

# Coreless Servo Upgrade Kit

## — Installation Guide —



Model 2571

This upgrade kit, compatible with most AxiDraw V3 and AxiDraw SE family machines, replaces the standard pen-lift servo motor with a high quality coreless servo.

This guide walks through the process of installing the new motor, including replacing the servo mount.

We strongly recommend that you **read through all of the steps before starting.**

For ease of viewing the photos in this guide, consider reading this guide on a phone, tablet, or computer screen, rather than printing it.

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If you should need any assistance with this installation, please contact us; we're here to help.

There are variations between AxiDraw units; if something doesn't look right or doesn't seem to fit right, please let us know as soon as possible so that we can help you get up and running.

Email: [contact@evilmadscientist.com](mailto:contact@evilmadscientist.com)  
Support chat: [axidraw.com/chat](https://axidraw.com/chat)

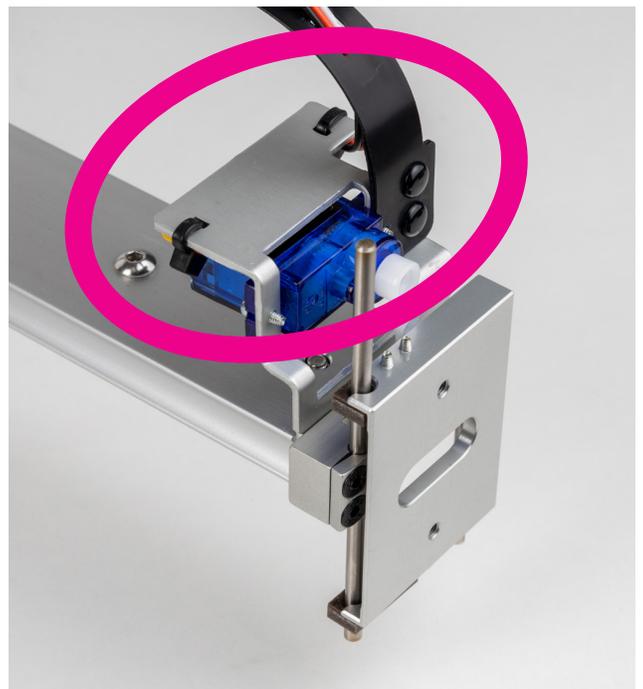
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### Step 1: Compatibility check

To verify that your AxiDraw is ready for this upgrade, look at the bracket where your existing pen-lift servo motor is mounted, comparing it to the photo here.

If it looks like the photo, with a silver-colored aluminum flap over the top of the servo motor, go on to Step 2.

If the mounting bracket is not silver in color, or does not have this flap over the servo motor top, your AxiDraw is not compatible with this upgrade. (Please contact support by email if you need help.)



## Step 2: Tool check

Certain tools are required to install this upgrade; they are not included with the kit:

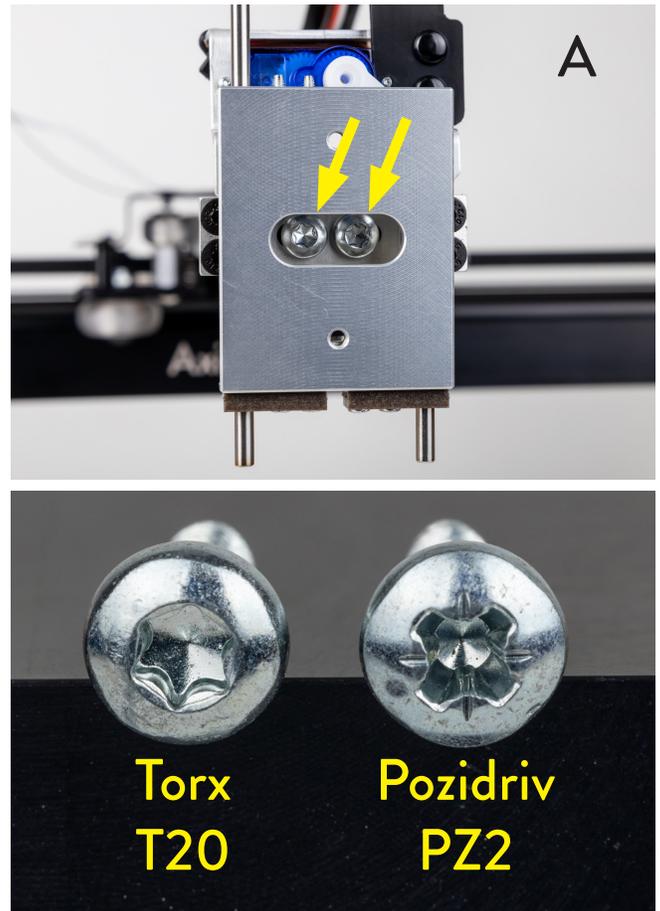
- Sharp scissors
- Wire cutters (recommended, not required)
- A screwdriver; *type to be determined below.*

You may also find sandpaper and a pin, needle, or ball-point pen tip helpful.

To determine the screwdriver type, remove the pen clip and lower your pen position to its lowest point **(A)**. Look through the hole in the front face of the pen slide to see the two screw heads visible inside. You may need to manually lift the pen slide up a bit in order to see them.

If the two screw heads have a 6-pointed star shape, the necessary screwdriver is a **Torx T20**.

