ASSEMBLY INSTRUCTIONS FOR THE MILLRIGHT CNC MEGA V XXL

Version 1.02

For additional resources, see *www.millrightcnc.com/resources*

Be sure to check the resources page for the most updated assembly instructions.

Contact support@millrightcnc.com if you have questions.

We have a big online community. Be sure to join in the discussion.
Facebook MillRight CNC Group
Facebook MillRight Mega V Group
MillRight CNC Forum at www.millrightcnc.proboards.com

Important safety rules for operating your MillRight CNC Mega V XXL:

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

The Mega V XXL is a big, heavy machine. Plan on spending a full weekend in assembly and seeking help with moving or flipping heavy assemblies.

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

V-Wheels

Parts

V-Wheel Kit

- V Wheel (12)
- 608 Bearing (24)

Hardware

V-Wheel Kit

- M8 Washer (12)

Tools

Hard Surface

Something Flat to Press Bearings

On a hard, flat surface, lay out your v-wheels. Place a 608 Bearing on top of the v-wheel. Using something flat, such as a wood board, press the bearing into the top of the v-wheel.

Flip the v-wheel over. Place a M8 washer flat on the 608 bearing inside the v-wheel. If you forget this step the bearing will not spin correctly. Correcting this will be difficult.

Place a second 608 bearing on the top of the v-wheel. Press the bearing into the v-wheel using your impromptu tool. Pinch the inner races of both bearings with your fingers and test that the v-wheel spins freely. Repeat this process with the other v-wheels and set them to the side.

Gantry End Plates

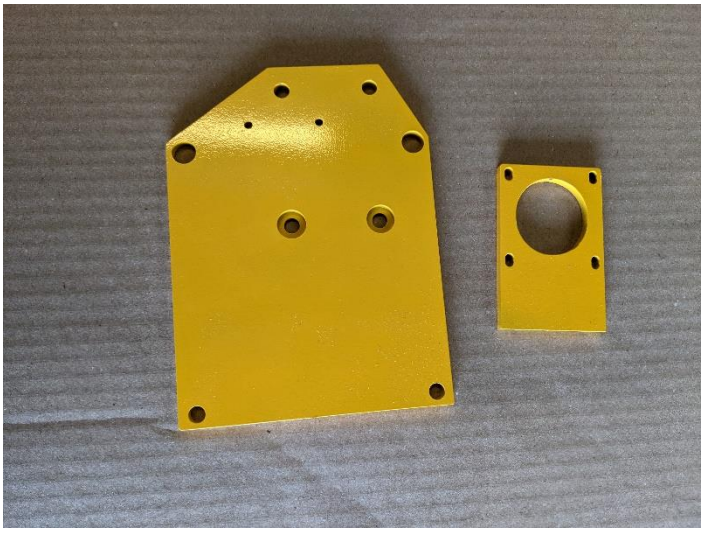
Parts

Left Gantry End Plate

Right Gantry End Plate

X/Y Motor Mount (2)

Assembled V-Wheel (4)



Hardware

M4x12 Machine Screw (4)

V-Wheel Kit

- M8x40 Machine Screw (4)
- M8 Nylock (4)
- Eccentric Spacers (4)

Tools

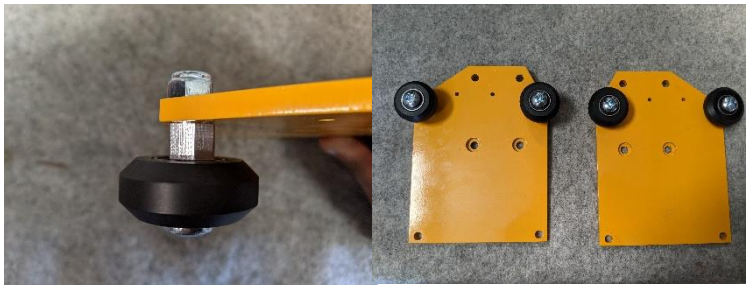
Phillips Screwdriver

Needle Nose Pliers

13mm Socket or Wrench

Locate the Right Gantry End Plate (pictured above). Place eccentric spacers in the large holes on the top of the Right Gantry End Plate. The recessed pockets should be face up. Place a v-wheel on a M8x40 machine screw. Spinning the v-wheel on the screw will help align the washer allowing wheel to seat on the screw. Insert the M8x40 Machine screw through the eccentric spacer and secure with a M8 Nylock. Snug the v-wheel to the plate. Repeat the process on the other side of the Right Gantry End Plate.

Repeat the Process with the Left Gantry End Plate. The recessed pockets on the plate should be face up.



Locate a XY Motor Mount. The mount will be installed on the same side of the Gantry End Plates as the v-wheels. Place (2) M4x12 machine screws through the back of the Gantry End Plate (opposite the v-wheels) using the two small holes located between the v-wheels and install the motor mount. Repeat the process on the other Gantry End Plate. Place both to the side.

Z Plate

Parts

Z Plate

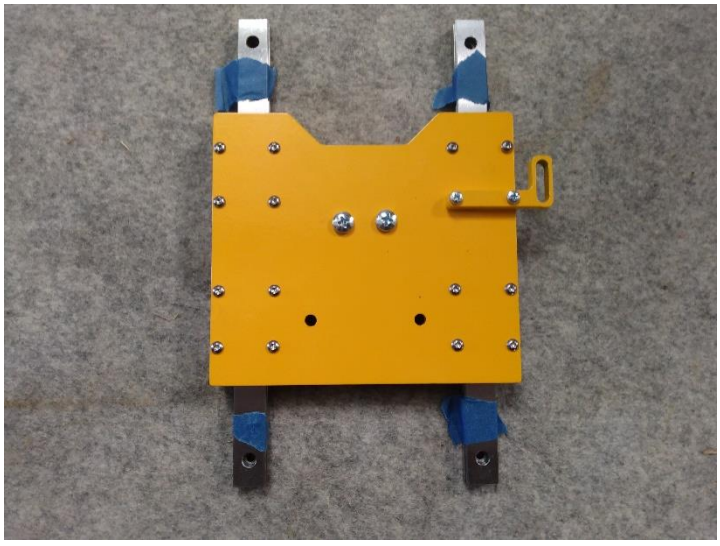
Z Engager Bracket

Router Mount with Hardware

Anti Backlash Nut with Hardware

Z Rail and Bearings (2)(Box 3 inside of

Single wrapped 1465 extrusion)



Hardware

M3x10 Button Cap (14)

M3x16 Machine Screw (2)

M5x20 Machine Screw (2)

Tools

2mm Hex Key

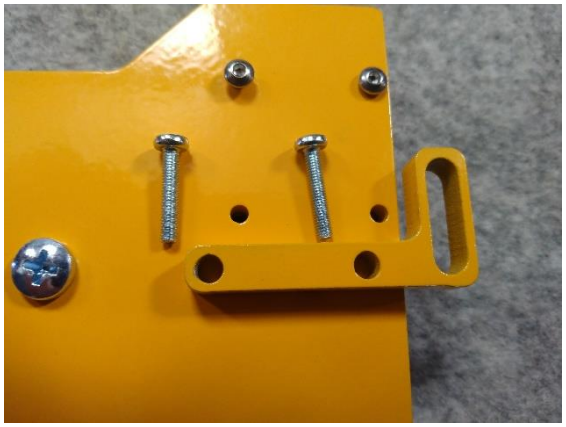
2.5mm Hex Key

3mm Hex Key

Phillips Screwdriver

Masking/Painters Tape

Locate the anti-backlash nut (ABN). The ABN will come with (2) M5 nylock nuts, a M5 grub screw, and a M5 jam nut in the bag. Push the nylocks into the hexagonal holes on the face of the ABN with the nylon facing up. Screw the grub screw into the top of the ABN until it touches the bottom. Cap the grub screw with the M5 jam nut. Place the ABN on the Z Plate and secure using the M5x20 machine screws. Leave loose. Make sure the nylocks can be seen.



Locate the z rails with bearings. Please proceed with caution as the ball bearings can be ejected from the block if the bearings are slid off the rails. The rails will have plastic or rubber blocks to keep the bearings from sliding off. Leave them in place until told to remove them. If the blocks are not present, **or for extra assurance** tape both ends of the rails to keep the bearings from sliding off. Place the z rails on a flat surface with the bearings face up.

Place the Z Plate on top of the bearings lining up the bearings with the 4-hole groups on the corners of the Z Plate. The ABN should be on the same side of the Z Plate as the bearings. Secure the Z Plate to the bearings using the M3x10 button cap screws. Leave loose. The bottom 2 holes of the top right 4-hole group will now get M3x10 button cap hardware. Locate the Z Engager bracket. Secure the bracket to the Z Plate with M3x16 machine screws using the two remaining holes on the top right of the Z Plate. Leave loose.

Locate your router mount. The router mount will have hardware preinstalled. Remove the 2 button cap screws and washers on the back of the router mount. Carefully turn the Z Plate on its side making sure the bearings stay on the rails. Place the screws with washer through the back of the plate using the 2 remaining holes. Attach the router to the Z Plate and tighten the router mount screws. Place your Z Plate to the side.

