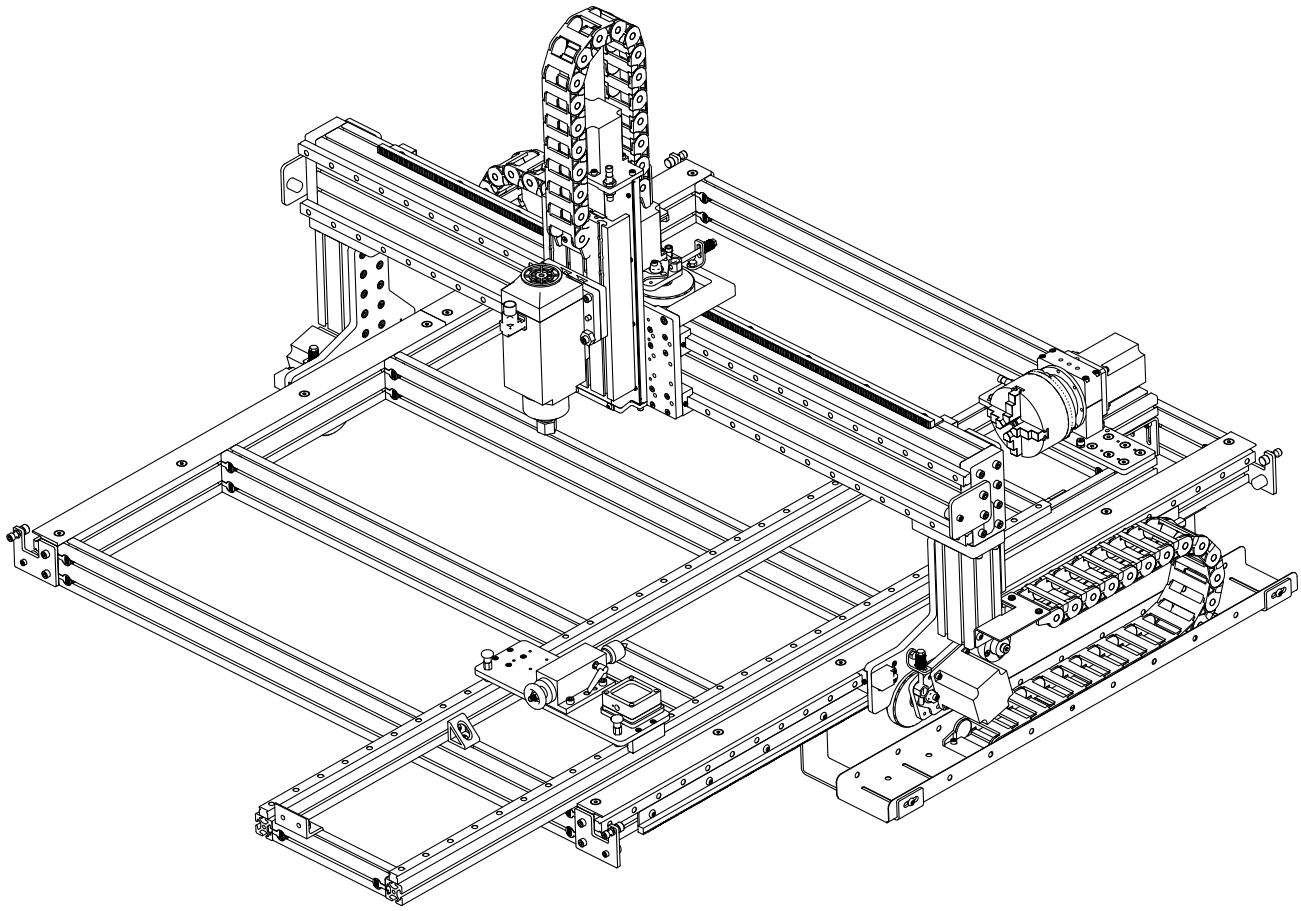
Avid CNC Rotary Axis
Table Top Installation & Calibration Instructions

v2022Q2.1



The instructions and images in this section show installation on the machine's crossmember extrusion. For mounting on a spoil board, it is recommended to cut a pocket in the spoil board for the rotary frame to sit in. Use a pocket width of 355mm (14") and depth of 5mm (3/16"). Position the rotary frame flush against one edge of the pocket.

