

Proximity Switch Upgrade

ASSEMBLY GUIDE

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Introduction

We're here to help! If you encounter any issues during assembly, please contact us at: support@carbide3d.com.

The proximity switch upgrade kit includes everything you need to replace your original homing switches on belt-drive X/Z **and** HDZ machines (see pages 6–7 for the belt-drive X/Z inventory list and pages 25–26 for the HDZ inventory list).

Compatibility Requirements

The new inductive proximity switches only work with Carbide Motion board version 2.4d and newer. Check the version of your Carbide Motion board before beginning assembly to make sure it is compatible.

You will need to upgrade to the latest version of Carbide Motion. Download it from: carbide3d.com/carbidemotion/download.

How to Use this Assembly Guide

For simplicity, we've split up this guide to individually address the assembly process for the two machine versions:

- For Belt-Drive X/Z Proximity Switch Upgrade, please go to page 5.
- For HDZ Proximity Switch Upgrade, please go to page 24.

Special Instructions and Call-Outs

There are minor differences in the installation procedures between Shapeoko 3, XL, and XXL. We've added special notes to guide you whenever these differences require alternate instructions:

SPECIAL INSTRUCTIONS: These call-outs will draw your attention to special instructions for different models.

Throughout the guide you will also find information that we've called out for you to pay particular attention to. We use three additional types of call-outs, WARNINGS, NOTES and PRO TIPS:

WARNING: This is a warning—please pay close attention.

NOTE: This is a note—information that points out critical steps or information for future reference.

PRO TIP: This is a pro tip—helpful, but optional, installation tips.

Directional References

In this guide, any reference or instructions with regard to direction or placement, such as: Front, Back, Left, Right, etc. are given from the perspective of one standing in front of and facing the machine. This is true, even when a photo is taken from the rear of the machine. We also use the term “Y1” in place of “Y-Axis Left” and “Y2” in place of “Y-Axis Right” to help avoid directional confusion.

Belt-Drive X/Z Proximity Switch Upgrade

Prior to Assembly & Installation

Disable the BitSetter

Machines With BitSetter: Please complete the following steps before moving on to the “Gather the Required Tools” section below.

Before beginning the proximity switch upgrade:

1. Connect your machine to Carbide Motion.
 - a. Plug in your USB cable.
 - b. Open Carbide Motion.
 - c. Turn on your Shapeoko.
 - d. Click the **Connect to Cutter button**.
2. Click **Settings** in the top menu bar.
3. If you have the BitSetter checkbox checked, go ahead and uncheck it.

You will need to re-calibrate the BitSetter after successful homing with your new proximity switches. See page 41 for instructions.

Gather the Required Tools

A basic mechanical know-how and an understanding of how the Shapeoko is assembled is required. Installation will take approximately 1 hour.

Required tools:

- Metric hex keys: 2–4mm
- Flush cut pliers
- Needle nose pliers
- Permanent marker
- Masking tape
- Pencil

Inventory

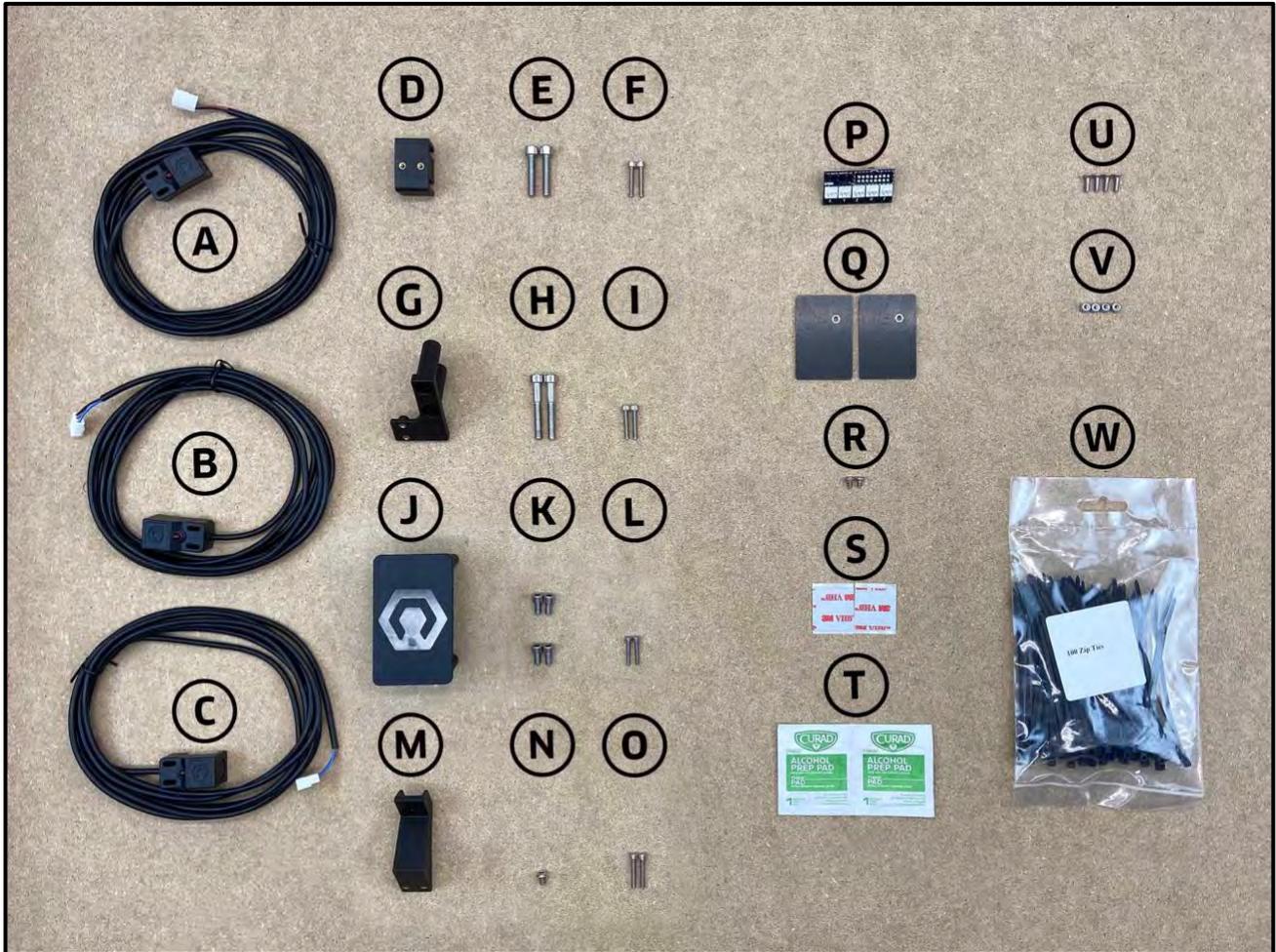


Figure 1

Belt-Drive X/Z Proximity Switch Upgrade Kit Contents

The proximity switch upgrade kit comes with the components listed in the table below and shown in *Fig. 1*.

Item	Description	Qty
A	X-Axis Proximity Switch (2675mm for XXL, 2350mm for XL, and 610mm for Shapeoko 3)	1
B	Y-Axis Proximity Switch (2540mm for XXL, 2220mm for XL, and 712mm for Shapeoko 3)	1
C	Z-Axis Proximity Switch (2675mm for XXL, 2350mm for XL, and 610mm for Shapeoko 3)	1
X-Axis Proximity Switch Mount Baggie		
D	X-Axis Proximity Switch Mount	1
E	M5 × 25mm Socket Head Cap Screw	2
F	M3 × 18mm Socket Head Cap Screw	2
Y-Axis Proximity Switch Mount Baggie		
G	Y-Axis Proximity Switch Mount	1
H	M5 × 35mm Socket Head Cap Screw	2
I	M3 × 18mm Socket Head Cap Screw	2
Z-Axis Proximity Switch Mount Baggie [Belt-Drive X/Z Machines ONLY]		
J	Z-Axis Proximity Switch Mount	1
K	M5 × 10mm Socket Head Cap Screw	4
L	M3 × 18mm Socket Head Cap Screw	2
Z-Axis Proximity Switch Mount Baggie [HDZ Machines ONLY]		
M	Z-Axis Proximity Switch Mount	1
N	M4 × 6mm Button Head Cap Screw	1
O	M3 × 18mm Socket Head Cap Screw	2
P	PCB Riser Board	1
Drag Chain Baggie		
Q	Tail Plate	2
R	M3 × 6mm Flat Head Screw	2
S	Double-sided VHB Tape	2
T	Alcohol Wipes	2
U	M3 × 8mm Flat Head Screw (Replacement)	4
V	M3 Nyloc Nut (Replacement)	4
W	4" Cable Ties (Pack of 100)	1

NOTE: Replacement M3×8mm FHS (4) and M3 nyloc nuts (4), for re-installing the drag chain to the X- and Y-Axis head brackets, are included so you don't have to keep track of tiny screws and nuts during the upgrade.

Disassembly

Disconnect Cables

1. Turn off your machine, unplug it, and disconnect the USB and power cables.
2. Clip all cable ties.
3. Unplug the router/spindle and remove it from the spindle mount.
 - a. Use a 4mm hex key to loosen the two (2) M5×55mm SHCS on the face of the mount.
4. Label all motor lead cables AND their extension cables.
 - a. Use a permanent marker or piece of tape to label all the white male/female connectors of the X-, Y1-, Y2-, and Z-stepper motor lead cables AND the X-, Y1-, Y2-, and Z-stepper motor extension cables.
5. Disconnect all cables.

WARNING: The Carbide Motion board can be damaged if the enclosure cover is removed or installed incorrectly. For correct removal/installation, please watch the *Removing the Lid on the Shapeoko Enclosure* video at: https://youtu.be/_wSW5EsFS00.

WARNING: Do NOT disconnect motor connectors by pulling on the wires or by prying at the latch. Use pliers to gently grip the base of each white connector and pull apart.

- a. Remove the Carbide Motion board enclosure cover.
- b. Disconnect the X-, Y1-, Y2-, and Z-motor leads from their extension cables AND disconnect all extension cables and homing switches from the Carbide Motion board.

Remove the Homing Switches and Drag Chain

Shapeoko 3 Machines: Skip steps 1, 5, and 6 in this section.

See **Fig. 2** (front) and **Fig. 3** (back).

1. Disconnect the drag chain from the X-Axis head bracket on the rear of the X/Z-carriage.
 - a. Use a 2mm hex key and needle nose pliers to remove the two (2) M3×8mm FHS and two (2) nyloc nuts securing the drag chain to the bracket.
2. Remove the Z-Axis homing switch mounting plate from the front of the X/Z-carriage, as well as the four (4) 1-inch standoffs and the X-Axis head bracket behind the plate.
 - a. Use a 3mm hex key to remove the four (4) M5×10mm BHCS securing the plate. (No need to separate any of the switches from their mounting plates.)
 - b. Use a 3mm hex key to remove the four (4) M5×10mm BHCS securing the four (4) 1-inch standoffs and the head bracket.
 - c. Set the X-Axis head bracket aside for re-installation in a later step.
3. Remove the X-Axis homing switch mounting plate from the rear of the X/Z-carriage.
 - a. Use a 4mm hex key to remove the two (2) M5×35mm SHCS, two (2) 1-inch spacers, and the mounting plate.
4. Remove the Y-Axis homing switch mounting plate from the outside of the Y2-carriage.
 - a. Use a 4mm hex key to remove the two (2) M5×35mm SHCS, two (2) 1-inch spacers, and the mounting plate.
5. Disconnect the drag chain from the Y-Axis head bracket on the outside of the Y1-carriage.
 - a. Use a 2mm hex key and needle nose pliers to remove the two (2) M3×8mm FHS and two (2) nyloc nuts.

