Duplex Designs' Thermoptic Pistol

Introduction

At Duplex Designs we do love a great sci-fi weapon. Although our favourite has got to be Deckard's blaster from the movie Blade Runner the pistol seen in the live action movie Ghost in The Shell really stood out.

Major Mira Killian / Motoko Kusanagi's thermoptic pistol is interesting as it appears in two states. A standard pistol when she is not in the active thermoptic suit but transforms into a beautiful white and transparent weapon once the suit is activated.

OK, we are a little late to the party with this model as the movie came out in 2017, but we believe the weapon is iconic enough to warrant its creation here in 2026.

There is not a fantastic amount of information available on this pistol and its screen time is limited (So screen shots are not plentiful) but we do know that the pistol was based on a Glock 19.

Why This Model Was Created

When we wanted to build a thermoptic pistol for our own collection we were disappointed in what was available either for free or for sale. Most models were nowhere near the correct size, and we like our models to be screen accurate and consist of many parts.

So, we started to design a new pistol based on the available screen shots and stunt weapon photos and used a Glock 19 as the starting point to ensure that our finished model was as close to that used (or at least envisioned) in the movie.

But there are discrepancies between the pistol's representation depending on what we look at.

Why Is This Model Better Than Other Available Models

The Duplex Designs model is based on actual Glock 19 dimensions and is so accurate you can actually use real (or replica) Glock parts.
There is minimal glueing required. Most parts lock together just like a Glock assembly.

We believe that this model is the most detailed and has the highest part count of all those available currently.

NOTE: We have made a change to the position and geometry of the barrel to avoid people trying to do silly things with real Glock parts and making a dangerous gun. Yes, you can fit a Glock slide or barrel, but the slide will be in the wrong place and would not function correctly.

Model Variations – A weapon Study

As we mentioned above, there are differences in how the pistol is represented depending on what source material we look at.

The main difference is frame is certainly different depending on the pistol's thermoptic state.

The stunt double rubber model has the clearest available phots and this does not show as mush detailing on the frame in its non-thermoptic state. In fact, we can clearly see where the original Glock frame had been built up.

Even in its non-thermoptic state we have a difference in detail between the rubber stunt pistol and the in movie shot of the weapon being fired. The rubber stunt pistol has no raised rectangular detail on the trigger guard lower while it is visible in the movie.

The frame in thermoptic mode always has this raised feature along with some more detailing that all existing models seem to agree on.

Non-thermoptic stunt model with no rectangular feature.

Non-thermoptic on screen including rectangular feature.

Thermoptic state always includes rectangular feature.

Therefore, this model contains three frames allowing you to choose what you want to build.

Another detail difference is the cutout on the rear slide cover. It is not present on the rubber stunt model but is clearly visible on the thermoptic version and follows the cutout on the Glock slide cover plate.

No cutout.

Cutout visible.

Again, both versions are available to build.

Some images show solid grey instead of transparent parts in thermoptic mode, so you are free to choose that style.
Even the screen shots of the pistol in non-thermoptic mode show grey and black parts so you are free to mix and match components to create the model you want. See the Gallery later for movie stills to aid your decision.

Project Skill Level Required

Because of the level of detail and number of parts this model is not suitable for beginners. You will need a proficient level of skill in 3D printing and modelling to do justice to this model.

Part tolerances are pretty much the same as an actual Glock so depending on what you create the parts with you may need to do some sanding and finishing to get parts to fit.

For example, FDM printing at 0.08mm layer height using a 0.4mm nozzle is good enough for a great fit for the assembly but as soon as you start to use resin parts the differences in resin shrinkage and tolerance will start to show.

NOTE: Although the model contains lots of detailed parts it should *not* be expected that final build will perform all the mechanical actions expected of the real pistol.

Technically, if all the materials were suitably strong and accurate the model would be able to cycle the slide and load and eject the rounds. However, we have omitted the ejector pin so that action will not work and you stand a good chance of breaking things if you try and rack the slide.

Please consider this a static model. Yes, you can field strip and rebuild this pistol just like the real Glock 19 but please use it for display purposes only.

Build Material Choices

FDM Printer

We have had good results with at 0.08mm layer height using a 0.4mm nozzle using PLA and the parts fit is excellent.

However, you are not going to achieve a good enough transparent finish using FDM.

It is also noted that larger parts such as the frame, slide and grip, may well exhibit VFA or ghosting which will require extra sanding and polishing.

If you are building the non-thermoptic version, then this is a very acceptable methos of printing. Also note that with this version you can omit a lot of the internal parts as they would not be visible.

Resin Printer

Necessary for the transparent parts as FDM simply does not cut it. Also great for all the small parts.

Resin is quite unpredictable when it comes to shrinkage or indeed expansion and is very dependent on the resin used, cure times and how well the model has been sliced and supported so when it comes to larger items such as the grip, frame and magazine tube you may find a lot of sanding and finishing is required for a good fit of parts.

Hybrid Printing

This is how we actually produced our final display ready model.

Resin was used for transparent parts and for the most part this was successful. However, the frame and magazine fit took some finishing whereas the FDM printed parts went together with no issue.

The aim was to go for resin for the whole build, but we actually ended up using white matte filament and FDM printed the grip and the front frame parts simply because these fitted the transparent resin frame without so much finishing and sanding.

Build Options

Non-Thermoptic

As this is mostly black and is non transparent you do have the options here of omitting a lot of the internal details.

Choices

You can use the non thermoptic frame with or without the trigger guard rectangular feature. Or you could use the thermoptic frame if you wanted the extra detail.

The barrel is supplied in a single part or two parts connected by a barrel connection ring. Use the single part barrel for the non-thermoptic version.

The slide exists as a single part or two-part design. Use the single part slide for this variant.

Thermoptic

This is the most challenging build because of the transparent parts. There are not many options to this build, but it is recommended to use non transparent parts for the rear slide internals, so they are more visible. Springs also add great visual detail.

Choices

The slide release lever could be printed in black, but this does show rather a lot through the transparent frame so a good option here is to print it transparent and just paint the thumb lever (Where it is external to the frame) in black.

The barrel is supplied in a single part or two parts connected by a barrel connection ring. Use the two-part barrel for the thermoptic version if you want the breech end transparent but the barrel end in metallic solid colour. If you print the grey and white thermoptic version you can use the single part barrel if desired.

The slide exists as a single part or two-part design. Use the two-part slide for this variant as the front and rear halves are always dual coloured in thermoptic mode.

Both Variants

The magazine assembly is common to both build types and depending on whether you want to add rounds to it this determines the magazine spring to use.

It is recommended to use FDM printing for the magazine spring. Use the long one if the magazine is to be empty or only contain a few rounds (Real or 3D printed).

There is a limit to how much the plastic spring will compress, so as the number of rounds increases you may want to cut the length of the spring to suit.

If the magazine is close to being full of rounds, then there is a compressed magazine spring available to print.

The trigger is supplied in a single composite form to simplify printing and assembly, or you can opt for the multi part trigger with separate safety and pins.

Hardware Required

The only parts that cannot be 3D printed are the springs. The slide stop spring and magazine springs are the exception, but you may find these too brittle if resin printed.

The other springs are simply impossible to print therefore it is recommended that you purchase some springs if you are building a thermoptic version. Of course, if you print the non-thermoptic version you may want to omit springs all together.

