

#Liberator12k



Liberator12k.com

#Liberator12k Manual

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Unlicensed

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Introduction

Welcome to the #Liberator12k project.

This manual contains all the documentation for the weapons, ammunition, and tools in the project. The first few chapters are a build guide: starting with the Minuteman receiver then a CAFE12 break-action 12ga forend. This is a good starting point - a simple, safe, affordable firearm.

The Minuteman receiver is reusable in several other configurations similar to how you might swap AR15 uppers.

Supporting the Project

This has been an ambitious one-man pro-bono operation from the start. The project has cost tens of thousands of dollars and years of my time. Now we have a modular weapons platform, ammunition, and a suite of ECM tooling. I dedicate it to the public domain to secure self-defense for everyone, forever.

I didn't start this to get rich, but I wouldn't mind help. Research and Development (R&D) doesn't pay the bills, it only comes with them. Making new guns and ECM machines full-time is the dream - so if you want to show your appreciation and help continue this work there are a few ways you can help.

Liberator12k.com Store

The [Liberator12k.com Store](#) has complete hardware kits. The hardware can be sourced and fabricated yourself if you have the equipment.

I'm asking the community to support the project by buying directly, or from official vendors - check the website. It's all public domain, so I'm counting on you to do the "encouraging".

Manufacturing is not my field and my time would be better spent in R&D. Contact me via email jeff@liberator12k.com for vendor royalty agreements.

Donations

The [Donation page](#) on the website has info on how to donate with crypto and more.

I also have a [Patreon](#).

Code Contributions

The first code contributions were received June 2021, after the Alpha release. We were able to get the Metric version of the CAFE12 setup as a result. Code contributions are priceless, they just need to be public domain/Unlicensed. Bug reports and improvement requests on GitHub are also a great way to help out if you're not comfortable in OpenSCAD/Bash/Web.

Thank YOU

Prints are the greatest encouragement of all.

I also love [likes, shares, and comments](#) and even hatred - if you're a hater. It's fun doing this, but it's also nice to know other people appreciate it. Thank you so much for joining me on this journey.

Join the Community

Chat with me and other builders! [#liberator12k:matrix.org](#) on [Element](#)

International Builders

This is a US-based operation. I won't knowingly ship internationally or to a forwarder either, sorry!

There's a metric version but it's less well documented and the STLs are not included in the release. You can render them, but it's a bit manual.

Join the chat, there's other builders around the world who can help out.

How to Laugh at Danger

How do you laugh at danger? From behind a solid barrier - don't be stupid. Everyone's a tough guy until they take a piece of shrapnel to the beanbag.

Make at Your Own Risk

Any experienced printer can complete this build if they buy a kit from the [Liberator12k.com Store](https://liberator12k.com). I have done my best to make sure the designs included here are safe to the user and bystanders, but ultimately you're the one building your own gun at your own risk.

WARNING

Pre-release designs *may not be safe*. Use extreme caution and two doses of common sense.

Bystander Care

It's one thing if you hurt yourself, it's another if you hurt someone else. The revolver will eject dangerous shot/wadding from the gap. Keep bystanders behind your back and maintain a safe "180 degree" line or I'll shake *their* hand for kicking your ass, because you were warned.

Basic Firearms Safety

1. All guns are always loaded.
2. Never point the gun at anything you are not willing to destroy.
3. Keep your finger off the trigger until your sights are on target and you have made the decision to shoot.
4. Be sure of your target and what is beyond it.

DIY Safety

DIY guns require special precautions and procedures that *are not fully documented here*.

- Use a secure test rig to hold the gun pointed in a **safe direction**.
- Stand behind a bulletproof barrier, such as several feet of dirt, concrete blocks, or very large tree.
- Ensure there is no direct path from the gun to anyone or anything of value.
- Use a long string to pull the trigger from behind cover.
- Test with at least 5 of the highest pressure cartridges you can find.

Gut Check

The power to create weapons and project lethal force hundreds of yards is now in your hands, use it responsibly.

Tools and Equipment

You can print and assemble an official kit with a couple wrenches and a butane torch.

Reaming holes in the prints is recommended. A drill bit will work, but reamers are a lot better. The cheap Chinese ones from Amazon are fine, buy a whole set.

Required Tools

- Slip-Joint Pliers

Files

- 3/4" Half-Round File
- Needle File Set

Drill Bits

- 5/16"
- #29 - #8-32 Tap Drill
- 11/64" or 4.5mm Long - #8-32 Clearance Drill
- #39 or 2.5mm

Reamers

- 11/64" or 4.5mm - Small Screw Clearance
- 1/4" - Medium Screw Clearance
- 5/16" - Pivot Pin Clearance
- 1/2" - Large Screw Clearance
- #39 or 2.5mm

"Close Enough"

All the parts are inch-standard (or all-metric), but there are "close enough" metric equivalents that are readily available even if you live in the US.

Sometimes it's easier and *much* cheaper to find certain parts in metric, that's especially true for little stainless pins. 3/32" is just under 2.5mm, and a #39 drill bit is just over 2.5mm.

You Can DIY Everything

You can fabricate all the required parts yourself - the documentation, jigs, and templates are included in the project files.

If you intend to DIY everything, you'll need more tools. There's not a lot of "machining" required - a couple tapped holes in flat plate and square rods. A cold saw or metal band saw are ideal for cutting the tubing and rods to size. If you're using Schedule 40 pipe, a pipe cutter is just the ticket.

I would strongly recommend a drill press if you're doing it all by yourself, but you *could get by* with some printed fixtures, jigs, and templates. A CNC waterjet/laser/plasma/mill will make life a lot easier later on, but with elbow grease and determination all things are possible.

Some designs may require more advanced tooling, see that specific documentation for more details. Notably, the revolver needs a lathe and TIG.

This Is Spiral Tap

Those bulk pack taps are called "hand taps" and they suck. If you scrap a part with a broken tap, you're already worse off than if you'd just bought a good tap in the first place.

Spend a few bucks on a Spiral Point or Spiral Flute tap. I like spiral point, myself. You only need one, but buy two just in case.

Metric and/or Inch

In general, here's how things go between inch and mm in this project:

Purpose	Inch	Metric
Small Pins	3/32"	2.5mm
Medium Pins	1/4"	6mm
Small Screws	#8-32	M4
Medium Screws	1/4"-20	M6
Large Screws	1/2"-13	12mm
Square Rods	1/4"	6mm

Drill Bits

- 5/16"
- #29 - #8-32 Tap Drill
- 11/64" or 4.5mm Long - #8-32 Clearance Drill
- #39 or 2.5mm

Reamers

- 11/64" or 4.5mm - Small Screw Clearance
- 1/4" - Medium Screw Clearance
- 5/16" - Pivot Pin Clearance
- 1/2" - Large Screw Clearance
- #39 or 2.5mm

Taps

- #8-32 - Spiral Flute

How to Read the Manual

Complete assemblies are built from several reusable components. Each component in this manual has its own fabrication instructions. The component sub-chapters all follow the same pattern.

Preview

The component previewed in the assembly position. Refer to the figures depicting the complete assembly to orient yourself.

Description

A brief description of the component and its purpose.

Prints List

A table of parts to be printed. Includes the part name and a thumbnail view of the model in its print orientation.

Hardware List

A table of hardware required to complete the assembly.

Preparation

Any preparation steps for the component. Reminders and tips before you print.

Post-Processing

Details on how to finish the prints, hardware installation instructions, and any notes on sub-assemblies.

Technical Notes

Explains why certain decisions were made, what's important to consider when building or before altering the component.

May discuss alternate hardware.

Assembly Guidelines

Printing Guidelines

Unless otherwise stated, every print will use these settings. Most parts are good with a thick shell and low infill.

If a part needs to be printed solid, the build guide will have a note for you. Increase your infill to 100% for these parts.

Compatible Materials

PLA, PLA+, ABS, PETG, Nylon, PC, POM - almost anything. The strength is in the steel.

Check your parts for shrinkage and scale them appropriately in your slicer if necessary. I've been eSun PLA+ for reference size. I often scale ABS to 100.8%, but taller layers shrink more. Your mileage may vary.

Print Settings

These are the only vital Cura settings to override.

Shell

- Wall Thickness: 3mm
- Top/Bottom Thickness: 3.2mm
- Filter Out Tiny Gaps: Yes (*reduces large-nozzle drool*)
- Z Seam Alignment: Sharpest Corner

Support

- Generate Support: Yes
- Support Structure: Tree
- Support XY Distance: 1.3mm

About Layer Heights

0.2mm layers are a good balance between speed and quality.

