

Diamond Engraving Tool

INSTALLATION AND USAGE GUIDE

(Covers kit & assembled versions of Diamond Engraving Tool)

The Diamond Engraving Tool is an optional accessory for The Original Egg-Bot Kit, <http://egg-bot.com/>

The Diamond Engraving Tool turns your EggBot into a vibrated-tip diamond-point engraving tool, capable of light-duty marking and drawing on hard materials like glass, stone, and ceramic.

This installation and usage guide covers the procedures for attaching the engraver tool to your EggBot, and getting started with it.

You can find the latest version of this manual at: <http://wiki.evilmadscientist.com/Engraver>

Support Forum: <http://forum.evilmadscientist.com/>

EggBot Diamond Engraving Tool

PLEASE READ THESE IMPORTANT SAFETY NOTICES ABOUT YOUR KIT

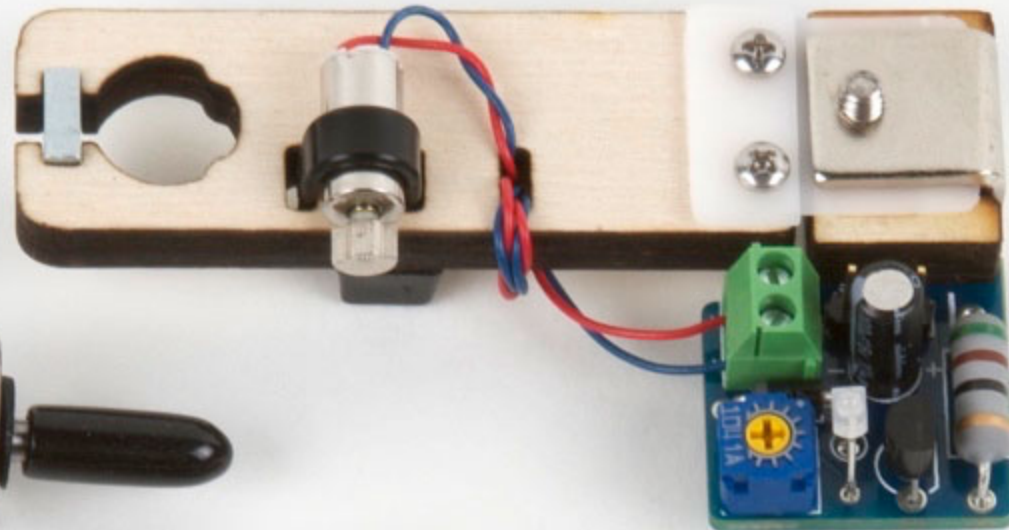
Caution: Please exercise appropriate care when installing and using your engraver kit: The kit contains small parts and sharp parts (like the diamond). Keep out of reach of small children. Older children and teens may require adult assistance.

Caution: Dust created by engraving objects can be potentially hazardous. Assure good ventilation and take additional necessary precautions if you are engraving objects that can create hazardous dust.

Warning: The engraver is capable of cracking and shattering fragile objects like lightbulbs and christmas ornaments, which could potentially result in sharp, flying shards. Wear safety glasses, and do not allow children to operate the engraver without adult supervision.

Step 1A: Identify parts (all models except EggBot Pro):

Upper pen arm assembly, with vibrating motor and driver board

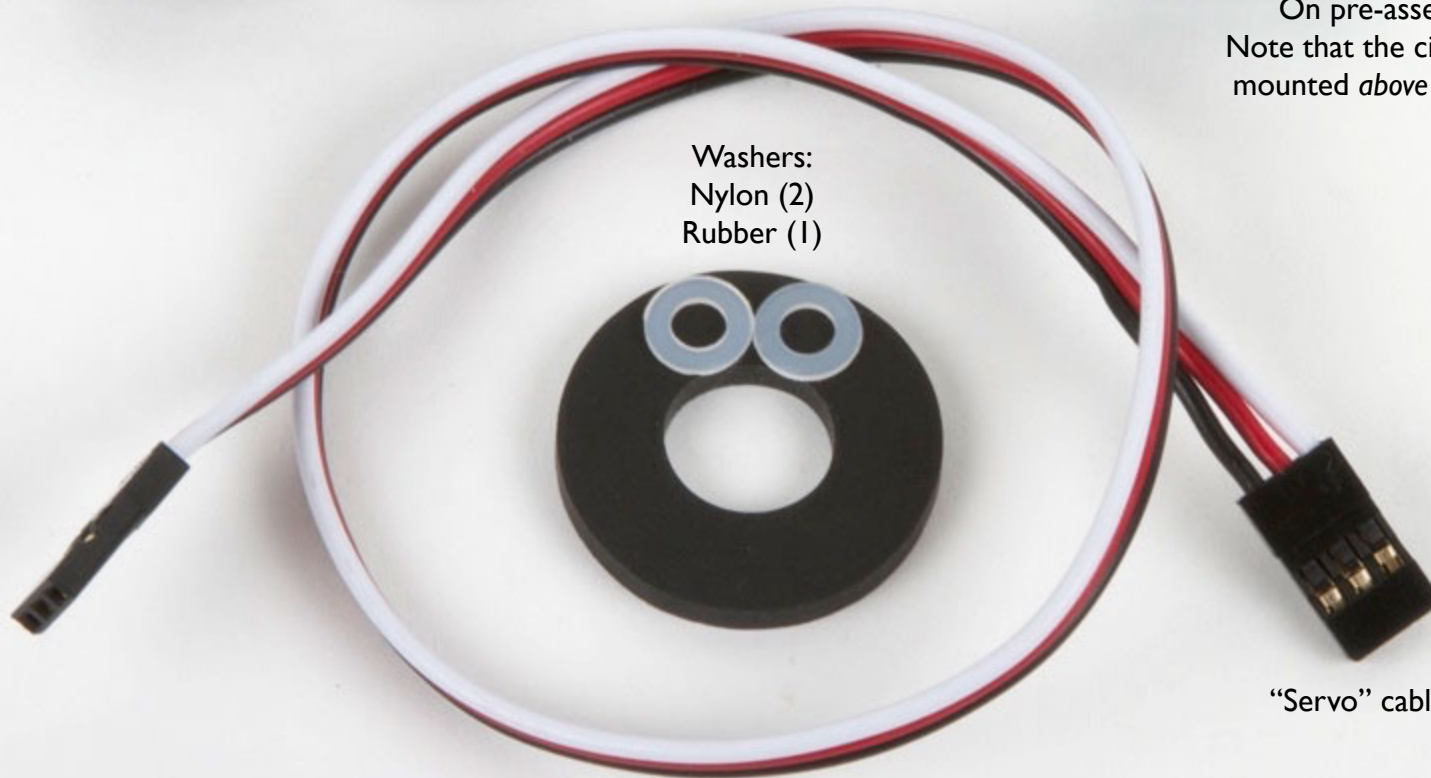


Diamond point tool, in mount



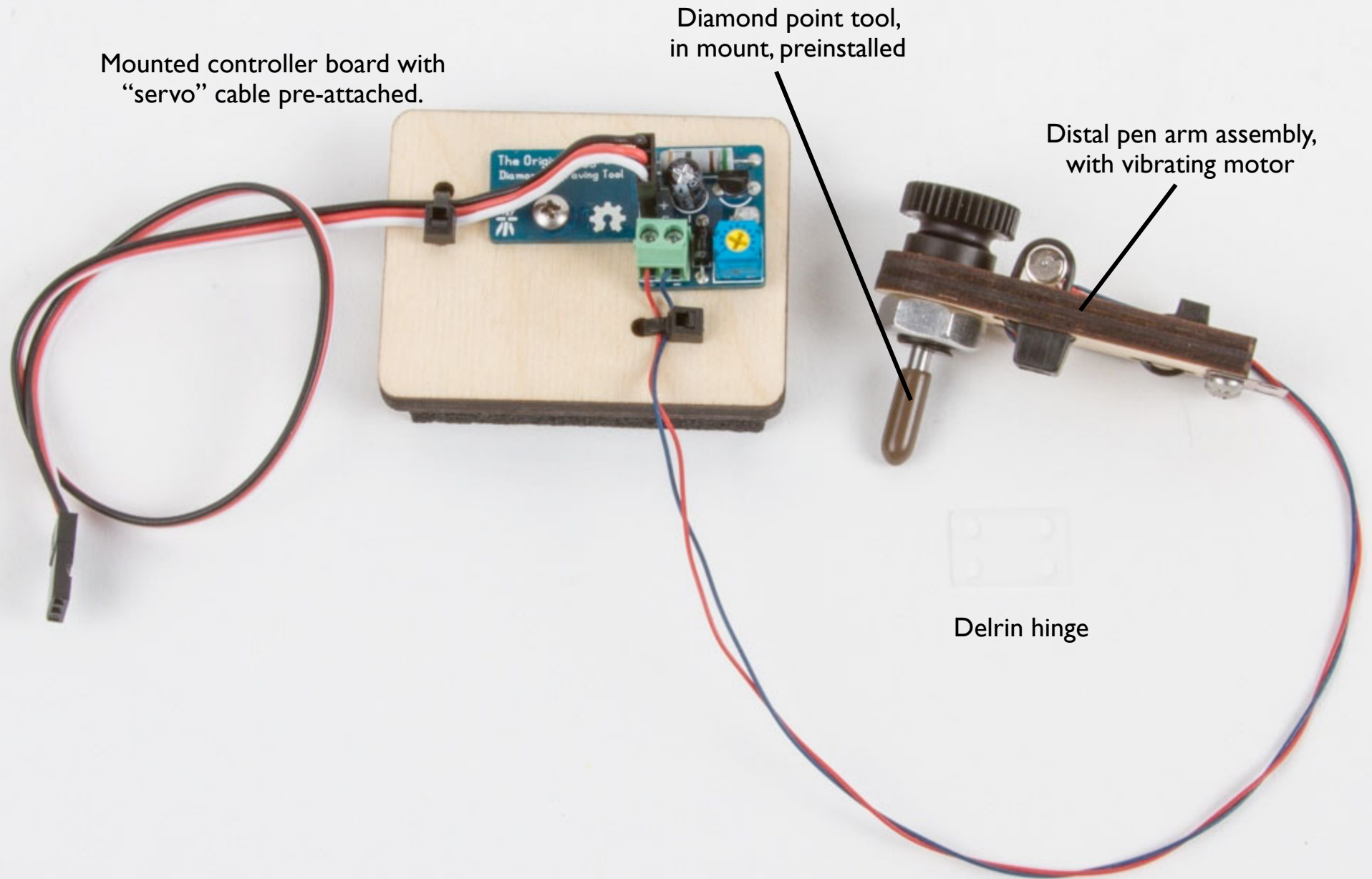
On pre-assembled models:
Note that the circuit board may be mounted above the wooden parts.

Washers:
Nylon (2)
Rubber (1)

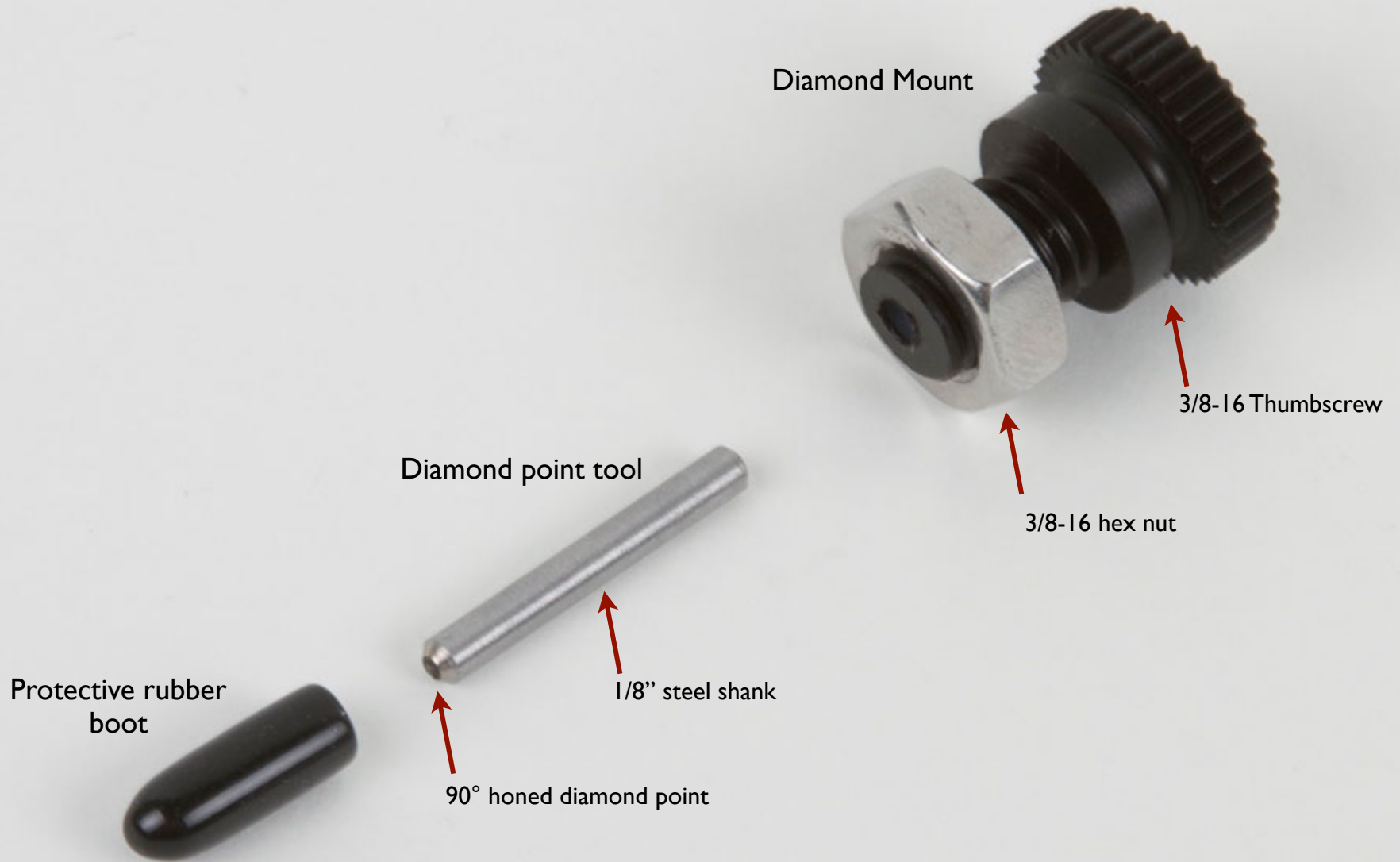


“Servo” cable

Step 1B: Identify parts (Engraver for EggBot Pro):