Spring List

- Recoil Spring 11mm diameter, 70mm length

- Ejector Rod Spring 4mm diameter, 18mm length

- Firing Pin Spring 6mm diameter, 35mm length (ID of at least 5.5mm required)

- Trigger Safety Plunger Spring 2.8mm diameter, 9mm length

- Magazine Release Spring 1mm diameter, 36mm Length - Spring Steel Bar or Rod

You have a choice on spring wire thickness, but we would suggest a maximum of 0.3mm, so they are not too strong.

The exception being the main recoil spring as a thicker spring shows better under the transparent grip. A thick spring here is another good reason not to try and rack the slide on your model.

Parts List

Following is a list of STL model parts along with notes. (ALT = There are alternative parts that can be used.)

Frame Non Thermoptic
This version does not have the trigger guard rectangular feature so matches the rubber stunt non-thermoptic pistol not the screen used version.

Print X **1** ALT **Non-Thermoptic: Black or Grey** ▪ **Thermoptic: Clear or Grey**

Frame Non Thermoptic + Feature
This version has the trigger guard rectangular feature so matches the screen used version.

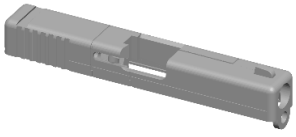
Print X **1** ALT **Non-Thermoptic: Black or Grey** ▪ **Thermoptic: Clear or Grey**

Frame Thermoptic
Used for all thermoptic variants.

Print X **1** ALT **Non-Thermoptic: Black or Grey** ▪ **Thermoptic: Clear or Grey**

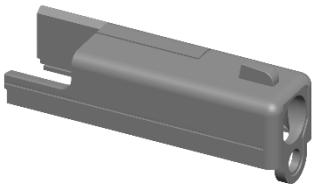
Grip

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: White**



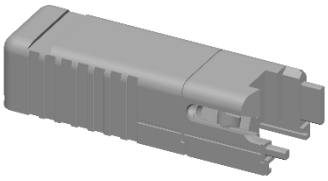
Slide
Can be used in non-thermoptic variants.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: Not Used**



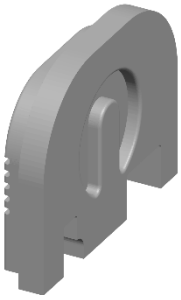
Slide Front
Used in thermoptic variants where slide is composed of two dissimilar materials.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: White**



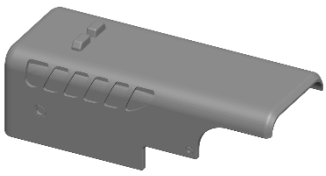
Slide Rear
Used in thermoptic variants where slide is composed of two dissimilar materials.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**



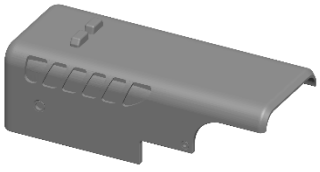
Slide Cover Plate

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**



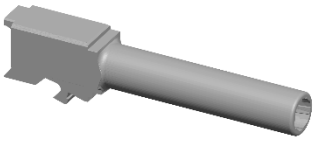
Slide Cover Rear
Without cutouts at the rear.
Matches rubber stunt pistol.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: White**



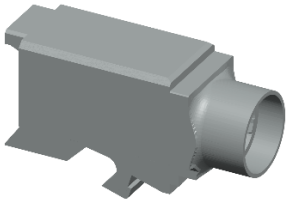
Slide Cover Rear Cutouts
With cutouts at the rear matching the **Slide Cover Plate.**
Matches thermoptic pistol movie stills.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: White**



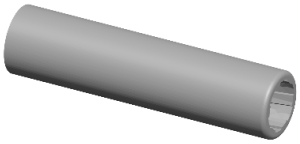
Barrel
Single part barrel for non-thermoptic version.

Print X **1** ALT **Non-Thermoptic: Black or Silver** ▪ **Thermoptic: Not Used**



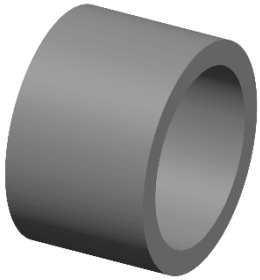
Barrel Split 1
Use with thermoptic version where breech end is transparent and barrel end is metallic.

Print X **1** ALT **Non-Thermoptic: Not Used** ▪ **Thermoptic: Clear or Grey**



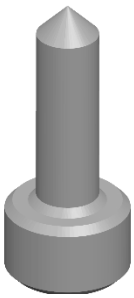
Barrel Split 2
Use with thermoptic version where breech end is transparent and barrel end is metallic.

Print X **1** ALT **Non-Thermoptic: Not Used** ▪ **Thermoptic: Silver**



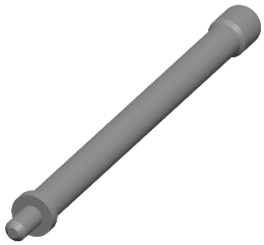
Barrel Connector
Used to connect both parts of split barrel.

Print X **1** ALT **Non-Thermoptic: Not Used** ▪ **Thermoptic: Clear or Grey**



Extractor Bearing
Internal part of rear slide.

Print X **1** **Non-Thermoptic: Silver** ▪ **Thermoptic: Silver**

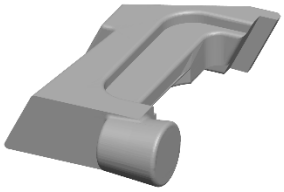


Extractor Plunger
Internal part of rear slide.

Print X **1** **Non-Thermoptic: Silver** ▪ **Thermoptic: Silver**

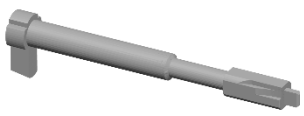
Extractor Split Level
Extractor with additional raised feature to match screen non-thermoptic pistol where each raised part is defined in silver/metallic.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**



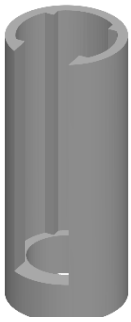
Extractor
Standard Glock extractor without raised feature.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**



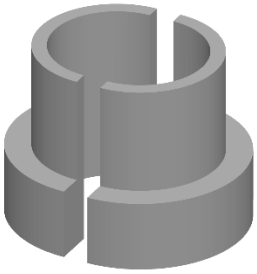
Firing Pin
Internal part of rear slide.

Print X **1** **Non-Thermoptic: Silver** ▪ **Thermoptic: Silver**



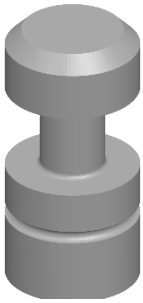
Strike Sleeve
Internal part of rear slide.

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Silver**



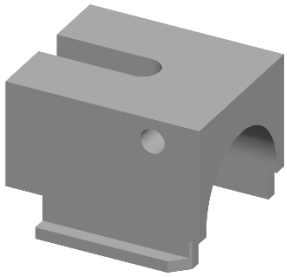
Strike Assembly Cup
Internal part of rear slide.
Note part contains one pair of cups.

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: Silver**



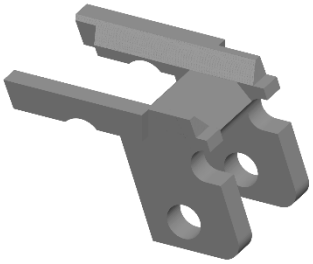
Firing Pin Safety
Internal part of rear slide.