X Plate

Parts

X Plate

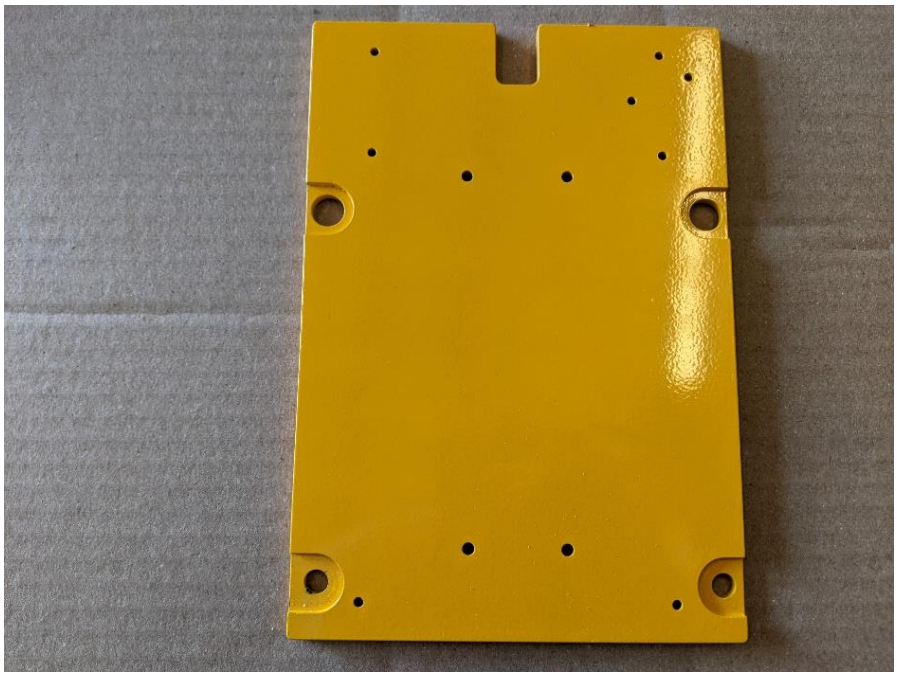
Z Motor Mount

Screw Seat Plate

UHMW Screw Seat

178mm Lead Screw

Assembled V-Wheel (4)



Hardware

M5x16 Machine Screws (2)

M5 Nylock Nut (2)

M4x12 Machine Screw (4)

M4 Split Lock Washer (4)

M3x16 Machine Screw (6)

M3 Nylock Nut (6)

V-Wheel Kit

- Eccentric Spacers (2)
- Standard Spacers (2)
- M8x40 Machine Screw (4)
- M8 Nylock (4)

Tools

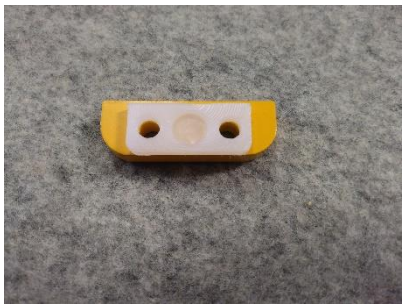
Phillips Screw Driver

Needle Nose Pliers

8mm Socket or Wrench

10mm Socket or Wrench

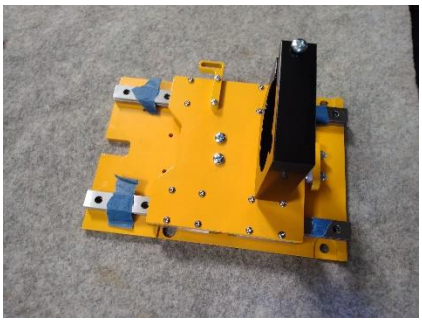
Locate your z screw seat plate and UHMW screw seat. Place the UHMW screw seat on top of the screw seat plate. Make sure the pocket of the UHMW screw seat is facing up as shown.



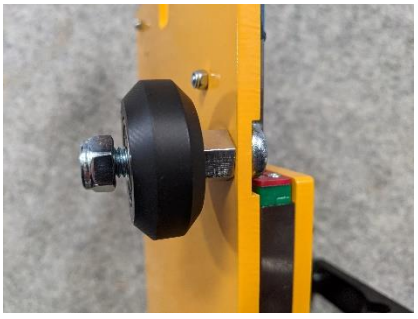
Secure the UHMW screw seat to the screw seat plate using (2) M5x16 Machine screws and (2) M5 nylock nuts. Do not over tighten or you may deform the UHMW screw seat.

The front of the X Plate is the face with the recessed pockets. The top of the X Plate is the section with the "U" cutout, as shown above. Place the screw seat plate on the X Plate near the bottom, center set of holes. Make sure the UHMW screw seat is pointing towards the top of the X Plate. Place a M4 split lock washer on (2) M4x12 machine screw and insert the screws through the back of the X Plate to secure the screw seat plate to the X Plate.

Place the Z Plate on the front of the X Plate. Line up the holes on the z rails with the (3) holes on each side of the X Plate. (2) holes on the top on each side and (1) hole on the bottom on each side. Carefully remove the top bearing block or tape on both rails. Insert a M3x16 machine screw in the top hole on both rails and finger tighten a M3 nylock. Repeat the process with the second set. Carefully remove the bearing block or tape from the bottom of the z rails. Insert a M3x16 machine screw in the bottom hole on both rails and finger tighten a M3 nylock.

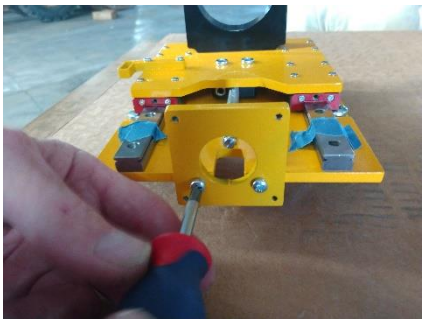


Prop the X Plate on its bottom using the router mount. Place eccentric spacers in the top, large holes on the back of the X Plate. Insert M8x40 machine screws into the large holes in the front of the X Plate and through the eccentric spacers. Place an assembled v-wheels on the M8x40 machine screw and secure with a M8 nylock nut.



Place (2) M8x40 machine screws in the large holes in the front of the X Plate at the bottom. Place standard spacers on the M8x40 screws, assembled v-wheels, and secure with a M8 nylock nut.

Thread the 178mm lead screw into the ABN. Locate the z motor mount. Using (2) M4x12 machine screws with M4 split lock washers, attach the z motor mount to the top of the X Plate.



Z Motor and X Motor Mount Installation

Parts

3675mm Motor

Coupler

X/Y Motor Mount

Hardware

6.35mm Spacer (4)

M4x16 Machine Screw (4)

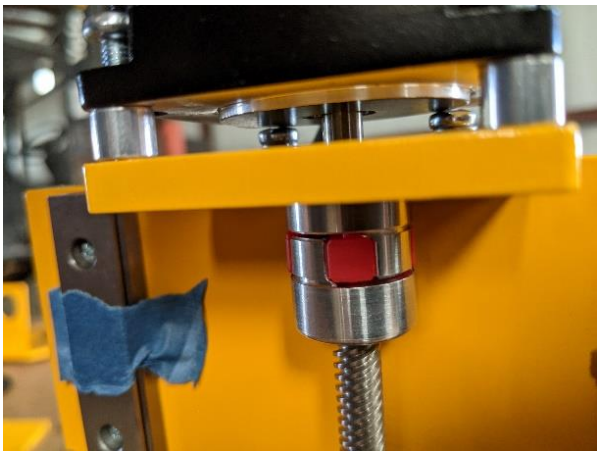
M4x12 Machine Screw (2)

Tools

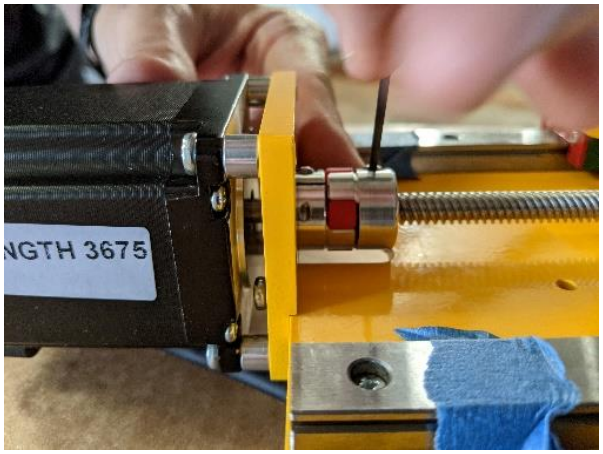
Phillips Screw Driver

Locate one 3675mm Motor and coupler. Place the coupler on the 178mm lead screw, allowing it to sit fully on the lead screw. Place 6.35mm spacers (4) on the mounting holes of the z motor mount. Place the 3675mm motor with the motor wire positioned to the back of the X/Z assembly, opposite of the router mount, onto the

spacers with the shaft in the top of the coupler. Secure the Z motor with (4) M4x16 machine screws going first through the motor, through the spacers, and into the Z motor mount.