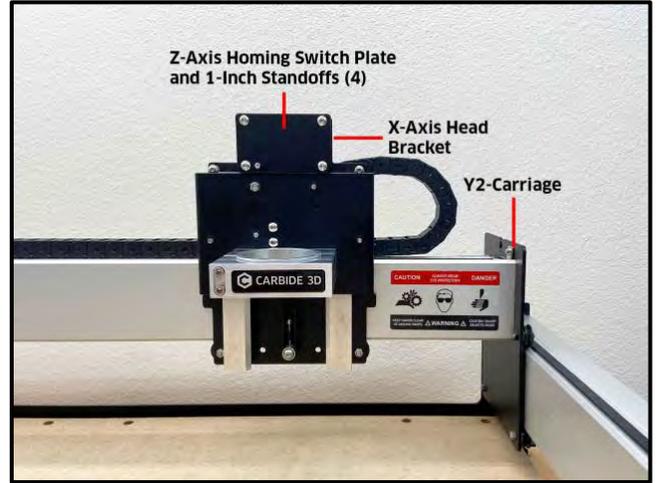


Figure 2

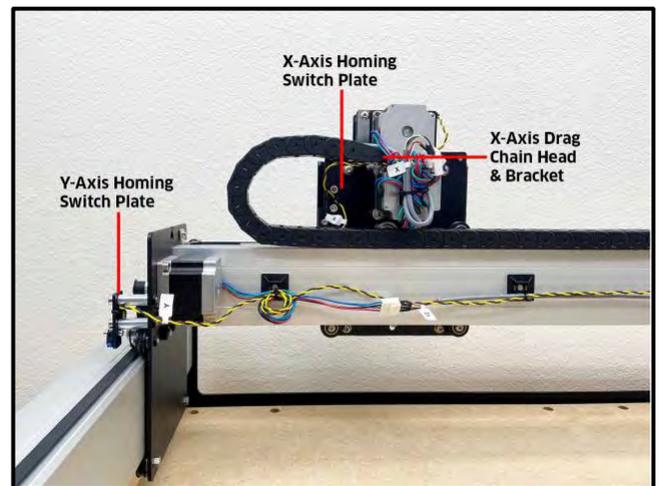


Figure 3

6. Remove the drag chain from the rails and lay it on the baseframe as shown in *Fig. 4*.
 - a. Pry the tail ends of the drag chain from the VHB tape securing them to the rails.
 - b. Lay the drag chain on the baseframe for proximity switch cable installation in the next section.
 - c. Remove the VHB tape from the rails.

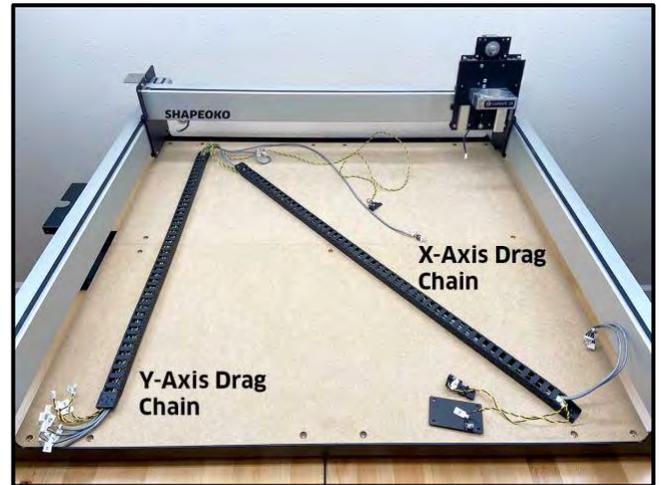


Figure 4

Prep and Re-Install the Drag Chain

Shapeoko 3 Machines: Skip ahead to the “Install the Proximity Switches and Mounts” section on page 15.

Install the Proximity Switch Cables

Required Components:

Item	Description	Qty
A	X-Axis Proximity Switch Cable (2675mm XXL and 2350mm XL)	1
B	Y-Axis Proximity Switch Cable (2540mm XXL and 2200mm XL)	1
C	Z-Axis Proximity Switch Cable (2675mm XXL and 2350mm XL)	1

1. Open up the drag chain and remove the three homing switch cables (black/yellow or black/orange twisted wires). See **Fig. 5** and **Fig. 6**.
 - a. Position the drag chain on the baseframe as shown in **Fig. 6**, with the chain’s clip-on panels facing up. (Only one side of the chain will open; be sure this side is facing up.)
 - b. Use a hex key or screwdriver as a lever to pry open one side of each drag chain link. Start from the rear of the machine and work your way forward (as shown in **Fig. 5**).
 - c. Remove the X-, Y-, and Z-Axis homing switch cables.
2. Label the proximity switches.
 - a. Identify the X-, Y-, and Z-Axis proximity switch cables by comparing the length printed on the switch body with the table above.
 - b. Use a permanent marker or piece of tape to label both ends of each proximity switch cable.

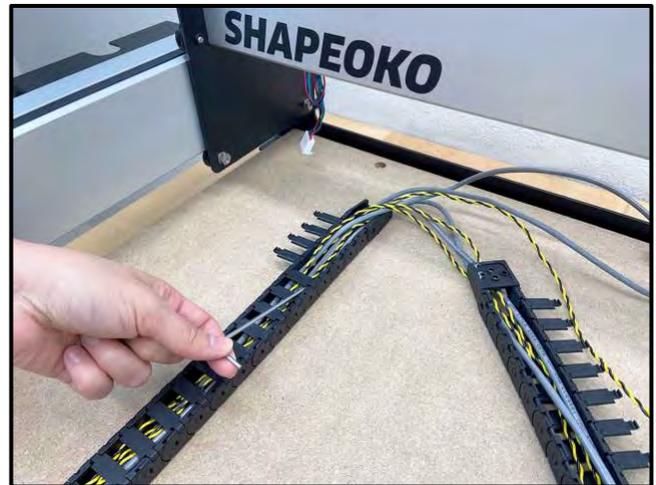


Figure 5

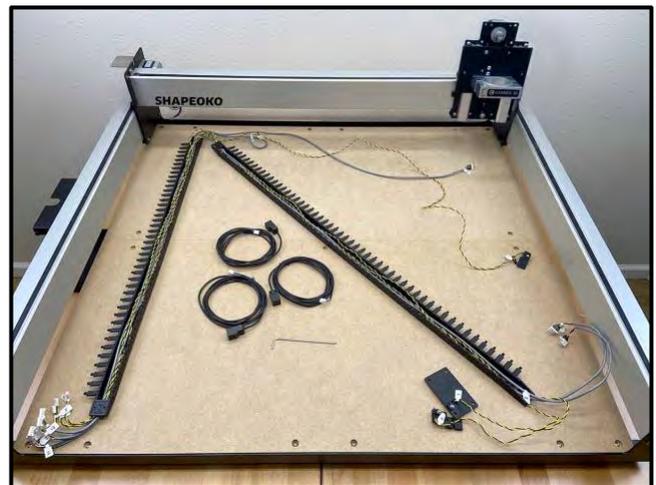


Figure 6

3. Insert the proximity switches into the drag chain.
See **Fig. 7**.
 - a. Insert the X- and Z-Axis proximity switch cables through both the Y-Axis and X-Axis portions of the drag chain.
 - b. Insert the Y-Axis proximity switch cable through the Y-Axis drag chain ONLY.
4. Close up the drag chain. Do not install it onto the rails just yet.

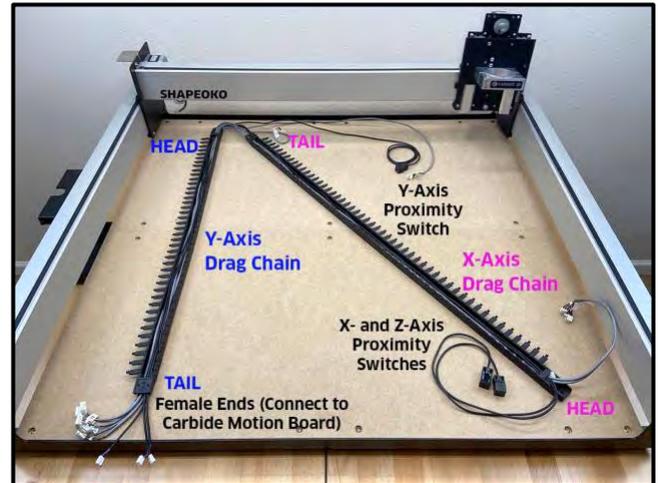


Figure 7

Install the Drag Chain Tail Plates

Required Components:

Item	Description	Qty
Q	Drag Chain Tail Plate	2
S	Double-Sided VHB Tape	2
T	Alcohol Wipe	2

The drag chain tail plates install to the top of the rail with the long edge parallel to the rail. Plates will overhang the rail by about $\frac{7}{16}$ " so as not to obstruct the PEM nuts.

1. Attach one (1) tail plate to the X-rail. See **Fig. 8**.
 - a. Measure and mark $3\frac{1}{2}$ " and $5\frac{1}{2}$ " from the Y1-carriage.
 - b. Clean the bottom of the tail plate AND the rail between your marks with an alcohol wipe. Allow the alcohol to evaporate.
 - c. Stick a piece of VHB tape along the back edge of the X-rail between your marks.

PRO TIP: Screw a M3×18mm SHCS about 2–3mm into the plate's PEM nut. The protruding screw will help you get the nut as close to the rail as possible without obstructing it. See **Fig. 9**.

- d. Stick the tail plate between your marks, with the PEM nut toward the Y2-side and overhanging the back of the rail. Get the PEM nut as close to the rail as you can without obstructing it.
 - e. Press the plate to the rail for 30 seconds.
2. Attach one (1) tail plate to the Y1-rail. See **Fig. 9**.
 - a. Measure and mark $15\frac{1}{2}$ " and $17\frac{1}{2}$ " from the front endplate.
 - b. Clean the bottom of the tail plate AND the rail between your marks with an alcohol wipe. Allow the alcohol to evaporate.
 - c. Stick the remaining VHB tape along the outside edge of the Y1-rail between your marks.
 - d. Stick the tail plate between your marks, with the PEM nut toward the rear endplate and overhanging the outside of the rail. Get the PEM nut as close to the rail as you can without obstructing it.
 - e. Press the plate to the rail for 30 seconds.

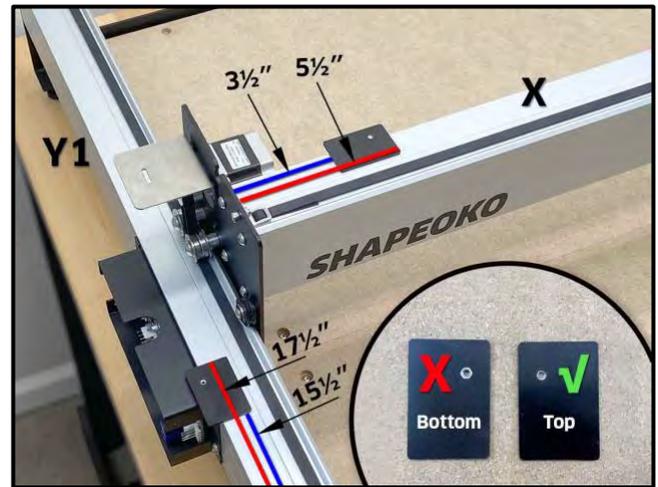


Figure 8

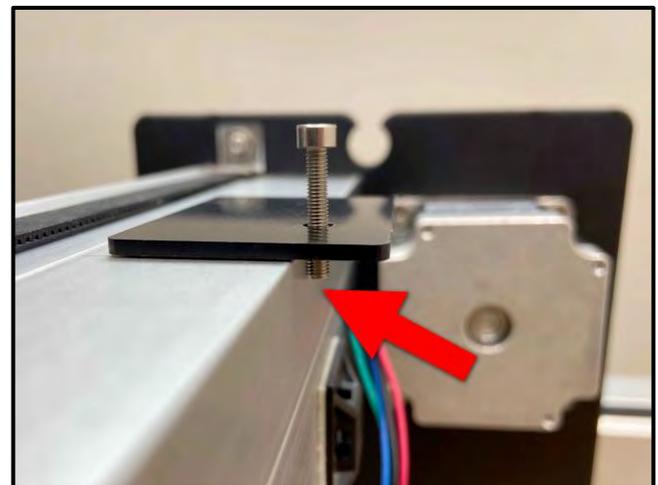


Figure 9

Install the Drag Chain to the X- and Y1-Rails

Required Components:

Item	Description	Qty
R	M3 × 6mm Flat Head Screw	2
U	M3 × 8mm Flat Head Screw (Replacement)	2
V	M3 Nyloc Nut (Replacement)	2

1. Position the X-rail to the back of the machine.
2. Lay the drag chain on the rails. See **Fig. 10**.
 - a. First, place the three cables not threaded through the X-Axis drag chain (the Y-Axis proximity switch cable and the Y1- and Y2-motor leads) over and behind the X-rail.
 - b. Second, lift the drag chain and place it across the Y1- and X-rails.
 - c. Lay the drag chains so that the tail of the Y-Axis drag chain will curl under and the head of the X-Axis drag chain will curl up.

