

FIREBOLT



Released: 12/2/20

Version: 3.0

Acknowledgements

Thank you to the beta team at Det_Dispatch that spent multiple months with me ironing out the kinks, giving feedback, and proposing ideas that lead to the current generation of the Firebolt. Your help was greatly appreciated, and I would have never developed this as far as I did without the teams help. Big shoutout to Timbrewslice for sidetracking his own project to adapt his buffer system exclusively to the Firebolt. Another shoutout to Fallnangel for creating the first draft of this manual, as well as PotatoSociety for creating the industry standard on what a proper manual should look like. I greatly appreciate all who helped.

-Spooky

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FIREBOLT DETAILS

The Firebolt excels in strength, modularity, and efficiency. Designed for the user with durability and longevity in mind, the Firebolt never has to be completely reprinted once it is assembled if a part fails. Parts that are more prone to failure due to higher stresses have been heavily reinforced, including areas such as the buffer tower and the front takedown. The Firebolt also utilizes a U-Bolt to further strengthen the lower but allows the user to choose between a standard buffer tower, as well as a customized, printable buffer tube and buffer tower created by Timbrewslice.

The Firebolt also aims at combining multiple firearm platforms into one. By using an innovative universal lower receiver rear, 6 of the 10 required parts for any lower are completely interchangeable with each available caliber. The magazine well for each caliber can be printed and assembled standalone, magazine catch included, and can be hot swapped with a few screws.

Pistol-caliber Firebolt lower's feed from Glock-style magazines, though it is **highly** recommended that the .45 ACP lower use only factory Glock 21 magazines due to feeding issues with off brand magazines.

PRINTER CALIBRATION

If you have already spent a decent amount of time calibrating your printer and know how to do so, you can skip this section.

Printer calibration is a key aspect of using a 3D printer. Typically, out of the box your printer is probably not going to be printing exactly to spec. Ironing out the kinks and dialing in your printer *prior* to printing a lower receiver can save you not only time, but also material and headaches.

It should be noted prior to reviewing this section that your bed should be leveled properly. You can do this with either your preferred method, test prints, or using hardware like a BLTouch. Regardless, if your bed is not properly level, your print **will** fail.

There are two main points of calibration: your dimensions and your flow. Calibrating dimensions is as easy as printing a test cube, measuring it with calipers, and adjusting your printer's steps/mm accordingly. Flow on the other hand can be more tricky, and typically is the first point you want to address as adjusting your flow can change your printers dimensional accuracy as well.

To calibrate you're flow, the first thing you're going to need to do is calibrate your extruder. This can be done very simply by measuring 100mm of filament from the extruder entrance outwards towards the spool and marking the 100mm point. Then, heat up your hot end and extrude 100mm of filament. Depending on where the mark ends up, you might be over-extruding or under. Using the equation below:

$$\left(\frac{\text{Expected Dimension}}{\text{Observed Dimension}} \right) \times \text{Current Steps/mm} = \text{New Steps/mm}$$

Calculate your new extruder steps/mm and run the test again until you are reasonably within a small margin of error with the extruder. Next, we will calibrate your flow in your slicer.

Included in the files are three calibration test prints: Flow_Calibration.STL, Firebolt_Calibration_Test.STL, and Calibration_Cube.STL. Start by printing the

Flow Calibration print; it is a simple 20mm x 20mm shelled box that will print with 3 wall lines on the edges with a 0.4mm nozzle. Once this is printed, measure the walls of the print with a caliper. Each wall should be about 1.2mm wide. If your walls are considerably larger or smaller, take 9 test measurements and average them out, and plug them into the equation below:

$$\left(\frac{1.2 \text{ mm}}{\text{Averaged Dimension}} \right) \times \text{Current Flow Percentage} = \text{New Flow Percentage}$$

Like the first test, print another test print and dial in your flow rate.

Once your flow has been calibrated properly, print the included Calibration_Cube. The settings on this cube should be minimal, with 2-3 walls and ~15% infill, but keep your speed and retraction settings the same as you would print a Firebolt. This calibration cube consists of multiple printer test all in one, including multiple overhang test, dimension tests, inner dimension test, hole dimension tests, stringing tests, and an M3 nut cutout for practical measurement. The dimensions of all the features included in the cutout are viewable in the folder.

Once the print is finished, measure the outside sides first. The cube is exactly 30mm x 30mm x 30mm, with the M3 cutout on the Y-axis and the 7.5mm hole on the X-axis. Measure each side more than once and average out the measurements to determine if you need to adjust your printer's steps/mm on that particular axis using the first equation from before. If you would like a less time-consuming print, find an XYZ cube on Thingiverse to print.

Dimensional accuracy is critical when it comes to a lower receiver. Printing too large can throw off your takedown pin hole alignment, while printing too small can cause your buffer tube to not thread. Inner dimensional accuracy is also important, which is why the third file, Firebolt_Calibration_Test, is the last file *you are going to want to print* regardless if you feel like your printer is up to spec or not. This print includes **all** of the holes that you will find on an AR-15 lower receiver, including the Safety, Takedown pins, FCG pins, and the Magazine release button slot. Not only that, but also included is a short copy of the buffer threads, allowing you to thread your buffer tube through it to test if your printer is calibrated. If you cannot thread your tube or fit the magazine release button into the slot, consider using the Hole Horizontal Expansion setting in Cura (demonstrated here: <https://www.youtube.com/watch?v=UUeLLZvDeIU>) to fix this issue. This print is 50mm x 50mm.