Using a 2mm hex key, tighten the bottom screw of the coupler. This will connect the coupler to the lead screw. Make sure the lead screw is fully engaged with UHMW screw seat and apply light downward pressure. Tighten the top screw on the coupler. This will attach the coupler to the motor shaft.



Locate the X/Y motor mount and lower the Z Plate to expose the two holes near the center top of the X Plate. Place a M4 split lock washer on (2) M4x12 machine screws. Insert the screws through the front of the X Plate and attach the X/Y motor mount to the back of the X Plate.

X Extrusion

Parts

1450 Mega V Extrusion w/Logo (Box 2)

Gear Rack (1)(Box 2)

Drag Chain Supports (2)(Box 1)

Hardware

Large T Nut (14)

M5x12 Button Cap (6)

M5x20 Button Cap (8)

M5 Lock Washers (6)

5/16 x 3/4 Button Cap (8)

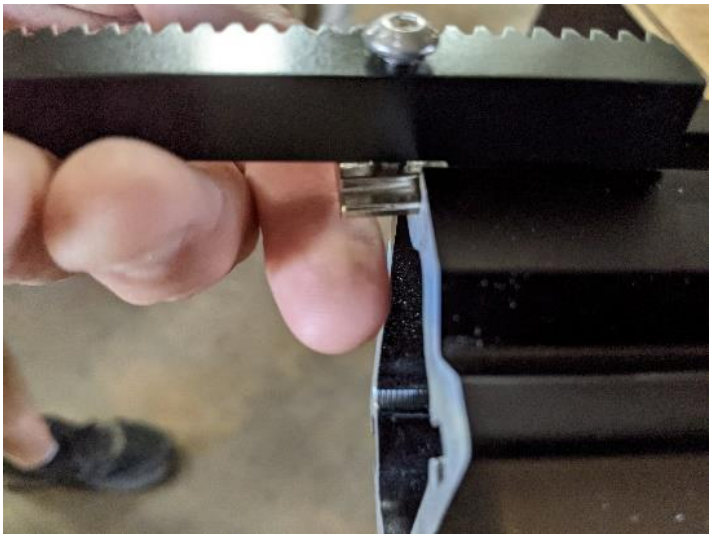
Tools

Phillips Screw Driver

3/16 Hex Key

3mm Hex Key

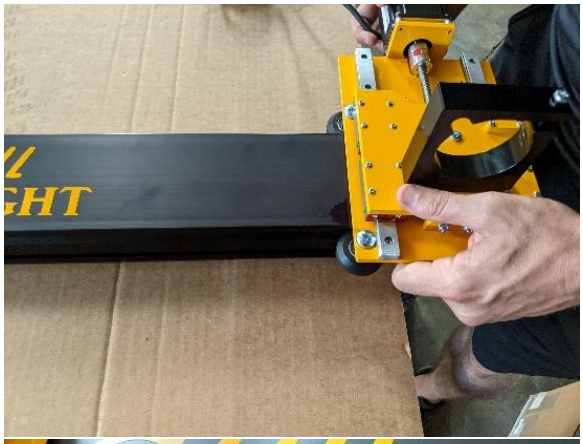
13mm Wrench



Get one section of gear rack. Place (8) M5x20 Button cap screw through the holes of the gear rack keeping the screw uniform. Spin a large t nut a few turns on each screw. Leave the t nuts loose.

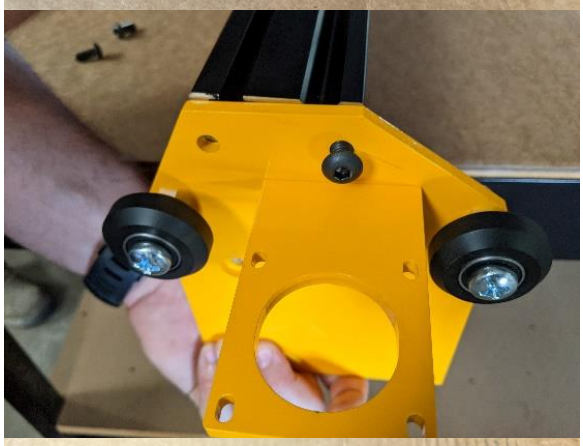
Slide the t nuts into the top of the Mega V extrusion with the gear rack teeth pointing towards the back of the extrusion. The Logo is on the front of the extrusion. Leave the rack loose.

Retrieve the x/z assembly. The v-wheels will pinch the outside of the Mega V extrusion using the v shaped slots on the top and bottom. If the v-wheels are too tight to slide on the extrusion, use a 10mm wrench to turn the eccentrics until the assembly slides onto the extrusion.



Slide (6) large t nuts into the bottom slot of the Mega V extrusion.

Retrieve the left end plate. On the left side of the extrusion, use 5/16 x 3/4 button cap screws to attach the left end plate to the extrusion. Repeat the process on the right side with the right end plate.



Tilt the gantry forward to gain access to the bottom. Using (6) M5x12 button cap with M5 split-lock washers and the already installed large t nuts, attach (2) drag chain supports. The drag chain supports need to be positioned on the right side of the gantry as seen from the front with the slotted ends pointed out towards the end plates. Leave loose. Please be careful not to bend the drag chain mounts. Set the gantry to the side.

Subframe Assembly

Parts

1465mm long extrusions (4)

1450mm long extrusions (2)

Gussets (4)

Foot Plates (4)

Leveling Feet (4)

Hardware

Inside corner joiners (16)

M5x8 Machine Screws (16)

Drop-in T Nuts (16)

5/16x3/4” Screws (8)

Tools

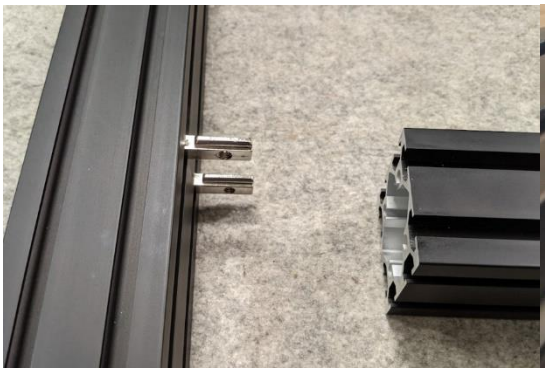
Phillips Screw Driver

3mm Hex Key

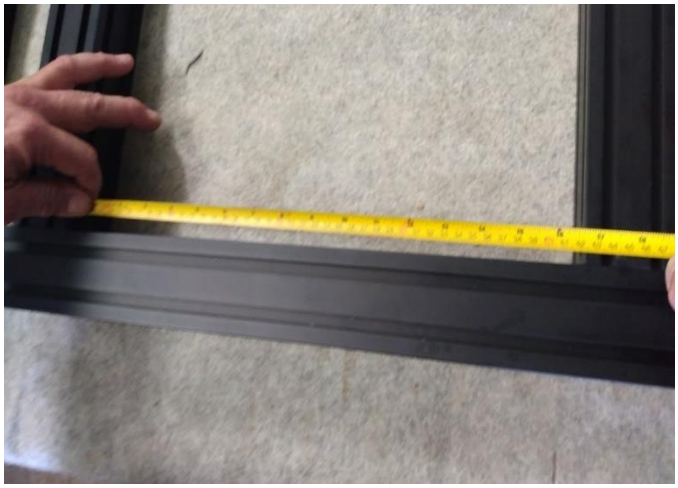
3/16 Hex Key

The subframe has 1465mm extrusion (crossmembers) running left to right with 1450mm extrusion running front to back. The 1465mm crossmembers will receive corner joiners and slide into the 1450mm (left and right) extrusion pieces.

Slide the inside joiners into place on the 1450mm extrusions and then slide the crossmembers onto them as shown. Note that the inside joiners will only allow the pieces to set flush when inserted one way. There are set screws (included in the bag with the corner joiners) that hold the joiners in position.