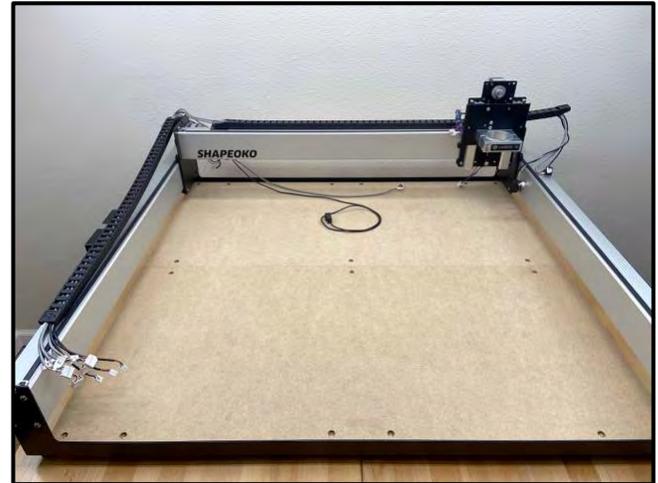


Figure 10

3. Secure the drag chain to the rails, but leave the X-Axis drag chain head disconnected for now. See **Fig. 11**.

- a. Secure the head of the Y-Axis drag chain to the head bracket on the outside of the Y1-carriage.
 - i. Use a 2mm hex key, needle nose pliers, two (2) M3×8mm FHS, and two (2) nyloc nuts to secure.
- b. Secure the tail of the Y-Axis drag chain to the tail plate next to the Carbide Motion Board enclosure.
 - i. Curl the tail of the drag chain under and toward the enclosure.
 - ii. Use a 2mm hex key and one (1) M3×6mm FHS to secure.
- c. Secure the tail of the X-Axis drag chain to the tail plate near the Y1-motor.
 - i. Use a 2mm hex key and one (1) M3×6mm FHS to secure.

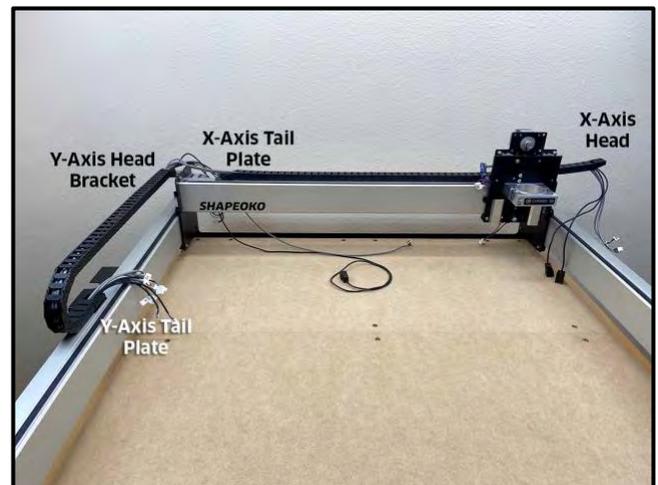


Figure 11

Install the Proximity Switches and Mounts

Install the X-Axis Proximity Switch Mount

Required Components:

Item	Description	Qty
D	X-Axis Proximity Switch Mount	1
E	M5 × 25mm Socket Head Cap Screw	2

1. Install the X-Axis proximity switch mount to the back of the X/Z-carriage. See **Fig. 12**.
 - a. Position the proximity switch mount with the two gold-colored threaded inserts facing out (away from X-motor) and the screw head recesses at the end of each slot facing back (away from the carriage plate).
 - b. Align the mounting slots with the two M5 screw holes on the Y2-side of the X-motor.
 - c. Use a 4mm hex key and two (2) M5×25mm SHCS to secure.
 - d. Before tightening, be sure to nestle the M5 screw heads into the recesses at the end of each mounting slot.

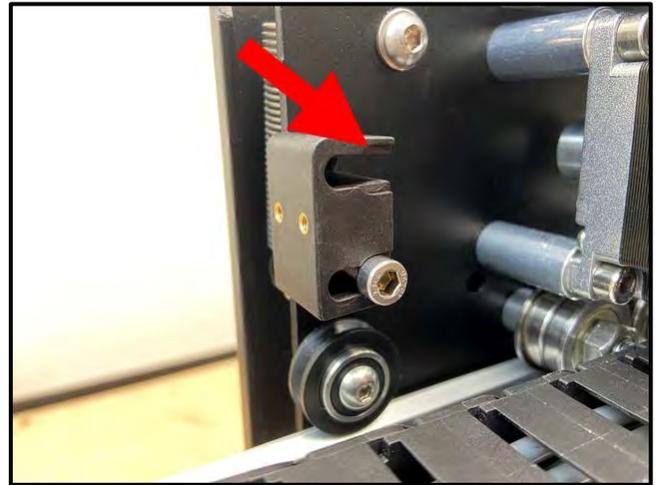


Figure 12

Install the Y-Axis Proximity Switch Mount

Required Components:

Item	Description	Qty
G	Y-Axis Proximity Switch Mount	1
H	M5 × 35mm Socket Head Cap Screw	2

1. Install the Y-Axis proximity switch mount to the outside of the Y2-carriage. See **Fig. 13**.
 - a. Align the mount with the two M5 holes on the outside of the Y2-carriage and the two threaded inserts down and to the front.
 - b. Use a 4mm hex key and two (2) M5×35mm SHCS to secure.

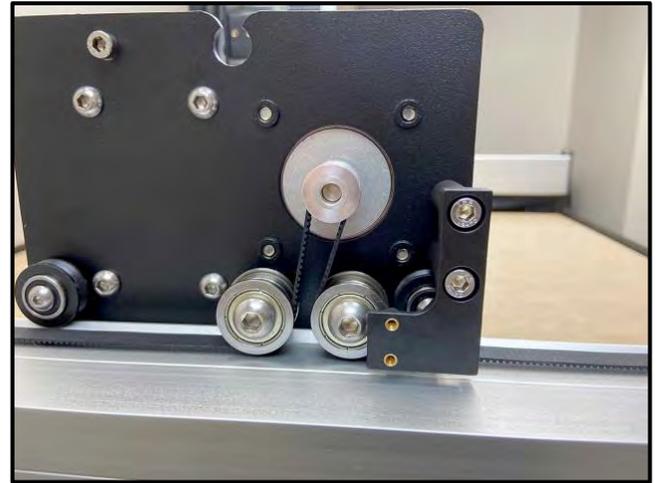


Figure 13

Install the Z-Axis Proximity Switch and Mount

Required Components:

Item	Description	Qty
C	Z-Axis Proximity Switch (2675mm XXL, 2350mm XL, and 610mm Shapeoko 3)	1
L	M3 × 18mm Socket Head Cap Screw	2
J	Z-Axis Proximity Switch Mount	1
K	M5 × 10mm Socket Head Cap Screw	4

1. Install the Z-Axis proximity switch to the back side of the Z-Axis mount. See **Fig. 14**.
 - a. Locate the Z-Axis proximity switch exiting the drag chain at the X-Axis head bracket.
 - b. Position the proximity switch with the red LED facing out and the target pointing down.
 - c. Align the proximity switch's mounting slots with the two threaded inserts on the back of the mount.

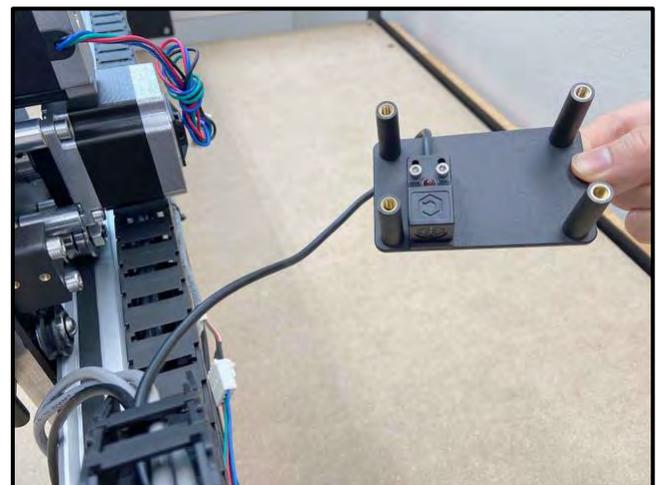


Figure 14

- d. Use a 2.5mm hex key and two (2) M3×18mm SHCS to secure.
 - e. Before fully tightening the screws, slide the switch up as far as it will go.
2. Install the Z-Axis proximity switch mount to the front the X-carriage. See **Fig. 15**.
 - a. Align the mount with the four M5 screw holes at the top of the X-carriage.
 - b. Direct the proximity switch cable up between the top two legs of the mount.
 - c. Use a 4mm hex key and four (4) M5×10mm SHCS to secure the mount to the front of the X-carriage.
 - d. Leave the two M5×10mm SHCS on the Y2-side loose for re-installation of the X-Axis head bracket.

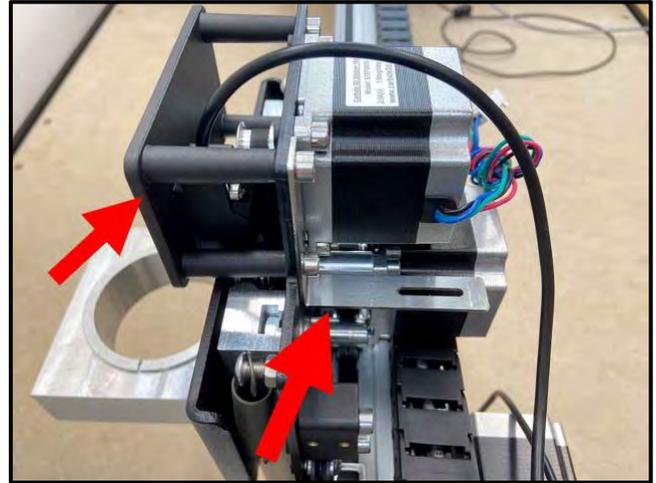


Figure 15

Re-Installation of the X-Axis Head Bracket

Shapeoko 3 Machines: Skip ahead to the “Attach the X-Axis Proximity Switch to the Mount” section on page 18.

Required Components:

Item	Description	Qty
N/A	X-Axis Drag Chain Head Bracket	1
U	M3 × 8mm Flat Head Screw (Replacement)	2
V	M3 Nyloc Nut (Replacement)	2

1. Install the X-Axis drag chain head bracket to the rear of the X/Z-carriage. See **Fig. 15**.
 - a. Slide the head bracket into the gap between the screw heads (of the two loose M5×10mm SHCS) and the rear of the X-carriage plate.
 - b. Use a 4mm hex key to tighten the two (2) M5×10mm SHCS.
2. Secure the head of the drag chain to the X-Axis head bracket. See **Fig. 16**.
 - a. Curl the head of the drag chain up and toward the X/Z-carriage.
 - b. Use a 2mm hex key, needle nose pliers, two (2) M3×8mm FHS, and two (2) nyloc nuts to secure.