If the two screw heads have a cross shape, the necessary screwdriver is a **Pozidriv PZ2**, or “Pozi #2”.



## Step 3: Remove the vertical slide

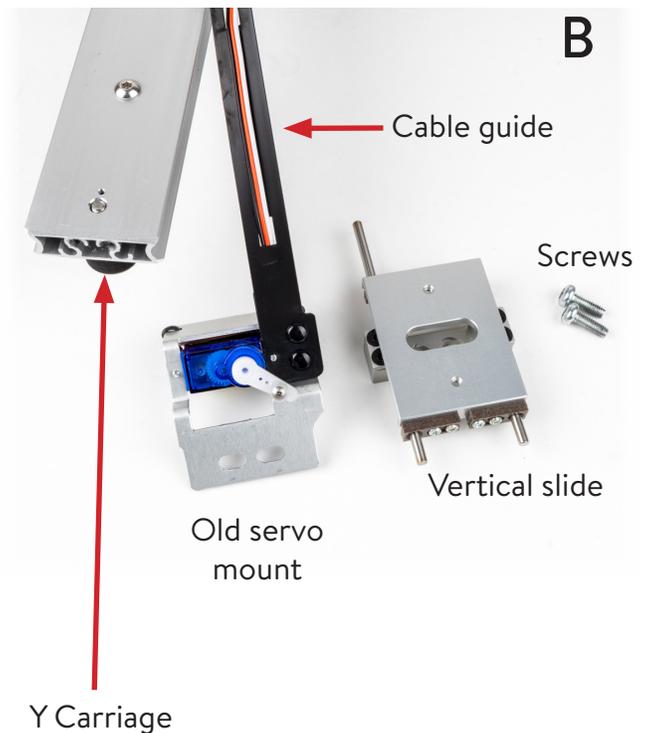
Before anything else, disconnect the AxiDraw from power and USB.

Then, using the screwdriver, loosen and remove those two screws **(B)**. They *will* be tight.

**Be extremely careful** as you remove the screws: Alternate between them as you unscrew them, and make sure that the screw heads are free of and **do not** press against the vertical slide; they could damage the slide.

These two screws normally attach the **vertical slide** to the **Y-carriage** of the AxiDraw, clamping the **old servo mount** in place between them. The old servo mount is still attached to the **cable guide**.

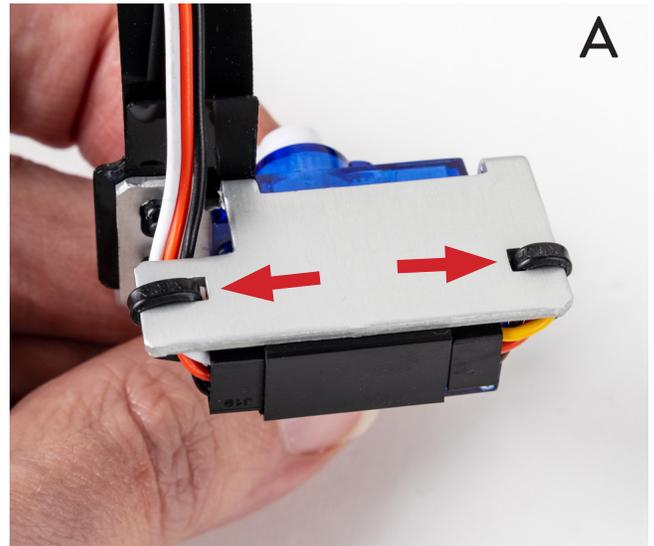
In the steps that follow, we will detach the cable guide, move it to the new servo mount, tie up loose cable ends, and then attach the parts back in place.



## Step 4: Disconnect the old servo

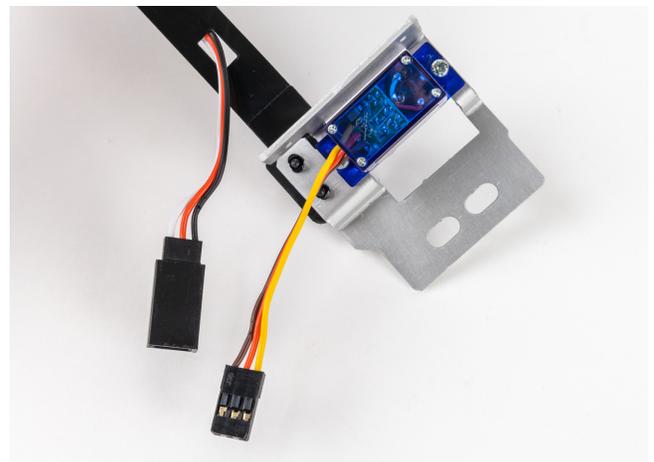
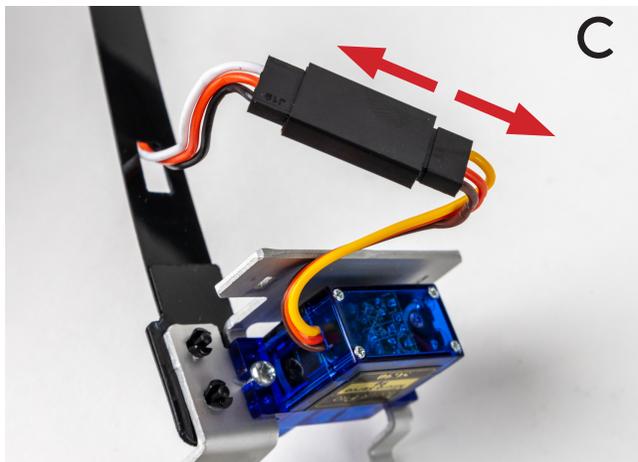
The existing servo wiring is typically held in place by two cable ties, as indicated.