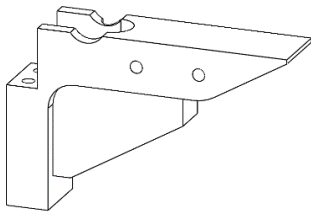
PRINT SETTINGS

| | |
|------------------------------|------------------------------|
| Material | PLA / PLA+ / ABS / PETG / |
| | Polycarbonate / Filled Nylon |
| Nozzle Size | 0.4 mm |
| Filament Size | 1.75 mm |
| Layer Height | 0.16 mm |
| Top/Bottom Layers | 15-20 Layers |
| Wall Line Count (Perimeters) | 6-8 Walls |
| Infill Pattern | Triangle / Cubic |
| Infill Percentage | 25-75% |
| Supports | None included, required. |

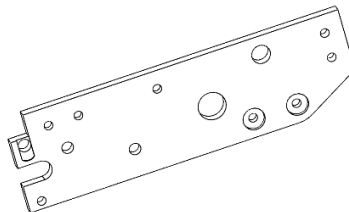
MATERIAL LIST

Universal

These parts are the same across the AR-15, AR-9 and AR-45 variations of the Firebolt. If you are printing an AR-15, AR-9, or AR-45 lower, you will need one of each of these parts. **Note:** Each buffer system utilizes its own versions of the grip part, FCG Sides, and a customized pistol grip. These parts are not cross-compatible, so check your file naming conventions (e.g., U-Bolt compatible parts will read “Firebolt_UBolt ...”



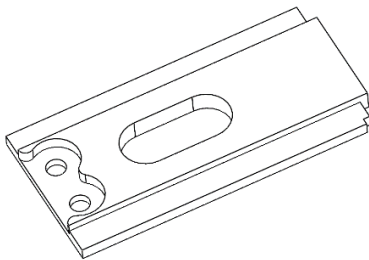
FCG Grip Base
< Firebolt_Grip_Part >



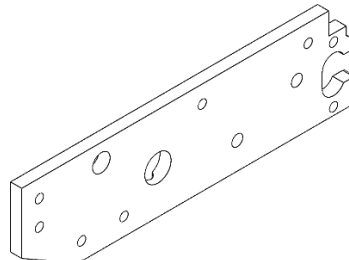
FCG Left
< Firebolt_Side_Left >



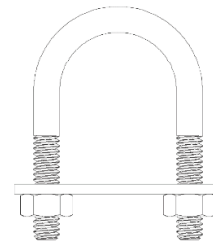
Trigger Guard
< Firebolt_Trigger_Guard >



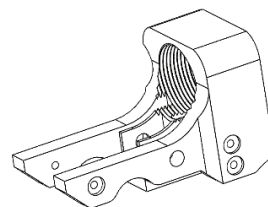
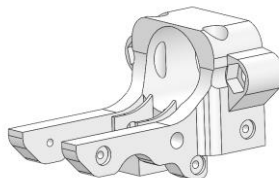
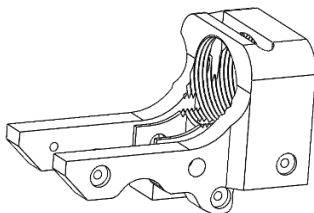
FCG Bottom
< Firebolt_Fire_Control_Well_Bottom >



FCG Right
< Firebolt_Side_Right >

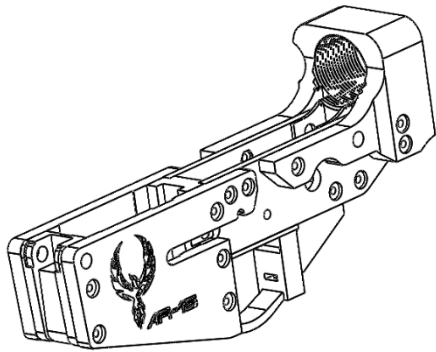


Complete U-Bolt*
#132-1/4" x 1-1/8" x 2-1/4"

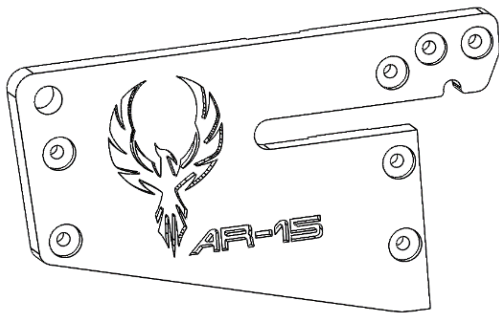


U-Bolt compatible buffer tower, Printable Buffer Tube, or Standard buffer tower
< Firebolt_Buffer_Tower >

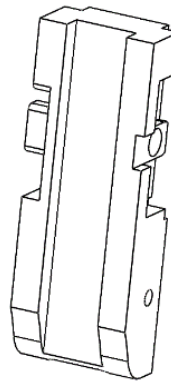
AR-15



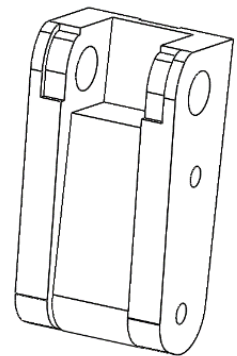
In addition to the printed parts listed in the Common section and additional hardware, you will also need one of each of the following printed parts to complete an AR-15 lower.