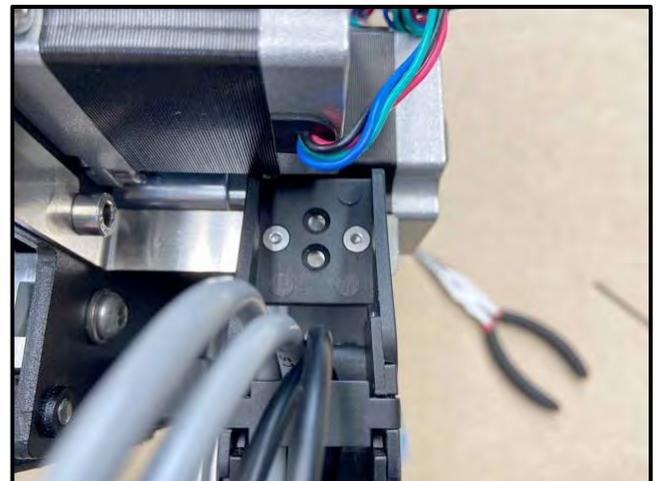


Figure 16

Attach the X-Axis Proximity Switch to the Mount

Required Components:

Item	Description	Qty
A	X-Axis Proximity Switch (2675mm XXL, 2350mm XL, and 610mm Shapeoko 3)	1
F	M3 × 18mm Socket Head Cap Screw	2

1. Attach the X-Axis proximity switch to the mount installed on the rear of the X/Z-carriage. See *Fig. 17*.

- a. Locate the X-Axis proximity switch exiting the drag chain at the X-Axis head bracket.
- b. Position the proximity switch with the red LED facing the Y2-carriage and the target pointing down.
- c. Align the proximity switch's mounting slots with the two threaded inserts on the face of the mount.
- d. Use a 2.5mm hex key and two (2) M3×18mm SHCS to secure the proximity switch.
- e. Before fully tightening the screws, slide the switch up as far as it will go.

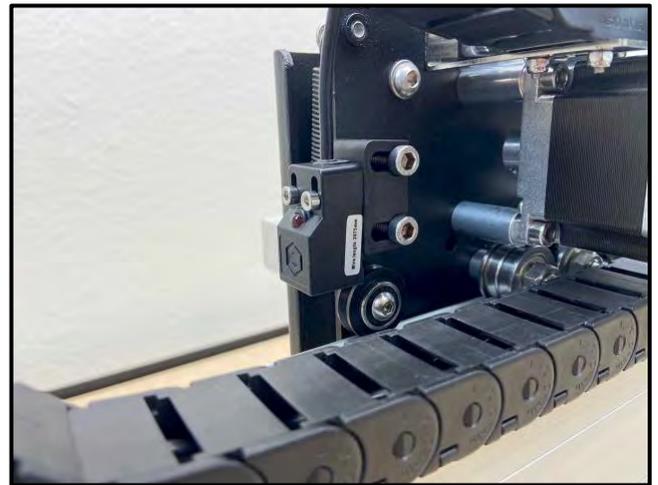


Figure 17

Attach the Y-Axis Proximity Switch to the Mount

Required Components:

Item	Description	Qty
B	Y-Axis Proximity Switch (2540mm XXL, 2200mm XL, 712mm Shapeoko 3)	1
I	M3 × 18mm Socket Head Cap Screw	2

1. Attach the Y-Axis proximity switch to the mount on the outside of the Y2-carriage. See **Fig. 18**.
 - a. Locate the Y-Axis proximity switch exiting the drag chain at the Y-Axis head bracket.
 - b. Position the proximity switch with the red LED facing out and the target pointing to the rear.
 - c. Align the switch's two mounting slots with the two threaded inserts on the face of the mount.
 - d. Use a 2.5mm hex key and two (2) M3×18mm SHCS to secure.
 - e. Before fully tightening the screws, slide the switch as far to the FRONT of the machine as it will go.

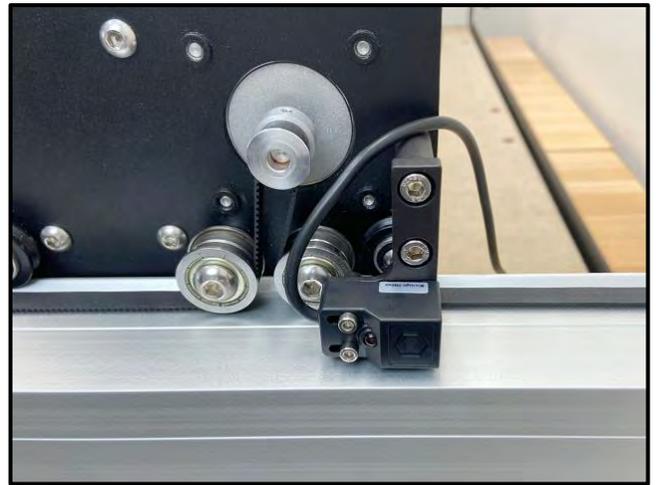


Figure 18

Connect and Cleanup Cables

Connect the Motors

1. Connect the X- and Z-motor lead cables to their labeled extension cables at the rear of the X/Z-carriage.
 - a. Both the X- and Z-motor extensions exit the head of the X-Axis drag chain behind the X/Z-carriage.
 - b. Connectors are polarized. Be sure to align them properly.
2. Connect the Y1- and Y2-motor lead cables to their extension cables.
 - a. Both the Y1- and Y2-motor extensions exit the head of the Y-Axis drag chain at the Y1-carriage.
 - b. The Y2-motor lead cable stretches across the machine, behind the X-rail.
 - c. Connectors are polarized. Be sure to align them properly.

Connect Cables to the Carbide Motion Board

WARNING: The Carbide Motion board can be damaged if the enclosure cover is removed or installed incorrectly. For correct removal/installation, please watch the *Removing the Lid on the Shapeoko Enclosure* video at: https://youtu.be/_wSW5EsFSO0.

Required Components:

Item	Description	Qty
P	PCB Riser Board	1

Shapeoko XXL and XL Instructions

1. Plug the PCB riser board into the Carbide Motion board. See **Fig. 19**.
 - a. Plug the PCB riser board into the 2x8 open bank of pins in the top-right of the Carbide Motion board.
2. Plug the proximity switch cables and stepper motor extension cables into the Carbide Motion board. See **Fig. 19**.
 - a. Plug each of the 3-pin proximity switch cables, X, Y, and Z, into the PCB riser board, as labeled.
 - b. Plug each of the 4-pin motor extension cables Z, Y1, Y2, X, into the connectors across the bottom of the Carbide Motion board, as labeled.

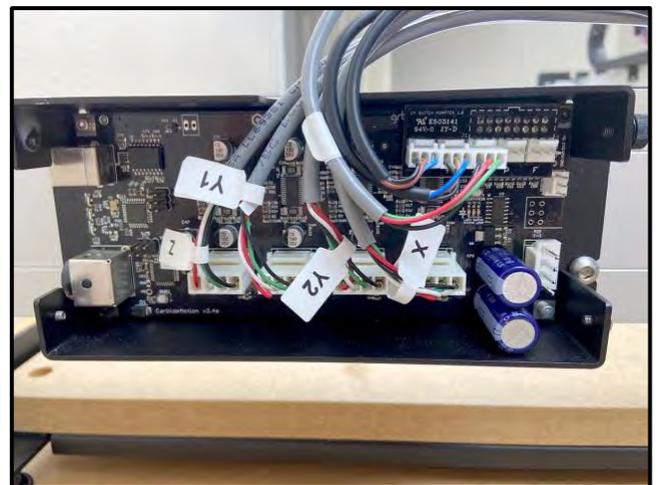


Figure 19

- c. Connectors are polarized. Be sure to align them properly.
3. Re-install the enclosure cover.

Shapeoko 3 Instructions

Shapeoko 3 Machines: Your Carbide Motion board should be installed upside down as shown in *Fig. 20*.

1. Plug the PCB riser board into the Carbide Motion board. See *Fig. 20*.
 - a. Plug the PCB riser board into the 2x8 open bank of pins in the bottom-left of the Carbide Motion board.
2. Plug the proximity switch cables and stepper motor extension cables into the Carbide Motion board. See *Fig. 20*.
 - a. Plug each of the proximity switch cables, Z, Y, and X, into the PCB riser board, as labeled.
 - b. Plug in the stepper motor extension cables X, Y2, Y1, Z, into the connectors across the top of the Carbide Motion board, as labeled.
 - c. Connectors are polarized. Be sure to align them properly.
3. Re-install the enclosure cover.



Figure 20

Secure Cables at the Y1-Carriage and X/Z-Carriage

Shapeoko 3 Machines: Skip ahead to the “Secure Cables Along the X-Rail” section on page 23.

Required Components:

Item	Description	Qty
W	4" Cable Ties	Several

1. Secure the cables crossing the Y1-carriage plate.
See **Fig. 21**.
 - a. Tuck all seven cables, one at a time, into the cutout at the top of the Y1-carriage plate.
 - b. Use two (2) cable ties, one on each side of the cutout, to secure the cables in place.
2. Secure the cables at the rear of the X/Z-carriage.
See **Fig. 22**.
 - a. Bundle the X- and Z-cables at the rear of the X/Z-carriage.
 - b. Use a few cable ties to secure the cables at the back of the Z- and X-motors.



Figure 21

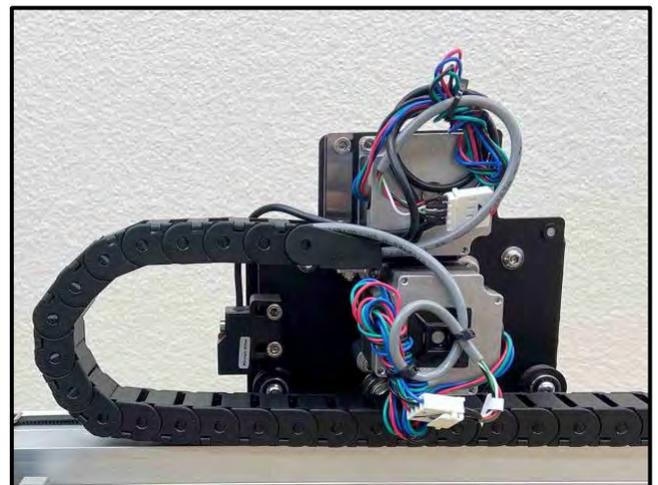


Figure 22

Secure Cables Along the X-Rail

Cable Cleanup

Required Components:

Item	Description	Qty
W	4" Cable Ties	Several

1. Tidy up the cables along the rear of the X-rail. See *Fig. 23*.
 - a. Secure the loose cables to the four self-adhesive cable tie mounts already attached to the back of the X-rail.

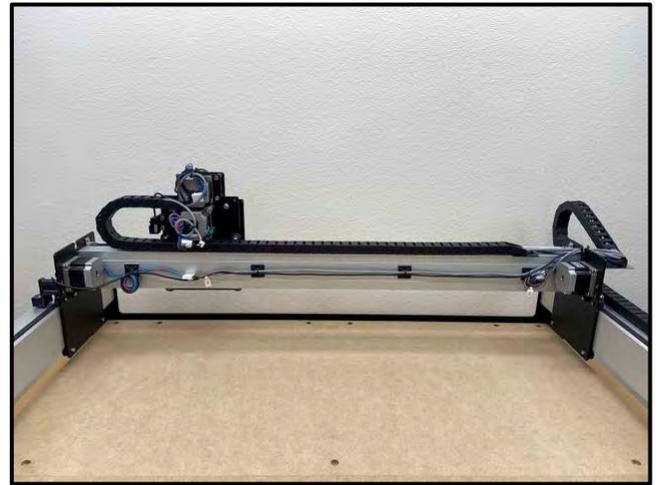


Figure 23

Post Installation Instructions

Please see the “Post Installation” chapter on page 41 for instructions on updating Carbide Motion, testing the new proximity switches, homing your Shapeoko, and re-calibrating the BitSetter.