Print X **1** **Non-Thermoptic: Silver** ▪ **Thermoptic: Clear or Silver**



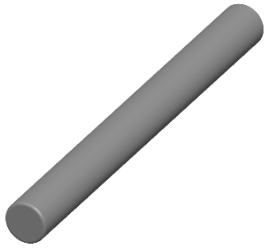
Front Rail Block
Fits to frame and holds slide.

Print X **1** **Non-Thermoptic: Black or Silver** ▪ **Thermoptic: Clear or Grey**



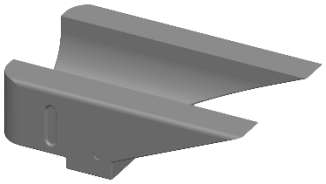
Locking Block
Fits to frame and is locked in with Locking Block Pin and Trigger Pin.

Print X **1** **Non-Thermoptic: Black or Silver** ▪ **Thermoptic: Clear or Grey**



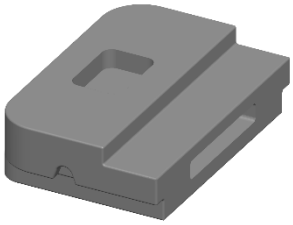
Locking Block Pin
Fits to frame to lock in Locking Block.

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**



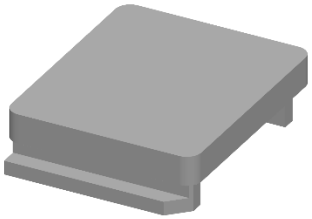
Front Frame Block
Front frame feature.

Print X **1** **Non-Thermoptic: Black or Grey** ▪ **Thermoptic: White**



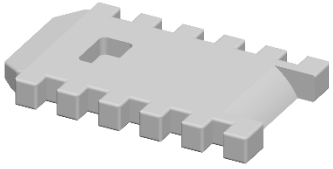
Front Frame Block Lower
Front frame feature.

Print X **1** **Non-Thermoptic: Black or Grey** ▪ **Thermoptic: Dull Silver**



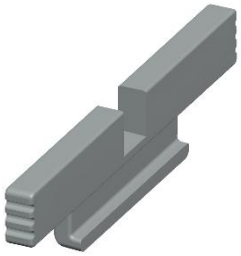
Rear Rail Block
Fits to grip and holds slide.

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**



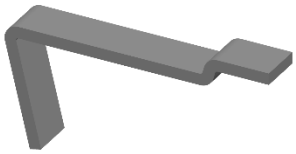
Rail
Fits under front of frame.

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: White**



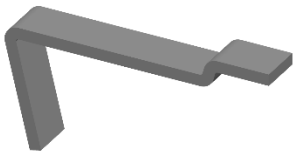
Slide Lock
Slides into frame and locks slide/barrel in place.

Print X **1** **Non-Thermoptic: Silver** ▪ **Thermoptic: Black**



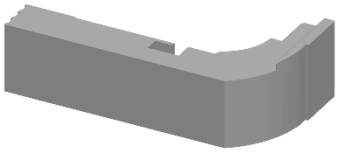
Slide Lock Spring
Spring for Slide Lock.

Print X **1** ALT **Non-Thermoptic: Silver** ▪ **Thermoptic: Clear or Grey**



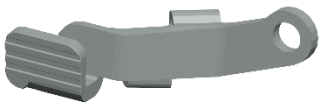
Slide Lock Spring Strong
Spring for Slide Lock with stronger flex.

Print X **1** ALT **Non-Thermoptic: Silver** ▪ **Thermoptic: Clear or Grey**



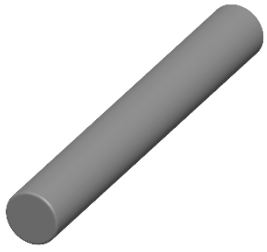
Magazine Catch
Fits to frame to hold in magazine.

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**



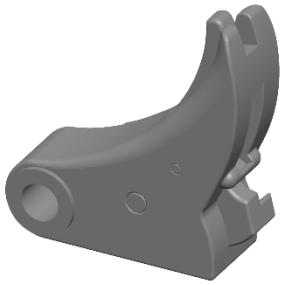
Slide Stop Lever
For thermoptic variants this can be printed clear and the thumb surface can be painted black. If all black this shows too much through transparent frame.

Print X **1** **Non-Thermoptic: Black or Silver** ▪ **Thermoptic: Clear or Grey**



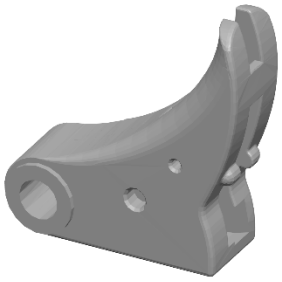
Trigger Pin
Holds in Trigger, Locking Block and Slide Stop Lever.

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**



Trigger Composite
A trigger variant to simplify printing and assembly. Already contains trigger Safety and pins.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**

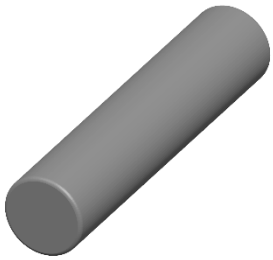


Trigger
Trigger body for detailed trigger assembly.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**

Trigger Safety
Fits into Trigger.
NOTE: Pin to hold in Trigger Safety not supplied as STL as this part would to too small to handle.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**

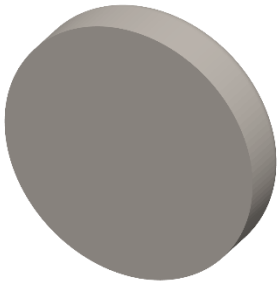


Trigger Bar Pin
Fits into trigger where (Not supplied) trigger bar would be locked in.

Print X **1** ALT **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey**

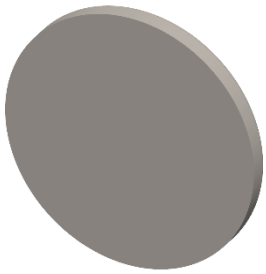
Recoil Guide Rod
Fits between frame and slide.

Print X **1** **Non-Thermoptic: Silver** ▪ **Thermoptic: Silver**



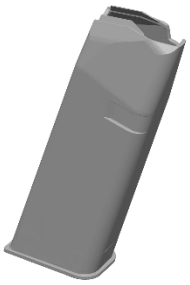
Grip Dot Small
Four detail dots fit each side of grip.

Print X **8** **Non-Thermoptic: Silver/Chrome** ▪ **Thermoptic: Silver/Chrome**



Grip Dot Large
One detail dot fits each side of grip.

Print X **2** **Non-Thermoptic: Silver/Chrome** ▪ **Thermoptic: Silver/Chrome**



Magazine Tube
Contains magazine parts and optional rounds.

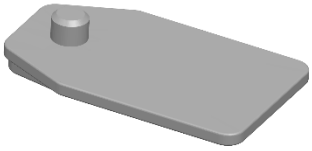
Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: Clear**

Magazine Follower
Sits inside Magazine Tube between spring and rounds.

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: Clear**

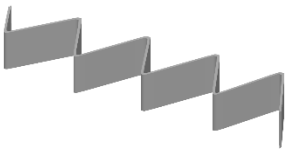
Magazine Floor Plate
Slides on to base of Magazine Tube.