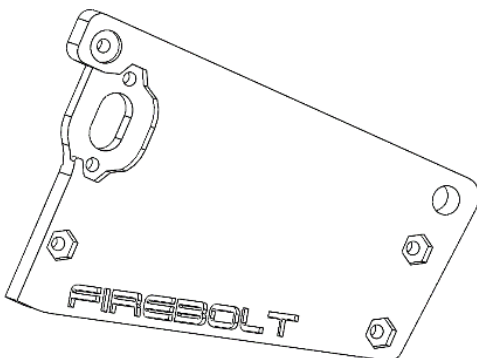
Left Magazine Well
<Firebolt_Mag_Well_Left>



Rear Magazine Well
<Firebolt_Mag_Well_Rear>



Front Magazine Well
<Firebolt_Mag_Well_Front>

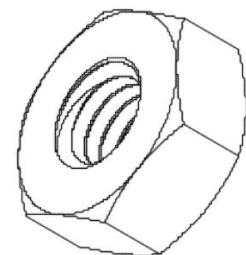


Right Magazine Well
<Firebolt_Mag_Well_Right>



10mm (4)
12mm (2)
35mm (5)
40mm (1)
50mm (2)

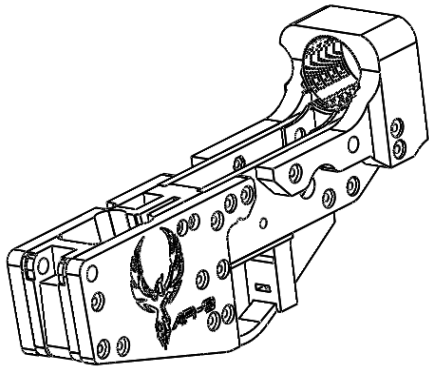
M3 Screw



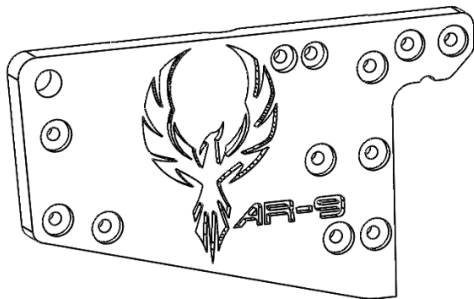
(14)

M3 Hex Nut

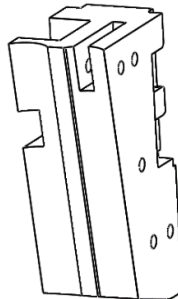
AR-9



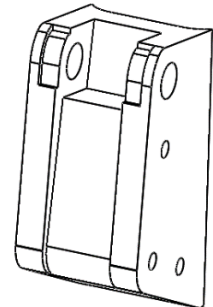
In addition to the printed parts listed in the Common section and additional hardware, you will also need one of each of the following printed parts to complete an AR-9 lower. You will also need to print a magazine release (Pistol_Caliber_Mag_Release) and either buy or create the ejector based on the included STL (Pistol_Caliber_Ejector.)



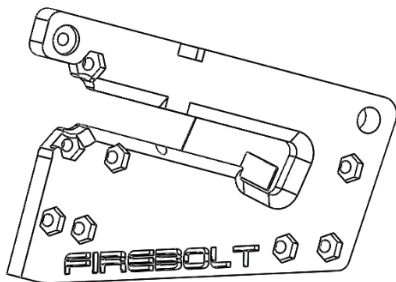
Left Magazine Well
<Firebolt_9_Mag_Well_Left>



Rear Magazine Well
<Firebolt_9_Mag_Well_Rear>



Front Magazine Well
<Firebolt_9_Mag_Well_Front>

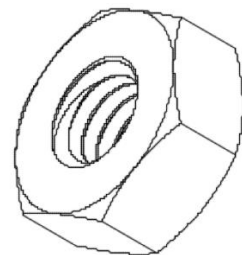


Right Magazine Well
<Firebolt_9_Mag_Well_Right>



10mm (4)
12mm (2)
25mm (2)
35mm (8)
40mm (1)
50mm (2)

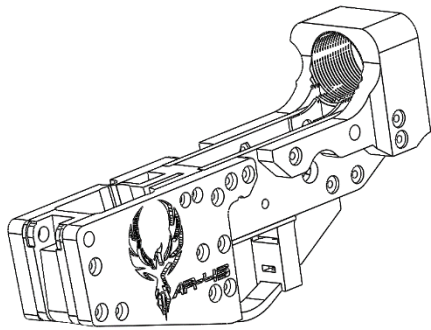
M3 Screw



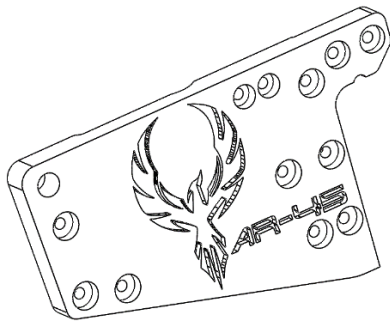
(19)

M3 Hex Nut

AR-45

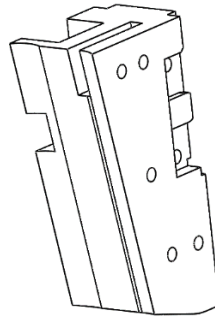


In addition to the printed parts listed in the Common section and additional hardware, you will also need one of each of the following printed parts to complete an AR-45 lower. You will also need to print a magazine release (Pistol_Caliber_Mag_Release) and either buy or create the ejector based on the included STL (Pistol_Caliber_Ejector.)