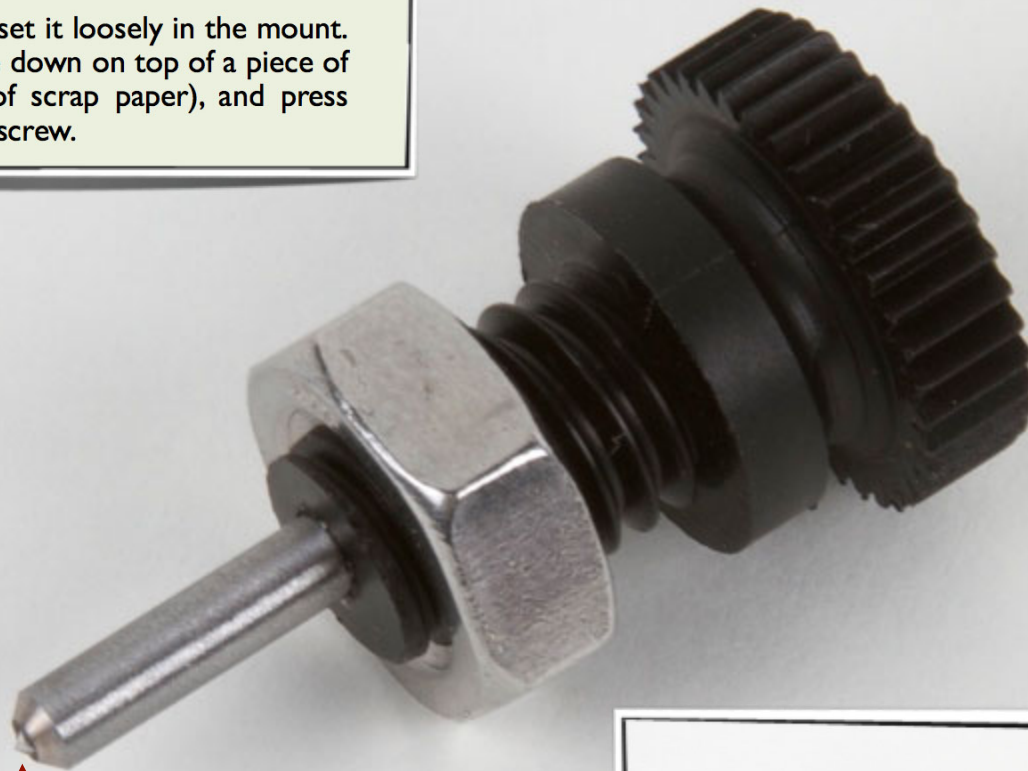
Step 2A: The diamond tool and its mount



Step 2B: The diamond tool and its mount (continued)

The diamond point tool is held in its mount by friction. If you need to remove and replace it, use pliers to pull the tool out, with a twisting motion.

To replace the tool, first set it loosely in the mount. Then, set it diamond-face down on top of a piece of hardwood (or a stack of scrap paper), and press down *hard* on the thumbscrew.



Be careful!
Tip is sharp, can cut skin (and glass...)

Use the protective rubber boot to cover the tip when not in use.



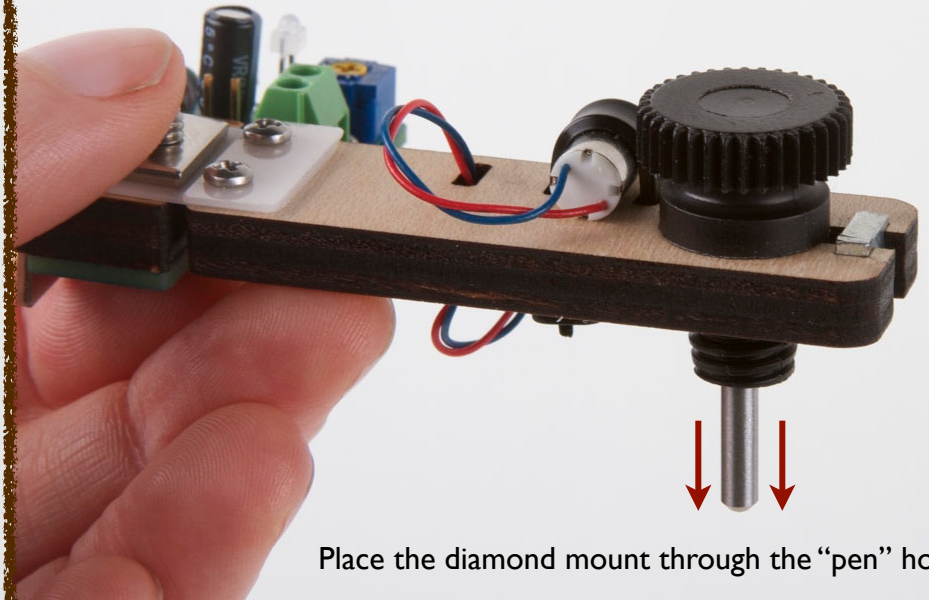
STEP 3: Attaching the Diamond Mount

>>> EggBot Pro users: **Skip this! Go to Step 8.** <<<



The diamond point tool can be installed on or removed from the pen arm whenever you like.

Begin with the hex nut removed from the Diamond Mount.



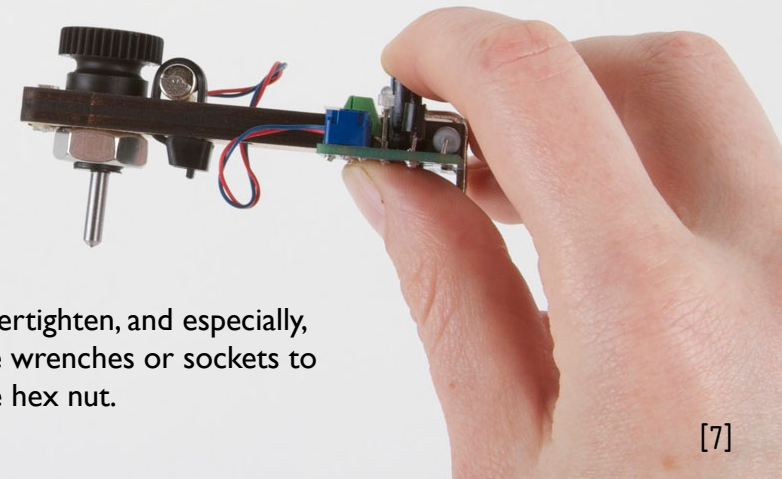
Place the diamond mount through the “pen” hole.

Thread the thumbscrew into the hex nut



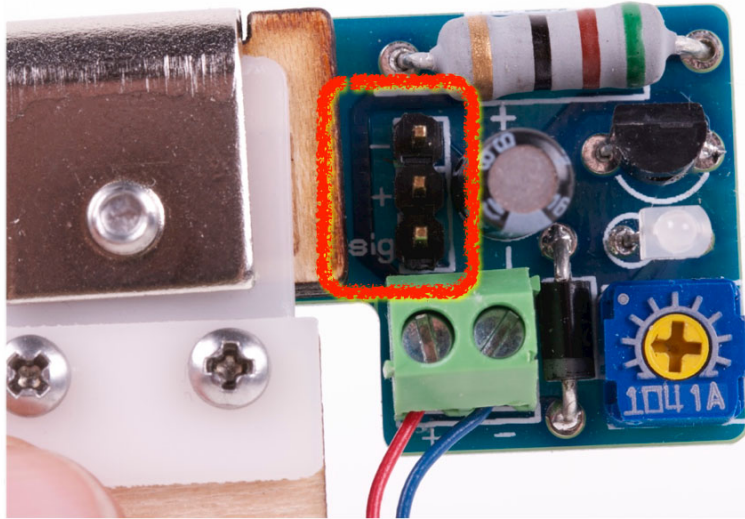
[Diamond Engraving Tool for Eggbot::Usage guide]

To tighten the Diamond Mount in place, hold the hex nut steady with your fingers, and turn the thumbscrew until the mount is firmly tight.



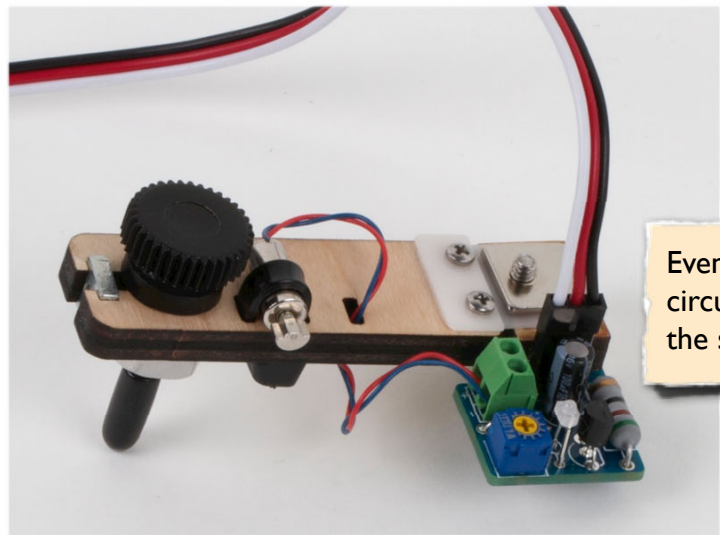
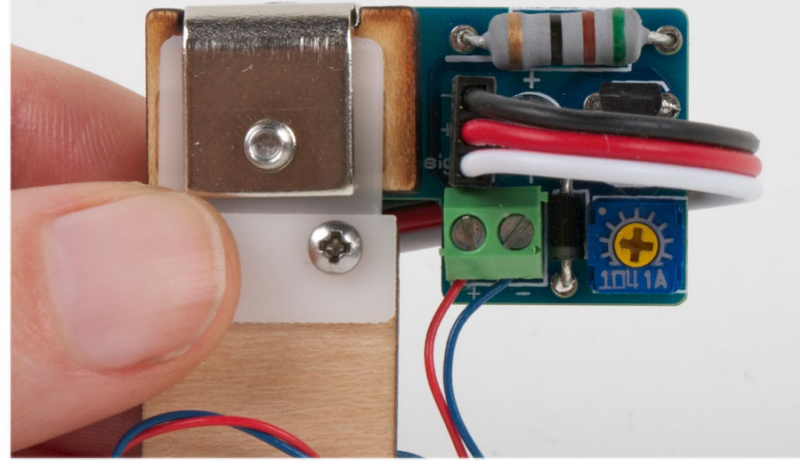
Do not overtighten, and especially, do not use wrenches or sockets to tighten the hex nut.

STEP 4: The Engraver's Servo Cable

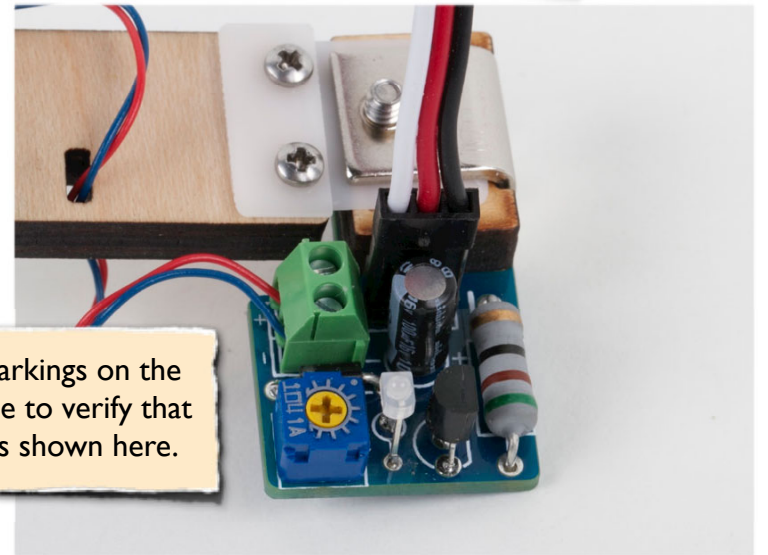


The three-conductor “servo” cable that powers the engraver hooks up to the driver board through this connector. The pins are labeled “-”, “+”, and “sig” (for signal). In practice, the labels may be hard to see.

Connect the cable to the three pins. The black wire goes to “-”, the red to “+” and the white to “sig.”



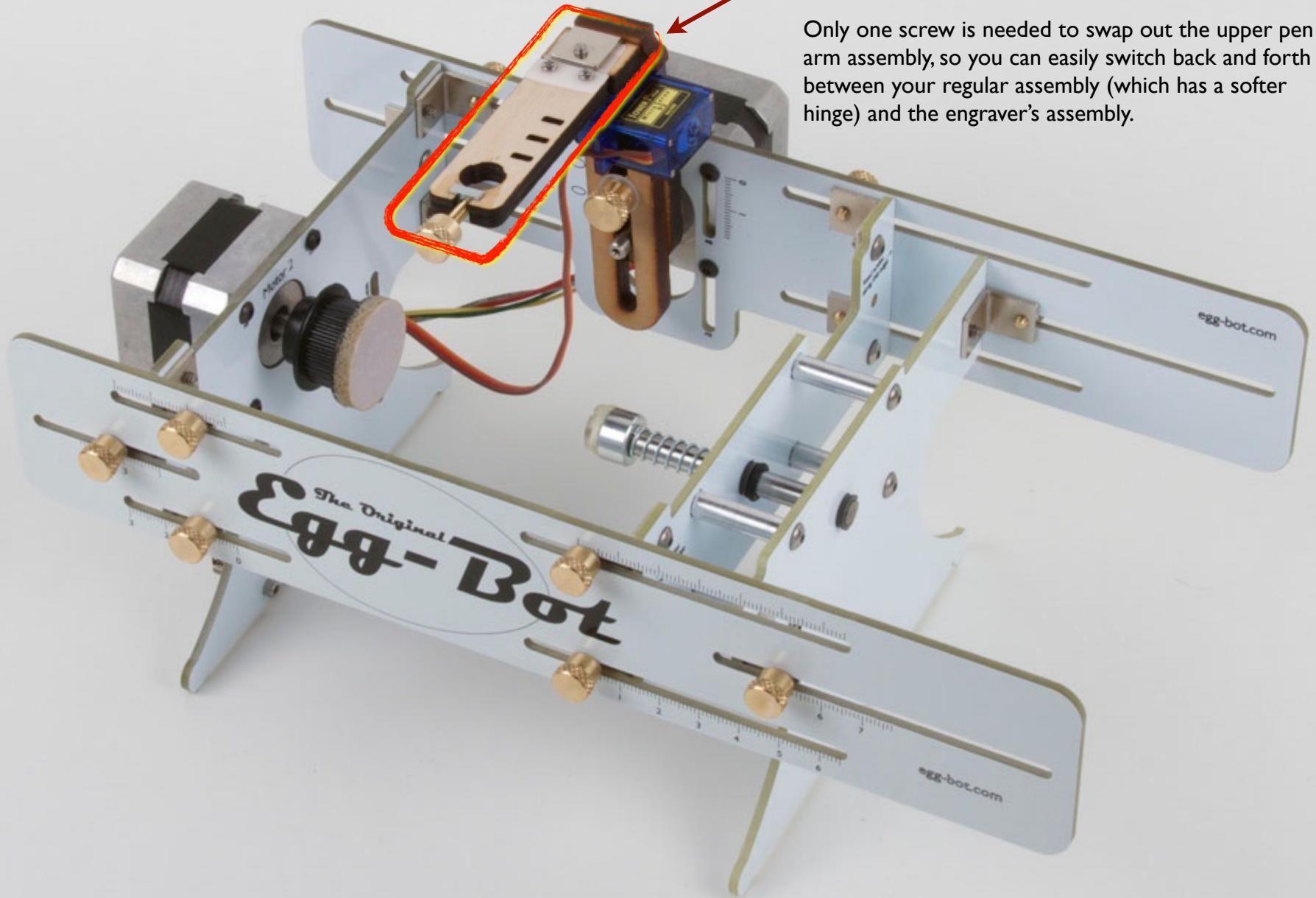
Even if you can't see the tiny markings on the circuit board, you should be able to verify that the servo cable orientation is as shown here.