0.1mm layers will look 50% better and take twice as long.

You can *probably* print any of the large parts with layers >0.2mm high. This is especially true with larger nozzles. You should expect the tolerances to change because the material shrinkage will be greater.

Smaller parts, notably the small Fire Control Group parts should be printed with standard layer heights. Small parts usually have tighter tolerance requirements and taller layers may cause binding. 0.1mm layers will only help here.

#FatNozzleGang

All print times are given for 0.4mm nozzles at 0.2mm layer height.

The Fire Control Group (FCG) will benefit most from smaller nozzles, print these parts first and then go ahead and swap to a 1.0 (or something in between).

Increasing nozzle diameter yields exponential speed gains. Since you gain so much speed from a larger nozzle, you can slow down your print speed and use lower layer heights for better print quality - and *still* be faster than stock.

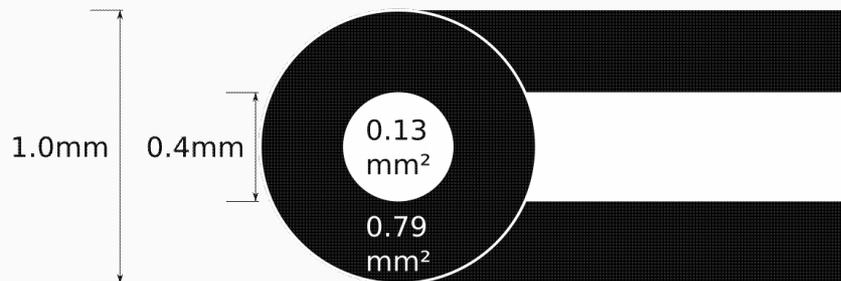
Diameter	Area	Time Factor	Effective Time
0.4mm	0.13mm ²	1	1 day
1.0mm	0.79mm ²	1/6	4 hours

Almost everything can be printed with a 1.5mm nozzle; 0.4mm works too - it just takes a lot longer.

But Seriously

You can buy a multipack of nozzles on Amazon Prime for \$15. A nozzle swap takes less than 5 minutes and will save you days of machine time.

There's a few tricks to it. Watch some videos about how to do the swap on your machine.



1: The "Minuteman" Receiver



Figure 1: The Minuteman Receiver

To get very technical this is a *Large Frame Receiver with a Stock*. That's a mouthful, so I call it the [Minuteman](#). It works with most of the designs in the project. There are other ways to configure the receiver, but we'll save that for a future build.

After the receiver is assembled, first-time builders can continue on to building a CAFE12 forend. [Chapter 2: Forends - Choose Your Weapon](#) covers the different forend configurations in detail, but for now let's focus on the receiver.

Components

Each of the following components has its own subchapter. Familiarize yourself with figures 1-5, this is your map. You can complete these components in any order and assemble them all at the end.

- Large Framed Receiver
- Fire Control Group (FCG)
- Lower
- Stock

Large Framed Receiver

This is "the gun" in the US. I can sell you everything **except** one of these. It's just one marathon print - almost two days at 0.4mm or just 20h at 1.0mm.

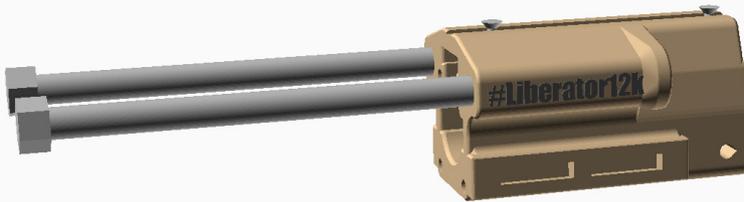


Figure 2: Large Framed Receiver

Fire Control Group

Abbreviated "FCG" - the most involved of all the components. Literally all the moving parts are here.

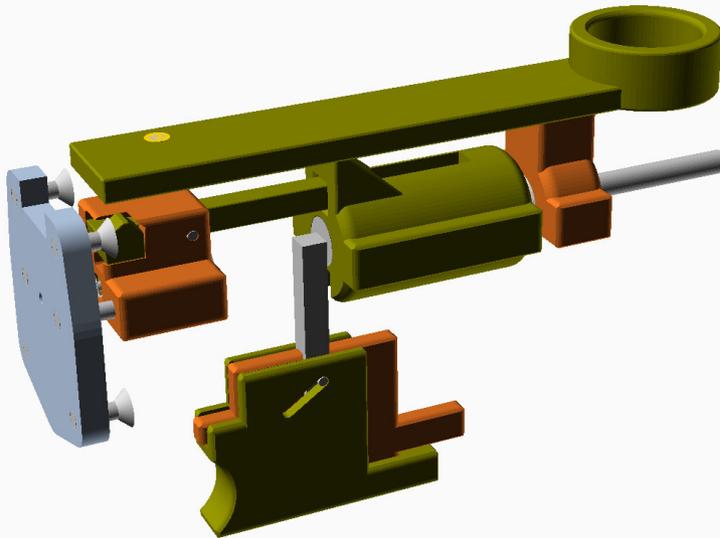


Figure 3: Fire Control Group

Lower

The grip for the gun, also holds the trigger from the FCG.



Figure 4: Lower

Stock

A spacer and buttpad for your receiver. Another of the major prints that will benefit greatly from a large nozzle.

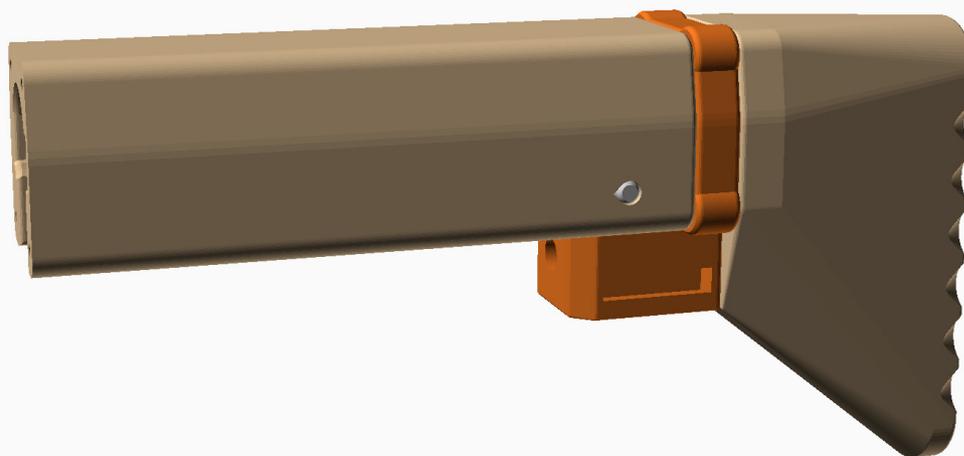


Figure 5: Stock

Preparing to Print

Pick Your Colors

Two-tone is canon - that means it's official.

Spool 1: Base Color

We'll be using a full 1kg spool for the base color. Most of the "big" parts will be printed with this filament.

Spool 2: Accent Color

The accent prints will take about 500g of plastic, or half a typical spool. Accent parts are often smaller and bear some kind of load, so if you want to splurge - do it here.

Spool 3: TPU For Your Buttpad

The buttpad was designed to be printed with "90D" TPU filament. 90D TPU is a semi-flexible filament, and takes some of the sting out of the shot because it's rubbery. The 90D stuff will run in a stock Ender 3. Lower than 90D is not advised as it requires printer modifications not documented here.

You may not find TPU that matches your base color, keep that in mind when you choose your colors. You can print the buttpad in any filament, but it may be more punishing than necessary.

Configure Cura and Preheat

Next we need to print the receiver parts. The STL files are located in the Liberato12k zip file where you found this PDF or from [Liberator12k.com](https://liberator12k.com).

Configure Cura according to the [Printing Guidelines](#) in the Introduction and slice each part for printing.

The models are already in the proper orientation for printing, so leave the bottom side down. You are free to position them on the build plate however you like.

Printing one part at a time will produce higher quality prints, but it will take longer. You should know your machine.

Minuteman Receiver Complete Print List

The table below can be used as a checklist. **Print this page** then refer to the sub-chapters for complete build instructions.