Before removing them, note their positions (**A**); see how the white/red/black cable is held in place by a looped cable tie, and one on the other side.



Use wire clippers or sharp scissors to cut and remove both cable ties (**B**). **Do not** cut or damage the wiring itself.

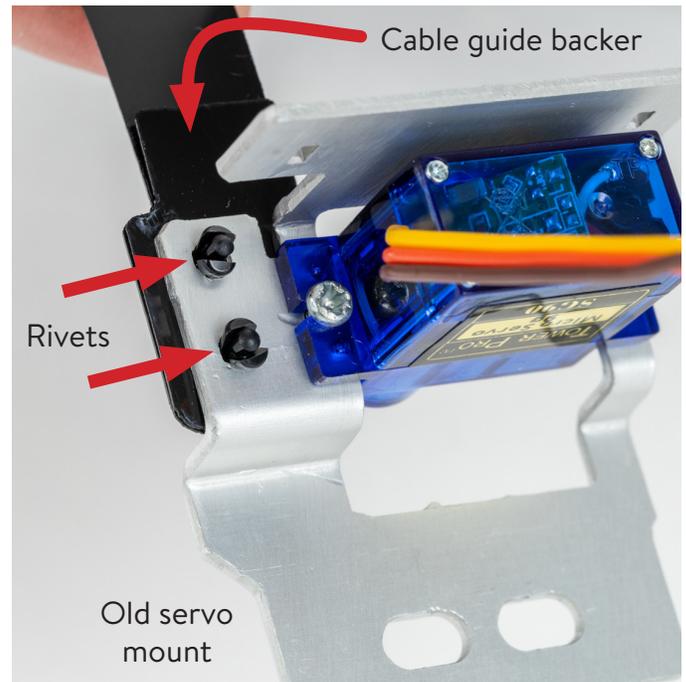
Once the cable ties are cut, disconnect the old servo motor by pulling its cable end (brown/red/yellow) out of the jack as shown (**C**).



## Step 5: Disconnect the cable guide

The cable guide – the flexible black plastic ribbon – is attached to the old servo mount by two plastic rivets. (The exact shape of your cable guide may not match the one shown here; they vary slightly between AxiDraw models.)

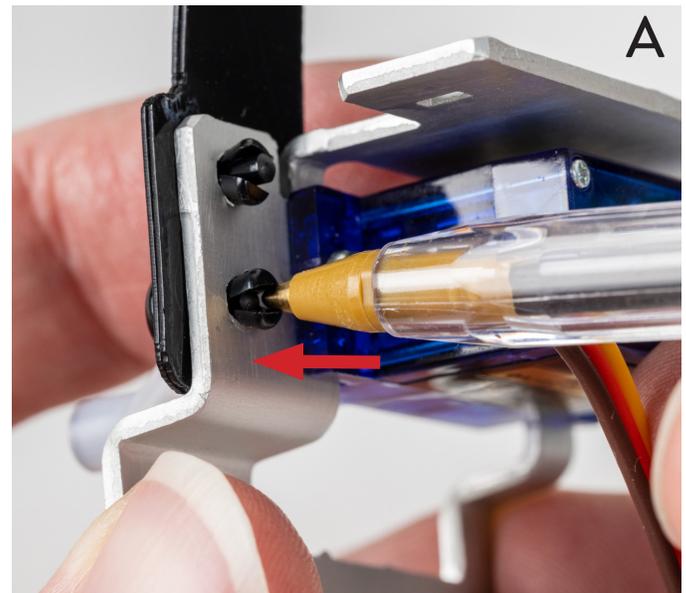
Between the cable guide and the servo mount is a second piece of black plastic, the Cable guide backer, also held in place by those rivets.



Remove the two plastic rivets, to release the cable guide parts from the old servo mount.

The best way to remove this type of rivet is to press the center pin in from the back side (**A**), with a narrow implement like a pin, needle, or sturdy pen point. Once you push that center point in a bit, you can pull out the two parts of the rivet from the front side.

Once both rivets are removed, carefully separate the parts (**B**). This concludes removing the old servo mount. In the next step, we begin installing the new servo mount.



## Step 6: Attach the new servo mount

Two new plastic rivets are provided to attach the existing cable guide and backer to the new servo mount (A).

Place the backer in position first – aligning its two large holes over those in the servo mount – and then place the cable guide end over it. Typically, both pieces will temporarily be held in place by the end of the servo mounting screw, which protrudes through the front of the servo mount.

