Deterrence Dispensed presents

Common Sense Gun Control Group

3D Printable Fire Control Group for FGC-9, AR-15, and more

IvanTheTroll

version 1.0

Preface

The Common Sense Gun Control Group (CSGCG) is a 3D printable fire control group that was designed for use in the FGC-9 – though it's compatible with a large number of AR15-based firearms, including AR15s themselves, AR15s with CMMG 22lr conversion bolts (assuming you print the correct CMMG specific hammer), The Mac Daddy, Mod9/WTF9, and several other platforms. While it's not quite as strong as a factory fire control group, the CSGCG is capable of holding up to a surprising amount of abuse and presents a solution for instances where fire control groups are hard to obtain or where the maker wants to have bragging rights about how much of their gun they truly made themselves.

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

While I've had no serious issues, unsafe function, or dangerous results when testing/using the CSGCG, you should realize that your testing and experience comes with your own risk and responsibility. Note that because the parts of this fire control group are plastic, they can be broken if you try and break/misuse them - it all depends on your print settings, assembly, and adherence to the steps laid out in this document. While I and others have tested this trigger extensively and have had no unsafe function (even when trying to force it), it's important to understand that IF a fire control group breaks, bad things could happen - wildfires (full auto until the magazine is empty), out of battery detonations (not really an issue with AR15s, but on some blowbacks it could happen), or other issues. Because of this fact, I've included a TESTING PLAN further down in this document - this plan will help you ensure that your fire control group will function correctly BEFORE you actually fire it - you'll put undue stress on the parts to ensure they will hold up.

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

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ggDWS7KFSt4dq9TAM9aTyVAGBrhM1gwvsafoX9rjMMc1
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A special thanks to the beta testers of this project

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

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Shopping List

This list will cover what supplies you will need to assemble the CSGCG. You will need some basic tools, such as a 3mm drill bit, a 5/32” drill bit (if using AR15 hammer and trigger pins) or 4mm drill bit (if you are using 4mm pins/screws for your hammer and trigger pins), a screwdriver, a punch, a mallet, a battery drill, a pair of needle-nosed pliers, plus an allen wrench set.

You will also need various springs and metal parts – several AR15 springs, an M3 bolt and nut, as well as an M4x6mm DIN84 screw. Further down, these items are detailed:

1x AR15 Hammer Spring

1x AR15 Trigger Spring

1x AR15 Disconnector Spring

1x M4x6mm DIN 84 bolt

1x AR15 Selector Detent Spring

1x AR15 Selector Detent

1x M3x35mm bolt (cut down to 27mm or 32mm) for safety selector assembly

1x M3 nut for safety selector assembly

JBWeld Two-Part Epoxy

Tooling:

You will need a 3mm drill bit, a 5/32” (or 4mm) drill bit (which size you need depends on which size pins you are going to be using: for standard AR15 fire control group pins, you need a 5/32” drill bit, for 4mm pins, a 4mm drill bit). You will need a battery drill, a couple screwdrivers (for removing support material), a punch (size isn’t really important), and a hammer. A pair of needle-nosed pliers will help. An allen wrench set will be required to tighten bolts.

AR15 Spring Set/Kit + Selector Detent

You will need an AR15 spring set that has the following springs:

