1/4" to penetrate through the side wall. Later, once you finish milling the interior pocket, the holes will have already been completed.
3. There's a slight but **IMPORTANT** indentation that you can't mill out because the safety selector DETENT hole is drilled through this area underneath the lower (near where the pistol grip goes).

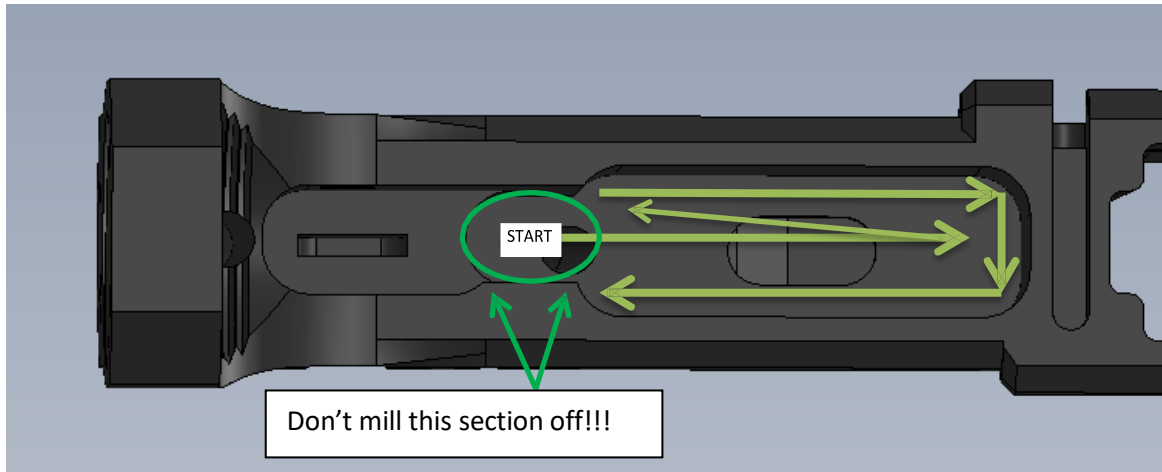


NOTE THE SLIGHT INDENTATION, DON'T MILL THIS OFF

4. **Drilling the Fire Control Pocket:** Insert the End Mill on the drill press. Put the jig and lower combined in the cross vise and tighten it down on the drill press table. Adjust TABLE of the drill press so that the tip of the end mill is exactly even with the top of the jig (bend down and look closely, sometimes as you tighten the drill press table, it drifts up). Side Note: The table that the vise is on or attached to must also be tightened (example: The tables for the floor drill press must be tightened on the rear tightening knob or they can move). **Crank it down hard!!**
5. Adjust the drill press stop to 45.5mm. Notice that the end mill also has a black mark that indicates 45.5mm depth when the receiver is sitting in the Jig.
6. Adjust drill press RPMs to approx. 1850 to 2250 RPMs
7. **Drill down into the fire control pocket using a plunging action with the End Mill:** Go exactly 45.5mm down watching the top of the jig and end mill bit, don't allow the black line on the end mill bit to go below the top of the jig. During each and every drill procedure visually checking to make sure the bit is not sliding up or down within the drill press chuck. Again, the bit starting position is dead-even with the top of the jig, as you plunge watch the black line on the bit, not allowing it to go deeper than the top of the jig.
 - Take advantage of the End Mill and clean out the pocket floor and sides slowly moving along the edge to create a smooth side wall on both sides.
 - Use **drilling procedures** to clear out the majority of the core section by plunging and lifting the press

head up, move to the next section, and plunge down again until you clear out the majority of the interior section. Once this is complete, we'll switch to using a **milling procedure** (leave the head down in the pocket and move the jig/lower in the vise to smooth the edges and floor if you are using a cross slide vise).

- Once the fire control pocket and hole #1 are done, you can start going straight across into the wider fire control pocket area to clear smooth out the floor and side walls to refine or smooth them out. It's important to start clearing out the hole from debris so you can see what you are doing. A bright light and a shop vacuum are useful. Figure 3 shows you the technique and pattern you should follow while plunging and milling.