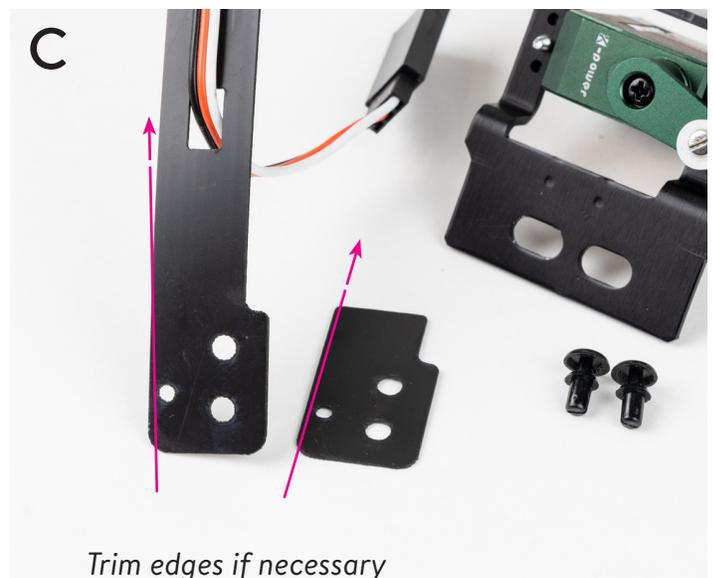
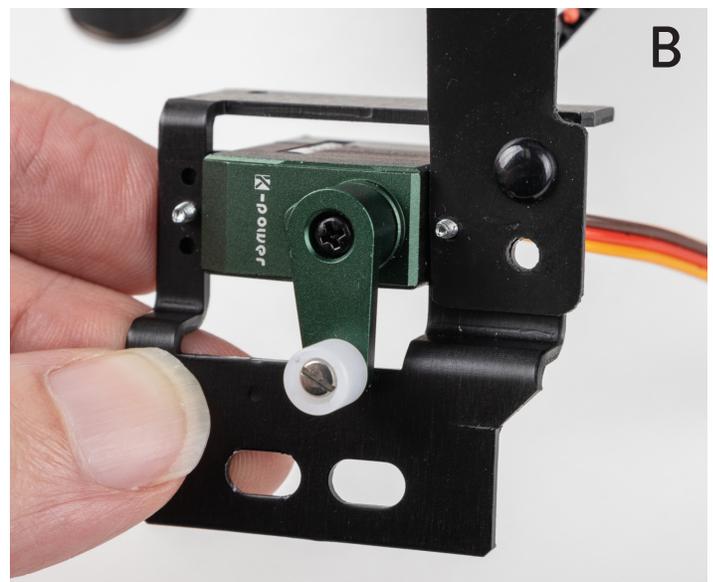
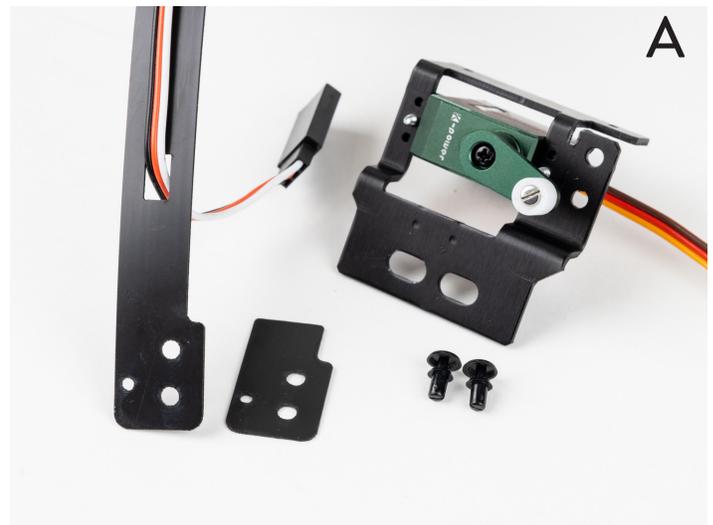
**Important note:** If these two pieces do not readily fit into place, see the last section at the bottom of this page.

Once both pieces are aligned, put the plastic rivets in place, through the holes until they snap into place. Picture (B) shows what it will look like after the first rivet is snapped into place. The lower hole is unobstructed, showing that the cable guide is properly aligned over the backer and servo mount.

Note also that the servo mounting screw protrudes through an existing hole in both the cable guide and backer.

It may be difficult to fit the two cable guide pieces into place. (The coreless motor is a little bit wider than the original motor that it replaces.) If so, use very sharp scissors or sandpaper to trim down the indicated edge (C), only taking off a very small amount of material, perhaps one millimeter at most.

If using scissors be careful not to *shatter* the cable guide; cut *all the way through* as indicated, rather than cutting with scissors into the part and stopping.



## Step 7: Attach the cable

Plug the new servo motor into the connector jack until it is fully seated (**A**). The orientation matters:

