

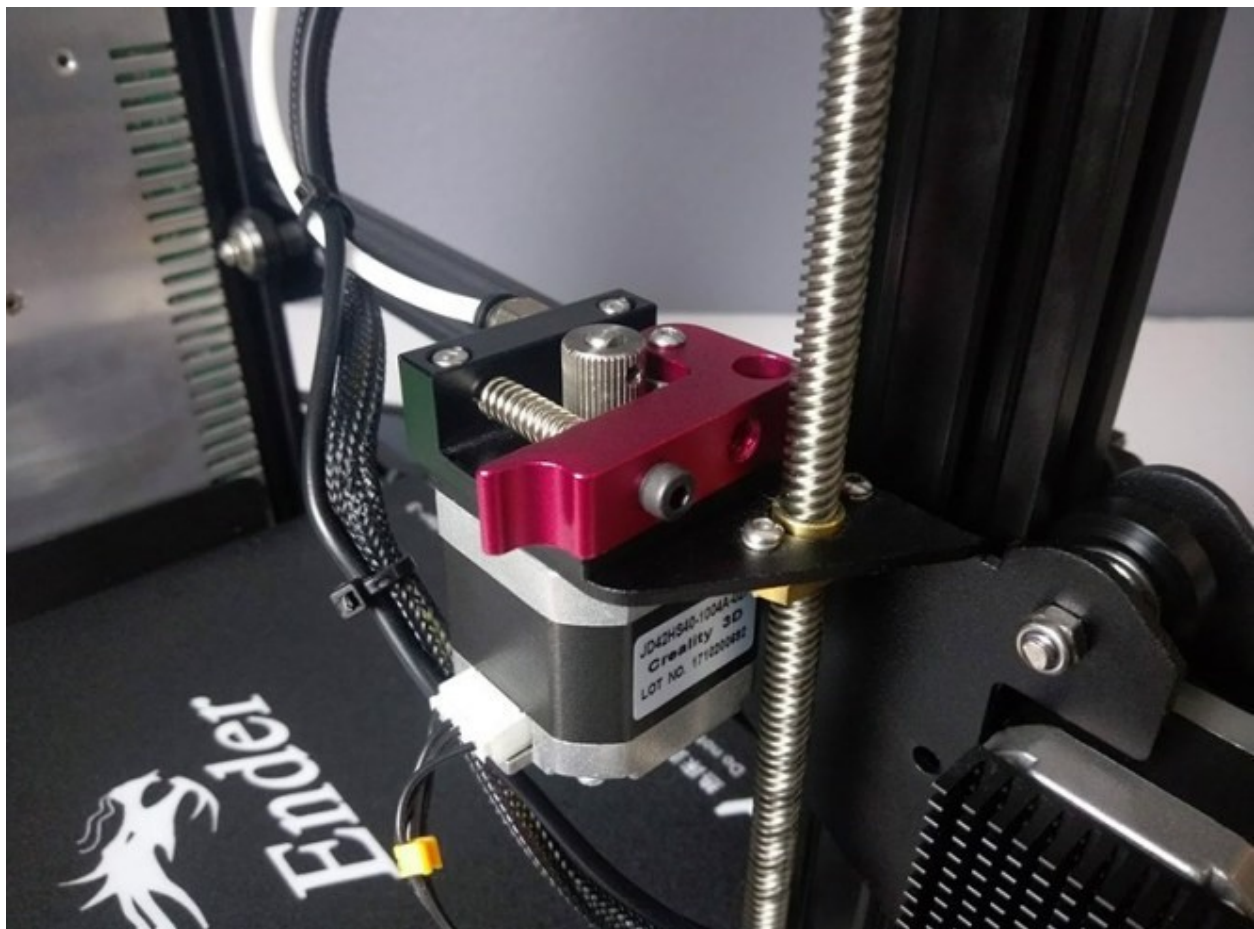
How to Upgrade the Extruder (Ender-3)

Last Updated January 27, 2019 by Brett

While the Ender-3 is easily one of the best 3D printers in the budget market, they have cut a few corners to reduce the manufacturing costs. The extruder is one glaring example, made from cheap plastic and an inferior brass drive gear. Having already purchased it's big brother (the CR-10) a year prior, I was all too familiar with this particular problem on Creality machines.

