



## ASSEMBLY INSTRUCTIONS FOR THE MILLRIGHT CNC CARVE KING 2 AND CARVE KING 2 MINI

Version 1.03

*Note that these are instructions for the Carve King 2. For instructions on the original Carve King, see  
[www.millrightcnc.com/resources](http://www.millrightcnc.com/resources)*

Contact [support@millrightcnc.com](mailto:support@millrightcnc.com) if you have questions.

### **Important safety rules for operating your MillRight CNC Carve King 2:**

Never place your hands near a spinning end mill or bit.

Unplug the router before changing cutting tools.

Always wear eye and ear protection while operating your machine.

Always run a dust collector or wear a mask while performing a milling operation.

Do not leave the machine unattended while running a milling operation.

Do not operate your machine while under the influence of alcohol or drugs.

Secure long hair and loose clothing so it is not caught in spinning mechanisms.

Ensure work pieces are properly secured before running a milling operation.

Keep a fire extinguisher nearby.

Visually inspect wires prior to power up to prevent short circuits.

*Note:*

*We recommend using a blue thread locker on any fastener not secured with a lock washer or lock nut.*

**The Carve King 2 and the Carve King 2 Mini are built on the same platform. The build instructions are the same with small changes for the Carve King 2 Mini noted in the sections if applicable. Please read the full instructions before starting your build. There will be extra hardware for with the Carve King Mini.**

# Building the Bed and Frame Section

## Parts

(4) 593mm Extrusion

(1) Front Frame

(1) Rear Frame

(5) Black Aluminum T Track

(4) MDF Bed Section

## Mini

(2) 384mm Extrusion

(4) Black Aluminum T Track

(3) MDF Bed Section

## Hardware

(16) #10x1 Self-tapping Screw

(20) M5x8 Button Cap Screw

(16) M5x16 Machine Screw

(16) M5 Split Lock Washer

(36) Drop-In T Nut

(8) #10z1 Self-tapping Screw

(8) M5x8 Button Cap Screw

(6) M5x16 Machine Screw

(6) M5 Slit Lock Washer

(14) Drop-in T Nut

## Tools

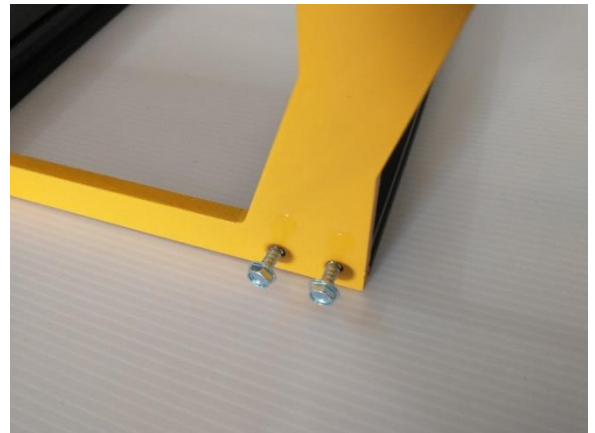
3mm Hex Key

Phillips Screwdriver

8mm or 5/16 Wrench or Socket

WD40 or Other Lubricant

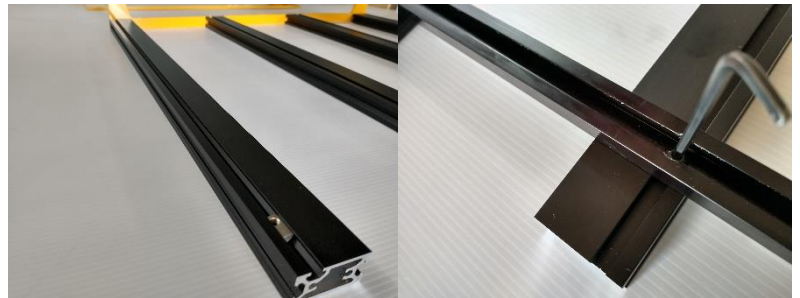
Place (4) 593mm extrusions between the front and rear frames. The slot on the 40mm side of the extrusion should be facing up and oriented to the outside of the machine. The two left should have the slot on the left, the two right should have the slot on the right. You can put a T track over these extrusions to get a better idea of the orientation needed for the holes to align. **The Rails on the Mini will be opposite the Carve King 2. The slots will be inbound to the center of the bed.**



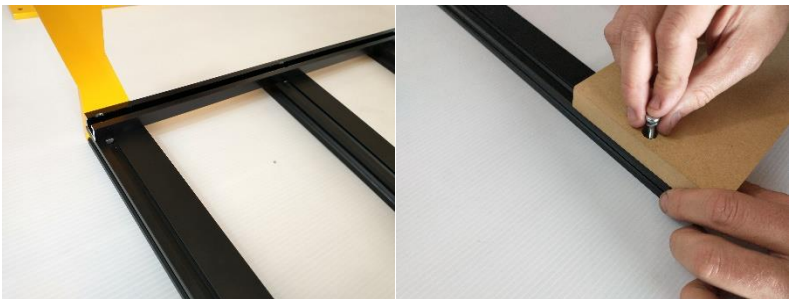
Lubricate 2 #10x1 self-tapping screws. Place the screws through the holes in the bottom of the frame into the holes in the end of the right most extrusion. Use the 8mm socket to drive in the screws. **Leave loose.** Continue installing the #10x1 screws in the other 3 extrusions.



Spin the frame around to work from the other side. Put one drop-in T nut in each slot with the hole leading. Line up one T track with the T nuts. Using the 3mm Hex Key, drive in (4) M5x8 button cap screws. **Leave loose.** Push the t track to the frame. **The hole of the T nut must be closer to the frame when slid all the way down or else the T track will not seat all the way to the frame.**



Put one T nut in each slot. Line up one MDF bed section with the t nuts. Put (4) split lock washers on (4) M5x16 machine screws. Using the screwdriver, drive the screws into the t nuts. Leave loose. Push the bed section to the back, up against the T track you previously installed.



Alternate between the remaining T track and bed sections pushing each back.

On the fifth T track, place the T nuts into the slot with the hole in the T Nut closest to the outside. Finish installing the last T track. Leave everything loose.



Lubricate (2) #10x1 self-tapping screws. Place screws through the holes in the bottom of the remaining frame piece into the holes in the end of the extrusion. Use the 8mm socket to drive the screws. Leave loose. Continue the process, installing the remaining extrusions.



## Y Rail Installation

### Parts

(2) 593mm Extrusion

### Mini

(2) 384mm Extrusion

### Hardware

(8) #10x1 Self-tapping Screw

### Tools

8mm or 5/16" Wrench or Socket

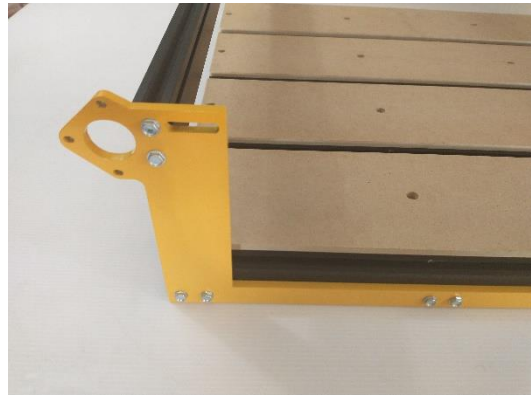
WD40 or Other Lubricant

Working from the side of the assembly, place one 593mm extrusion with the slot on the 40mm wide face pointing in and oriented with the slot near the top of the extrusion as shown in the picture. Remember, one of the frame pieces should be slightly loose so you can set this extrusion in place.



Lubricate (2) self-tapping screws. Place the screws through the two holes on the frame and into the holes in the end of the extrusion. Finger tighten the screws to hold the extrusion in place. Do the same to the other end of the extrusion. Follow the same process with the second extrusion on the other side of the bed. **Be sure that the slots on the side of the extrusion faces inboard and are up.**

Tighten all the screws on the frame. Tighten the screws for the MDF bed sections and the T tracks. You may need a long screwdriver at a slight angle to the screw or a stubby screwdriver to reach the screws under the Y rails.