1x Hammer Spring

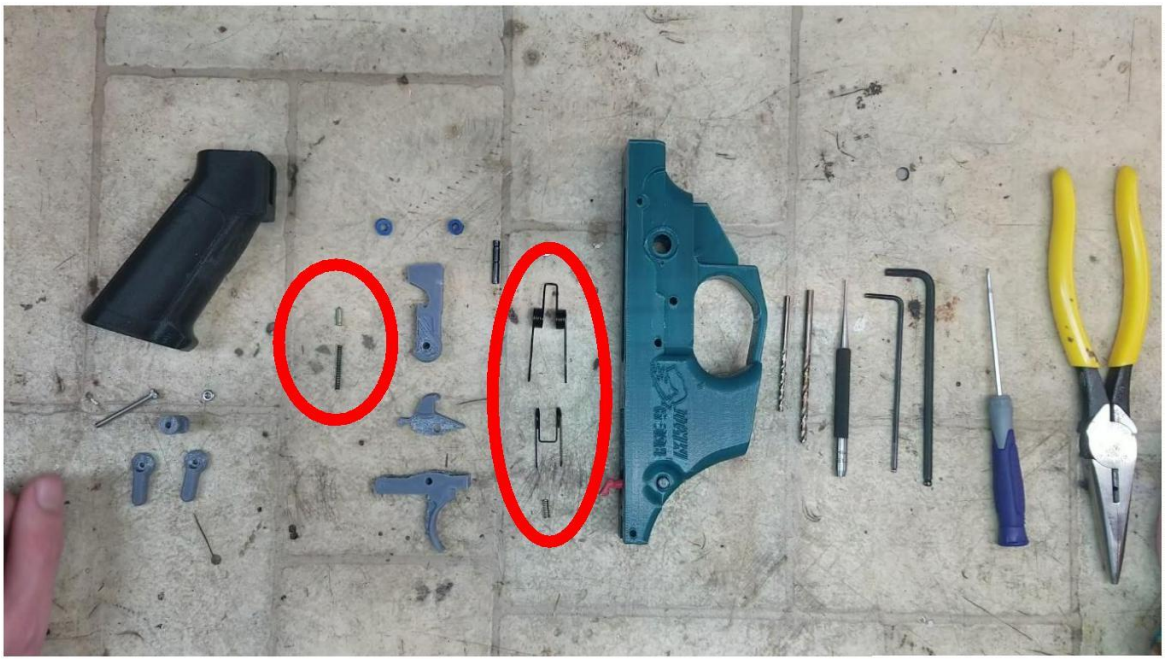
1x Trigger Spring

1x Disconnector Spring

You will also need:

1x Safety Selector Spring

1x Safety Selector Detent



Note about sourcing springs

When it comes to the springs, standard AR15 fire control group springs can/should be used. If you are making your own springs (I don't recommend this since you can just buy them), note that the AR15 fire control group REQUIRES the spring pressure of the hammer and disconnector spring to be balanced - too weak a hammer/too strong a disco spring and your hammer won't reset, and in the opposite case you'll have hammer follow/random doublefires. Do note that much of this testing was done using Chinese-sourced fire control group springs - these springs sell/ship from several different countries, including some that regulate fire control group parts - so, at least for now, for all intents and purposes, the springs can be considered COTS parts (unregulated). However, depending on how willing these Chinese shops would be to play ball with governments, if they went looking for a list of people who ordered springs from a particular shop, you might want to have a cover story just in case - just be aware.

Here is the link for the springs I used: https://www.aliexpress.com/item/32916890199.html

Here is a link for springs that ship from all over (which should be the same springs and should work, but I did not order these): https://www.aliexpress.com/item/1005001451650916.html

AR15 Hammer/Trigger Pins (or 4mm pins/bolts of similar length)

You will need two hammer/trigger pins, or two 4mm bolts/pins cut down to roughly similar length (or the width of your receiver/frame)

M3x35mm Bolt + M3 Nut

You will need an M3x35mm bolt and M3 nut. You can buy a longer bolt if you can't find an M3x35. This bolt will need to be cut down to either 27mm long or 32mm long (measuring just the length of the shaft of the bolt, not counting the length of the head of the bolt) – depending on if you want a two-lever, ambidextrous safety selector, or a single sided selector. Remember that when cutting down bolts, you can use a hacksaw to shorten it, but you will need to use a file to deburr and chamfer (add an angled edge on the end of spot where you cut) for the nut to thread onto the bolt easily.

M4x6mm DIN84 Screw

You will need one M4x6mm DIN84 screw for each hammer you print – this screw acts as a reinforced striking face on the hammer.

JBWeld Two-Part Epoxy

You will need some JBWeld epoxy, such as that pictured below:

Printed Parts List

You will need to print the following parts in the listed quantities. Note that if you are using this fire control group in an application where the height of the hammer is a critical dimension (for example, on the CMMG AR15 22lr conversion bolts) you will need to print the “CMMG Specific” hammer. Otherwise, print the standard hammer. ***Refer to the README for detailed printing info!***