The STL files are located in the Liberator12k.zip file's Receiver/ directory. For instance: Receiver/FCG/Prints/FCG_Hammer.stl

Done	Color	Print Settings	Part	Filament	Time
<input type="checkbox"/>	Accent	See Below	FCG_FiringPinCollar	1g	0h48m
<input type="checkbox"/>	Accent	See Below	FCG_Trigger	14g	1h55m
<input type="checkbox"/>	Accent	See Below	FCG_Housing	16g	2h12m
<input type="checkbox"/>	Accent	See Below	FCG_Disconnector	4g	29m
<input type="checkbox"/>	Accent	See Below	FCG_Hammer	34g	4h37m
<input type="checkbox"/>	Accent	See Below	FCG_HammerTail	13g	1h38m
<input type="checkbox"/>	Accent	Standard	FCG_TriggerMiddle	11g	1h23m
<input type="checkbox"/>	Accent	Standard	FCG_ChargingHandle	34g	4h07m
<input type="checkbox"/>	Accent	Standard	Lower_MountRear	23g	2h21m
<input type="checkbox"/>	Accent	Standard	Lower_MountFront	22g	2h09m
<input type="checkbox"/>	Accent	Standard	Lower_Middle	68g	5h20m
<input type="checkbox"/>	Base	Standard	Lower_Left	66g	5h52m
<input type="checkbox"/>	Base	Standard	Lower_Right	66g	5h52m
<input type="checkbox"/>	Base	Standard	Frame_Receiver	272g	1d18h01m
<input type="checkbox"/>	Base	Standard	Stock	243g	1d08h52m
<input type="checkbox"/>	Base	Standard	Stock_Backplate	95g	12h05m
<input type="checkbox"/>	TPU	See Below	Stock_Buttpad	181g	19h31m
Totals					
Base Color				?g	?d?h?m
Accent Color				?g	?d?h?m

Standard Print Settings

Review the [Printing Guidelines](#) from the Introduction. Use the right accent or base color!

FCG Print Settings

These small FCG parts have special print settings:

- Infill: 100%
- Layer Height: 0.1mm

Buttpad Print Settings

I have printed Amazon-brand TPU 95 on my stock Ender 3, just select the proper material in Cura. Be sure to **reset the material** before slicing other parts. You can use other plastics, but TPU is softer and will absorb some recoil.

Just select *Generic TPU* for the material in Cura.

Bill of Materials

Full hardware list for the Minuteman receiver

Parts Kit	Purpose	Part	Quantity
Receiver	Tension Bolt Nut	#8-32 Heatset Nut (Long)	4
Receiver	Tension Bolt Washer	#8-32 Washer	4
Receiver	Tension Bolt Acorn Nut	#8-32 Acorn Nut	4
Receiver	M-LOK Rail Nuts	#8-32 Heatset Nut (Long)	2
Receiver	Stock Pin	1/4x2" Dowel Pin	1
Receiver	Stock Pin Retaining Pin	6Dx2" Box Nail	1
Receiver	Stock Backplate Nut	1/4-20 Heatset Nut (Short)	2
Receiver	Stock Buttpad Bolt	1/4-20x3-1/2" Flat Head Screw	2
Lower	Lower Nut	#8-32 Heatset Nut (Short)	5
Lower	Lower Bolt	#8-32x1.25 SS Flat-Head Bolt	5
Lower	Lower Pin	1/4x2" Dowel Pin	1
Lower	Lower Pin Retaining Pin	6Dx2" Box Nail	1
Lower	Sear	1/4"x1.67" Steel Square Rod	1
Lower	Sear Pin	2.5x10mm Dowel Pin or 3/32"x1/2" Music Wire	1
Lower	Sear Return Spring	0.02" Wire, 0.25"x1.25"	1
Fire Control	Charging Handle Bolt	#8-32x1/4" SS Socket Cap Bolt	1
Fire Control	Charging Handle Nut	#8-32 Short Heatset Nut	1
Fire Control	Hammer Bolt	1/4-20x5" Flat Head Bolt	1
Fire Control	Hammer Bolt Sleeve	9/32"x3.5" K&S Brass Tube	1
Fire Control	Hammer Cap Nut	1/4-20" Acorn Nut	1
Fire Control	Hammer Nut	1/4-20" Heatset Nut (Short)	1
Fire Control	Hammer Spring	0.052x0.625x3" ~6.3lbs/in Compression Spring	1
Fire Control	Disconnecter Pivot Pin	2.5x18mm Dowel Pin or 3/32"x3/4" Music Wire	1
Fire Control	Disconnecter Spring	0.22" OD 0.625" Long (0.02" wire)	1
Fire Control	Firing Pin	6Dx2" Box Nail, cut flush to 1.54" OAL	1
Fire Control	Firing Pin Spring	0.22" OD 0.625" Long (0.02" wire)	1
Fire Control	Recoil Plate Center Bolts	#8-32x1.5 SS Flat-Head Bolt	2
Fire Control	Recoil Plate Side Bolts	#8-32x0.5 SS Flat-Head Bolt	4
Frame Bolts	Frame Bolt	1/2-13x10 Hex Bolt	2
Frame Bolts	Frame Nut	1/2-13 Hex Nut	2
Threaded Rods	Tension Bolt	#8-32x12 Threaded Rod	4
Recoil Plate	Recoil Plate	#Liberator12k Recoil Plate	1

Metric BOM

Full hardware list for the Minuteman receiver.

Component	Purpose	Part	Quantity
Receiver	Tension Bolt Nut	M4 Heatset Nut (M4xD7xL8)	4
Receiver	Tension Bolt Washer	DIN125 M4 Washer	4
Receiver	Tension Bolt Acorn Nut	DIN1587 M4 Domed Hex Cap Nut	4
Receiver	M-LOK Rail Nuts	M4 Heatset Nut (M4xD7xL8)	2
Receiver	Stock Pin	None	1
Receiver	Stock Pin Retaining Pin	2.5x50mm Nail	1
Receiver	Stock Backplate Nut	M6 Heatset Nut (M6xD9.5xL6)	2
Receiver	Stock Buttpad Bolt	DIN7991 M6x90 Countersunk Bolt	2
Lower	Lower Nut	M4 Heatset Nut (M4xD7xL5)	5
Lower	Lower Bolt	DIN7991 M4x35 A2/A4 Countersunk Bolt	5
Lower	Lower Pin	None	1
Lower	Lower Pin Retaining Pin	2.5x50mm Nail	1
Lower	Sear	6mm x 42.42mm Steel Square Rod	1
Lower	Sear Pin	None	1
Lower	Sear Return Spring	0.5mm Wire, 6.5mm OD, 35mm Length Spring	1
Fire Control	Charging Handle Bolt	TODO: DIN???? M4x1/4" SS Socket Cap Bolt	1
Fire Control	Charging Handle Nut	TODO: M4 Heatset	1
Fire Control	Hammer Bolt	DIN7991 M6x130 Countersunk Bolt	1
Fire Control	Hammer Bolt Sleeve	6mm ID Sleeve for <i>Hammer Bolt</i>	1
Fire Control	Hammer Cap Nut	DIN1587 M6 Domed Hex Cap Nut	1
Fire Control	Hammer Nut	M6 Heatset Nut (M6xD9.5xL6)	1
Fire Control	Hammer Spring	1.4mm Wire, 16mm OD, 80mm Length Spring	1
Fire Control	Disconnecter Pivot Pin	2.5x18mm Stainless Steel Pin	1
Fire Control	Disconnecter Spring	0.5mm Wire, 6mm OD, 20mm Length Spring (Cut to 16mm)	1
Fire Control	Firing Pin	2.5x50mm Nail, , cut flush to 40mm OAL	1
Fire Control	Firing Pin Spring	0.5mm Wire, 6mm OD, 20mm Length Spring (Cut to 16mm)	1
Fire Control	Recoil Plate Center Bolts	DIN7991 M4x40 A2/A4 Countersunk Bolt	2
Fire Control	Recoil Plate Side Bolts	DIN7991 M4x40 A2/A4 Countersunk Bolt	4
Frame Bolts	Frame Bolt	DIN931 M12x260 Hex Head Bolt	2
Frame Bolts	Frame Nut	DIN934 M12 Hex Nut	4
Threaded Rods	Tension Bolt	DIN795 M4x305 Threaded Rod	4
Recoil Plate	Recoil Plate	6mm Thickness 50.80x60.325mm AISI 4140 Steel Plate	1

1.1: Large Frame Receiver



This is the core of the gun. In the United States it's the receiver. Legally-speaking it's a gun. If you need to dispose of it, burn it to ash. Don't make one for a stranger - that's a Fed, especially if they're offering money in exchange. Screenshot it and ridicule them online.

The *Large Frame Receiver* is the same as the standard *Receiver*, but with two large (1/2") bolts support heavy forends.