# Gantry End Plate Assembly

## Parts

Motor Side Gantry Plate

Idler Side Gantry Plate

X/Z Motor Spacer Plate

Short Wire Motor

## Hardware

Pillow Block Bearing

Coupler

(2) Anti-backlash Nut

(2) M5 Grub Screw (in Anti-backlash nut bag)

(2) M5 Jam Nut (in Anti-backlash nut bag)

(4) M3x16 Machine Screw

(2) M5x10 Machine Screw

(4) M5x16 Machine Screw

V-Wheel Kit

## Tools

8mm or 5/16 Wrench or Socket

Phillips Screwdriver

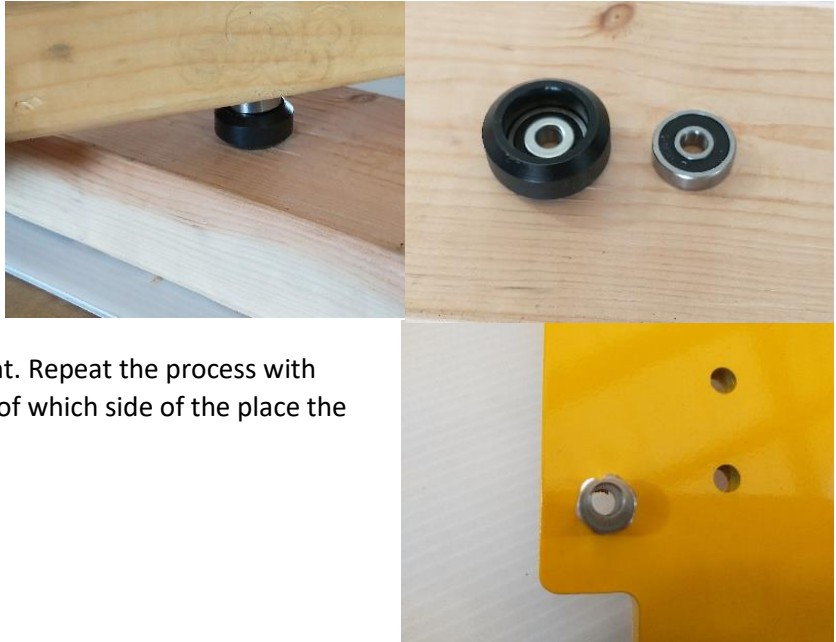
3mm Hex Key

2.5mm Hex Key

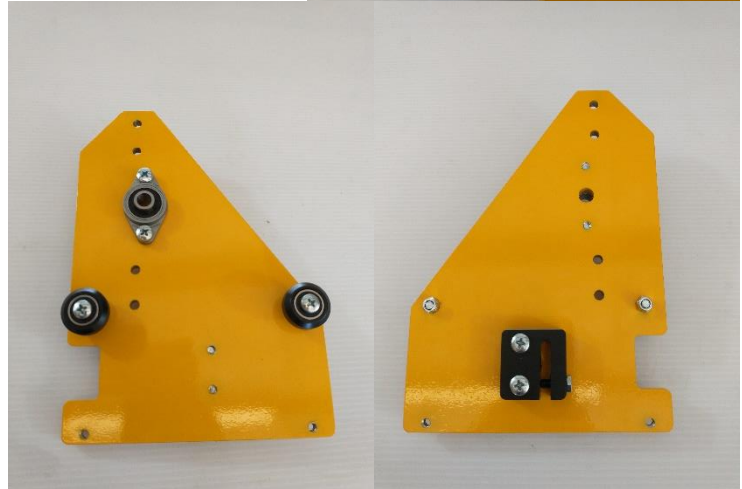
Place a v-wheel on a flat, hard surface. Place a bearing on top of the v-wheel. Using something else flat and hard, press the bearing into the v-wheel using your body weight. A section of wood is pictured. Turn the v-wheel over. Place a M5 washer on the bearing in the wheel. **It is especially important to remember the M5 Washer. It is extremely hard to correct this if you forget.** Press a second bearing into the wheel. Repeat this process for the other wheels.



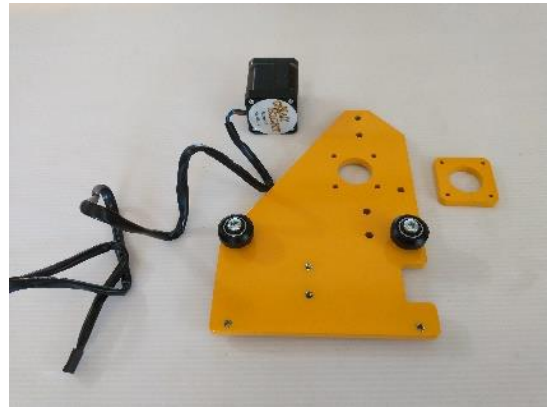
Place (2) eccentric spacers in the Idler Side Gantry Plate (top picture on previous page). Place eccentric spacers with the thin wall portion pointing to the top of the Idler Side Gantry Plate. Put a M5x30 machine screw through the v-wheel, then through the eccentric spacer. Secure with a M5 nylock nut. Leave Snug, not tight. Repeat the process with another v-wheel. Take careful note of which side of the plate the spacers and wheels are installed on.



Place the pillow block bearing on the Idler Side Gantry Plate as pictured. Secure the pillow block bearings with (2) M5x10 machine screws. Flip the plate over. Screw in a M5 grub screw in the top of an anti-backlash nut using a 3mm Hex Key. Stop tightening when the grub screw touches the bottom. Cap the grub screw with a M5 jam nut. Repeat the process for the second anti-backlash nut. Place an anti-backlash nut on the plate as pictured. Secure it with (2) M5x16 machine screws.



Place (2) eccentric spacers into the Motor Side Gantry Plate with the thin wall of the eccentric spacer facing up. Place a M5x30 machine screw through a v-wheel, then the eccentric spacer, and secure with a M5 nylock nut. Repeat the process with a second wheel. Flip the plate.



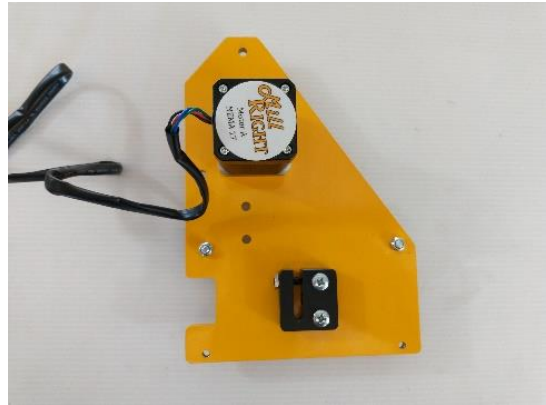
Place the coupler on the short wire motor using the X/Z Motor Spacer Plate to set the coupler to the correct position. See picture to right of spacer being used to set the proper position. Tighten the coupler using the 2.5mm Hex Key.



With the Motor Spacer Plate still on the motor, insert the coupler into the large hole on the Motor Side Y Gantry Plate. The motor wire should be pointing left if you are looking at the back of the motor. From the v-wheel side of the place (4) M3x16 machine screw through the Motor Side Y Gantry Plate, through the Motor Spacer Plate, into the motor. Snug down. Coupler should have free rotational motion.



On the motor side of the Motor Side Y Gantry Plate, place an anti-backlash nut. Using (2) M5x16 machine screws, secure the anti-backlash nut to the plate.



Place both Y Gantry Plates to the side.