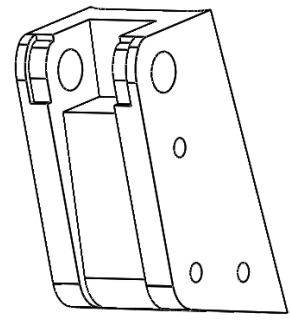
Left Magazine Well

<Firebolt_45_Mag_Well_Left>



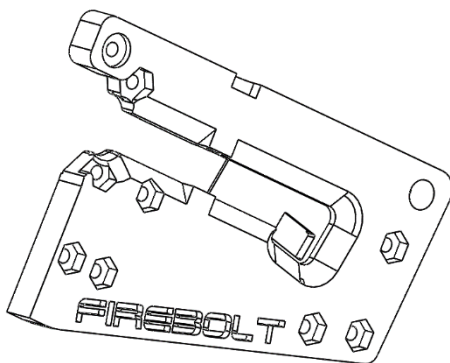
Rear Magazine Well

<Firebolt_45_Mag_Well_Rear>



Front Magazine Well

<Firebolt_45_Mag_Well_Front>



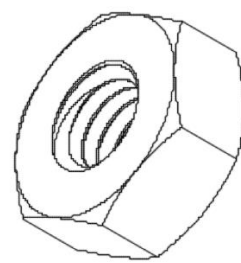
Right Magazine Well

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10mm (4)
12mm (2)
25mm (2)
35mm (8)
40mm (1)
50mm (2)

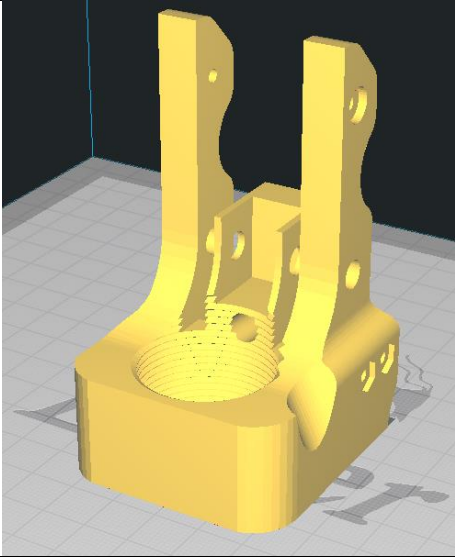
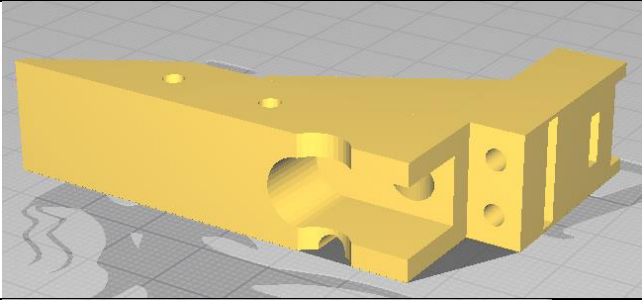
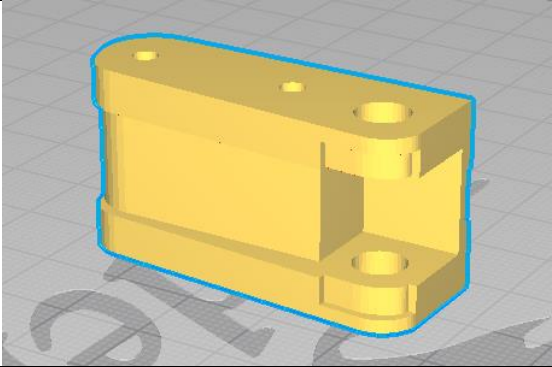
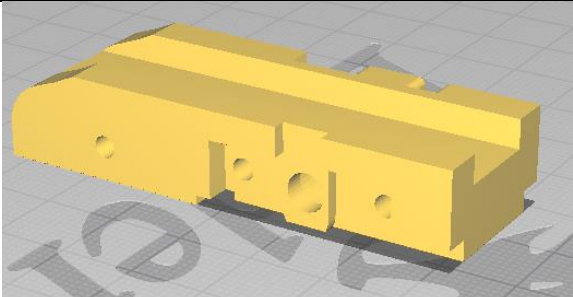
M3 Screws

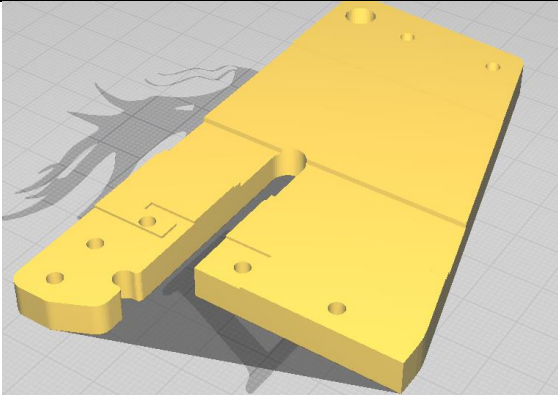
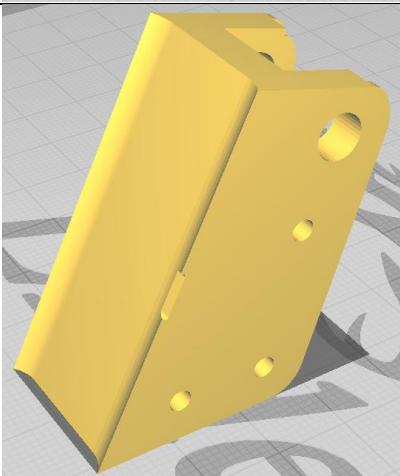