1x Hammer

1x Trigger

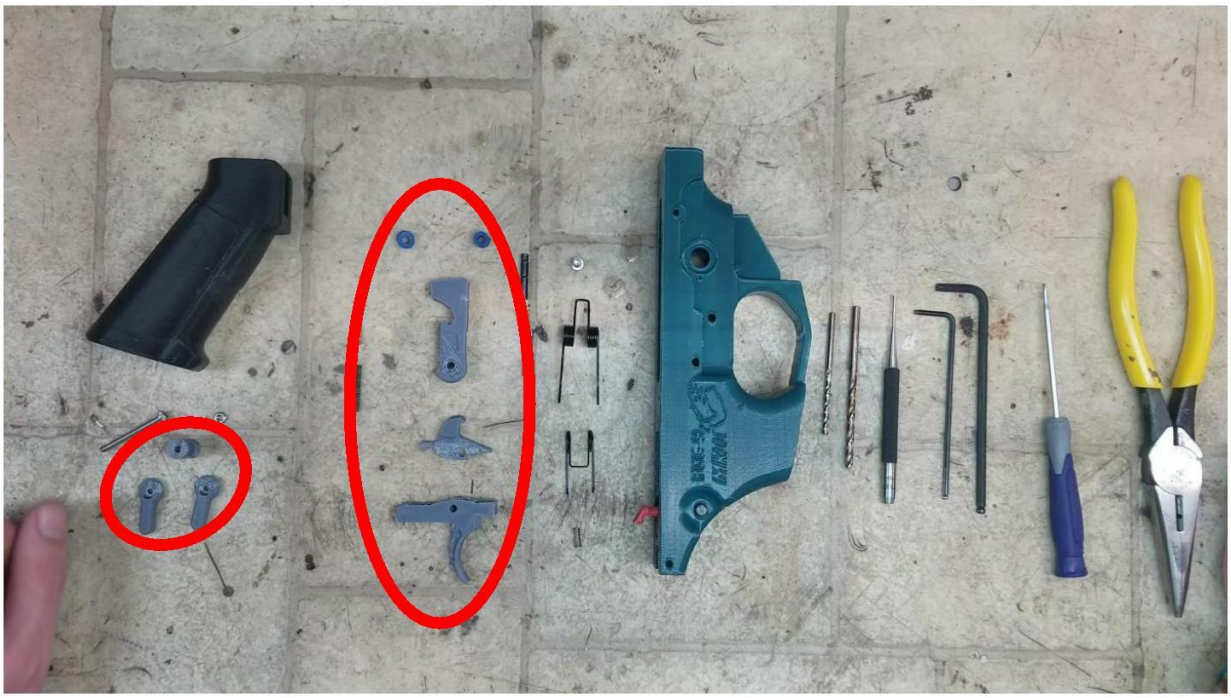
1x Disconnector

1x Trigger Stud

1x Hammer Stud

1x Safety Selector Drum

2x Safety Selector Lever (you can print just one lever if you don’t want ambidextrous function)



Assembly Tutorial

I recommend you read this section in its entirety before you attempt installing your CSGCG. It is also ***VERY IMPORTANT*** that you follow the "Testing Plan" section of this document before using this trigger group with live fire.

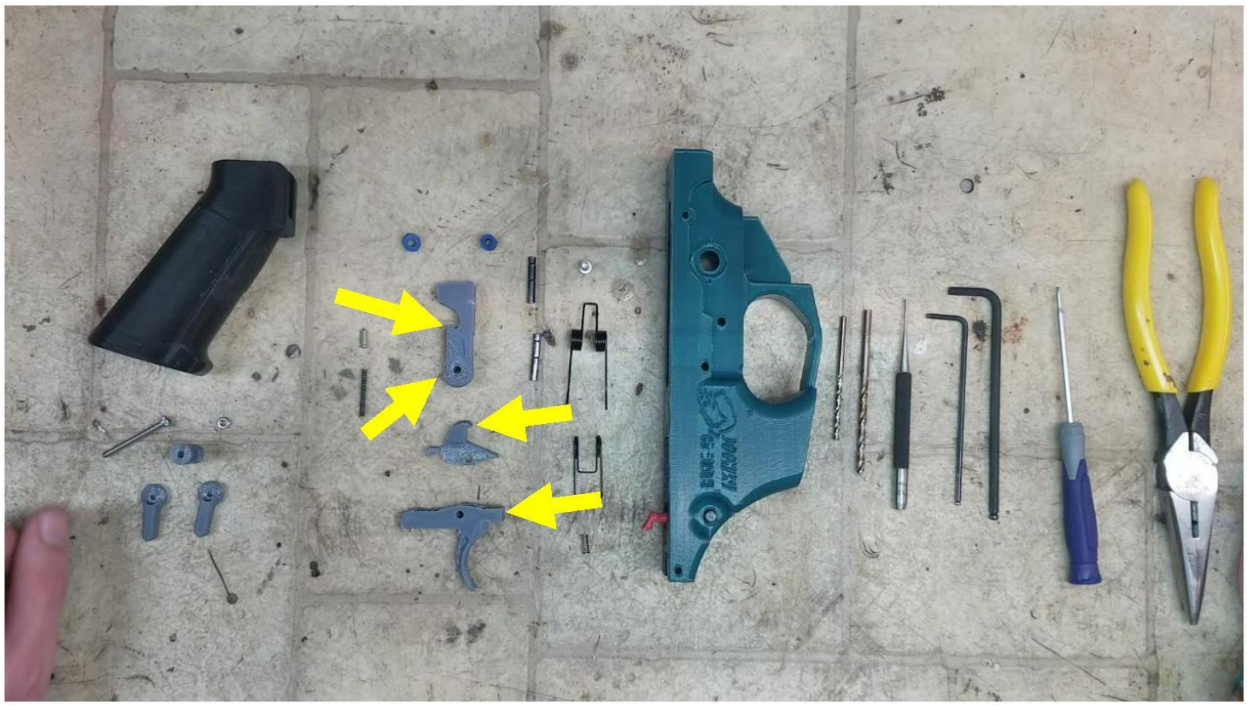
For a video showing installation of these parts:
https://lbry.tv/@Ivan's_CAD_Streams:c/CSGCG_Assembly:7