## X Plate Assembly

### Parts

X Plate

Z Bottom Plate

UHMW Screw Seat

### Hardware

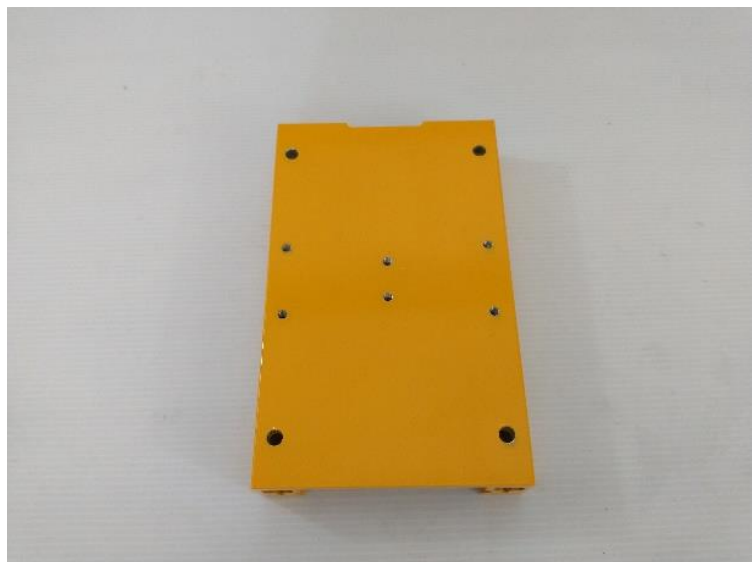
(2) M5 Nylock Nut

(1) Anti-backlash Nut

(1) M5 Grub Screw (in Anti-backlash nut bag)

(1) M5 Jam Nut (in Anti-backlash nut bag)

(2) M5x16 Machine Screw



(2) M5x12 Button Cap

(2) #10x1 Self-tapping Screw

V-Wheel Kit

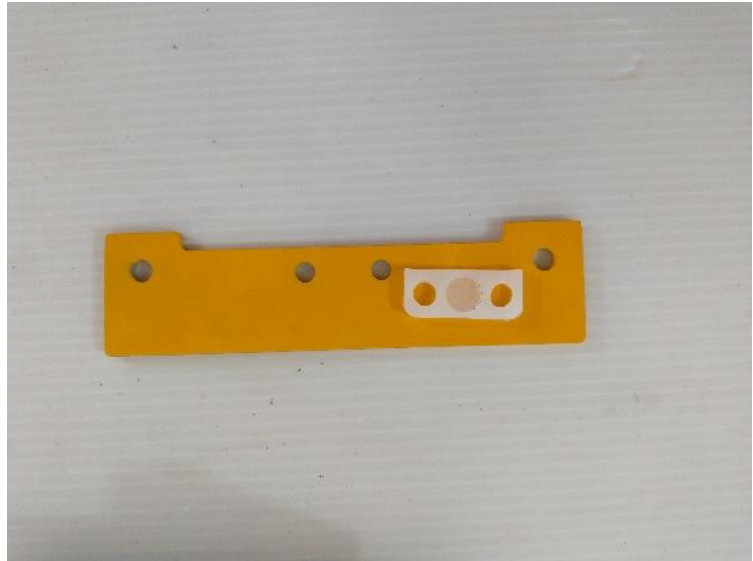
### Tools

Phillips Screwdriver

8mm or 5/16" Wrench or Socket

3mm Hex Key

WD40 or Other Lubricant



The top of the X Plate Extrusion has a notch. The bottom is flat. Take a M5x25 machine screw and put it through a v wheel, then through a standard spacer from the v-wheel kit, then screw it into the X Plate Extrusion. Repeat the process with 3 other v-wheels.



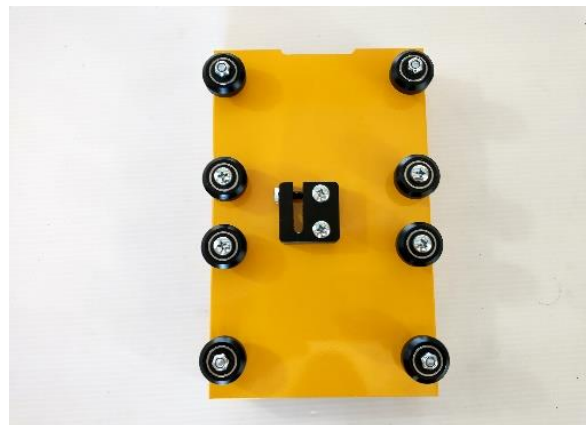
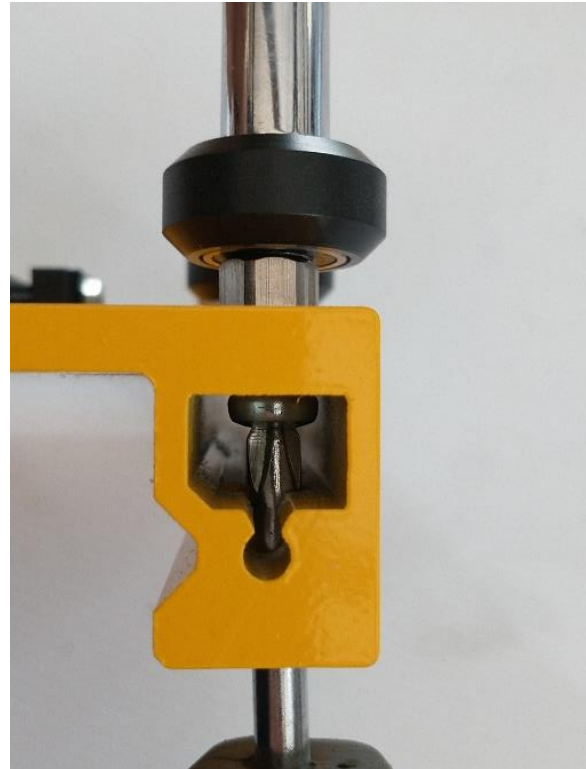
Screw an M5 grub screw into the top of an anti-backlash nut using the 3mm Hex key. Cap the grub screw with a M5 Jam Nut. Using M5x16 machine screws, attach the anti-backlash nut to the X Plate Extrusion.



Place a M5x30 machine screw through the hole in the front of the X Plate Extrusion. Place an eccentric spacer on the screw. The thin part of the spacer should face the top if near the top, the bottom if near the bottom.

Then place a V-wheel on the screw and secure with a M5 nylock nut. Repeat the process with three other v-wheels. Leave Snug. See the picture to the right of the screw being inserted through the hole in the front of the X plate with the other components slid onto it.

Of the 8 V wheels on the X plate, 4 use eccentric spacers and 4 use standard spacers. The top and bottom holes use eccentric spacers. The four in the middle use standard spacers.



Attach the UHMW Screw Seat to the Z Bottom Plate using (2) M5x12 button cap screws and (2) M5 nylock nuts.

Place the Z Bottom Plate on the bottom of the X Plate Extrusion. Lubricate (2) #10x1 self-tapping screws and place them through the Z Bottom Plate into the holes at the end of the X Plate Extrusion. Tighten with the 8mm wrench.



Place the X Plate Extrusion to the side.