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

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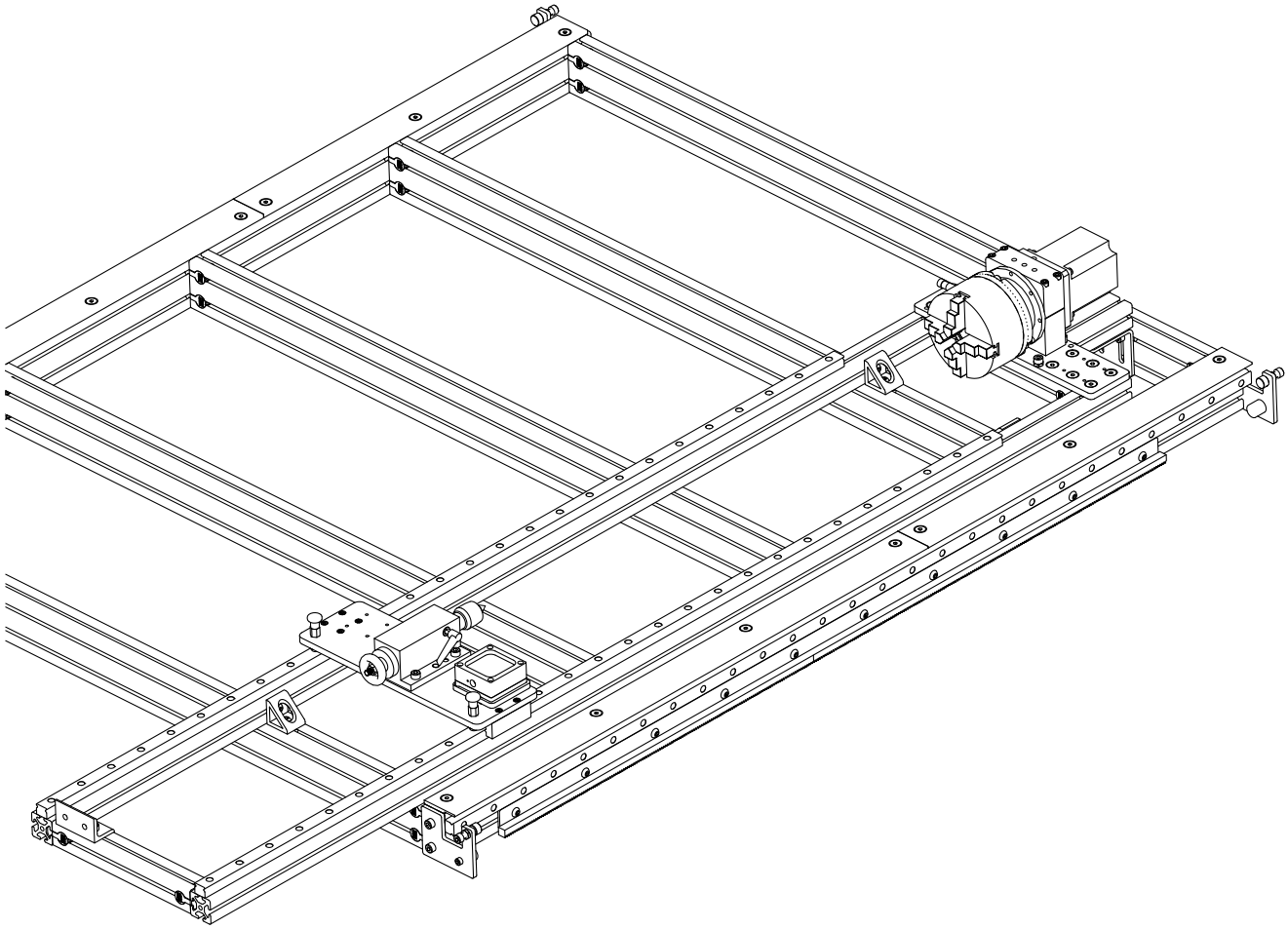
1.1 Table Top Installation - PRO CNC

Machine Type Option

For Benchtop installations, skip to **Section 1.2**.



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Parts and Tools Required

The following parts and tools will be used in Section 1.1 for installation on PRO CNC machines

QTY	Part/Description	Packaged In
1	CRP110-09, Tailstock End-Stop	CRP195-00-PRO-SHORT
4	40-4332 Mounting Bracket	CRP195-00-PRO-SHORT
10	M8 Roll-in T-Nut	CRP195-00-PRO-SHORT
2	M8 x 30mm Socket Head Cap Screw	CRP195-00-PRO-SHORT
8	M8 x 16mm Button Head Cap Screw	CRP195-00-PRO-SHORT
1	4080 Extrusion, 140mm (5-1/2")	CRP195-00-PRO-SHORT
1	CRP190-19, Headstock Mounting Bracket	CRP195-00-PRO-SHORT
2	M8 x 16mm Socket Head Cap Screw	CRP195-00-PRO-SHORT
1	M12 Proximity Sensor Cable, 20'	CRP190-00-BASE
1	NEMA 34 Motor Cable, 20'	Rotary Electronics
1	CRP195-00-FAST: - (2) 40 Series Anchor Fastener - (8) M8 Roll-in T-Nut - (6) M8 x 16mm Socket Head Cap Screw *Remaining parts from this kit used in Section 1.3*	CRP195-00-PRO-SHORT

Note: Rotary frames 1850mm (72") and longer will use parts packaged in CRP195-00-PRO-LONG. This kit includes an additional (4) 40-4332 mounting brackets with fasteners.

