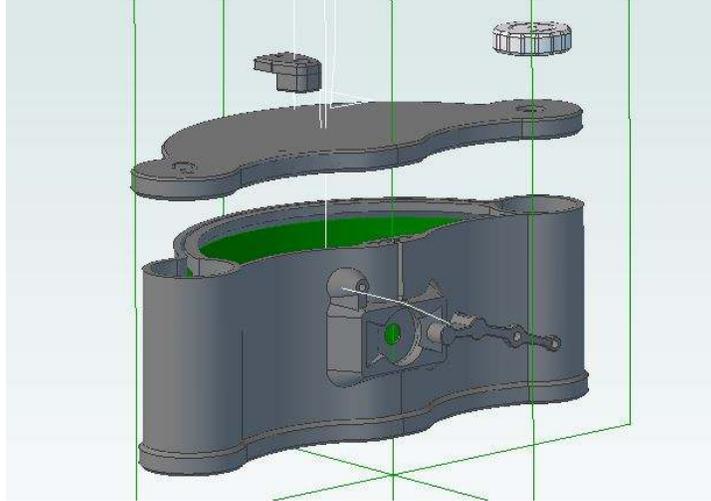


Assembling the Clipper 6x18



Mechanical Kit Parts

The following parts are included in your kit (in 2 or more bags):

1. Pinhole disc
2. Pinhole O-ring
3. Red Window disc
4. Red Window O-ring
5. 3 black M3-8mm screws
6. M2-12mm screw
7. M2 nut
8. brass shutter plate (drilled)
9. 2 springs
10. 2 M4-3mm grub screws
11. ¼-20 nut (tripod)
12. 6-32 nut (cable release)
13. Section of weatherstrip
14. 2 rubber bands



Other supplies/tools needed: Phillips screwdriver, tweezers, super glue gel or epoxy, 7/64" drill bit, 1/8" drill bit, M2 tap, M4 tap, 2mm allen wrench. If you do not have the taps, you can get by with filing or grinding a notch on the threads of the M3 screws and M4 grub screws, this will help cut the threads as you drive the screws in gently and back them out. You do need the 7/64" bit to clear the spring holes so the springs can travel freely within their holes.

Assembly

Spring Warning! Springs do what they do best - springing out of your hands to invisible or inaccessible places. There are two pesky springs in your kit - leave them in the bag until you are ready and work somewhere safe where you can find them if they escape. If they tangle, hold one and unscrew the other until they separate.

Pinhole

Set the camera down with the large hole and shutter mount facing up and the pinhole and large o-ring on hand. There is a dimpled recess inside for the o-ring. Make sure this is clear of loose filament strands and bumps. It does not need to be perfectly round. Carefully drop the pinhole into the recess - it should be flat against the front of the camera. Take the large o-ring and push it in after the pinhole. The o-ring will collapse into the recess and then expand again to fill the dimpled recess inside. Use a fingernail or tweezers to insure the o-ring is seated into the dimpled recess.



Red Window

The procedure is the same as the pinhole, using the red window filter and small o-ring.



Knob and Winder

If you printed the winder, it included some support material that first needs to be removed (see the Printing Instructions). Put the winder up through the top plate so the winder rim fits into the recess in the top plate and the square boss is protruding. Put the knob onto the winder and insert the screw. Push down firmly on the screw as you are screwing it in. Screw it in until the knob no longer is loose on the winder and then a quarter-turn more. Do not overtighten or you will strip the threads.

Film Tension

Holding the camera as if you're taking a picture, the small section of weatherstrip should be placed in the left side film chamber. Peel the backing and insert midway down and in the center of the flat side of the film chamber. This ensures the film wraps tightly on the spool. Placement is not critical.

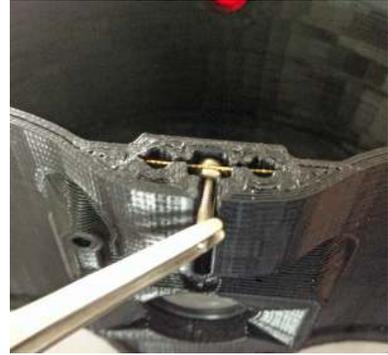


Shutter

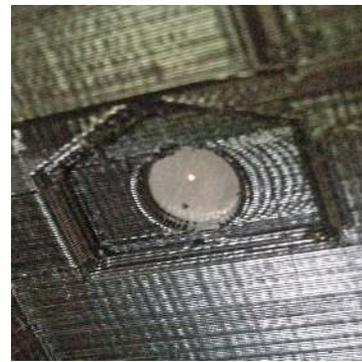
The shutter is the most complicated part of the assembly. The internal slot must be cleared so the shutter moves freely up and down, the inside window must be cleaned of plastic strings (it is hard to print without some roughness), the spring holes must be cleared so the springs move freely, and the threads must be cut for the grub screws.

Brass Shutter

The brass shutter is pre-cut and pre-drilled from $\frac{3}{4}$ " brass shim stock 0.016" thick. Insert the M2-12mm screw into the hole and thread the M2 nut on the other side. Tighten the nut onto the screw. There is a slot and cavity that accepts the shutter with the screw protruding in the front. The shutter must slide freely up and down in the slot - you may need to work it up and down to clear any plastic inside. Once it's all the way down, you may need to use an Xacto or hobby knife to clear messy filament bits from the inside shutter window (design limitations prevented reaching an ideal printable slope so this depends on the quality of your printing). Make sure the shutter can slide up and down easily, then remove the shutter.