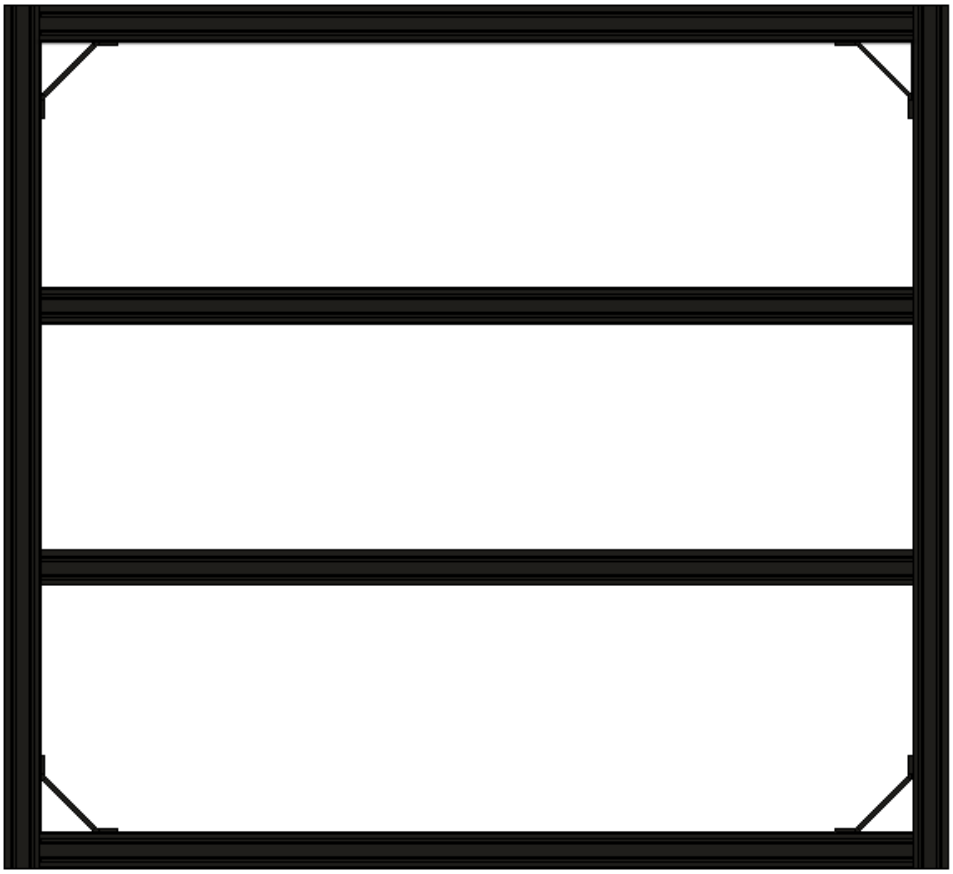
The edge of the frontmost crossmember should be about 422 millimeters from the edge of the “middle-front” crossmember. The four crossmembers are **NOT** placed equidistant from one another. Placing them with the spacing described will allow you to use the bed design file that we have provided. Use a square, if available, to set the 1465mm crossmembers square to the 1450mm extrusions. Also, make sure the front and rear 1465mm crossmembers are flush with the edges of the 1450mm extrusions.



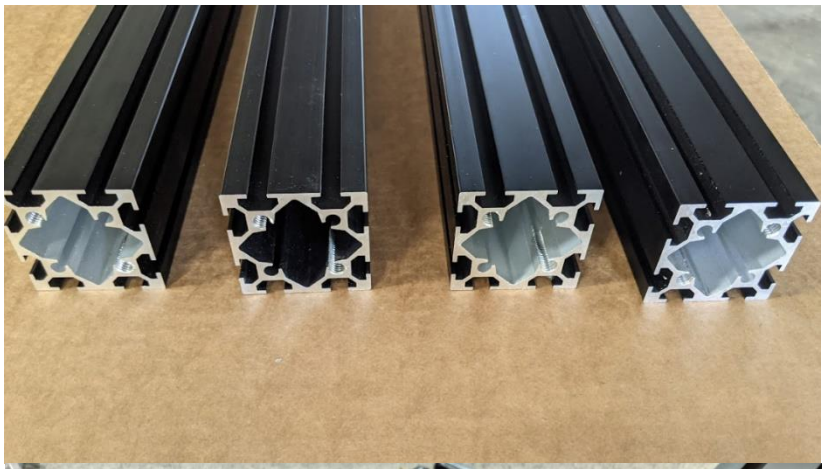
Place four gussets in the inside four corners of the frame you just created. Put the gusset into position and take note of where the holes are. Pull the gusset away and put drop in T nuts there.

Secure it with M5x8 machine screws. Blue thread locker is recommended.

Once completed, your frame should look similar to the picture shown below.



Leg installation



Parts

Gussets (16)

760mm Leg Extrusions (4)

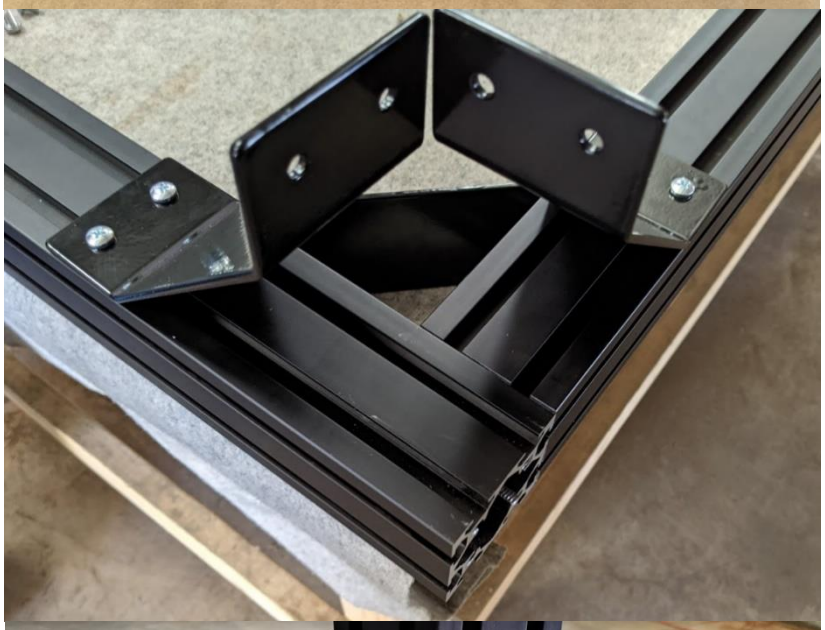
(2) 1330mm extrusions (2)

Hardware

Inside corner joiners (16)

M5x8 Machine Screws (64)

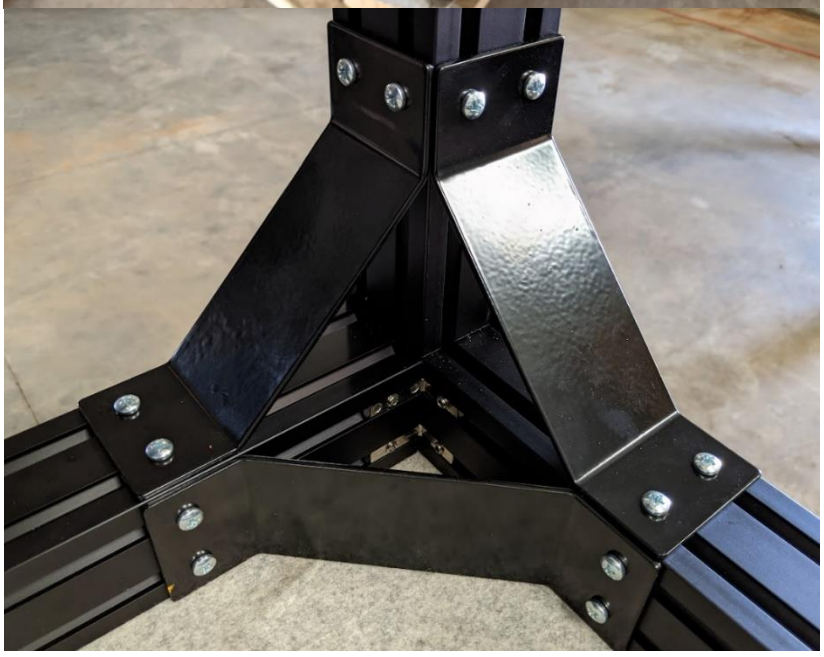
Drop-in T Nuts (64)



Tools

Phillips Screw Driver

Note that one side of these leg extrusions has two threaded holes. When you install these, the tapped holes should be **away** from the frame you just built.



Gather 8 more gussets. Loosely install them (just finger tight on the screws) to the frame assembly you just completed such that they'll rest on the sides of the legs.

Position one of the legs (remember, with the tapped holes facing UP and away from the frame assembly against the gussets. Slide drop-in T nuts into the legs and secure the gussets with M5x8 machine screws. Make sure the leg flushes up to the edges of the frame. It will take some adjusting, loosening, and re-tightening to get it right. Once correct, tighten all to final torque. Repeat this for all four legs.

Gather 8 more gussets. Position them as shown on the legs. The exact height of the top flange of the gusset is not critical so long as all eight are at the same height, but we recommend around 430mm. This step will be easiest if you use one or two sections of wood or other material that are about this length.

Gather (2) 1330mm extrusions and (8) inside corner joiners. Place the inside corner joiners into the ends of the 1330mm extrusions as shown below.

If you made spacing blocks, leave them in place as you slide the corner joiners you already placed in the 1330mm extrusion down into the leg pieces.

Add drop in T nuts and secure the gussets to the 1330mm extrusions with M5x8 screws. Do this for both 1330mm extrusions.

Your frame assembly should now look like the below picture.