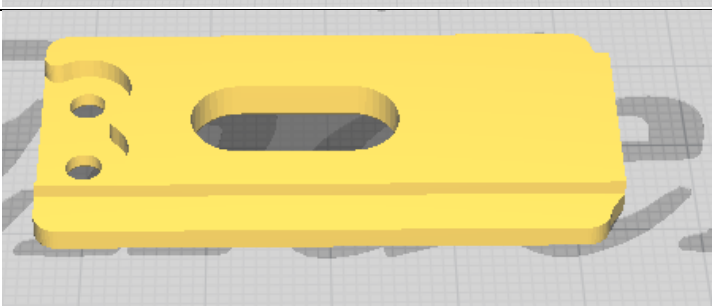
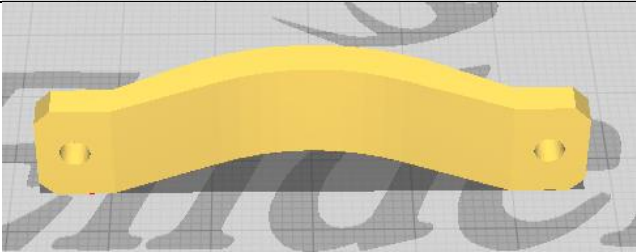


(19)

M3 Hex Nuts

PRINT ORIENTATION FOR ALL PARTS

| Part | Orientation |
|-----------------------|--|
| Buffer Tower |  |
| Grip Part |  |
| Mag Well Front |  |
| Mag Well Rear |  |

| | | |
|--------------------------------------|--|--|
| Mag Well Sides |  | |
| Pistol Caliber Mag Well Front |  | |
| FCG Sides |  | |
| FCG Well Bottom |  | |
| Trigger Guard |  | |

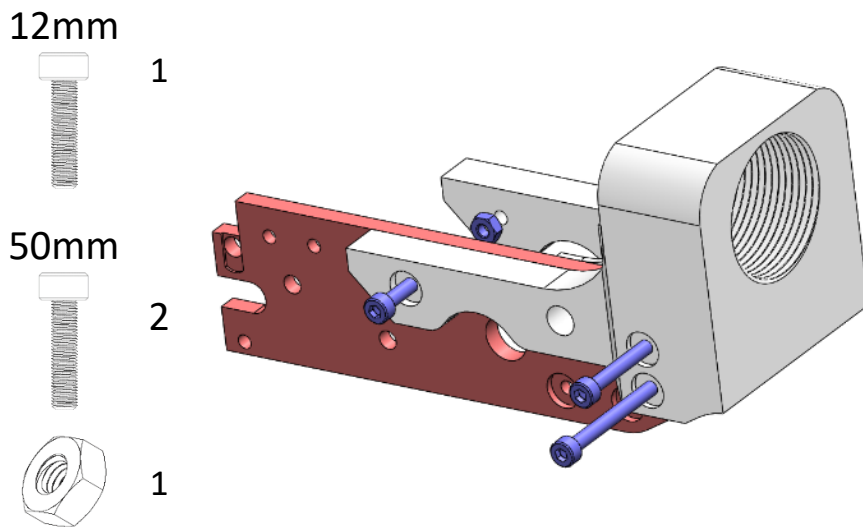
NOTES

- Buffer tower should be printed flat, perpendicular to the print bed, as if the stock were vertical. If using a U-Bolt, printing the U-Bolt compatible buffer tower with the bottom parallel to the print surface (requires support), is recommended.
- Grip part should be printed on its side.
- The front magazine well should be printed with the pivot holes away from the print bed so that the interior face that is profiled for the magazine well is against the print bed.
- The rear magazine well should be printed with the largest flat side against the print bed. This is the side opposite the mag well.
- The left and right magazine well sides should be printed on their largest flat face, the side opposite the magazine well.
- Both left and right fire control group sides should be printed with the internal facing (flattest) sides against the print bed.
- The bottom fire control group wall should be printed flat, so the side facing the trigger guard is against the print bed.
- Trigger guard can be printed either flat (so it looks like a bridge), or on its side (so it needs no support). Printing on the trigger guard on its side is recommended.

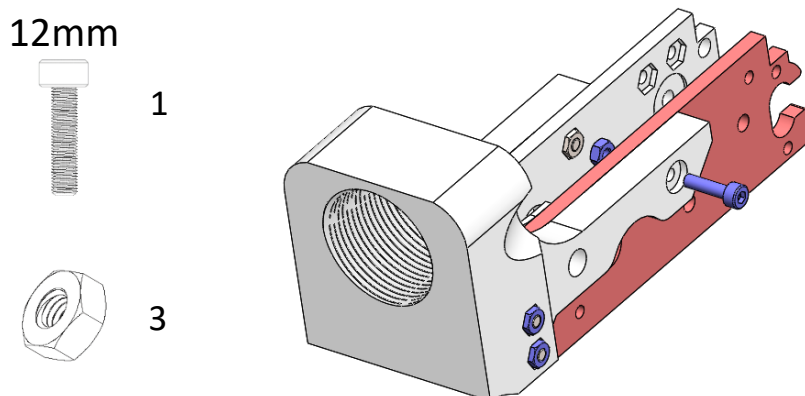
ASSEMBLY

Universal Parts

To complete the rear-half of the lower receiver, you will need to decide which buffer system to incorporate. The U-Bolt buffer tower utilizes a U-Bolt attached through the buffer tower and around the buffer tube which can add a noticeable amount of strength to the buffer tower. The printed buffer tower does not require the purchase of a buffer tube or stock.



Attach the left fire control group plate to the buffer tower. Make sure not to push the two 50mm bolts all the way through, as they will need to fit through the right fire control group plate in the next step. Finish securing the buffer tower to the left fire control group plate with a nut and 12mm bolt.



Attach the right fire control group plate to the buffer tower, pushing the 50mm bolts through the rear-most holes when completed. Finish securing the buffer tower to the right fire control group plate with a nut and 12mm bolt.