HDZ Proximity Switch Upgrade

Prior to Assembly & Installation

Disable the BitSetter

Machines With BitSetter: Please complete the following steps before moving on to the “Gather the Required Tools” section below.

Before beginning the proximity switch upgrade:

1. Connect your machine to Carbide Motion.
 - a. Plug in your USB cable.
 - b. Open Carbide Motion.
 - c. Turn on your Shapeoko.
 - d. Click the **Connect to Cutter button**.
2. Click **Settings** in the top menu bar.
3. If you have the BitSetter checkbox checked, go ahead and uncheck it.

You will need to re-calibrate the BitSetter after successful homing with your new proximity switches. See page 41 for instructions.

Gather the Required Tools

A basic mechanical know-how and an understanding of how the Shapeoko is assembled is required. Installation will take approximately 1 hour.

Required tools:

- Metric hex keys: 2–4mm
- Flush cut pliers
- Needle nose pliers
- Permanent marker
- Masking tape
- Pencil

Inventory

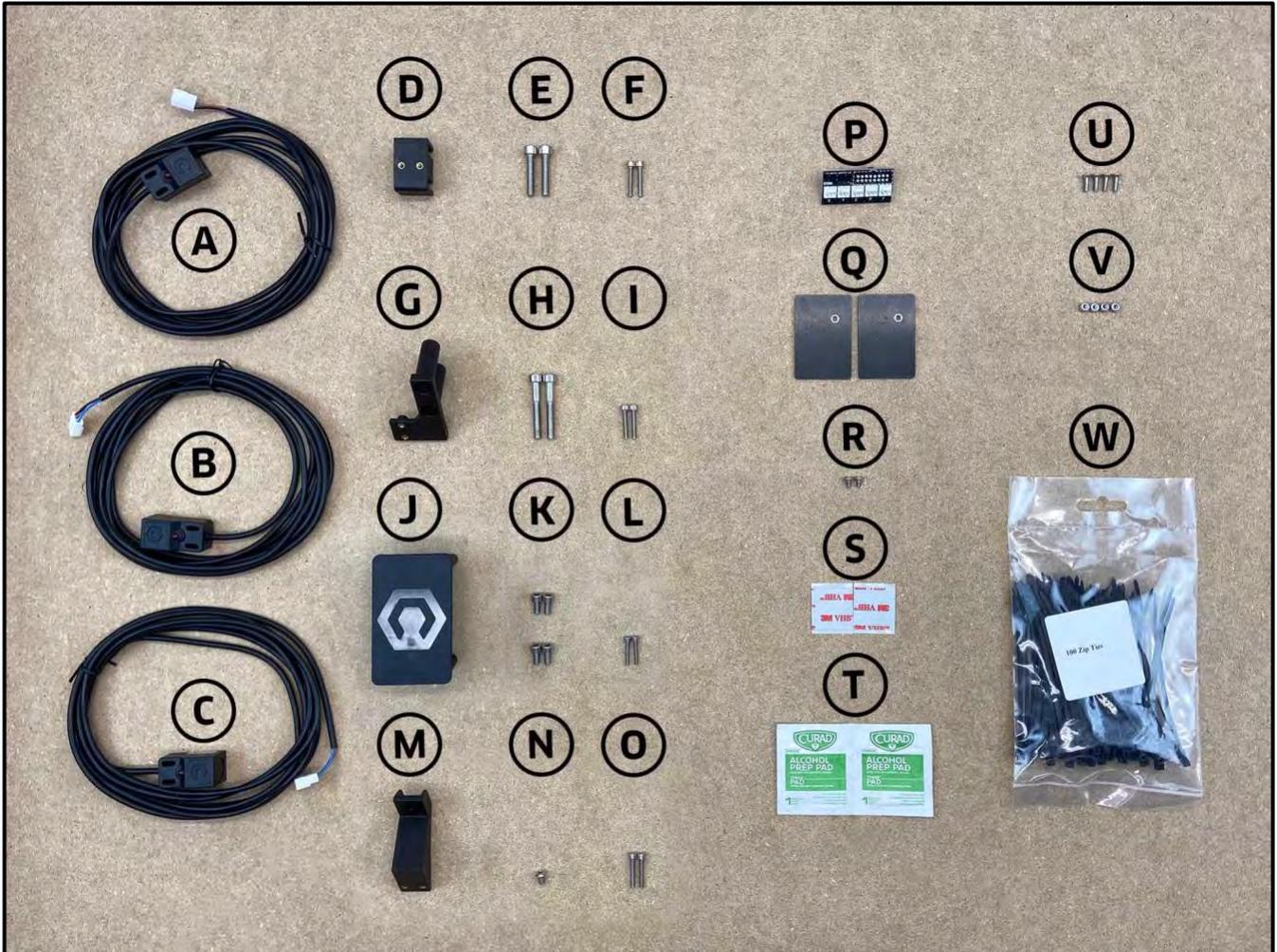


Figure 24

HDZ Proximity Switch Upgrade Kit Contents

The proximity switch upgrade kit comes with the components listed in the table below and shown in *Fig. 24*.

Item	Description	Qty
A	X-Axis Proximity Switch (2675mm for XXL, 2350mm for XL, and 610mm for Shapeoko 3)	1
B	Y-Axis Proximity Switch (2540mm for XXL, 2220mm for XL, and 712mm for Shapeoko 3)	1
C	Z-Axis Proximity Switch (2675mm for XXL, 2350mm for XL, and 610mm for Shapeoko 3)	1
X-Axis Proximity Switch Mount Baggie		
D	X-Axis Proximity Switch Mount	1
E	M5 × 25mm Socket Head Cap Screw	2
F	M3 × 18mm Socket Head Cap Screw	2
Y-Axis Proximity Switch Mount Baggie		
G	Y-Axis Proximity Switch Mount	1
H	M5 × 35mm Socket Head Cap Screw	2
I	M3 × 18mm Socket Head Cap Screw	2
Z-Axis Proximity Switch Mount Baggie [Belt-Drive X/Z Machines ONLY]		
J	Z-Axis Proximity Switch Mount	1
K	M5 × 10mm Socket Head Cap Screw	4
L	M3 × 18mm Socket Head Cap Screw	2
Z-Axis Proximity Switch Mount Baggie [HDZ Machines ONLY]		
M	Z-Axis Proximity Switch Mount	1
N	M4 × 6mm Button Head Cap Screw	1
O	M3 × 18mm Socket Head Cap Screw	2
P	PCB Riser Board	1
Drag Chain Baggie		
Q	Tail Plate	2
R	M3 × 6mm Flat Head Screw	2
S	Double-sided VHB Tape	2
T	Alcohol Wipes	2
U	M3 × 8mm Flat Head Screw (Replacement)	4
V	M3 Nyloc Nut (Replacement)	4
W	4" Cable Ties (Pack of 100)	1

NOTE: Replacement M3×8mm FHS (4) and M3 nyloc nuts (4), for re-installing the drag chain to the X- and Y-Axis head brackets, are included so you don't have to keep track of tiny screws and nuts during the upgrade.

Disassembly

Disconnect Cables and the X-Axis Belt

1. Turn off your machine, unplug it, and disconnect the USB and power cables.
2. Clip all cable ties.
3. Unplug the router/spindle and remove it from the spindle mount.
 - a. Use a 4mm hex key to loosen the two (2) M5×55mm SHCS on the front of the mount.
4. Label all motor lead cables AND their gray extension cables.
 - a. Use a permanent marker or piece of tape to label all the white male/female connectors of the X-, Y1-, Y2-, and Z-stepper motor lead cables AND the gray X-, Y1-, Y2-, and Z-stepper motor extension cables.
5. Disconnect all cables.

WARNING: The Carbide Motion board can be damaged if the enclosure cover is removed or installed incorrectly. For correct removal/installation, please watch the *Removing the Lid on the Shapeoko Enclosure* video at: https://youtu.be/_wSW5EsFS00.

WARNING: Do NOT disconnect motor connectors by pulling on the wires or by prying at the latch. Use pliers to gently grip the base of each white connector and pull apart.

- a. Remove the Carbide Motion board enclosure cover.
- b. Disconnect the X-, Y1-, Y2-, and Z-motor leads from their extension cables AND disconnect all extension cables and homing switches from the Carbide Motion board.

Remove the Homing Switches and Drag Chain

See **Fig. 25** (front) and **Fig. 26** (back).

1. Remove the Z-Axis homing switch from the top of the HDZ.
 - a. Use a 2.5mm hex key to remove the one (1) M3×12mm SHCS securing the switch to the Z-motor mount.
2. Remove the X-Axis homing switch mounting plate from the rear of the HDZ.
 - a. Use a 4mm hex key to remove the two (2) M5×35mm SHCS and two (2) 1-inch spacers. (No need to separate X- or Y-Axis homing switches from their mounting plates.)
3. Remove the Y-Axis homing switch mounting plate from the outside of the Y2-carriage.
 - a. Use a 4mm hex key to remove the two (2) M5×35mm SHCS and two (2) 1-inch spacers.

Shapeoko 3 Machines: Skip 4-6 and move ahead to “Install the Proximity Switch Mounts” on page 29.

4. Disconnect the drag chain from the X-Axis head bracket on the rear of the HDZ.
 - a. Use a 2mm hex key and needle nose pliers to remove the two (2) M3×6mm FHS and two (2) M3 nyloc nuts.
5. Disconnect the drag chain from the Y-Axis head bracket on the outside of the Y1-carriage.
 - a. Use a 2mm hex key and needle nose pliers to remove the two (2) M3×6mm FHS and two (2) M3 nyloc nuts.
6. Remove the drag chain from the rails and lay it on the baseframe as shown in **Fig. 27**.
 - a. Pry the tail ends of the drag chain from the VHB tape securing them to the rails.
 - b. Lay the drag chain on the baseframe for proximity switch cable installation in the next section.
 - c. Remove the VHB tape from the rails.