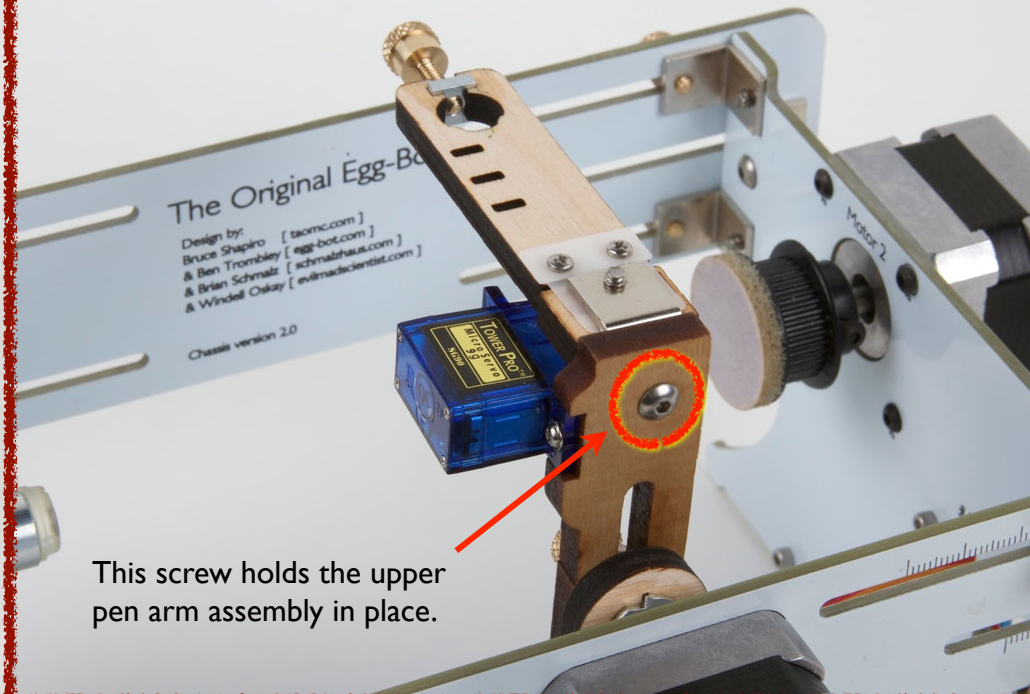
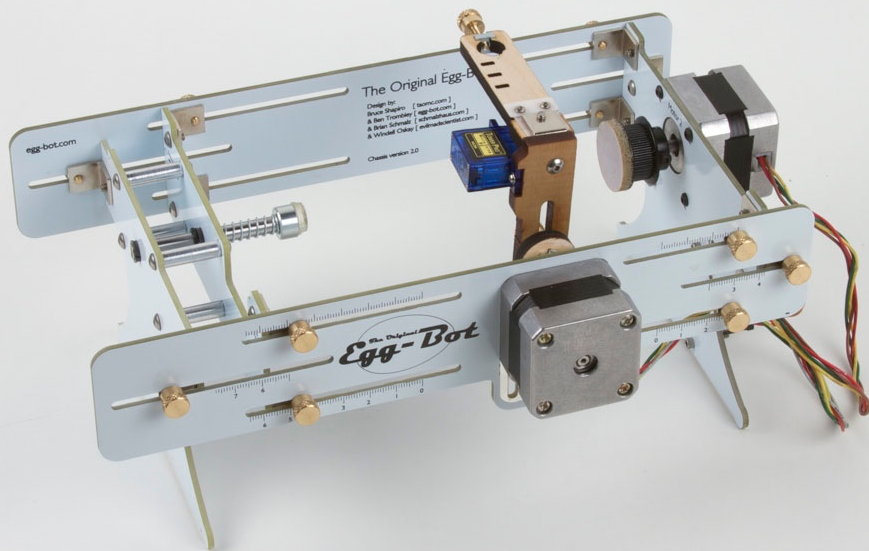
STEP 5A: The upper pen arm assembly

The Diamond Engraving Tool replaces this part of your Eggbot, the "Upper pen arm assembly."

Only one screw is needed to swap out the upper pen arm assembly, so you can easily switch back and forth between your regular assembly (which has a softer hinge) and the engraver's assembly.



STEP 5B: Remove your upper pen arm assembly



This screw holds the upper pen arm assembly in place.



[Diamond Engraving Tool for Eggbot: Usage guide]

Set aside your original upper pen arm assembly for when you want to switch back to using pens.



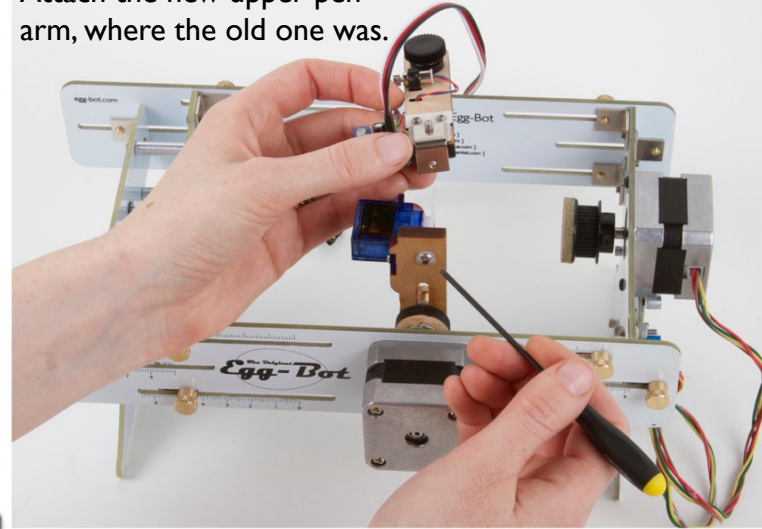
You just unscrewed this 6-32 x 3/8" screw. Keep it handy; we'll need it in the next step.

STEP 6: Install the new upper pen arm assembly

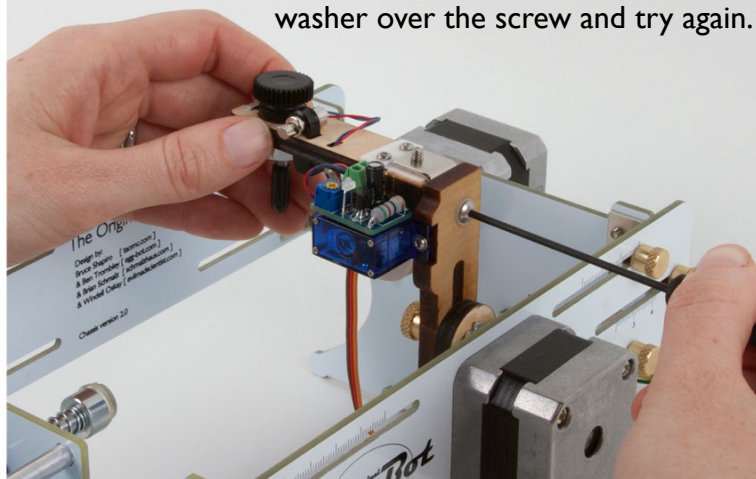
Put one of the nylon washers over the 6-32 x 3/8" screw.



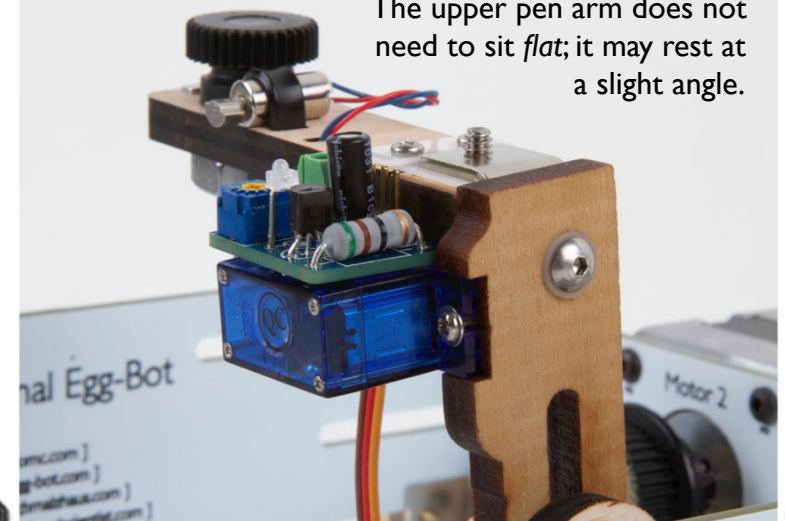
Attach the new upper pen arm where the old one was.



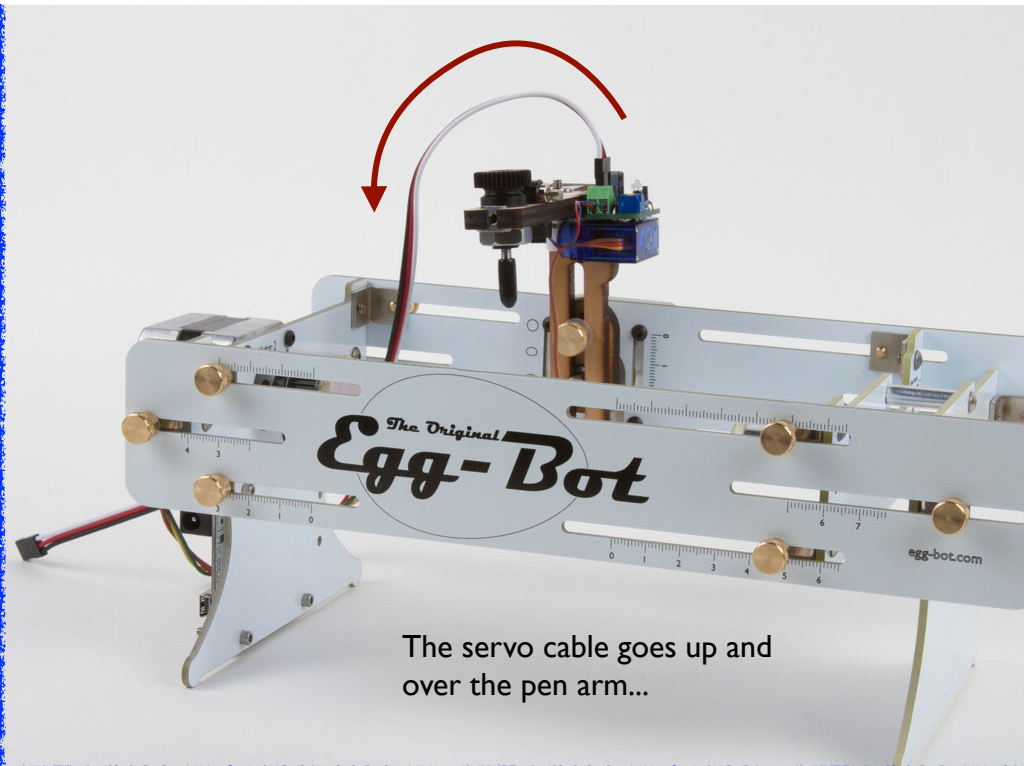
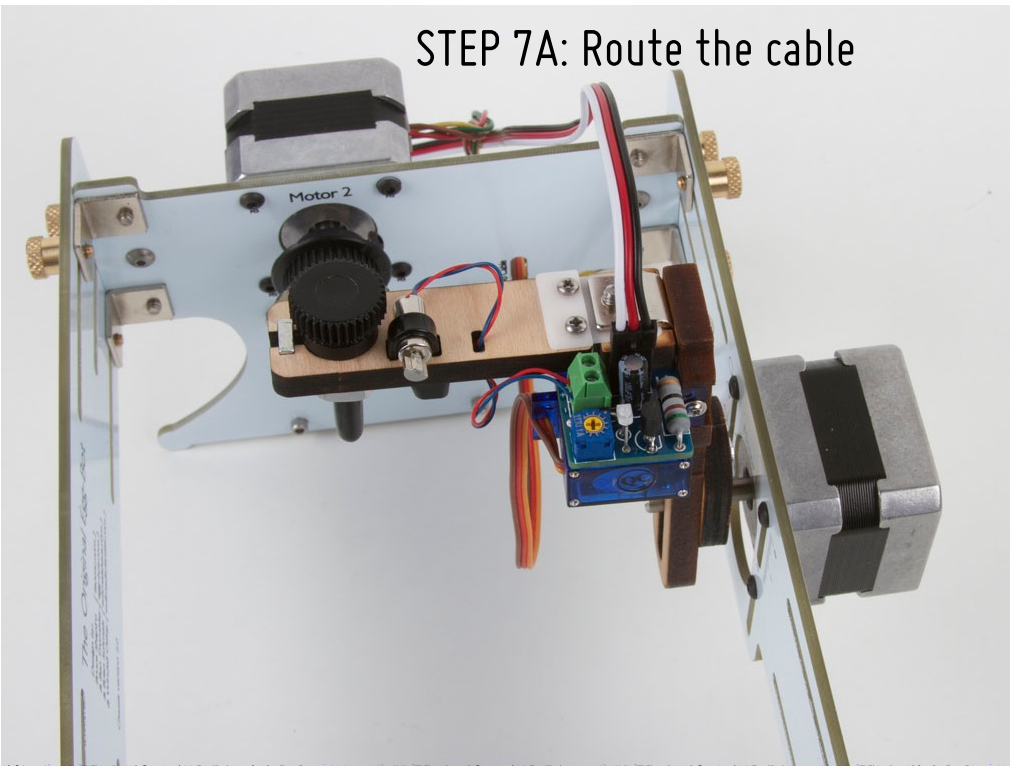
The new assembly should tighten in place securely. If it does not tighten securely, put a second nylon washer over the screw and try again.