Prints

STL Files Location: Receiver/Frame/Prints/



Vitamins - Imperial

Purpose	Part	Quantity
Frame Bolt	1/2-13x10 Hex Bolt	2
Frame Nut	1/2-13 Hex Nut	4
Rail Nuts	#8-32 Heatset Nut (Long)	2
Tension Bolt	#8-32x12 Threaded Rod	4
Tension Bolt Nut	#8-32 Heatset Nut (Long)	4
Tension Bolt Washer	#8-32 Washer	4
Tension Bolt Acorn Nut	#8-32 Acorn Nut	4

Vitamins - Metric

Purpose	Part	Quantity
Frame Bolt	DIN931 M12x260 Hex Head Bolt	2
Frame Nut	DIN934 M12 Hex Nut	4
Rail Nuts	M4 Heatset Nut (TODO: Long)	2
Tension Bolt	DIN795 M4x305 Threaded Rod	4
Tension Bolt Nut	M4 Heatset Nut (M4xD7xL8)	4
Tension Bolt Washer	DIN125 M4 Washer	4
Tension Bolt Acorn Nut	DIN1587 M4 Domed Hex Cap Nut	4

Post-Processing

Install Tension Nuts

These four threaded inserts are installed in the front of the receiver.

Insert a threaded rod through the receiver from the rear and screw on the threaded insert while you install the threaded inserts, this will help keep them aligned.

Install Rail Nuts

Insert a threaded rod through the receiver from the top and screw on the threaded insert while you install the insert.

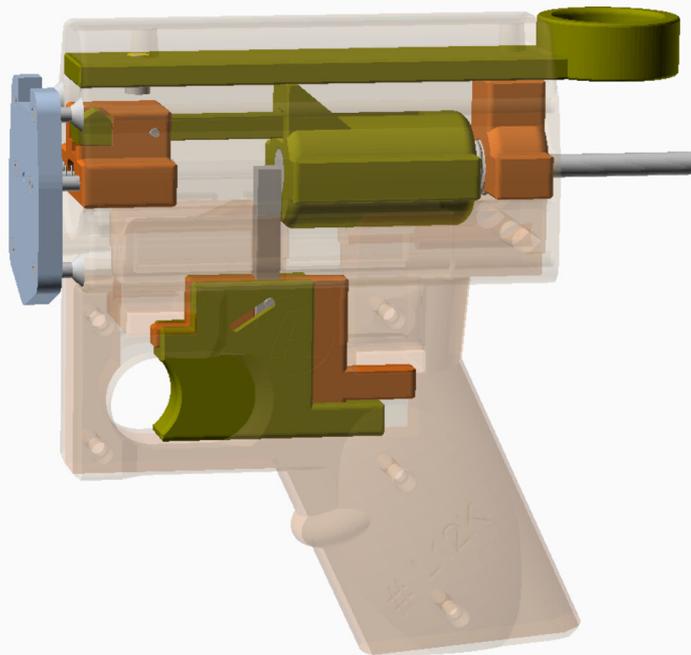
Epoxy Acorn Nuts

The acorn nuts need to be permanently secured to the threaded rods so you can actually unscrew them from the back. Red threadlocker or 2-part epoxy are both good options.

File/Sand Internal Surfaces

The smoother these surfaces, the nicer the gun will run. Mostly optional, print at 0.1mm for better overall quality.

1.2: Fire Control Group



A fire control group for fixed recoil plate designs. Trigger is based on [The Unknown Cat's](#) design.

The sear is a square rod with a cross-pin near the bottom. An inclined slot in each side of the trigger forces the cross-pin and sear downward when the trigger is pulled. A central support tab keeps the sear and its return spring (not pictured) oriented vertically.

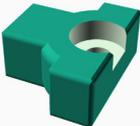
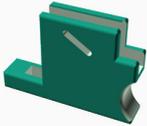
A compression spring located below the sear pushes the sear into the upward position, driving the trigger forward via the sear pin.

A linear hammer strikes the firing pin, which protrudes through the recoil plate.

The FCG is designed to support slamfire via the optional disconnecter.

Prints

STL Files Location: Receiver/FCG/Prints/

FCG_Housing	FCG_Disconnector	FCG_FiringPinCollar	FCG_ChargingHandle
			
FCG_Hammer	FCG_HammerTail	FCG_TriggerMiddle	FCG_Trigger
			

Vitamins - Imperial

Purpose	Part	Quantity
Charging Handle Bolt	#8-32x1/4" SS Socket Cap Bolt	1
Charging Handle Nut	#8-32 Short Heatset Nut	1
Disconnecter Pivot Pin	3/32"x3/4" Steel Pin	1
Disconnecter Spring	0.22" OD 0.625" Long (0.02" wire)	1
Firing Pin	6Dx2" Box Nail, cut flush to 1.54" OAL	1
Firing Pin Spring	0.22" OD 0.625" Long (0.02" wire)	1
Hammer Bolt	1/4-20x5" Flat Head Bolt	1
Hammer Bolt Sleeve	9/32"x3.5" K&S Brass Tube	1
Hammer Cap Nut	1/4-20" Acorn Nut	1
Hammer Nut	1/4-20" Heatset Nut (Short)	1
Hammer Spring	0.052x0.625x3" ~6.3lbs/in Compression Spring	1
Recoil Plate (L12k)	#Liberator12k Official Alloy Recoil Plate	1*
Recoil Plate (DIY)	2x2-3/8x3/8" Mild Steel Plate	1*
Recoil Plate Center Bolts	#8-32x1.5 SS Flat-Head Bolt	2
Recoil Plate Side Bolts	#8-32x0.5 SS Flat-Head Bolt	4
Sear	1/4"x1.67" Steel Square Rod	1
Sear Pin	3/32"x1/2" Music Wire	1
Sear Return Spring	0.02" Wire, 0.25"x1.25"	1

* Pick one, these parts have alternates.

Vitamins - Metric

Purpose	Part	Quantity
Charging Handle Bolt	TODO: DIN???? M4x1/4" SS Socket Cap Bolt	1
Charging Handle Nut	TODO: M4 Heatset	1
Disconnecter Pivot Pin	2.5x18mm Stainless Steel Pin	1
Disconnecter Spring	0.5mm Wire, 6mm OD, 20mm Length Spring (Cut to 16mm)	1
Firing Pin	2.5x50mm Nail, , cut flush to 40mm OAL	1
Firing Pin Spring	0.5mm Wire, 6mm OD, 20mm Length Spring (Cut to 16mm)	1
Hammer Bolt	DIN7991 M6x130 Countersunk Bolt	1
Hammer Bolt Sleeve	6mm ID Sleeve for <i>Hammer Bolt</i>	1
Hammer Cap Nut	DIN1587 M6 Domed Hex Cap Nut	1
Hammer Nut	M6 Heatset Nut (M6xD9.5xL6)	1
Hammer Spring	1.4mm Wire, 16mm OD, 80mm Length Spring	1
Recoil Plate (L12k)	None	1*
Recoil Plate (DIY)	6mm Thickness 50.80x60.325mm AISI 4140 Steel Plate	1*
Recoil Plate Center Bolts	DIN7991 M4x40 A2/A4 Countersunk Bolt	2
Recoil Plate Side Bolts	DIN7991 M4x40 A2/A4 Countersunk Bolt	4
Sear	6mm x 42.42mm Steel Square Rod	1
Sear Pin	None	1
Sear Return Spring	0.5mm Wire, 6.5mm OD, 35mm Length Spring	1

* Pick one, these parts have alternates.

Post-Processing

Trigger Subassembly

1. Insert the trigger middle portion into the glued sides. It should slide freely.
2. Drop the sear return spring into the trigger middle.
3. Insert the sear and compress the return spring until the pin hole is visible through the side slot.
4. Insert cross-pin through the inclined slot through the sear. It should lay flush or just below the surface of the trigger sides.
5. Verify the trigger moves freely.
6. Lube the cross-pin hole, both sides of the slot, front and rear of the sear.
7. Squeezing the trigger should now feel silky smooth.

Hammer Subassembly

Install the 1/4-20" heatset nut into the rear of the hammer (the portion with the large pocket) and wait to cool.

Install the hammer bolt and slip the hammer bolt sleeve over the extended portion. Add the hammer spring, hammer tail. Finally, install the hammer cap nut with threadlocker.

Firing Pin Subassembly

Prepare the firing pin by cutting the 6D box nail to 1.535" in length. Cut generously, file flush and gently round the outer edge of the end. Sand smooth with 220 grit or finer.

Ream the firing pin collar hole to 2.5mm and install into the firing pin collar from the rear, the flared portion is forward.