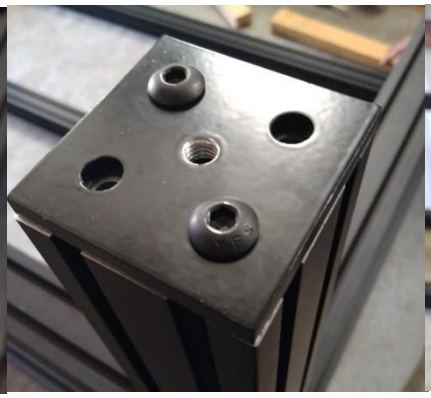
Gather the remaining (2) 1450mm extrusions and install those the same way you did the 1330 extrusions. Start by installing the inside corner joiners on the ends of the 1450mm extrusion, then slide them down into the legs.

Using positioning blocks can be helpful here as well to make sure you have the 1450mm and the 1330mm extrusions on the same plane.

Add drop in T nuts to the 1450mm extrusion, secure the gussets to them using M5x8 machine screws, and put a final torque on the inside corner joiners.

As mentioned previously, the legs should be installed such that the two threaded holes are exposed (facing up).

Gather the (4) foot plates, (4) leveling feet, and (8) 5/16x3/4” screws. Take note of the position of the threaded holes, then secure the foot plates onto the end of the legs. Do this for all four legs. Then thread the leveling feet down into the center hole of the foot plate.


Enlist a couple of helpers, such as neighbors who will be jealous of your MillRight CNC Mega V XXL and want to buy one too, to assist you in flipping the frame assembly right-side-up. Once flipped over, your frame should look like the picture. Don’t be concerned yet about adjusting the leveling feet.

Y Bearing Rail Construction

Parts

Gear Rack (2)

Mega V Extrusions (2)

Y end plates (4)

Hardware

M4x12 Button Cap Screws (8)

M5x20 Button Cap Screws (16)

Drop-in T Nuts (8)

Large T Nuts (16)

5/16x3/4” Button Cap Screws (32)

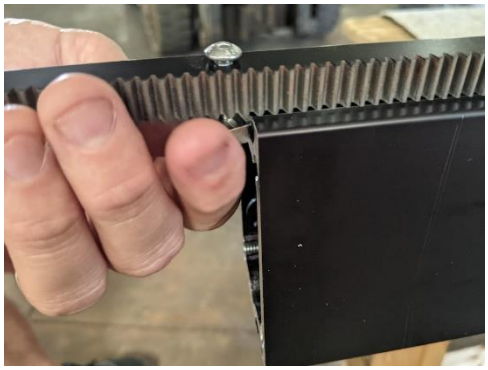
Tools

3mm Hex Key

3/16 Hex Key

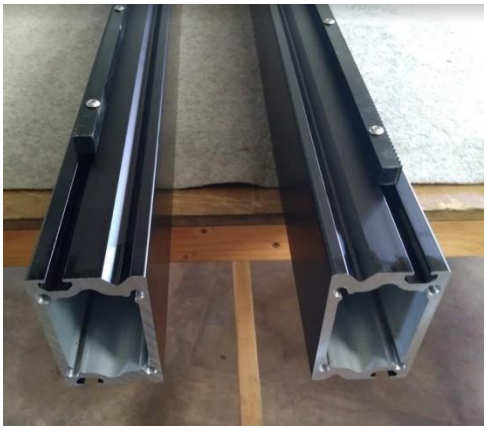
Phillips Screw Driver

13mm Wrench



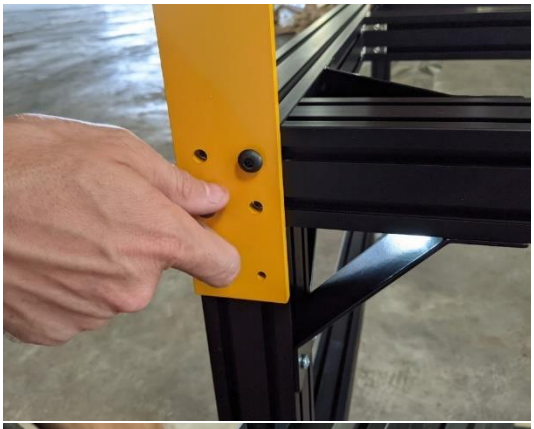
Take note that your drag chains are stuffed inside of these extrusions. **Do not proceed until you pull them from these extrusions.**

Using slide in T nuts and M5x20 button cap screws, install the remaining two gear racks onto the remaining two 1450mm Mega V extrusions.



Put the M5x20 button caps through the holes in the gear rack, then spin on the slide in T nuts a couple of turns. Slide them into the tracks in the extrusion, just as you did on the gantry rail. **Make sure the teeth face to the outside of the extrusion.** Don’t worry about the exact position of the gear rack yet. You will adjust these at a later step. Just tighten down a couple of screws now to keep the rack from sliding.

Install the (4) Y end plates onto the ends of the 1450mm 6060 extrusion using 5/16x3/4” screws and shown. Use (4) of these screws for each plate. Do **not** tighten them down yet or it will make the next step more difficult.



Install the Y bearing rails onto these plates. Use a helper or appropriately sized spacer block to support one end while you position the other end to match up with the holes in the Y end plate.

You must install these so that the gear rack you already installed are on top and the teeth are facing OUTBOUND. See the bottom right picture.

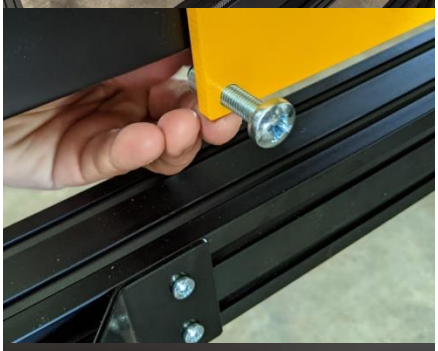
Thread a couple 5/16x3/4” button cap screws into each one to secure them in place. Once you get good thread engagement, do the same on the other side of the rail.

Spend some time making sure everything is straight, then tighten all the 5/16x3/4” button cap screws.

Place the gantry on top of the Y rails. **The gantry is heavy, and the X Plate can roll over your fingers or off the gantry if you tilt the rail. If you don't feel comfortable lifting this heavy assembly by yourself, get a friend to assist you.**

At this point, the frame assembly has no front or back. The front will be designated once you place the gantry rail. Place the gantry onto the frame assembly from either side by laying the V wheels into the V grooves in the Y extrusions.

It should roll with little effort once installed. If not, you may need to make some positional adjustments to the Y end plates as there is some free fitment within the holes of those plates.

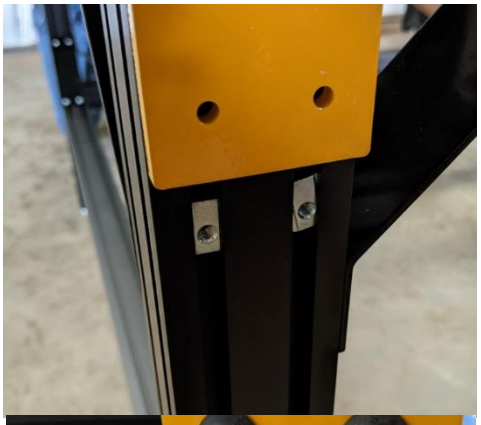


Intall the bottom (4) V wheels into the gantry end plates. This step will secure the gantry to the Y bearing rails. Slide an M8 machine screw from the V Wheel Kit into the bottom holes of gantry end plate, then place a spacer onto the threads. Don't push the screw all the way in yet.

Place a V wheel into the bottom V groove of the Y bearing rails, then begin to push the M8 machine screw further in. **It will probably help you get the bottom V wheels in if you loosen the M8 nuts and M8 screws on the top V wheels.**

If the screw won't slide in the bottom V wheel, it may be catching on the M8 washer that is between the V wheels. A small screwdriver can be used to help move this out of the way as you push the M8 machine screw all the way through. Once through, secure it with an M8 nylock nut from the V Wheel Kit and retighten the top V wheels if you loosened them. Do this for all four of the bottom V Wheels. After this, the gantry is secured to the frame. It should still roll with reasonable push or pull force placed on the center of the gantry rail. If not, you may need to turn the eccentric spacers on the top V wheels to remove tension, or you may need to adjust the Y end plates.

When all is adjusted, fasten the Y end plates to the legs using drop in T nuts and M5x12 button cap screws. Place the drop in T nuts into the legs, then push them up to the holes using a zip tie (from the wire management bag), a screwdriver, or something similar.



Place the M5x12 button cap screws through the holes and tighten the Y End Plate to the leg by fastening into the Drop-in T Nuts.

