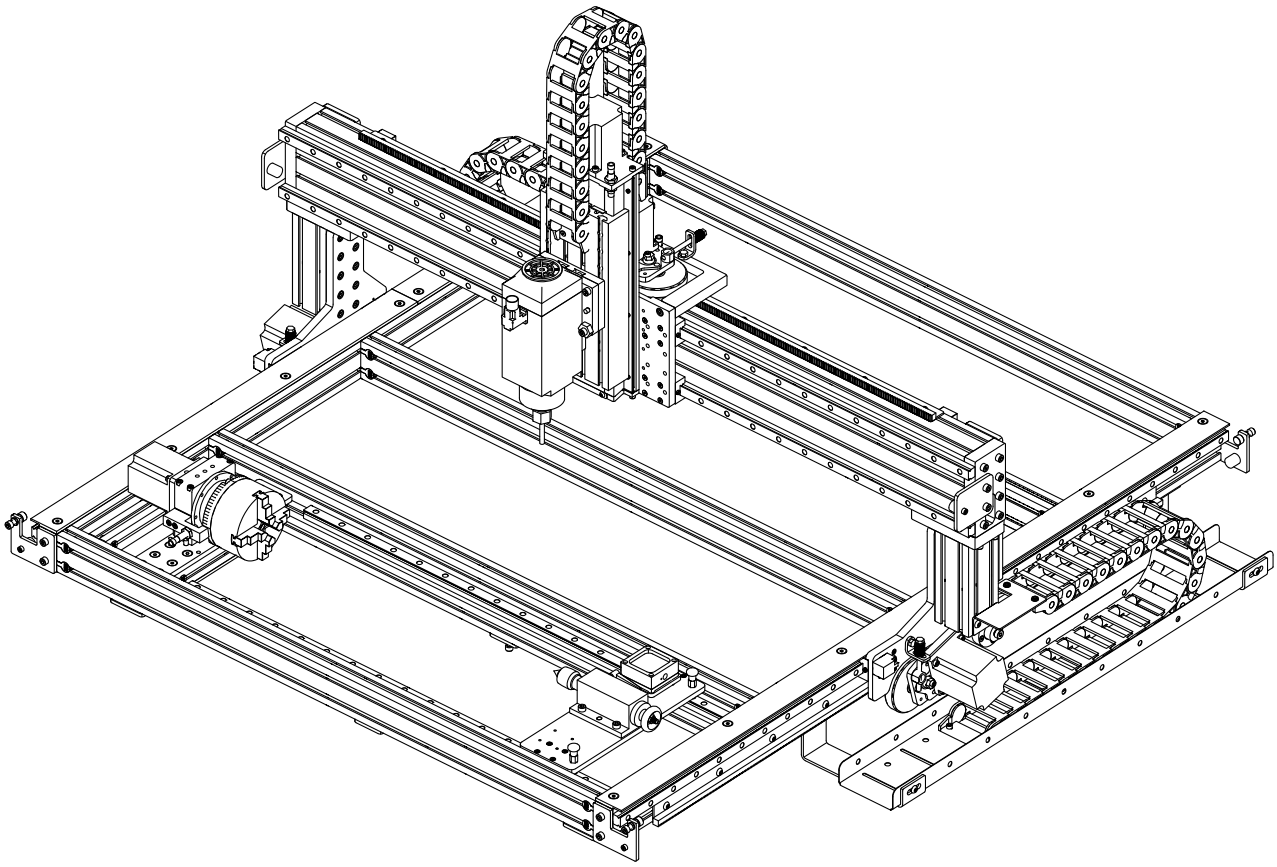
Avid CNC Rotary Axis
Recessed Installation & Calibration Instructions

v2022Q2.1



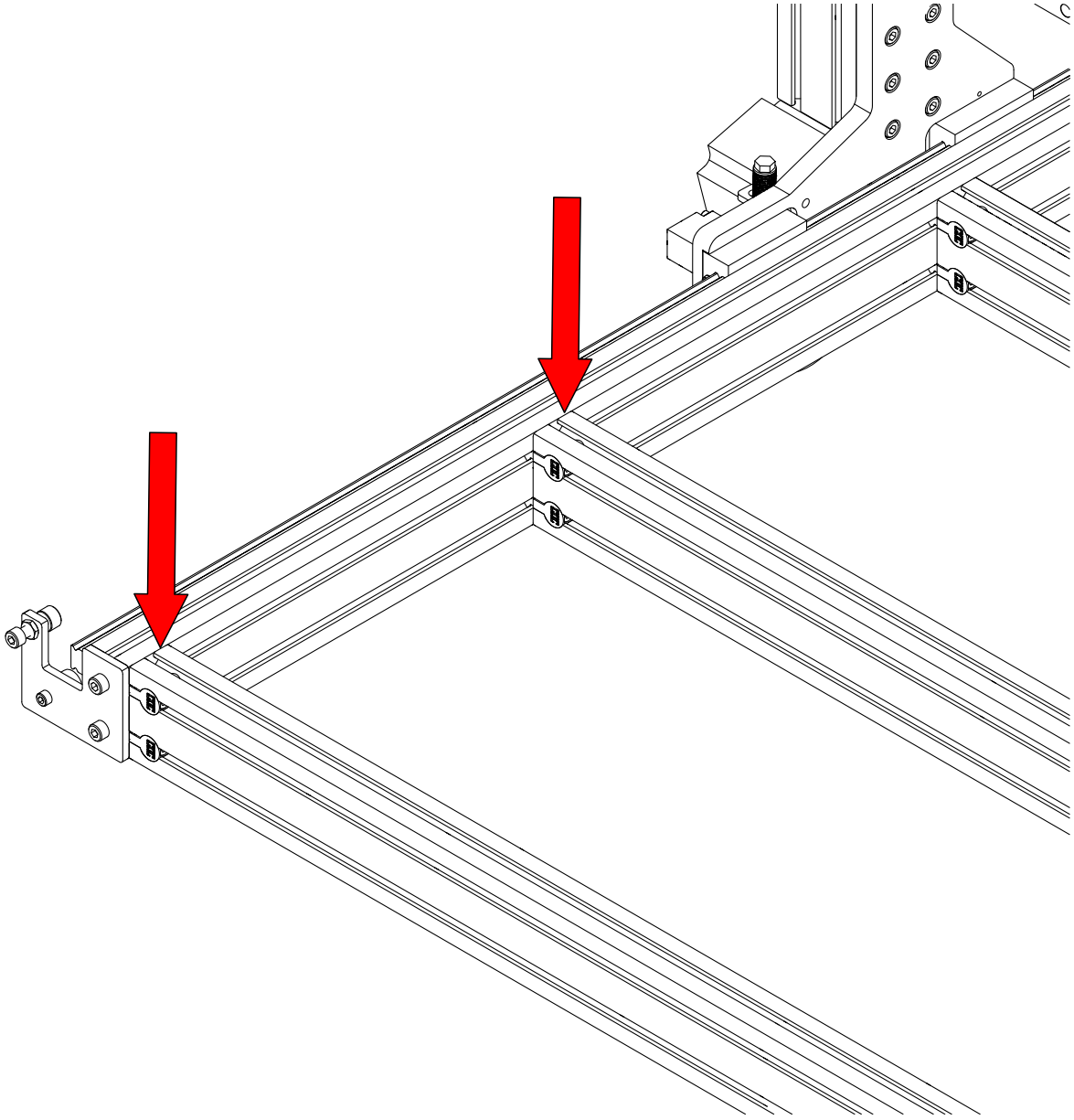
An assembly video is available as a complimentary guide during installation and calibration of your Avid CNC rotary axis:
https://youtu.be/dJZ4IF69yu0

1.1 Machine Preparation

- The recessed (undermount) rotary mounting kit allows the rotary assembly to be installed between any two crossmembers that are within the work area of your Avid PRO CNC Machine. The images used throughout the mounting process that show the rotary assembly installed at the front of the machine are for illustrative purposes only.
- The following steps to prepare your machine will ease in the installation and calibration of your rotary assembly.

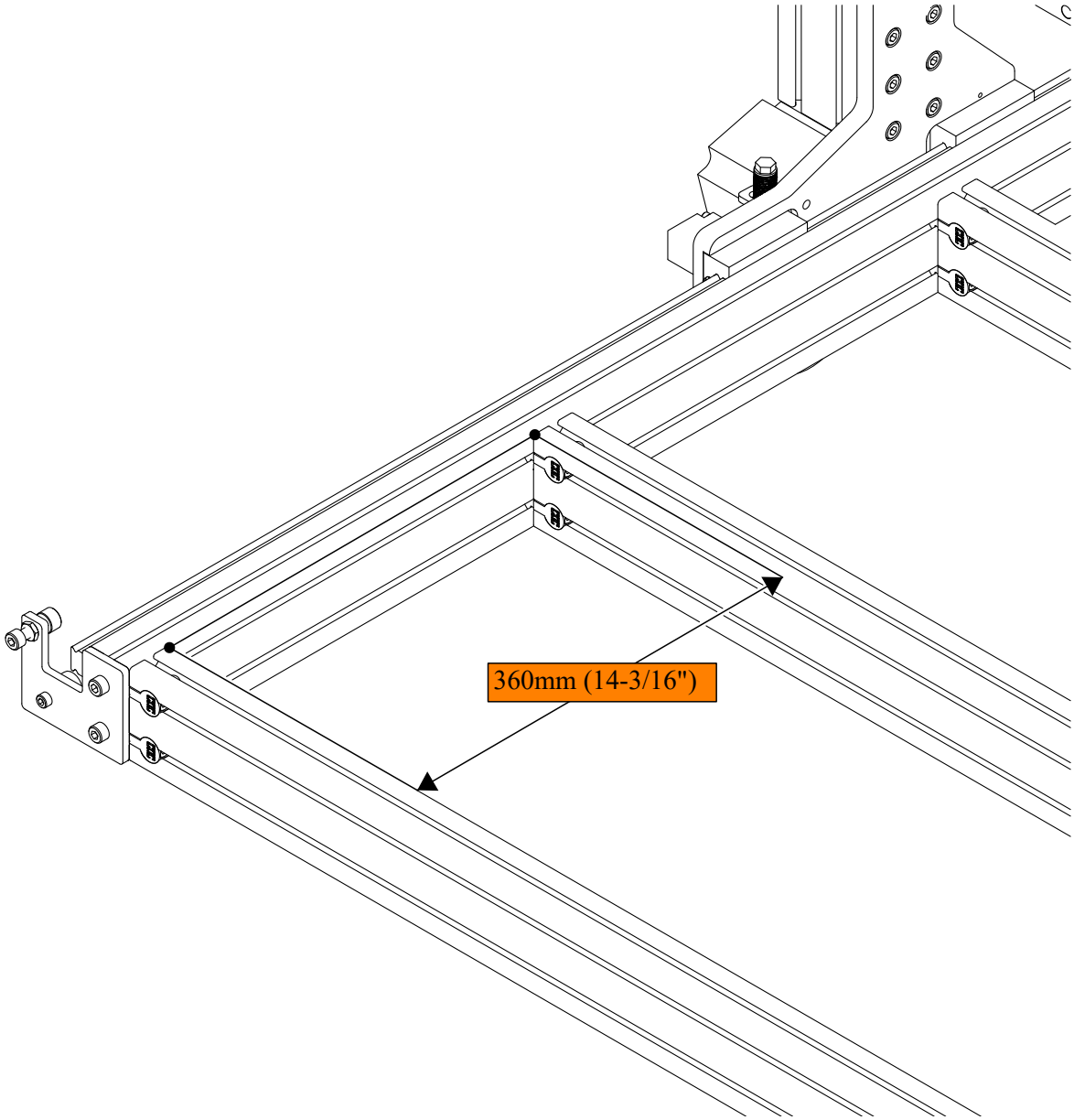
1.1.1 Table Crossmembers

1.1.1.1



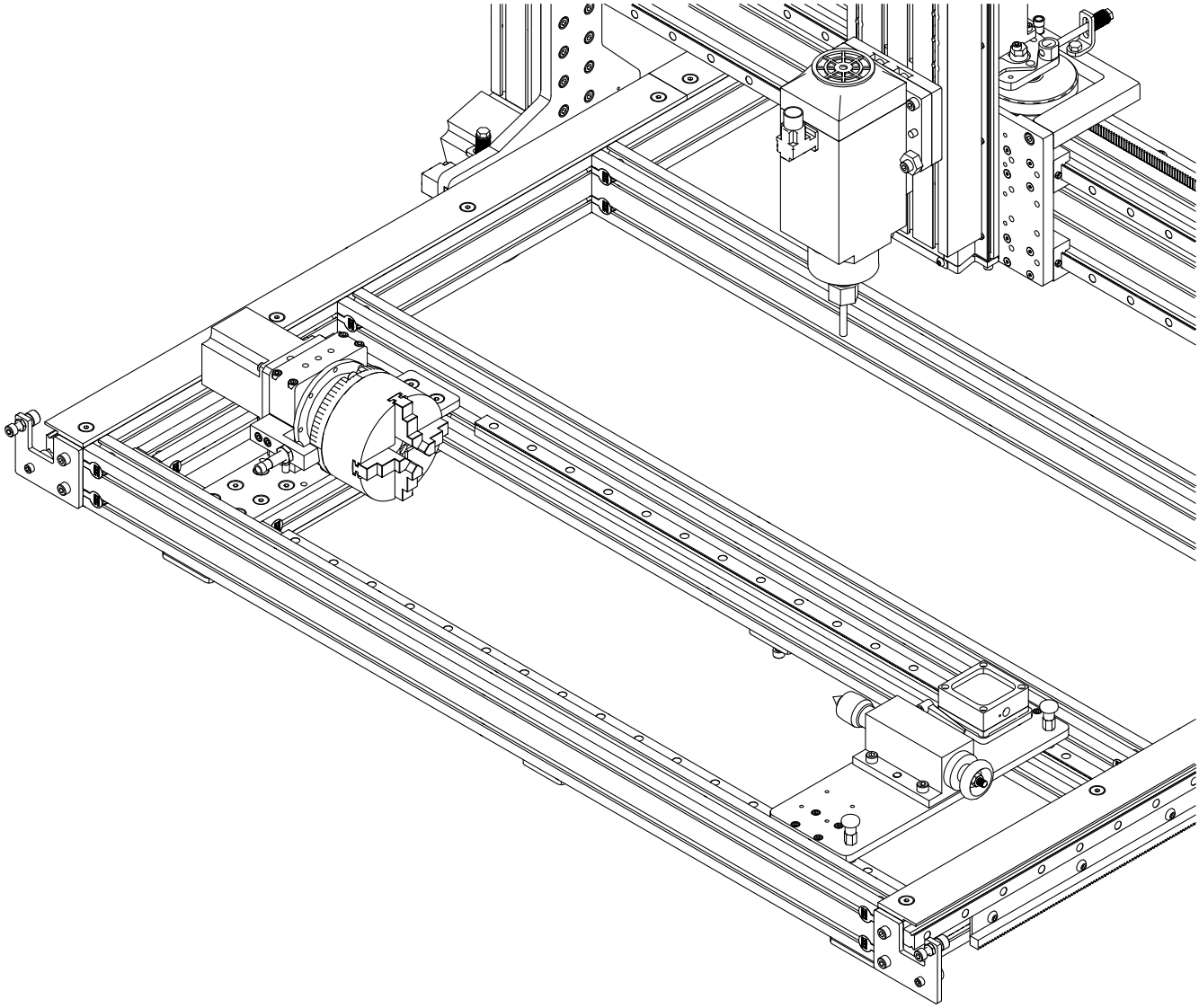
- Ensure the tops of the table crossmembers are flush with the top of the table side extrusion. Adjust the crossmembers as needed.

1.1.1.2



- Ensure the two crossmembers where the rotary assembly will be installed are spaced 360mm (14-3/16") apart, inside edge to inside edge. Adjust the crossmembers as needed.

1.2 Recessed Installation



Parts and Tools Required

The following parts and tools will be used in Section 1.2

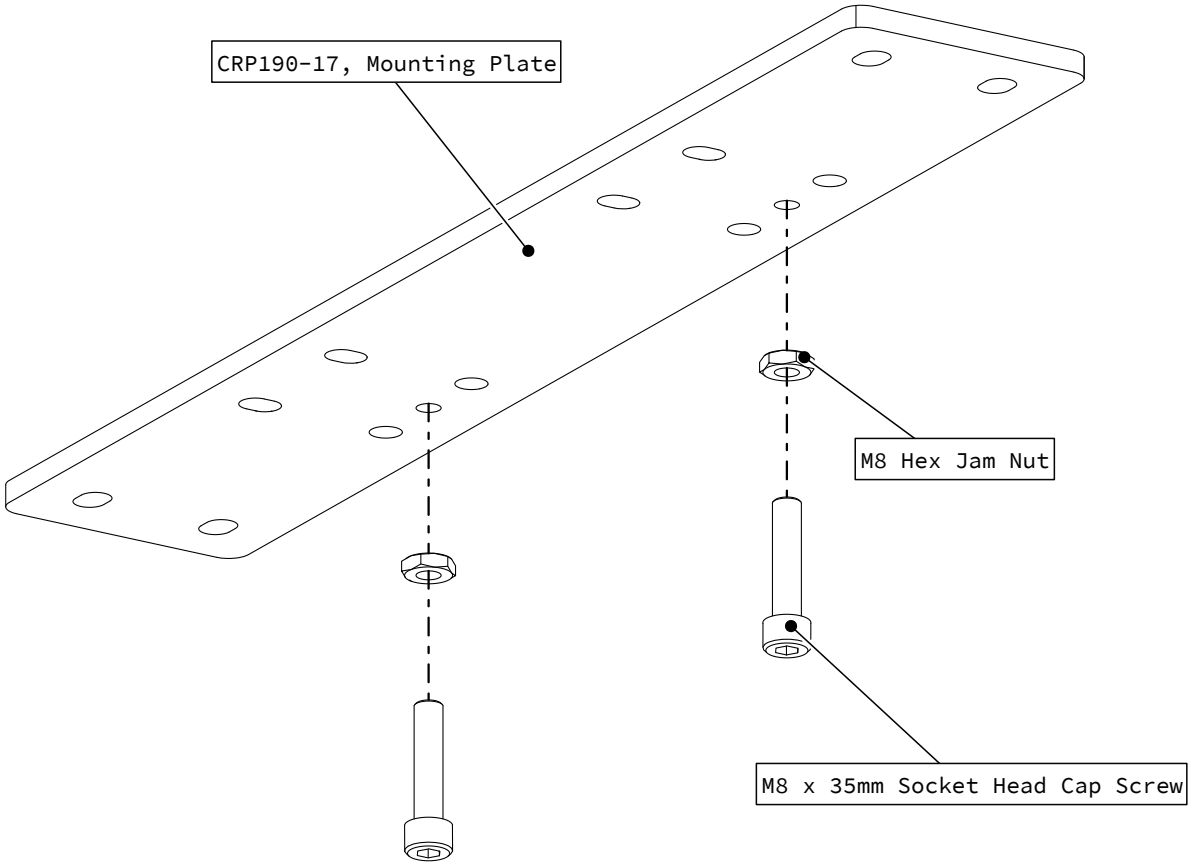
QTY	Part/Description	Packaged In
2	CRP190-17, Mounting Plate	Recessed Mounting Kit
2	CRP190-19, Mid-Support	Recessed Mounting Kit
1	M12 Proximity Sensor Cable, 20'	CRP190-00-BASE
1	NEMA 34 Motor Cable, 20'	Rotary Electronics
1	CRP194-00-FAST: - (24) M8 x 16mm Socket Head Cap Screw - (24) M8 Roll-in T-Nut - (6) M8 x 35mm Socket Head Cap Screw - (6) M8 Hex Jam Nut	Recessed Mounting Kit

Required Tools:

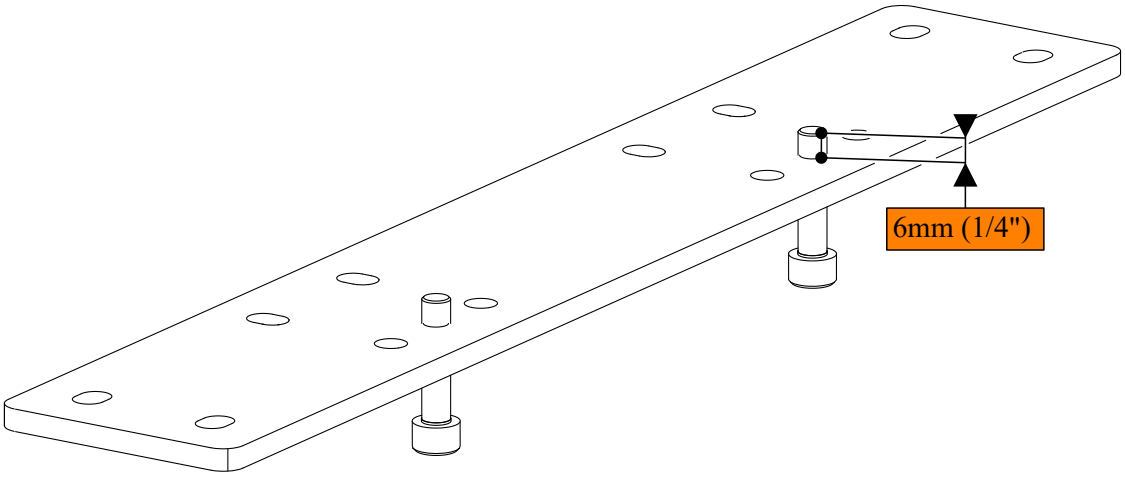
- 6mm Ball-End Allen Wrench
- 13mm Combination Wrench
- Tape Measure

1.2.1 Mounting Plates

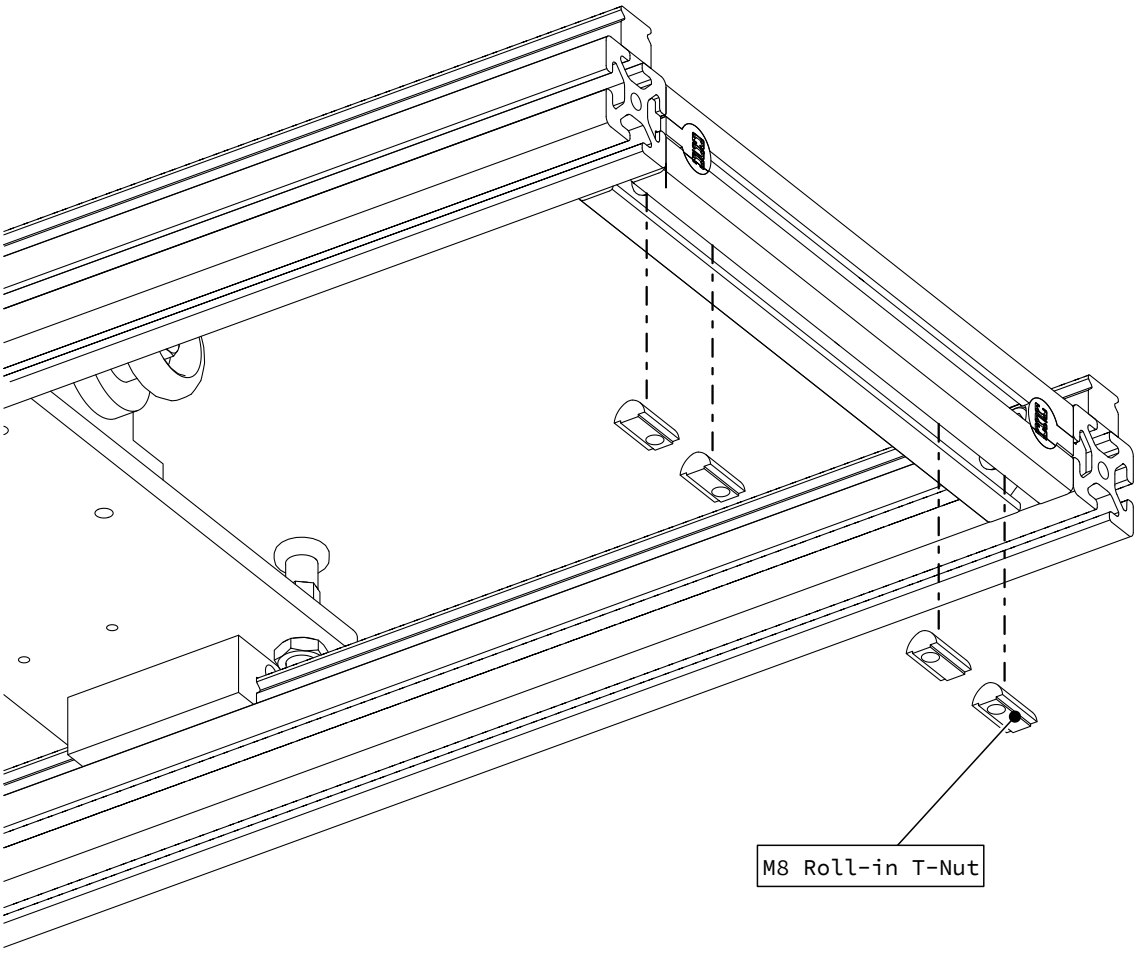
1.2.1.1



- Thread fasteners into the mounting plate as indicated.