# Z Motor Mount

## Parts

Z Motor Mount

X/Z Motor Spacer Plate

Long Wire Motor

X Drag Chain Post

## Hardware

(4) M3x16

(1) M4x12

(1) M4 Split-Lock Washer

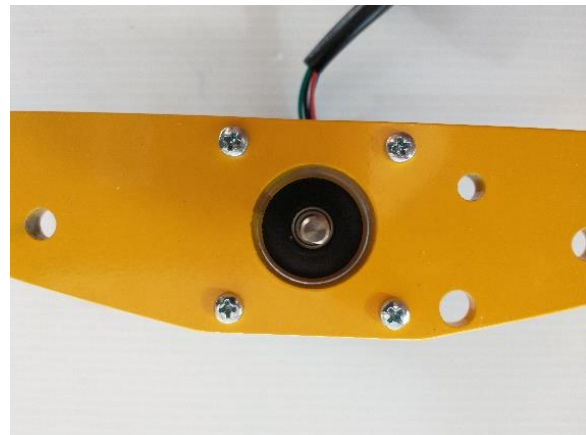
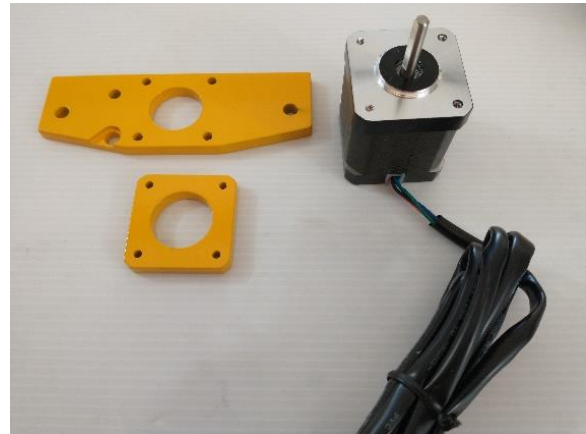
## Tools

Phillips Screwdriver

Put the motor on the table with the cord pointing away from you. Place the Motor Spacer Plate on the motor. Place the Z Motor Mount on the Motor Spacer Plate. Screw in (4) M3x16 machine screws into the motor.

Make sure the motor is centered with the Motor Spacer Plate and the Z Motor Mount. Tighten screws.

Lay the motor on its side. Attach the X Drag Chain Post using a M4x12 Machine Screw with an M4 Split-Lock Washer. Tighten. Place to the side. Note that the X Drag Chain Post is just a cylinder with holes tapped on each side. Do not confuse this with the Y Drag Chain Post, which has additional features machined into it.



# Z Plate

## Parts

Z Plate

Router Mount

2 Hole Spacer

178mm Lead Screw

## Hardware

(1) Anti-backlash Nut

(2) Nylock Nuts

(1) Grub Screw (in Anti-backlash nut bag)

(1) M5 Jam Nut (in Anti-backlash nut bag)

(1) Coupler

(2) M5x25 Machine Screw

(2) #10x1 Self-tapping Screw

V-Wheel Kit

## Tools

Phillips Screwdriver

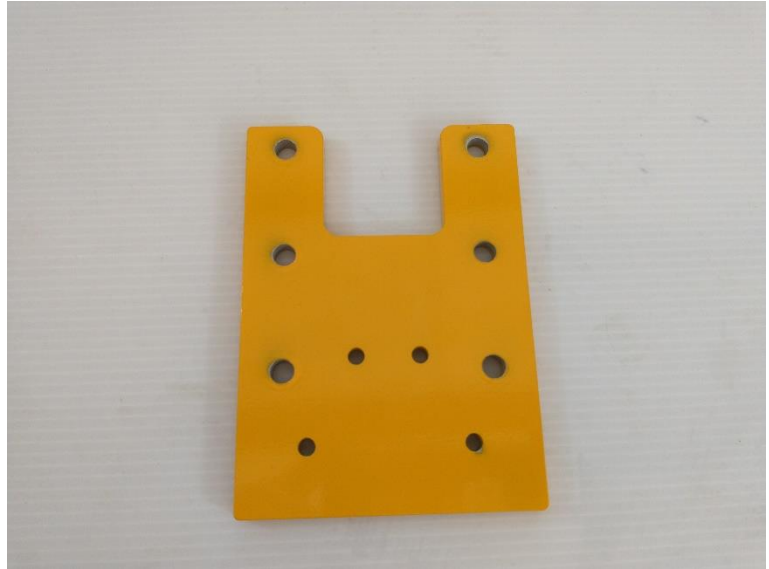
2.5mm Hex Key

3mm Hex Key

8mm or 5/16 Wrench or Socket

10mm Wrench

WD40 or Other Lubricant



Place eccentric spacers in the (6) large holes on the Z Plate. The thin part of the eccentric spacers should face the middle of the plate. Place a M5x30 machine screw through the Z Plate, then through the eccentric spacer. Place a v-wheel on the screw and secure with a M5 nylock nut. Tighten firmly. Repeat the process with (5) other v wheels.

Press (2) M5 nylock nuts into the hexagonal holes on the face of an anti-backlash nut. **The nylon portion of the nut should be facing up.** Drive a grub screw into the top of the anti-backlash nut using the 3mm Hex key. Stop when the screw touches. Cap the grub screw with a M5 jam nut.

Place the 2-hole spacer on the Z Plate. Place the anti-backlash nut on the 2-hole spacer. From the opposite side attach the anti-backlash nut using (2) M5x25 machine screws. You may have to hold the nylock nuts in place to prevent them being pushed out of the anti-backlash nut as you insert the screws.

The router mount will already have its hardware installed. Remove the (2) screws and (2) lock washers from the back of the mount. Put the screws through the lock washers, through the Z Plate using the last two holes, and into the mount using the 3mm Hex Key. Be careful to install the router mount straight on the Z plate.

Slide the Z Plate, mount end first, into the X Plate Extrusion from the top. If the Z Plate will not fit, use the 10mm wrench to turn the eccentric spacers until the Z Plate will slide completely in. Turn the eccentrics until the wheels are snug against the X Plate Extrusion. Do the same with the next pairs of wheels as you continue to slide the Z plate into the X plate. The wheels should each make firm contact, but the Z plate should still slide when given some hand pressure.

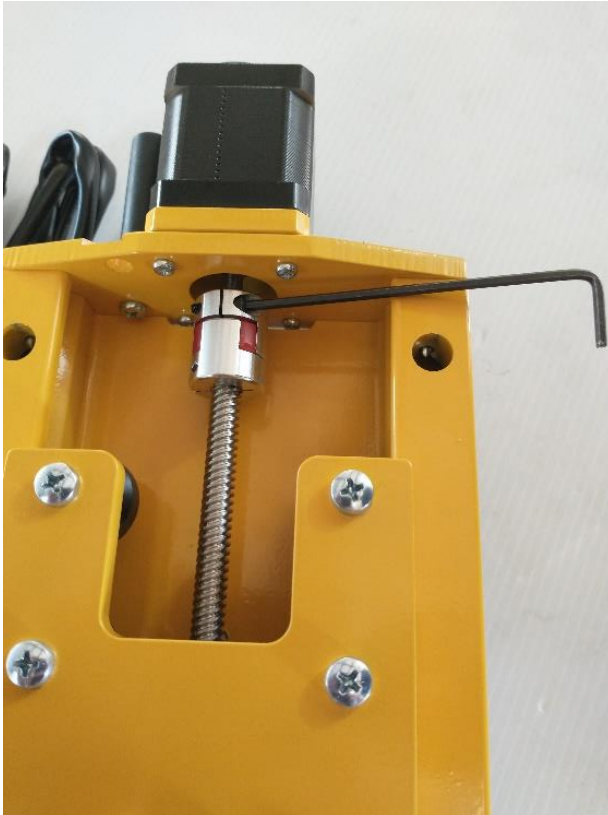


From the top of the X Plate Extrusion, thread the 178mm lead screw through the anti-backlash nut connected to the Z Plate. Continue until the lead screw is sitting in the pocket on the UHMW Screw seat.

Place the coupler on the top of the lead screw. Leave loose.

Grab the Z Motor Mount. Place the shaft of the motor into the top of the coupler. Leave loose.

Lubricate (2) #10x1 self-tapping screws. Place them through the Z motor mount into the holes at the end of the X Plate Extrusion. Tighten with the 8mm wrench.