Before:



After:

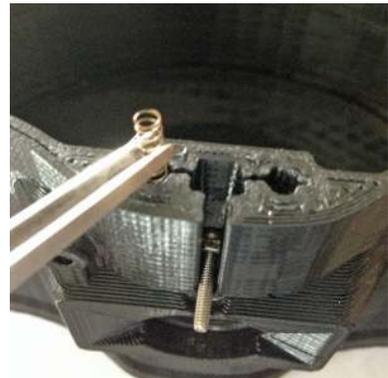
Grub Screws

There are two M4-3mm grub screws that hold in the springs. If you have an M4 tap, insert it into each hole and turn it about 4 times (just enough for the screws to be flush with the top), remove it, and blow out the shavings. If you don't have a tap, you can file or grind a notch in the screws so that they will "cut" their own threads by screwing them in part way and backing them out and then repeating until they are flush without forcing them (if you force the screws in, you will spread the shutter opening and possibly crack it). Take the screws out.



Springs

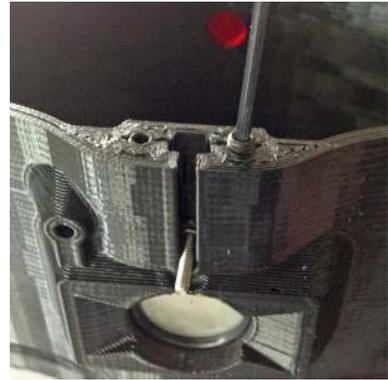
Read the spring warning at the beginning. The two holes at the top must be cleared so the springs will move freely. For this, you need a $\frac{7}{64}$ " bit - turn the bit by hand or if you must use a power drill, tape the drill $\frac{3}{4}$ " or 19mm above the tip, and drill no further than the tape. Thoroughly blow out any shavings in the holes and shutter slot. After this, drop one spring into both holes to make sure they go in freely. Remove the springs.



Assembly

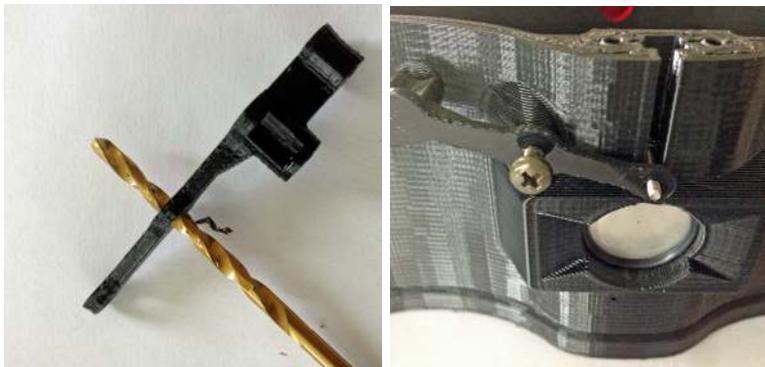
Insert the shutter followed by both springs. Install the grub screws on top of the springs and tighten only until they are flush with the top of the camera body. You should be able to lift the shutter screw in the front and have it snap back to the closed position.

Alternatively, if you want to manually open and close the shutter, remove the springs and tighten the shutter lever screw until there is enough pressure for the shutter to stay open or closed by itself.



Shutter Lever

Drill the center hole of the shutter lever with a 1/8" bit. Insert one M3-8mm screw into the lever and fit the screw into the boss to the top left of the pinhole, with the lever end hole slipping over the brass shutter screw. Screw it in until the shutter just starts to freeze and then back off a quarter-turn or so. The shutter should open and close smoothly.



Tripod Nut

Using super glue gel or 2-part epoxy around the sides of the recess, glue the nut into the recess. Be careful not to get glue into the threads.



Cable Release

The cable release mounts on the top plate using the small hole on the top plate. First, the 6-32 nut must be glued and pressed in with superglue - use sparingly. The mounting hole for the M3-8mm screw must be drilled out with a $\frac{1}{8}$ " drill so the screw can turn in the hole. Next, tap the M3 hole in the top by hand, stopping when you feel some resistance. If you don't have an M3 tap, file or notch the threads on the screw and screw it in. If it gets tight midway, back it out and try again but be careful not to bottom out or break through. Then screw on the cable release mount.



The cable release (not included) will go through the hole and engage the nut. It is not an exact thread match but the nut will hold the cable release securely. The following cable release was used in the design - other cable releases should work also.

The Camera Hunter 21 inch German Professional Grade Camera Locking Remote Shutter Cable Release for Macro Photography, Digital or Film Cameras

Amazon: <http://www.amazon.com/gp/product/B006O3LTQQ/>

No Kit

If you don't have the kit, you can get by without some of these parts. Glue can be used to secure the pinhole and red window, and the knob can be glued to the winder. A pinhole can be made from a $\frac{3}{4}$ " round piece of aluminum foil and a needle. A red window can usually be made from a transparent red plastic office folder. The springs and grub screws are not necessary to the operation of the shutter - any thin piece of metal can be cut to the following dimensions ($\frac{3}{4}$ " wide strip of brass x 0.016" thick x 21.5mm long, 2mm hole in center 2mm from short edge) but you will need a screw or substitute as the shutter handle.

Alternatively, you can just use a large piece of black gaffer's tape as a pinhole cover and not have a shutter.