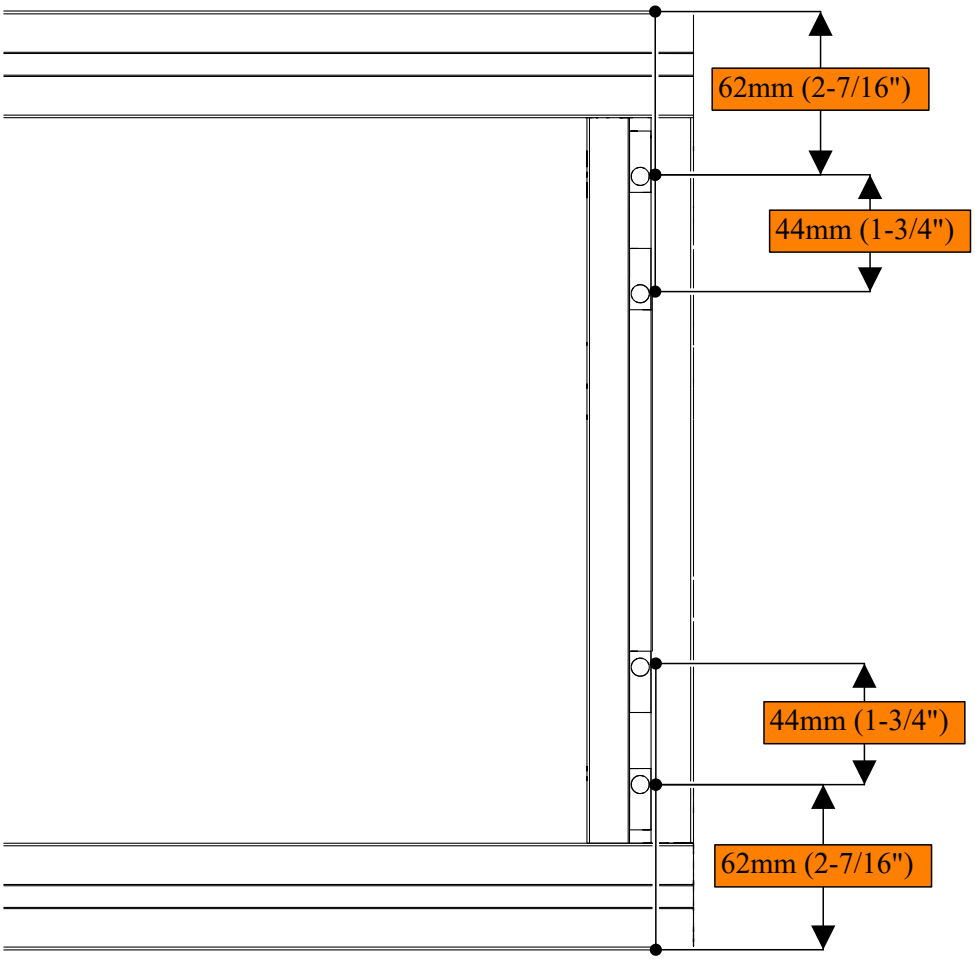


- Position the fasteners 6mm (1/4") above the plate and hand tighten the jam nuts on the bottom.



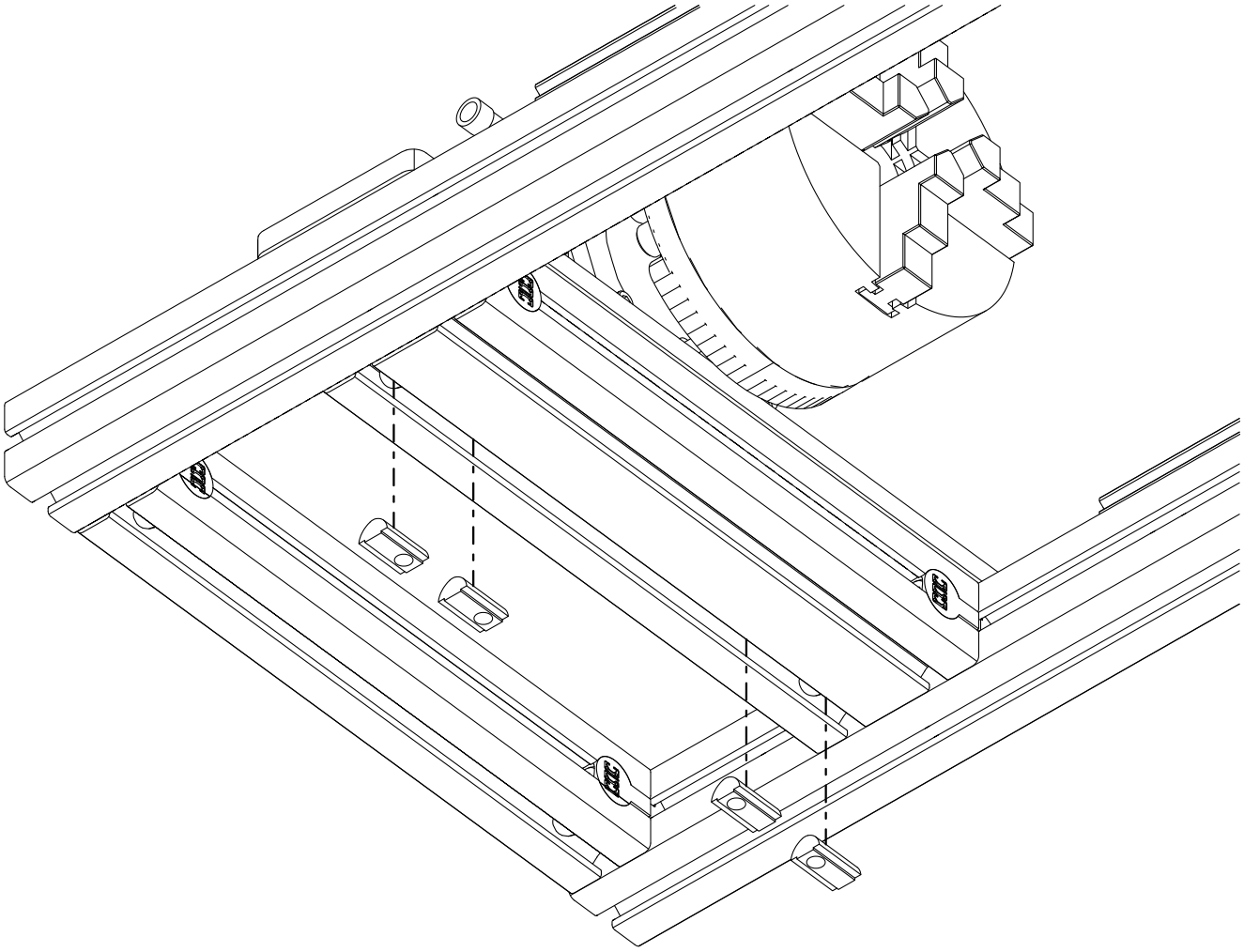
Bottom View

- On the tailstock end of the rotary assembly, insert t-nuts in the bottom t-slot of the extrusion as indicated.



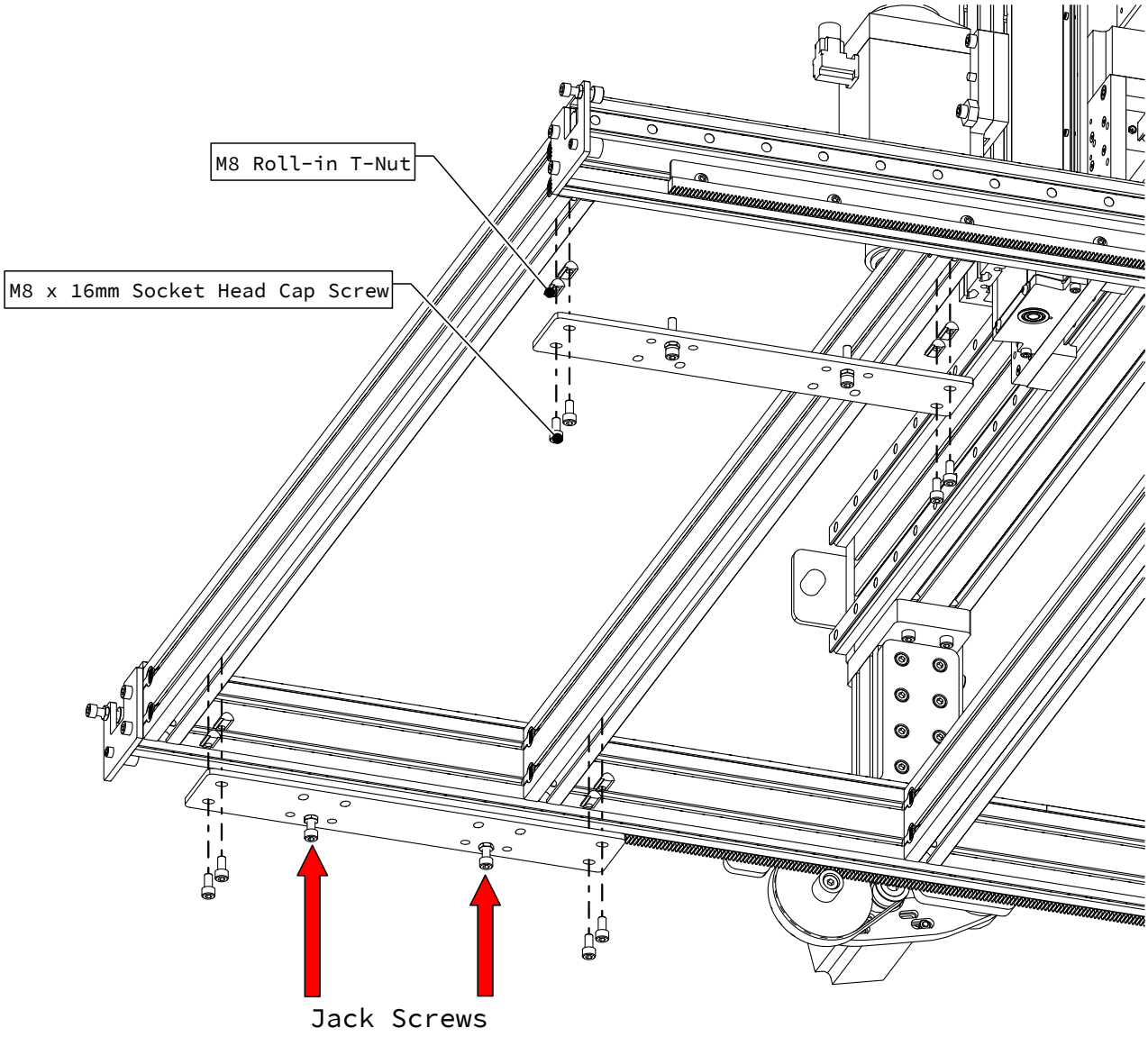
Bottom View

- Position the t-nuts to the dimensions shown.



Bottom View

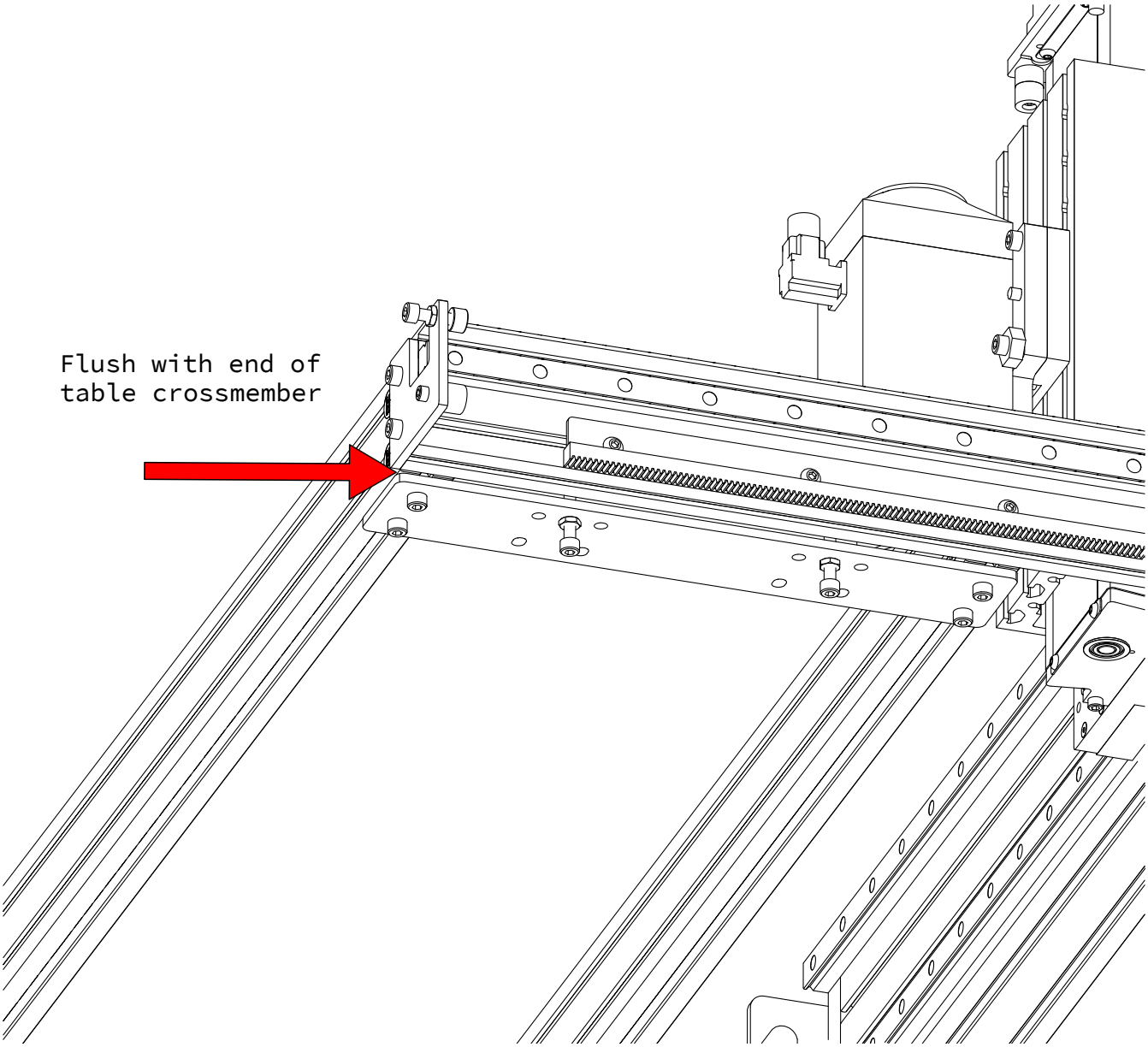
- Repeat this process to install t-nuts in the 4080 extrusion under the chuck plate.
- Position to t-nuts using the same dimensions as the previous step.



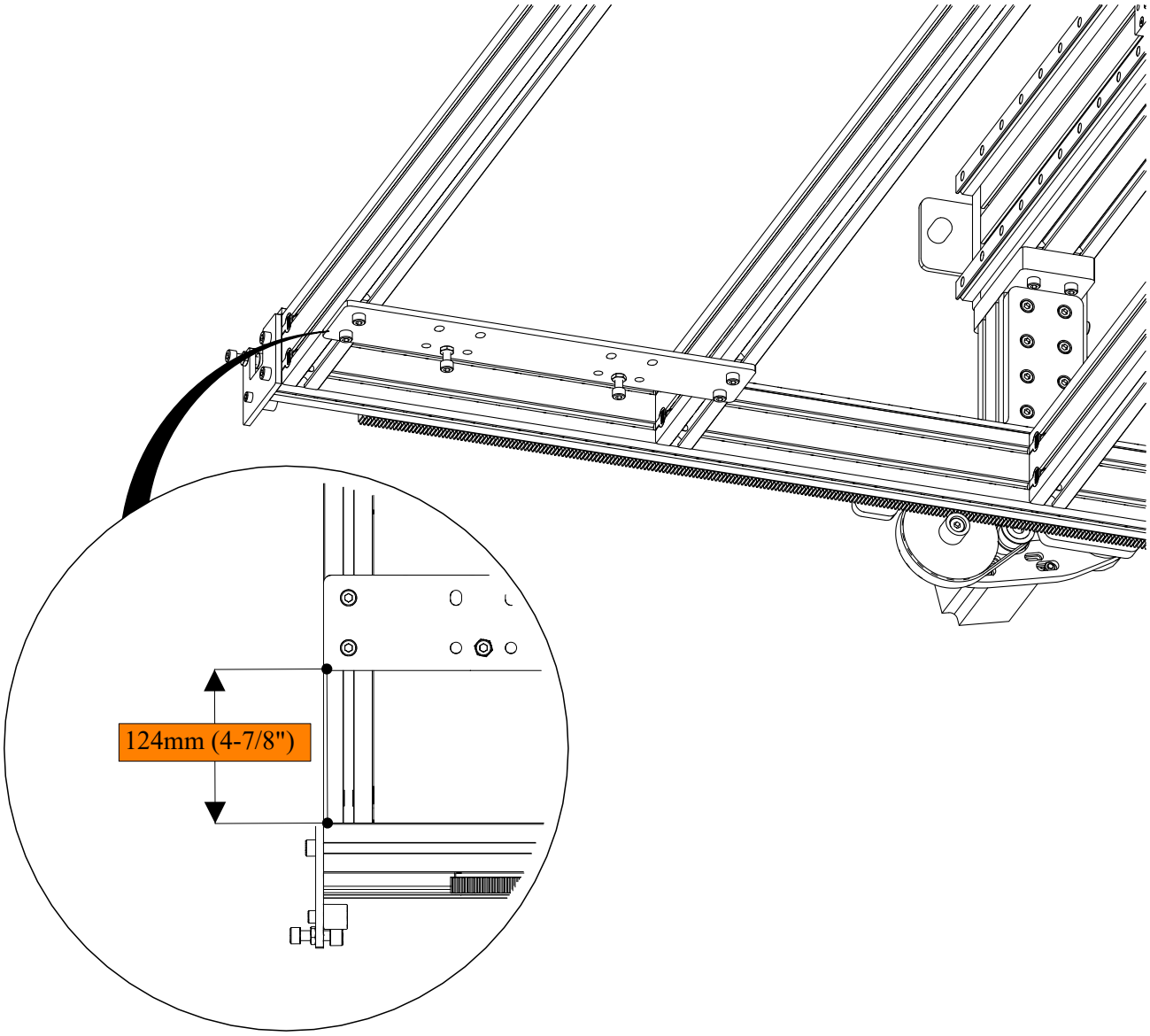
- Attach the mounting plates to the underside of your crossmembers as indicated, partially tightening the fasteners.

Assembly Note

Ensure the mounting plates are oriented with the jack screws biased towards the outside of the machine.



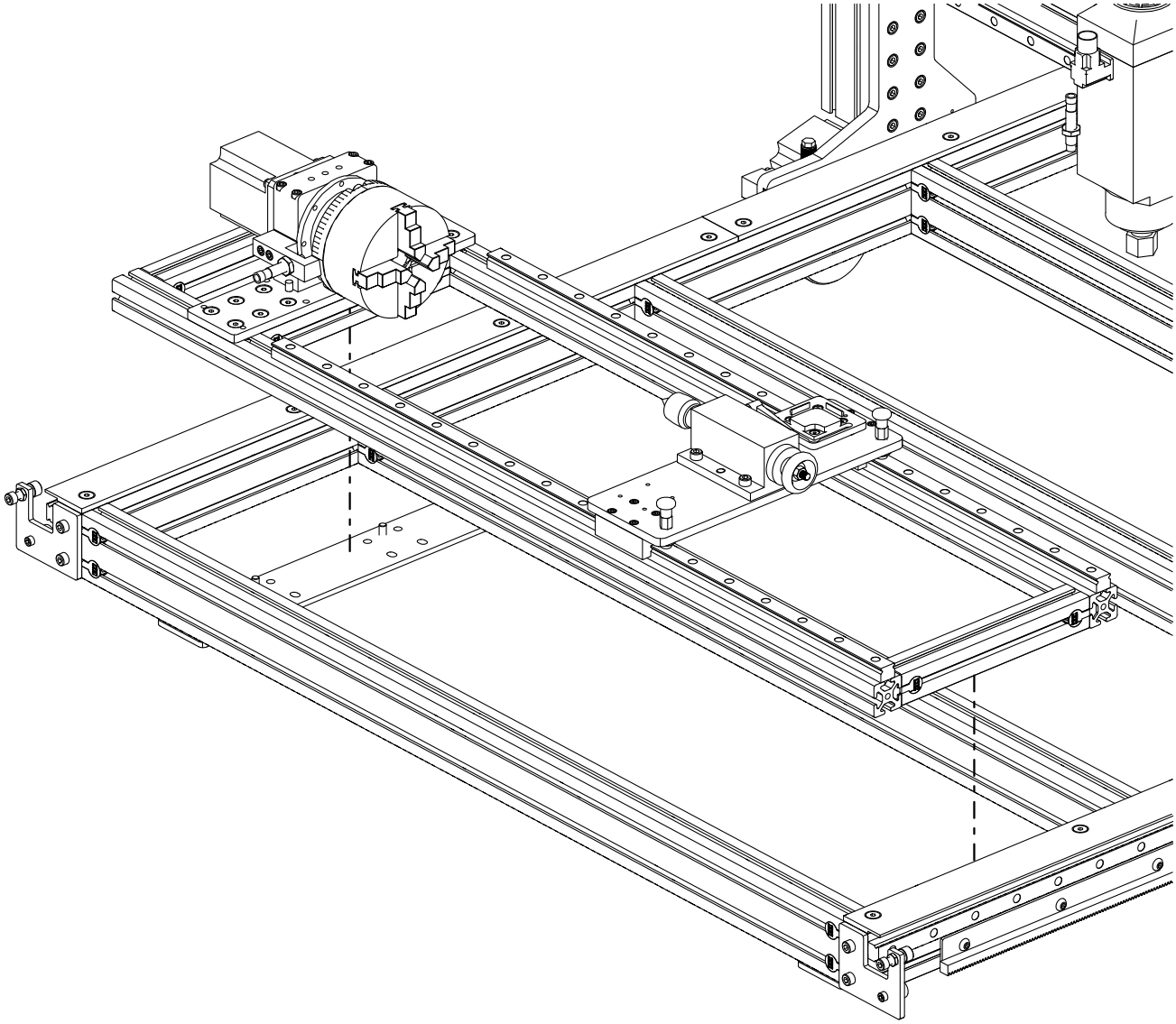
- On the side where you are going to locate the tail stock, position the mounting plate flush with the end of the crossmember.
- Fully tighten the fasteners attaching this mounting plate to the crossmembers.



- On the side where you are going to locate the chuck, position the mounting plate 124mm (4-7/8") from the end of the crossmember.
- Fully tighten the fasteners attaching this mounting plate to the crossmembers.

1.2.2 Rotary Assembly

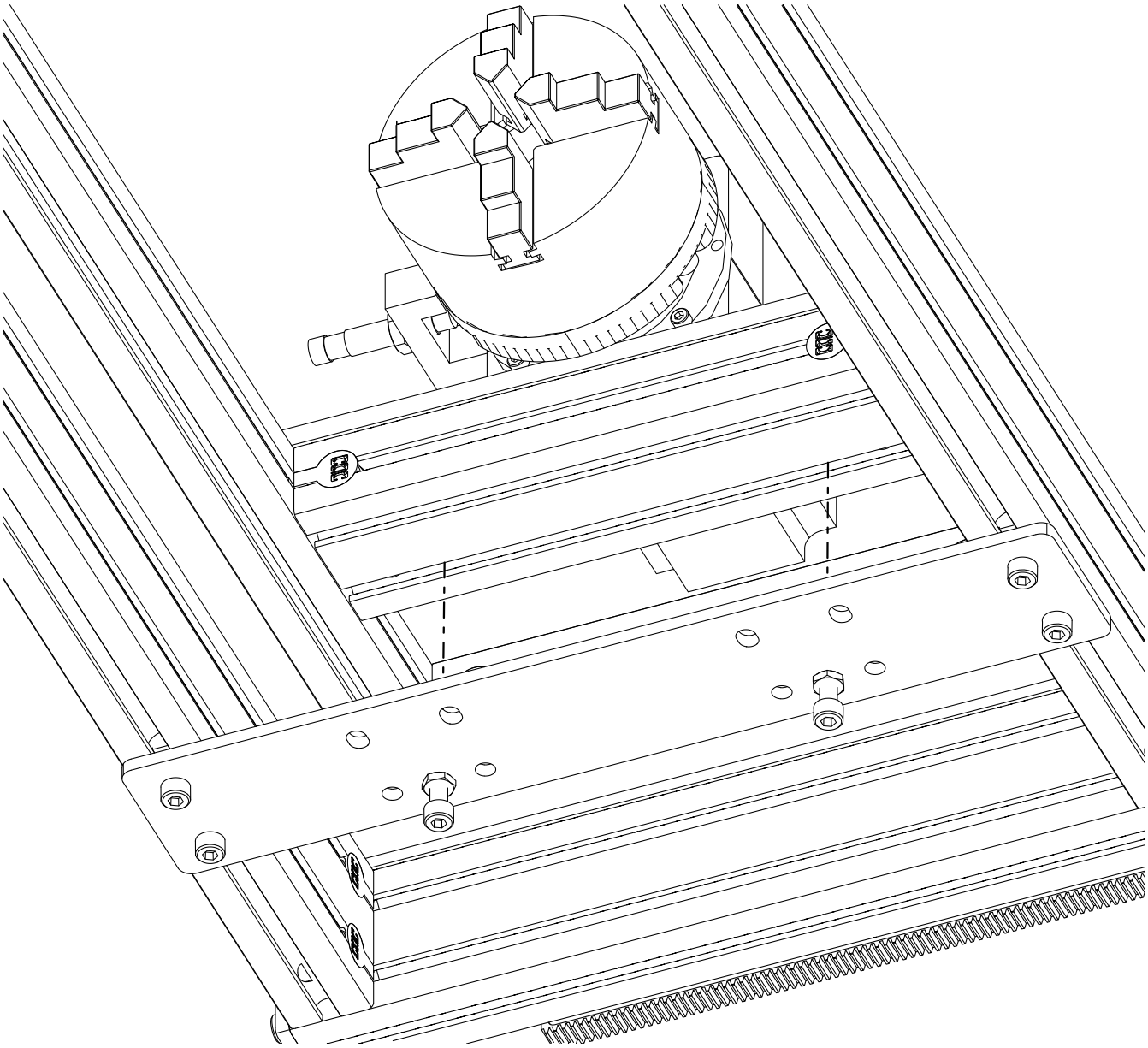
1.2.2.1



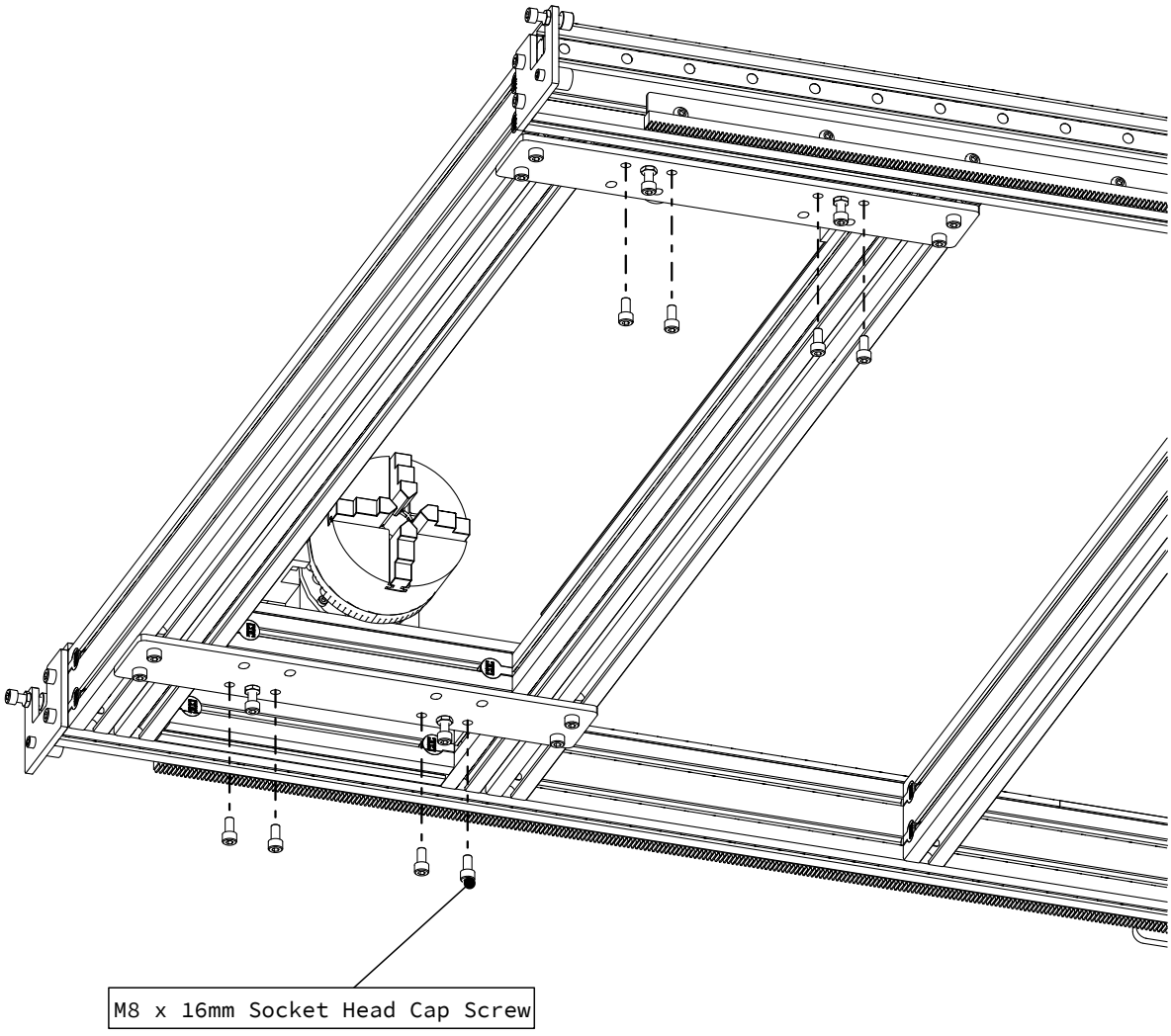
- Place the rotary assembly on to the mounting plates as indicated.