Install the firing pin spring into the flared portion of the firing pin collar.

Charging Handle

Install the #8-32 heatset nut into the charging handle and allow to cool.

Before installing the #8-32x1/4" Socket Cap Screw, chuck it up in a drill and file/sand the side of the bolt cap smooth. Then install the bolt into the charging handle from the underside.

DIY Hardware

If you don't want to purchase a kit from the [Liberator12k.com Store](https://liberator12k.com), you can make your own. It won't be faster or cheaper, but all the information you need is freely available and the hardware is available at your local hardware store or metal supplier.

Sear

- 1/8" hole 5/16" from the bottom for the sear cross-pin
- This hole should be drilled under-size and reamed if possible.
- Filing any burrs is Good Enough

Sear Cross-Pin

- 3/32" Music Wire
- 1/2" long
- Ends should be slightly rounded and smooth.

Recoil Plate

Required Tool	Metric Alternative
#8-32 Tap	M4 Tap
#29 Drill Bit	3.5mm Drill Bit
5/16" Drill Bit	8mm Drill Bit
2.5mm Drill Bit	N/A

Instructions

The full How To is incomplete, but at a high level:

1. Print a Recoil Plate template (TODO).
2. Mark the holes with a punch and drill to specified size.
3. Tap the holes for the tension rods and FCG Housing holes with #8-32.

Technical Notes

Recoil Plate

2" wide (fits between the frame bolts) and 2.375" high, 1/4" thick. This covers the tension rods and provides room for the revolver spindle pin.

Firing Pin

When the hammer is in the full forward position, the back of the *Firing Pin* will be flush with the back of the *FCG Housing*, meaning anything beyond 1.5" will stick out of front of the recoil plate.

However... nails have a pointed tip - and you have to cut that off.. plus a little deformed metal rear of the tip. So plan for some loss. A bare minimum of, 40mm worth of nail to work with.

The nail is intended to be glued into the collar, and the collar is indexed with wide flats, so it can't rotate - making it rimfire-friendly.

Why won't my firing pin fit? It's a 6D, but it's got a 2.75mm shaft

You've got "Common" nails. You need 6D "Box" nails - they're thinner. Sorry :) A 6D Box nail has a 2.4mm shaft.

Hammer Spring

There's some flexibility here. "If it fits, I sits." $>5/16$ " ID and $<5/8$ " OD.

You shouldn't need a stupid strong spring - 10lb is probably too much, but it shouldn't ever be an issue for the FCG. The hammer tail would probably fail first, or the charging handle bolt. If you can't charge it by hand, it's too strong.

Trigger Pull

The coefficient of friction for lubed steel/steel is ~ 0.16 , the trigger has a mechanical advantage of 1.5. Give or take, trigger pull is 10% of hammer spring.

Plastic-on-plastic friction probably contributes much more to trigger pull than the hammer spring does.

For improved performance:

1. Polish and lube the sear surfaces and pin.
2. Sand/polish the friction surfaces of the trigger sides.
3. Use a needle file to clean up the inclined slot in the Trigger.
4. Sand/polish slot smooth.

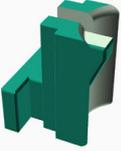
1.3: Lower Receiver



Provides a grip, trigger guard, means of attachment via T-lugs. The printed parts are sandwiched and bolted together. The mount is sandwiched in with the lower side plates. The T-lug tabs secure the mount into the lower. The lower mount couples the lower to the receiver.

Prints

STL Files Location: Receiver/Lower/Prints/

Lower_Left	Lower_Middle	Lower_Right
		
Lower_MountFront	Lower_MountRear	
		

Vitamins - Imperial

Purpose	Part	Quantity
Lower Nut	#8-32 Heatset Nut (Short)	5
Lower Bolt	#8-32x1.25 SS Flat-Head Bolt	5
Lower Pin	Universal Clevis Pin 1/4x2"	1
Lower Pin Retaining Pin	6Dx2" Box Nail	1

Vitamins - Metric

Purpose	Part	Quantity
Lower Nut	M4 Heatset Nut (M4xD7xL5)	5
Lower Bolt	DIN7991 M4x35 A2/A4 Countersunk Bolt	5
Lower Pin	None	1
Lower Pin Retaining Pin	2.5x50mm Nail	1

Post-Processing

Install Heatset Nuts

Install the heatset nuts into Lower_Left.

Pin Retainer

Locate the small hole in the Lower_MountRear. Insert Lower Pin Retaining Pin, press it into the mount until flush.

Subassembly

Requires the trigger from the [Fire Control Group](#).

1. Lay Lower_Left flat-side up.
2. Install Lower_MountFront - the extended portion points left.
3. Install Lower_MountRear - the extended portion points left.
4. Tuck the trigger up between the two LowerMounts.
5. Add Lower_Middle to the stack.
6. Add Lower_Right, it should seat on the LowerMount tabs.
7. Gently compress the stack by hand.

If there are large gaps in the stack, light tapping with a rubber mallet should close them. If you need a lot of force, there's probably something binding. Figure out what's bulging, and file it down. Needle files are great for this.

Technical Notes

Trigger Pull

File, sand smooth, and lube any friction surfaces that are dragging.

1.4: Stock



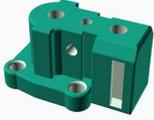
A stock and buttpad designed to fit the standard receiver.

Four Tension Rods secure the stock to the Receiver.

A Stock Pin keeps the Stock_Backplate on the stock - this secures the guts of the Receiver in place. Remove to field strip the gun.

Prints

STL Files Location: Receiver/Stock/Prints/

Stock	Stock_Backplate	Stock_Buttpad
		

Vitamins - Imperial

Purpose	Part	Quantity
Stock Pin	Universal Clevis Pin 1/4x2"	1
Stock Pin Retaining Pin	6Dx2" Box Nail	1
Stock Backplate Nut	1/4-20 Heatset Nut (Short)	2
Stock Buttpad Bolt	1/4-20x3-1/2" Flat Head Screw	2

Vitamins - Metric

Purpose	Part	Quantity
Stock Pin	None	1
Stock Pin Retaining Pin	2.5x50mm Nail	1
Stock Backplate Nut	M6 Heatset Nut (M6xD9.5xL6)	2
Stock Buttpad Bolt	DIN7991 M6x90 Countersunk Bolt	2

Post-Processing

Stock Backplate

Insert the *Stock Pin Retaining Pin* into the back of the *Stock_Backplate*.

Buttstock

Insert the *Stock Buttpad Bolts* through the *Stock_Buttpad*, and screw into the back of the *Stock Latch Subassembly*.

Technical Notes

Stock Pin

The Universal Clevis Pin is simply an off-the-shelf item that works for the job. A better, purpose-made pin can be easily made: 2x1/4" round rod. Cut a small groove cut around the center to act as a detent for the *Stock Pin Retaining Pin*. This secures the pin in place.

Stock Pin Retaining Pin

I've used 3/32" music wire, 6D box nails, 2.5mm stainless wire. It just needs to be about that size and about 2" long.

Drill out the hole in the *Stock_Backplate* to size, and hammer in your pin. Add superglue to the last bit before you hammer it all the way in.

2: Forends - Choose Your Weapon

Your First Build

Your first build should be a CAFE12 break-action 12ga. Even if there's another design that caught your eye, the CAFE12 is training wheels for the project and a great way to kick the tires on your receiver build.

CAFE12 or CAFE12+

The **Plus** version uses 4130 tube instead of Schedule 40 pipe. 3/4" Schedule 40 pipes and 4130 tube are different sizes, so the CAFE12 and CAFE12+ forends do not share all parts.

The CAFE12 will be slightly cheaper, and you can easily source the parts from your local hardware stores. The pipe seam must be removed from the barrel, a large rat tail or half-round file works nicely. This may take some WORK. Pipe seams suck and are sketchy.

The CAFE12+'s normalized 4130 tube is much stronger **and** seamless. You'll have to purchase it from a metals supplier. Since it's stronger, machining is harder as well - don't use a pipe cutter on 4130 tubing.

Using an Official [Liberator12k.com Store](#) Kit? Go to [2a: CAFE12+ Forend](#)

Planning to fabricate all your own parts? Go to [2b: CAFE12 Forend](#)

The Models

This list includes models that don't fit into the Universal Receiver system, like BARBB. Most of these forends can be mounted to the universal receiver without modification.

Model	Class	Status
CAFE12+	Top Break	Alpha
CAFE12	Top Break	Alpha
FP37	Top Break	Alpha
ZZR 6x12	Zig Zag Revolver	Prototype
BARBB	Bolt-Action Bullpup	Prototype

Just a reminder, the [Liberator12k.com Store](#) has complete parts kits if you don't want to source your own hardware. Your support is greatly appreciated, thank you!