Using the 2.5mm Hex Key, tighten the coupler to the motor shaft and the lead screw. **The lead screw MUST be firmly against the UHMW piece at the bottom of the assembly or the coupler will separate, causing the Z axis to lose height during operation. Make sure the coupler does not separate when the Z axis plate is pulled downward.**

# Attaching XZ Assembly to Gantry Plates

## Parts

613mm Extrusion w/ MillRight Sticker

613mm Extrusion

(1) 600mm Lead Screw

## Mini

384mm Extrusion w/ MillRight Sticker

384mm Extrusion

(1) 375mm Lead Screw

## Hardware

(8) #10x1 Self-tapping Screws

## Tools

Phillips Screwdriver

1.5mm Hex Key

2.5mm Hex Key

8mm or 5/16" Wrench or Socket

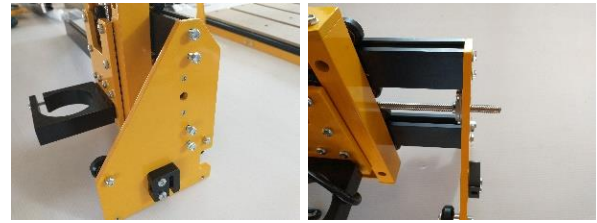
WD40 or Other Lubricant

Run the 613mm extrusions through the v-wheels on the X Plate Extrusion. The extrusion with the MillRight sticker will go up top. Make sure the extrusions are oriented as pictured. If the wheels are too tight, use the 10mm wrench to turn the eccentric spacers until the extrusions fit. Once the extrusion is in, turn the eccentric spacers until the wheels are making good contact with the extrusion.

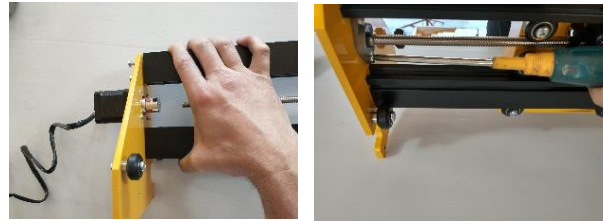
Tighten the v-wheels making sure not to turn the eccentric spacers. Turn the XZ Assembly over and move it to the end of the extrusions with the sticker.



Lubricate (4) #10x1 self-tapping screws and place them through the Idler Side Y Gantry Plate into the holes on the end of the 613mm extrusion. Use the 8mm socket to tighten the screws.



Using the 1.5mm Hex Key, loosen the set screws on the pillow block bearing. Thread the 600mm lead screw through the anti-backlash nut on the XZ Assembly until a portion of it sticks through the pillow block bearing as pictured on the top right of this page.



Lubricate (4) #10x1 self-tapping screws. Place them through the Motor Side Y Gantry Plate and into the holes in the end of the 613mm extrusion. Use the 8mm socket to tighten the screws.

Turn the 600mm lead screw until the screw fits into the coupler attached to the Motor Side Gantry Plate. Make sure the screw is still engaging the pillow block bearing. Use the 2.5mm Hex Key to tighten the coupler to the lead screw.



Use a Philips screwdriver to tighten the machine screws on the pillow block bearing. Use the 1.5mm Hex Key to tighten the set screw on the pillow block bearing. The coupler should NOT separate if you push the X/Z assembly to the right. If it separates, the set screws on the pillow block bearing are not set properly.

# Gantry to Y Rails

## Parts

- (2) 600mm Lead Screw
- (2) Motors (one long wire, one short wire)
- (2) 3 Hole Motor Spacers

## Mini

- (2) 375mm Lead Screw

## Hardware

- (2) Drop-in T Nut
- (2) M5x10 Machine Screw
- (2) M5x18 Machine Screw
- (4) M5x16 Button Cap Screw
- (6) M3x20 Machine Screws
- (2) M5 Washer
- (2) M5 Split Washer
- (6) M5 Nylock Nut
- (2) Pillow Block Bearing
- (2) Corner Bracket
- (2) Coupler
- V-Wheel Kit

## Tools

- Phillips Screwdriver
- 3mm Hex Key
- 2.5mm Hex Key
- 1.5mm Hex Key
- 8mm or 5/16" Wrench or Socket
- 10mm Wrench

Place the Gantry onto the Y Rails as pictured.



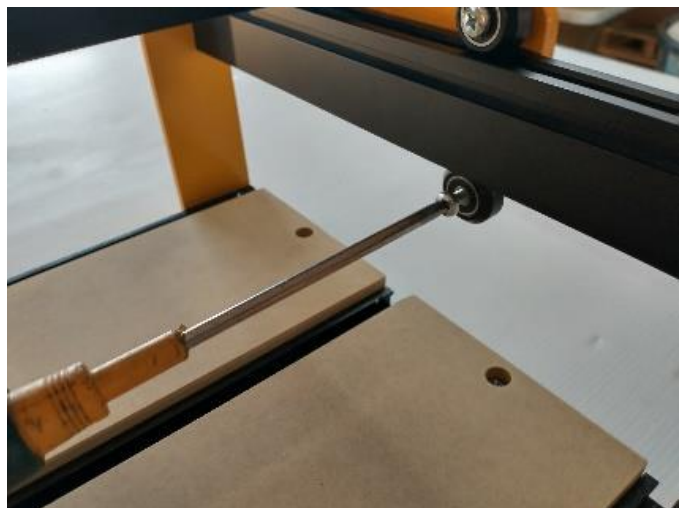
Place a V-wheel on an M5x25 machine screw, followed by a standard spacer from the V-wheel kit. Put the v-wheel into the V groove of the extrusion before tightening the screw. Screw the v-wheel into the bottom of the Gantry Y Plate. If the fit is tight, use the 10mm wrench to adjust the eccentric spacers. You may have to loosen the screws on the top wheels to get the bottom wheel screws to line up with the threaded hole.



Repeat the process for the other 3 V-wheels.

Use the 10mm wrench to turn the eccentric spacers to give the v-wheels a good grip on the extrusion. Tighten the v-wheels, being careful not to turn the eccentric spacers when you do.

This will secure the gantry assembly to the Y rails. The gantry should smoothly roll forward and back.



Insert a drop-in T nut into the Y Extrusion near the Rear Frame as pictured. Grab a corner bracket. If it has a tabbed side and a non-tabbed side, the tabbed side will fit into the slot on the Rear Frame as pictured. It is okay if neither side has tabs.

Place an M5 split lock washer on a M5x18 machine screw, place it through the corner bracket, then through the slot in the Rear Frame. Secure with an M5 flat washer and an M5 nylock nut.

Place a M5 flat washer on a M5x10 machine screw. Put the screw through the corner bracket and screw it into the drop-in T nut. Tighten. Repeat the process on the opposite side of the Rear Frame.

Grab a motor and a 3 Hole Motor Spacer Plate. Use the Motor Spacer Plate to place the coupler on the motor in the correct position. Use the 2.5mm Hex Key to tighten the coupler. Repeat the process with the last motor and coupler.

You will have a long wire motor and a short wire motor remaining. **When looking at the machine from the front, the long wire motor will go at the back right and the shorter wire motor will go to the back left.**



Place (3) M3x20 machine screws and them through the Rear Frame, through the 3 Hole Motor Spacer, into the motor. The motor wire should be pointing down and angled towards to middle of the machine. Line up the edge of the Rear Frame, the 3 Hole Motor Spacer and the motor. The coupler should have free movement as you spin it. Repeat the process on the opposite side of the Rear Frame. You may want to leave the motor screws a bit loose so you can adjust the position of the motor at the next step.