Pinion Gear and Motor Installation

Parts

Motors, Length 3675 (2)

Motors, Length 2550 (1)

Pinion Gear Set (Contains 3 pinion gears and 6 set screws)

Hardware

M4x16 Machine Screws (10)

M4 Nylock Nuts (10)

Tools

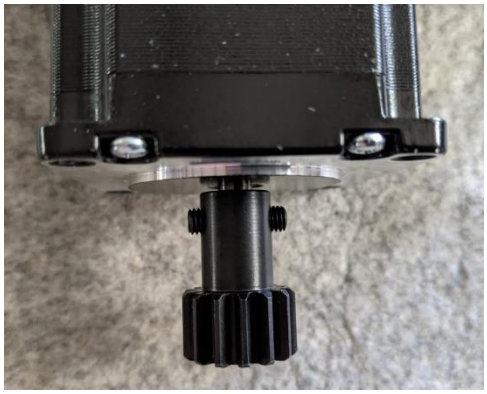
2.5mm Hex Key

Needle Nose Pliers

Philips Head Screwdriver

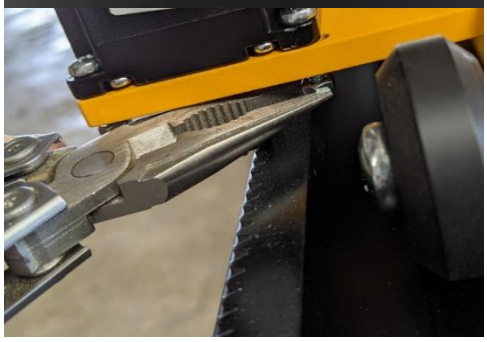
Slide a pinion gear over each motor shaft and install the set screws that come in the pinion gear bag. Notice that the motor shafts all have a flat side. **Be sure that one of the set screws is on the flat portion of the motor shaft. The pinion gear should be installed almost all the way down the shaft. If you don't place it far enough down the shaft, the top of the gear will drag on the Y extrusion when installed.**

Take note of what side is the front of the machine. The side of the gantry with the MillRight sticker is the front. **As viewed from the front, the left side of the gantry gets a "Length 3675" motor and the right side gets a "Length 2550" Motor. The X Plate gets a "Length 3675" motor. Notice where the cable exits each motor. The Left Y motors should be installed so the cable exits towards the gantry, the right Y motor should be installed so the cable faces the rear, and the X motor should be installed so the cable exits to the left.**



Place each motor into its respective motor mount and get them "snug but adjustable" with M4x16 machine screws and M4 nylock nuts.

It's easiest to use needle nose pliers to hold the M4 nylock nuts as you screw in the M4x16 screws. One motor mounting hole for the X axis and one motor mounting hole on the right Y axis motor will instead receive an M4x20 screw that you will install later for the purpose of attaching drag chain. **Reference the pictures on pages 27 and 28 to see which holes will receive those screws. You can mount these motors with just three screws for now**.



The left Y motor will use (4) M4x16 and (4) M4 nylock nuts now because it does not have a drag chain that will we attached.

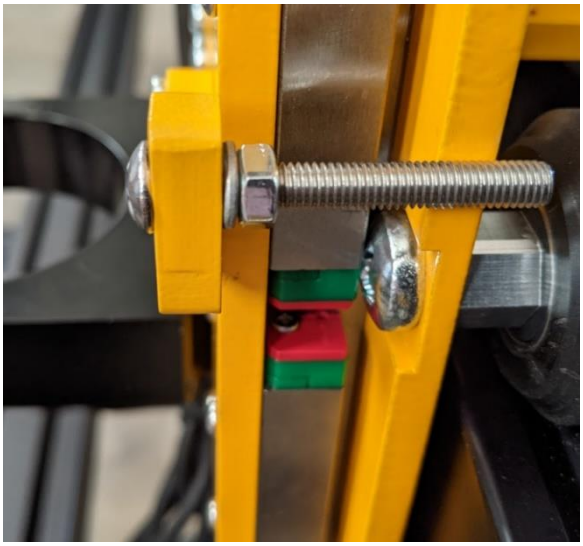
Homing Switch Installation

Parts

Homing Kit Includes Everything Needed

Hardware

Homing Kit Includes Everything Needed



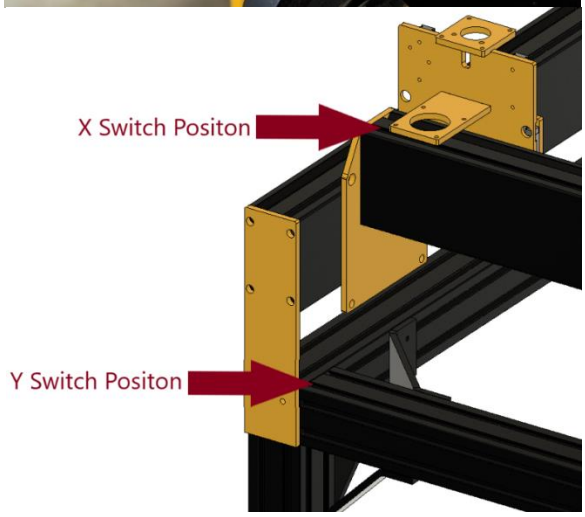
Install the Z Switch Engagement Stud into the Stud bracket on the Z axis. Put the M5x35 button cap screw through the stud bracket, then slide on an M5 split-lock screw and a regular M5 nut (not a nylock nut). Notice that the stud bracket is slotted so you can adjust the engagement position later.

Then gather the long paddle switch, (2) M3x20 machine screws, and (2) M3 nylock nuts. Install the Z switch onto the back of the X Plate as shown.

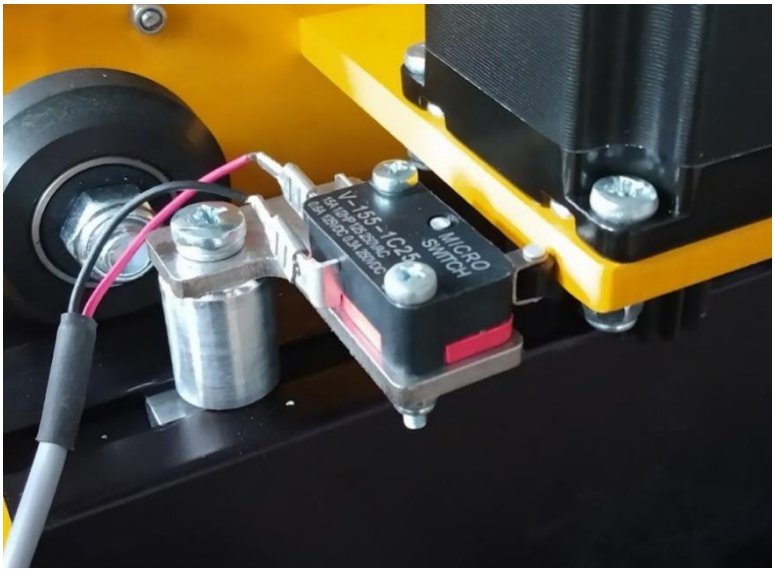
Slide the small black extender piece onto the paddle of the switch and secure it in place by threading an M3x8 machine screw into the plastic.

You can now spin the coupler on the Z axis motor with your thumb to observe where the switch will engage. Listen for a click from the switch to indicate it has engaged. Adjust the set screw as desired. Note that you may want to reexamine this position after you install your router, as it can collide with the Z motor mount before the switch engages if installed too high.

See the graphic to the right that illustrates the position of the X and Y homing switches that you are about to install. This graphic is looking at the machine **from the back. The Mega V XXL homes up in Z, to the back in Y, and to the right in X.**

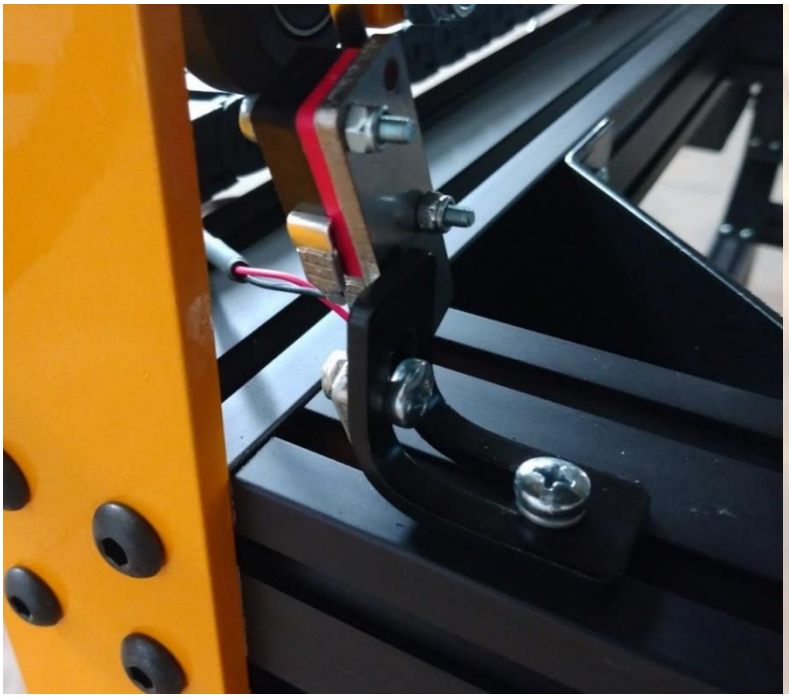


Place a drop in T nut into the right side of the gantry rail. Set the homing spacer in place, the L bracket on top of it, and secure it with an M5 split lock washer and M5x30 machine screw.