CAFE12 Plus

This upgraded kit uses 4130 tubing instead of Schedule 40 pipe.

Jump to [2a: CAFE12+ Forend](#)

CAFE12 Base

A CAFE12 break-action shotgun that uses Schedule 40 pipe instead of 4130 tube. [2b: CAFE12 Forend](#) has the full details about what pipes you need to buy and tips for how to prepare them.

FP37

The FP37 was mostly "For Fun" and because it was an easy demonstration of how flexible the #Liberator12k platform can be. The parts list is almost identical to the CAFE.

[2c: FP37 Forend](#) will put a flare launcher in your hands.

ZZR6x12

Still a work-in-progress, but there's enough here that you could run a set of prints. No guarantees that any of it'll work or even go together properly.

2a: CAFE12+ Forend



A 12ga Top Break variant inspired by the venerable pipe shotgun.

The Easy Way

You can buy a CAFE kit from the [#Liberator12k store](#).

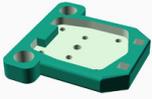
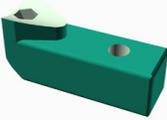
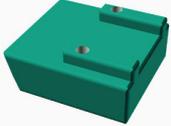
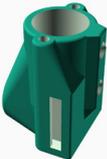
CAFE12 or CAFE12+

This is the documentation for the **Plus Version** using 4130 tube instead of Schedule 40 pipe. 3/4" Schedule 40 pipes and 4130 tube are different sizes, so the CAFE12 and CAFE12+ have different *Barrel Collars*.

See [Chapter 2b: CAFE12 Forend](#) if you're sourcing your own barrel from pipe.

Prints

STL Files Location: Forend/TopBreak_CAFE12+/Prints/

ReceiverFront	Forend	BarrelCollar	Extractor
			
LatchTab	Cluster	Vertical Foregrip	Sightpost
			

Part	Filament Used	Print Time @ 0.4mm
ReceiverFront	57g	07h17m
Forend	189g	1d01h10m
BarrelCollar	114g	15h00m
Extractor	14g	1h55m
LatchBlock	114g	15h00m
Cluster	?g	?h?m
Vertical Foregrip	?g	?h?m
Total	420g	2d08h09m

Inch BOM

This build uses the [Top-Break Common BOM](#) in addition to the following components.

Component	Purpose	Part	Quantity
Forend/Barrel Assembly	Trunnion Set Screws	#8-32x1/8" Grub Screw	8
Forend/Barrel Assembly	Trunnion	1.25"x0.125" 4130 Tubing 8" Long	1
Forend/Barrel Assembly	Barrel	1"x0.093" 4130 Tubing 20" Long	1
Forend/Barrel Assembly	Barrel Shim	3x6" 0.002" Shim Stock	1

Metric BOM

TODO

Assembly

Use the [Top Break Common Assembly Instructions][TopBreak_Assembly.html].

2b: CAFE12 Forend



A 12ga Top Break variant based on the venerable pipe shotgun.

This version uses Schedule 40 3/4" and 1" pipe. Read the [Chapter 2a: CAFE12+ Forend](#) for the better, faster, stronger 4130 tube forend.

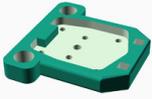
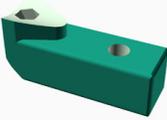
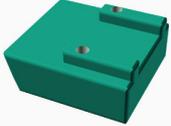
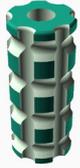
Partial Kit

You can still buy a Partial CAFE kit from the [#Liberator12k store](#).

It has all the nuts, bolts, and custom parts already completed for you, just no barrel. If you want to DIY everything, see [Appendix: Top-Break Common - Machining](#).

Prints

STL Files Location: Forend/TopBreak_CAFE12/Prints/

ReceiverFront	Forend	BarrelCollar	Extractor
			
LatchTab	Cluster	Vertical Foregrip	Sightpost
			

These numbers are wrong, **TODO: Redo them.** Copied from CAFE12+, ballpark accurate.

Part	Filament Used	Print Time @ 0.4mm
ReceiverFront	57g	07h17m
Forend	189g	1d01h10m
BarrelCollar	114g	15h00m
Extractor	14g	1h55m
LatchBlock	114g	15h00m
Cluster	?g	?h?m
Vertical Foregrip	?g	?h?m
Total	420g	2d08h09m

Vitamins

Inch BOM

This build uses the [Top-Break Common BOM](#) in addition to the following components.

Component	Purpose	Part	Quantity
Forend/Barrel	Trunnion Adhesive	2-part Epoxy	1
Forend/Barrel	Trunnion Bolts	#8-32x1/2" Socket Head Screw	3
Forend/Barrel	Trunnion	1" NPT Schedule 40 Pipe 8" Long	1
Forend/Barrel	Barrel	3/4" NPT Schedule 40 Pipe 18.5" Long	1

Schedule 40 Pipe

These Schedule 40 galvanized pipes are common in every single hardware store in the United States. They'll be in the plumbing section, with a silvery finish.

Pipe Seam

Pipes have a seam - this is not a good thing for many reasons, but it is what it is. You'll have to file the seam out of the 3/4" pipe near the chamber area, and out of the entire 1" pipe.

1" Pipe Nipples

"Pipe nipples" - they're just short pipes threaded on both ends. They're more expensive per foot, but they tend to be smoother on the inside and will require less filing.

Metric BOM

TODO

Post-Processing

If you purchased a kit all the machining is already done for you.

Foregrip Cluster Heatset

Install the *Foregrip Bolt Nut* on the inside of the *Cluster*.

Trunnion Machining

The *Trunnion* has several #8-32 holes drilled along the top. These holes are used to secure the *BarrelCollar* to the *Trunnion* and the *Foregrip Cluster* to the *Trunnion* and *Barrel*.

DIY Fixture

DO NOT DRILL THE BARREL

A fixture located at `Forend/TopBreak_CAFE12/Fixtures/TrunnionFixture.stl` can be used to help you drill and tap your own *Trunnion*.

Using a #8-32 tap, add threads to the hole in the middle. Use a 1.5" #8-32 to hold the *Trunnion* in place like a set screw. Now you're ready to drill and tap the holes.

DO NOT DRILL THE BARREL

Drill the holes out with a #29 wire bit, start out very slowly so the drill bit doesn't walk on the round surface. Be sure to clear your chips early and often, use lots of cutting fluid.

Once you've finished drilling and tapping, ensure the inside of the *Trunnion* is clear of any chips and debris.

Extractor Slot Machining

File out a 1/4" wide slot in the 6-O'clock position for the extractor bit. Aim for a 45 degree angle 1/8" deep.

File this same notch in a matching location on the barrel. This is easiest if you wait until you've installed the *Cluster*.

Latch Bars Machining

Drill and tap the the *Latch Rods* 1" from the end -

Barrel Subassembly

Install the *Barrel* into the *Trunnion*, add the *Cluster* and *Foregrip*. The *Foregrip Bolt Nut* and *Cluster Bolts* should act as set screws to secure the *Barrel* into the *Trunnion*.

Barrel Collar: Extractor Subassembly

1. Insert the *Extractor Bit* into the *Extractor*.
2. Drop the *Extractor Spring* into the *Barrel Collar*'s large rectangular hole.
3. Insert the *Extractor* into the hole, and install the *Extractor Retainer* from the large round hole for the barrel.

Barrel Collar: Latch Subassembly

1. Insert the *Latch Springs* into the small square holes in the *Barrel Collar*.
2. Insert the *Latch Bars* into the square holes in the *Barrel Collar*.
3. Ensure the *Latch Bars* slide smoothly - file the holes if necessary.
4. Insert the two rectangular tabs of the *Latch* into the underside of the *Barrel Collar
5. Depress the *Latch Bars* while you install the *Latch Screws*.
6. Lube the slots and bars.

Forend Subassembly

1. Rotate the *Barrel Collar* up into the *Forend*.
2. Install the Barrel with the sleeve

2c: FP37 Forend

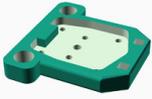
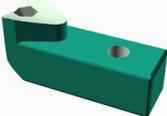
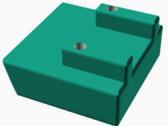


"Flare Projector" 37mm - It's not a weapon.