- Black to Brown
- Red to Red
- White to Orange



## Step 8: Begin tying down the cable

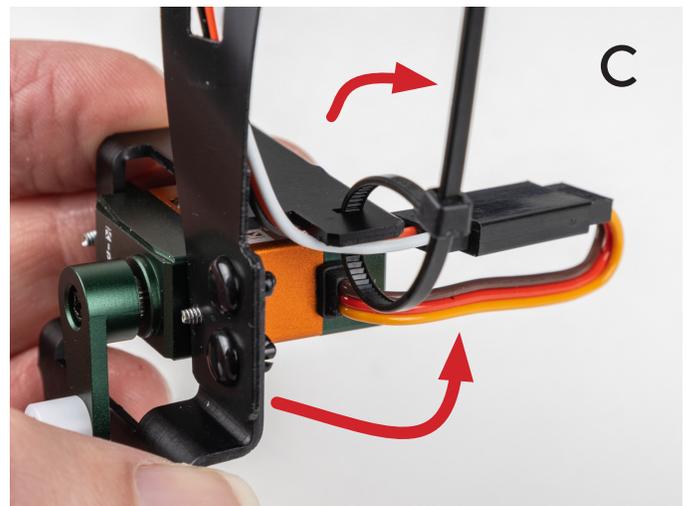
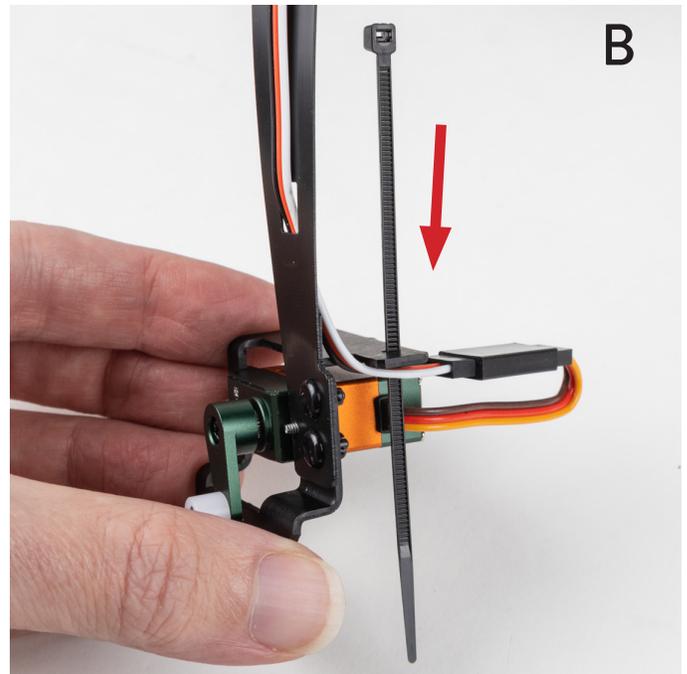
We now begin the process of tying down the excess cable slack.

*Ideally*, we would like to end up with something as neat as the first picture in Step 4, with the red-white-black cable strain relieved in the same place – under the metal tab – and tied down neatly on the other side.

*In practice*, the amount of available cable slack varies from unit to unit, and it is not always easy or straightforward to achieve such a clean result. **The important thing** is that you don't leave extra cable loops hanging down that can get caught on something as the AxiDraw moves.

In case of ambiguity or variation, prioritize tying the cables up in a way that prevents hanging cable loops (and ask for help if you need it).

To get started: Tuck the black/red/white cable under the metal tab of the servo mount, and insert a cable tie down through the hole in the tab (**B**). Loop the cable tie back up and through the end clasp (ferrule) of the cable tie (**C**). Don't cinch it tight just yet.

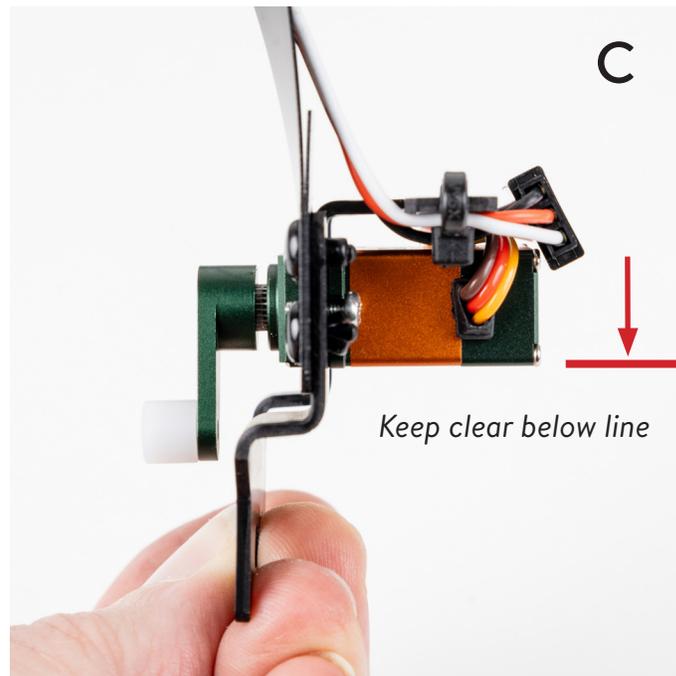
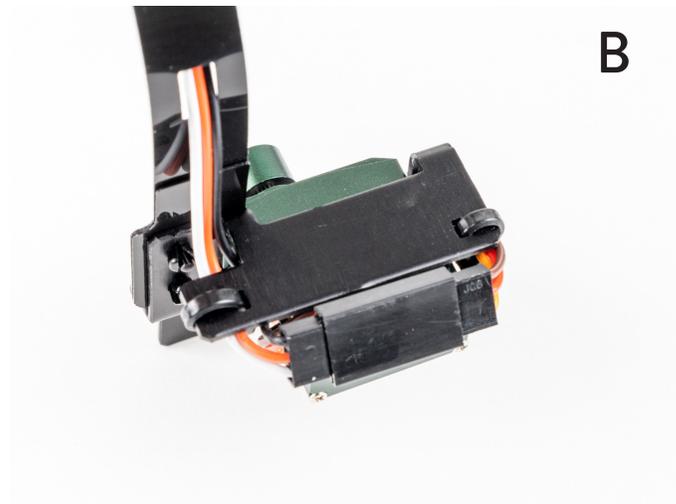
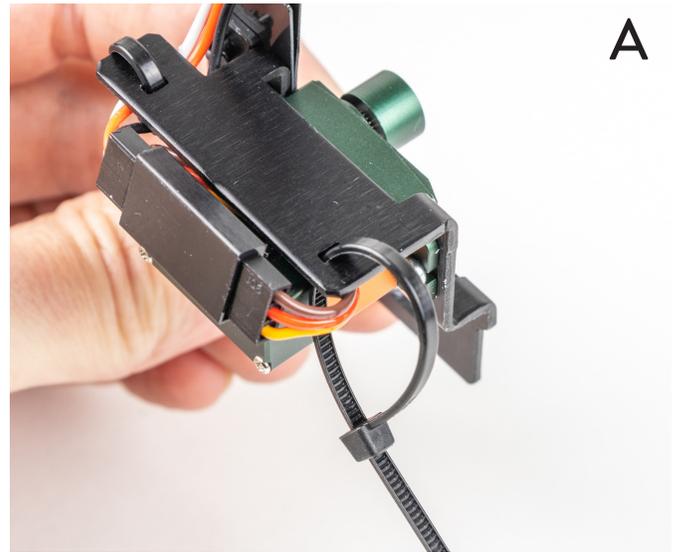