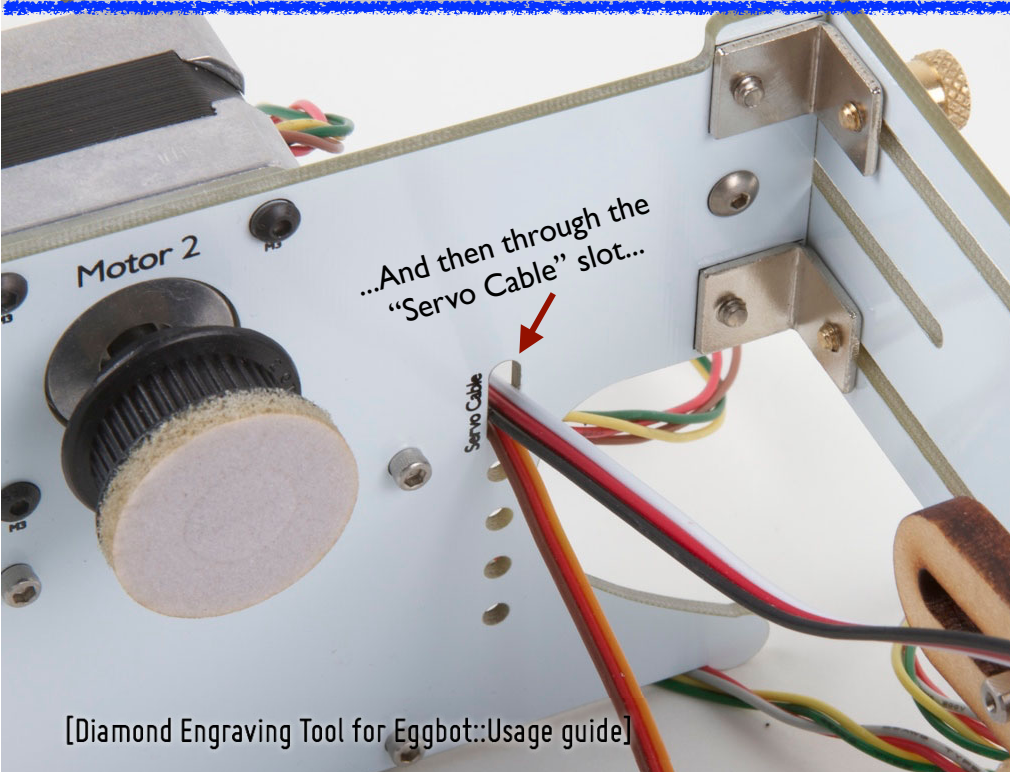
The upper pen arm does not need to sit flat; it may rest at a slight angle.



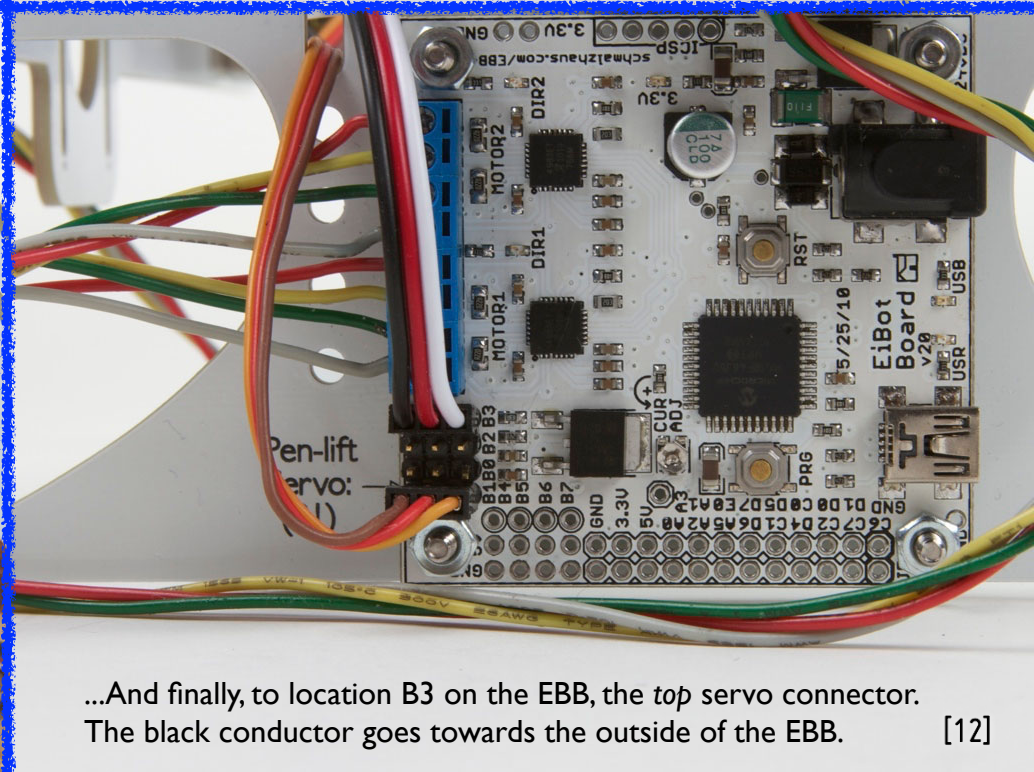
STEP 7A: Route the cable



The servo cable goes up and over the pen arm...



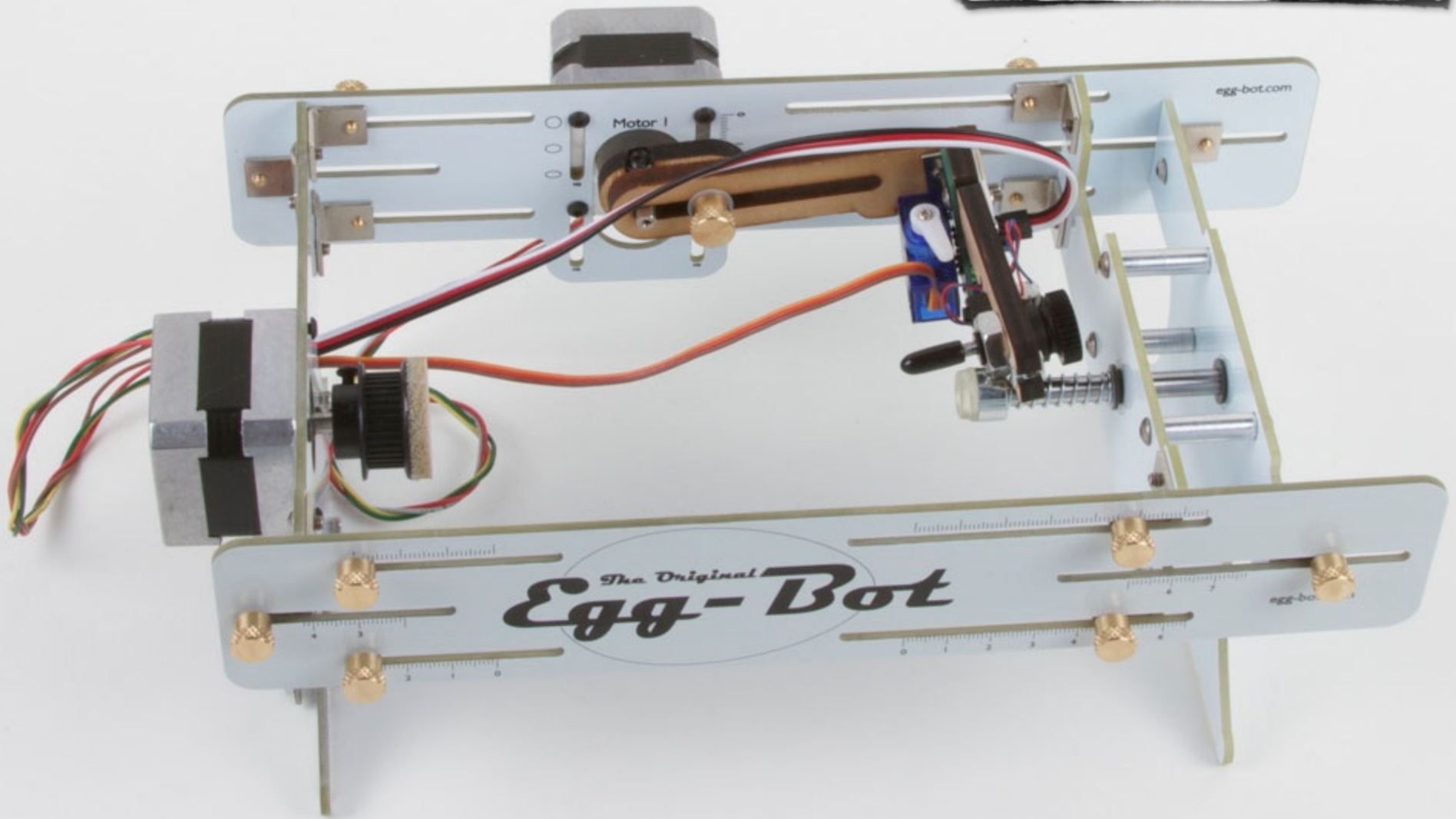
[Diamond Engraving Tool for Eggbot::Usage guide]



...And finally, to location B3 on the EBB, the top servo connector. The black conductor goes towards the outside of the EBB.

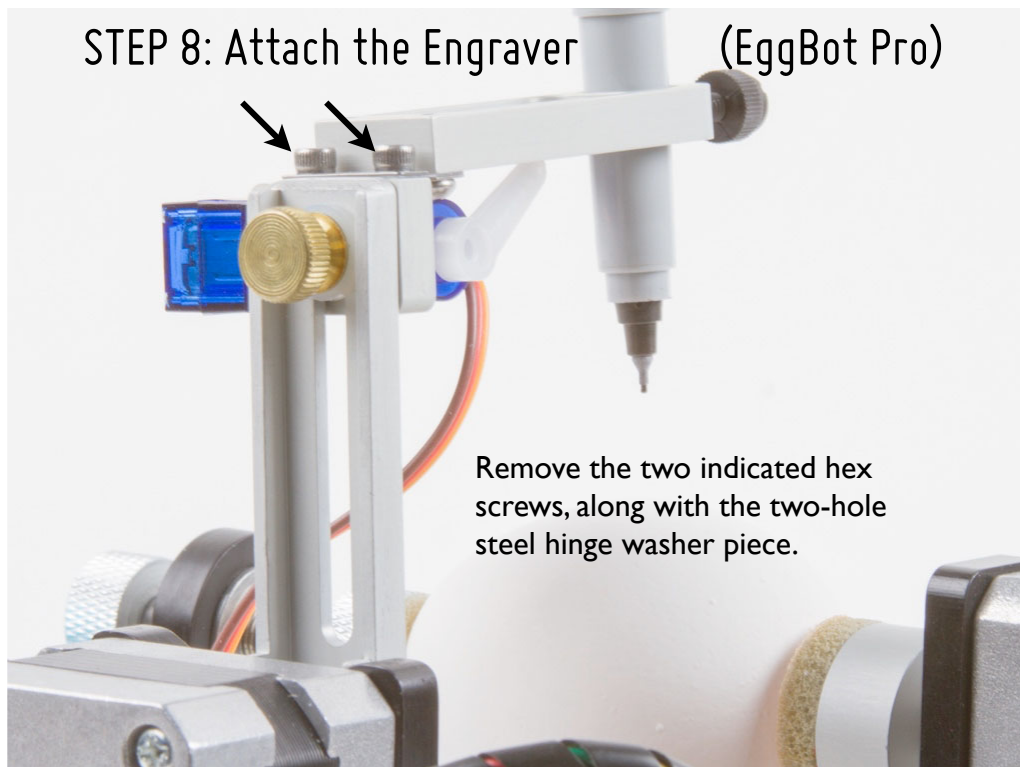
STEP 7B: Test the reach of your cabling

Final hardware installation step:
Make sure that your pen arm can reach all the way to both ends of its travel, without being constrained by the cables.