This video doesn't have the detail that the text document does – it's for reference/help if you get stuck installing the parts only, use the document for detailed instructions.

It's important that you understand what the term "sear surfaces" means – in this context, it's the places that the different parts of the fire control group hook against each other. The arrows in the below pictures point to the sear surfaces – take care not to damage the sear surfaces during assembly or support removal. The hammer has two sear surfaces – one at it's bottom, which looks like a square-shaped cutout, and one about midway up the hammer, which looks like a little claw or hump. The trigger has one sear surface – the blocky area at the front of the trigger. The disconnector has one sear surface – the hook-shaped area at the top.

IMPORTANT NOTE

It is very important that the hammer and trigger holes in whatever receiver you are using are drilled to the correct size for your pins (not oversized) and that you drill out these holes as straight as possible!!



REFER TO THE README FOR BASIC PRINT INFORMATION

Step 1: Prep Work

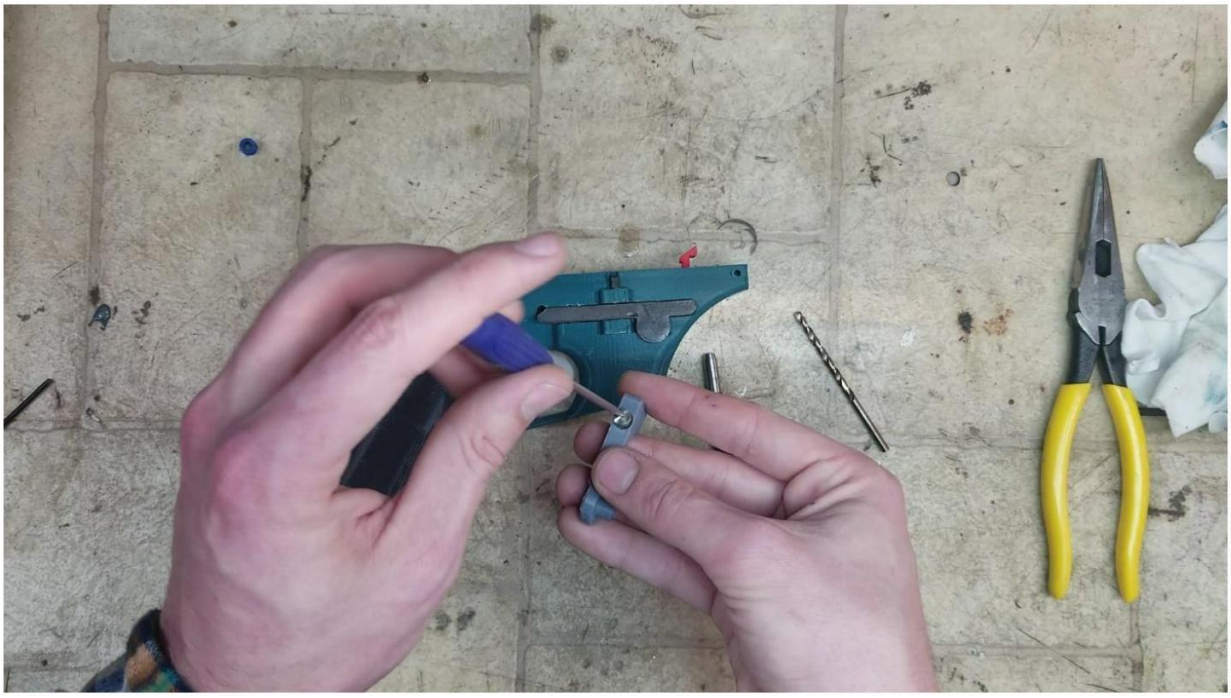
Remove the parts from the print bed. If they are stuck down and you have to pry/chisel them off, DO NOT pry or chisel on or near the sear surfaces for these parts. Pry from the rear end of the trigger, from the bottom/base of the disco, and from the top of the hammer. Remove enough support material so that you can use a 4mm or 5/32" drill bit to drill out the holes (carefully, drill straight and control your drill) on the disco, trigger, hammer, and both of the studs. You will want to drill just enough so that an AR15 fire control group pin (or 4mm pin, etc) can pass through the holes in these parts without excessive resistance. Once the holes drilled to size, remove all support material. You will probably have to scrape some supports off the hammer and disco. The trigger is hard to remove supports from due to its internal channel - use a small screwdriver and be patient. It takes me about 10 minutes to get all the supports off the trigger. After removing all the support material, you should ensure that any/all brim material that was used (if any) is removed. I have found that a box cutter works great for shaving off the brim material. It's important to remove the brim material from the sear surfaces of each part - but be careful not to damage the sear surface itself. Next, take your safety levers and safety drum and drill out the holes on these parts with an 3mm drill bit. Ensure that you remove any print debris or brim from the drum, so that the locking/alignment tabs on the levers can fit inside the slots on the drum. Next, test fit the disco inside the slot in the trigger. It should not be snug/hard to rock back and forth in the slot. If it is, then you either still have support material attached to the disco/trigger, or your support settings were wide enough that the sag on the two parts is interfering. Take some sandpaper or a rotary tool (Dremel tool) and sand down the support (sagging) side of the disco. You can clean up the support side of the channel on the trigger as well. ***Avoid sanding the sear surfaces!***