- It's important to note that the drill bit in a drill press is spinning in a clock-wise direction towards you, from right to left. **ASSUMING YOU ARE USING A CROSS SLIDE VISE** therefore, when moving the jig underneath in the slide vise, follow the path pictured in the above image to prevent the bit from jumping and chattering. You will work against the grain in one sense, rather than allowing the bit to grab and run.
- Start at the rear side in the pocket where the safety selector switch goes through. Move straight down the middle, then go back and start on the right side, swinging around the edge, and then back towards the rear of the fire control pocket.
- Each time you go through this process, FOLLOW THE PATH IN FIGURE 3.**
- Once you finish the interior milling of the Fire Control Pocket, now is the time to use the trigger guide and drill the hole for your trigger.
- Start by taping the small red Trigger Hole Guide into its slot so it doesn't move while you drill the trigger hole.
 - Go to the drill press and drill the trigger hole using the 5/16ths drill bit.
 - Drill down slowly and let the drill bit do the work, but don't go so deep that your TRIGGER GUARD gets drilled.
 - Don't allow the drill bit to float sideways out of alignment of the final pass-through point under the receiver.
 - Clean out the trigger hole with a small Dremel. I've used a cutting bit such as the #9904 at the LOWEST SPEED to clean up areas like the trigger hole and the side walls as I fit the trigger assembly in place. 9904 cutter hyperlink: <http://www.dremel.com/en-us/Accessories/Pages/ProductDetail.aspx?pid=9904>
- Final step is to start the trigger fitting: In **Figure 4**, there are 3 general areas that you'll focus on (besides the trigger hole itself). The trigger should just drop straight down in there cleanly, but it may require some additional fine tuning. **Using the Dremel bit on the slowest setting**, carefully and slowly trim surfaces to make sure the trigger operates smoothly. The rear section on the left side of the below figure is where you need to be careful not to penetrate too far on the wall; because the safety selector switch **detent and spring** are very close to this area, and there is very little room for error.

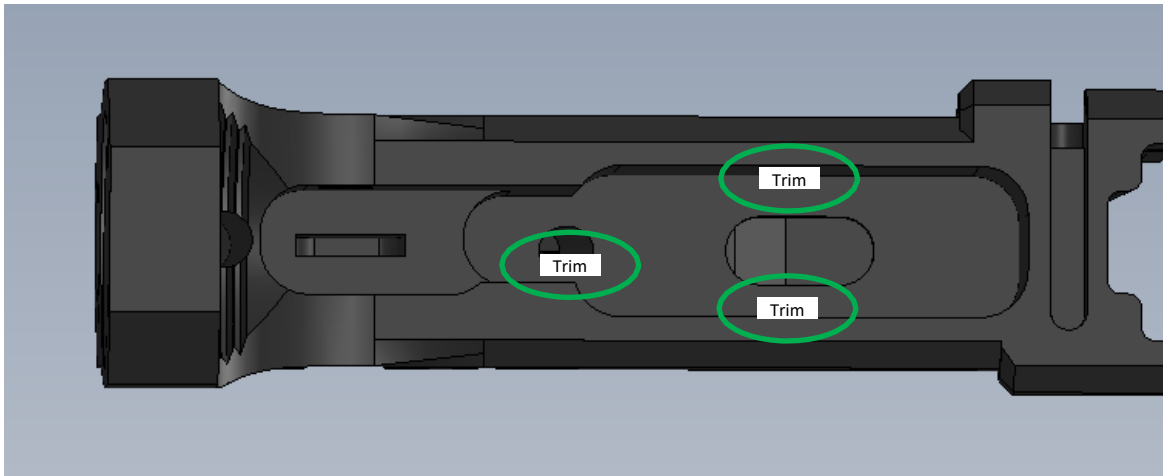


Figure 4

Tips & Tricks to Help in Final Assembly and Testing

1. The depth of the fire control pocket should be precisely 1.25 inches from top of receiver.
2. If you experience difficulty while installing the trigger due to misalignment of the pin holes, you might consider several inspections, modifications, or troubleshooting in the following order:
 1. 90% of the issues on trigger assembly are related to the floor of the fire control pocket not being milled deep enough, and therefore the trigger has no room to move even though it might install. The depth of the fire control pocket should be precisely 1.25 inches from top of receiver.
 2. Make sure the trigger hole is vacated of any material that prevents proper movement.
 3. Make sure the rear of the trigger is not rubbing against that odd offset wall (in the rear right) that houses the safety selector switch detent.
 4. Take a very slight additional amount from the floor of the fire control pocket with the end mill. Go back to the vise and drill press and remove several hundredths of an inch off then retry fitting the trigger .
3. After you install the trigger and hammer, the trigger should release the hammer properly and smoothly.
4. At the front side of the fire control pocket, there's very little room in the original mil-spec design between what I've dubbed the firewall and the mag release button housing. If you see exposure to that area after you drill, don't be alarmed. There's very little material there by mil-spec design, and this will not impact performance of the firearm.
5. The buffer tube housing has been designed to be snug so no movement is allowed. For those extra tight fits, Teflon wrap rather than oil makes the buffer tube go in easier.

Any further questions, feel free to email us at our support email address or call:

800-517-1243

support@polymer80.com