Assembly Note

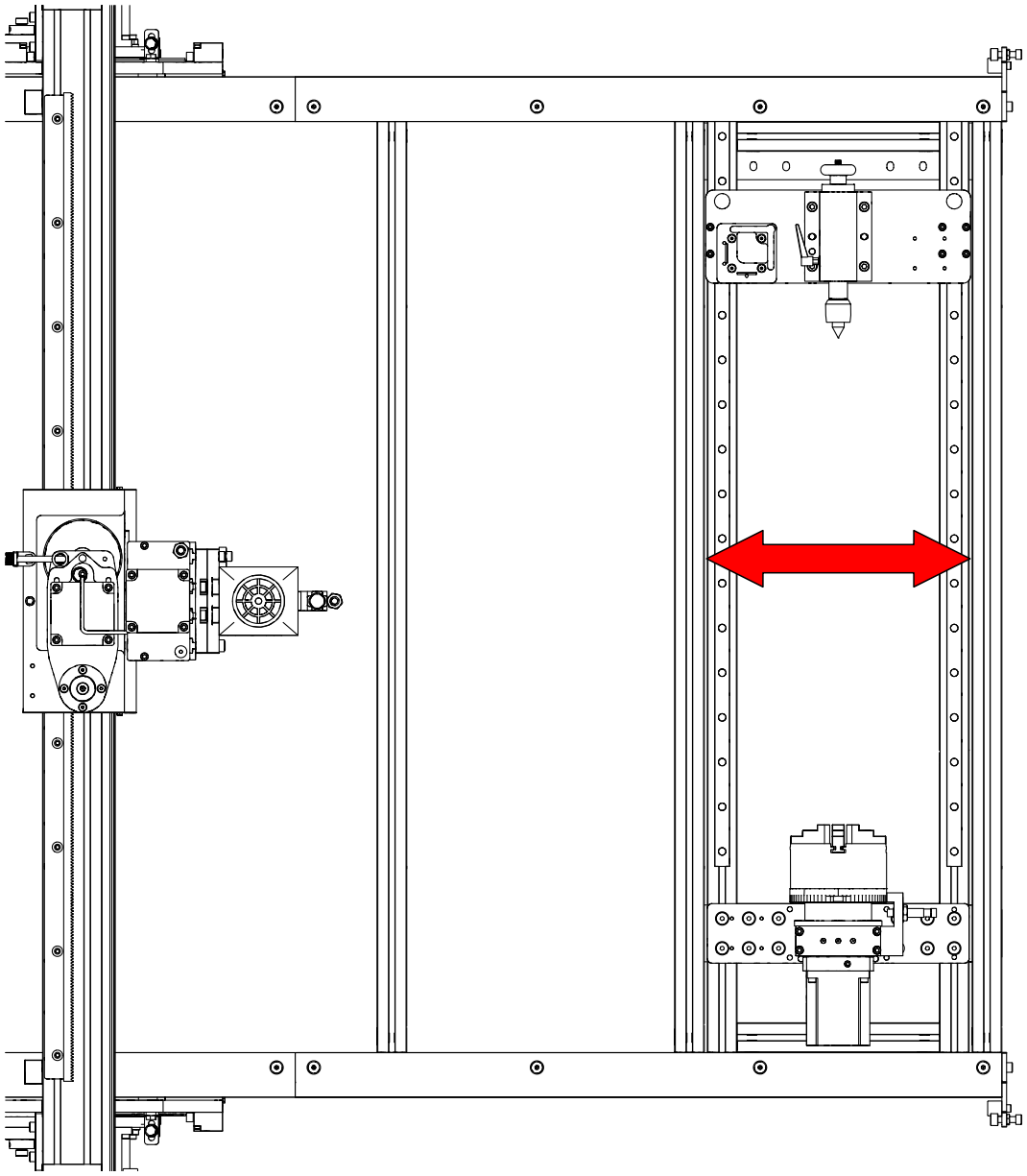
The jack screws in the mounting plates will locate in the t-slots of the 4040 and 4080 rotary crossmembers.



- It may be necessary to adjust the position of the chuck-side mounting plate to allow the jack screws to freely locate in the rear t-slot of the 4080 rotary crossmember.



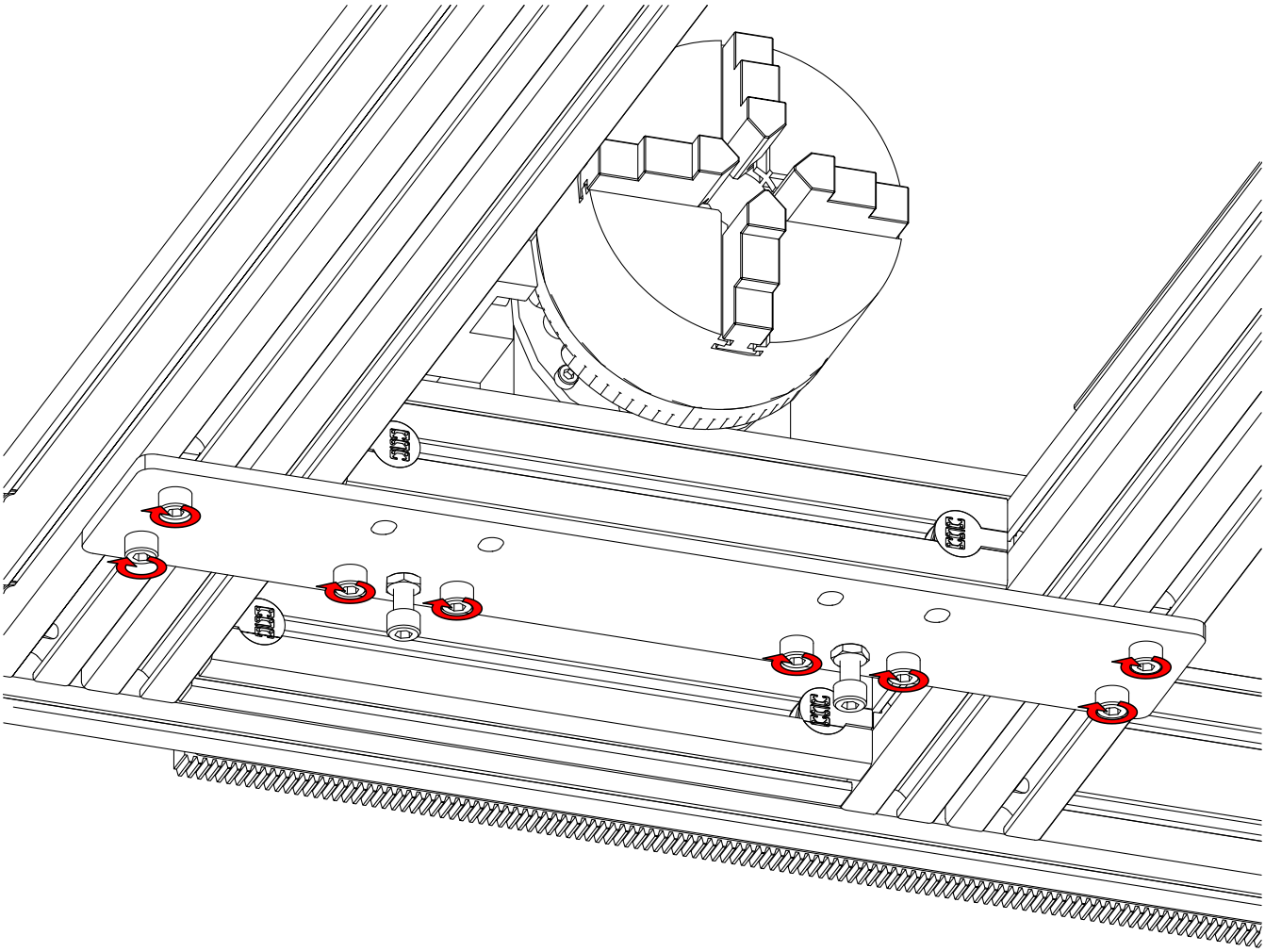
- Attach the rotary assembly to the mounting plates as indicated, partially tightening the fasteners.



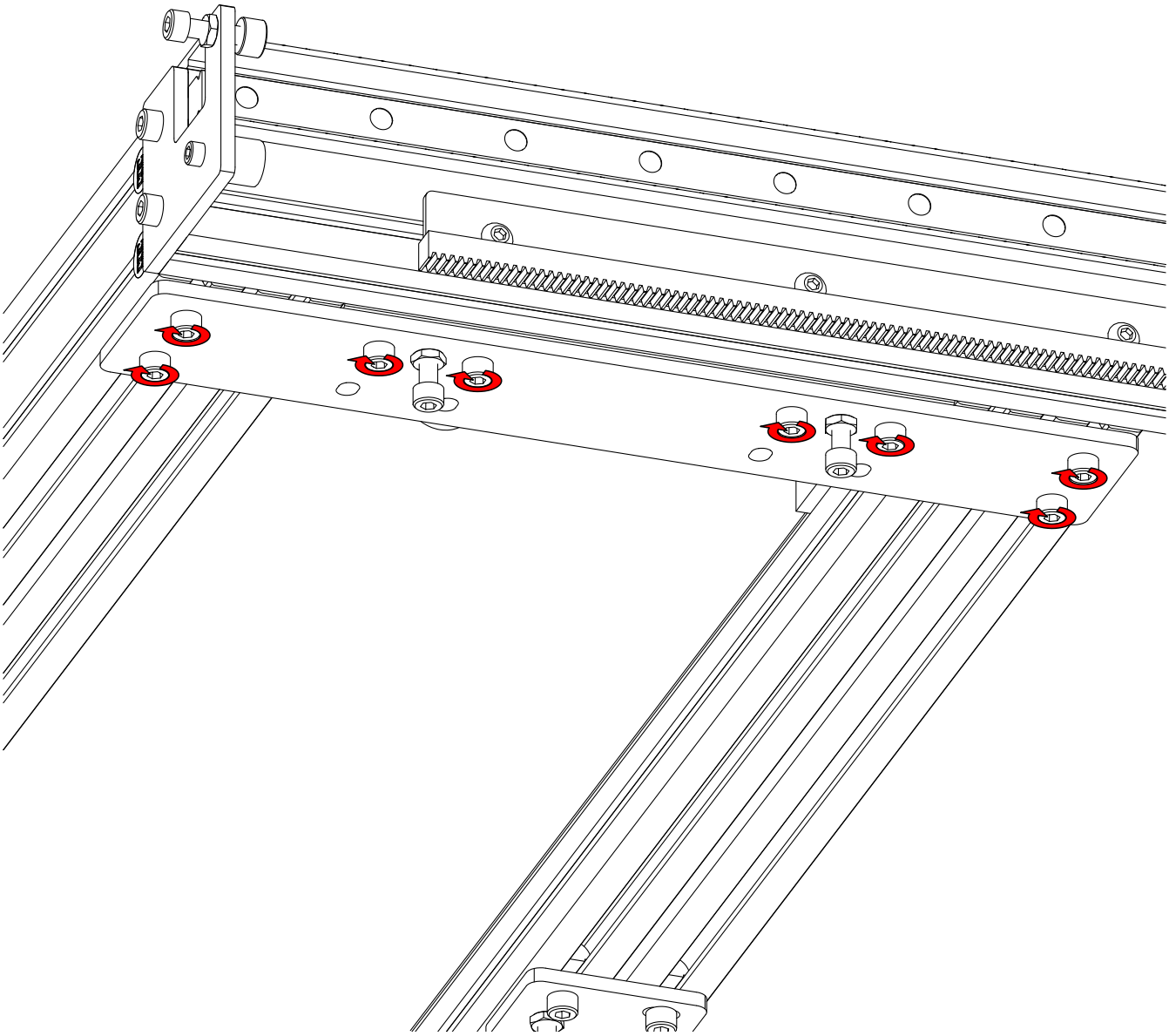
- Center the rotary assembly between the table crossmembers as indicated.

Assembly Note

Keep the rotary assembly parallel with the table crossmembers. This will provide the best starting point for the calibration procedure.



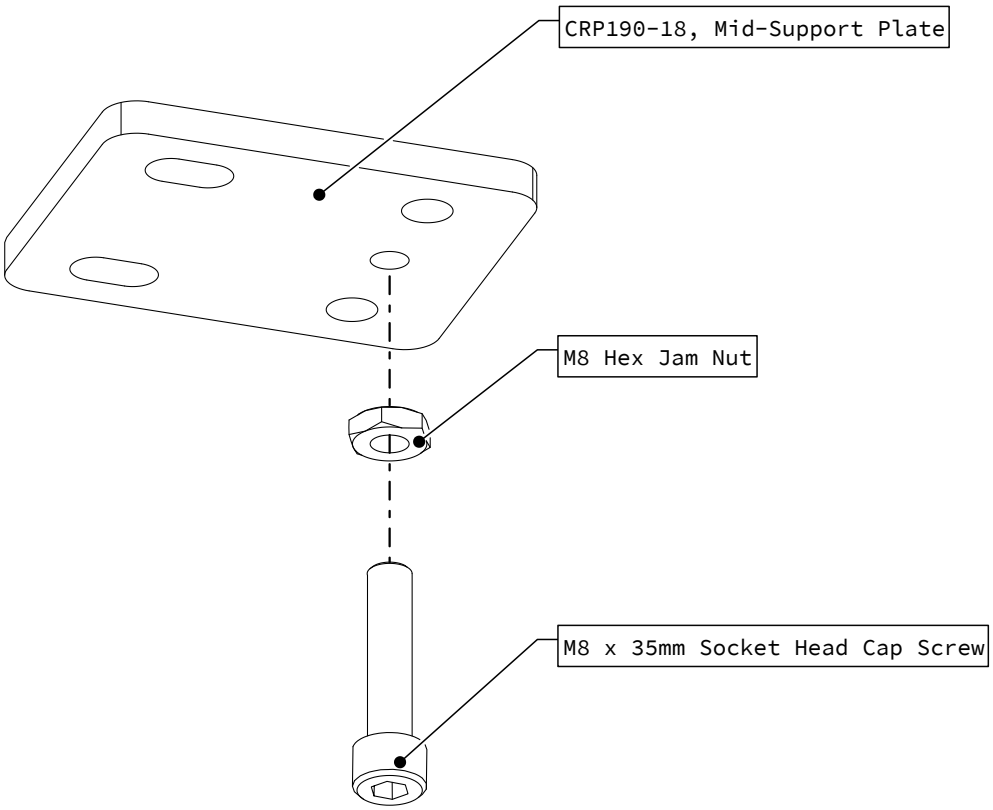
- Fully tighten the indicated fasteners.



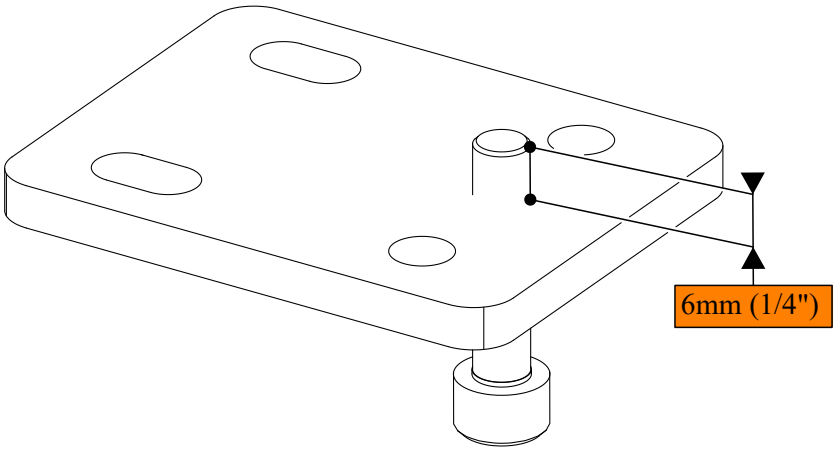
- Fully tighten the indicated fasteners.

1.2.3 Mid Supports

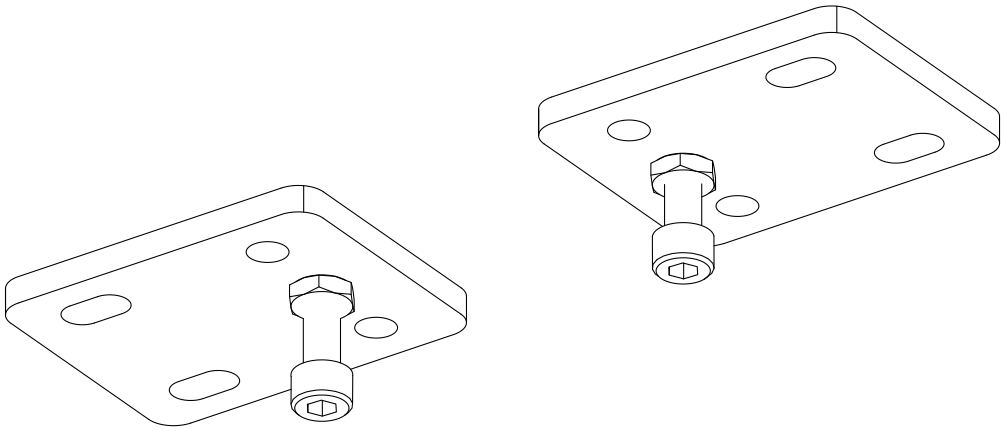
1.2.3.1



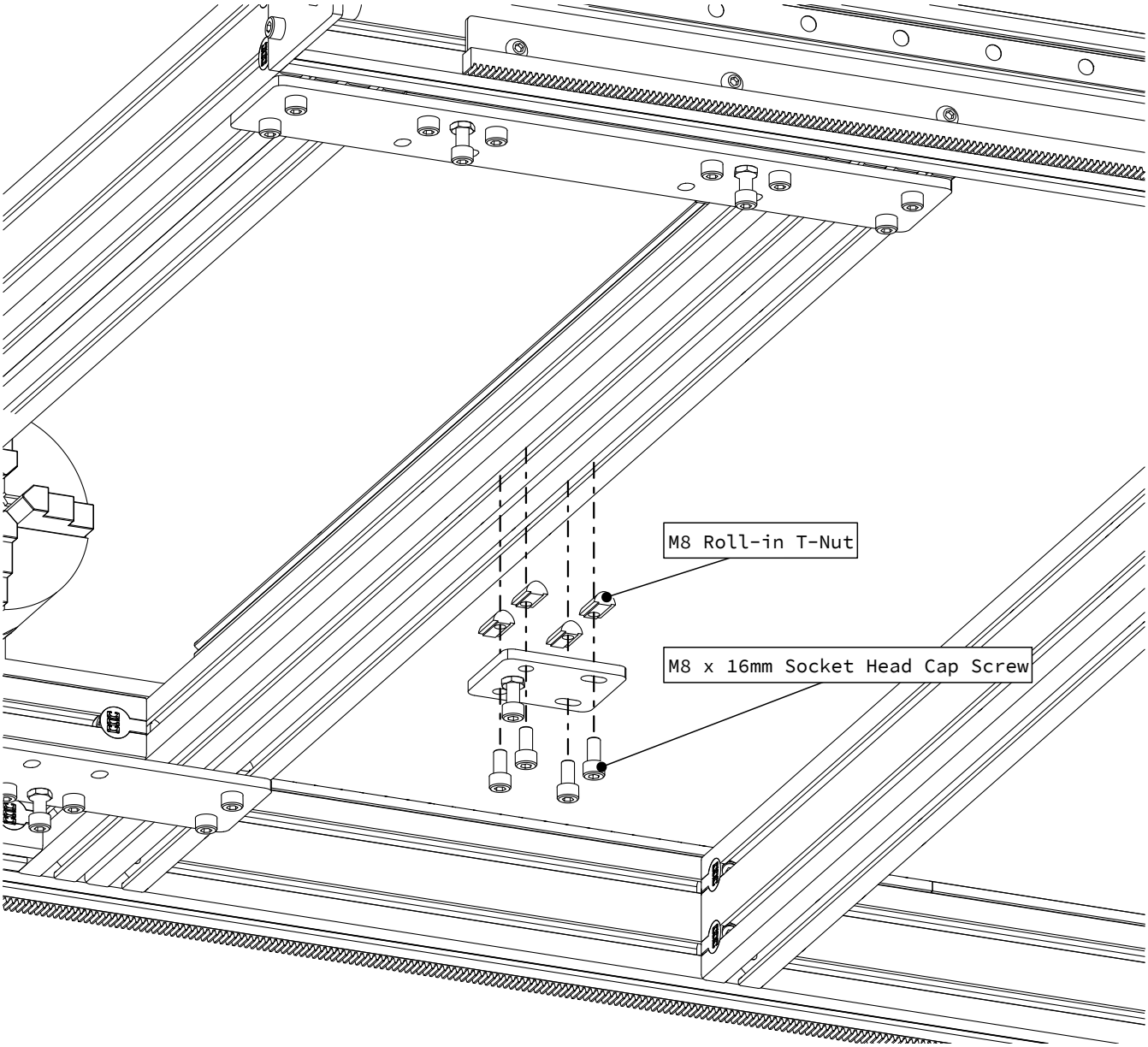
- Thread the indicated fastener with jam nut into the mid-support plate.



- Position the fastener 6mm (1/4") above the plate and hand tighten the jam nut on the bottom.



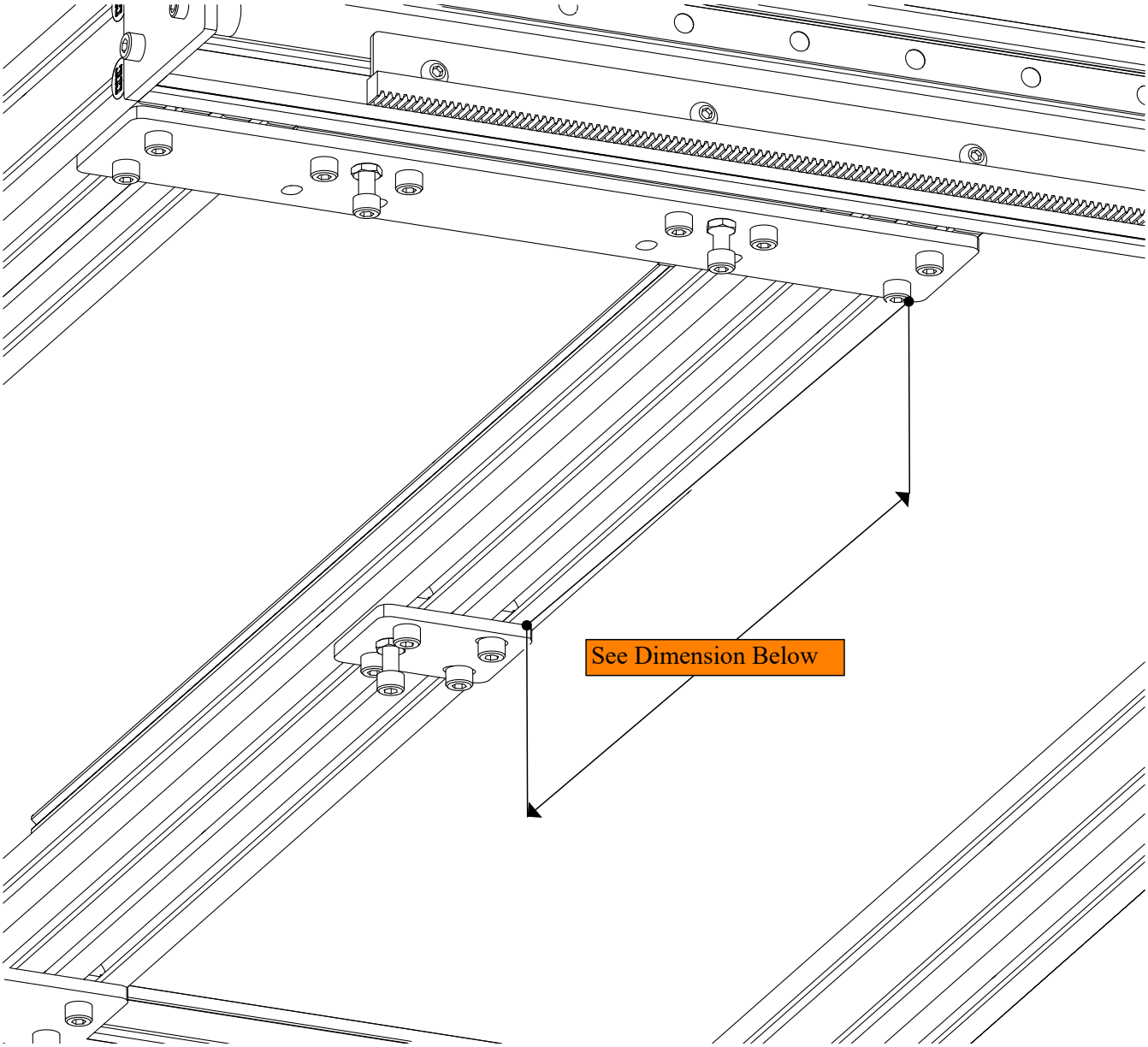
- Repeat the process to assemble a second mid-support plate.