You can use a 3mm screwdriver to scrape the supports out of the channel inside the trigger.

It is important to make sure that you try not to damage the parts themselves when removing supports – try and be as surgical as you can.

Step 2: Hammer Reinforcement

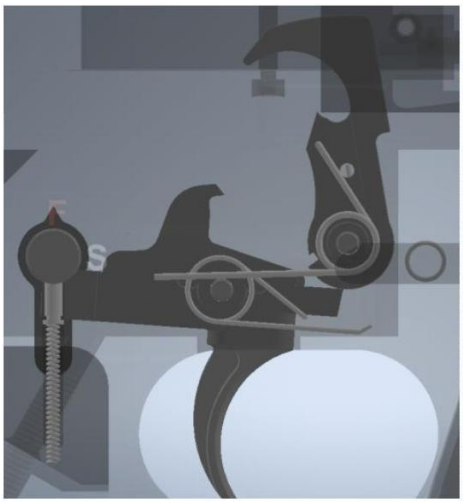
The hammer for this fire control group uses a steel insert to reinforce the strike face (where the firing pin and hammer touch). I recommend using a DIN84 M4x6mm bolt. Remove the supports from the pocket on the face of the hammer. Mix up a little JBWeld and apply it to the threads of the bolt as well as to the internal cavity on the hammer – try and fill the cavity in the hammer with JBWeld. Next, screw the bolt into the hammer. Only screw the bolt in far enough for it to be flush with the face of the hammer - don't screw it in deeper than the face of the hammer. Screw slowly and allow the JBWeld to smush out – you can wipe off any excess. Once you get the bolt flush with the face of the hammer, wipe some of the excess JBWeld that smushed out into the slot that you used the screwdriver on (the slot on the face of the bolt). Let the JBWeld set up for 12-24 hours.



Install screw into hammer

Installing the Parts

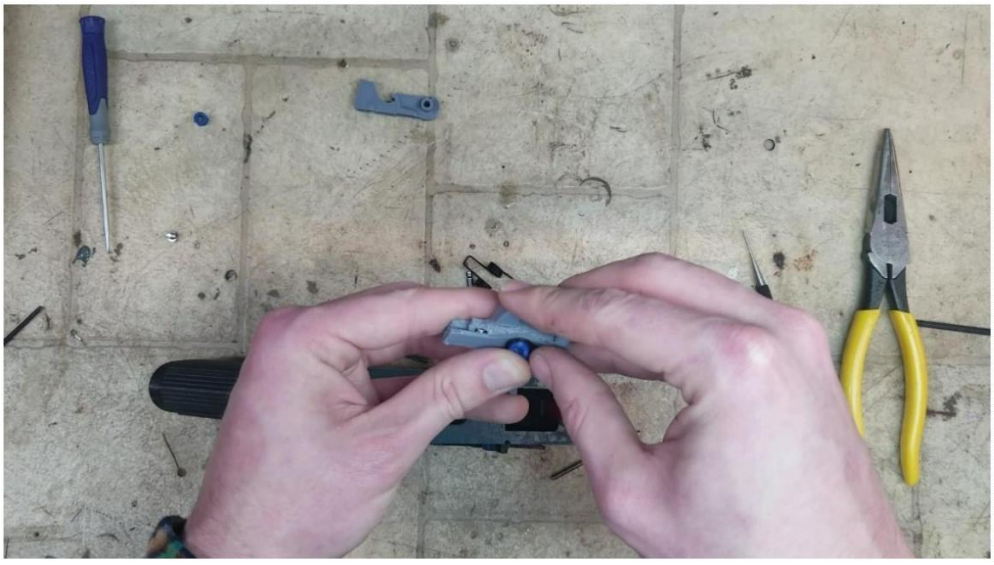
This goes very similar to standard AR15 fire control group installation. Watch this video if you're unsure how this is done (especially with regard to how to install the springs – it's very important you install them correctly): https://lbry.tv/@Ivan's_CAD_Streams:c/CSGCG_Assembly:7