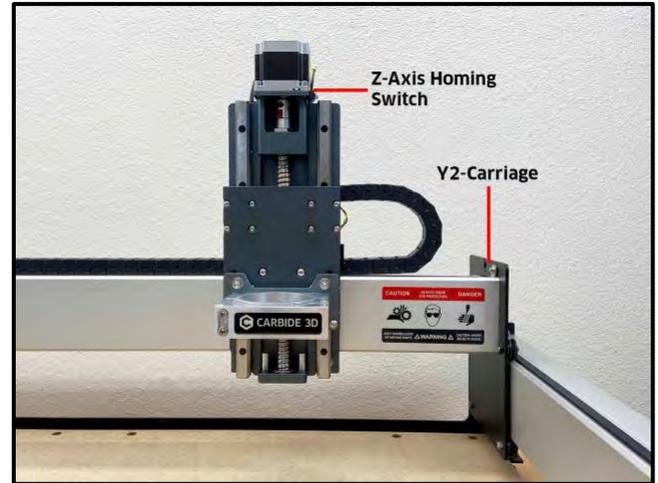


Figure 25

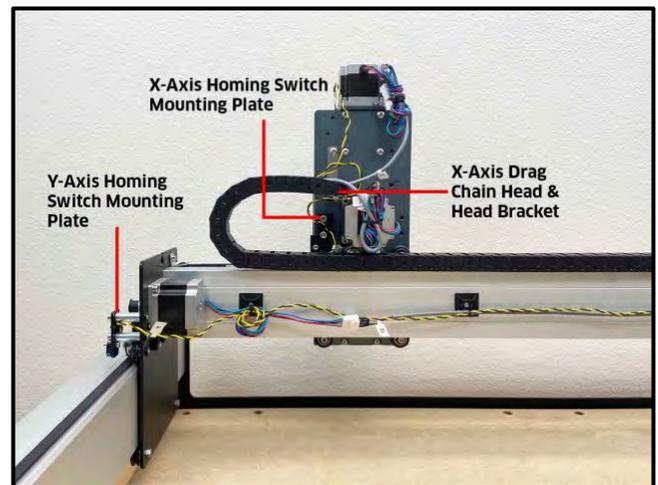


Figure 26

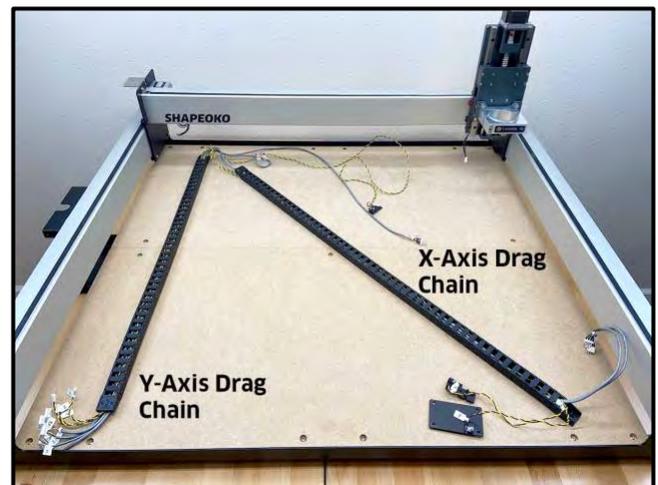


Figure 27

Install the Proximity Switch Mounts

Install the X- and Z-Axis Proximity Switch Mounts

Required Components:

Item	Description	Qty
D	X-Axis Proximity Switch Mount	1
E	M5 × 25mm Socket Head Cap Screw	2
M	Z-Axis Proximity Switch Mount	1
N	M4 × 6mm Button Head Cap Screw	1

1. Install the X-Axis proximity switch mount to the back of the HDZ. See **Fig. 28** and **Fig. 28 inset**.
 - a. Align the mounting slots with the two M5 screw holes on the Y2-side of the X-motor.
 - b. The two gold-colored threaded inserts on the mount face out (away from X-motor).
 - c. Use a 4mm hex key and two (2) M5×25mm SHCS to secure.
 - d. Before fully tightening the screws, slide the mount toward the X-motor far as it will go.

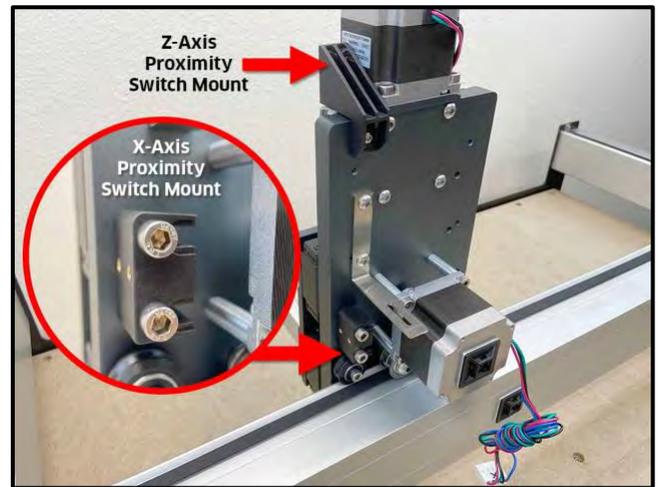


Figure 28

2. Install the Z-Axis proximity switch mount to the back of the HDZ. See **Fig. 28**.
 - a. Align the mount with the M4 screw hole at the very top of the HDZ.
 - b. Use a 2.5mm hex key and one (1) M4×6mm BHCS to secure the mount at the top of the HDZ.

Install the Y-Axis Proximity Switch Mount

Required Components:

Item	Description	Qty
G	Y-Axis Proximity Switch Mount	1
H	M5 × 35mm Socket Head Cap Screw	2

1. Install the Y-Axis proximity switch mount to the outside of the Y2-carriage. See **Fig. 29**.
 - a. Align the mount with the two M5 holes on the outside of the Y2-carriage, with the threaded inserts down and to the front.
 - b. Use a 4mm hex key and two (2) M5×35mm SHCS to secure.

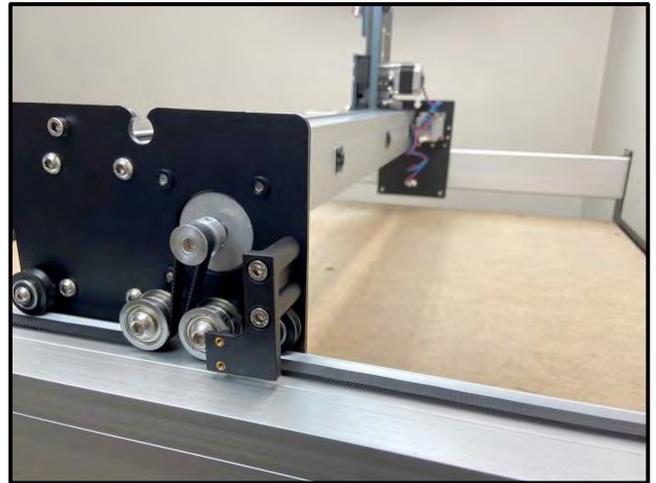


Figure 29

Prep and Re-Install the Drag Chain

Shapeoko 3 Machines: Skip ahead to the “Install the Proximity Switches” section on page 35.

Install the Proximity Switch Cables

Required Components:

Item	Description	Qty
A	X-Axis Proximity Switch Cable (2675mm XXL and 2350mm XL)	1
B	Y-Axis Proximity Switch Cable (2540mm XXL and 2200mm XL)	1
C	Z-Axis Proximity Switch Cable (2675mm XXL and 2350mm XL)	1

1. Open up the drag chain and remove the three homing switch cables (black/yellow or black/orange twisted wires). See **Fig. 30** and **Fig. 31**.
 - a. Position the drag chain on the baseframe as shown in **Fig. 31**, with the chain’s clip-on panels facing up. (Only one side of the chain will open; be sure this side is facing up.)
 - b. Use a hex key or screwdriver as a lever to pry open one side of each drag chain link. Start from the rear of the machine and work your way forward as shown in **Fig. 30**.
 - c. Remove the X-, Y-, and Z-Axis homing switch cables.
2. Label the proximity switches.
 - a. Identify the X-, Y-, and Z-Axis proximity switch cables by comparing the length printed on the switch body with the table above.
 - b. Use a permanent marker or piece of tape to label both ends of each proximity switch cable.

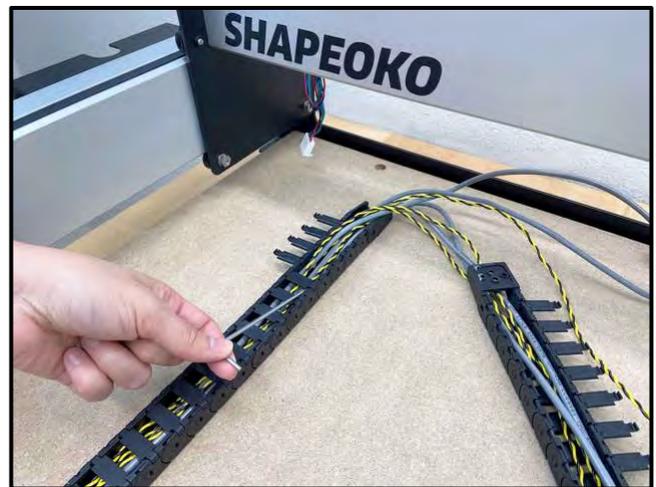


Figure 30

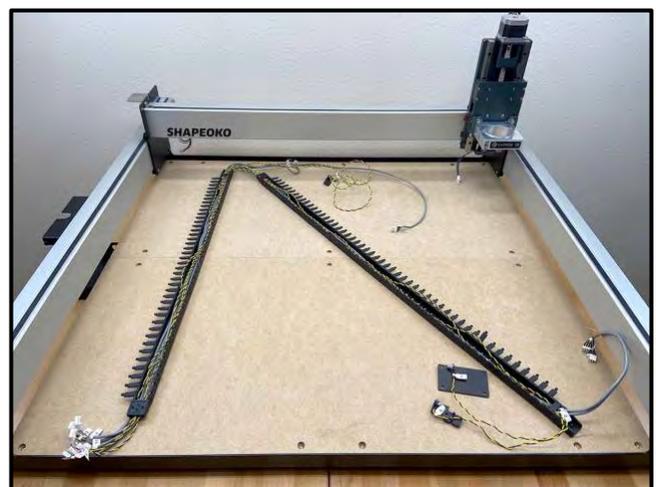


Figure 31

3. Insert the proximity switches into the drag chain.
See **Fig. 32**.
 - a. Insert the X- and Z-Axis proximity switch cables through both the Y-Axis and X-Axis portions of the drag chain.
 - b. Insert the Y-Axis proximity switch cable through the Y-Axis drag chain ONLY.
4. Close up the drag chain. Do not install it onto the rails just yet.

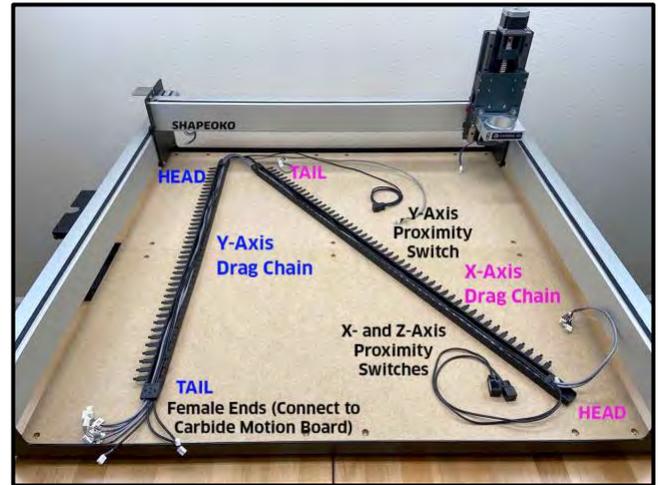


Figure 32

Install the Drag Chain Tail Plates

Required Components:

Item	Description	Qty
Q	Drag Chain Tail Plate	2
S	Double-Sided VHB Tape	2
T	Alcohol Wipe	2

The drag chain tail plates install to the top of the rail with the long edge parallel to the rail. Plates will overhang the rail by about $\frac{7}{16}$ " so as not to obstruct the PEM nuts.

1. Attach one (1) tail plate to the X-rail. See **Fig. 33**.
 - a. Measure and mark $3\frac{1}{2}$ " and $5\frac{1}{2}$ " from the Y1-carriage.
 - b. Clean the bottom of the tail plate AND the rail between your marks with an alcohol wipe. Allow the alcohol to evaporate.
 - c. Stick a piece of VHB tape along the back edge of the X-rail between your marks.

PRO TIP: Screw a M3×18mm SHCS 2–3mm into the plate's PEM nut. The protruding screw will help you get the nut as close to the rail as possible without obstructing it. See **Fig 34**.

- d. Stick the tail plate between your marks, with the PEM nut toward the Y2-side and overhanging the back of the rail. Get the PEM nut as close to the rail as you can without obstructing it.
 - e. Press the plate to the rail for 30 seconds.
2. Attach one (1) tail plate to the Y1-rail. See **Fig. 33**.
 - a. Measure and mark $15\frac{1}{2}$ " and $17\frac{1}{2}$ " from the front endplate.
 - b. Clean the bottom of the tail plate AND rail between your marks with an alcohol wipe. Allow the alcohol to evaporate.
 - c. Stick the VHB tape along the outside edge of the Y1-rail between your marks.
 - d. Stick the tail plate between your marks, with the PEM nut toward the rear endplate and overhanging the outside of the rail. Get the PEM nut as close to the rail as you can without obstructing it.
 - e. Press the plate to the rail for 30 seconds.