- Manual Charging
- Linear Hammer
- Single shot
- Top-break action

Prints

STL Files Location: Forend/TopBreak_FP37/Prints/

ReceiverFront	Forend	BarrelCollar	Extractor
			
LatchTab	Cluster	Vertical Foregrip	Sightpost
			

These numbers are wrong, **TODO: Redo them.** Copied from CAFE12+, ballpark accurate.

Part	Filament Used	Print Time @ 0.4mm
ReceiverFront	57g	07h17m
Forend	189g	1d01h10m
BarrelCollar	114g	15h00m
Extractor	14g	1h55m
LatchBlock	114g	15h00m
Cluster	?g	?h?m
Vertical Foregrip	?g	?h?m
Total	420g	2d08h09m

Vitamins

Inch BOM

This build uses the [Top-Break Common BOM](#) in addition to the following components.

Component	Purpose	Part	Quantity
FP37	Trunnion Adhesive	2-part Epoxy	1
FP37	Cluster Bolt Nuts	#8-32 Heat Set Short	2
FP37	Trunnion Bolt Nuts	#8-32 Heat Set Short	2
FP37	Barrel	1-5/8x19" Fence Post	1

Fence Post Barrel

1-5/8-in x 1-5/8-in W x 8-ft H Silver Galvanized Steel Line Fence Post Lowes has this stuff for \$26/8ft.
Item #552282Model #58910128

Trunnion

There is no trunnion.

Post-Processing

If you purchased a kit, all the machining is already done for you.

Foregrip Cluster Heatset

Install the *Foregrip Bolt Nut* on the inside of the *Cluster*.

Extractor Slot Machining

File out a 1/4" wide slot in the 6-O'clock position for the extractor bit. Aim for a 45 degree angle 1/8" deep.

File this same notch in a matching location on the barrel. This is easiest if you wait until you've installed the *Cluster*.

Latch Bars Machining

Drill and tap the the *Latch Rods* 1" from the end -

Barrel Subassembly

Install the *Barrel* into the *Cluster* and *Foregrip*. The *Foregrip Bolt Nut* and *Cluster Bolts* should act as set screws to secure the *Barrel* into the *Trunnion*.

Barrel Collar: Extractor Subassembly

1. Insert the *Extractor Bit* into the *Extractor*.
2. Drop the *Extractor Spring* into the *Barrel Collar's* large rectangular hole.
3. Insert the *Extractor* into the hole, and install the *Extractor Retainer* from the large round hole for the barrel.

Barrel Collar: Latch Subassembly

1. Insert the *Latch Springs* into the small square holes in the *Barrel Collar*.
2. Insert the *Latch Bars* into the square holes in the *Barrel Collar*.
3. Ensure the *Latch Bars* slide smoothly - file the holes if necessary.
4. Insert the two rectangular tabs of the *Latch* into the underside of the *Barrel Collar
5. Depress the *Latch Bars* while you install the *Latch Screws*.
6. Lube the slots and bars.

Forend Subassembly

1. Rotate the *Barrel Collar* up into the *Forend*.
2. Install the *Barrel*.
3. Install the *Barrel Collar Screws*

3: Ammunition

Now that you've got a receiver and forend, you need some ammo.

The good news is there are printable shells in the project. The bad news is they aren't rendered to STL yet.

Swing by the chat if you want to 3D print some ammo.

4. Developers

Want to customize the designs to fit the materials you have on hand? Change gauge or caliber completely, or something even more extreme?

The real "secret sauce" of this project, is the software library I developed during the design process of these guns. I tried a lot of different ideas, and what I came away with, is an OpenSCAD software library chock-full of useful *configurable* gun parts.

If you browse through the code, you'll see the project has been grouped into major functional areas.

- Ammo - Printable Ammunition
- Receiver - Lower+Universal Receiver
- Forends - Interchangeable forends for the receiver
- Tooling - Printable tools for gun making
- Vitamins - Store-bought parts, nut and bolts, collars, etc.
- Toys - Ideas I've tried and thrown away, or not.

Requirements

If you're running Linux/Mac and have `make` available, there are Makefiles here.

OpenSCAD

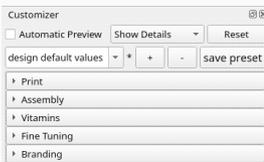
[OpenSCAD](#) is required to render printable STLs.

Liberator12k Source Code

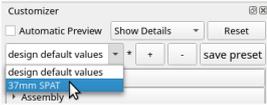
You will also need the complete source code ZIP for the project. If you're reading this, you should have a copy. Otherwise, [download the zip](#).

Rendering STLs

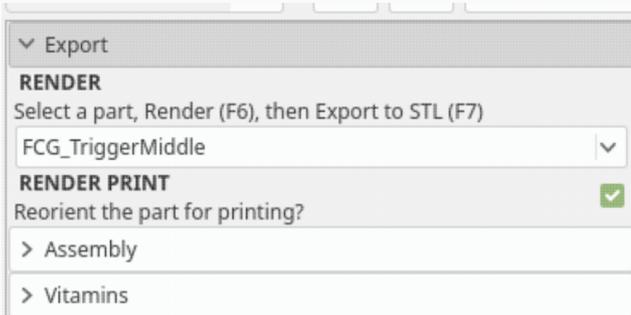
OpenSCAD has a "Customizer" pane which can be enabled from the View menu. Only very advanced users and developers need to touch the source code - everything else can be done with the customizer panel:



Some of the designs have other presets, like the break-action:



Export STL for Printing



1. Choose the part you want and push F6 to render it, or from the *Design* menu, select *Render*.
2. Once you've rendered a part for printing, you need to export the STL.
3. Push F7 or *File -> Export -> Export as STL*.
4. Save it with a unique filename based on the part name.stl

For instance:

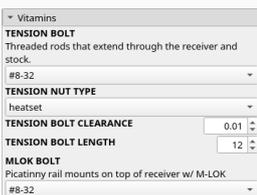
- ReceiverFront.stl
- ReceiverForend.stl
- BarrelCollar.stl
- Extractor.stl
- Latch.stl
- Foregrip.stl

Assembly



When you preview (F5), you will see the complete assembly of all the related parts. This section lets you show/hide parts, cutaway parts, and control transparency.

Vitamins



Customize the nuts, bolts, tubes, rods, etc used to render the model. This is a great way to customize a design to your own uses/materials.

Fine Tuning



Allows customizing some of the parameters of a model. Useful for customizing.

Branding



Control the branding text by model.

5. Why

It is the imperative of every living thing to defend itself. That means it's up to you to fight back when something tries to eat you.

Get help if you can, but sometimes no help is coming. Let this be a light for dark times.

No Step

The 2-inch-long Golden Poison Dart Frog's skin contains a toxin so deadly it can kill over a dozen adults. But they'd all have to touch it. Rosebushes and rattlesnakes get along like hemlock and honeybees. Harmless and helpless are worlds apart.

Let us trade stories, good times, food, jeans, and genes. Go in peace and prosper. Failing that - leave me alone or else.

Bigger Fish to Fry

The great [democides](#) and [wars](#) in living memory have demonstrated the need for individually held arms.

If history repeats itself, complying might be the death of you. So like the honeybee - fight like hell anyway.

The "Banality of Evil"

The *second* greatest danger to human prosperity and life is the order giver. Stalin, Hitler, and Mao never personally murdered anyone. Neither did Charles Manson or Jim Jones for that matter.

The greatest danger is the unquestioning order-follower. Nothing more than a cog in a machine.

1. Enforce the current government's current laws, even if they are atrocious.
2. Fight the current government's enemies, even if manufactured or imagined.

"Befehl ist Befehl" is German for "an order is an order." Nazis used this explanation in the Nuremberg trials to excuse their murders. "I was just following orders" they said.

Takeaway: You can be murdered by a normal person just going about their day. That person might be an upstanding patriot wearing your country's flag and enforcing the law - following lawful orders to murder you.

See also: [Hannah Arendt](#)

Murder Machine

I'm a software engineer, it's a lens through which I see the world. I see nation states which run like mindless machines. Code written by lawyers running on flawed human beings doing their part. Its ultimate tool: violence - to death. And nobody knows this is a machine.

What About Mass Shooters?

Most definitions of "mass shooting" use something along the lines of 3+ people.

Nation states have body counts in the tens of millions, with precedents in living memory. When a state is murdering its own people, that's a Tuesday morning in BFE. An event so routine and monotonous that they make up games to spice things up.

Don't miss the forest for the trees.

What About Terrorists?

The US Government gave them billions of dollars worth of equipment way better than this when it left Afghanistan.

What About Tanks and Nukes?

Read up a bit on [Guerrilla Warfare](#) tactics.