Example of how the springs should be installed on the hammer and trigger. Note how the springs sit on these parts.

The only real difference is that the trigger and hammer have their right side studs printed as separate parts. If you'd like, you can glue or JBWeld these on after printing. However, you can just assemble the parts with the studs held in the right place (some commercial triggers have separate studs for the trigger, so this isn't unsafe/bad).

If you are using the Chinese spring set (which I have sized the trigger for, so this may apply for OEM disconnector springs as well), your disconnector spring will not be automatically retained by the trigger - you will have to be careful when installing it. I've found that installing the trigger, disconnector, and trigger stud all as one unit (with the trigger spring and disco spring in place) is the best way to do this.



Install the trigger, trigger stud, trigger spring, disconnector, and disconnector spring as one unit

With a little practice, you can drop the whole trigger assembly into the receiver in one step

You can use a slave pin (a pin only as wide as the trigger + trigger studs) to hold everything together while dropping it in, then drive the slave pin out with a full-size pin. This isn't required, however, and I've installed this setup by using a small punch to line each part up as I push the pin through.

You can use a punch or screwdriver to help line up all of the pin holes while you push the pin through

After installing the trigger and disconnector, apply a little grease to the sear surface on the front foot of the trigger and the sear surface on the hook of the disconnector. At this point, you can also test that the disconnector and trigger fit together correctly – rock the disconnector by pushing on the rear rail of it. It should move freely and spring back into place without dragging or hanging up. If it hangs up or you feel resistance, remove the disconnector and sand down its rough support side a little, then retest. You can reinstall it with grease on the parts of the disconnector that sit down inside of the slot in the trigger.

When installing the hammer, the same concept applies (though because there isn't a disco to line up, everything slides together easier). You may have to push the hammer stud/spring into position to line it up with the hole in the lower.

You might have to use a punch or screwdriver to align the hammer stud with the hole - guide it into place and push the pin in. You can see here that the stud and spring need to be pushed towards the bottom of this picture.

**** A note on installing the hammer pin ****

Because the hammer itself doesn't have a hammer pin retainer (unless you add one), it can be a little tricky to get your hammer pin lined up just right. If you just can't get it to work, get and M4 bolt or 4mm pin and use it for your hammer pin – you can cut it to be much longer than the normal AR15 pin, which will alleviate the trouble of getting it centered in the receiver.

After installing the hammer, apply grease to the hook-shaped sear surface that is located about halfway up the hammer.

After installing the hammer, trigger, and disconnector, you can install the safety/fire selector. Cock the hammer back and slide the drum into the selector hole. Ensure the detent stops (the round holes connected by a track) are on the right side of the drum. If your drum fits tight in the receiver, ensure the hole in the receiver is properly drilled out to 0.375”, then ensure that the drum doesn’t have any print debris or raised edges on it – remove these with a file or Dremel tool if they exist.

The drum should be installed so that the round detent cutouts in the selector should be on the right

Take your M3x27mm or M3x32mm screw (cut down from an M3x35mm screw) and one of your levers. Slide the screw (it should pass through assuming you drilled the hole in the lever out properly), but you can spin it if needed to get it to go through.

Next, install the lever and screw into the drum. You might have to use a tool to spin the bolt as you guide it through the drum. Make sure that the raised alignment notches on the lever line up with the slots in the selector as you install the first lever, and that the drum isn’t upside down (the hump/cutout on the drum should be facing DOWN when the lever you are installing is vertical).

After installing the first lever, your bolt should be sticking out of the other side of the drum. Take your second lever (if you plan on using a second lever) and push it onto the bolt and align it with the slots in the drum.

Finally, take your M3 nut and tighten it down. I have found that using an allen wrench (or what ever tool is needed) to spin the bolt while holding the nut with a pair of pliers works best to tighten these parts. Tighten these parts enough that the nut won't come loose. You can melt a little plastic against one of the flat faces of the nut to "stake" it in place if you would like.