Unfortunately the stock extruder offers little more than the bare minimum. It can be hard to insert filament, the fragile lever is prone to breaking and worst of all, the cheap brass gear can quickly degrade and start missing steps, resulting in poor print quality.

On the bright side, there are plenty of options to upgrade and many are available for less than \$20 bucks. Often made from solid aluminum and packaged with stainless steel drive gears, these are vastly better alternatives to the atrocious parts installed at the factory. Unless you opt for a genuine E3D Titan or Bondtech extruder, these steps will be universal for installing most kits on the market.



Purchased Parts List

[All Metal MK8 Bowden Extruder](#) - \$9.99

Instructions

Before we get started, it is a good idea to disconnect the extruder stepper motor and bowden tube. Once these are unplugged, the extruder will be a breeze to disassemble moving forward.

The stepper motor connector just pulls out as shown below, but the bowden tube is clamped in place by the the coupler. To release it, press down on the white lip of the coupler to compress it, and simultaneously pull the bowden tube until it comes loose. If it's stuck, use an adjustable wrench or pliers to push on the coupler and twist the tube until it breaks free.





Now there are (4) M3 screws in the extruder plate we must remove, one per corner that passes through the metal bracket and secures the stepper motor in place. Three of these screws are visible and the fourth is located underneath the filament feed lever.





Once the stepper motor has been separated from the machine, we can go ahead and replace the original 26T brass extruder gear with our upgraded 40T steel feed gear. There are (2) small grub screws that clamp this to the motor shaft, which we must loosen in order to remove it.

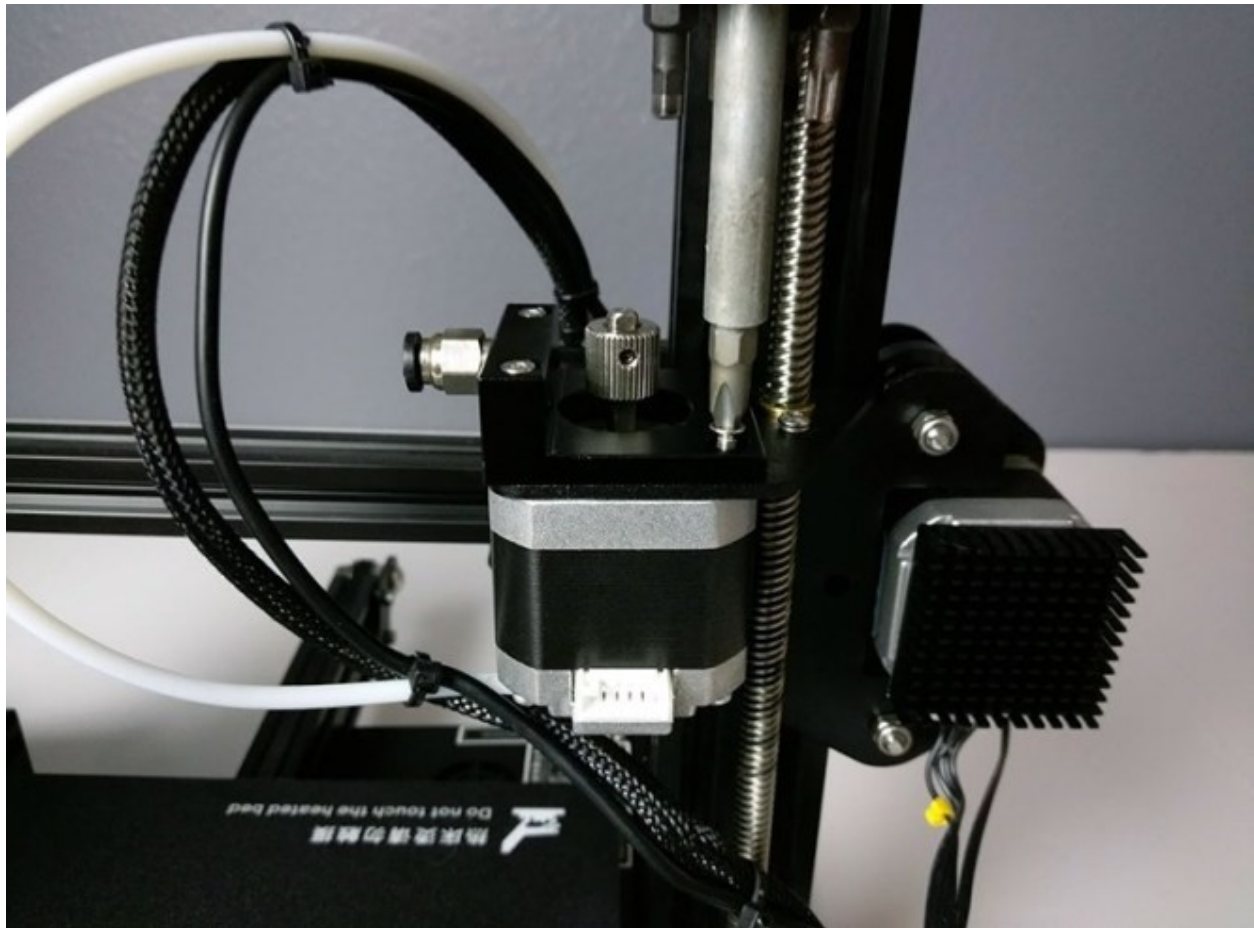
Go ahead and slide the new steel gear in to its place, but keep in mind that one side of the shaft will be flat, where this provides a surface for the grub screw to lock. Align the grub screw with the flat side and tighten it down, ensuring that it is held firmly in place and there is absolutely no play in the gear.