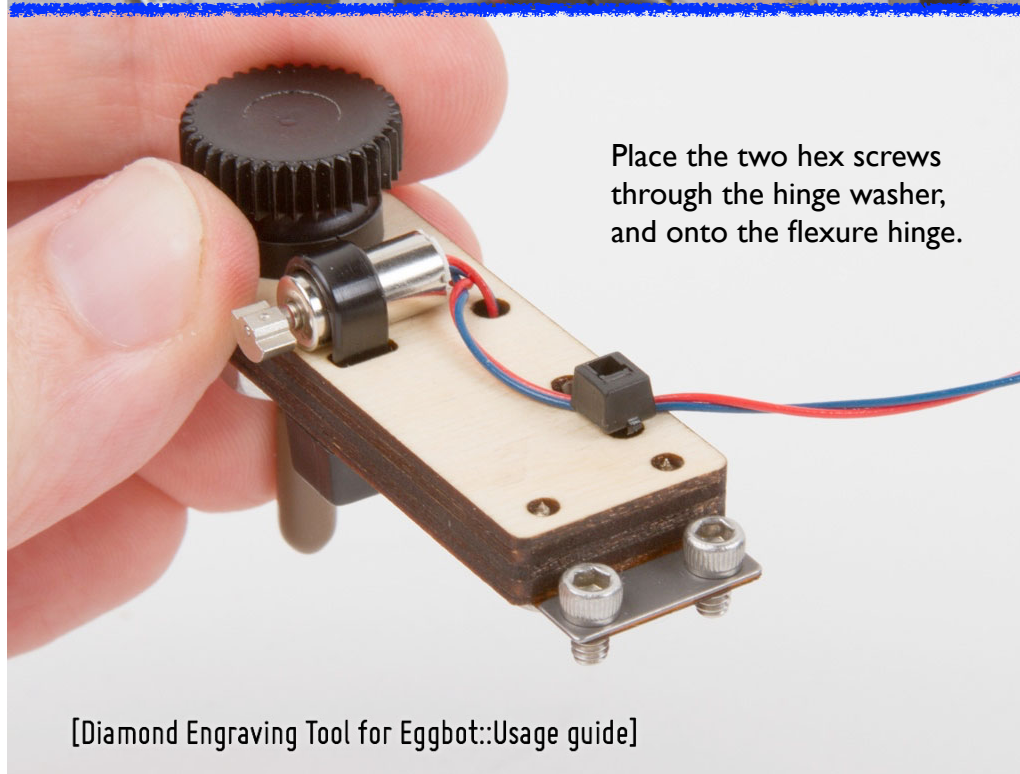
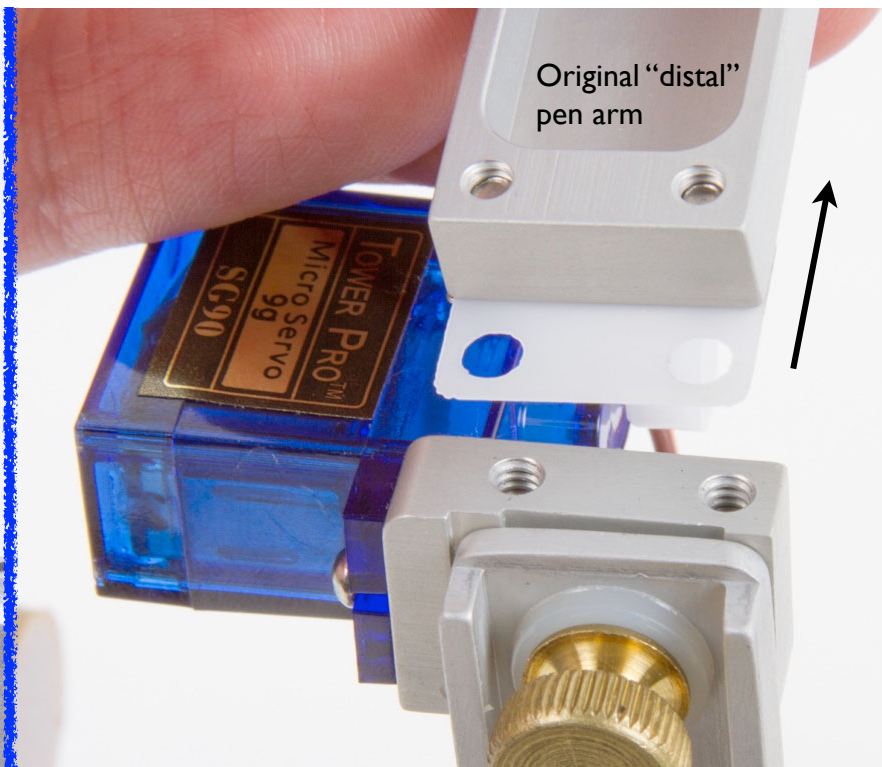


>> Skip ahead directly to Step 10.

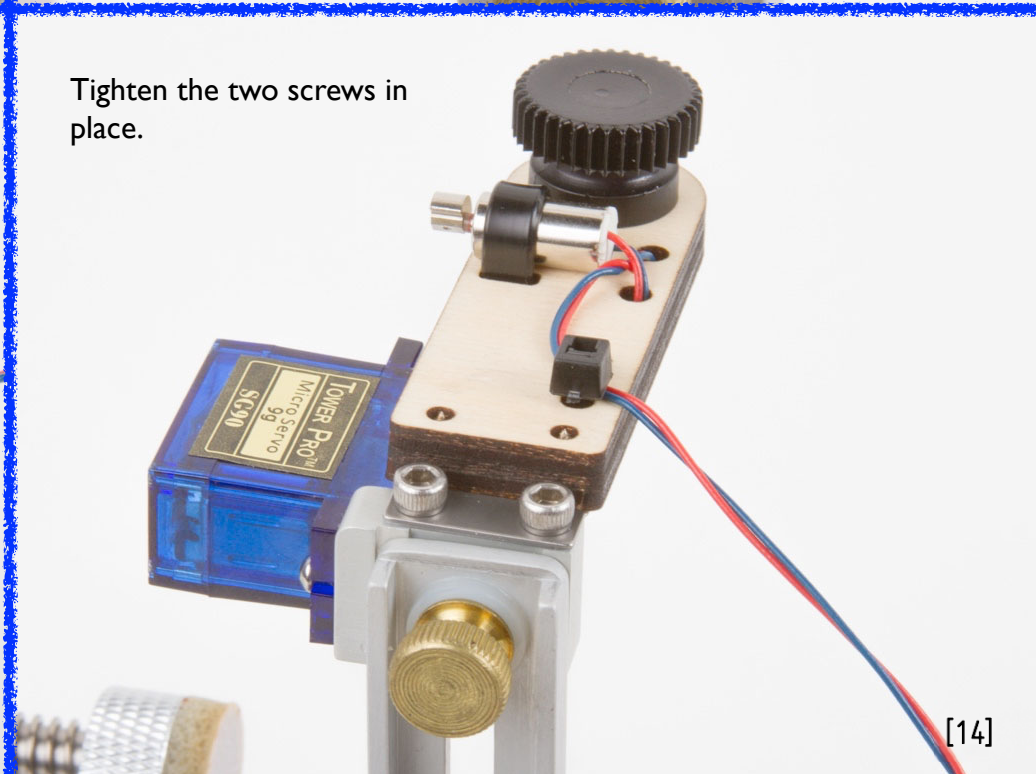
STEP 8: Attach the Engraver (EggBot Pro)



Remove the two indicated hex screws, along with the two-hole steel hinge washer piece.

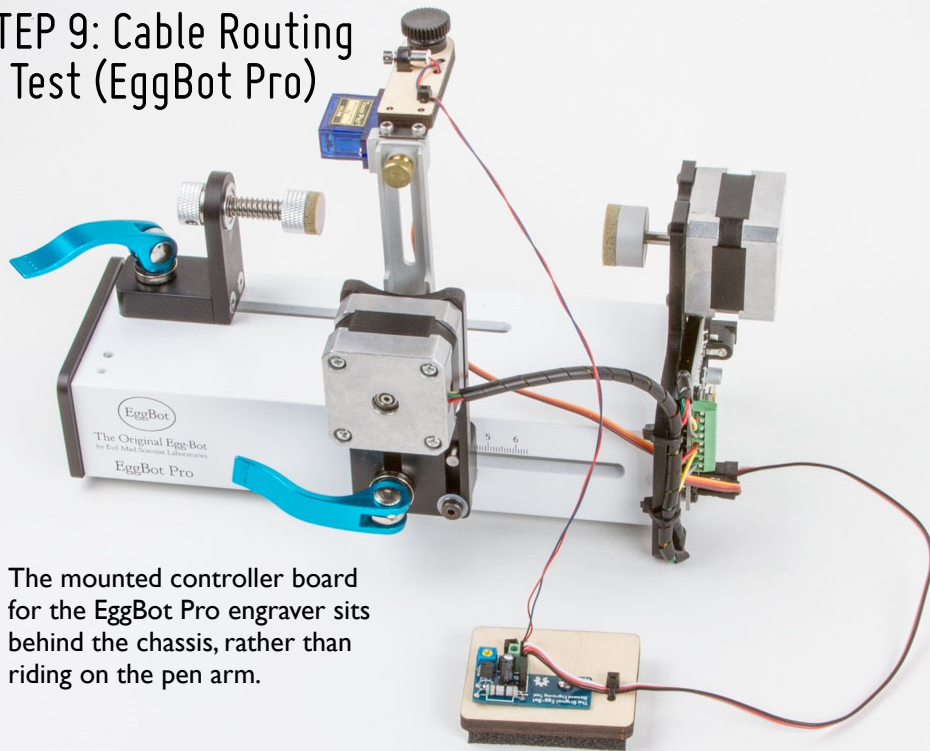


Place the two hex screws through the hinge washer, and onto the flexure hinge.

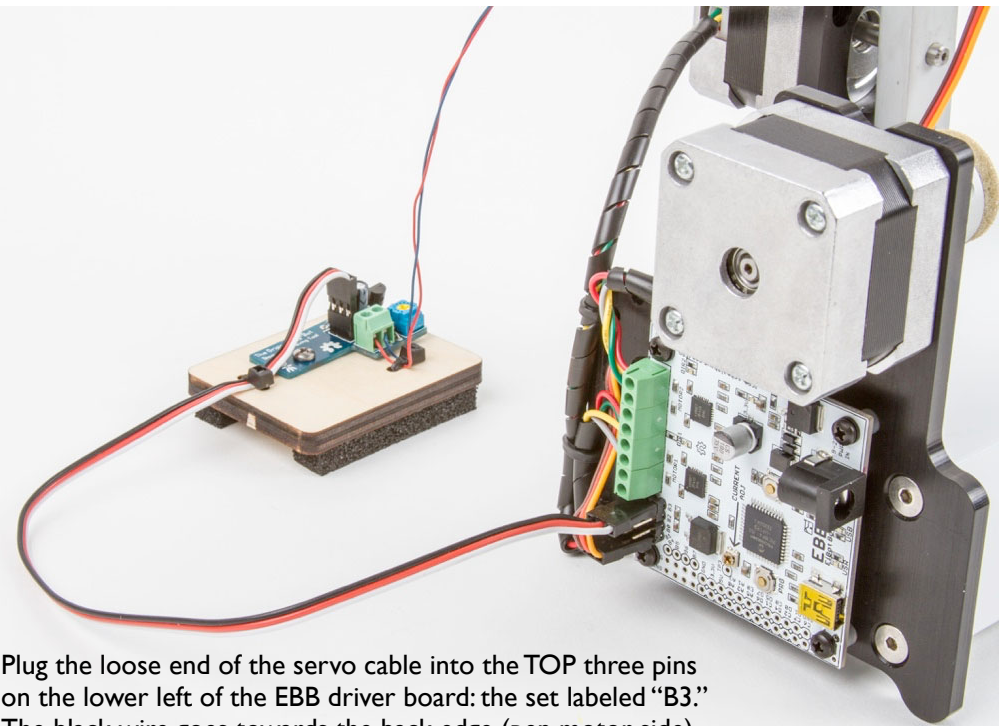


Tighten the two screws in place.

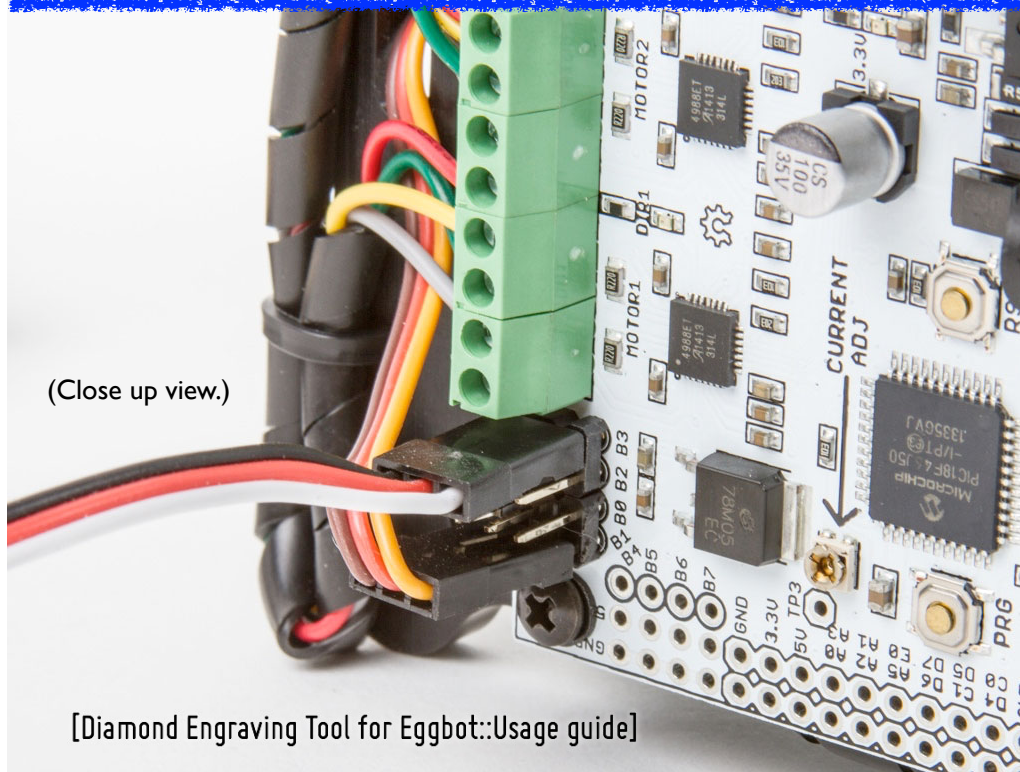
STEP 9: Cable Routing & Test (EggBot Pro)



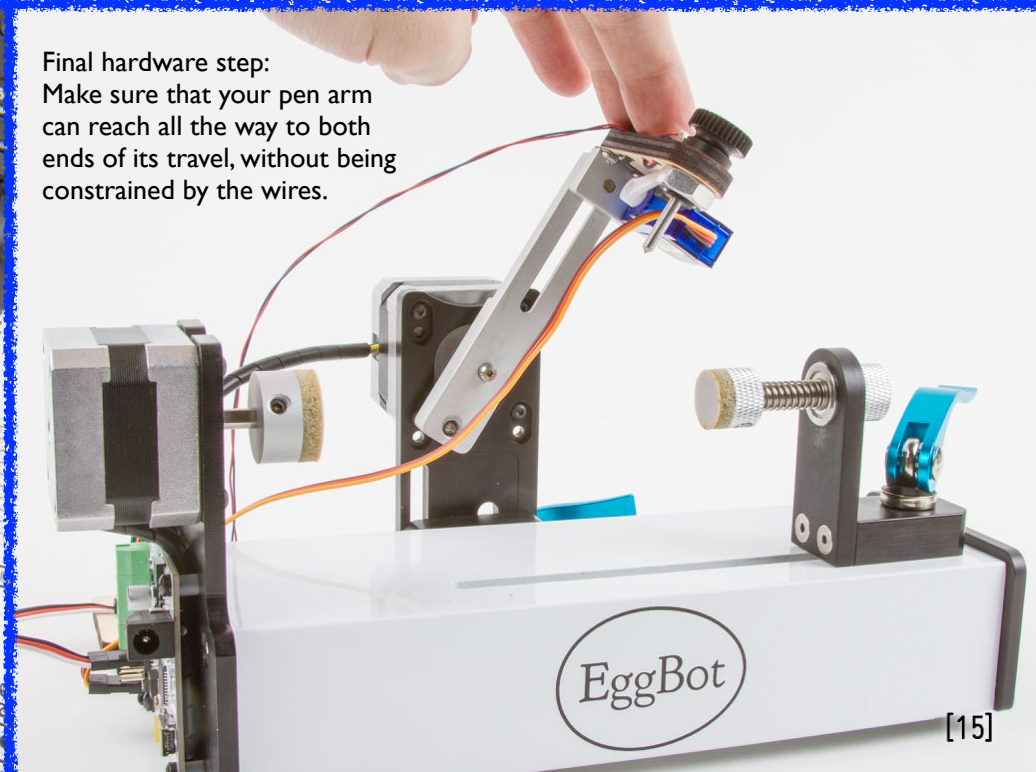
The mounted controller board for the EggBot Pro engraver sits behind the chassis, rather than riding on the pen arm.