Finally, install your pistol grip, detent, and detent spring. Test the safety out by rotating it from the fire to safe positions several times. It might be stiff at first, but should loosen up to move smoothly between detent positions. You are now ready to do your function checks. DO NOT fire the gun before doing these checks!

TESTING PLAN

Finally, you've got your fire control group installed. Make sure you've got a little grease or thick oil on your sear surfaces - this will ensure that the sear surfaces don't drag and that they won't wear, and makes the trigger pull and function smoother.

Give your setup a basic function test. I recommend you do this with whatever your upper receiver is not installed – just test the setup on your lower receiver (where applicable). A basic function test involves the following (leave your safety selector on fire – the tail on the selector should be vertical):

1. Cock hammer (finger off trigger)

2. Pull trigger (catch the hammer with your hand, **do not let the hammer slam forward without hitting something before it smacks into the lower**)

3. Cock hammer (trigger still held down)

4. Release trigger (hammer should pop up but should not release)

5. Go back to Step 2 and repeat. Pull the trigger slowly, release it slowly, jerk it quickly and release it quickly. **Be sure to catch the hammer when pulling the trigger**.

If you have parts hanging up (pulling the trigger won't release the hammer, releasing the trigger won't reset the hammer), ensure that there is no brim/support material remaining on these parts, that you applied grease to the sear surfaces, and that all your springs are correctly installed. Do not try and sand/file down sear surfaces to make things work, you've either got something installed wrong or didn't remove supports properly.

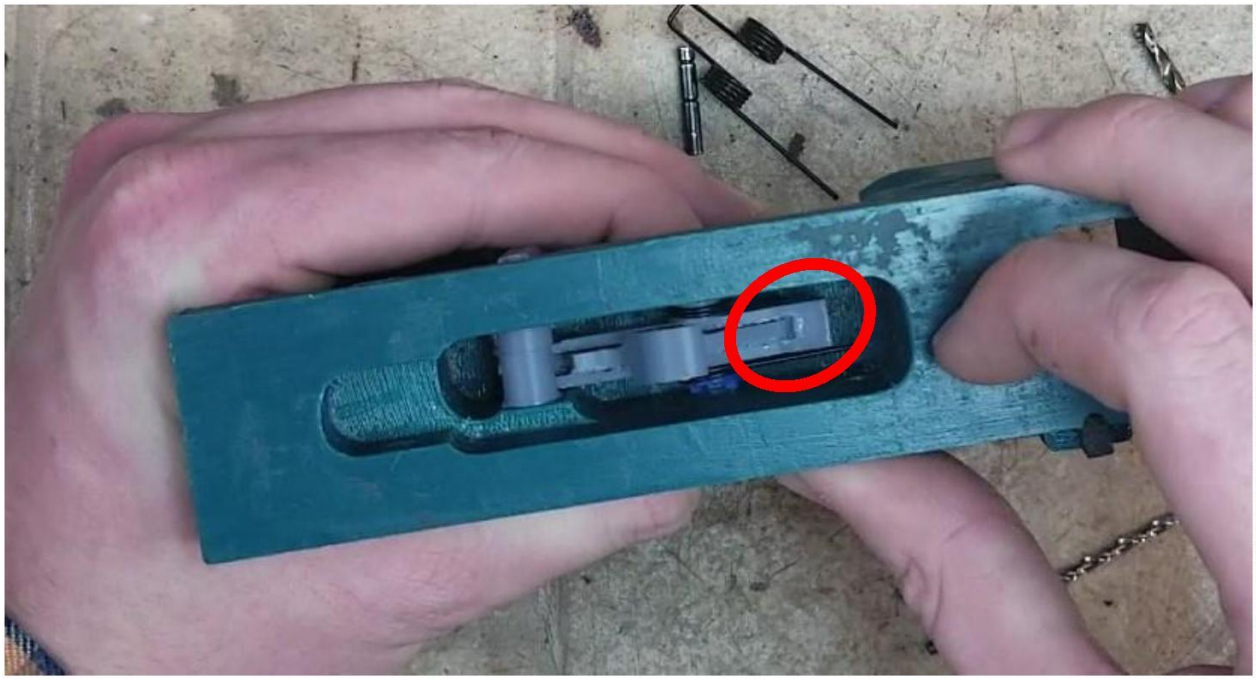
After ensuring basic function is good (perform at least 50 iterations of the steps listed above), you are ready to check the integrity of your fire control group. Follow this process:

1. Cock the hammer. With the hammer cocked, pull upward on the top of the hammer, as though you were forcing the hammer to move. The hammer should not release.

2. Pull the trigger and **catch the hammer with your hand**. Keep the trigger held down and push the hammer back. It should click as the disconnector catches it.