And 3D printed nukes.

Some other thoughts of others

A man's natural rights are his own, against the whole world; and any infringement of them is equally a crime; whether committed by one man, or by millions; whether committed by one man, calling himself a robber, or by millions calling themselves a government.

Lysander Spooner, No Treason: The Constitution of No Authority

My political opinions lean more and more to Anarchy (philosophically understood, meaning abolition of control not whiskered men with bombs) - or to 'unconstitutional' Monarchy. I would arrest anybody who uses the word State (in any sense other than the inanimate realm of England and its inhabitants, a thing that has neither power, rights nor mind); and after a chance of recantation, execute them if they remained obstinate! If we could get back to personal names, it would do a lot of good. Government is an abstract noun meaning the art and process of governing and it should be an offence to write it with a capital G or so as to refer to people. If people were in the habit of referring to 'King George's council, Winston and his gang', it would go a long way to clearing thought, and reducing the frightful landslide into Theyocracy.

The Letters of J.R.R. Tolkien, pg. 74, Letter 52.

And how we burned in the camps later, thinking: What would things have been like if every Security operative, when he went out at night to make an arrest, had been uncertain whether he would return alive and had to say good-bye to his family? Or if, during periods of mass arrests, as for example in Leningrad, when they arrested a quarter of the entire city, people had not simply sat there in their lairs, paling with terror at every bang of the downstairs door and at every step on the staircase, but had understood they had nothing left to lose and had boldly set up in the downstairs hall an ambush of half a dozen people with axes, hammers, pokers, or whatever else was at hand?... The Organs would very quickly have suffered a shortage of officers and transport and, notwithstanding all of Stalin's thirst, the cursed machine would have ground to a halt! If...if...We didn't love freedom enough. And even more - we had no awareness of the real situation.... We purely and simply deserved everything that happened afterward.

Aleksandr I. Solzhenitsyn , The Gulag Archipelago 1918-1956

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Appendix: Top-Break Common - BOM

Inch BOM

Component	Purpose	Part	Quantity
Forend	Reinforcement Screws	#10x3" Bugle Head Deck Screws	2
Forend	Trunnion Bolts	#8-32x1/2" Socket Cap Screw	3
Forend	Extractor Bit	#2 flat 1/4" Hex Bit	1
Forend	Extractor Retainer	1/4"x3/4" Dowel Pin	1
Forend	Extractor Spring	12lb 5/6" OD 2.75" Long	1
Forend	Latch Bars	1/4"x3" Square Rod	2
Forend	Latch Screws	#8-32x1" Flat Head Screw	2
Forend	Latch Springs	0.22" OD x 0.02" Wire x 1.6" Long	2
Forend/Handguard	Handguard Bolts	#8-32x12" Threaded Rod	2
Forend/Handguard	Handguard Bolt Nuts	#8-32 Heatset Insert	2
Forend/Handguard	Handguard Bolt Caps	#8-32 Acorn Nut	2
Forend/Handguard	Handguard Bolt Washers	#8-32 Washer	2
Forend/Handguard	Cluster Bolts	#8-32x1/2" Flat Head Screw	2
Forend/Handguard	Vertical Foregrip Bolt	1/4"-20x3.5" Flat Head Screw	1
Forend/Handguard	Vertical Foregrip Nut	1/4"-20 Heatset Insert	1
Forend/Handguard	Vertical Foregrip Pin	2.5x18mm Dowel Pin	1
Forend/Handguard	Sightpost Bead Screw	#8-32x1-1/2" Socket Cap Screw	1
Forend/Handguard	Sightpost Nut	#8-32 Heatset Insert	1

Metric BOM

TODO

Appendix: Top-Break Common - Assembly

Hardware Kit

If you purchased a kit, all the machining is already done for you.

To DIY all the parts yourself, read the [Top-Break Common Machining](#) section.

Print Post-Processing

Tools you may use include:

- Needle File Set
- 1/2" Reamer
- 3/4" half-round file
- #2 Square Drive Bit
- Sandpaper, ~100-300
- Superglue, 2-part epoxy, or other permanent adhesive.

Forend

1. Ream the frame bolt holes.
2. Lightly apply permanent adhesive or epoxy to the *Reinforcement Screws*.
3. Screw the *Reinforcement Screws* into the forend and wipe off any excess.
4. Optional: sand the pivot surfaces smooth.
5. Oil the pivot surfaces.

Barrel Collar

Pivot

1. Using pliers, peel off the supports from the pivot area.
2. Flush cutters can be used to clean up the flat portion.
3. Using a 3/4" half-round file, file the rounded inner pivot area smooth.
4. If there is any elephant's foot, file it off now.
5. Sand the inner curve of the pivot smooth with progressively finer grits.
6. Test fit by rotating the *Barrel Collar* up into the *Forend*.
7. Sand the inner and outer curves of the *Barrel Collar* pivot smooth.
8. If the pivoting action feels tight or sticks, it's probably elephant foot. Clean that up.

Extractor

1. Ream the *Extractor Retainer* hole to 1/4".
2. Insert the *Extractor Bit* into the *Extractor*, shim and add superglue if loose.
3. File/sand the extractor's top/bottom/sides smooth.
4. Drop the *Extractor Spring* into the *Barrel Collar*'s large rectangular hole.
5. Insert the *Extractor* into the hole.
6. With the *Extractor* pressed inwards, install the *Extractor Retainer* through the barrel hole.

Foregrip Cluster

1. Ream the *Cluster Bolts* holes.
2. Ream the *Handguard Bolt* hole.
3. Ream the *Vertical Foregrip Pin*.
4. Heatset the *Foregrip Nut* on the inside of the *Cluster*.
5. Heatset the *Handguard Bolt Nuts* in the sides at the back of the *Cluster*

Latch

1. Insert the *Latch Springs* into the small square holes in the *Barrel Collar*.
2. Insert the *Latch Bars* into the square holes in the *Barrel Collar*.
3. Ensure the *Latch Bars* slide smoothly - file the holes if necessary.
4. Insert the two rectangular tabs of the *Latch* into the underside of the **Barrel Collar*
5. Depress the *Latch Bars* while you install the *Latch Screws*.
6. Lube the slots and bars.

Forend

1. Rotate the *Barrel Collar* up into the *Forend*.
2. Holding the *Barrel Collar*, install the *Barrel Group* from the front.
3. Secure the *Barrel Collar Bolts*

Appendix: Top-Break Common - Machining

Drill and Tap the Trunnion

These instructions apply to the CAFE series. The FP37 uses epoxy for fixing the barrel in place.

DO NOT DRILL THE BARREL

A fixture located at `Forend/TopBreak_CAFE12+/Fixtures/TrunnionFixture.stl` can be used to help you drill and tap your own *Trunnion*.

Using a #8-32 tap, thread the hole in the middle of the fixture. Use a 1.5" #8-32 to hold the *Trunnion* in place, like a set screw. Now you're ready to drill and tap the holes.

DO NOT DRILL THE BARREL

Drill the holes out with a #29 wire bit, start out very slowly so the drill bit doesn't walk on the round surface. Be sure to clear your chips early and often, use lots of cutting fluid.

Tip: Use a small end mill to put a flat on it first, if you have one. This will prevent the drill bit from wandering.

Once you've finished drilling and tapping, ensure the inside of the *Trunnion* is clear of chips and debris.

Cut the Extractor Slot

File out a 1/4" wide slot in the 6-O'clock position for the extractor bit. Aim for a 45 degree angle 1/8" deep.

File this same notch in a matching location on the barrel. This is easiest to do with the *Trunnion* installed on the barrel so you can do both at once. A large square-edged file makes quick work of this operation but you can also use a Dremel or angle grinder (and a lot of finesse).

Tip: Use a vise.

Extractor Crescent

The extractor bit needs a crescent shaped cutout to go around the cartridge. If you're making just one or two, check-and-fit until a cartridge chambers snugly without binding.

A Dremel with a cylindrical grinding bit works best for DIY. Use a dummy cartridge.

Drill and Tap the Latch Bars

Drill and tap (#8-32) the *Latch Bars* 1" from the end

Barrel Group

1. Insert the *Trunnion* into the rear of the *Cluster* and line up the threaded holes on top.
2. Insert the *Barrel* into the front of the *Cluster*. Extractor cutout-side first.
3. Headspace on a dummy cartridge. The *Trunnion* should be flush and the *Barrel* slightly recessed.
4. Install the *Cluster Bolts*.
5. Install the *Foregrip Bolt* into the *Foregrip* and screw into the *Cluster* from the bottom.