Install the short roller switch onto the L bracket with (2) M3x20 screws and (2) M3 nylock nuts. This switch is engaged by the X motor mount during homing operations.

The Y switch is placed at the back right of the machine. It uses the roller switch with the longer paddle to make contact with the back side of the Right Gantry End Plate. Start by inserting a drop-in T nut into the rear most slot of the rear crossmember. Secure the slotted 90 degree bracket into this drop-in nut using an M5x12 machine screw and M5 split-lock washer. Mount the long roller switch onto the flat L bracket using (2) M3x20 machine screws and (2) M3 nylock nuts. Finally, install the L bracket onto the slotted 90 degree bracket using an M5x12 machine screw and M5 nylock nut. See the pictures to make sure you get the orientation correct.



Router Installation

Parts

Router

Hardware

Already in place

Loosen the pinch bolt in the router mount and slide the router into the opening of the mount. The mounts are machined very close to the size of the router body. Depending on the amount of powder coat accumulated in the opening, you may have to use a flathead screwdriver to gently pry the opening as you wiggle the router into position. Note the depth to which the router is installed in the mount in the picture below. The cable should exit the router as shown. There is no "exact position of the router in the mount as some users will want more tool clearance over the part while other users will want it lower. It can be too shallow, however, which can cause the top of the router to hit the Z motor mount.

Drag Chain Installation and Cable Routing

Parts
Drag Chains (2)
Homing Switch Wires (from homing kit)

Hardware
Zip Ties (as needed from cable management bag)
M4x12 Machine Screw (2)
M4x20 Machine Screw (2)
M4 Nylock Nuts (4)
Drop-in T Nuts (8)
M5x8 Machine Screws (5)
M5 Split-Lock Washers (3)
M5x12 Button Cap Screws (3)

The drag chains were snapped in half when stuffed into the voids of your extrusions. They can be snapped back together. The longer drag chain is for the X and the shorter is for the Y. The drag chain carries the wires along with the moving assemblies and rests on top of the drag chain supports. The chains can be snapped open to allow you to lay the cables into position within the chain. Study how the cable chain flexes for a moment and think of that in relation to how the machine moves. **You may need to snap a few links off your drag chain if the length is excessive.**

Wires	Cable Routing
X Switch Wires	Runs in Y drag chain only
Y Switch Wires	Runs along right 1450mm subframe rail
Z Switch Wires	Runs in X drag chain, then runs in Y drag chain
X Motor Wires	Runs in X drag chain, then runs in Y drag chain
Left Y Motor Wires	Zip tie to X drag chain support, then runs in Y drag chain
Right Y Motor Wires	Runs in Y drag chain only
Z Motor Wires	Runs in X drag chain, then runs in Y drag chain
Router Wires	Runs in X drag chain. If ran into Y, must exit at plug

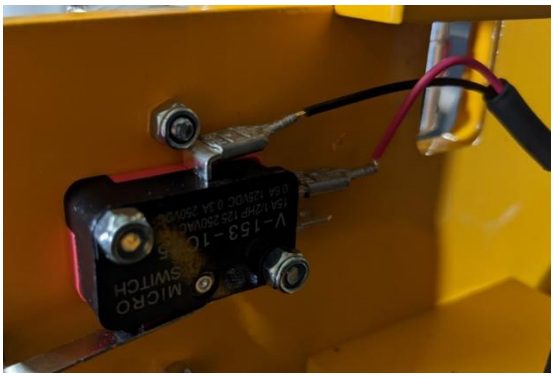
PRO TIP: MARK YOUR CONNECTORS BEFORE PUTTING THEM IN THE DRAG CHAINS. YOU'LL HAVE A REALLY HARD TIME AT START-UP IF YOU DIDN'T MARK THEM AND ACCIDENTALLY CROSS YOUR WIRES AT THE CONTROL BOX.

Start by zip tying your Y motor cable to the drag chain supports you previously installed on the gantry rail. Notice in the picture how the wire is pulled down to run along the gantry end plate, then moves over towards the drag chain support.

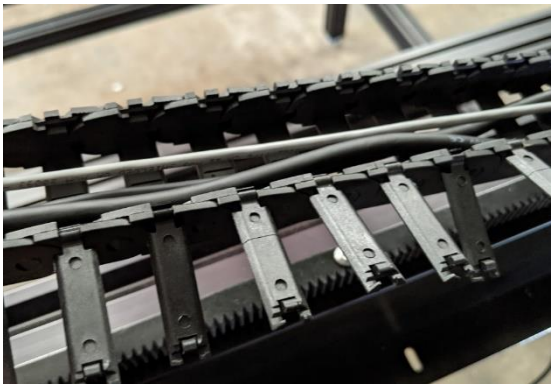
Install the X drag chain (the longer of the two drag chains) first by installing one end to the X motor mount using an M4x20 machine screw and M4 nylock nut.

Secure the opposite end to the drag chain support using an M4x12 machine screw and M4 nylock nut.

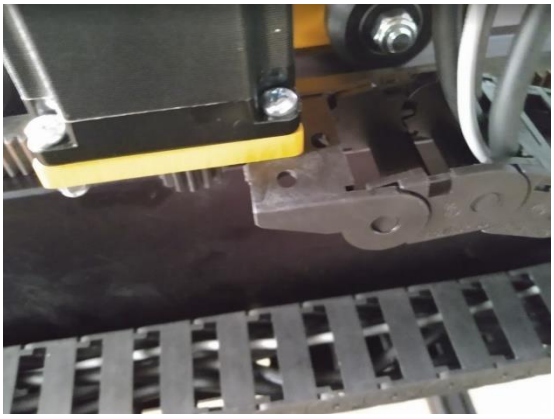
Attach the Z switch wires onto the Z axis homing switch. The Z uses the connector with just a single wire pair and is the longest wire set in the homing switch. The black wire goes onto the terminal on the side while the red wire goes onto the bottom terminal nearest to where the black wire is installed.



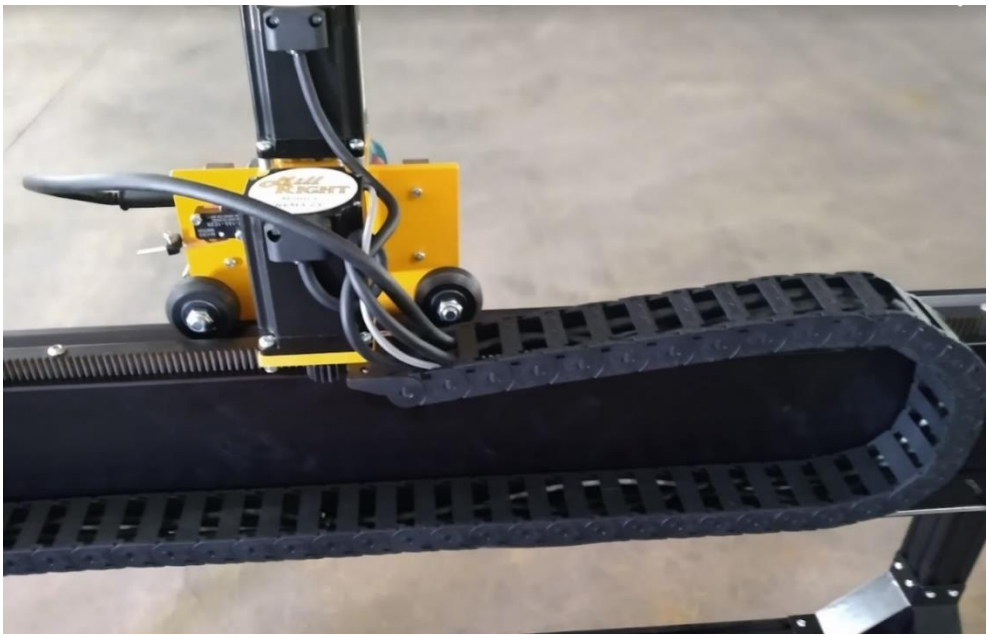
Use needle nose pliers to slide the connector onto the terminal. If for some reason you must slide it back off, pull it by the connector and not by the wire.



Begin running the wire through the X drag chain. The router wire, X motor wire, Z motor wire, and Z switch wire will run through this drag chain.