3. Again, try to pull upward on the top of the hammer. You might get the disco to move a little, but it should not release the hammer. Keep in mind that you must keep the trigger held down tight when performing this step - if you release the trigger a little, the hammer can reset (because that's what it is supposed to do).

4. Finally, hold the trigger down and push the hammer back until it clicks under the disco. Slowly release the trigger. The hammer should pop up and reset the trigger regardless of how slowly you move the trigger. If your hammer flies all the way forward when releasing the trigger, you will need to ensure that you removed all the support material from the disconnector and the channel inside the trigger. You will also need to ensure there is ZERO print debris or deformation on the front toe of the disconnector (or where the front toe of the disconnector meets the trigger itself.



NO support material or deformation can be present between the trigger and the front toe of the disconnector at this point.

4 (cont). If you do have a little deformation or damage to either the trigger or disconnector (this can happen on accident when removing the supports from either part), you can try to clean it up by scraping the damaged sections with a screwdriver to try and make them more smooth – the connection between the trigger and disconnector at this point sets how much rotation of the trigger is required to reset the hammer – if it's damaged, you can have the hammer release before the trigger has rotated into place to catch it – while this can function as "binary" fire (the gun fires when the trigger is pulled and released) it IS NOT safe to have a gun that randomly works as a binary or a semi based on poor fitment of parts.

5. After ensuring function of the trigger group, cock the hammer and rotate the safety selector to the 'safe' position (the tail on the lever will be pointing to the rear). Try and pull the trigger. The hammer should not move when the safety is pulled – it might wiggle just a little if you pull hard on the trigger, but it should not fire even if you pull hard. Pull on the trigger as hard as you think you might need – it's surprisingly durable, so don't worry too much about breaking the trigger. Pulling hard enough to make it flex is something you should only do this once time – just verify that the hammer won't fall when you pull the trigger hard while the gun is on safe and your final check is complete.

***** A Quick Note Regarding Hammer Pin Retaining *****

I had come up with a workable solution (but not a very good one) for retaining the hammer pin - it worked but I'm still not sure how necessary it is - I've had no issue with the pin walking without the retaining wire during firing, small drops, or shaking. In my opinion, using extra long 4mm bolts and nuts for hammer/trigger pins is the best DIY solution if you're using this fire control group in some application that causes hammer/trigger pins to walk out. Or, if you're using a mil-spec profile receiver, you can just use commercial anti-walk pins.

FAQ/Troubleshooting

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

A: Depends on your platform/application. With 22lr CMMG AR15 bolts, I would expect the CSGCG to last thousands and thousands of rounds. In something centerfire like the FGC-9 or an AR15, I was able to run hundreds of rounds with thousands more dry fires – so maybe a thousand rounds, maybe more, maybe less. Just remember that the CSGCG is more of a workaround than it is a legit fire control group – while it works well enough, it isn't meant to replace a real fire control the group.

Q: What sort of reliability should I expect?

A: Reliability has been good, though some light strikes have been reported. Especially with use in things like the FGC-9, it is very important to make sure your firing pin and bolt setup is all built correctly (that you have good extension on your firing pin, that your firing pin doesn't bind up, etc). It's also very important when using an FGC-9 or similar setup that your firing pin channel is perfectly concentric with the barrel/bore axis – you need your firing pin hits to be well centered on the primer!

Q: Why am I getting light primer strikes or bad reliability with CMMG 22lr conversion bolts?

A: When using the CSGCG with the CMMG 22lr bolt (or any bolt/setup where the overall height of the hammer is a critical dimension), you will need to make sure that you print and use the 'CMMG Specific' hammer model.

Q: Why am I getting light strikes on an FGC-9/Mod9/WTF9?

A: It's likely that your firing pin is just a little too short. You can try to fix this problem by shaving a little material off of the bottom of the hammer cutout on the housing, but the best solution is to make a new firing pin and make sure to have the correct length at the end of the firing pin.

Q: Why am I getting doublefires?

A: Doublefiring is when the gun fires when you pull the trigger and when you release it. Thanks to beta testing, we've found out the most common ways this issue could happen: if you are using this fire control group in a receiver that has out of spec pin holes (if the holes are in the wrong location, if the holes are too loose/not drill out straight), if you are using the wrong sized pins - if you drill the fire control parts and receiver out with a 4mm drill bit, use 4mm pins. Don't use smaller pins with holes you drilled out to a larger size. Finally, doublefires can be caused due to damage to the surface where the front of the disconnector touches the trigger, or due to not fitting the disconnector into the trigger properly – the disconnector must be able to rotate easily when installed.