- Attach an assembled mid-support plate between the rotary frame and table crossmember as indicated, partially tightening the fasteners.

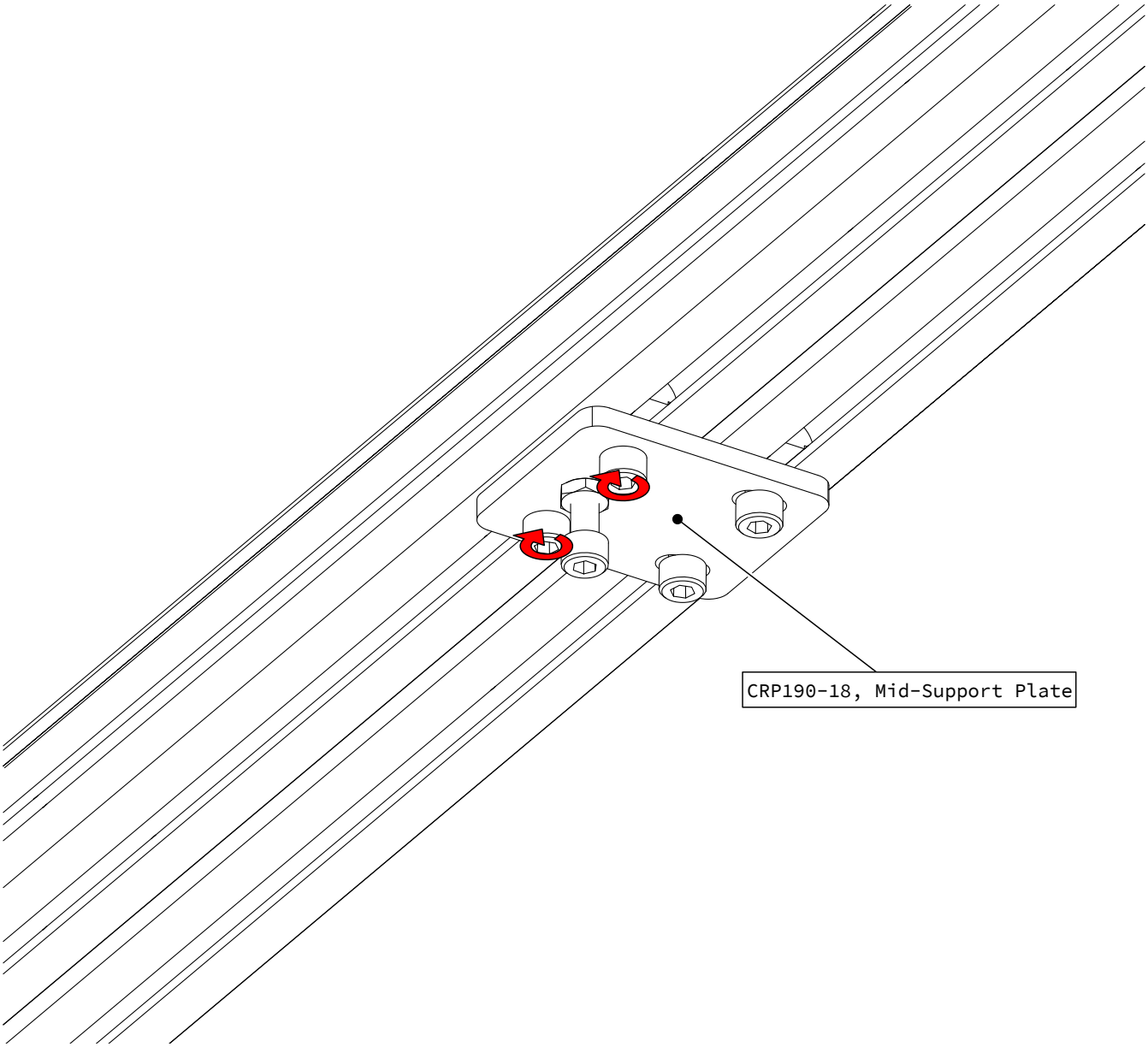
Assembly Note

Ensure the mid-support plate is oriented so the jack screw locates in the rotary frame t-slot.



- Position the mid-support using the appropriate dimension from the table below.

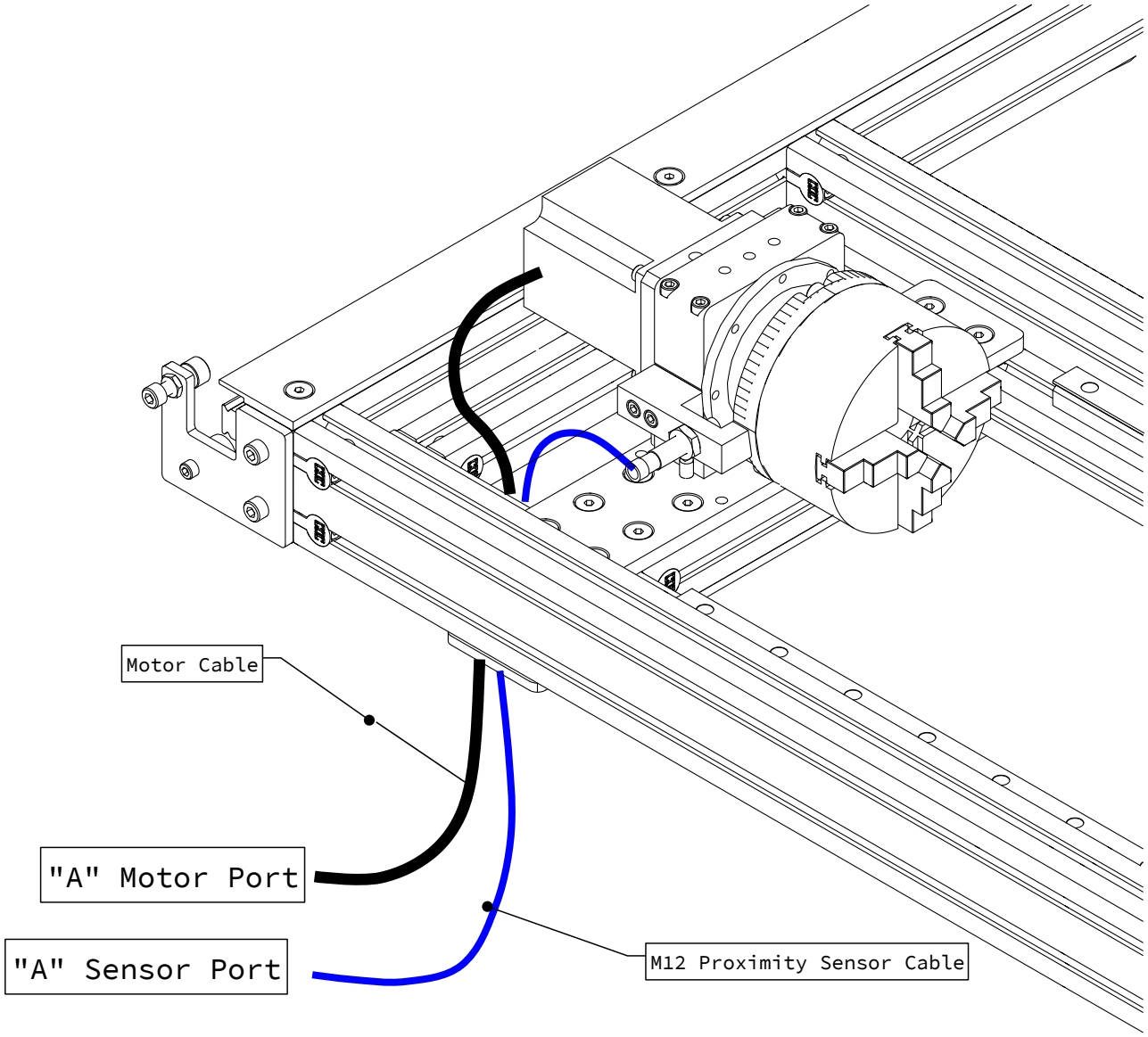
Rotary Frame Length	Mid-Support dimension
1250mm (49")	395mm (15-1/2")
1550mm (61")	545mm (21-3/8")
1850mm (72")	690mm (27-1/4")



- Tighten **ONLY** the indicated fasteners on both mid-support plates.

1.2.4 Motor & Sensor Connections

1.2.4.1



- Attach the sensor and motor cable to the control box as indicated (Plug and Play Control Systems purchased prior to October 2019 will use the "X+" sensor port).

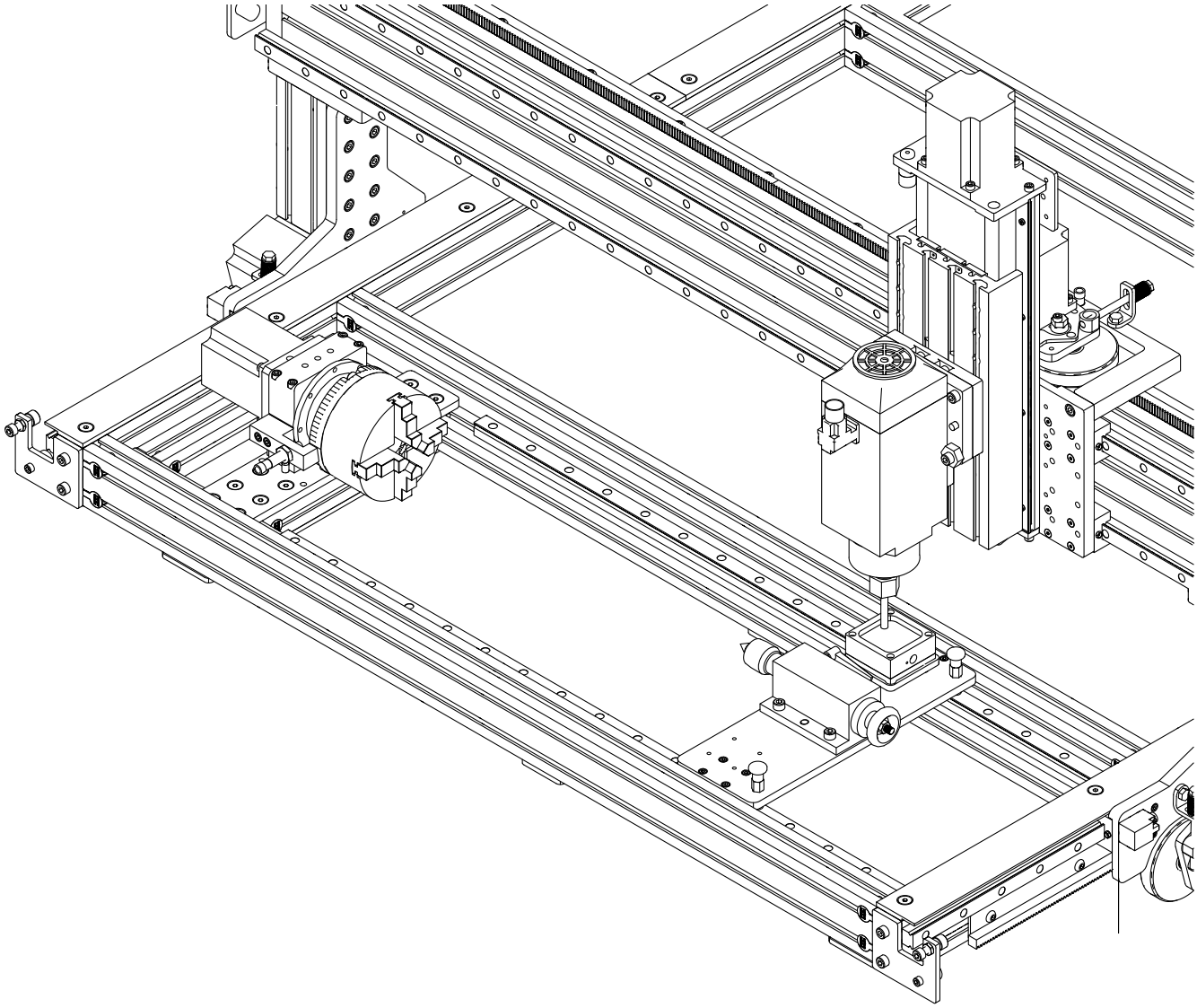
Assembly Note

For PRO machines purchased prior to 2019, an M12 splitter is required to connect the X+ and X- limit switches to the X- port on the control box.

1.3 Calibration

Rotary Calibration

The calibration procedures in this section will need to be completed each time the rotary assembly is installed on the CNC machine.



Parts and Tools Required

The following parts and tools will be used in Section 1.3

QTY	Part/Description	Packaged In
1	CRP193-00-21.1 [1] : - (1) CRP190-07 Stepped Dowel Pin	CRP190-00-BASE

Required Tools:

- 6mm Ball-End Allen Wrench
- 13mm Combination Wrench
- Auto Z and Corner Finding Touch Plate
- Mach4 CNC Controller Software from Avid CNC

Machine Revision

1. If your CRP190-00-BASE contains CRP193-00, you will use the supplied M8 x 120mm Dowel Pin instead of CRP190-07 Stepped Dowel Pin.

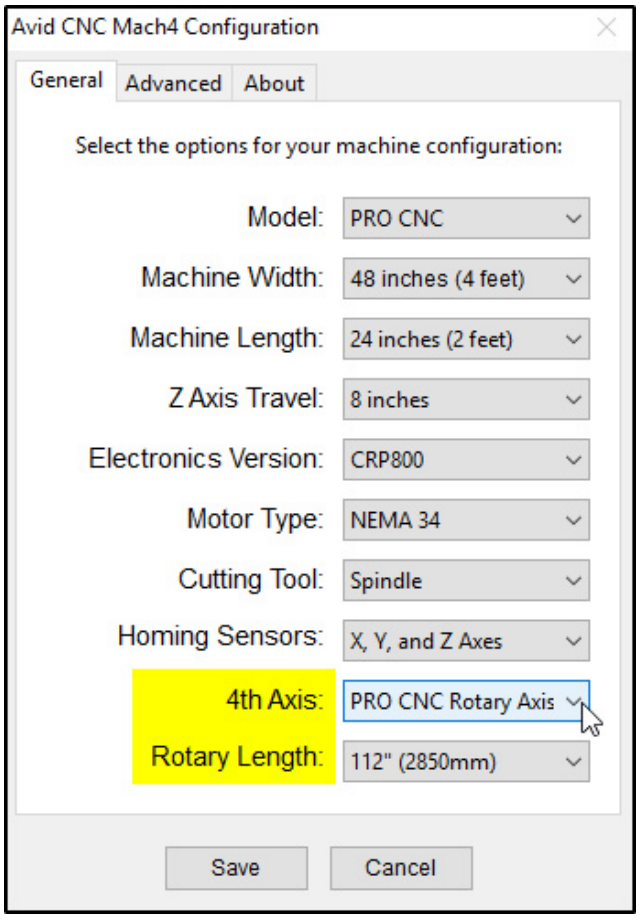
1.3.1 Mach4 Setup

The instructions for calibrating your Avid CNC Rotary Axis make use of Avid CNC's version of Mach4 CNC controller software, version 1.0.4 or newer (https://www.avidcnc.com/mach4-cnc-control-software-p-165.html) and the Auto Z and Corner Finding Touch Plate (https://www.avidcnc.com/auto-z-and-corner-finding-touch-plate-p-288.html). Follow the instructions below to configure Mach4 for use with your rotary axis.

Mach4 Usage Note

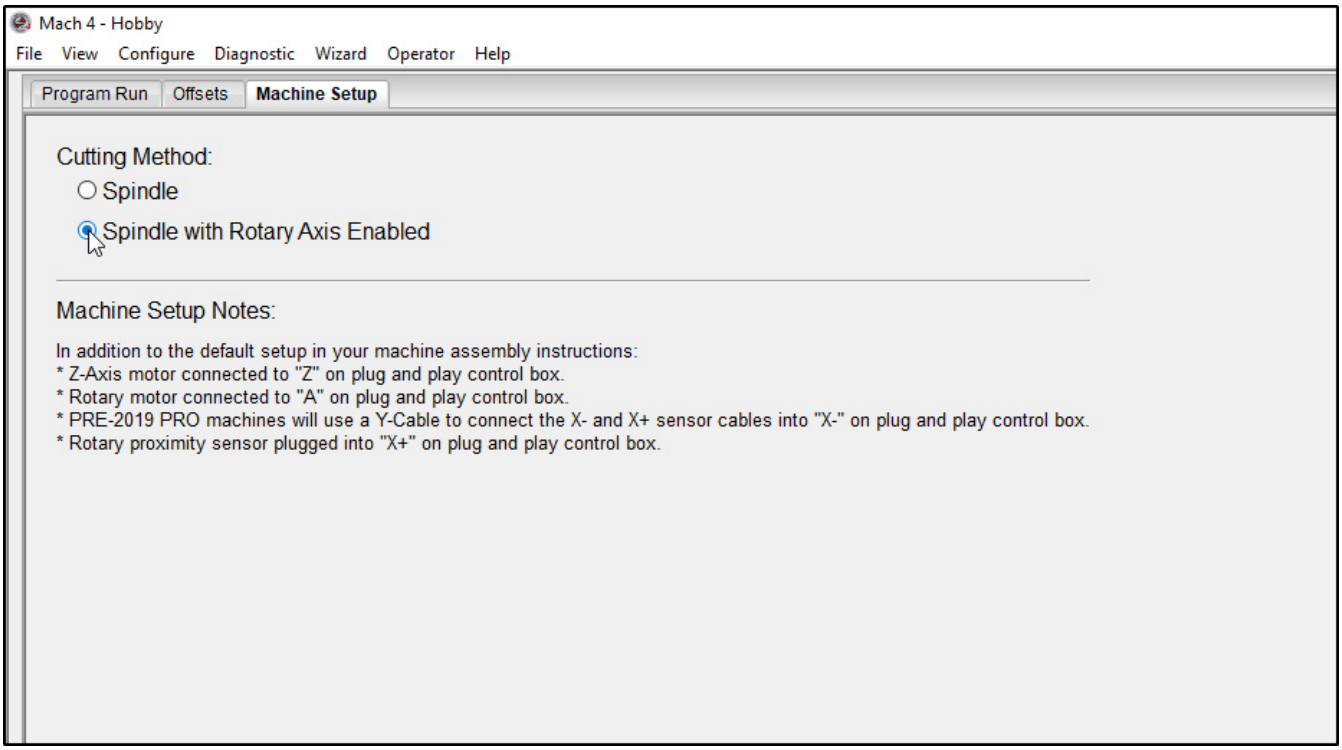
If you have not previously installed and configured Mach4 for your CNC machine, complete the CNC Software Setup Guide (https://www.avidcnc.com/support/instructions/software/mach4) prior to continuing with this section.

1.3.1.1



- In the Avid Mach4 Configuration menu, select the **Avid CNC Rotary Axis** 4th Axis option.
- Select the appropriate length of your rotary axis.
- Save these changes.

> **Mach4 Usage Note**
>
> If you have already configured Mach4 with these rotary options, you do not need to save any changes.



- On the Machine Setup Tab, select a **Rotary Axis Enabled** cutting method.

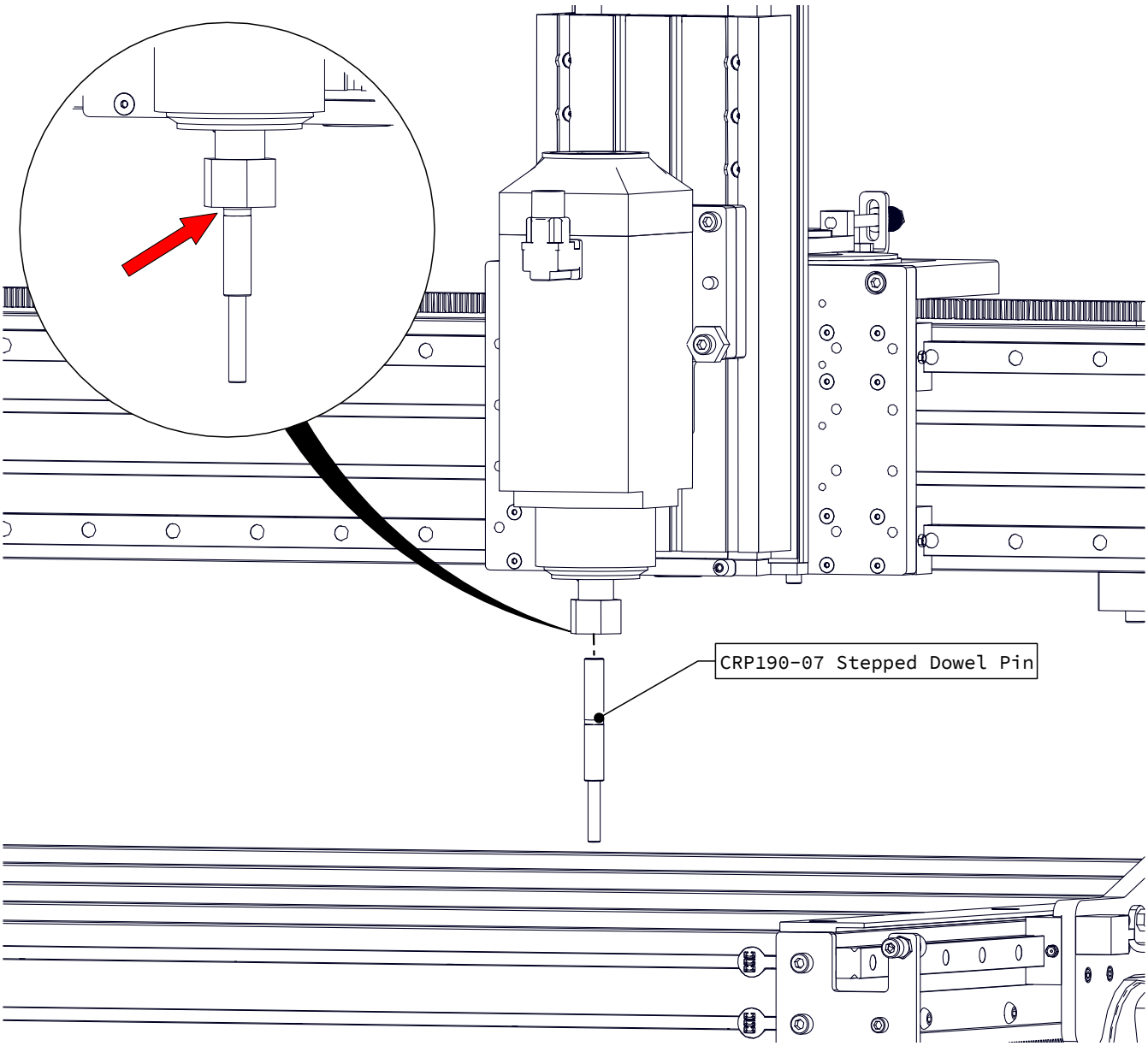
Mach4 Usage Note

The Machine Setup Notes will list any motor/sensor connections that may need to be changed when using rotary.

1.3.2 Frame Alignment

The frame alignment procedure will assist in leveling your rotary frame across the length of the gantry, as well as squaring the rotary frame in relation to your machine.

1.3.2.1

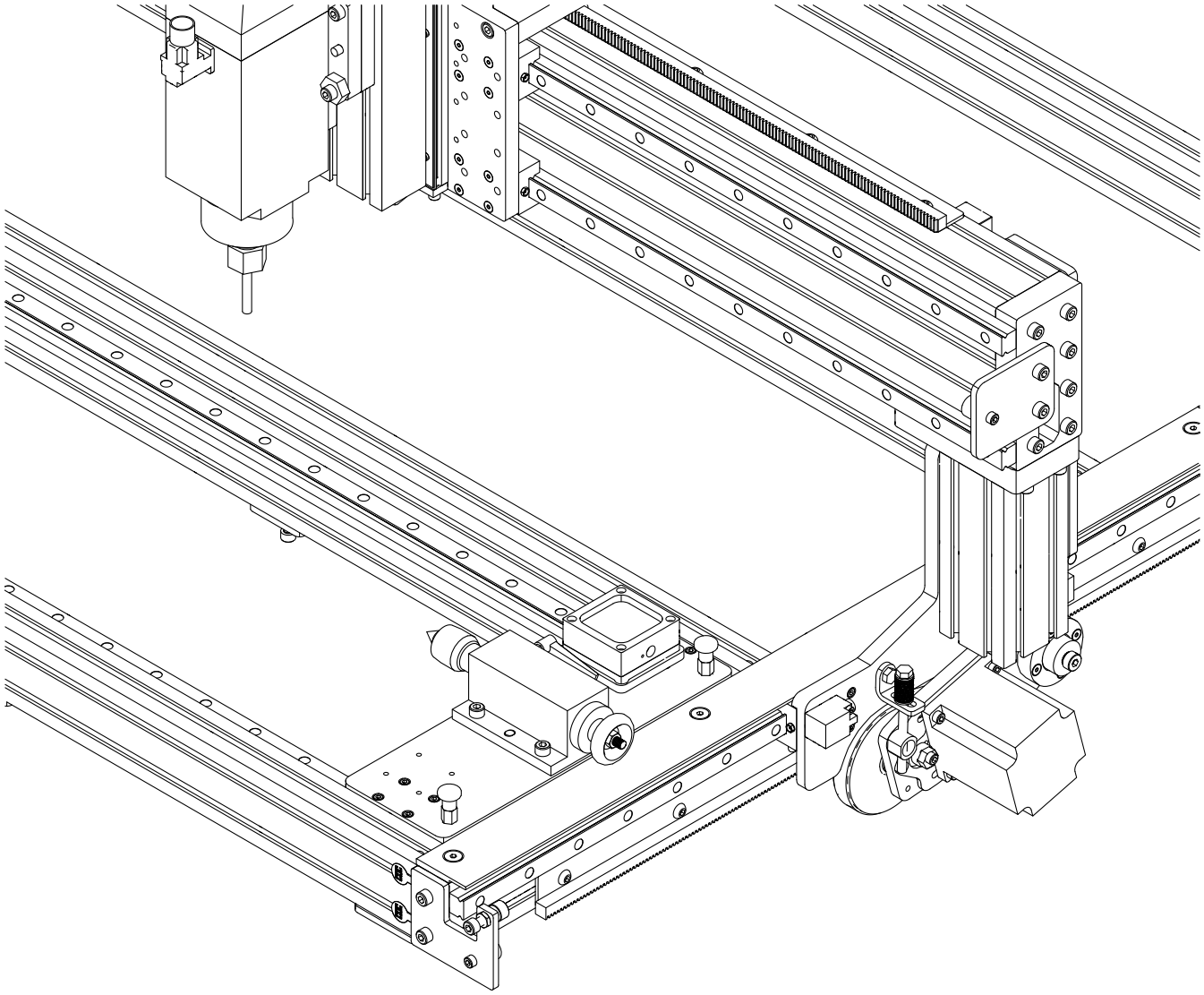


- Using a 1/2" collet, insert the CRP190-07 stepped dowel pin into the spindle until the indicated groove is at the bottom of the collet.
- Fully tighten the collet nut.