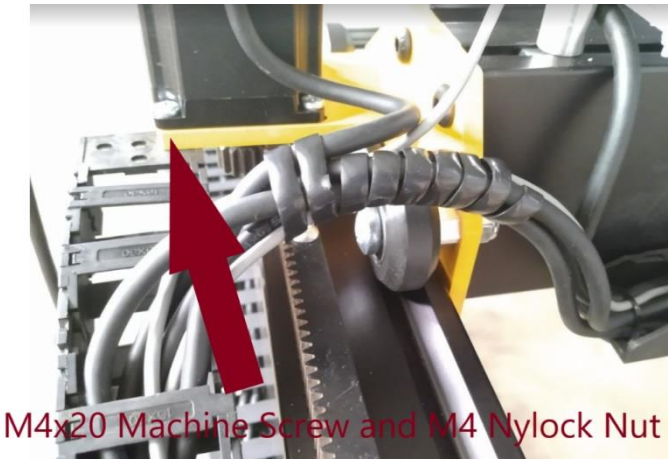
Leave a couple of the cover pieces unclipped on the end of the drag chain to make it easier for the wires to enter the chain. Keep in mind that you can snap the drag chain apart and back together if it makes it easier for you to run your wires.



Now install the Y drag chain support on the right side of the machine using (3) drop in T nuts and (3) M5x12 machine screws with M5 split lock washers. Notice that one end has a slot on it. Position the slot towards the front of the machine, with the piece about 400mm (16 inches) from the front right Y End Plate.

The X and Y homing switch wires are on the same connector. The X switch is on the longer wire set of the X/Y combo. You can run the Y switch wire along the rail **(not in the drag chain).** The X switch wire should run inside the Y drag chain.

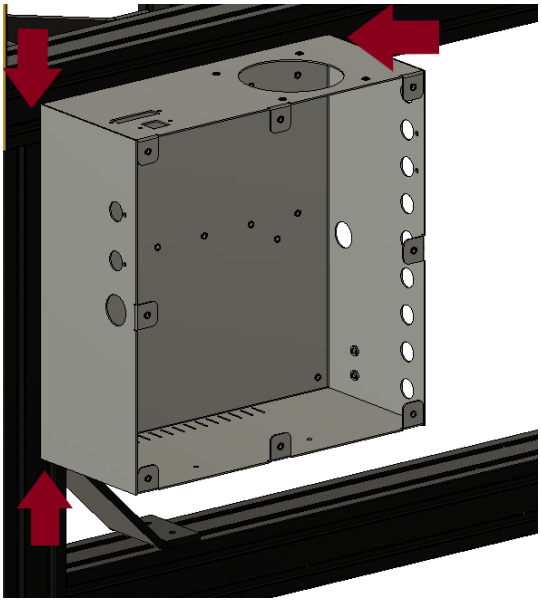
Attach one end of Y drag chain onto the right Y motor using an M4x20 machine screw. Bundle the wires using spiral wrap from the wire management bag and run them into the drag chain.



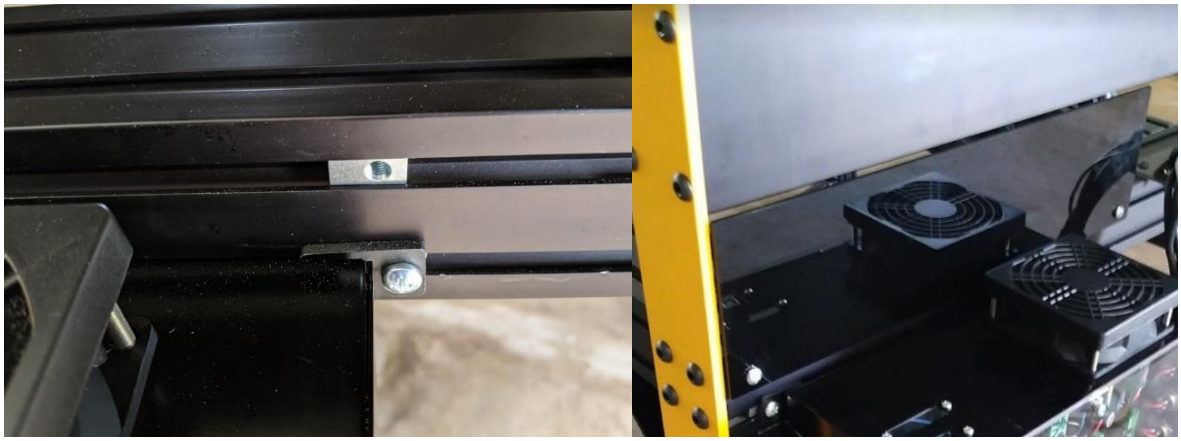
The cable for the router won't reach to the end of the drag chain. Fasten it to the outside of the Y drag chain, as far as it will go down, and use an extension cord to reach the plug.

The other end of the drag chain will attach to the slot in the drag chain support with an M4x12 machine screw and an M4 nylock nut.

The control box has three small brackets on the bottom that are folded inward to protect them during shipping. Loosen the screw that holds them in place and rotate them outward, then retighten them. The control box mounts to the front right side of the frame using (3) drop in T nuts and (3) M5x8 machine screws. Some thread locker is suggested. The red arrows in the picture show the mounting positions in the extrusion Note the orientation of the features in the control box.



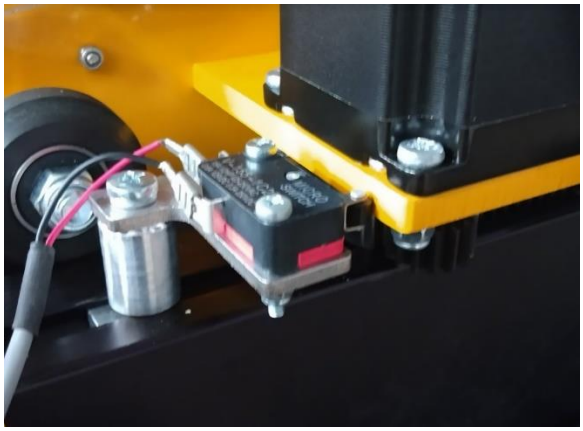
Install the black dust shield above the control box using drop-in T nuts and M5x8 screws.



Wait to plug the connectors into the back of the control box. Later, you will adjust the gear rack, which requires pushing the machine along each axis. Doing this with the connectors plugged in will back drive the system, making it harder to push and potentially blowing electronics.

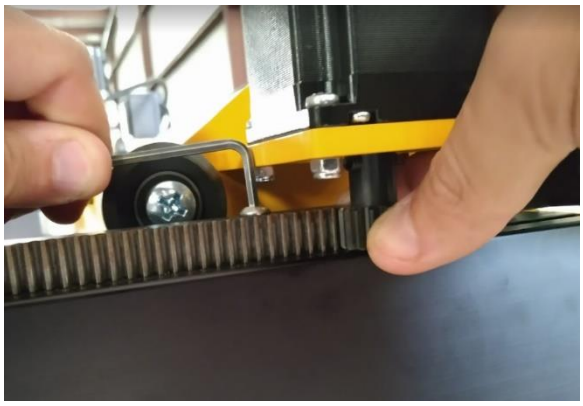
Rack and Pinion Final Adjustments

No new hardware or parts are needed for this step.



The gear rack needs to be adjusted to allow for proper engagement. The pinion gear should only have a couple of teeth left before running off the gear rack at the point of engaging the homing switch. This applies to both the X and Y.

Position the axis, so it clicks the switch. Take note of how much gear rack, if any, is left. Loosen and slide the gear rack as necessary.



There are adjustments in the motor mounting holes (they are slotted), **but you should instead tighten these screws down now, leaving some adjustment room in the slot for later, and adjust the gear rack to the pinion gear. In other words, this adjustment is done with the pinion gear fixed and the gear rack is adjusted to it.**

To position the gear rack properly and parallel with the motion of the machine, you should start on the homing switch end and tighten the M5x20 screws in the gear rack one at a time as you move the axis towards the other end of travel. The gear rack will have a bow to it and installing it this way will bring it straight on the machine. If you experience binding later due to excessive pinion gear to gear rack mesh, you can adjust the mounting position of the motor by loosening it and moving it further back in the slotted holes.

Using your index or middle finger on the gear rack and thumb on the pinion gear, apply some pressure to pinch them together. Tigthen the closest screw. Clear your hand out of the way, then push the axis near the next screw in the gear rack.

Rolling Caster Installation

If you do not intend to roll the machine to different positions in your garage or shop, you can skip this step.

Parts
Caster Set

Hardware
Drop-in T Nuts (16)
M5x8 Machine Screws (16)

The casters are intended to be installed on the interior facing portion of each leg using (4) drop in T nuts and (4) M5x8 machines screws each. The goal is to adjust them in such a way that you can step on the foot lever to lower the wheel to engage the wheels to roll the machine around, when necessary, but so that the leveling feet are on the ground when the foot lever is “kicked up”. The bottom two mounting holes can be difficult to get to once the wheel is installed, so experiment a bit before putting the wheels on.

The wheel has a stud on it that is secured to the mounting body with a washer and large nut (included with the caster set).

Congratulations on the build of the Mega V XXL!

For tips on start-up and to learn more about operating the machine, check out the Operating and Troubleshooting Guide at https://millrightcnc.com/wp-content/uploads/2021/08/Operating-and-Troubleshooting-Guide-version-1p00.pdf

Also see www.millrightcnc.com/resources for more information

Have questions or comments? Contact support@millrightcnc.com