The extruder gear's (T) value represents the number of teeth. A higher tooth count increases filament precision and is preferred for 3D Printers.



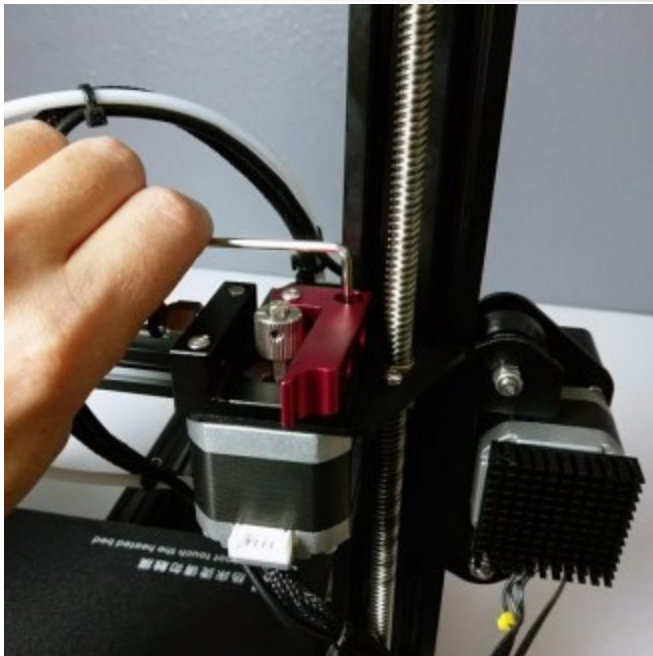
To reassemble the extruder using our new kit, start by placing the extruder base plate (black) on the metal mounting bracket. Thread (2) of the longer screws in to the raised side and (1) short screw in to the corner as shown below.

Turn the stepper motor so that the connector faces to the rear of the machine, then align it with the screws above. Holding it in place, tighten these (3) screws down until the motor is securely fastened.



Before we can install the extruder lever, we need to first add the idle bearing to it. Using the short silver M3 screw, position the bearing as shown and insert the screw through the center, which will thread in to the back side of the lever and tighten down.