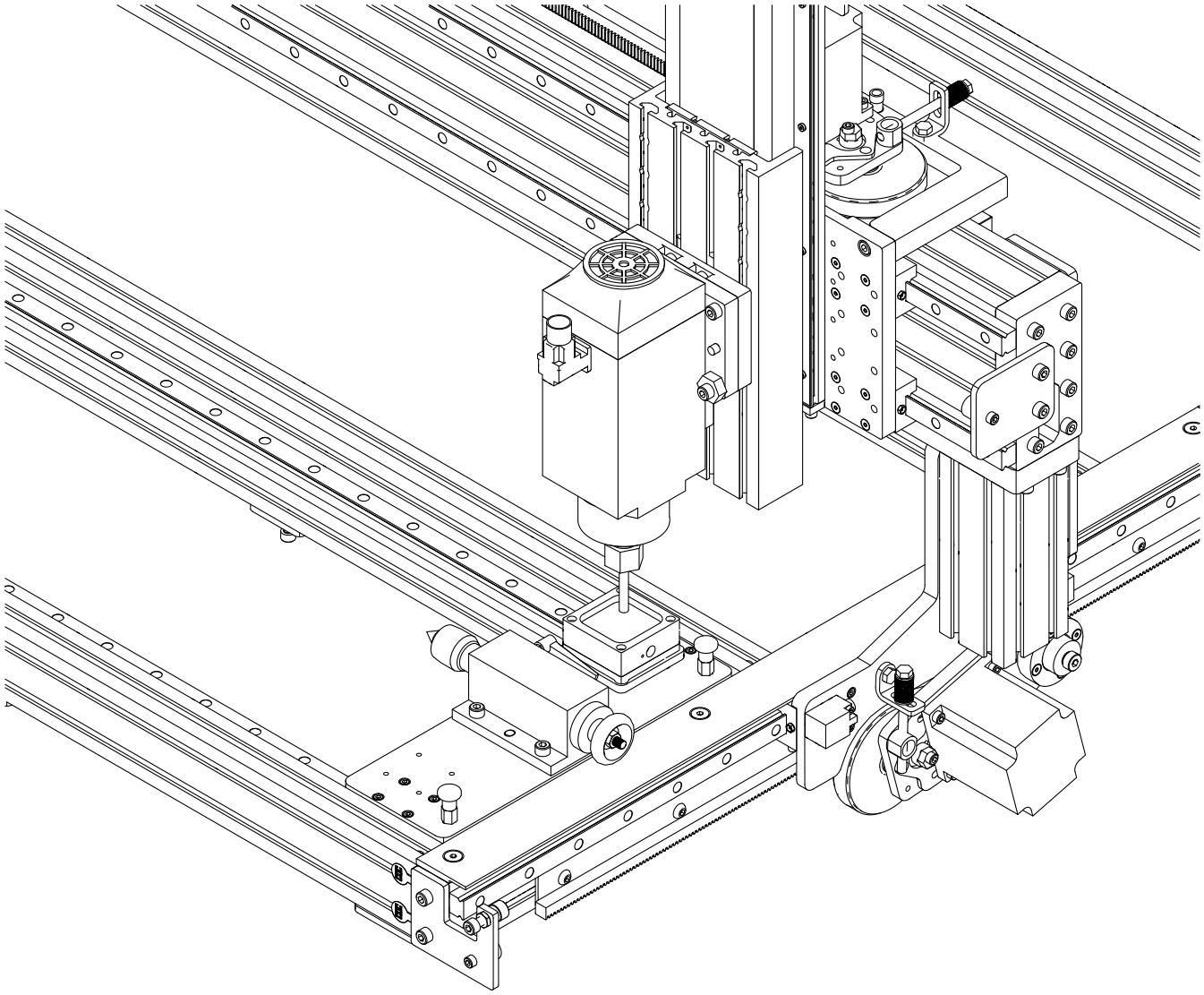
> **Assembly Note**
>
> It is acceptable if the dowel pin bottoms out in the spindle before the groove is at the bottom of the collet.

Previous Revision Rotary Axes

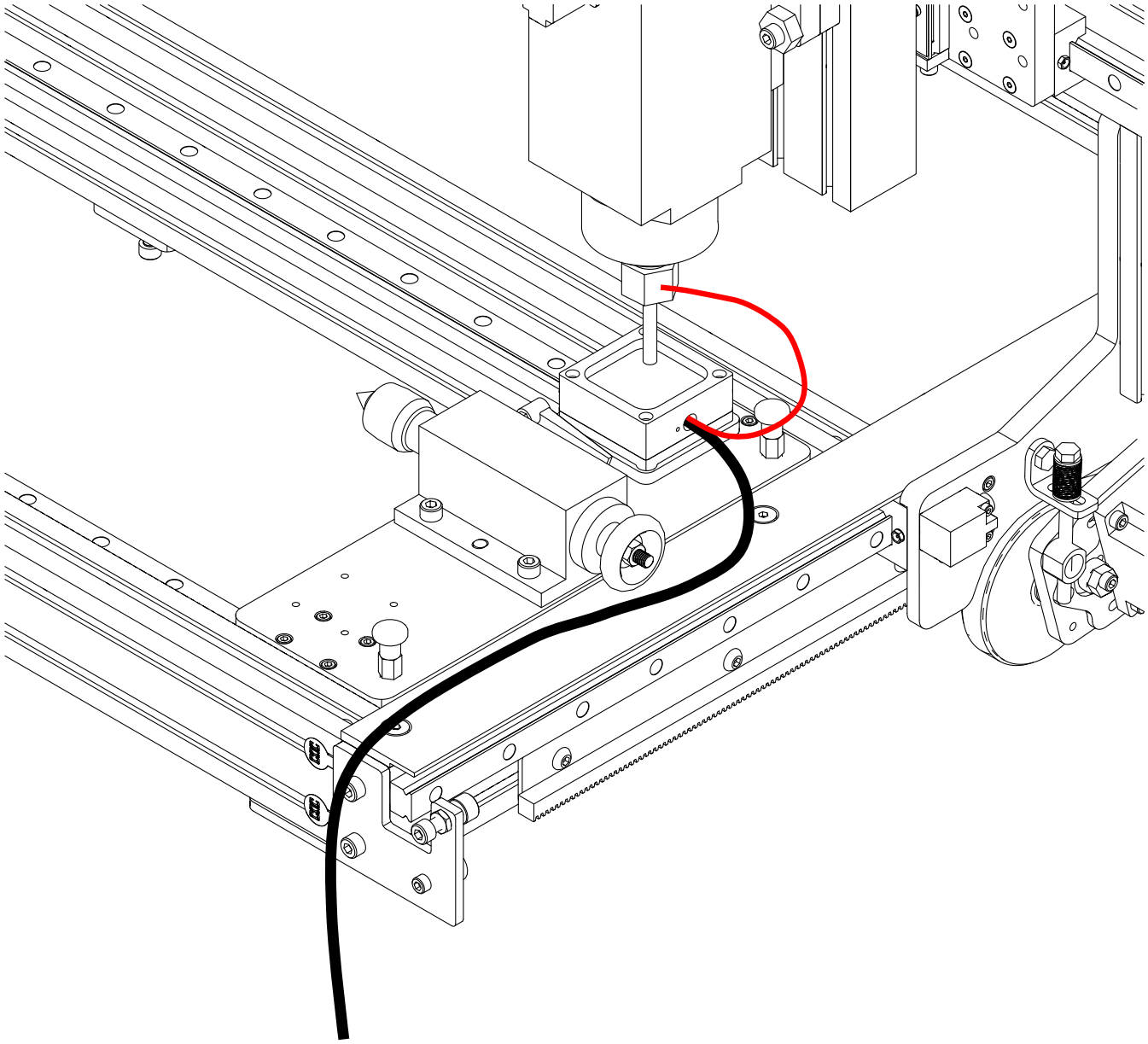
If your CRP190-00 Calibration Kit contains a non-stepped M8 dowel pin, insert the beveled end into the spindle using an 8mm collet.



- Position the tail stock at the end of the rotary frame as indicated.
- Lock the tail stock in place using the spring plungers.

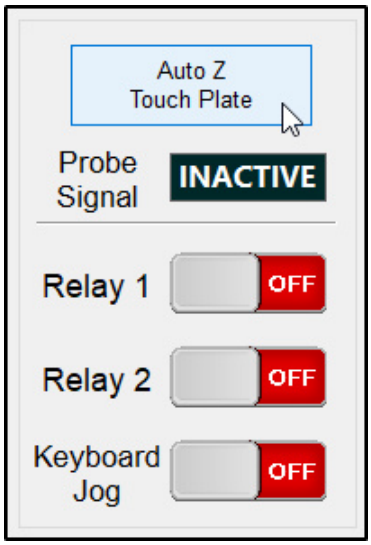


- Place your auto Z touch plate on the touch plate isolator.
- Position the bottom of the dowel pin roughly 25mm (1") above the center of the touch plate.



- Ensure the magnet from the touch plate is attached to the collet nut on the spindle.

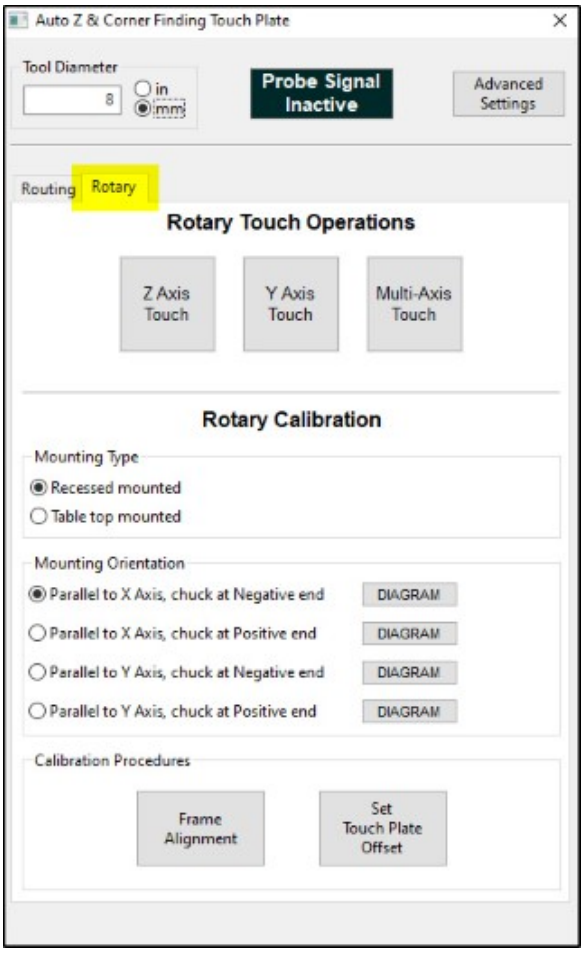
1.3.2.5



- Open Mach4 and click the **Auto Z Touch Plate** button.

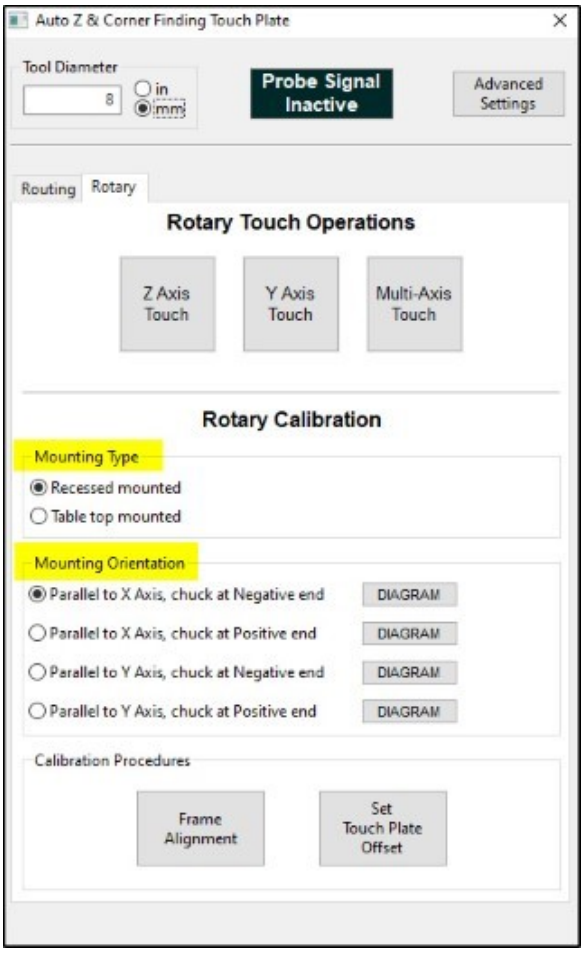
> **Mach4 Usage Note**
>
> You will need to "Enable" Mach4 to allow access to the Auto Z Touch Plate button.

1.3.2.6

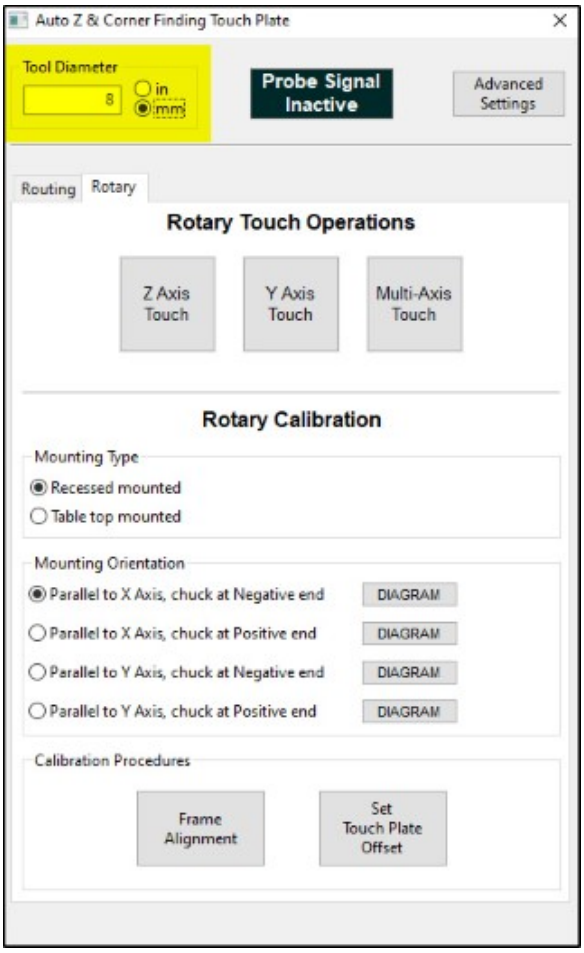


- There will now be a **Rotary** tab with rotary-specific touch off and calibration functions.

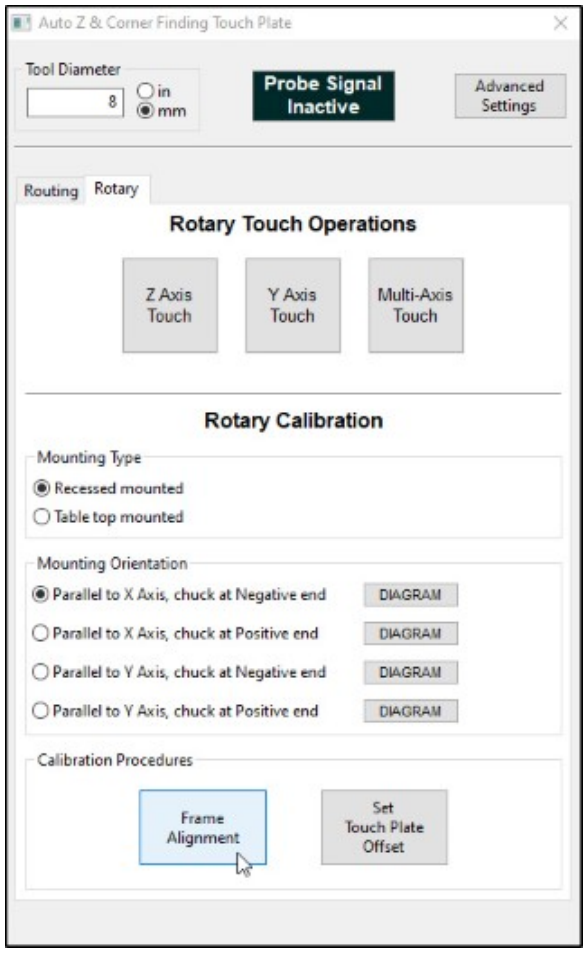
1.3.2.7



- In the **Rotary Calibration** section, select the Mounting Type and Orientation of your rotary assembly.
- The **Diagram** buttons show the orientation for each Mounting Orientation option.



- Enter the tool diameter of **8** and select **mm** for the units.

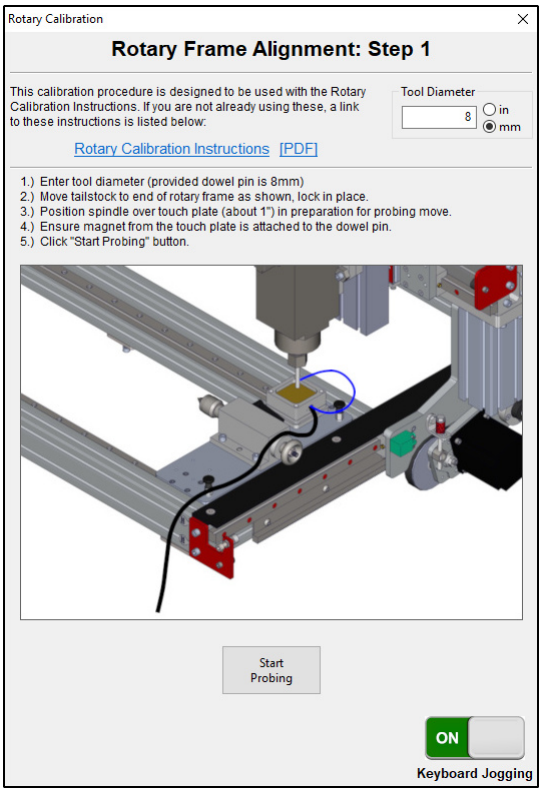


- Click the **Frame Alignment** button.

Mach4 Usage Note

Use of the Rotary Touch Operations require your X, Y, and Z axes to be homed.

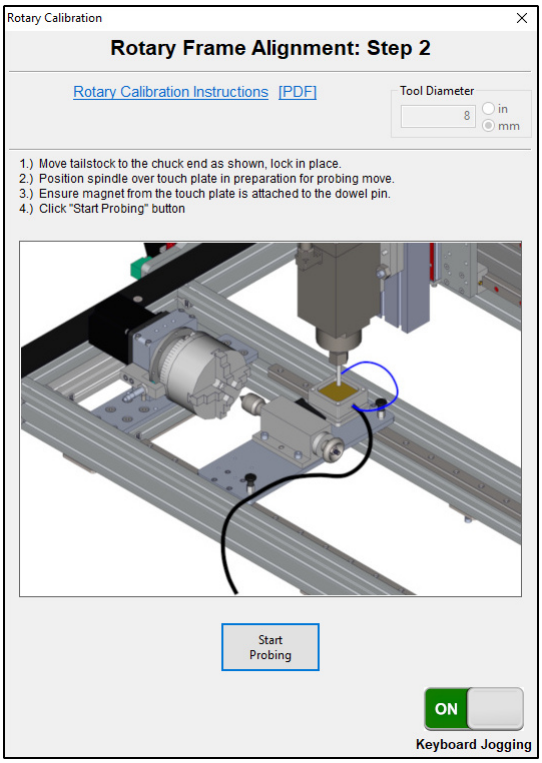
1.3.2.10



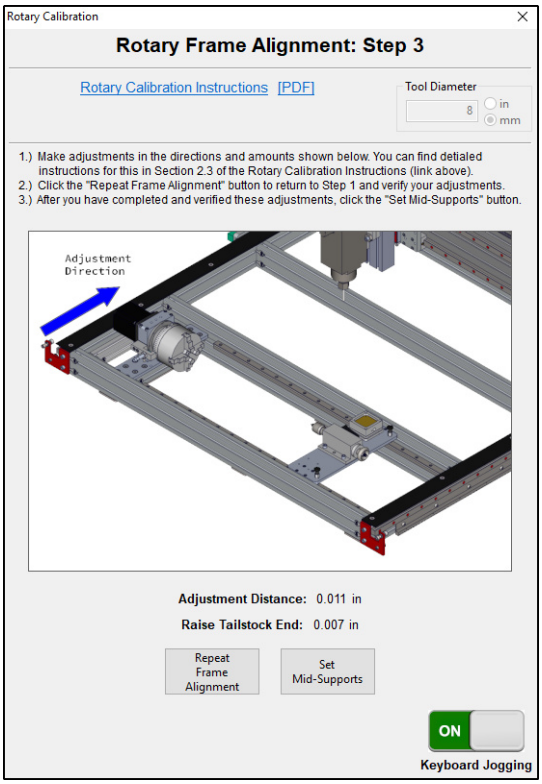
- Follow the instructions shown in Mach4 for **Rotary Frame Alignment: Step 1** to probe the first position.

> **Mach4 Usage Note**
>
> The images and instructions shown in Mach4 will differ depending on your mounting type, mounting orientation, and rotary frame length.
>
> If the dowel pin being used is not magnetic, attach the Auto Z Touch Plate magnet to the collet nut.

1.3.2.11



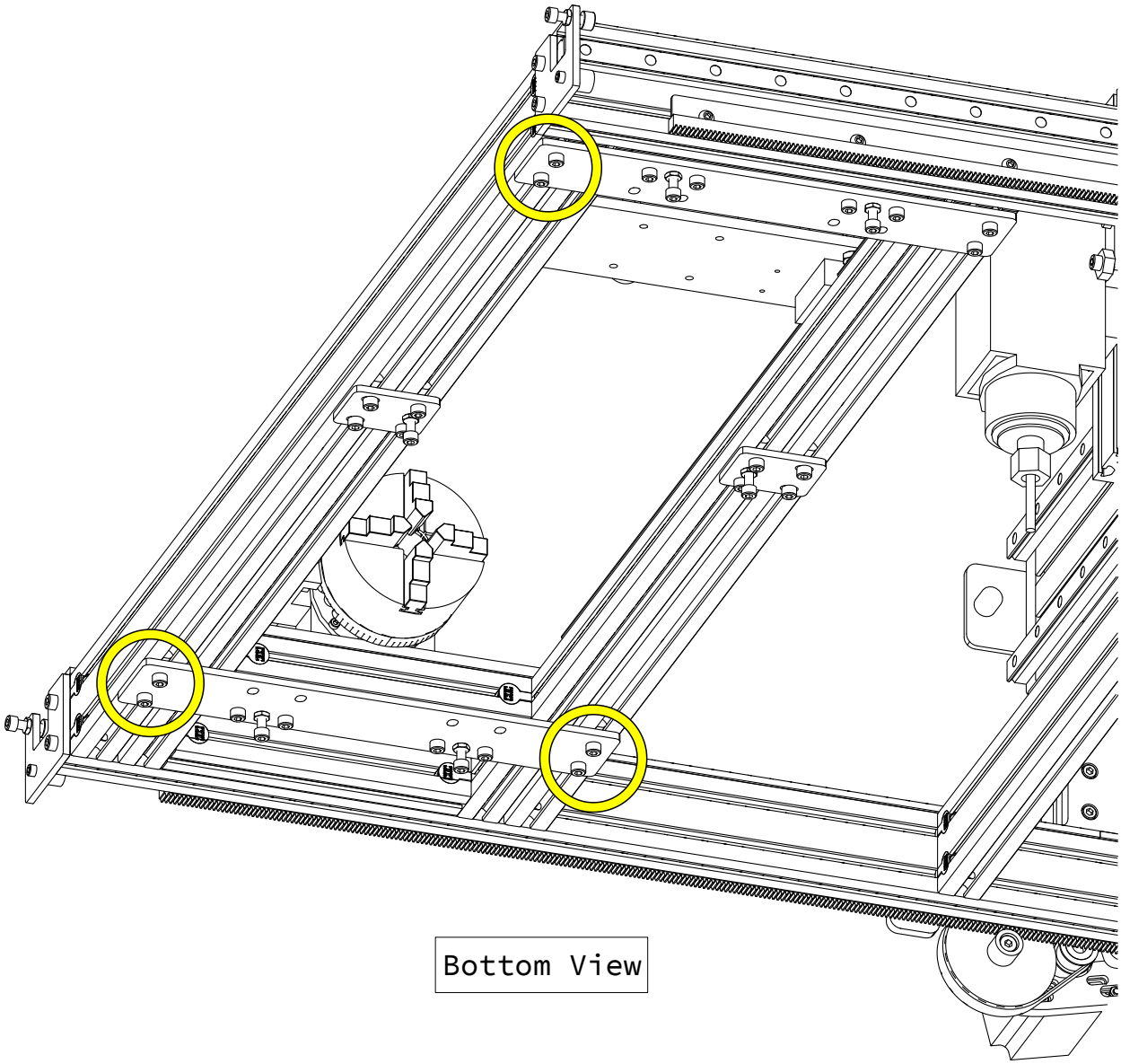
- Follow the instructions shown in Mach4 for **Rotary Frame Alignment: Step 2** to probe the second position.