Plug the loose end of the servo cable into the TOP three pins on the lower left of the EBB driver board: the set labeled "B3." The black wire goes towards the back edge (pen motor side).



(Close up view.)



Final hardware step: Make sure that your pen arm can reach all the way to both ends of its travel, without being constrained by the wires.

STEP 10: Prerequisites

The Diamond Engraving Tool is an Eggbot add-on, and the rest of these instructions assume that you are already be familiar with basic usage of the Eggbot (with pens!).

So, if you are just getting started with Eggbot, please begin with the main documentation, and make sure that you are comfortable making basic plots before proceeding here.

Eggbot documentation lives at:
<http://wiki.evilmadscientist.com/Eggbot>

The screenshot shows the Evil Mad Scientist Wiki page for "The Original Egg-Bot Kit". The page includes a navigation menu on the left with links to various project documents and a main content area with a table of contents and detailed links to related resources and documentation.

Evil Mad Scientist Wiki

Project Documentation

- The Egg-Bot Kit
- The Bulbdial Clock Kit
- Octolively
- Interactive Game of Life
- Alpha Clock Five
- Peggy 2 and 2LE
- WaterColorBot
- Meggy Jr RGB
- Diavalino
- Relay Shield
- Art Controller
- Discrete 555 Timer Kit
- XL741 Discrete Op-Amp
- Googly Eye Shield
- ISP Shield
- Larson Scanner
- LED Menorah
- Snap-O-Lantern

Navigation

- Main page
- Recent changes
- Evil Mad Science shop
- Evil Mad Scientist blog
- Wiki help

Page **Discussion** Read Edit View history

The Original Egg-Bot Kit

This page is the central documentation site for **The Original Egg-Bot kit** from Evil Mad Scientist.

Contents [hide]

- 1 The Original Egg-Bot Kit
- 2 Ostrich Egg-Bot Kit
- 3 Tutorials
- 4 Advanced topics and tips
- 5 Support Resources

The Original Egg-Bot Kit

[edit]

Main details about the Egg-Bot kit:

- [Announcement article](#) at Evil Mad Scientist Laboratories
- [Product page](#) at Evil Mad Scientist shop
- [egg-bot.com](#), the official site, featuring the Eggbot FAQ

Getting started with Eggbot: Essential documentation

- Part I: Assembly guide. Two versions are available:
 - (A) Single-file PDF version: [Available here](#), a 27 MB PDF document (Trouble Viewing? [Please click here.](#))
 - (B) Page-by-page online version: [Available here](#)
- Part II: [Installing software](#)
- Part III: [Making your first plot](#)

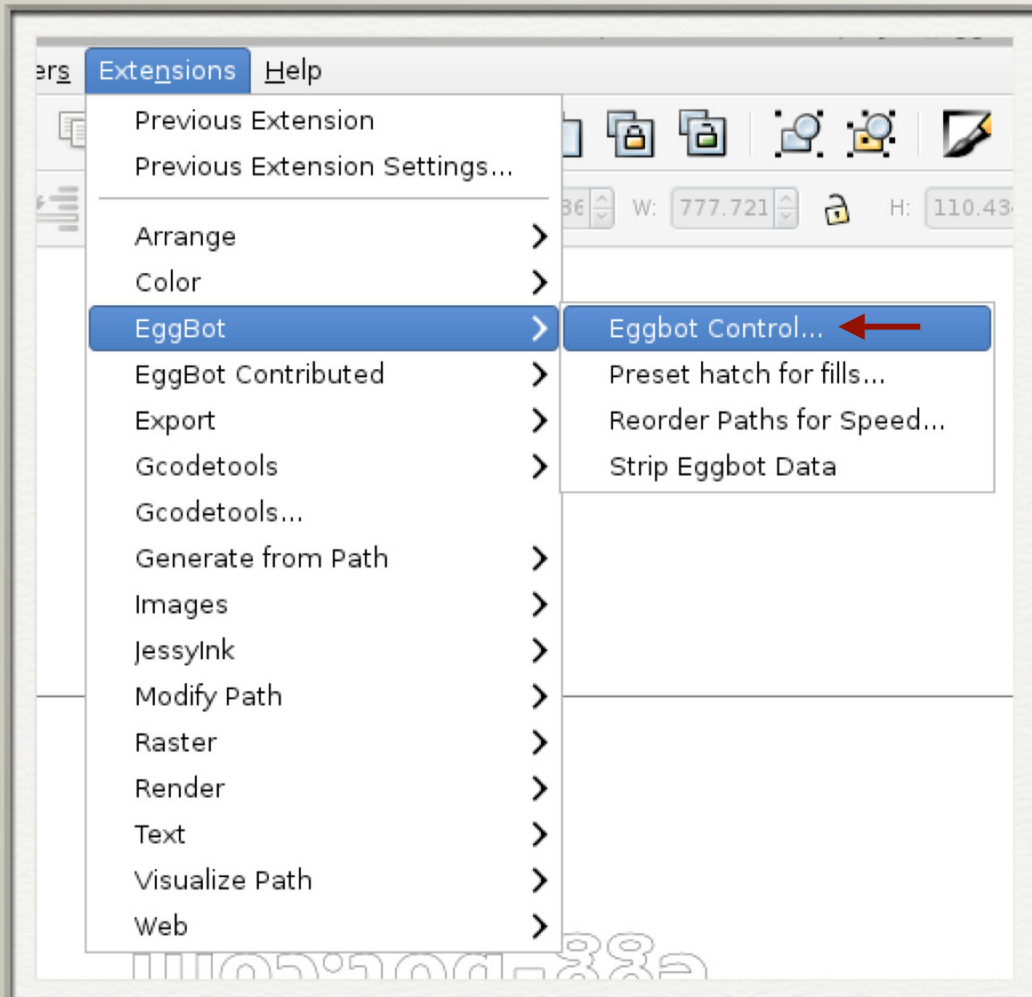
Ostrich Egg-Bot Kit

[edit]

- [The Ostrich Eggbot Kit](#) -- an extra large chassis for plotting on larger objects

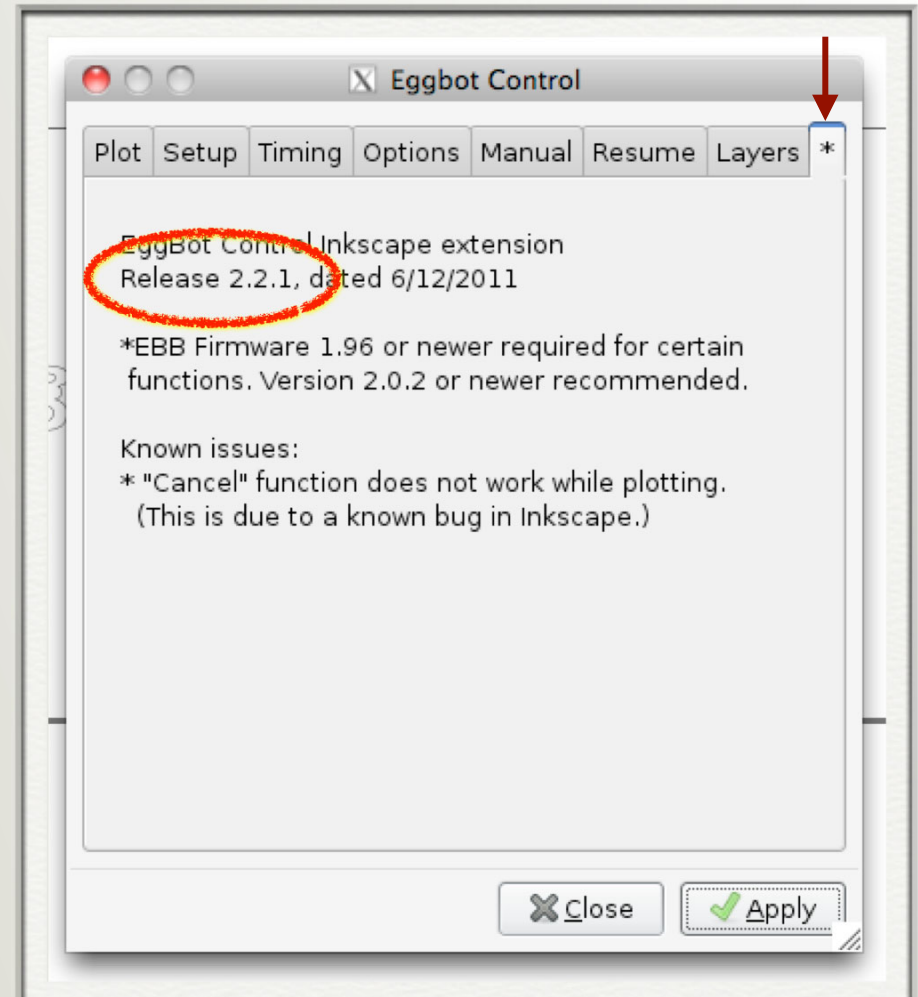
STEP 11: Verify that your software is up to date.

From the Inkscape Extensions menu, open Eggbot Control, and select the "*" tab that shows the version number of your software.



The engraver kit requires **Release 2.2.1 or newer**.

If you have an older version of this software, please visit <http://wiki.evilmadscientist.com/Engraver> and follow the link "Update Eggbot Software" for instructions.



STEP 12: Enabling (or disabling) the Engraver

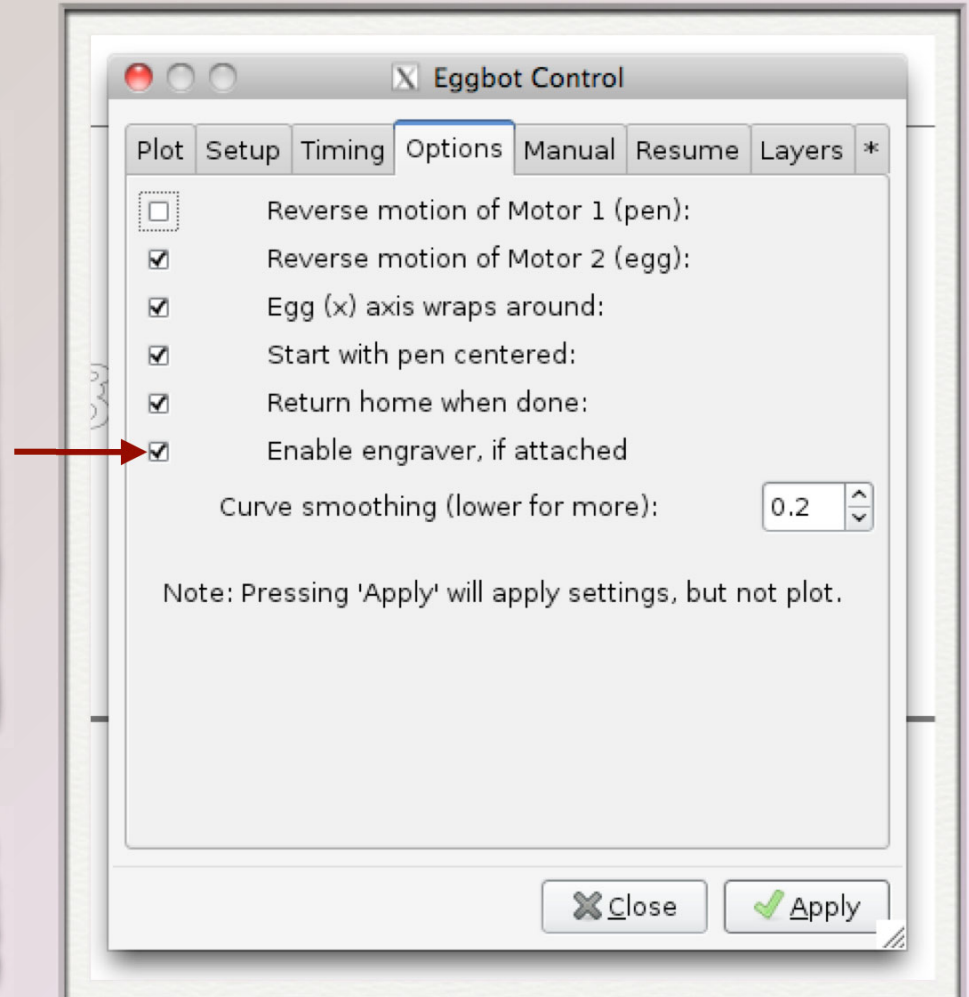
Under the “Options” tab of Eggbot Control, there is an option called “Enable engraver, if attached.”

If this box is checked, then the engraving motor will turn on when you begin a plot, and turn off automatically when the plot finishes.

Uncheck this box if you want to leave the Engraver’s upper pen arm assembly in place, but do not want to turn the motor on.

Other than selecting this option, there are no other essential steps to operating the Diamond Engraving Tool.

Note that you can also disable the engraver by disconnecting its servo cable at one or both ends.