## Step 9: Finish tying down the cable

Tuck the brown/red/orange cable over the top of the servo motor and below the metal flap above it. Add a second cable tie on the opposite side, down through the hole capturing this part of the cable in place (A).

If everything looks neat – or neat enough; without loops of cable hanging down – go ahead and cinch up the two cable ties and trim off any excess ends of the cable ties (B).

The final appearance may vary a bit, but the important thing is that there should not be any excess cable below the servo motor itself (C).

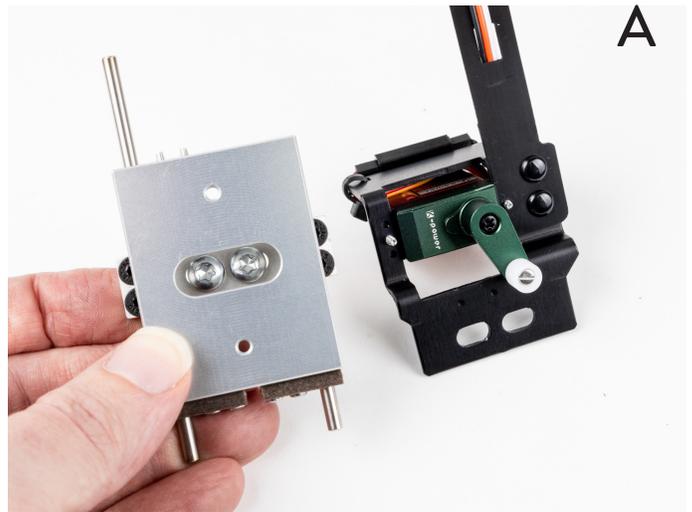


## Step 10: Re-attach the vertical slide

Now that the new servo mount is attached to the cable guide, we can mount everything back on the AxiDraw.

First, get things oriented correctly:

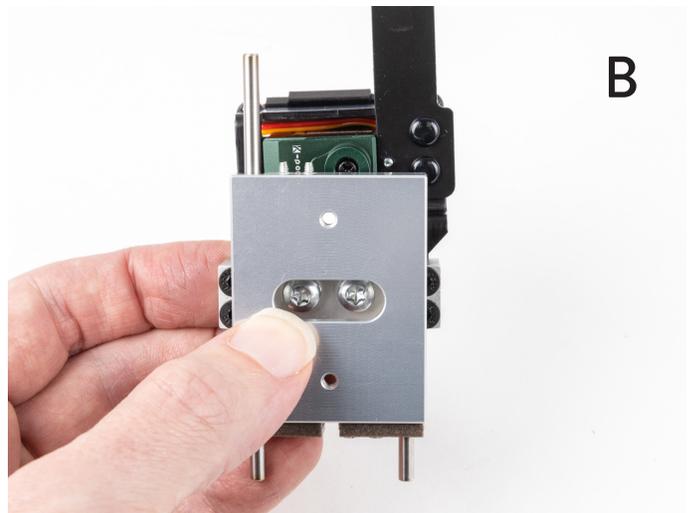
1. Rotate the green lift arm on the servo to point down, as shown here (A).
2. If the vertical slide has come “unfolded”, with the two parts “hinged” together, fold it back together so that the rails slide vertically.
3. Orient the vertical slide as shown here, with only a single shaft coming out the top.



Then, drop the two screws through the hole in the front of the vertical slide, into their slots (A).

Next, place the servo mount behind the vertical slide (B), such that:

1. The green lift arm is still pointing down, now hidden by the vertical slide, and
2. The two screws go through the lower slots in the servo mount.