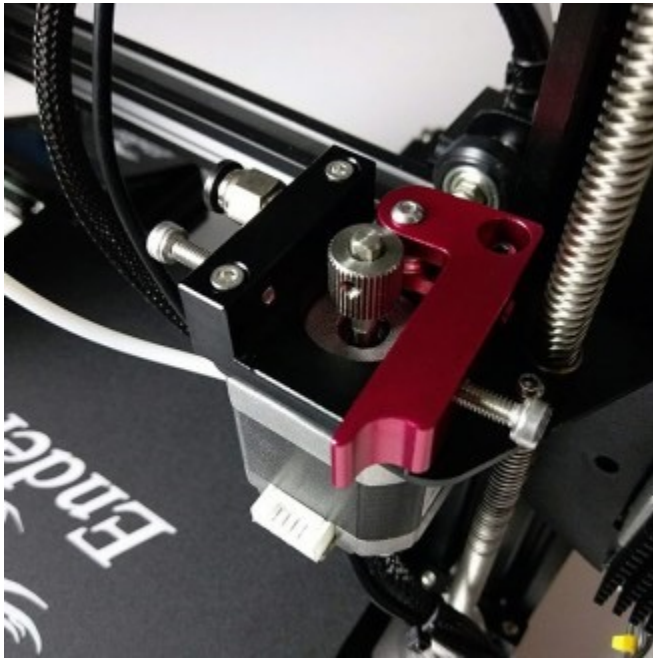
The black screw will be used to mount the lever on the base extruder plate, in the back right corner nearest the lead screw. Go ahead and install the lever as shown, but leave it somewhat loose for the time being, where we still need to insert the compression spring to make it work.



While this is one of my favorite extruder kits to use, the spring system leaves a lot to be desired. It does in fact work quite well, but uses a total of 3 bolts that stick out and look ridiculous, reducing the visual aesthetic quite a bit. We will first look at how to assemble it with the included parts, and follow-up with an improved setup that looks more pleasing.

Take the (2) M5 cap head screws and thread one in from either side until the end is flush with the inner wall. The screw on the black side will fit inside of the spring and hold it in place, while the lever screw will be responsible for compressing the spring when it's pressed.

Now use the shorter M5 cap head screw and insert this in to the spring. This will give the outer spring something to press against.



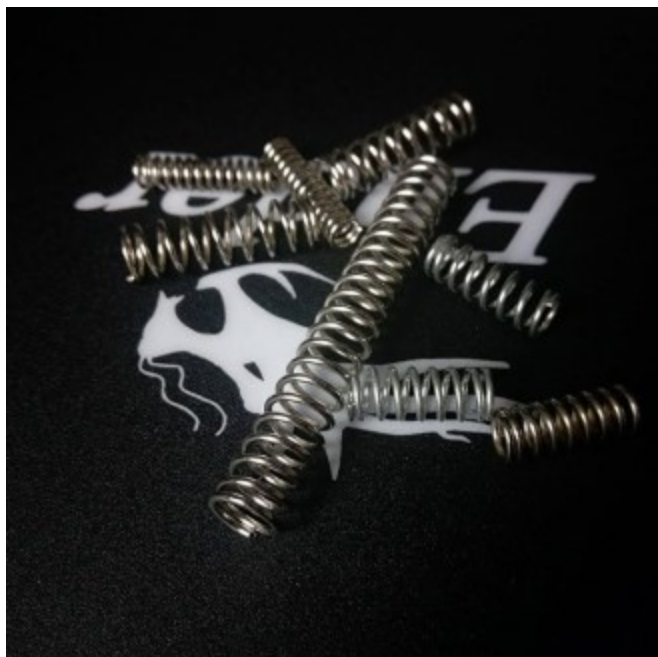
Tighten down both of the outer bolts until they retain the spring, but leave a gap on the inside so that the spring also has room to compress. Go ahead and finish tightening the black screw in the lever, while testing to make sure that it can still move. If it is too tight, loosen it a bit to ensure the lever can swing as needed.



Improved Springs

As the intended method to install the compression spring is not exactly optimal, I decided to pick up a cheap [Assorted Spring Kit](#) from Amazon and replace it. We want decent tension on the spring to make sure the extruder won't skip steps, so I used a spring that was snug but fit almost perfect.

The particular spring I chose had a smaller ID (Inner Diameter) than the original, where the large M5 bolts no longer fit inside of it. These were swapped out with (2) M3x16mm bolts I had in the toolbox and they worked fantastic. The smaller bolt heads can thread all the way inside of the extruder plate and lever, which created a cleaner aesthetic overall.



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