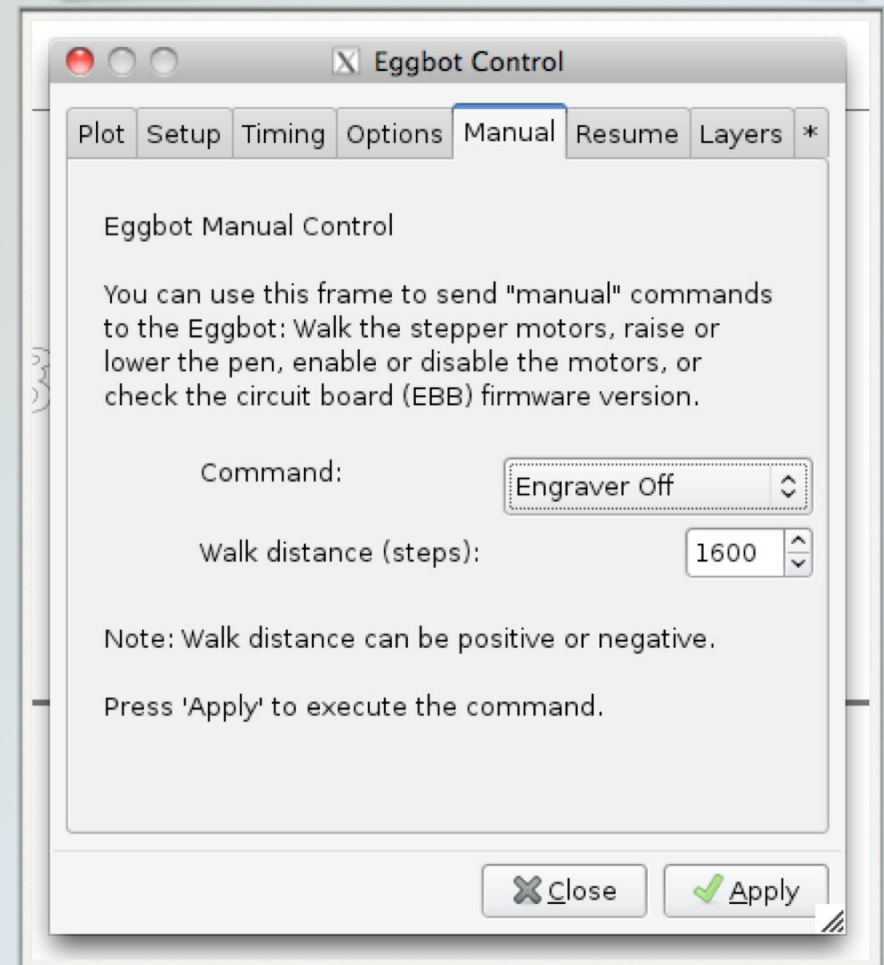
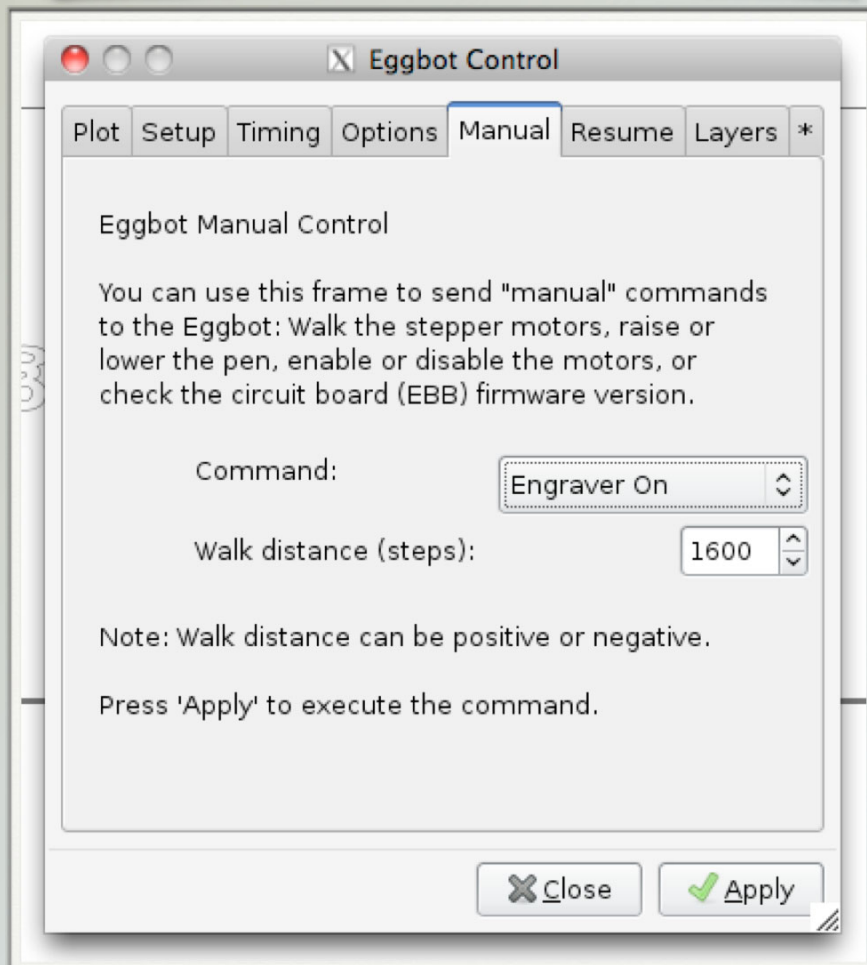


STEP 13: Manual control of the Engraving tool

Under the “Manual” tab of Eggbot Control, there are options called “Engraver On” and “Engraver Off.”

If “Engraver On” is selected, then the engraving motor will turn on immediately when you click the “Apply” button, but *only* if the engraver is also enabled in the Options tab.

If “Engraver Off” is selected, then the engraving motor will turn off immediately when you click the “Apply” button, whether or not the engraver is enabled in the Options tab.



STEP 14: Factors influencing quality of engraving

Many factors influence the quality of engraving possible with the Diamond Engraving Tool for Eggbot.

Chief amongst these are

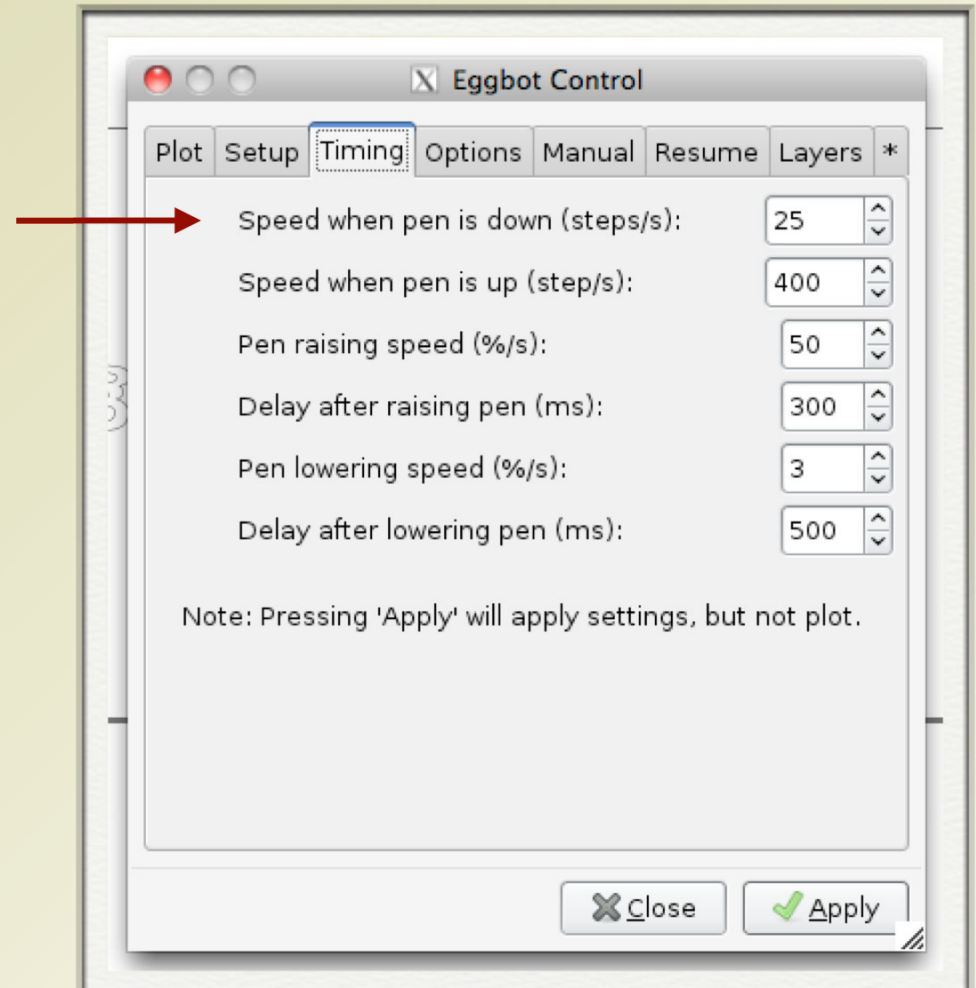
- The type of surface being engraved
- The speed of engraving (“pen down” speed)
- The pressure applied by the engraving tool
- The strength of vibration applied by the engraving motor

Generally speaking, you can get the finest quality engraving by using a slow pen-down speed (often in the range 25-100), in combination with moderate pressure and moderate vibration strength.

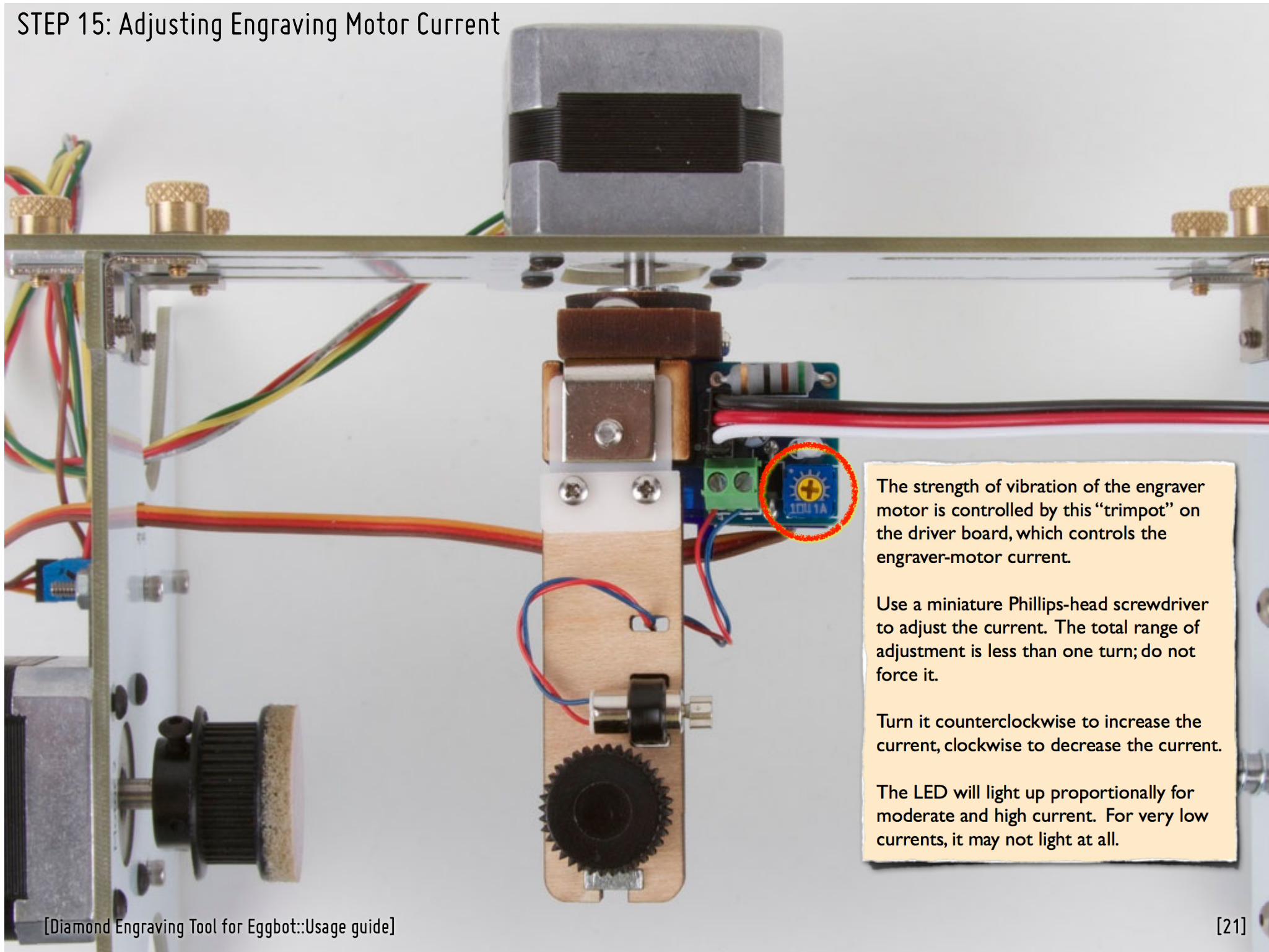
Depending on your needs, you may prefer to increase the speed of engraving (perhaps as high as 300), while increasing the pressure and vibration strength.

When working with fragile items like glass ornaments, you may also want to drastically reduce the “Pen lowering speed” – so as to only gently lower the diamond point onto the surface.

(Hammering the diamond point down is a good technique for engraving certain hard surfaces, but is also a very good way to break fragile objects.)