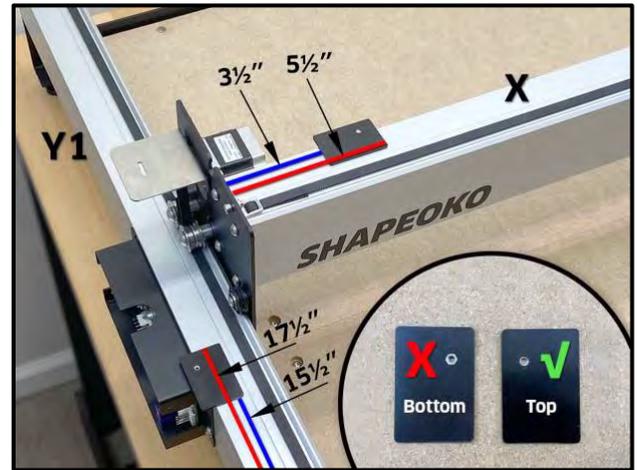


Figure 33

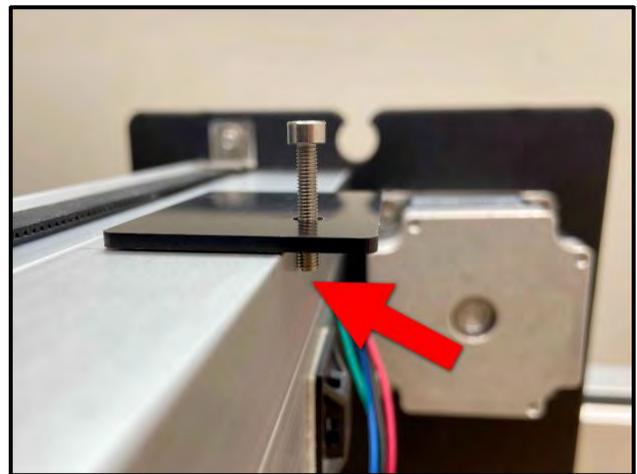


Figure 34

Install the Drag Chain to the X- and Y1-Rails

Required Components:

Item	Description	Qty
R	M3 × 6mm Flat Head Screw	2
U	M3 × 8mm Flat Head Screw (Replacement)	4
V	M3 Nyloc Nut (Replacement)	4

1. Move the X-rail to the back of the machine.
2. Lay the drag chain on the rails. See **Fig. 35**.
 - a. First, place the three cables not threaded through the X-Axis drag chain (Y-Axis proximity switch and Y1- and Y2-motor leads) over and behind the X-rail.
 - b. Second, lift the drag chain and place it across the Y1- and X-rails.
 - c. Lay the drag chains so that the tail of the Y-Axis drag chain will curl under and the head of the X-Axis drag chain will curl up.

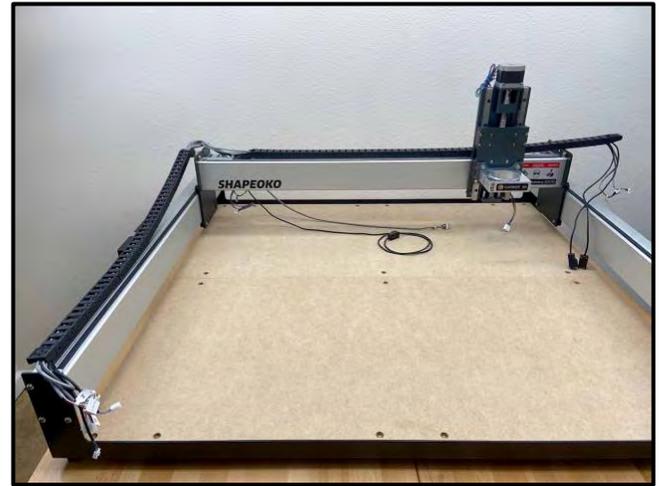


Figure 35

3. Secure the drag chain to the rails. See **Fig. 36**.
 - a. Secure the Y-Axis drag chain head to the head bracket on the outside of the Y1-carriage.
 - i. Use a 2mm hex key, needle nose pliers, two (2) M3×8mm FHS, and two (2) nyloc nuts to secure.
 - b. Secure the tail of the Y-Axis drag chain to the tail plate next to the enclosure.
 - i. Curl the tail of the drag chain under and toward the enclosure.
 - ii. Use a 2mm hex key and one (1) M3×6mm FHS to secure.
 - c. Secure the tail of the X-Axis drag chain to the tail plate near the Y1-motor.
 - i. Use a 2mm hex key and one (1) M3×6mm FHS to secure.
 - d. Secure the head of the X-Axis drag chain to the head bracket on the rear of the HDZ.
 - i. Curl the head of the drag chain up and toward the HDZ.
 - ii. Use a 2mm hex key, needle nose pliers, two (2) M3×8mm FHS, and two (2) nyloc nuts to secure.

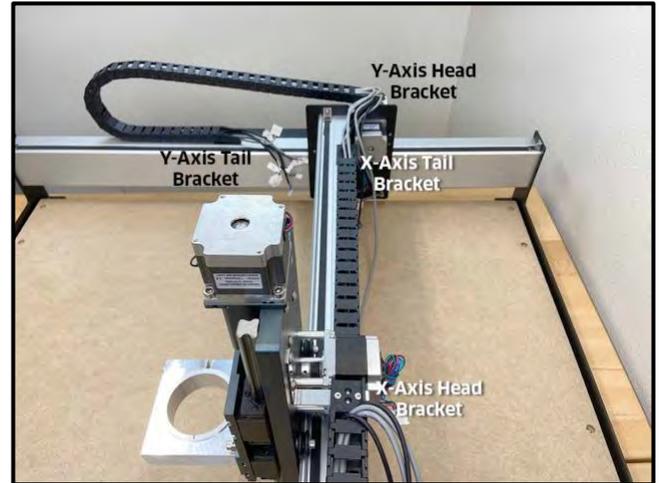


Figure 36

Install the Proximity Switches

Install the X-, Y- and Z-Axis Proximity Switches to the Mounts

Required Components:

Item	Description	Qty
A	X-Axis Proximity Switch (2675mm XXL, 2350mm XL, and 610mm Shapeoko 3)	1
F	M3 × 18mm Socket Head Cap Screw	2
C	Z-Axis Proximity Switch (200mm XXL and XL, 610mm for Shapeoko 3)	1
O	M3 × 18mm Socket Head Cap Screw	2
B	Y-Axis Proximity Switch (2540mm XXL, 2200mm XL, 712mm Shapeoko 3)	1
I	M3 × 18mm Socket Head Cap Screw	2

1. Attach the X-Axis proximity switch to the X-Axis proximity switch mount installed on the rear of the HDZ. See **Fig. 37**.
 - a. Locate the X-Axis proximity switch exiting the drag chain at the X-Axis head bracket.
 - b. Position the proximity switch with the red LED facing the Y2-carriage and the target pointing down.
 - c. Align the proximity switch's mounting slots with the two threaded inserts on the face of the mount.
 - d. Use a 2.5mm hex key and two (2) M3×18mm SHCS to secure the proximity switch.
 - e. Before fully tightening the screws, slide the switch up as far as it will go.

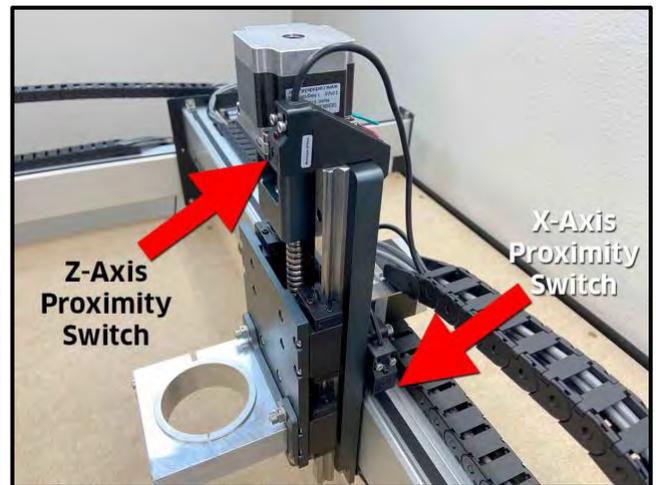


Figure 37

2. Attach the Z-Axis proximity switch to the Z-Axis switch mount installed at the top of the HDZ. See **Fig. 37**.
 - a. Locate the Z-Axis proximity switch exiting the drag chain at the X-Axis head bracket.
 - b. Position the Z-Axis proximity switch with the red LED facing the front and the target pointing down.
 - c. Align the proximity switch's mounting slots with the two threaded inserts on the face of the mount.
 - d. Use a 2.5mm hex key and two (2) M3×18mm SHCS to secure.
 - e. Before fully tightening the screws, slide the switch up as far as it will go.

3. Attach Y-Axis proximity switch to the mount on the outside of the Y2-carriage. See **Fig. 38**.
 - a. Locate the Y-Axis proximity switch exiting the drag chain at the Y-Axis head bracket.
 - b. Position the proximity switch with the red LED facing out and the target pointing to the rear of the machine.
 - c. Align the switch's two mounting slots with the two threaded inserts on the face of the mount.
 - d. Use a 2.5mm hex key and two (2) M3×18mm SHCS to secure.
 - e. Before fully tightening the screws, slide the switch as far to the FRONT as it will go.

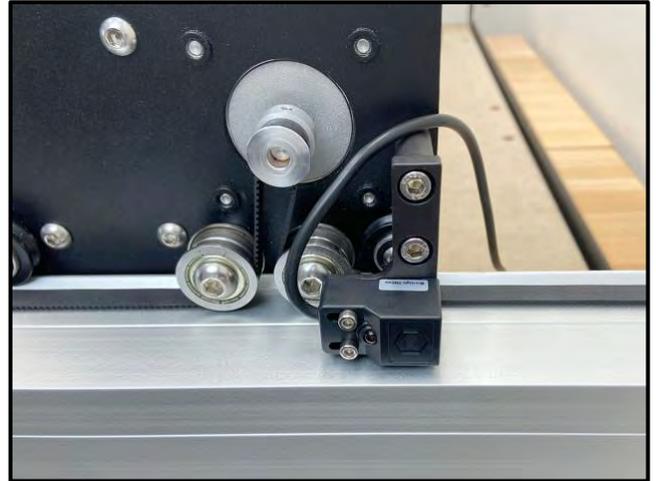


Figure 38

Connect and Cleanup Cables

Connect the Extension Cables

Shapeoko 3 Machines: Skip ahead to the “Connect Cables to the Carbide Motion Board” section below.

1. Connect the X- and Z-motor lead cables to their labeled extension cables at the rear of the HDZ.
 - a. Both the X- and Z-motor extensions exit the head of the X-Axis drag chain behind the HDZ.
 - b. Connectors are polarized. Be sure to align them properly.
2. Connect the Y1- and Y2-motor lead cables to their extension cables.
 - a. Both the Y1- and Y2-motor extensions exit the head of the Y-Axis drag chain at the Y1-carriage.
 - b. The Y2-motor lead cable stretches across the machine, behind the X-rail.
 - c. Connectors are polarized. Be sure to align them properly.

Connect Cables to the Carbide Motion Board

WARNING: The Carbide Motion board can be damaged if the enclosure cover is removed or installed incorrectly. For correct removal/installation, please watch the *Removing the Lid on the Shapeoko Enclosure* video at: https://youtu.be/_wSW5EsFS00.