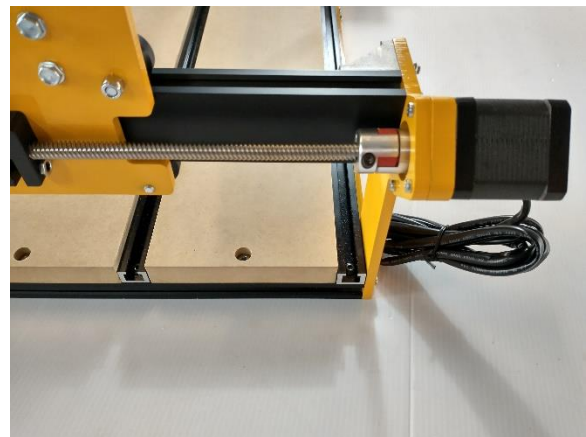


Thread a 600mm lead screw through the anti-backlash nut on the right side of the Gantry using the large hole in the front frame. Keep threading until you insert the lead screw into the coupler. Repeat the process on the left side of the Gantry. **Mini – You will have to install the pillow block bearing before threading in the 373mm lead screw. The bearings will need to be placed on the inside of the front frame, opposite of what is pictured on page 23 below.**



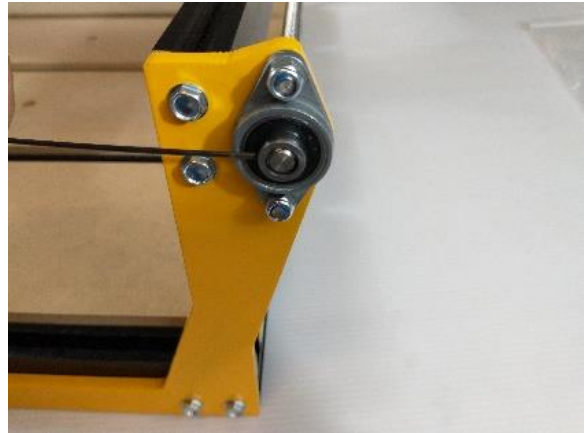
Continue to thread the lead screw back until the lead screw meets the coupler. Guide the screw into the coupler, tighten the set screw on the coupler, and fully secure the motor mounting screws. Repeat this for both sides.

Loosen the set screw on a pillow block bearing. Place the pillow block bearing against the Front Frame over the portion of the lead screw sticking through the Front Frame. Place (2) M5x16 button cap screws through the front frame and through the pillow block bearing. The head of the screw should be on the interior. Secure with (2) M5 nylock nuts using the 8mm socket and the 3mm hex key.



Use the 2.5mm hex key to tighten the coupler. Use the 1.5mm hex key to tighten the pillow block bearing set screw. Repeat the process on the opposite side of the machine.

\*Mini – The pillow block bearing should be installed on the opposite side of the front frame from what is pictured here. The bearing will need to be installed before the 373mm lead screw.



# Drag Chain Installation

## Parts

Drag Chain Angle Mount

X Drag Chain Bracket

Y Drag Chain Post

(2) Drag Chains



## Hardware

(2) M5x8 Button Cap Screw

(2) M4x12 Machine Screw

(2) M3x16 Machine Screw

(3) M3x8 Machine Screw

(2) M5 Lock Washers

(2) M4 Lock Washer

(5) M3 Nylock Nuts

(2) Drop-in T Nuts



## Tools

Phillips Screwdriver

3mm Hex Key

Needle Nose Pliers

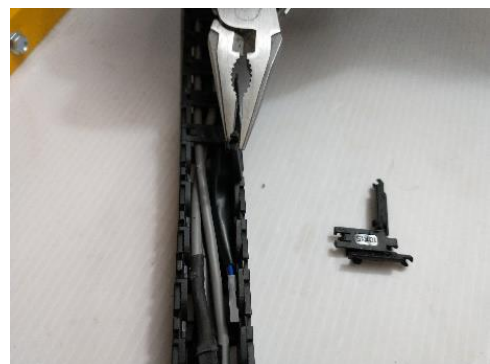


Place two drop-in t nuts in the slot on the back of the top X Extrusion.

Place a M5x8 button cap with M5 split-lock washer through the right slots on the Drag Chain Angle. Screw the button cap into the right drop-in t nut. Leave loose. Repeat the process for the second slot on the Drag Chain Angle and second t nut. Leave a couple inches between the motor side gantry end plate and the drag chain mount. Tighten screws. **You may need to readjust this position later once the entire drag chain is mounted and the X axis is traversed to its rightmost position.**

Put a M4x12 machine screw with M4 split-lock washer through the X Drag Chain Bracket and screw it into the top of the X Drag Chain Post. The X Drag Chain Bracket should be pointing straight back, as shown.

A pair of needle nose pliers can be used to open the drag chain. It may make it easier to run wires through the drag chains. If you have homing, you will want to run those wires at the same time. Open the drag chain and run the Z motor wire and the Z Homing wire through the drag chain. (scroll ahead to see the Z homing switch and wire; it is the only push button style switch). Leave yourself enough wire hanging out to install the Z homing switch. Close the drag chain.



Use a M3x8 machine screw to come up through the end of the drag chain, through the X Drag Chain Mount, and secure with a M3 nylock nut. Repeat the process with the second X Drag Chain hole.

Loop the drag chain around and rest it on the Drag Chain Angle. Use a M3x8 machine screw to come through the top of the end of the drag chain, through the slot on top of the Drag Chain Angle, and secure with a M3 nylock.

Open the second drag chain. Run the X and Z motor wires, and the X and Z Homing wires through it. Leave enough room to install the X axis homing switch in its position. (Scroll ahead to see a picture of the X switch installed in its position. The X switch is the roller snap switch with the longer paddle.) Close up the drag chain.

Place a M4 lock washer onto a M4x12 machine screw. Place the screw through the Motor Side Gantry Plate. Attach the Y Drag Chain Post to the outside of the Motor Side Gantry Plate as pictured.

Place (2) M3x16 machine screws through the beginning of the second drag chain as pictured. Finger tighten (2) M3 nylock nuts onto the ends of the screws. Slide the screws over the end of the Y Drag Chain Mount. Tighten the screws.

The drag chain travels towards the front of the machine and then loops down and to the back of the machine. The other end will attach to a zip tie mount near the electronics box.



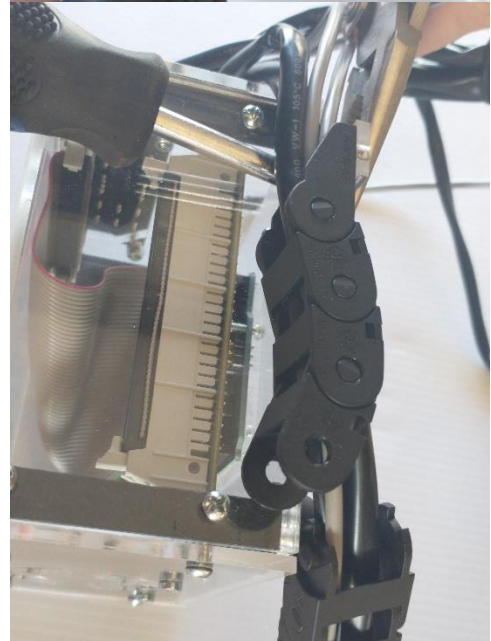
Locate the drag chain mount in the wire management kit. Remove the backing to expose the adhesive bottom. Attach the drag chain mount to the table near the back of the Carve King 2. The free end of the drag chain will attach to this point.



The control box has a slotted bracket already mounted to its underside. Mount the end of the cable chain to this using (2) M3x8 machine screws and (2) M3 nylock nuts. The head of the screw should be closest to the wires and the nut on the other side.



Note that the control box has been placed on its side to install these screws. After installing, set the control box back on its rubber feet and snap the drag chain back together.



### Carve King 2 Drag chain anchor instructions since August 15<sup>th</sup> 2021:

Locate the zip tie anchor in the wire management bag. Remove the backing to expose the adhesive. Place on the table surface near the rear of the Carve King 2. The drag chain will attach to this anchor.



Grab some zip ties from the wire management bag. Thread the zip tie through the holes on the end of the drag chain and through the zip tie anchor. Place the electronics box near the end of the drag chain.