- You will now see two values on the screen:
  - **Adjustment Distance**: Amount to adjust the end of the rotary frame shown in the image. This will square the rotary frame to the gantry.
  - **Raise Chuck/Tailstock End**: Amount to adjust the jack screws on the designated end of the rotary frame. This will level the rotary frame in relation to your machine table.

Assembly Note

The following steps will describe how to adjust the rotary frame and use the jack screws. It is recommended to make adjustments until the values shown above are less than 0.005".

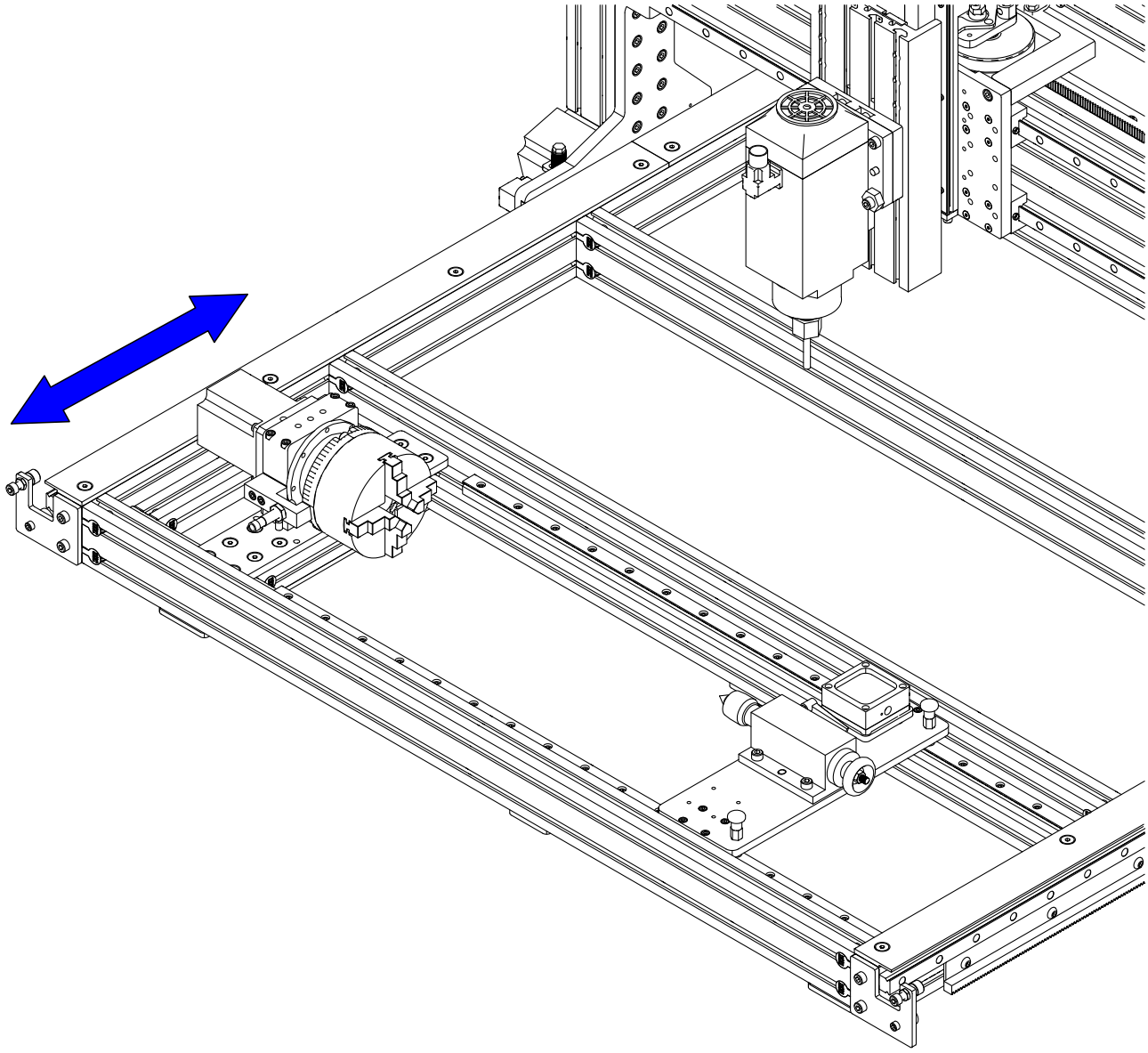


Bottom View

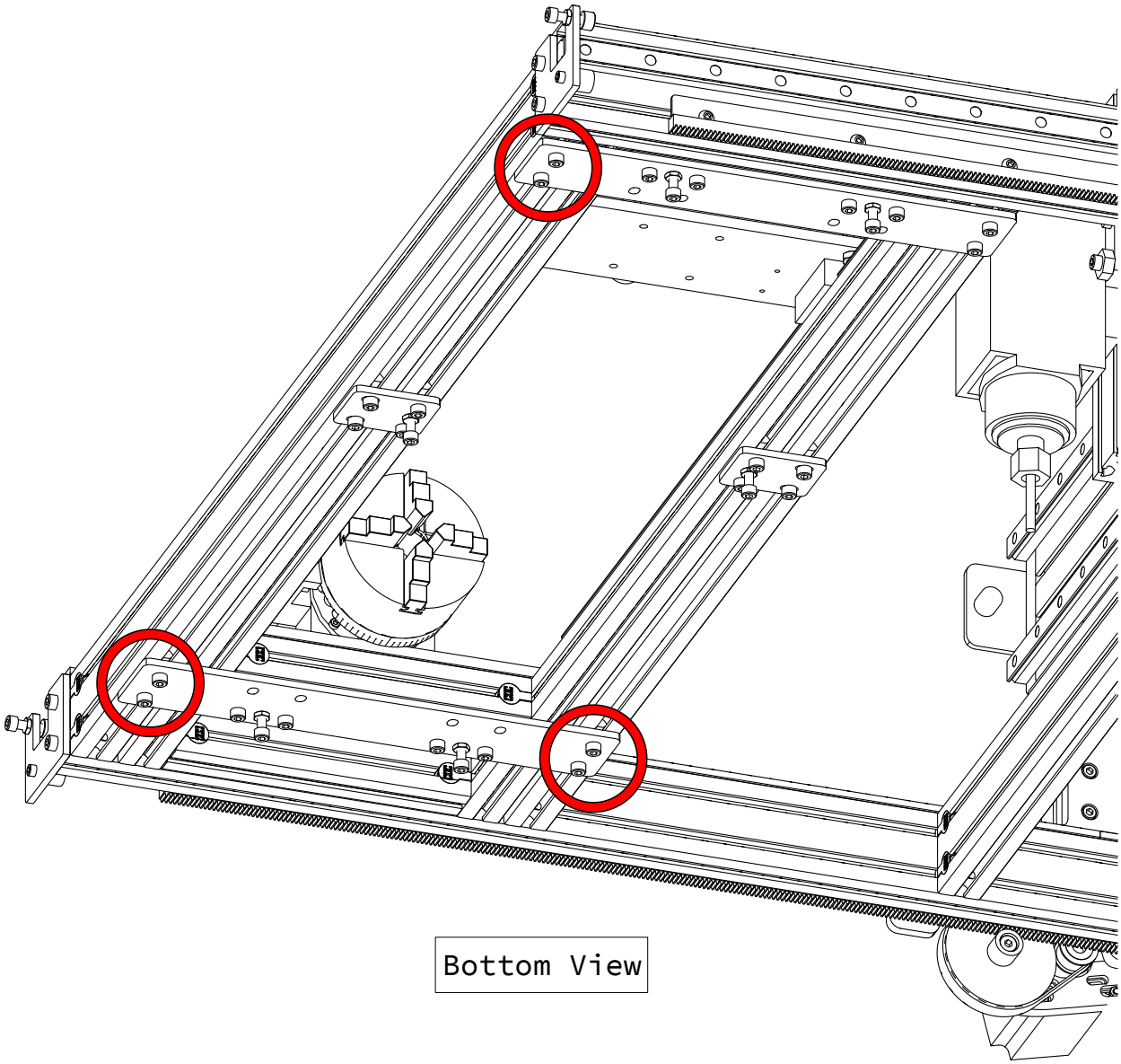
- At the three indicated corners, loosen the fasteners attaching the undermount plates to the machine crossmembers.

Assembly Note

DO NOT loosen the fasteners at the fourth, unmarked corner.



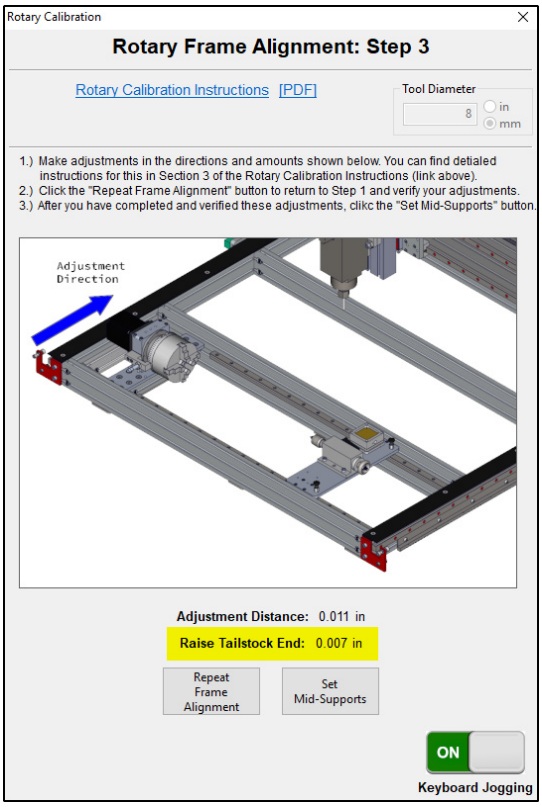
- Adjust the frame in the direction and amount that was shown on the screen in Mach4 (Step 1.3.2.12).



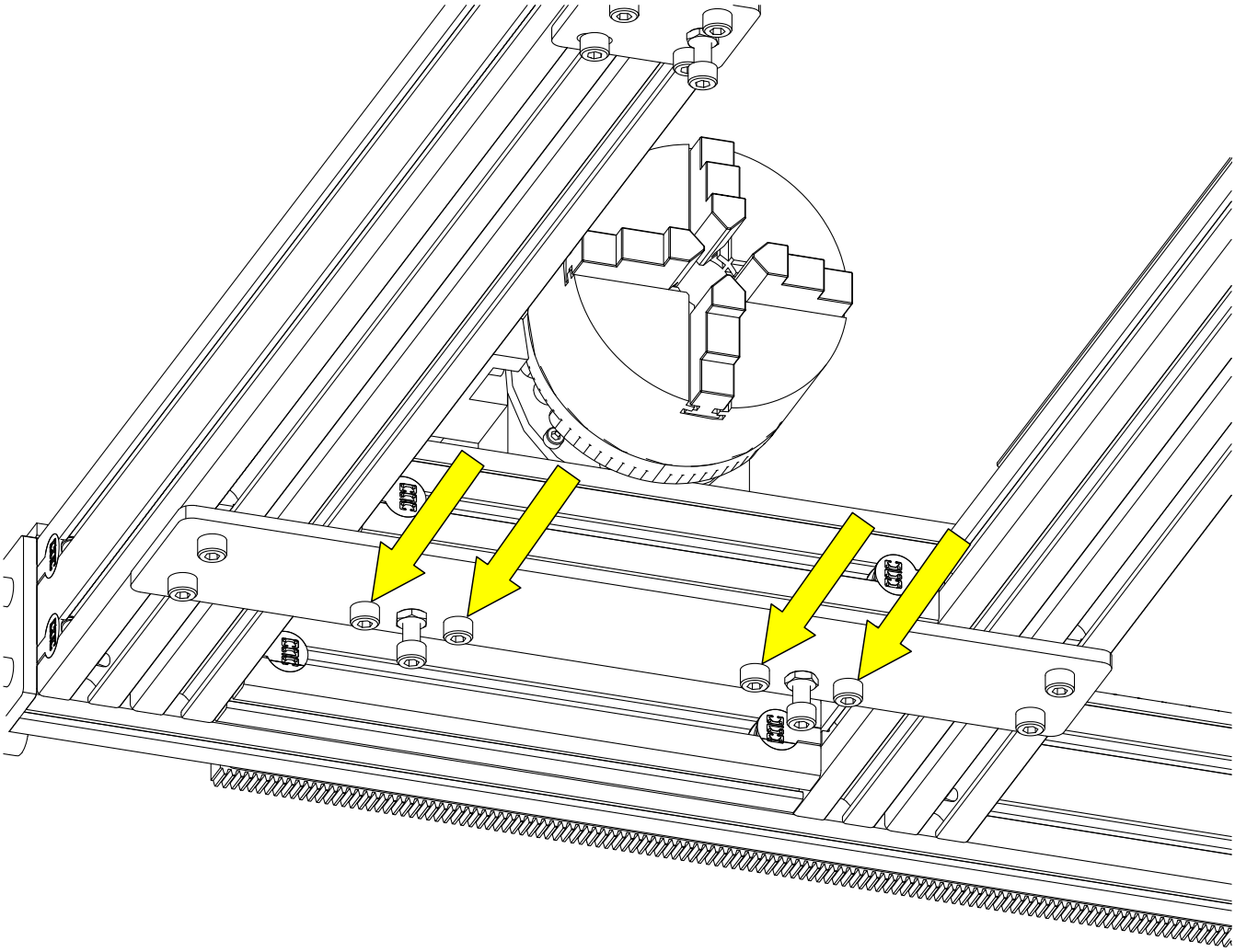
Bottom View

- At the three indicated corners, tighten the fasteners.

1.3.2.16



- In the following steps, adjust the jack screws at the location indicated on the screen in Mach4.

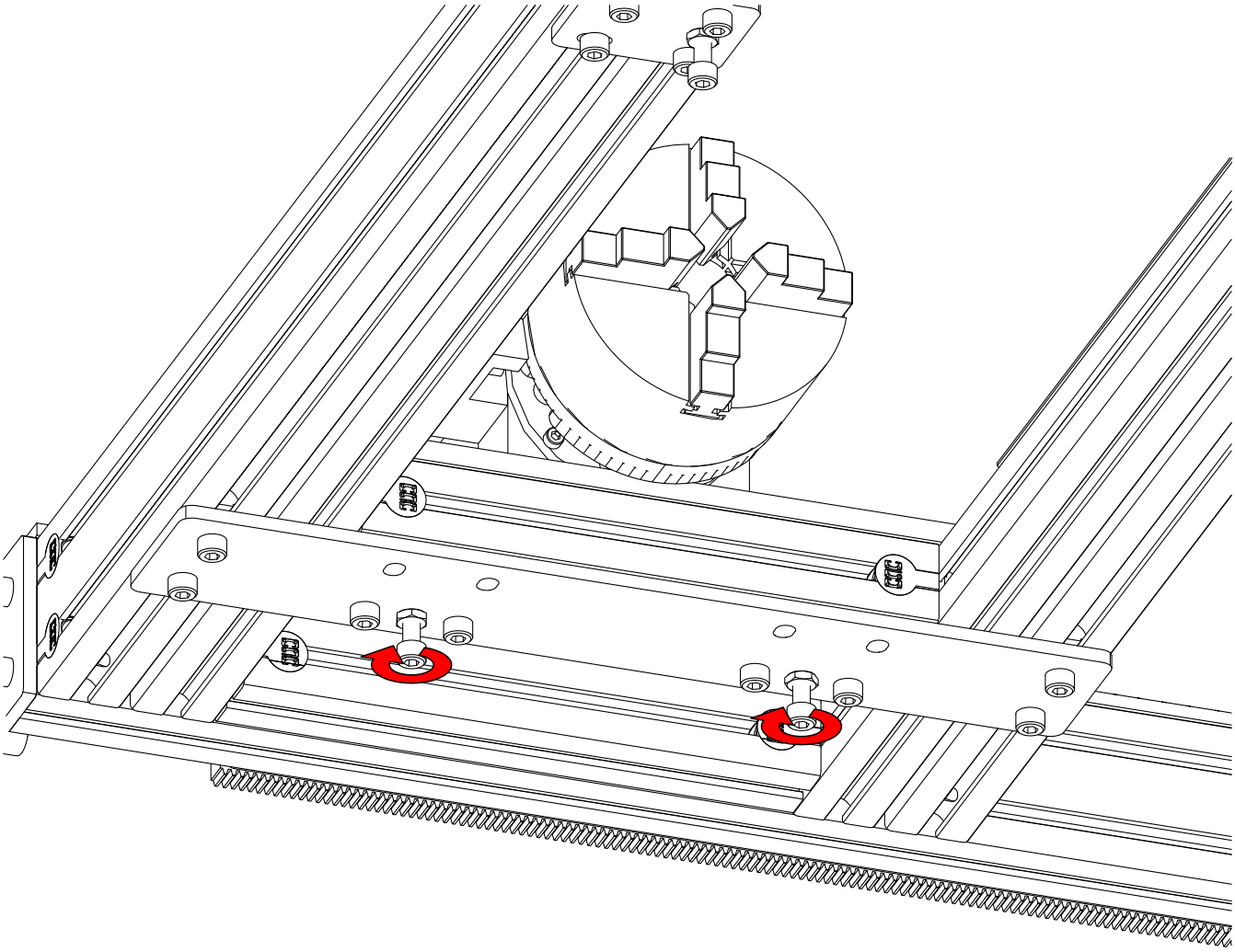


Bottom View

- Loosen the indicated fasteners attaching the undermount plates to the rotary frame.

Assembly Note

Adjusting the jack screws at the tailstock end will follow the same procedure.

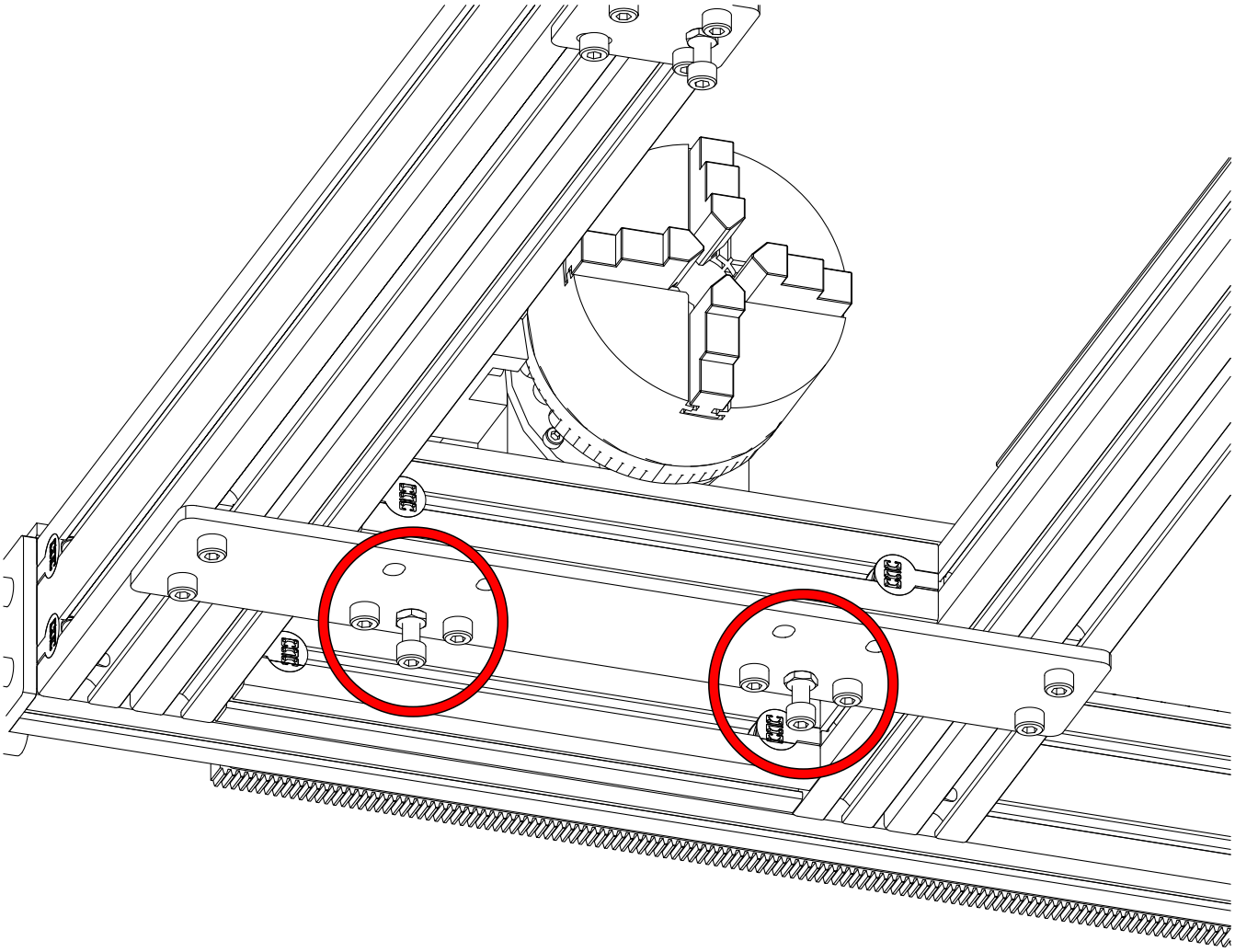


Bottom View

- Loosen the jack screw jam nuts.
- Tighten the jack screws to raise the rotary frame.

Assembly Note

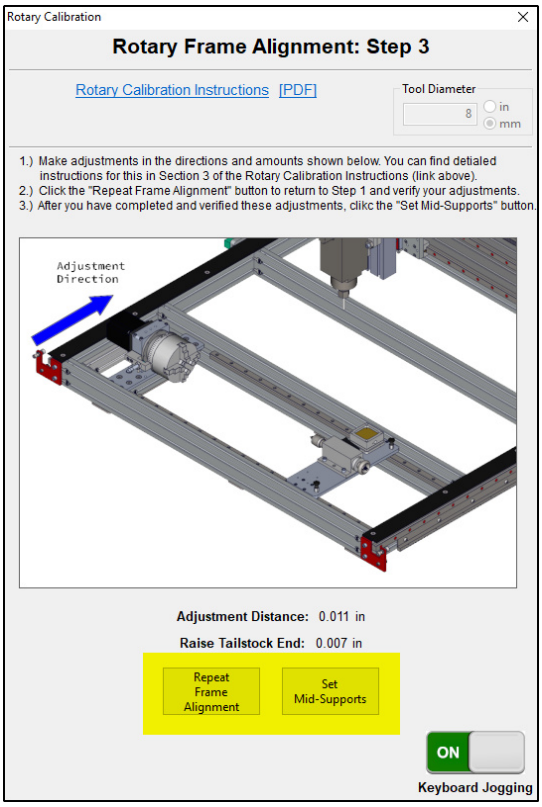
1/4 turn of the jack screw will raise the frame approximately 0.3mm (0.012").



Bottom View

- Tighten the fasteners and jam nuts at the indicated locations.

1.3.2.20



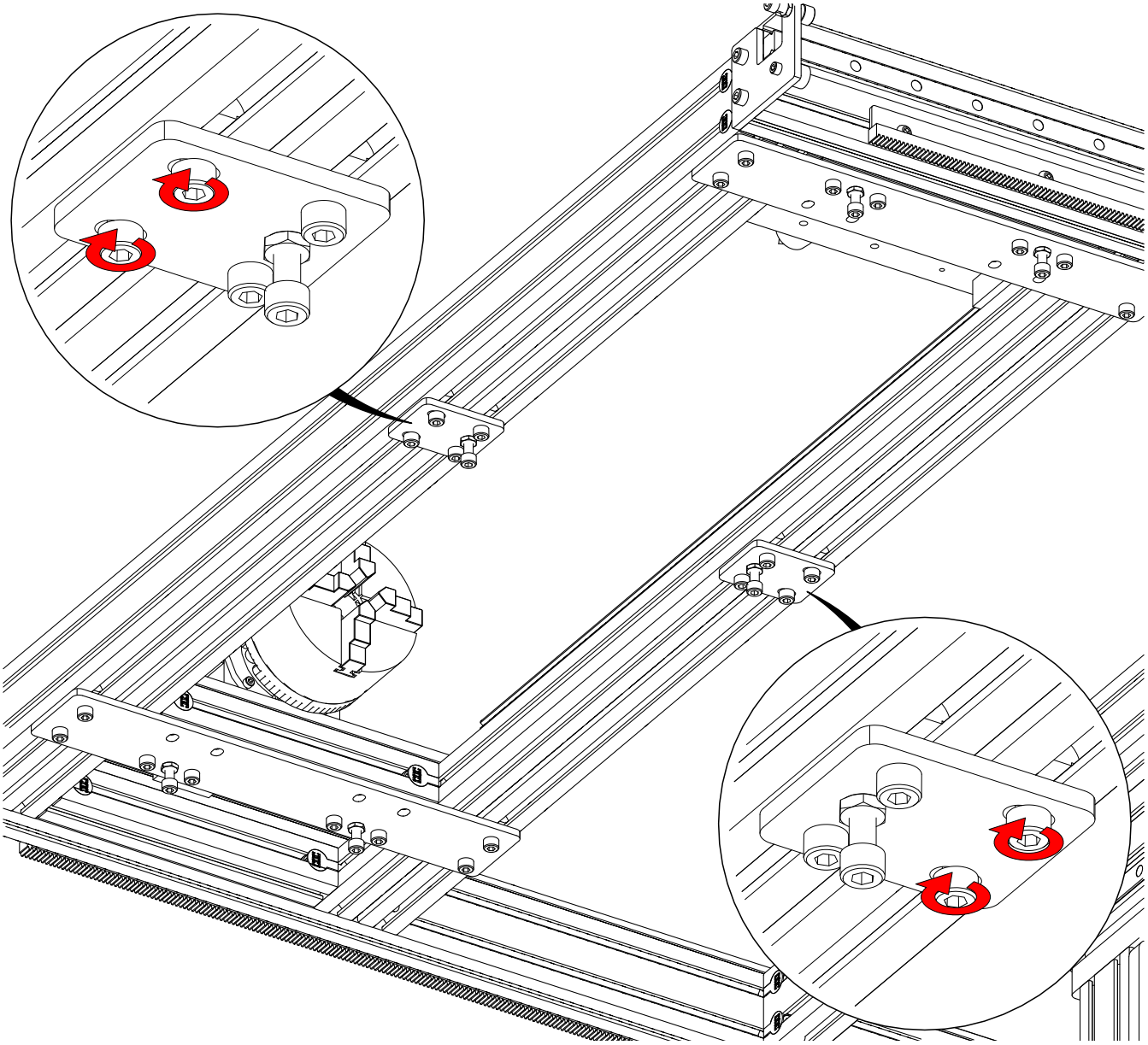
- Use the **Repeat Frame Alignment** button to verify your adjustments using the touch off routine.
- If no more adjustments are required, click the **Set Mid-Supports** button.