Print X **1** **Non-Thermoptic: Black** ▪ **Thermoptic: Clear or Grey or Black**



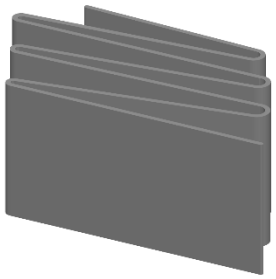
Magazine Insert
Locks the Magazine Floor Plate to the base of the Magazine Tube.

Print X **1** **Non-Thermoptic: Any** ▪ **Thermoptic: Any**



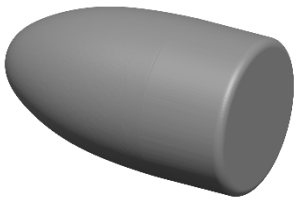
Magazine Spring
Used when none or few rounds are inserted into magazine.
Best printed on FDM printer.

Print X **1** ALT **Non-Thermoptic: Any** ▪ **Thermoptic: Clear**



Magazine Spring Compressed
An alternative magazine spring if many rounds are inserted into magazine.
Best printed on FDM printer.

Print X **1** ALT **Non-Thermoptic: Any** ▪ **Thermoptic: Clear or White**

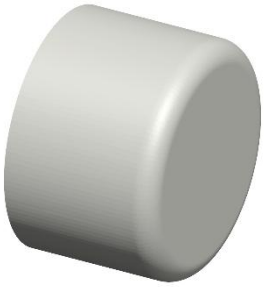


9 X 19 Round Bullet
Bullet to assemble into cartridge for dummy round.

Print X **0-15** **Non-Thermoptic: Copper** ▪ **Thermoptic: Copper**

9 X 19 Round Cartridge
Cartridge for dummy round.

Print X **0-15** **Non-Thermoptic: Brass** ▪ **Thermoptic: Brass**

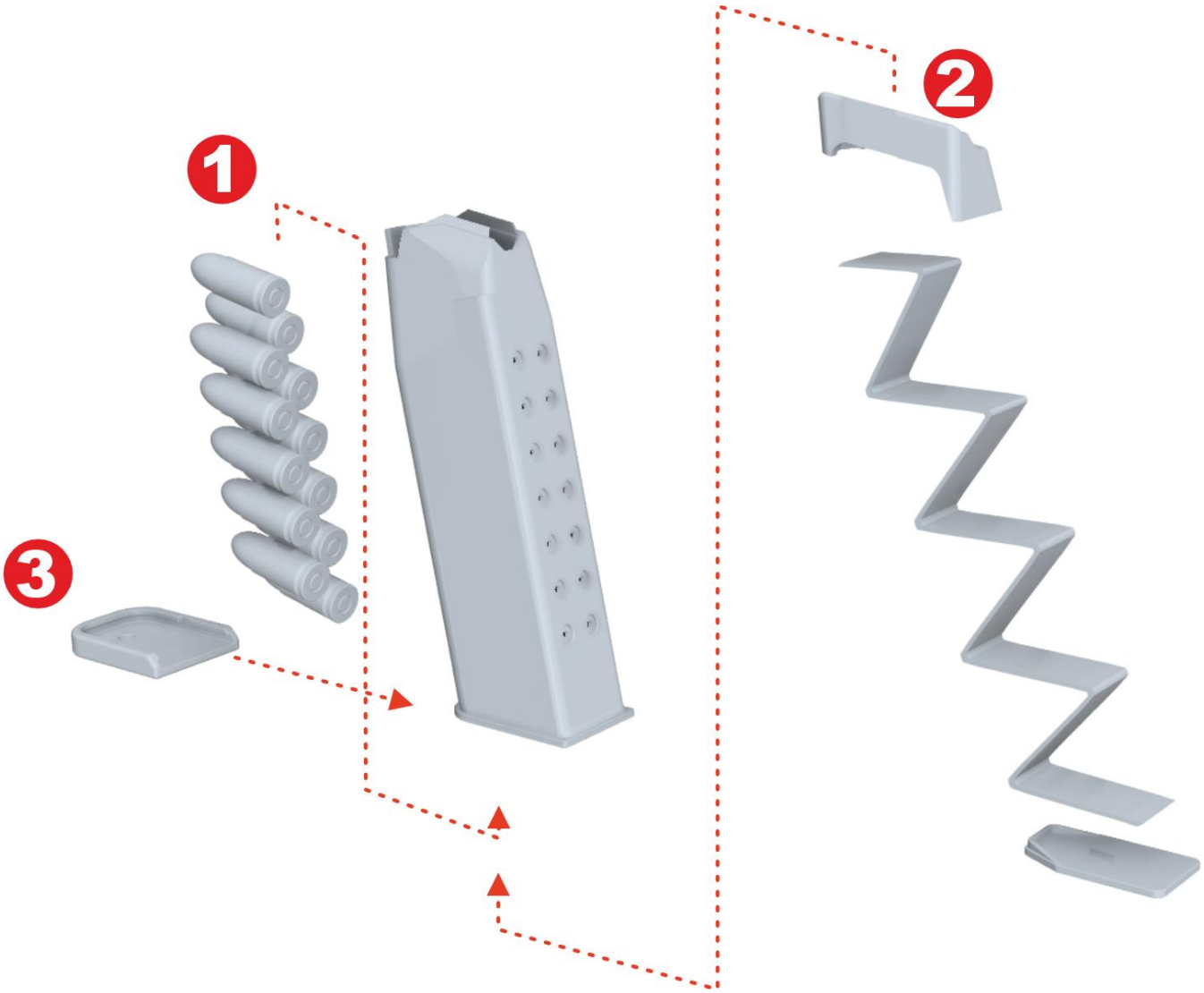


9 X 19 Round Primer
Primer to insert into base of Cartridge.

Print X **0-15** **Non-Thermoptic: Silver** ▪ **Thermoptic: Silver**

Assembly Sequence

Magazine Sub-Assembly

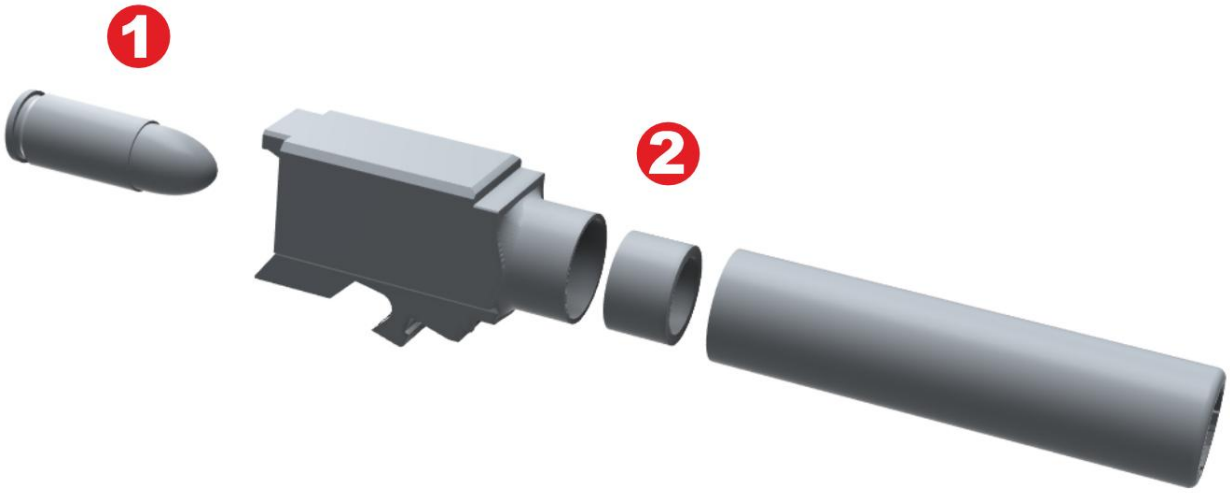


1. Decide how many rounds you are going to use. Stack them as shown inside the Magazine Tube.

2. Insert the Magazine Follower next then the Magazine Spring. If you are using a lot of rounds you may want to use the Magazine Spring Compressed instead.
   The last part to insert is the Magazine Insert. Hold all of this inside the Magazine Tube and go to step 3.