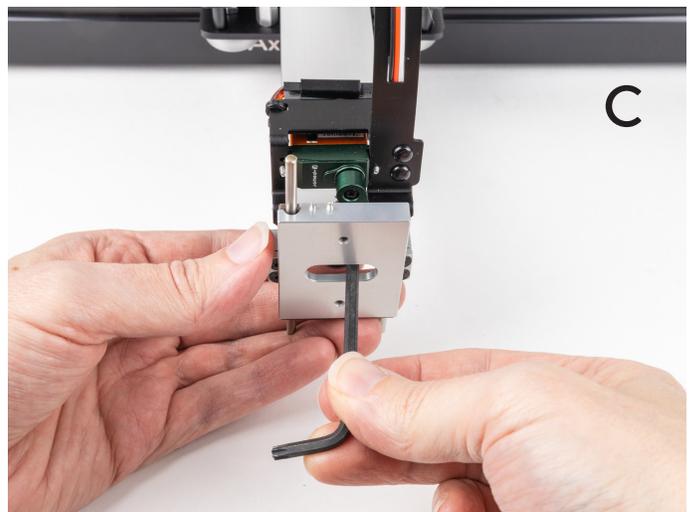


Finally, use those two screws to re-attach the slide assembly to the end of the Y carriage (C).

The front face of the Y carriage may have two or four holes in it.

- If there are only two holes, use those.
- Otherwise, *for all AxiDraw models except the AxiDraw V3/A3*, use the top two holes.
- On the AxiDraw V3/A3 *only*, use the bottom two holes (which are further apart).

**Be extremely careful** as you screw this back into place. Alternate between two screws and make sure that both screw heads kept free of and **do not** press against the vertical slide; they could damage the slide.



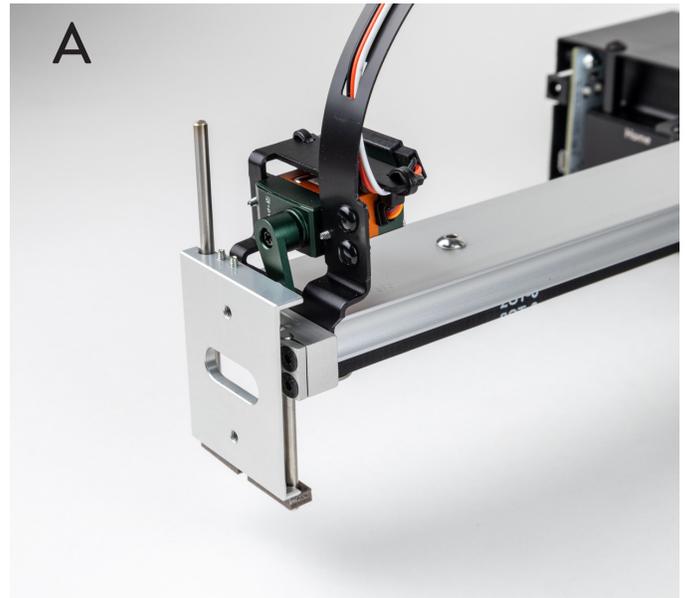
## Step 11: Checks

Your new servo mount and coreless servo should now be installed in place behind the vertical slide (A).

Final checks to make sure that everything looks OK:

- The vertical slide should move up and down freely when you lift it.
- The vertical slide should be supported by the rolling wheel at the end of the lift arm.
- The vertical slide and servo mount should be reasonably perpendicular to the table top, not at an odd angle.

If anything is amiss, this is a good time to identify that.

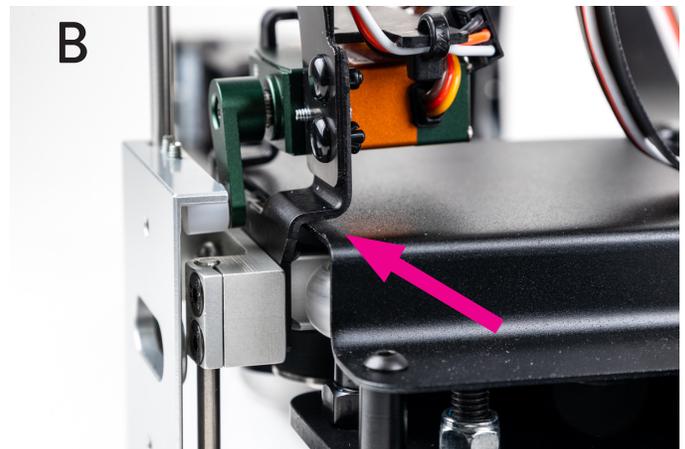


## Step 11B: Special check on AxiDraw V3/A3

For AxiDraw V3/A3 only: there is one final check.

Slide the Y carriage all the way back to the main carriage. The new servo mount should not contact the cover over the main carriage. There is normally very little clearance here (B), but it should not actually catch there, limiting travel or causing excess friction.

If it does contact, then very slightly loosen the two screws that hold the vertical slide in place, and pull the servo mount up as far as it will go while you tighten the two screws again.