Assembly Note

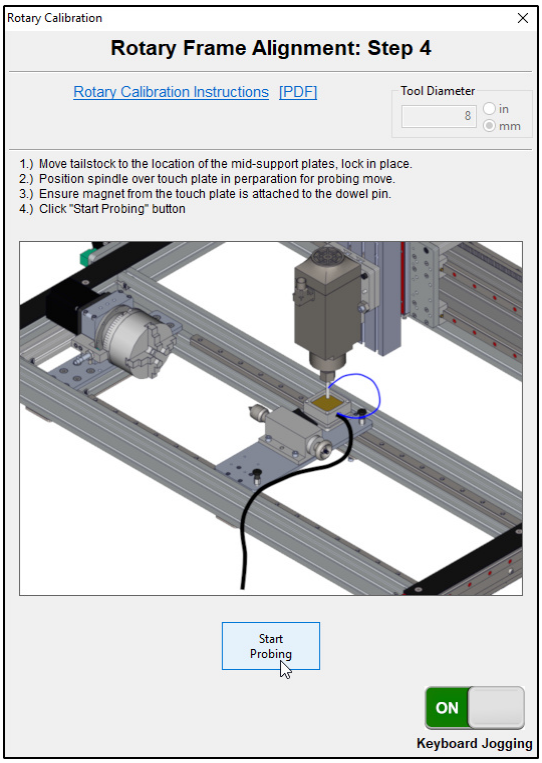
You may need to repeat the frame alignment procedure more than once to achieve proper alignment.

1.3.3 Mid-Supports

1.3.3.1

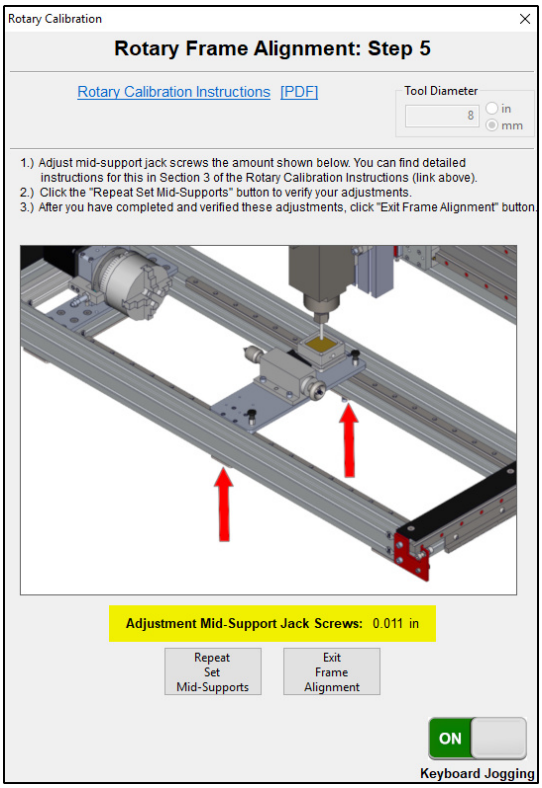


- Tighten the indicated mid-support fasteners.

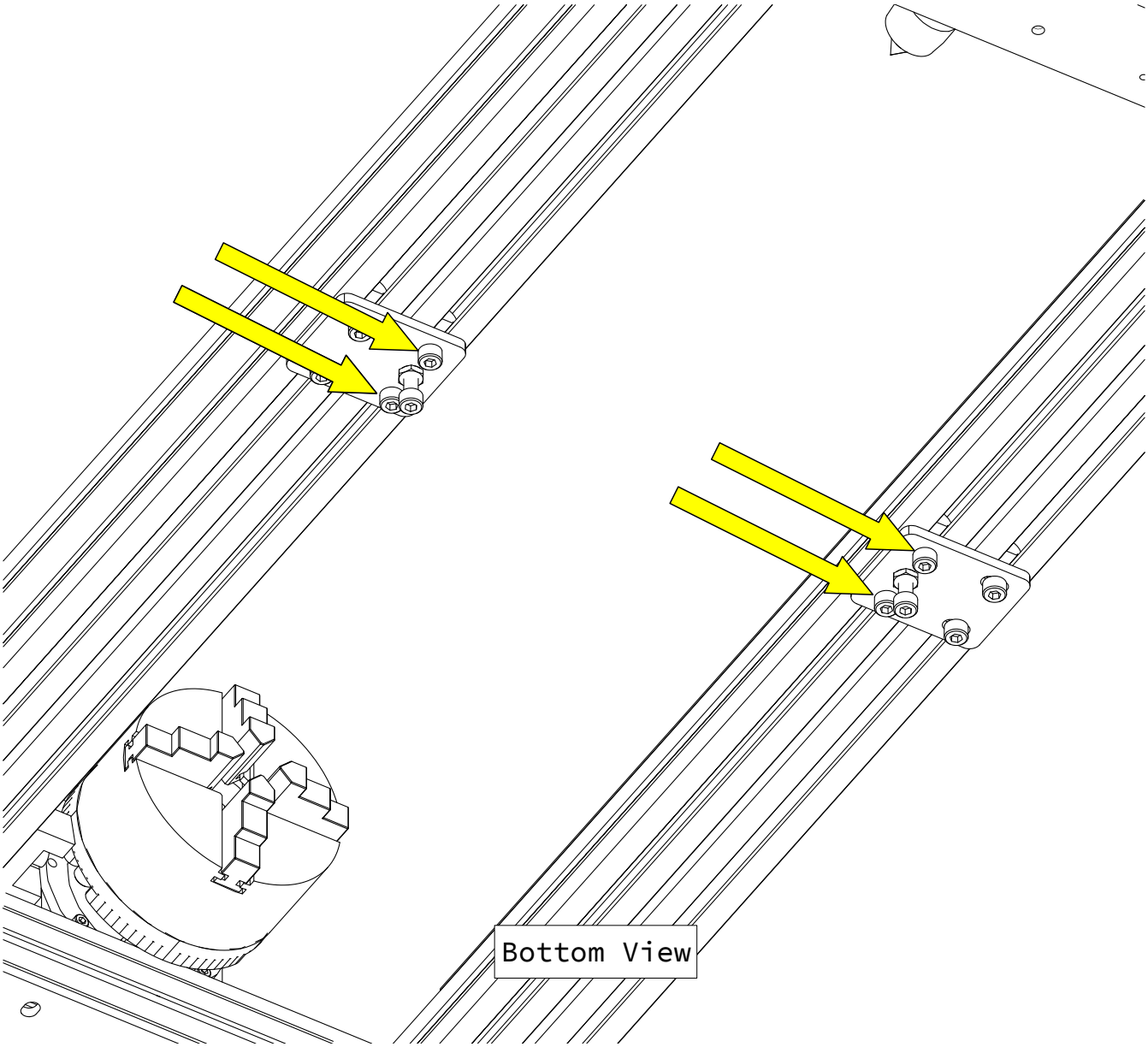


- Follow the instructions shown in Mach4 for **Rotary Frame Alignment: Step 4** to probe at the mid-support location.

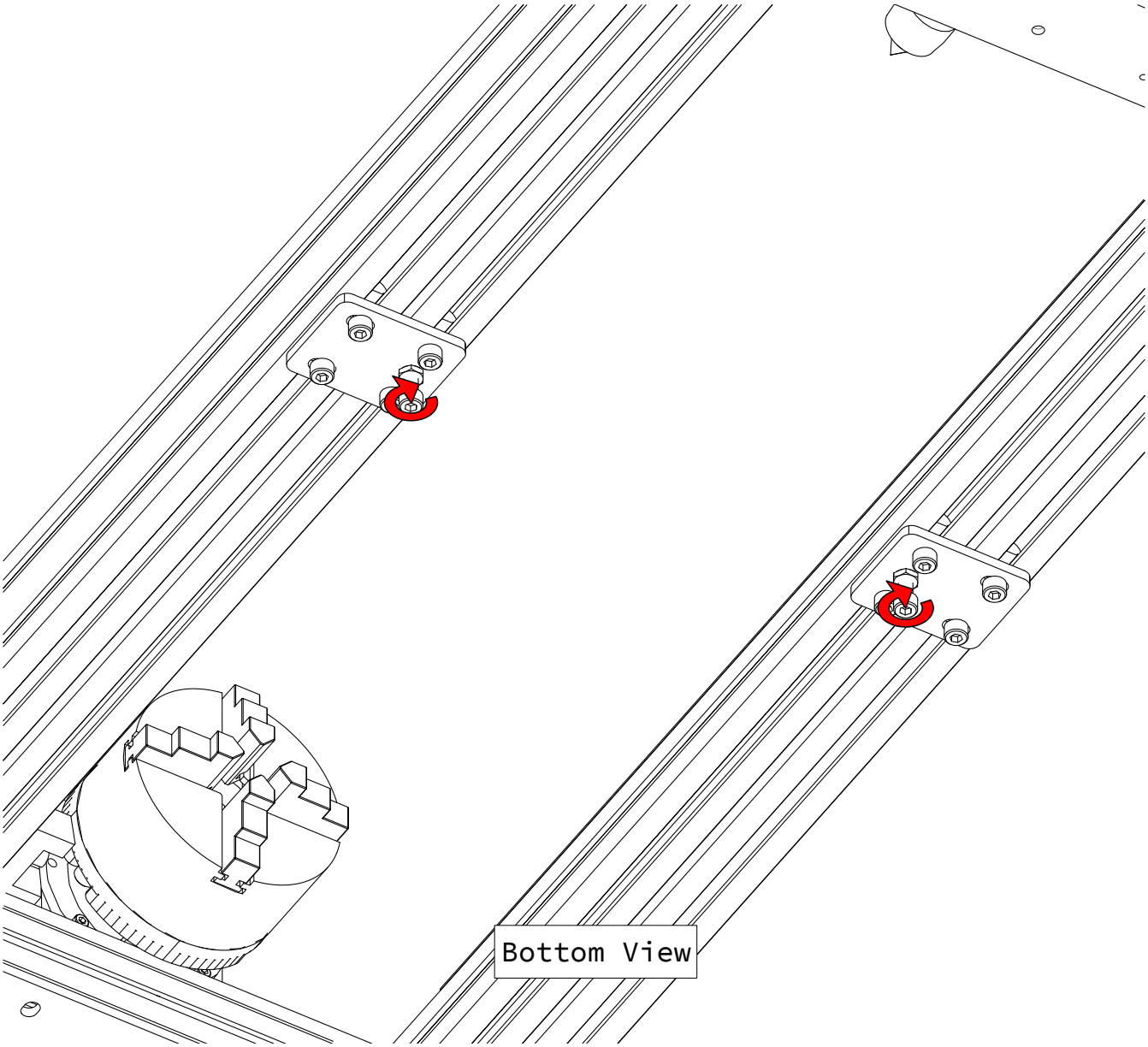
1.3.3.3



- You will now see an amount to adjust the mid-support jack screws.



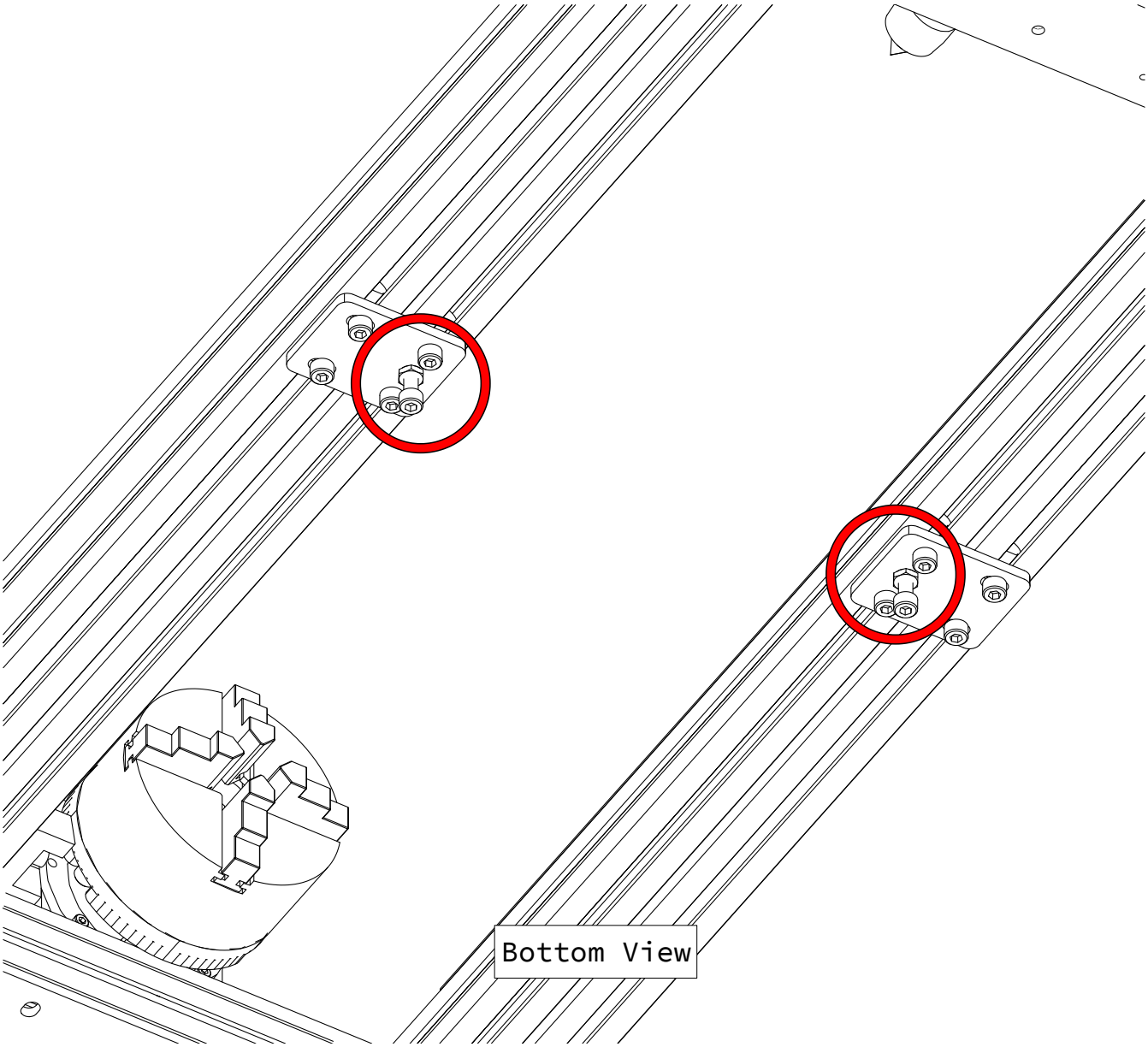
- Loosen the fasteners attaching the mid-support plates to the rotary frame.



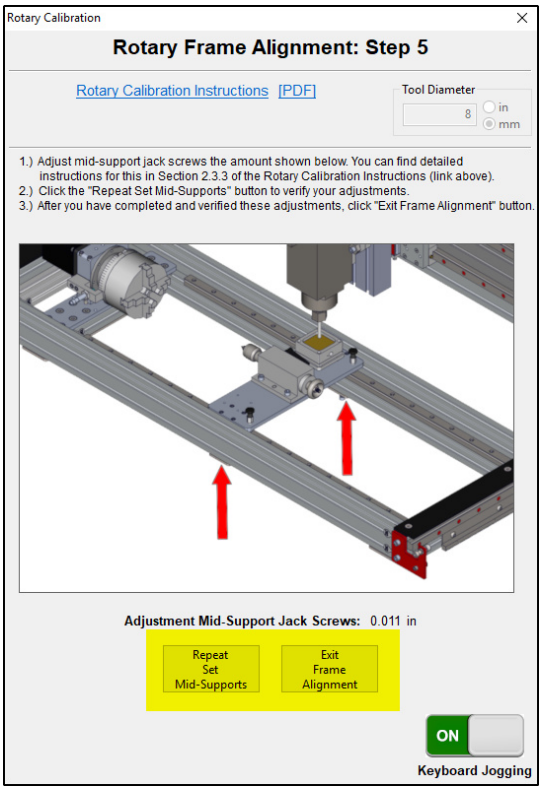
- Loosen the jack screw jam nuts.
- Tighten the jack screws to raise the center of the rotary frame.

Assembly Note

1/4 turn of the jack screw will raise the frame approximately 0.3mm (0.012").



- Tighten the fasteners and jam nuts at the indicated locations.



- Use the **Repeat Set Mid-Supports** button to verify your adjustments using the touch off routine.
- If no more adjustments are required, click the **Exit Frame Alignment** button.

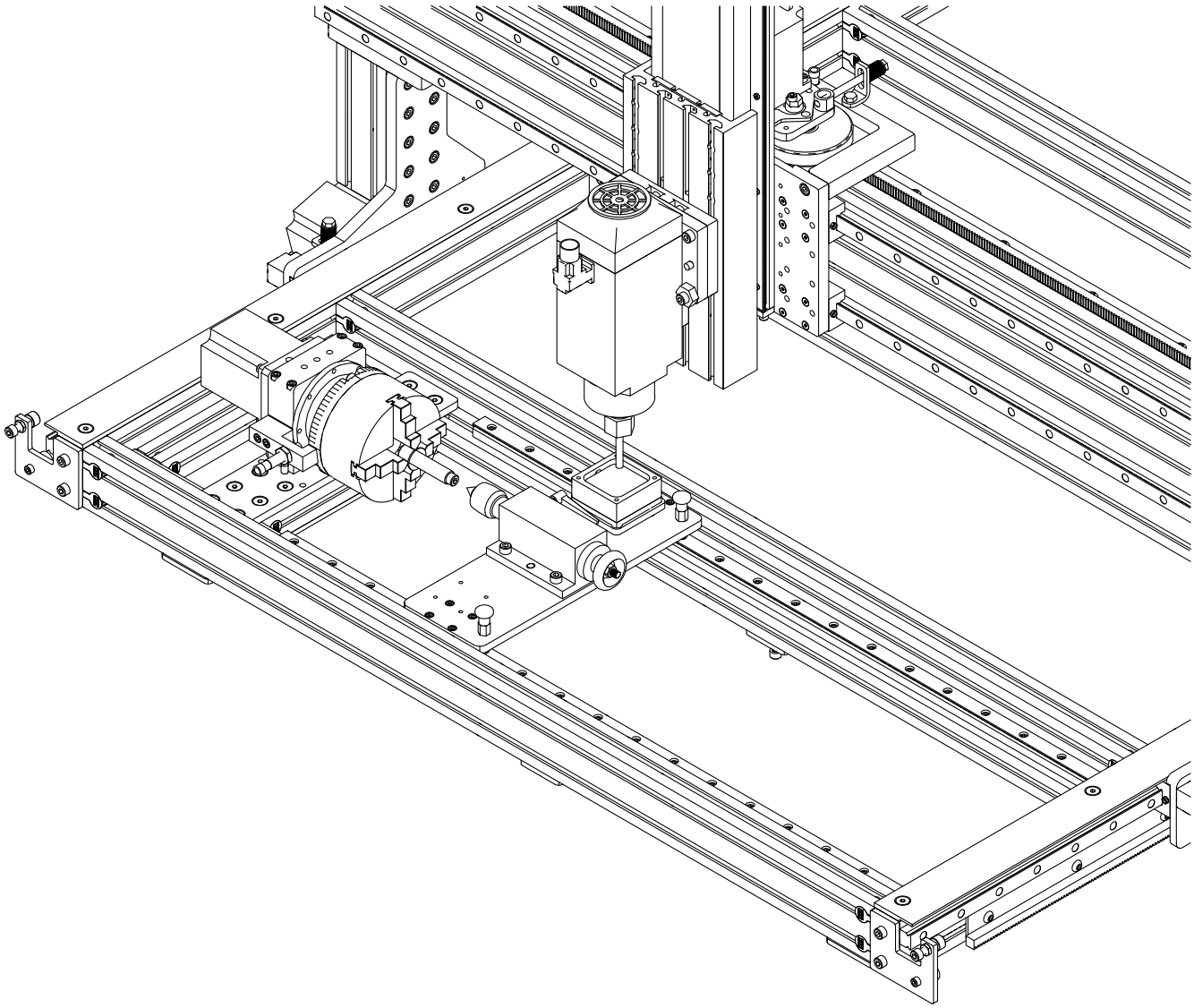
Assembly Note

You may need to repeat the mid-support procedure more than once to achieve proper alignment.

1.4 Touch Plate Offset

This section will determine the offset from the touch plate to the center of the chuck for the Z axis and axis perpendicular to the rotary frame. You will then be able to use the touch plate to set your rotary fixture offsets. This procedure will only need to be completed during initial assembly and installation.

> **Caution**
>
> Before continuing, it is highly recommended to fully read section **1.4 Touch Plate Offset** to be familiar with the probing routines used. Failure to follow the procedure can cause the machine to crash.



Parts and Tools Required

The following parts and tools will be used in Section 1.4

QTY	Part/Description	Packaged In
1	CRP193-00-21.1 [1] : - (1) CRP190-07 Stepped Dowel Pin - (1) CRP193-01, Rotary Chuck Locating Pin	CRP190-00-BASE

Required Tools:

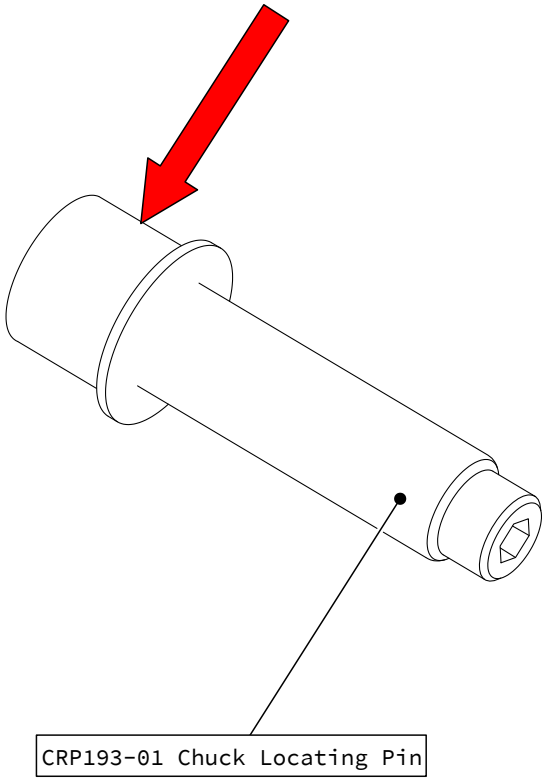
- Auto Z and Corner Finding Touch Plate
- Mach4 CNC Controller Software from Avid CNC

Machine Revision

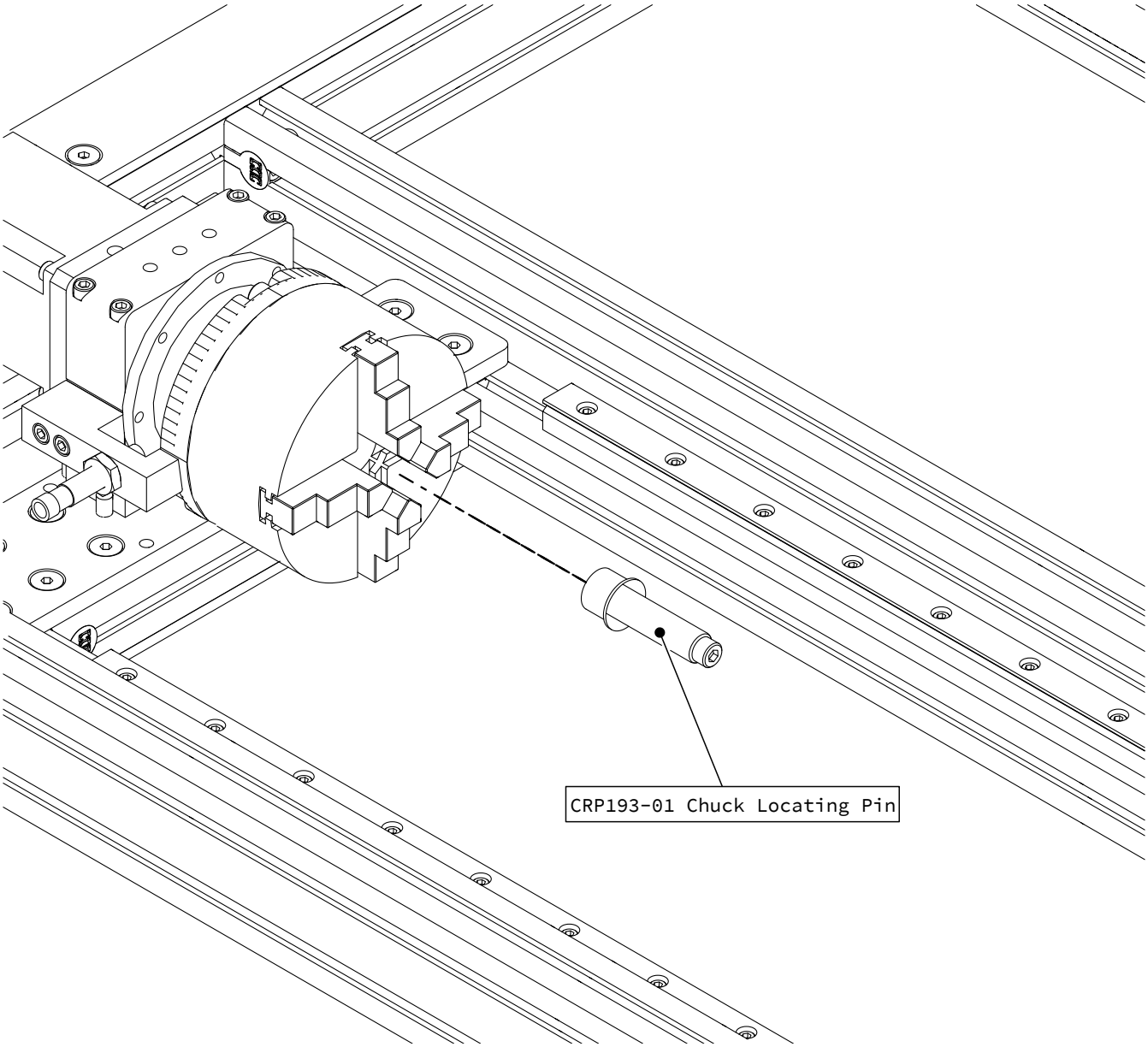
1. If your CRP190-00-BASE contains CRP193-00, you will use the supplied M8 x 120mm Dowel Pin instead of CRP190-07 Stepped Dowel Pin.