3. Slide the Magazine Base Plate over the lip at the base of the Magazine Tube. The Magazine Insert has a raised feature that should locate into the hole in the Magazine Base Plate and is held in place by the pressure of the Magazine Spring.

Barrel Sub-Assembly



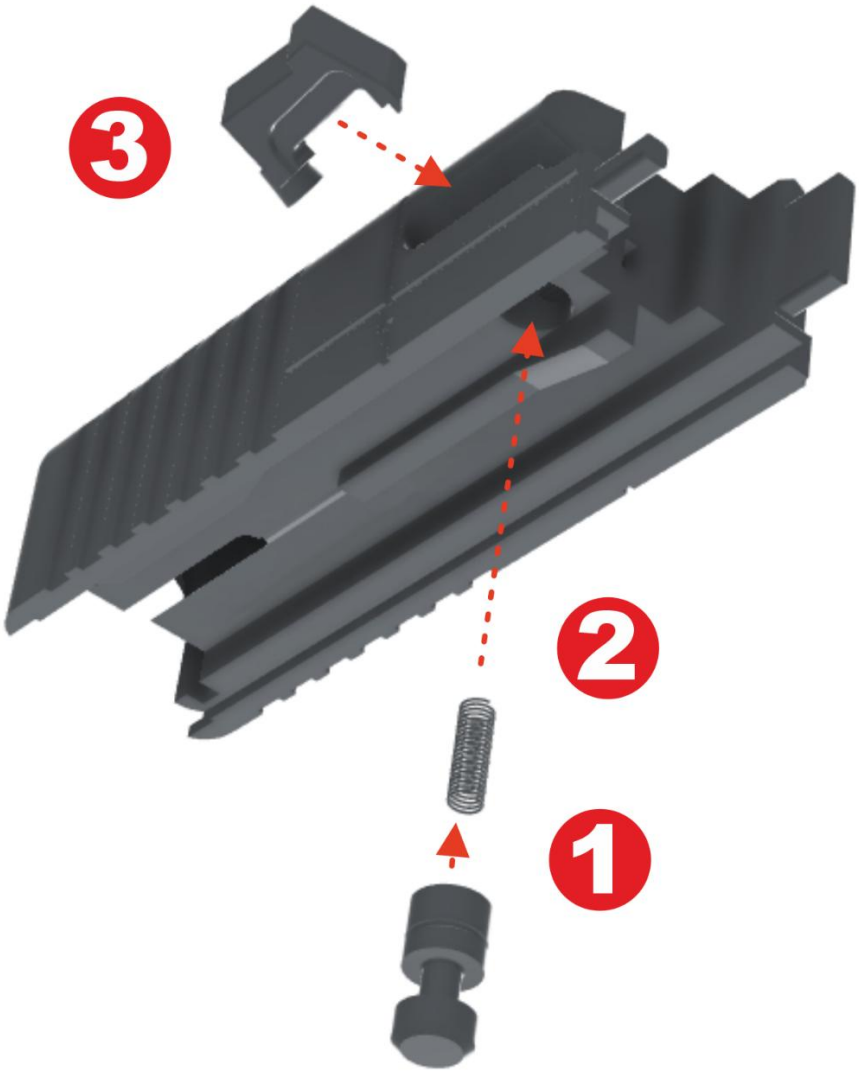
1. Build a round (Bullet, Cartridge and Primer) and insert into Barrel Split 2.

2. Use the Barrel Connector to join Barrel Split 1 and Barrel Split 2 parts.
   Note that you may use the complete Barrel part so may not need to join these parts.

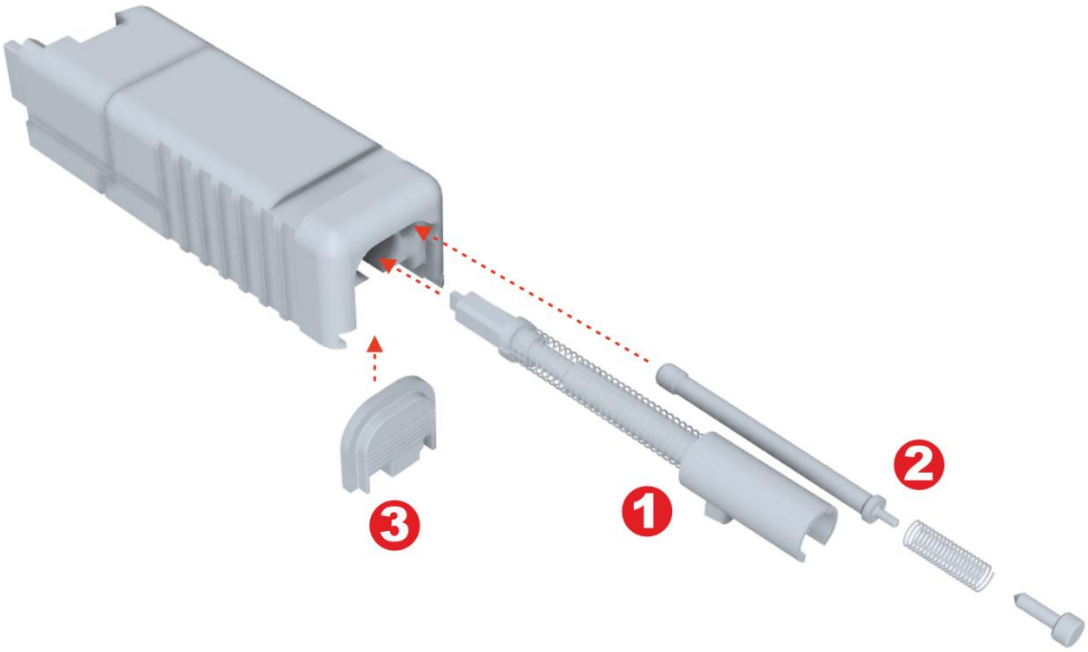
Firing Pin Sub Assembly

1. Slide Firing Pin into Strike Sleeve and through Firing Pin Spring.
2. Slightly pull back spring to allow Caps to sit over Firing Pin.
3. Let Firing Pin Spring relax back over Caps to keep the whole sub-assembly together.