Required Components:

Item	Description	Qty
P	PCB Riser Board	1

Shapeoko XXL and XL Instructions

1. Plug the PCB riser board into the Carbide Motion board. See **Fig. 39**.
 - a. Plug the PCB riser board into the 2x8 open bank of pins in the top-right of the Carbide Motion board.
2. Plug the proximity switch cables and stepper motor extension cables into the Carbide Motion board. See **Fig. 39**.
 - a. Plug each of the 3-pin proximity switch cables, X, Y, and Z, into the PCB riser board, as labeled.

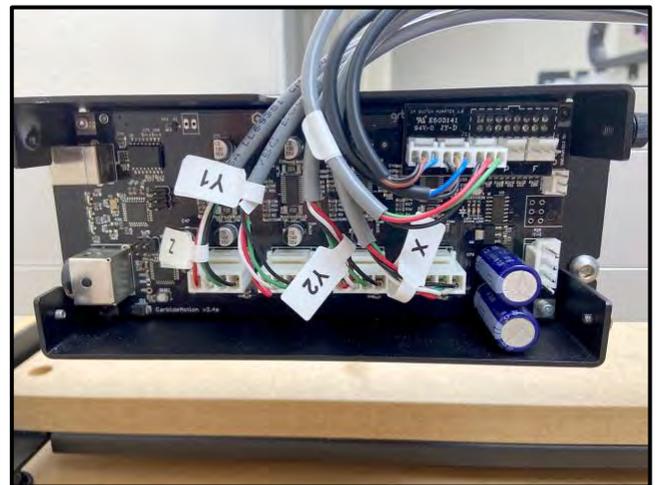


Figure 39

- b. Plug each of the 4-pin motor extension cables Z, Y1, Y2, X, into the connectors across the bottom of the Carbide Motion board, as labeled.
 - c. Connectors are polarized. Be sure to align them properly.
3. Re-install the enclosure cover.

Shapeoko 3 Instructions

Shapeoko 3 Machines: Your Carbide Motion board should be installed upside down as shown in *Fig. 40*.

1. Plug the PCB riser board into the Carbide Motion board. See *Fig. 40*.
 - a. Plug the PCB riser board into the 2x8 open bank of pins in the bottom-left of the Carbide Motion board.
2. Plug the proximity switch cables and stepper motor extension cables into the Carbide Motion board. See *Fig. 40*.
 - a. Plug each of the proximity switch cables, Z, Y, and X, into the PCB riser board, as labeled.
 - b. Plug in the stepper motor extension cables X, Y2, Y1, Z, into the connectors across the top of the Carbide Motion board, as labeled.
 - c. Connectors are polarized. Be sure to align them properly.
3. Re-install the enclosure cover.



Figure 40

Secure Cables at Y1-Carriage and HDZ

Shapeoko 3 Machines: Skip ahead to the “Secure Cables Along the X-Rail” section on page 40.

Required Components:

Item	Description	Qty
W	4" Cable Ties	Several

1. Secure the cables crossing the Y1-carriage plate. See *Fig. 41*.
 - a. Tuck all seven cables, one at a time, into the cutout at the top of the Y1-carriage plate.
 - b. Use two (2) cable ties, one on each side of the cutout, to secure the cables in place.
2. Secure the cables at the rear of the HDZ. See *Fig. 42*.
 - a. Bundle the X- and Z-cables at the rear of the HDZ.
 - b. Use a few cable ties to secure the cables.

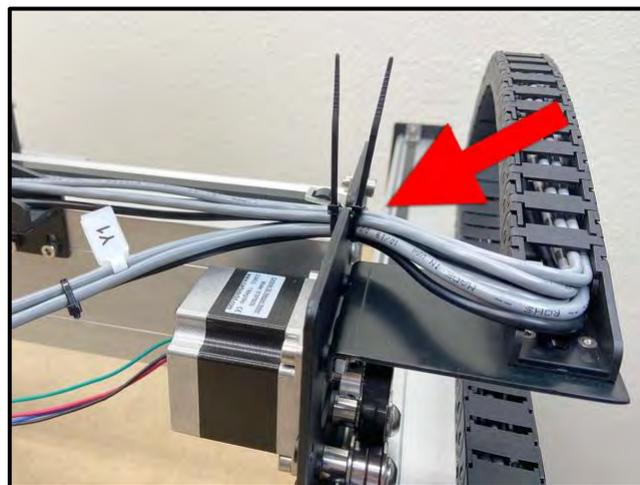


Figure 41

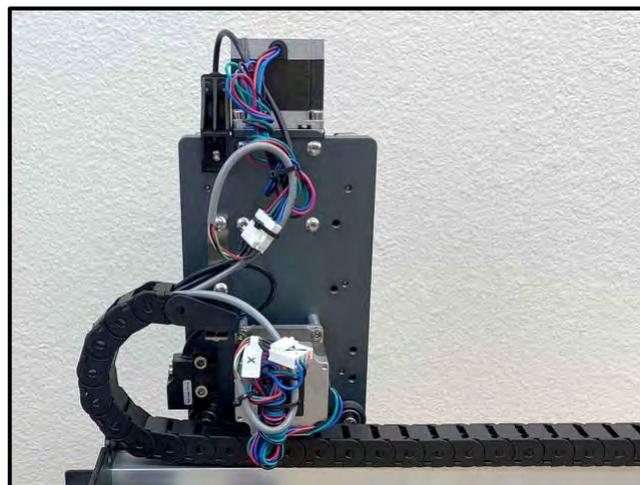


Figure 42

Secure Cables Along the X-Rail

Cable Cleanup

Required Components:

Item	Description	Qty
W	4" Cable Ties	Several

1. Tidy up the cables along the rear of the X-rail. See *Fig. 43*.
 - a. Secure the loose cables to the four self-adhesive cable tie mounts already attached to the back of the X-rail.

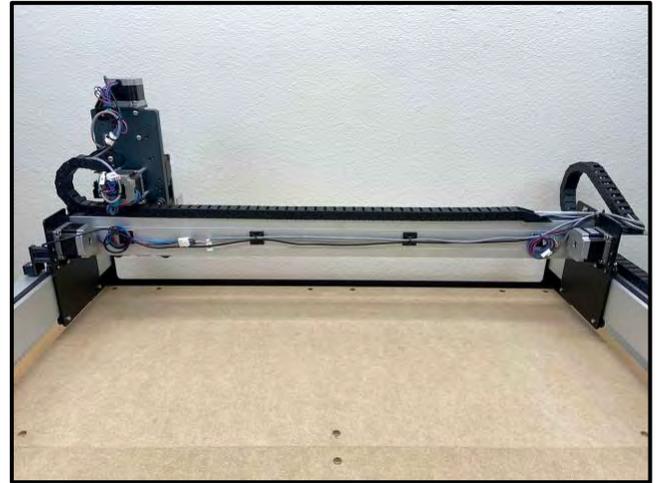


Figure 43

Post Installation

Update Carbide Motion

You will need to use the latest version of Carbide Motion with your new proximity switches.

1. Download the latest version here: carbide3d.com/carbidemotion/download.
2. Install Carbide Motion to your computer.

Test Proximity Switches

Double check that your proximity switches are installed and functioning correctly.

1. Turn on your Shapeoko.
2. Place a metal object, such as a wrench, in front of each proximity switch target in turn.
3. Check to see if the red LED on the switch lights up. You can also check to see that a blue LED lights up on the Carbide Motion board.

A detailed video on proximity switch testing is available here: <https://youtu.be/Zf8NPmxrEDs>.

Home Your Shapeoko

Once all switches have been checked, your Shapeoko is ready to home.

1. Connect your machine to Carbide Motion.
 - a. Plug in your USB cable.
 - b. Open Carbide Motion.
 - c. Turn on your Shapeoko.
 - d. Click the **Connect to Cutter** button.
2. Click the yellow **Initialize Machine** button to home your Shapeoko.

Re-Calibrate the BitSetter

Machines With BitSetter: Complete the steps below to re-calibrate your BitSetter.

After updating your settings and homing your Shapeoko, you will need to clear offsets and change your machine coordinates.

1. Clear machine offsets.
 - a. Click **Jog** in the top menu bar.
 - b. Click the **Set Zero** button. See *Fig. 44*.



Figure 44

- c. On the Set Current Position screen, click the **Clear All Offsets** button. Then, click **Done**. See *Fig. 45*.
2. Position your spindle directly above the BitSetter. See *Fig. 46*.
 - a. Click the **Position** label. This will toggle the view to the machine coordinates.
 - b. Click **Rapid Position**, then click the **SE** button to move the spindle to the front-right of the machine. Once in position, click **DONE**.
 - c. From the Jog screen, use the arrows on the screen (or the arrows on your keyboard) to jog the gantry so the spindle is directly above the BitSetter.

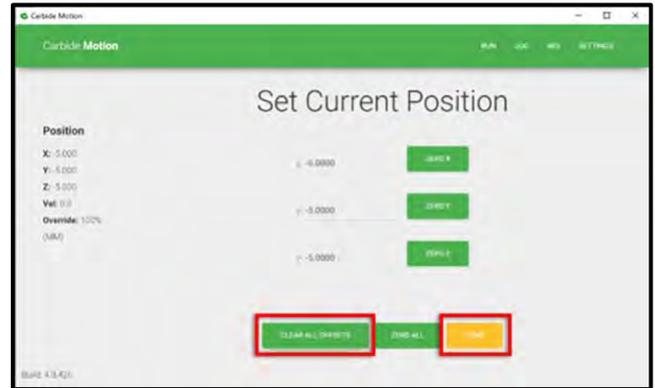


Figure 45

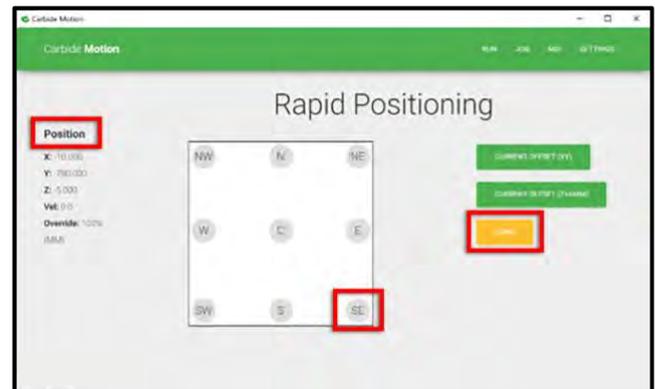


Figure 46

Once you have the spindle positioned directly above the BitSetter, we need to permanently save this location.

1. Click **Settings** in the top menu bar.
2. Recalibrate your BitSetter. See *Fig. 47*.
 - a. In the BitSetter box, select the **Enabled** checkbox.
 - b. With your spindle directly above the BitSetter, click the **Use Current Location** button to set the location. This will permanently save the X/Y location of your BitSetter.
3. Click **Ok** to save and close the window.

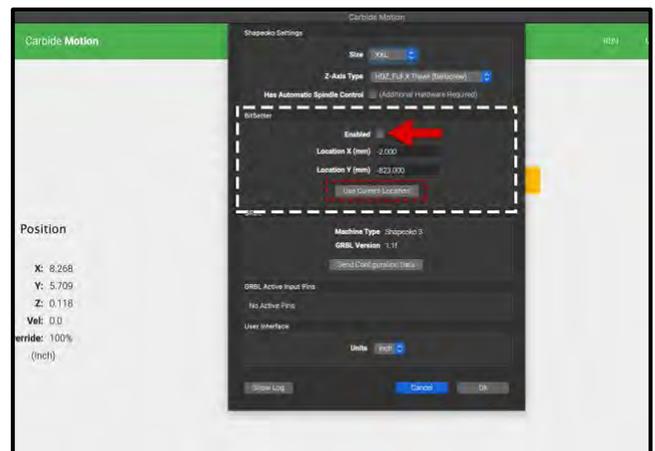


Figure 47