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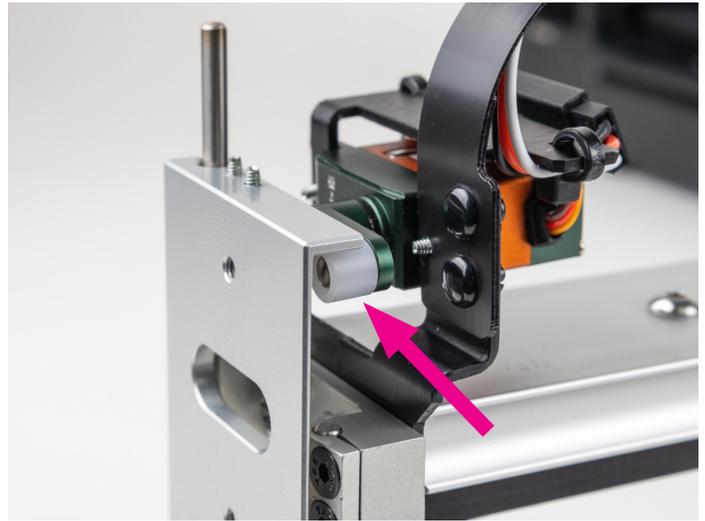
**This concludes the installation instructions for the Coreless Servo Upgrade Kit.**

Your new servo mount and coreless servo should now be ready to use.

## AxiDraw Coreless Servo Motor: Wheel replacement & Servo Calibration

The rolling wheel on the end of the lift arm is designed to be replaceable. (It can wear down over time, but protects the lift arm and vertical slide so that they can last much longer.)

Periodically check this wheel's condition. It can work just fine after quite a bit of wear, but it should never get so low that the screw head inside is exposed.

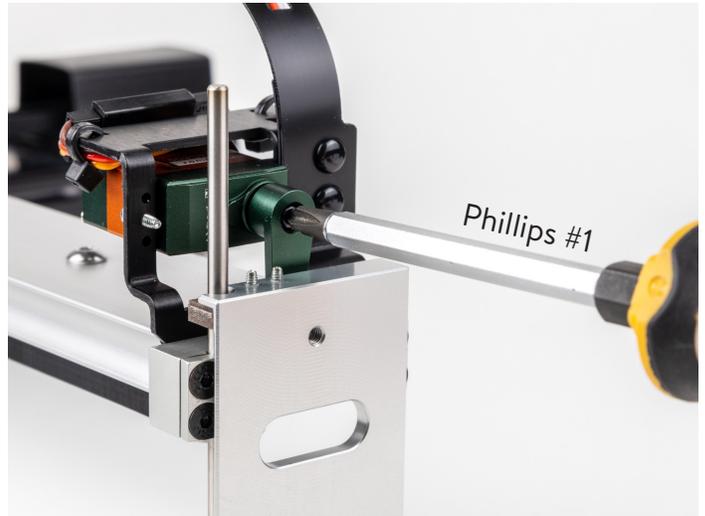


### Replacing the wheel alone:

To replace the wheel without removing the whole servo motor, disconnect the AxiDraw from power and USB.

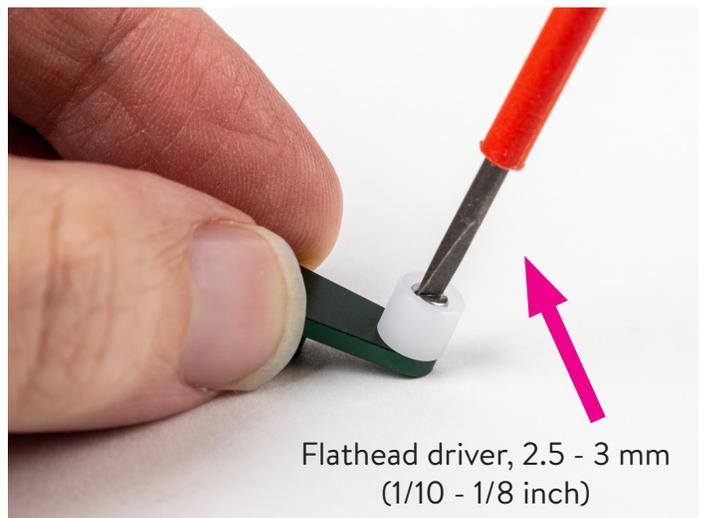
Point the lift arm straight down, and use a Phillips #1 driver to loosen and remove the screw that holds the lift arm in place. Hold the lift arm in place as you do so, keeping it pointing down.

Once you've removed the screw, you should be able to pull the lift arm off of the servo motor.



Once the lift arm is removed, use a 2.5 - 3 mm (1/10 - 1/8 inch) wide flathead screwdriver to unscrew the wheel.

- Continues on next page -



## Replacing the wheel alone *(continued)*

Inside the wheel is a screw that goes through a stainless steel sleeve. You'll re-use these with the new wheel. Put the screw through the sleeve, and then through the recessed end of the new wheel.

Then, reverse the prior steps: Screw the new wheel into place on the lift arm and tighten it into place. Then the lift arm back onto the servo motor – still pointing straight down – and screw it into place.

After removing and replacing the lift arm, plug the machine back in and use the AxiDraw software to raise and lower the pen between 0 - 100% heights.

Verify that the lift arm is still correctly positioned: It should only point **to the right** (or up or down); never past center to the left, or otherwise run into the limits of travel. If necessary, cut power and re-position the lift arm.



## Calibrating the lift arm when replacing the servo motor

If you are moving the lift arm from one coreless servo motor to another, you can position the lift arm before screwing the servo motor into place.

A relatively easy way to do so is to set your pen up and pen down positions both to 50%, move the pen to that position, and then attach the lift arm, pointing to the right, while it is held there.