STEP 15: Adjusting Engraving Motor Current



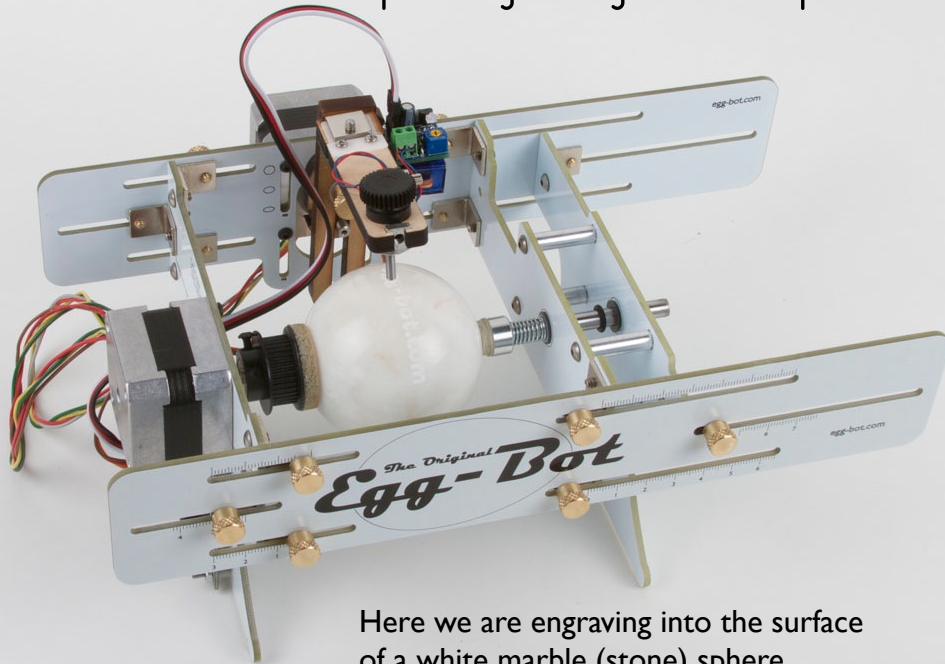
The strength of vibration of the engraver motor is controlled by this “trimpot” on the driver board, which controls the engraver-motor current.

Use a miniature Phillips-head screwdriver to adjust the current. The total range of adjustment is less than one turn; do not force it.

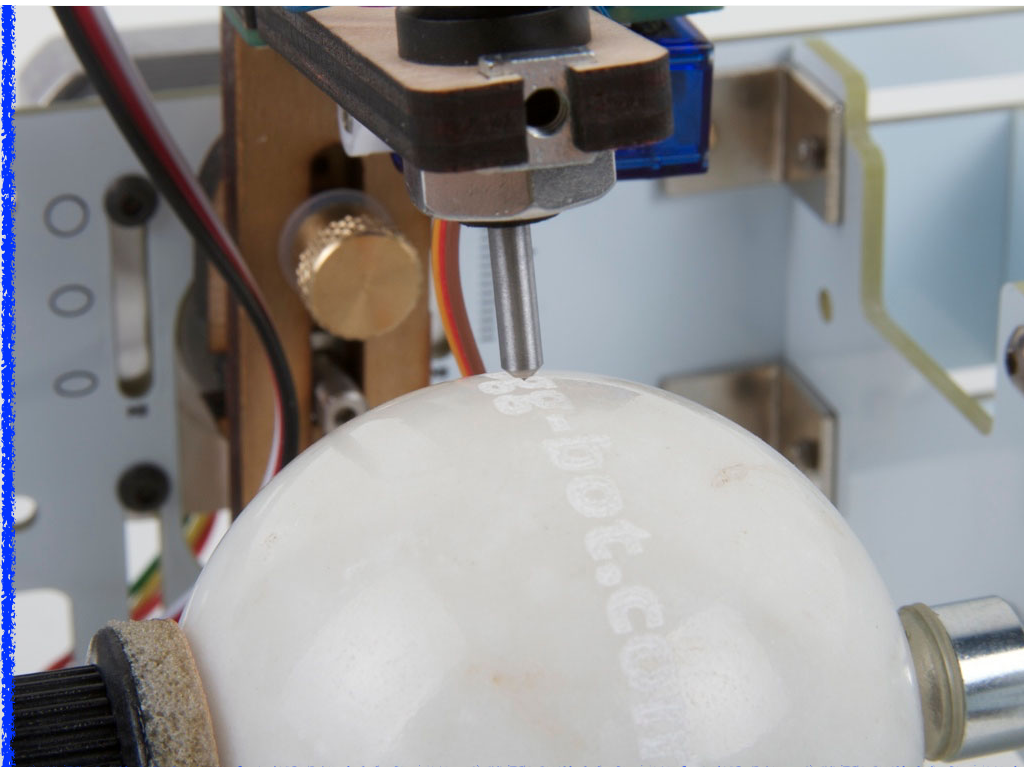
Turn it counterclockwise to increase the current, clockwise to decrease the current.

The LED will light up proportionally for moderate and high current. For very low currents, it may not light at all.

STEP 16: Example: Engraving a stone sphere



Here we are engraving into the surface of a white marble (stone) sphere.



When engraving rigid objects, you can apply substantial pressure. Here, the “pen” is down, with the diamond against the surface. The angle of the pen arm allows the hinge to apply downwards pressure.

Center the *diamond point* (not the pen arm, but the point itself) directly above the center of your object before plotting.

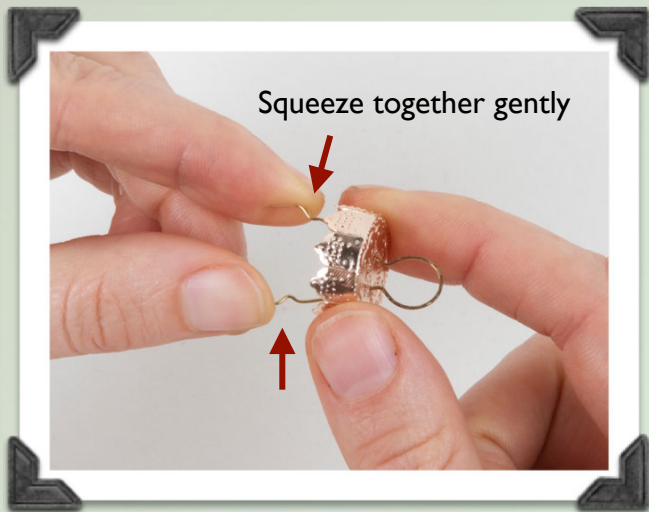
STEP 17A: Example: Etching glass christmas ornaments (part I, preparation)



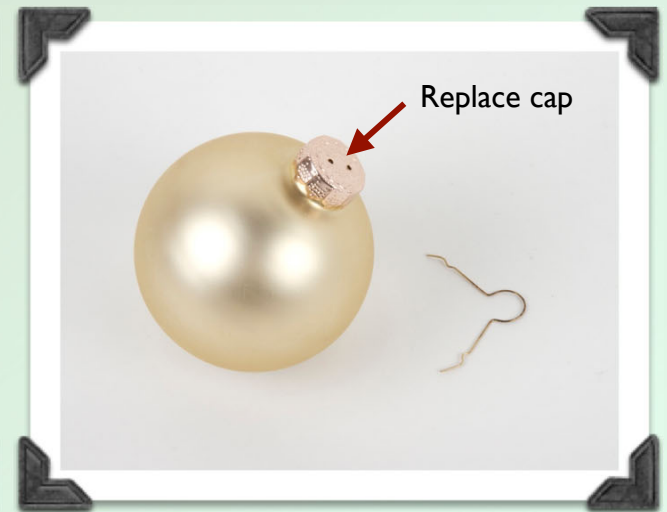
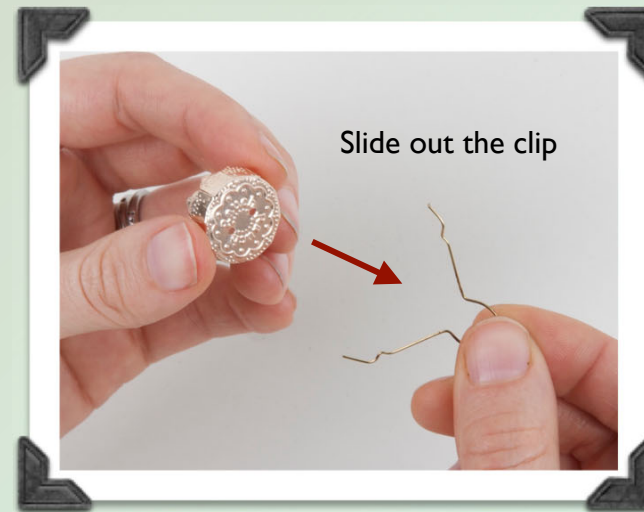
Glass christmas ornaments are good items to etch or engrave with the Eggbot. (You can also decorate them with pens!)



First, though, you need to remove the little hanger clip.

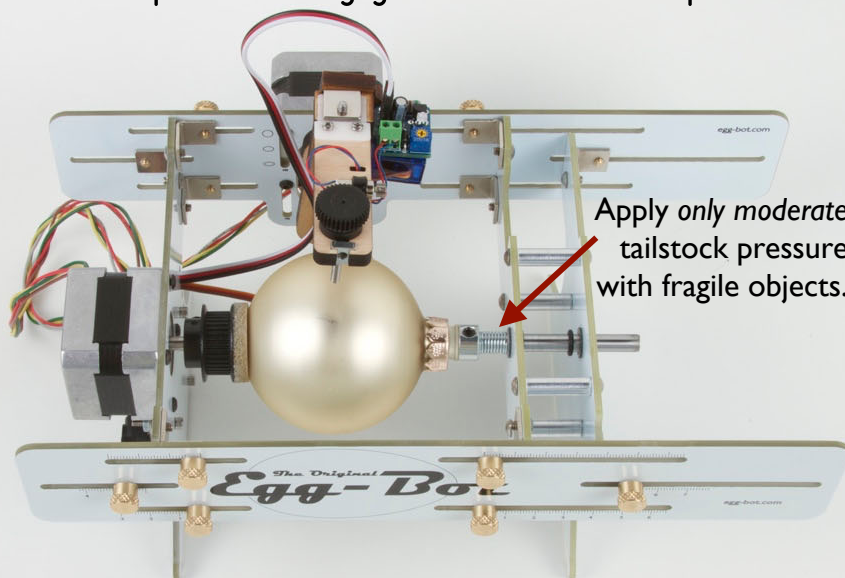


Remove the clip



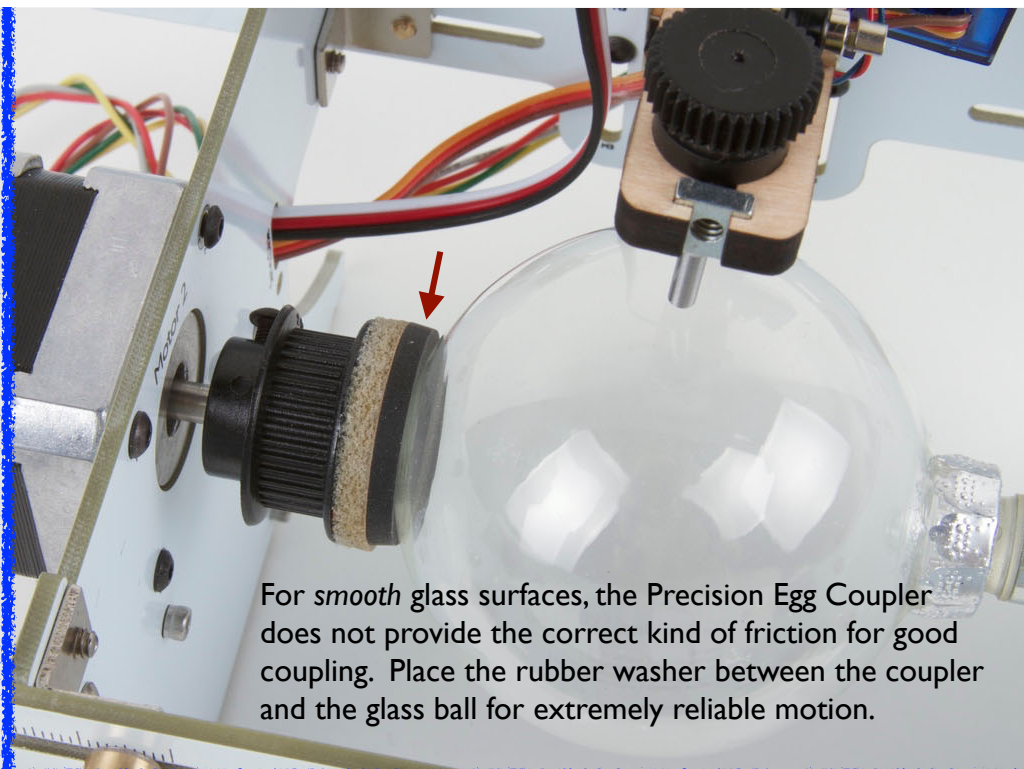
Replace the cap, providing a flat mounting surface. The clip can be replaced when you are done.

STEP 17B: Example: Etching glass ornaments (part II)



Apply only moderate tailstock pressure with fragile objects.

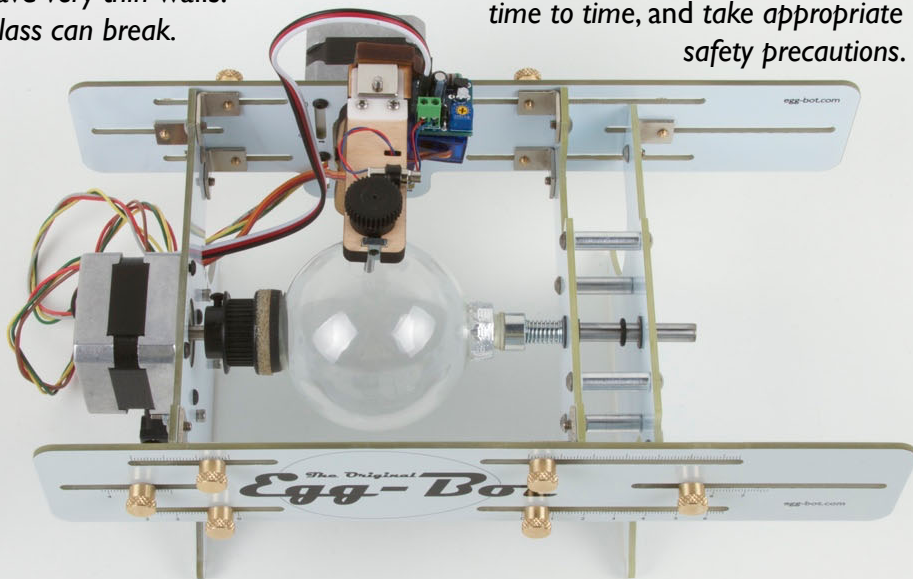
Mount glass ornaments with the cap facing the tailstock. You may need to rotate your artwork 180° to match.



For smooth glass surfaces, the Precision Egg Coupler does not provide the correct kind of friction for good coupling. Place the rubber washer between the coupler and the glass ball for extremely reliable motion.

Glass ornaments usually have very thin walls. Glass can break.

Apply minimal plotting pressure, assume that breaks will happen from time to time, and take appropriate safety precautions.



But it's worth it.