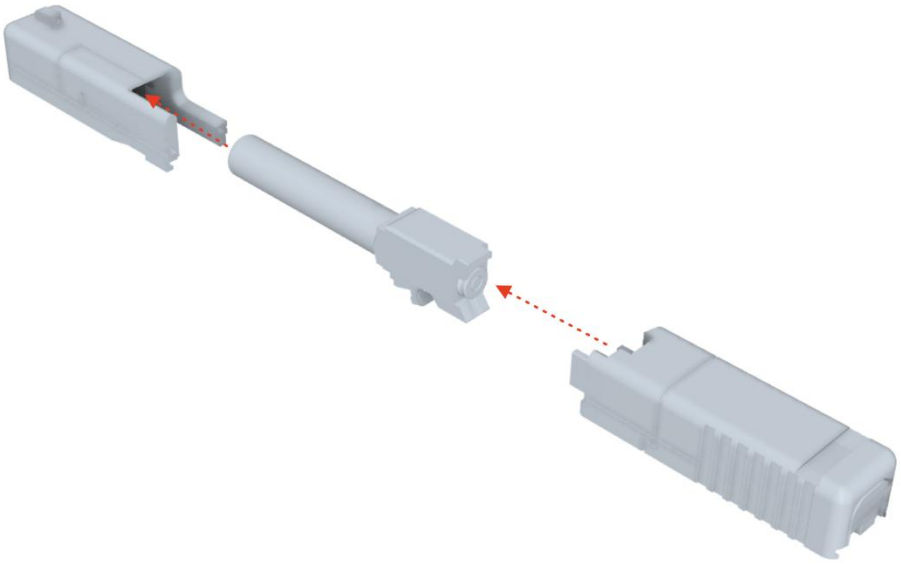
Slide Sub-Assembly



1. Fit together Firing Pin Safety plunger and Firing Pin Safety Spring.
2. Slide these items into the hole on the underside on the Slide Rear.
3. Slide Ejector into the side of the Slide Rear. This keeps the Trigger Safety from popping out again. You may need to hold this together during the later steps.

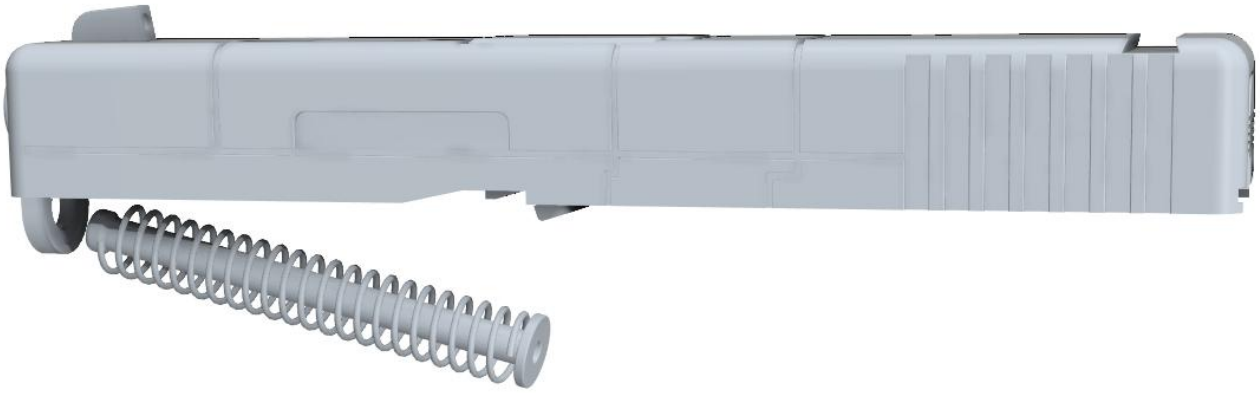


1. Slide the completed Firing Pin Sub-Assembly into the rear of the Side Rear.
2. Slide the Ejector Rod, Ejector Rod Spring followed by the Ejector Plunger into the smaller hole at the rear of the Rear Slide.
3. Whilst keeping these elements pushed in, slide the Slide Cap up into the grooves at the rear of the Rear Slide.
   This should lock into place being held by the Striker Sleeve. The Ejector rod should now hold the Ejector in place at the side of Rear Slide.



The Barrel Sub-Assembly can now be fitted between the front and rear slide assemblies.

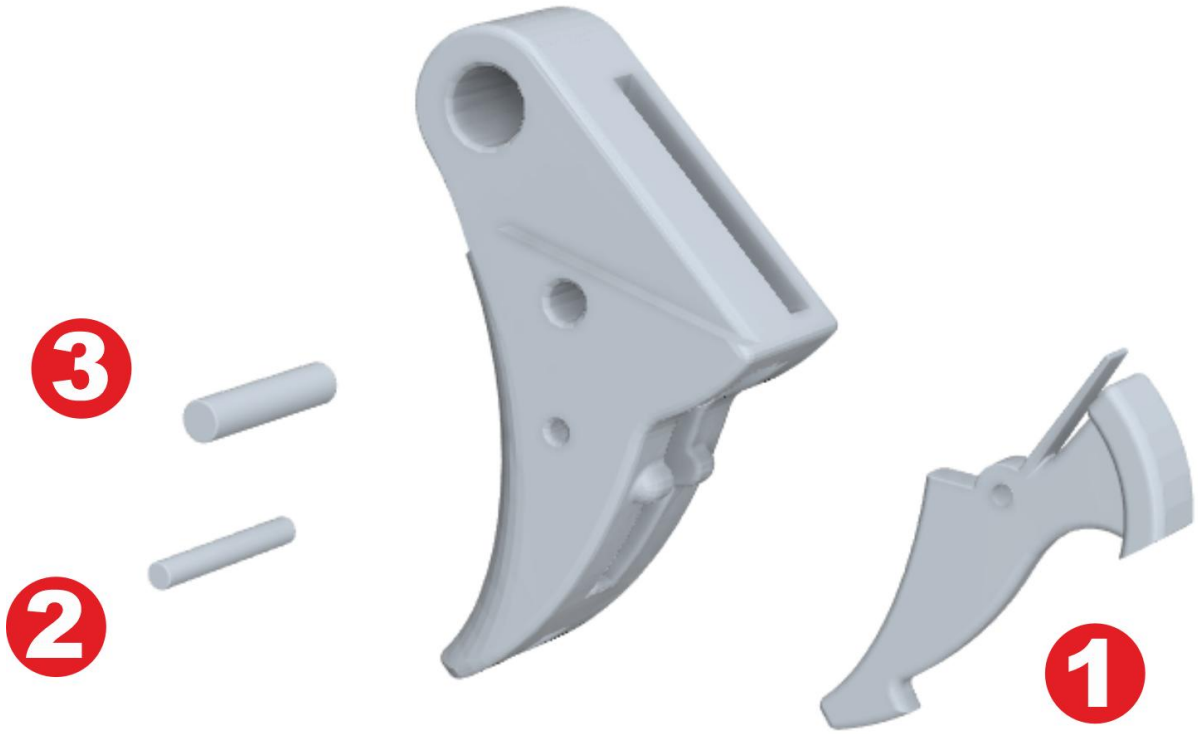
NOTE: If you have used the complete slide (Rather than the split slide) or have already assembled the two slide parts, the Barrel can be inserted from below into the slide. Start by pushing the front of the barrel up through the barrel hole at the front of the Slide at an angle.



Slide the Recoil Guide into the Recoil Spring and slide that complete assembly up into the bottom of the slide.