1.4.1 Set Offset

1.4.1.1



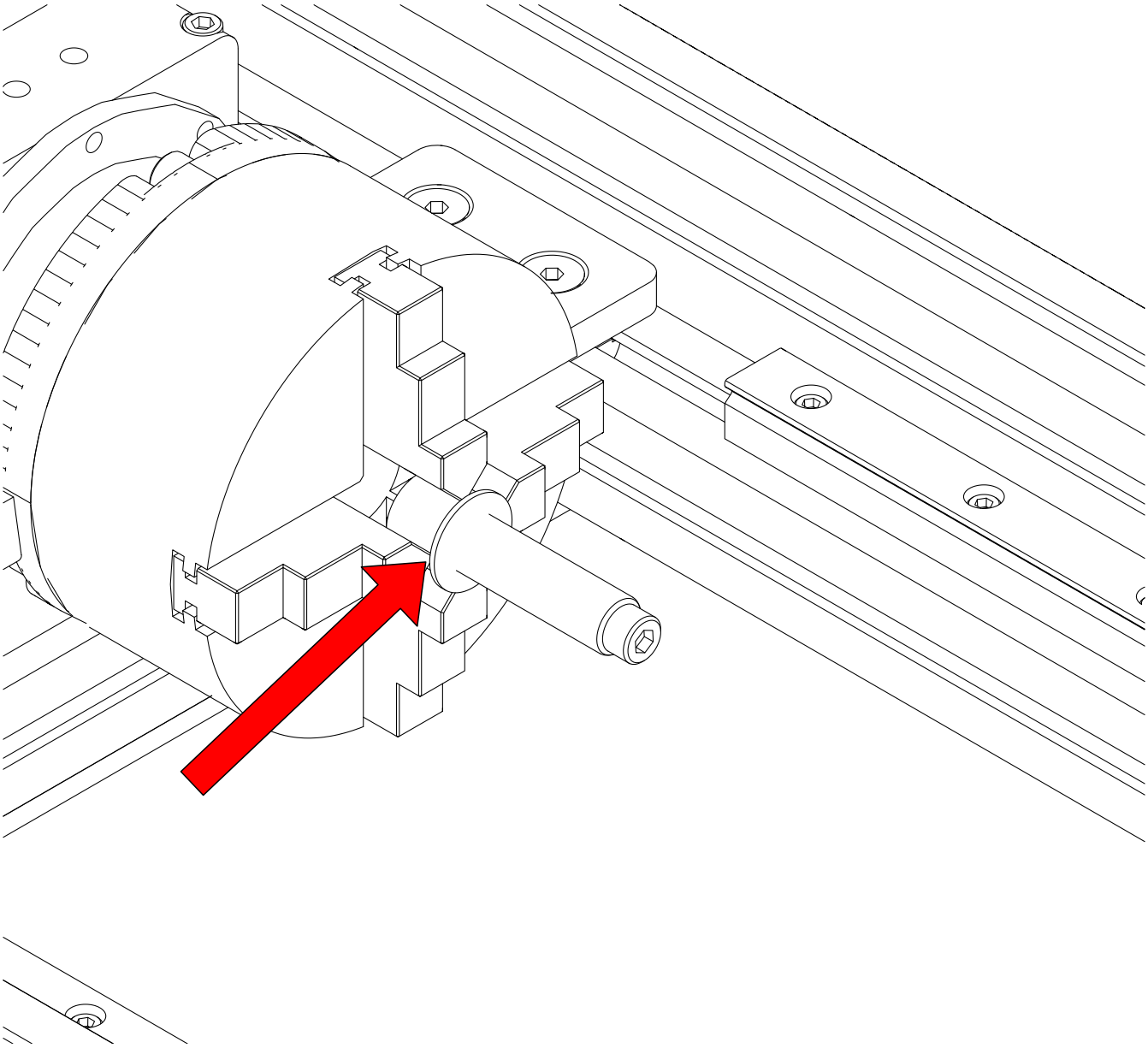
- Position the preinstalled busing at the end of the chuck locating pin as indicated.



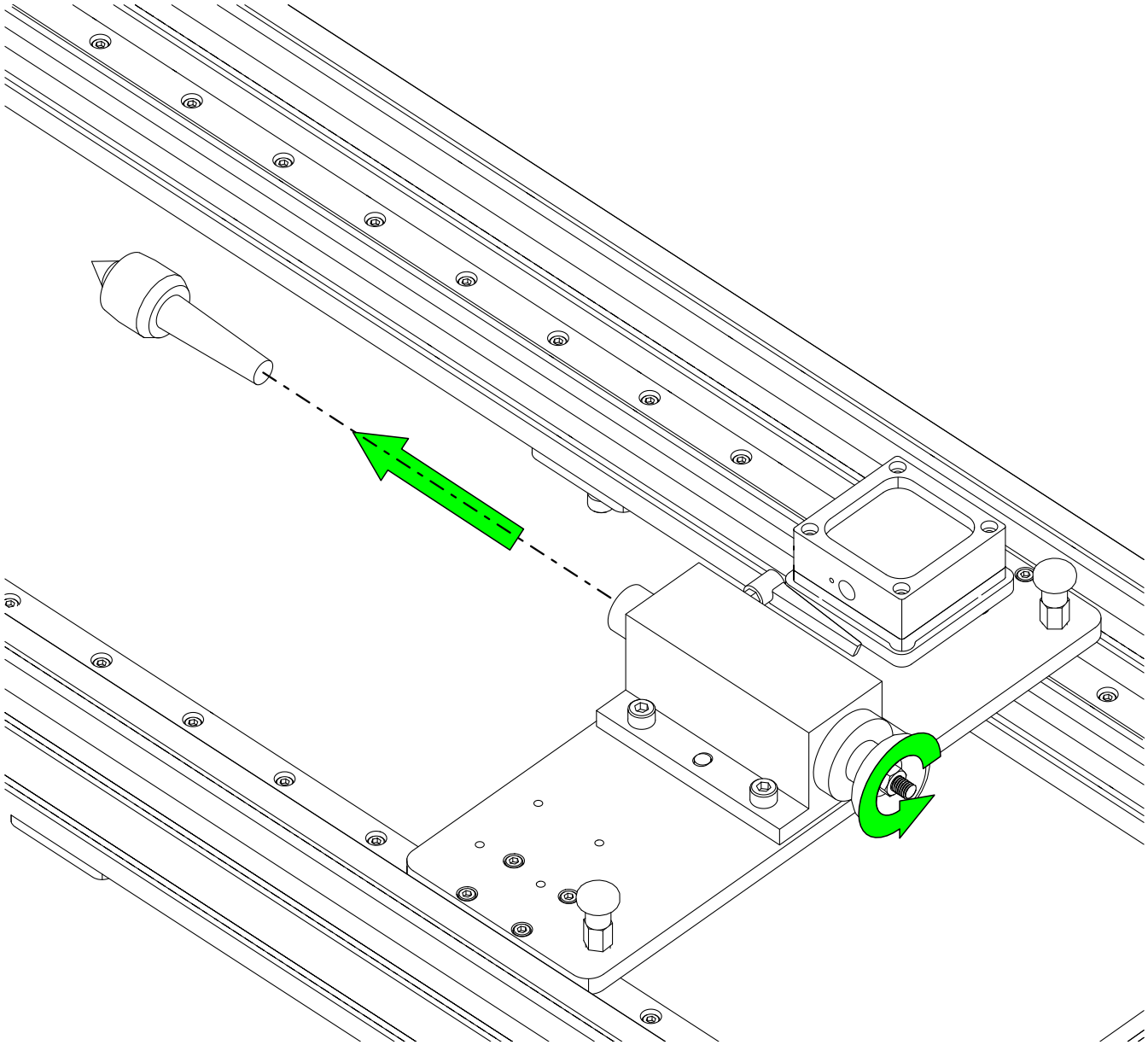
- Insert the Chuck Locating Pin into the chuck.

Assembly Note

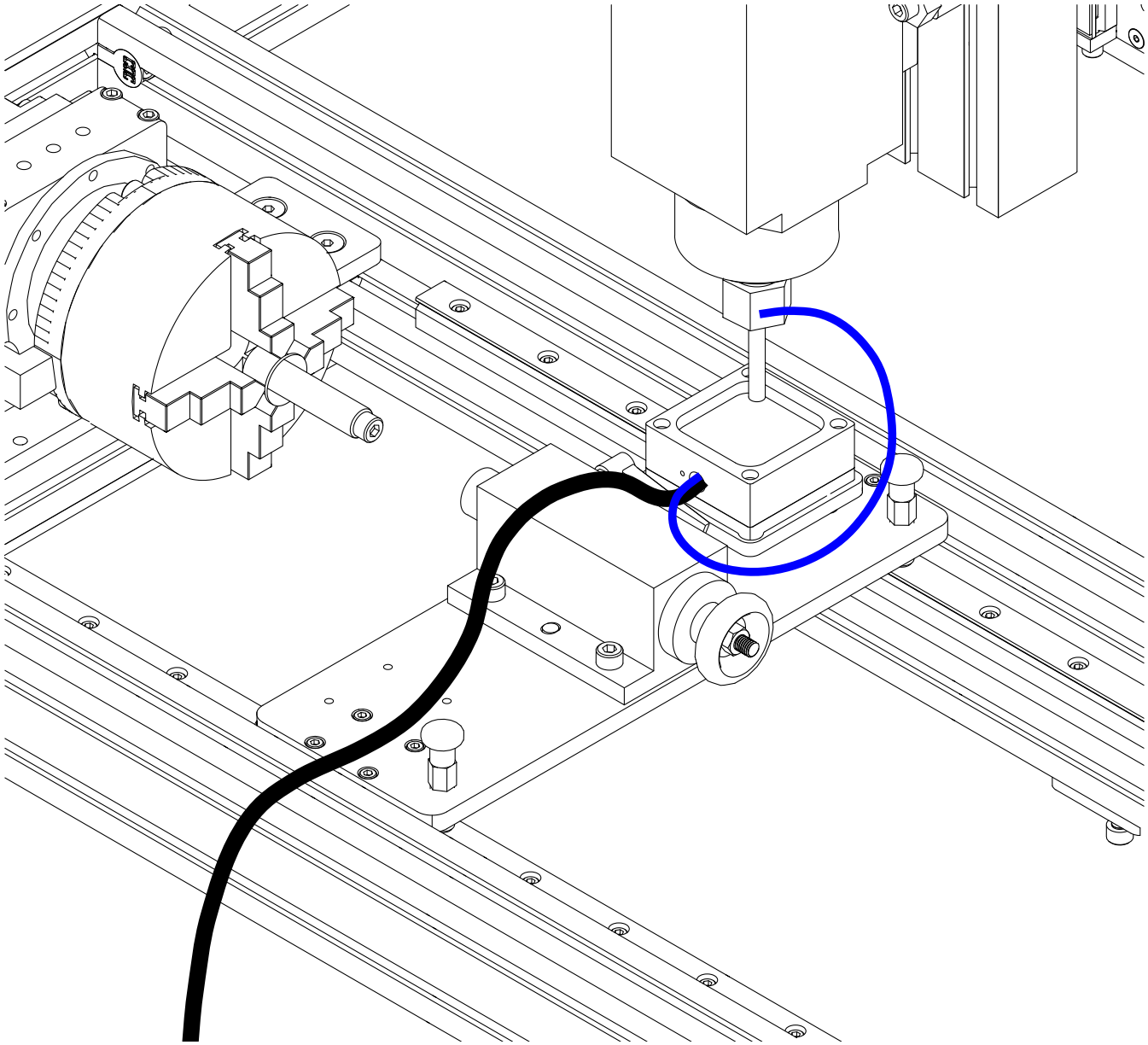
The wire on the Chuck Locating Pin is not shown in all images.



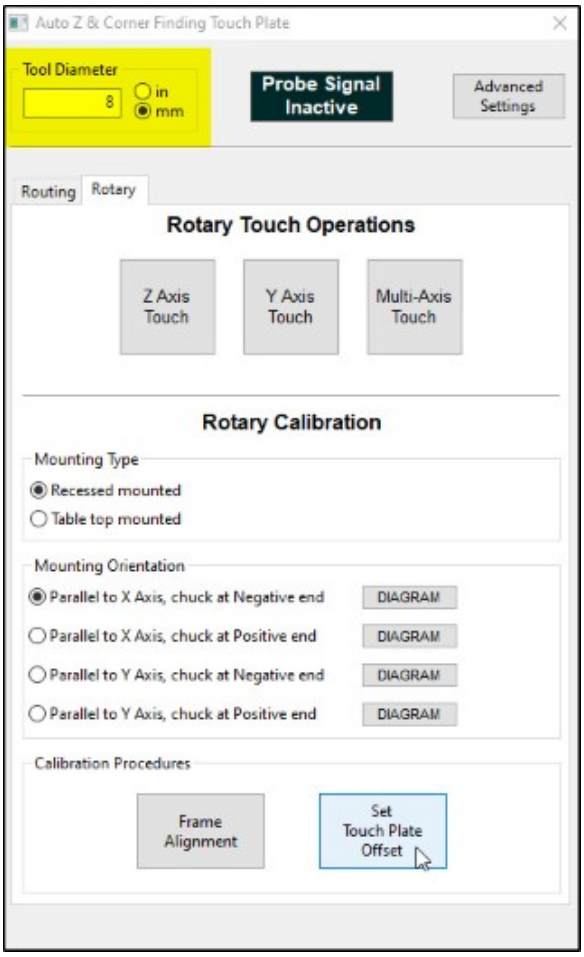
- With the flange of the bushing flush against the chuck jaws, tighten the chuck.



- Remove the tailstock live center.

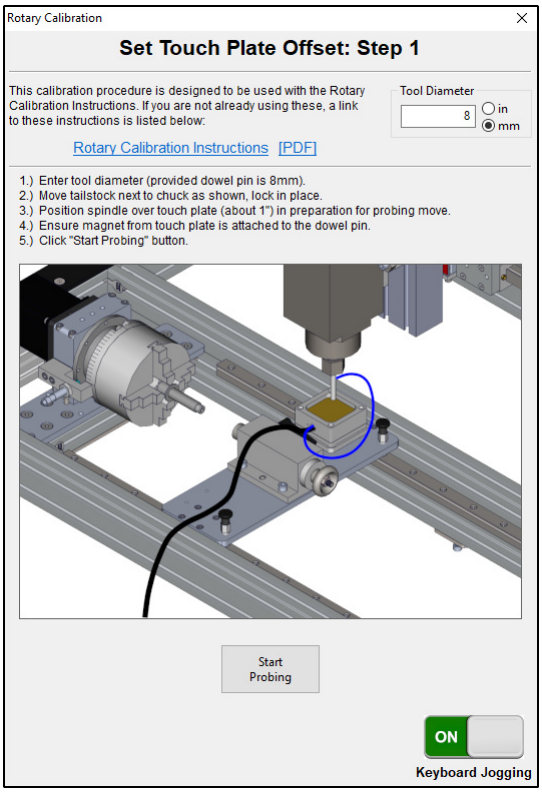


- Position the tailstock as indicated and lock in place.
- Ensure the magnet from the touch plate is attached to the collet nut on the spindle.

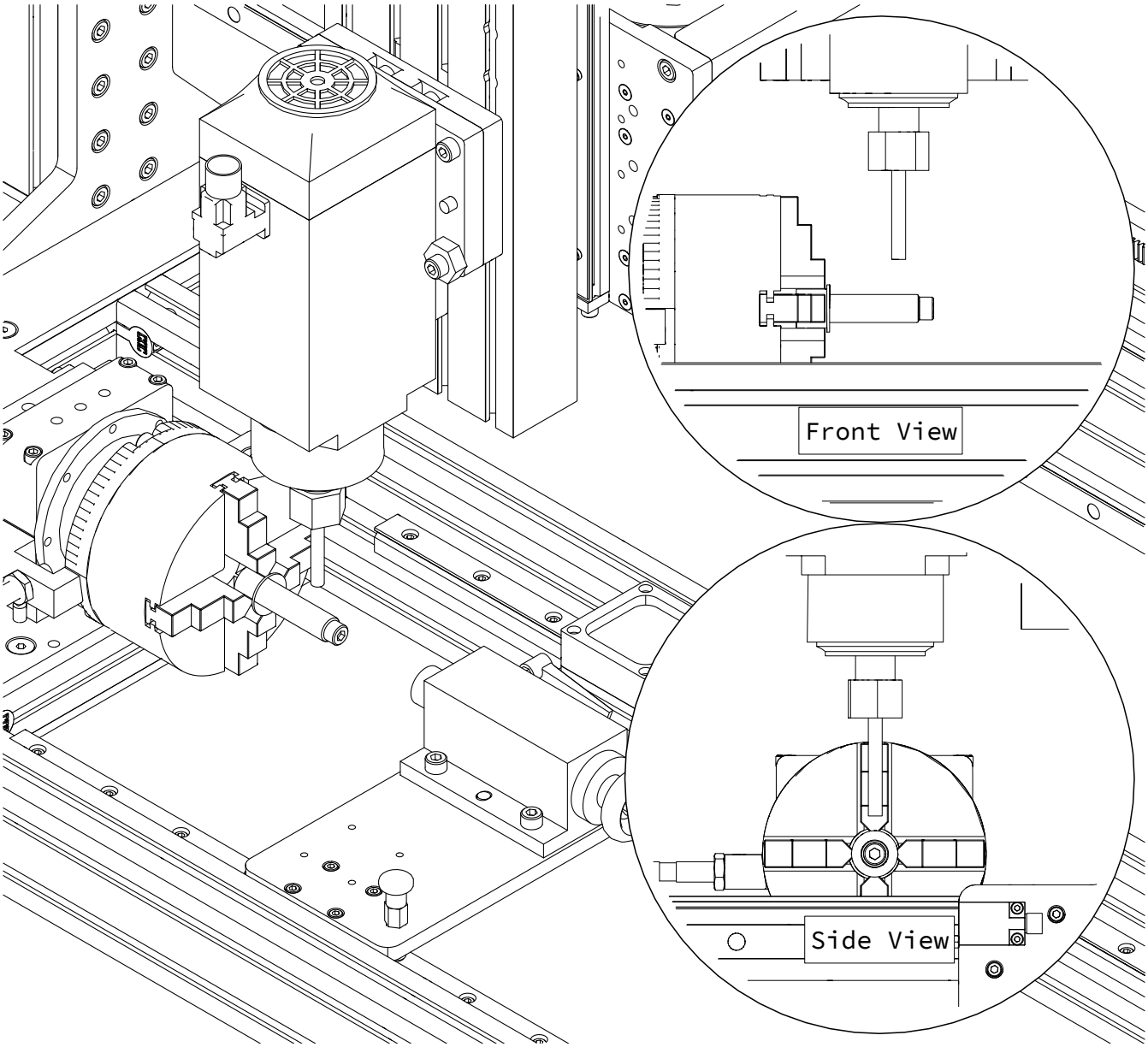


- Set the tool diameter to 8mm.
- Click the **Set Touch Plate Offset** button.

1.4.1.7

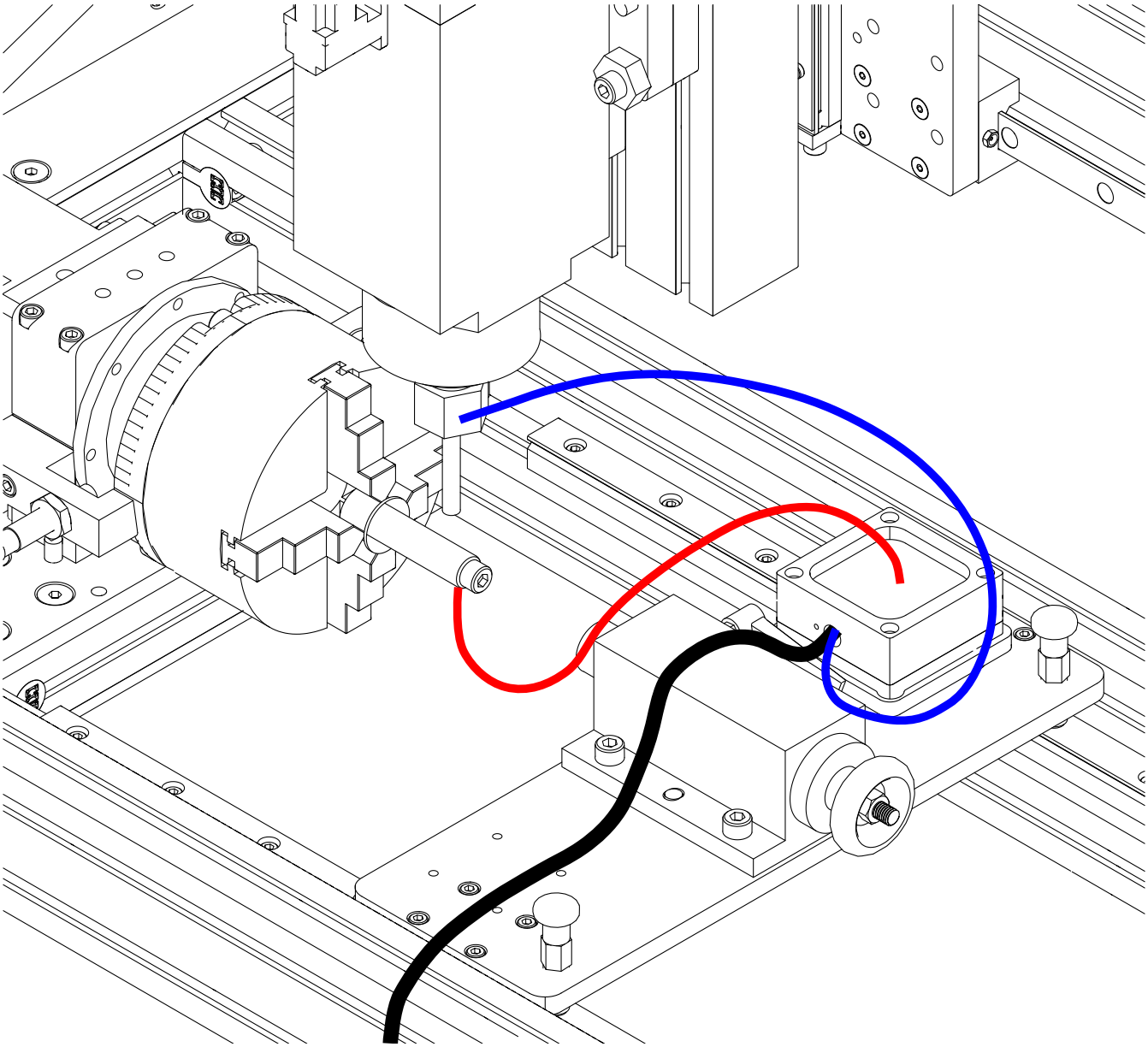


- Follow the instructions shown in Mach4 for **Set Touch Plate Offset: Step 1** to probe the touch plate location.



- Position the spindle over the over the Chuck Location Pin as indicated.

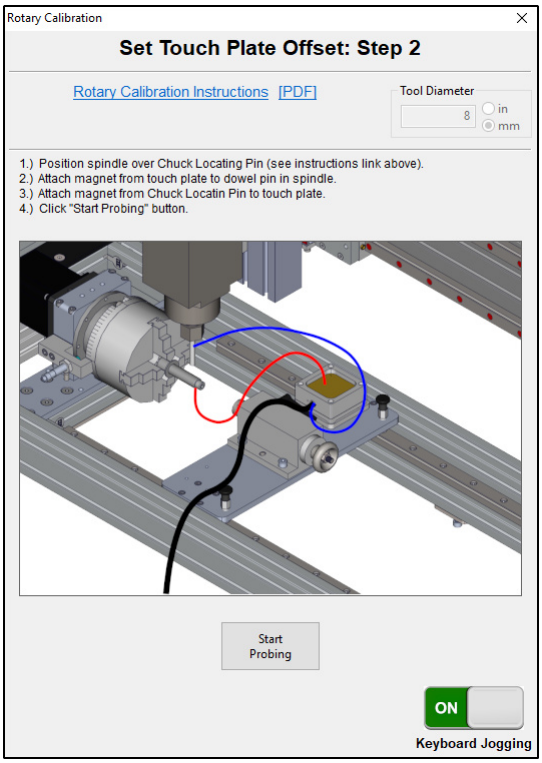
> **Caution**
>
> The probing routine will probe the top of the Chuck Locating Pin, followed by each side. Ensure there will be ample clearance between the collet nut and chuck jaws.



- Connect the magnet from the touch plate to the collet nut on the spindle.
- Connect the magnet from the Chuck Locating Pin to the touch plate.

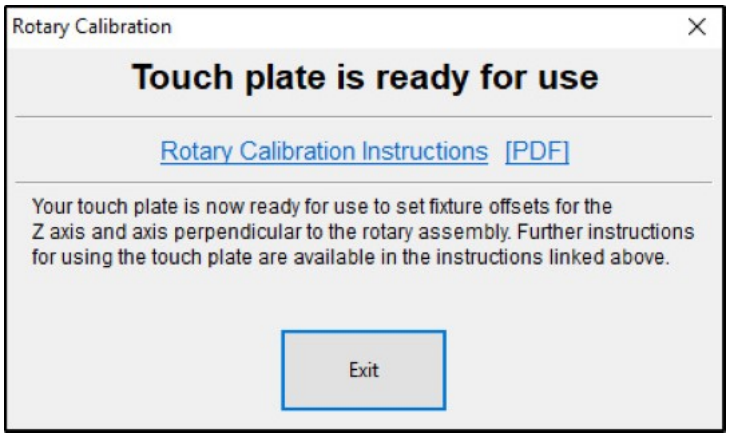
> **Caution**
>
> Failure to attach the magnets as described can cause the machine to crash.

1.4.1.10



- Follow the instructions shown in Mach4 for **Set Touch Plate Offset: Step 2** to probe the Chuck Locating Pin.

1.4.1.11



- The touch plate is now ready to be used with your rotary assembly.