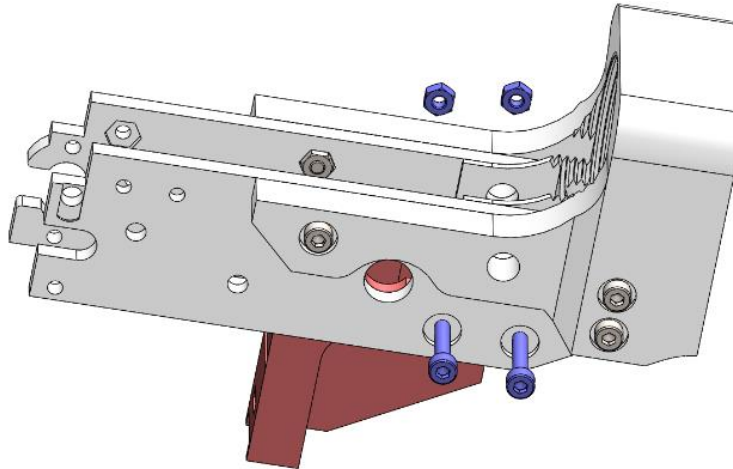
25mm



2



2



Place the grip part between the two fire control group plates. Next, fit two 25mm bolts through both fire control group plates and the grip part. Screw a nut onto the end of the bolt to hold it in place.

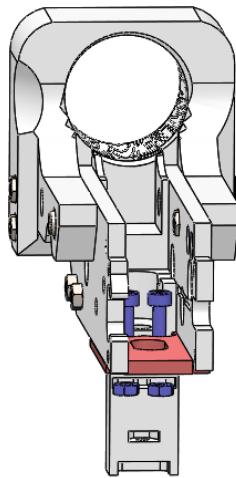
10mm



2



2



Fit the bottom fire control group plate between the left and right walls and the grip part. Use two 10mm bolts and two nuts to secure the plate in place.

U-Bolt Buffer Tower

12mm



1

40mm



1

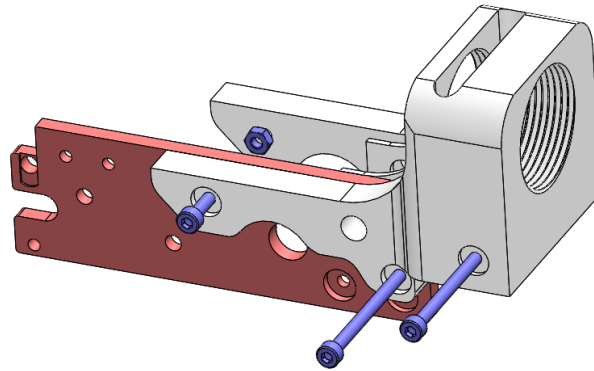
50mm



1



1



Attach the left fire control group plate to the buffer tower. Make sure not to push the 40mm and 50mm bolts all the way through, as they will need to fit through the right fire control group plate in the next step. Finish securing the buffer tower to the left fire control group plate with a nut and 12mm bolt.

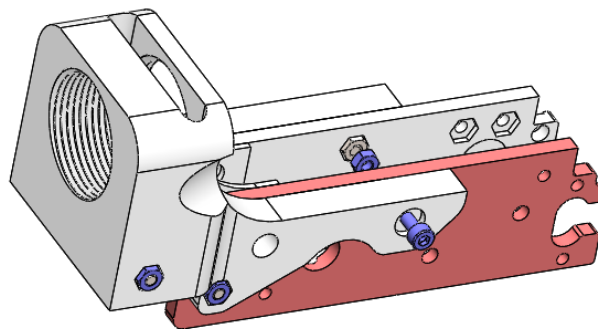
12mm



1



3



Attach the right fire control group plate to the buffer tower, pushing the 40mm and 50mm bolts through the rear-most holes when completed. Finish securing the buffer tower to the right fire control group plate with a nut and 12mm bolt.

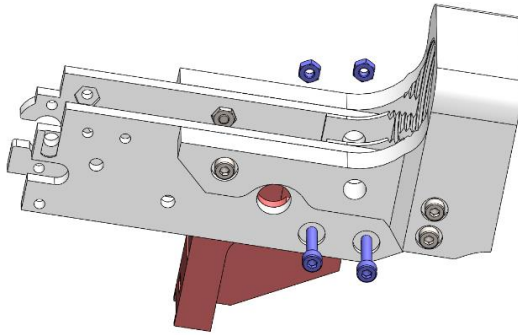
25mm



2



2



Place the grip part between the two fire control group plates. Next, fit two 25mm bolts through both fire control group plates and the grip part. Screw a nut onto the end of the bolt to hold it in place.

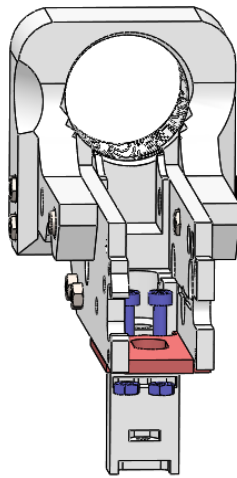
10mm



2



2



Fit the bottom fire control group plate between the left and right walls and the grip part. Use two 10mm bolts and two nuts to secure the plate in place.