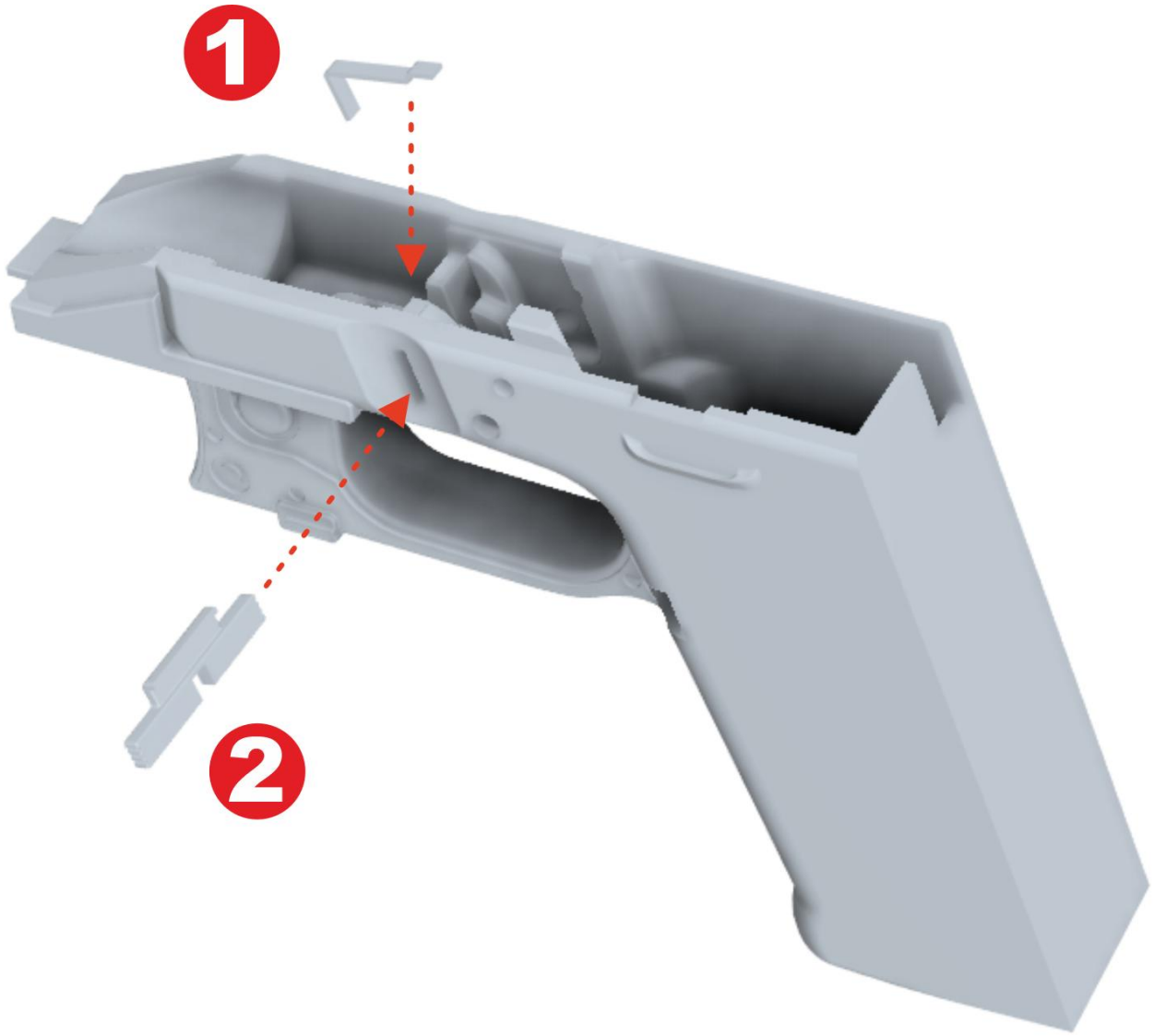
The front of the Recoil Guide should appear through the hole at the front of the slide, and the rear should engage with the barrel locking feature.

Trigger Sub-Assembly

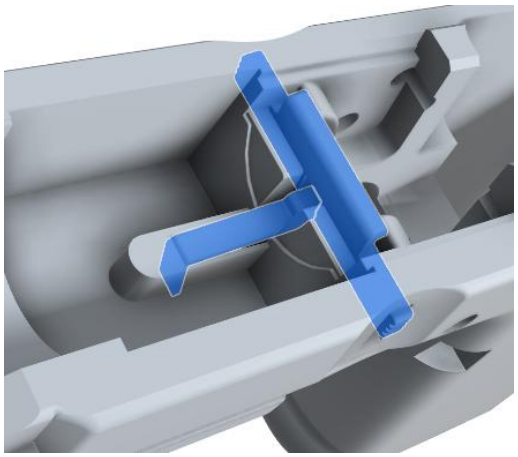


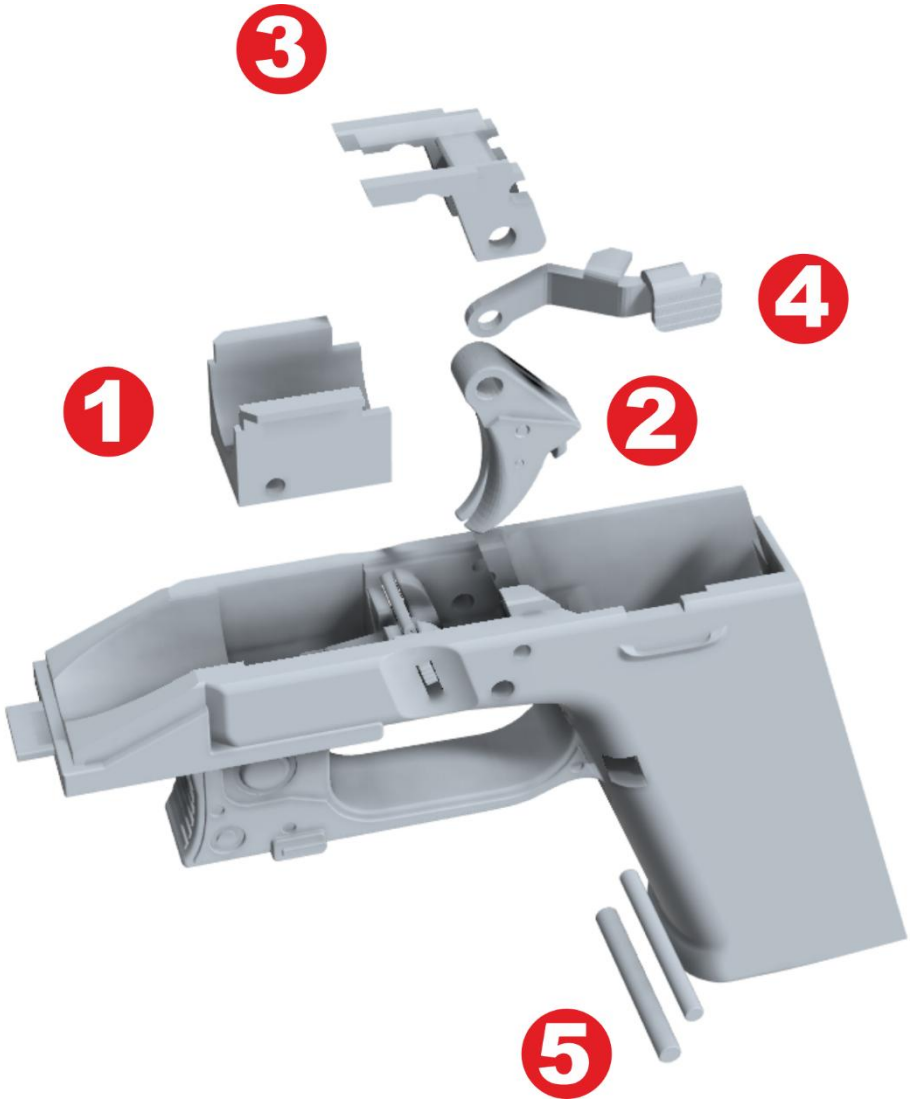
1. Slide the Trigger Safety into the rear of the Trigger.
2. Secure the Trigger Safety into the trigger with a small pin. This is **not supplied** as an STL file as it would be too small, so use a 1mm X 8.5mm piece of resin support or other type of small bar.
3. Now fit the Trigger Bar Pin. This does not hold anything as we do not include the trigger bar in this model.