Plug in the motor and homing wire following the instructions found further in the instruction.



# Homing Switch Installation

## Parts

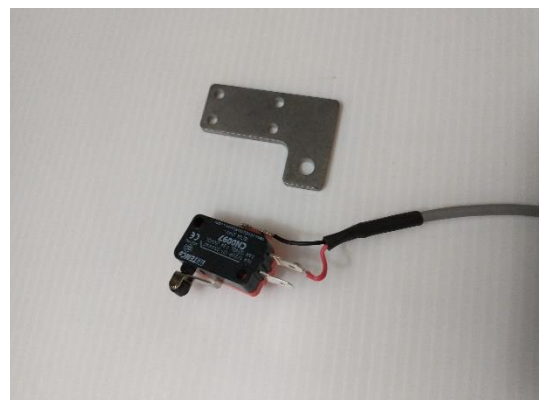
Long roller (X) Switch w/ approx. 970mm wires  
Short roller (Y) Switch w/ approx. 350mm wires  
Push button (Z) Switch w/ approx. 1640mm wires  
(2) L Bracket

## Hardware

(4) M3 x 16 Machine Screw  
(4) M3 Nylock Nut  
(1) M5x16 Machine Screw  
(1) M5x45 Machine Screw  
(1) M5x50 Bolt  
(2) M5 Split Lock Washer  
(4) 16mm (5/8") Spacer  
(1) 6.35mm (1/4") Spacer  
(1) Drop-in T Nut

## Tools

Phillips Screwdriver  
Needle Nose Pliers  
8mm or 5/16" Wrench or Socket

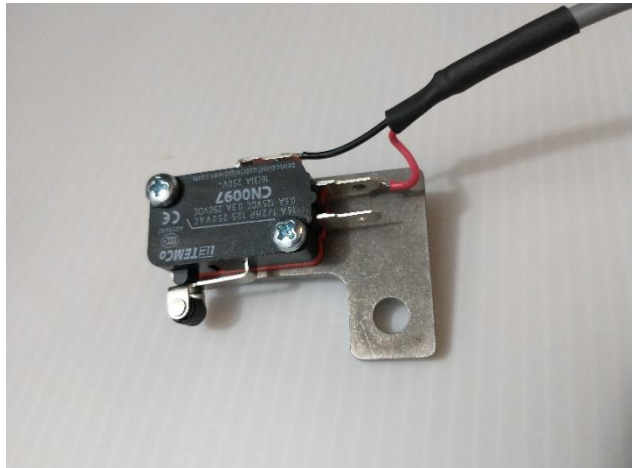


Remove the nut from the end to the Z homing switch(the only button style homing switch). Discard the lock washer. Place the Z homing switch through the hole to the left (if looking at the machine from the front) of the Z motor. Thread the nut back on the Z switch. Hold the switch in place and use some needle nose pliers to tighten the nut on the switch.

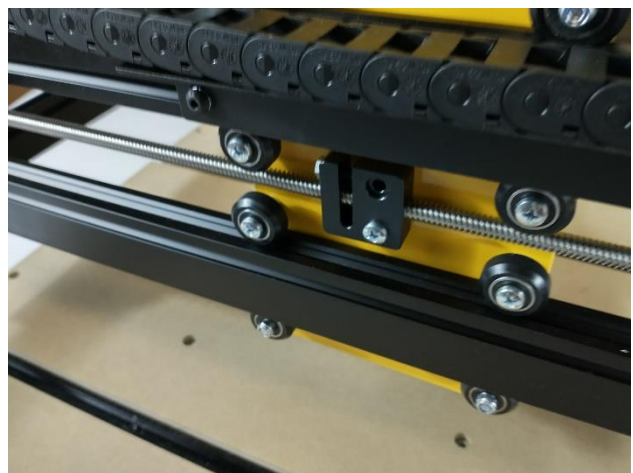


The X and Y switches will be roller switches. The **X will be the long roller** switch and the **Y will be the short roller switch**.

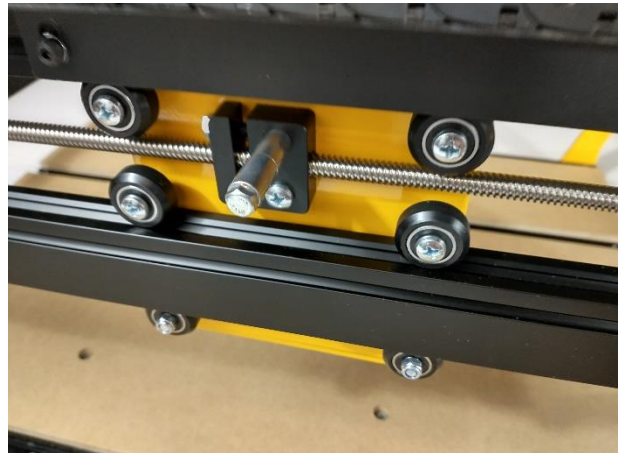
Both switches will go on the L brackets as pictured. Use (2) M3x16 machine screws, place through the holes on the black side of the homing switch, through the L bracket, and secure with (2) M3 nylock nuts. Repeat the process with the other homing switch.



Remove the top M5x16 machine screw from the anti-backlash nut on the rear of the X Plate.



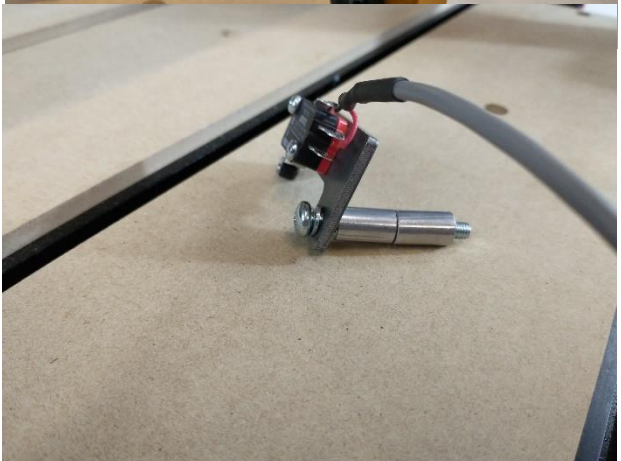
Place (2) 16mm (5/8") spacers onto the M5x50 bolt. Use the 8mm or 5/16" wrench or socket to screw the bolt into the hole that held the M5X16 machine screw in the anti-backlash nut.



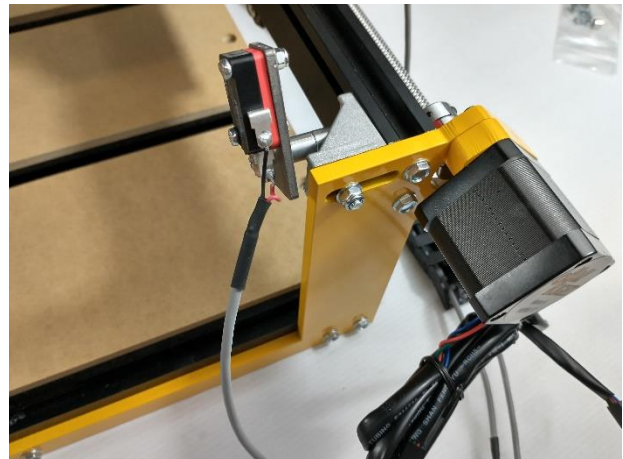
Remove the M5x10 Machine Screw and washer from the back left corner bracket where it connects to the 593mm Y rail.