AR-15

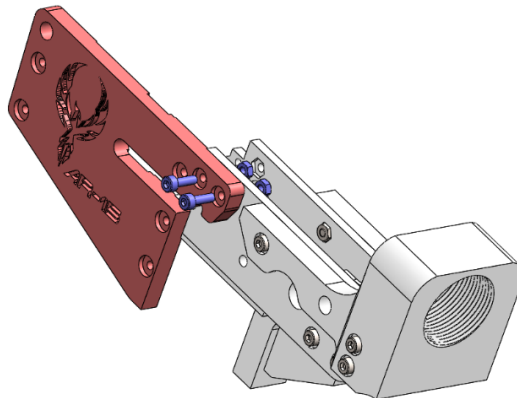
10mm



2



2

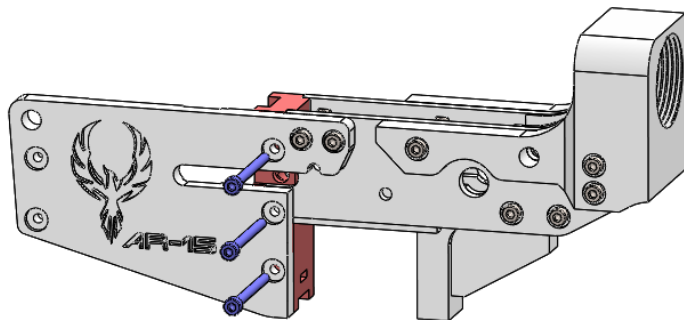


Place the left magazine well plate against the left fire control group plate, securing it in place with two 10mm bolts and two nuts.

35mm



3



Using three 35mm bolts, hold the rear magazine well part flush against the left magazine well plate and back against the fire control group plates.

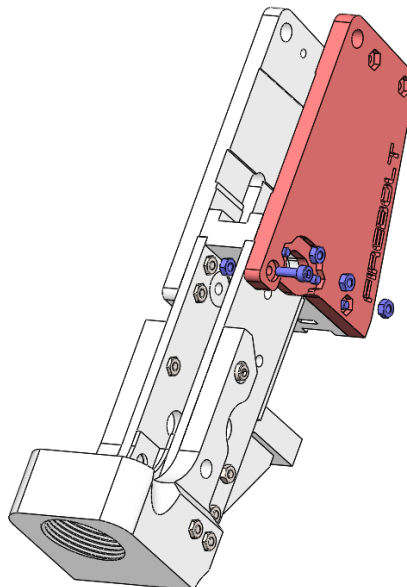
10mm



1



4



Secure the right magazine well plate to the lower with four M3 nuts and a 10mm M3 bolt.

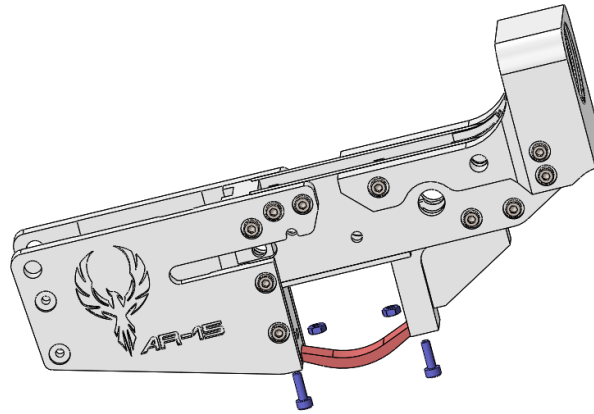
10mm



2



2



Place the trigger guard against the bottom of the grip part and the rear magazine well part, securing it in place with two 10mm bolts and two nuts.

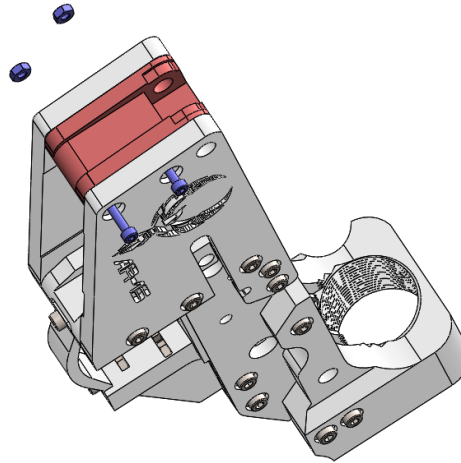
35mm



2



2



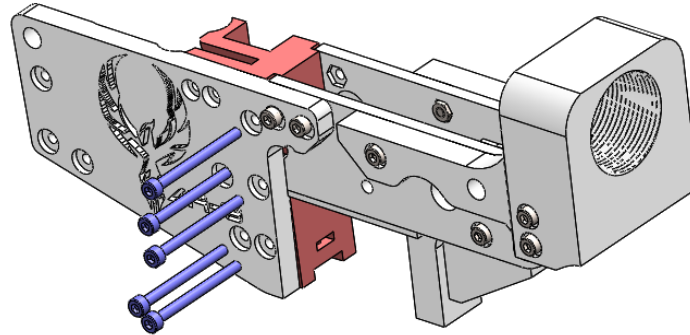
Secure the magazine well front part in place using two 35mm bolts and nuts.

AR-9 or AR-45

35mm



5



Using five 35mm bolts, hold the rear magazine well part flush against the left magazine well plate and back against the fire control group plates.

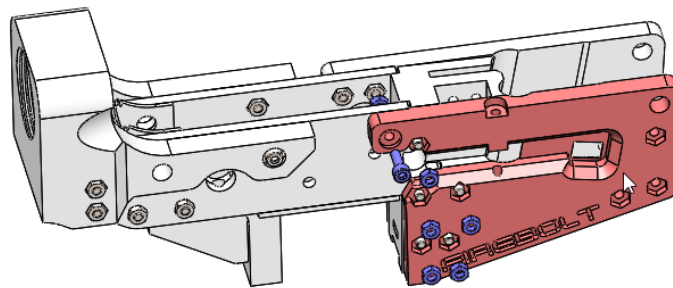
10mm



1



6



Secure the right magazine well plate to the lower with six nuts and a 10mm bolt.