Frame Sub-Assembly

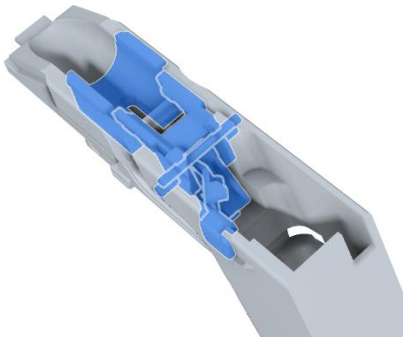


1. Fit the Slide Lock Spring down into the top of the Frame.
2. While holding the Slide Lock Spring down, slide in the Slide Lock through the rectangular slot in the side of the Frame.
   Note that the 'hook' part at the top of the Slide Lock should be facing the rear of the Frame. The Slide Lock Spring should engage in the slot of the Slide Lock to keep it in place.



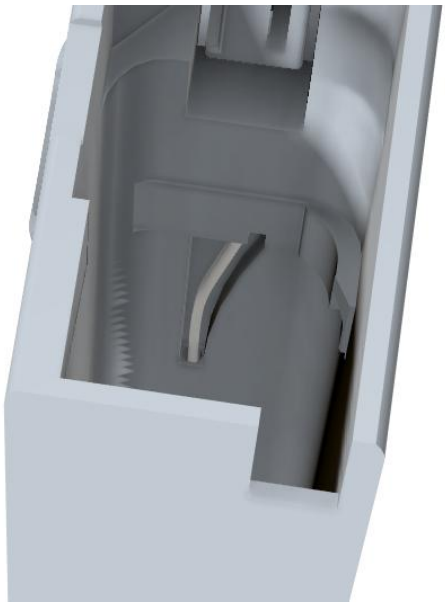


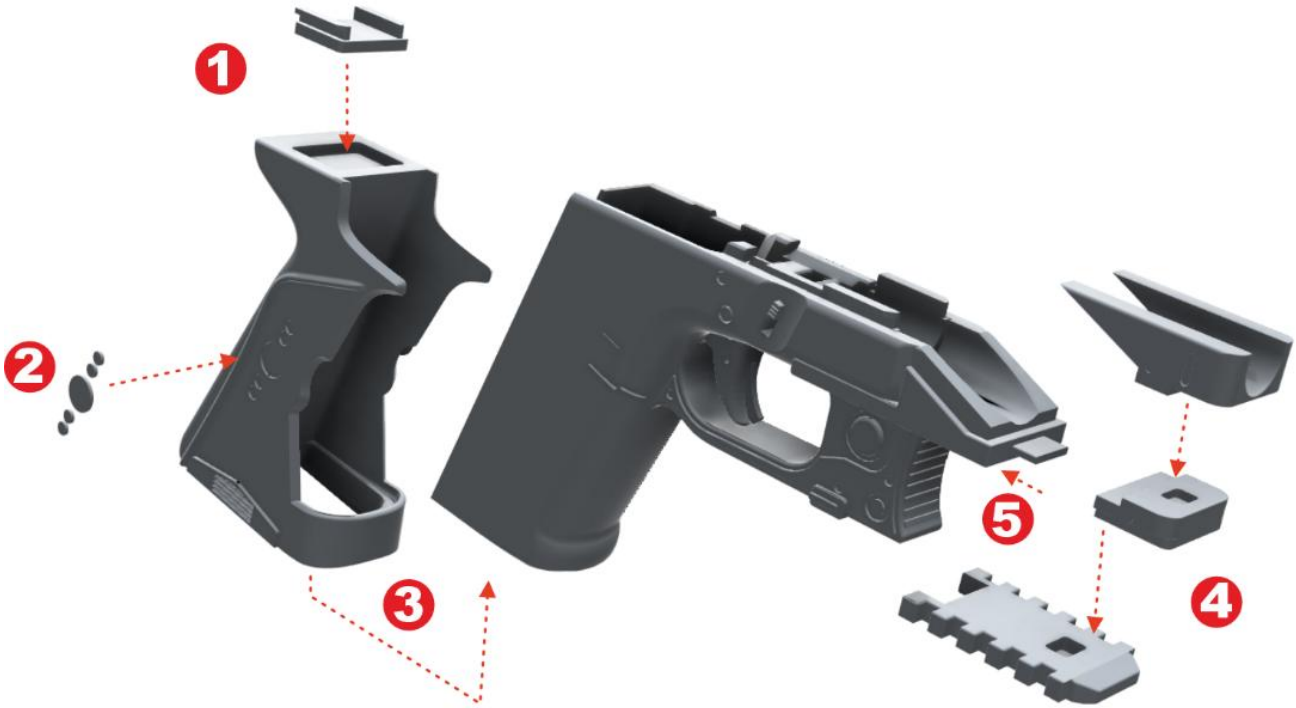
1. Drop the Front Rail Block into the top of the Frame. This can be glued because the model does not have a pin to lock this in place.
2. Drop the Trigger Sub-Assembly (Or use the Trigger Composite) into the top of the Frame so it fits into the trigger guard.
3. Next, push the Locking Block into the top of the Frame. This should hold down the Front Rail Block and align with the holes in the Frame.
4. Fit the Slide Stop Lever to the Frame and between trigger and Locking Block.
5. Finally, slide in the Trigger Pin which should pass through the hole in the Trigger, Slide Stop Lever and the Locking Block. Follow this with the Locking Block Pin which should secure the Locking Block in place.



Slide the Magazine Release through the side of the Frame.

Although not supplied in this model, you can fit a spring to secure the Magazine Release. A length of spring steel hair clip would do the job. (36mm Length)





1. Glue Rear Rail Block onto top of Grip.
2. Attach Grip Dots to each side of Grip.
3. Slide Grip up and onto the Frame. Note that the Frame should sit inside the lower lip of the Grip and the top of the Grip and the top of the Frame should be level.
4. Assemble Front Frame Block, Front Frame Block Lower and Rail together.
5. Slide this assembly onto the front of the Frame.

Final Assembly

1. Pull the Slide Lock down against the spring.
2. Slide the complete Slide Assembly onto the Frame from the Front. The Slide Lock can now be slid up again to lock the Slide Assembly in place.

1. Fit the Slide Cover over the rear of the Slide.
2. Slide the completed Magazine Assembly into the Grip.

Gallery

Ghost In The Shell Movie and Prop Images

Rubber Stunt Non-Thermoptic (No Trigger Guard Feature Visible)

Thermoptic Museum Prop

Non-Thermoptic Movie Still Showing Two Tone Black Grey

Poster Showing Transparent Frame and Slide Rear

Non-Thermoptic Movie Still Showing Two Tone Black Grey (Trigger Guard Feature Visible)

Movie Still Showing Grey Solid Frame and Slide Rear

Duplex Designs Model Renders

Non Thermoptic Version (No trigger Guard Rectangular Feature) - Render

Thermoptic Version - Render

Duplex Designs 3D Printed Model Images

Duplex Designs
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