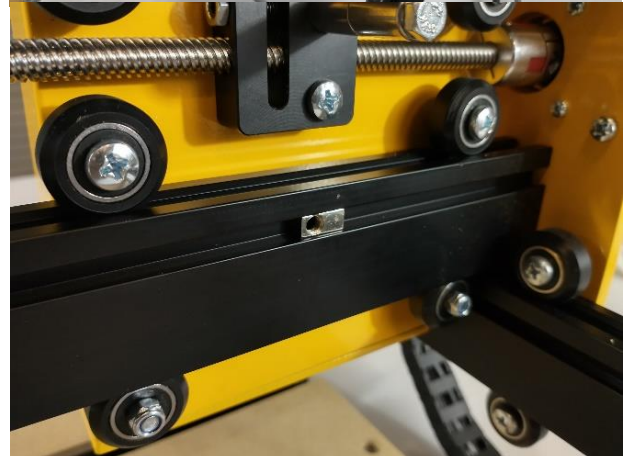
Take the M5x45 screw, place it through a M5 split-lock washer, the L Bracket with short roller switch, and 2 16mm (5/8") spacers (In that order)



Place the M5x45 Screw through the corner bracket and into the T nut that housed the M5x10 Machine screw. Angle the L Bracket so the roller switch will engage the lower 613mm Extrusion of the Gantry.



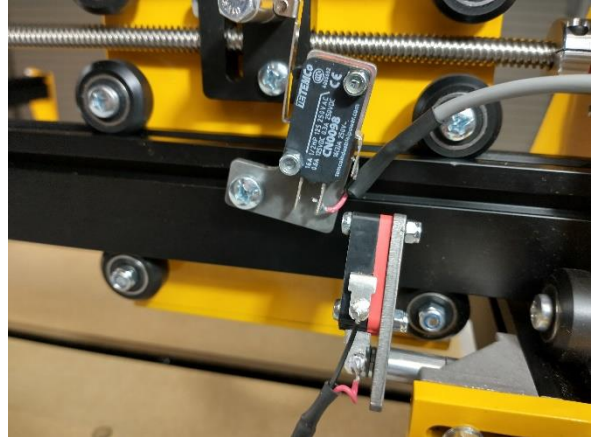
Place a drop-in t nut in the slot on the lower 613 extrusion on of the Gantry.



Place a M5 split lock washer, the L Bracket holding the long roller switch (the X homing switch), and a 6.35mm (1/4") spacer on a M5x16 machine screw. Screw that into the drop-in t nut you placed earlier. Angle the L bracket to engage the X Engager Bolt on the ant-backlash nut on the rear of the X Plate. Tighten.



The Switch should be placed where it is triggered near the end of the X travel without being in the way of the Y switch. You can use spiral wrap (described in a later step) to secure the X axis switch wire to the cables coming from the X drag chain. This will secure it up and out of the way, preventing it from fouling the Y switch.



## Plugging in Wires

### Parts

Wire management bag

### Hardware

None (all items already installed)

### Tools

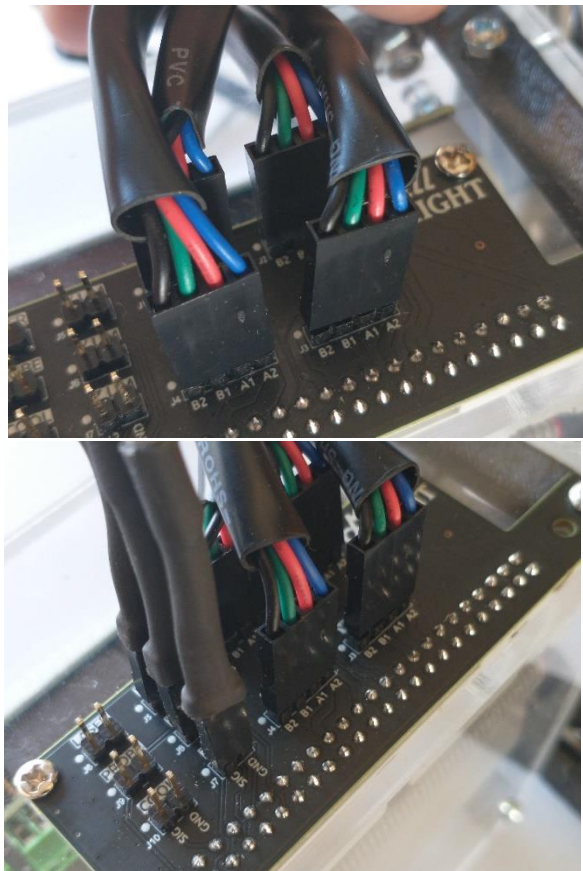
Snips to cut zip ties

Set the control box with the fan side down. Be careful not to stress the bracket holding the cable chain end that you installed previously.

**The blue wire on each motor should be closest to the MillRight logo on the interface board.** See the picture to the right.

There are ports labelled Y1 and Y2. Either Y motor can plug into either port.

The homing switches plug in next to the motor switches. You must make sure you plug the correct switch into the appropriately labelled port, but the direction does not matter on these.

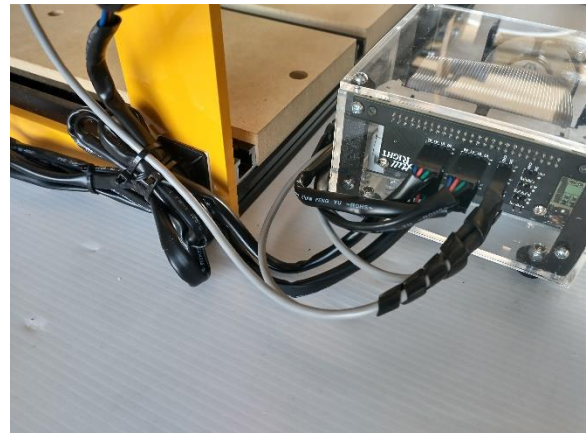


There are also ports for the laser, probe, and for a coolant output available.

Use a zip tie anchor from the wire management kit to pin the back right Y motor wire to the back of the frame.

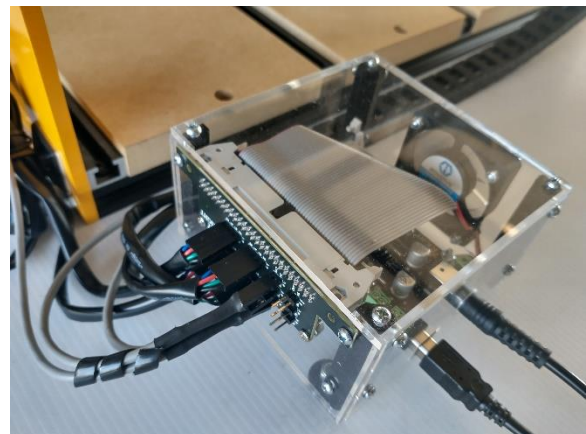


Run its wire to the back left and bundle the excess (there will be a fair amount of excess) to the back left of the frame along with excess from the back left Y motor. Secure it with zip ties and a zip tie anchor.



Note the approximate position for the control box. Also note where the USB cable and power cable plug into the control box. Power is brought to the machine simply by plugging and unplugging the power adapter barrel at this location.

You may use the spiral wrap to tidy up wires elsewhere on the machine.



# Installing the Router

## Parts

Makita Router

## Hardware

None (all items already installed)

## Tools

Phillips head screw-driver or 3mm Hex Key  
(depending on hardware type in mount)

Place the router into the mount and tighten the pinch bolt to collapse the router mount around the router body. The position of the router in the mount does not have to be exact. As depth in the mount like pictured to the right is a good starting point. This allows the router to reach the bed with most cutters while still allowing for good bed clearance when at maximum height.



Congratulations! Assembly is complete. Check out the [Quick Start Guide](#) at [www.millrightcnc.com/resources](http://www.millrightcnc.com/resources) for more information on connecting to the machine and running your first program.

Be sure to join our forum at [www.millrightcnc.proboards.com](http://www.millrightcnc.proboards.com) to connected with the CNC community and share your build.

Please take this short survey at the link below to give us feedback on the machine and the instructions:

<https://forms.gle/MThAQqKWNrtnBJYq5>