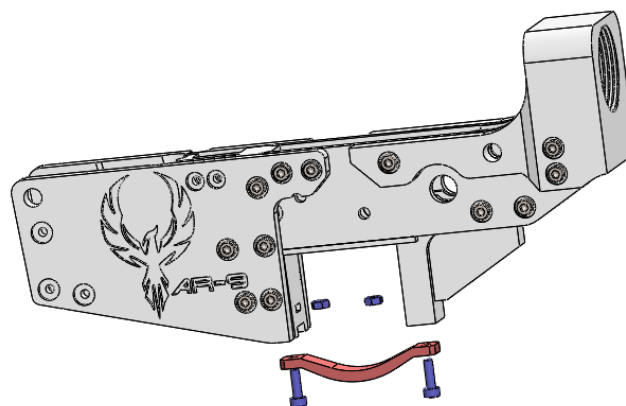
10mm



2



2



Place the trigger guard against the bottom of the grip part and the rear magazine well part, securing it in place with two 10mm bolts and two nuts.

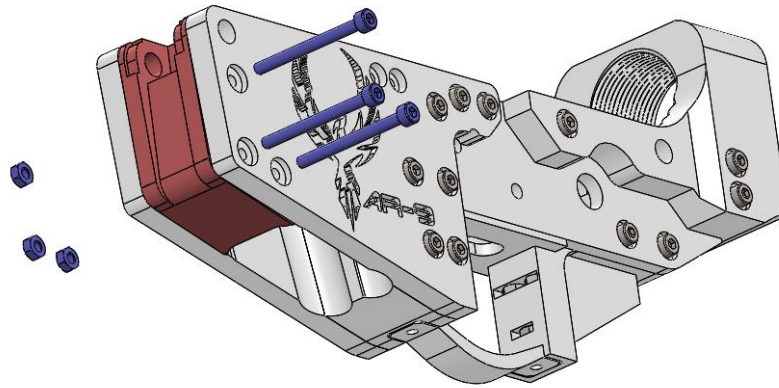
35mm



3



3

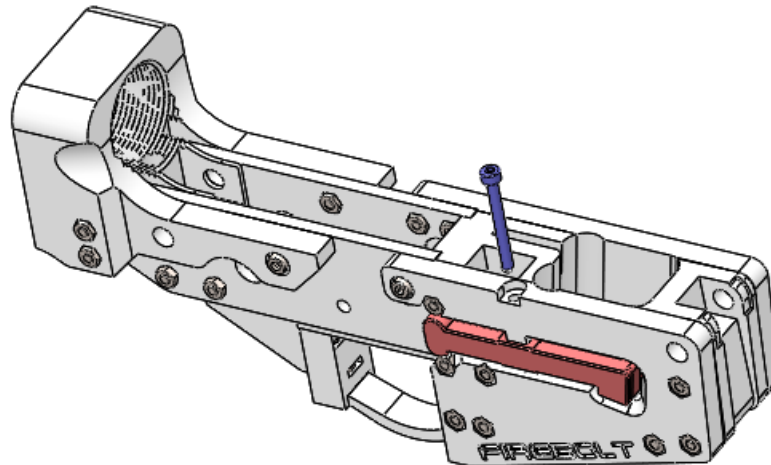


Secure the magazine well front part in place using three 35mm bolts and nuts.

35mm



1



Secure the magazine release lever in place with a 35mm M3 bolt. Keep in mind the magazine release lever will need a spring behind the end closest to the rear of the magazine well.

APPENDIX

Hardware

The U-Bolt can be found for \$1.38 on Amazon here:

https://www.amazon.com/gp/product/B002Y0VRI8/ref=ppx_yo_dt_b_asin_title_o00_s00?ie=UTF8&psc=1

This set of M3 screws contains all of the screws you will need to assemble your Firebolt, and the head of the screws is low profile enough that a standard safety switch will fully operate over them:

https://www.amazon.com/gp/product/B07L65DHV6/ref=ppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1

The Printable Buffer Tube connects to the corresponding buffer tower via two ¼“ x 1-½ bolts and two ¼“ x 2 bolts. The printable buffer uses a ½“-13 thread size, 2-½” Hex Head Screw for the weight. More details for that can be found here:

<https://www.mcmaster.com/92620A722/>

Devs Notes

- The Firebolt_Pistol_Grip is compatible with all variations of the Firebolt, however the Firebolt_UBolt_Pistol_Grip **cannot** be used with the standard buffer tower.
- Included in the Accessories folder is a miniature Shockwave Blade brace, intended for **pistol buffer tubes only**.
- The bolt catch can be stiff at first, but with proper sanding and operation it will wear in.
- Keep an eye open for the screw that fits through the right side of the mag well on the bolt catch variant, it feeds into the mag well rear underneath the bolt catch. Putting an M3 nut into that slot can be tight so handle with care.
- If you fully assemble your lower and *then* try to insert your hammer and trigger group, it will not fit because the walls of the FCG sides are thicker on the inside for durability. Loosen the screws that feed through the mag well rear to loosen the FCG sides at the front, and then place your trigger and hammer pieces in. Once you have them in, tighten down the screws.

- Make sure the screws that feed into the Fire Control Well are tight, as a loose M3 nut can jam up your FCG.
- If you didn't print the test print, once you print all the pieces of the mag well that house the magazine release, test your release button in the slot to ensure it fits and operates smoothly. If it does not, sand accordingly.
- If you have any further questions, message me on Keybase: @spookyspectre