Required Tools:

- 6mm Ball-End Allen Wrench
- 5mm Allen Wrench
- Tape Measure

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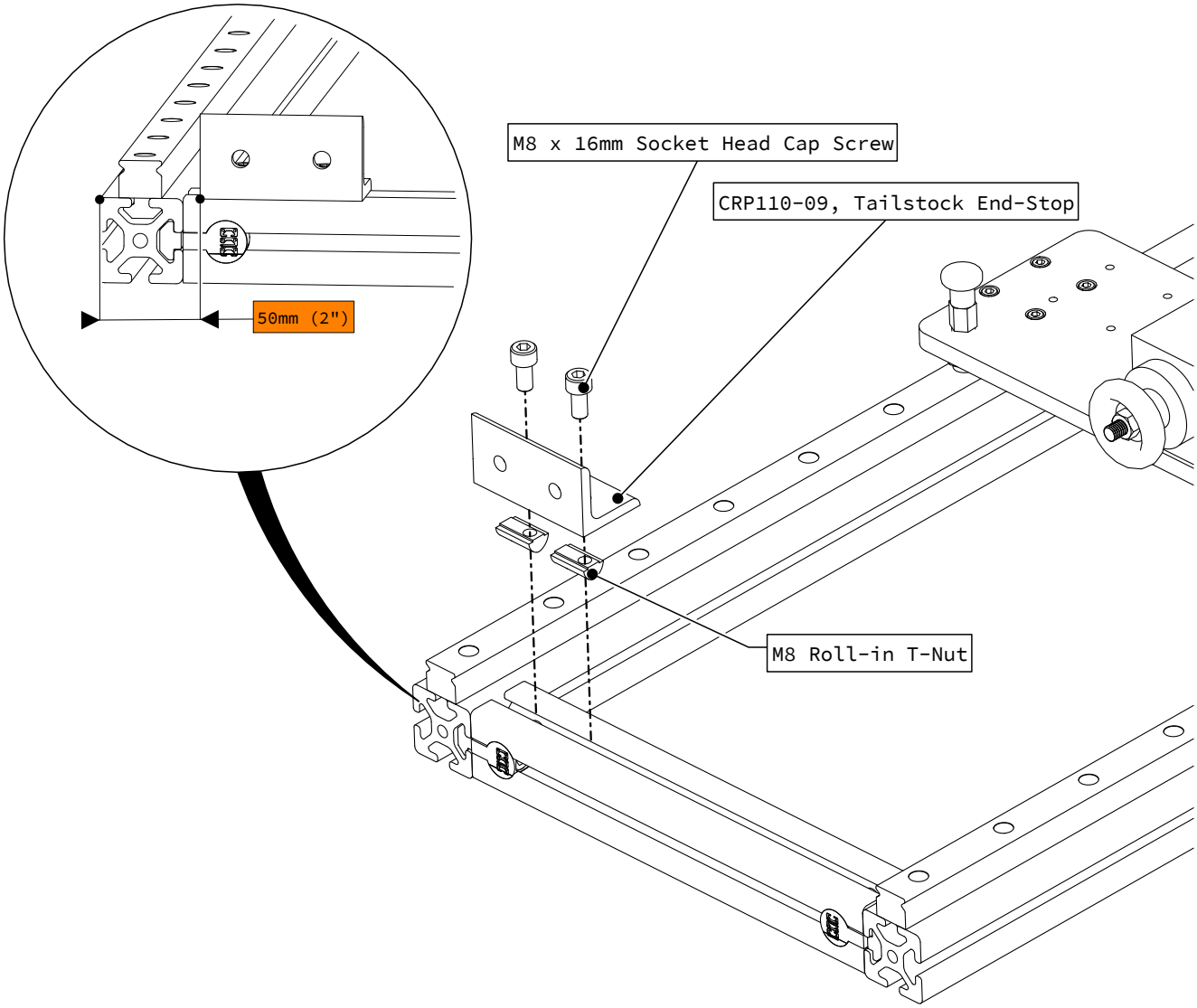
1.1.1 Installation Steps

1.1.1.1



- Attach the tailstock end-stop to the tailstock end of the rotary frame as indicated.

Model Revision

For rotary axes purchased prior to April 2020, refer to the Previous Revision Table Top Installation and Calibration Instructions (https://www.avidcnc.com/cad/2019Q4/Rotary_Axis_Table_Top_Installation_and_Calibration_Instructions_v2019Q4_2.pdf#pa to install the tailstock end-stop. You can then return to these current instructions for the remaining installation and calibration steps.

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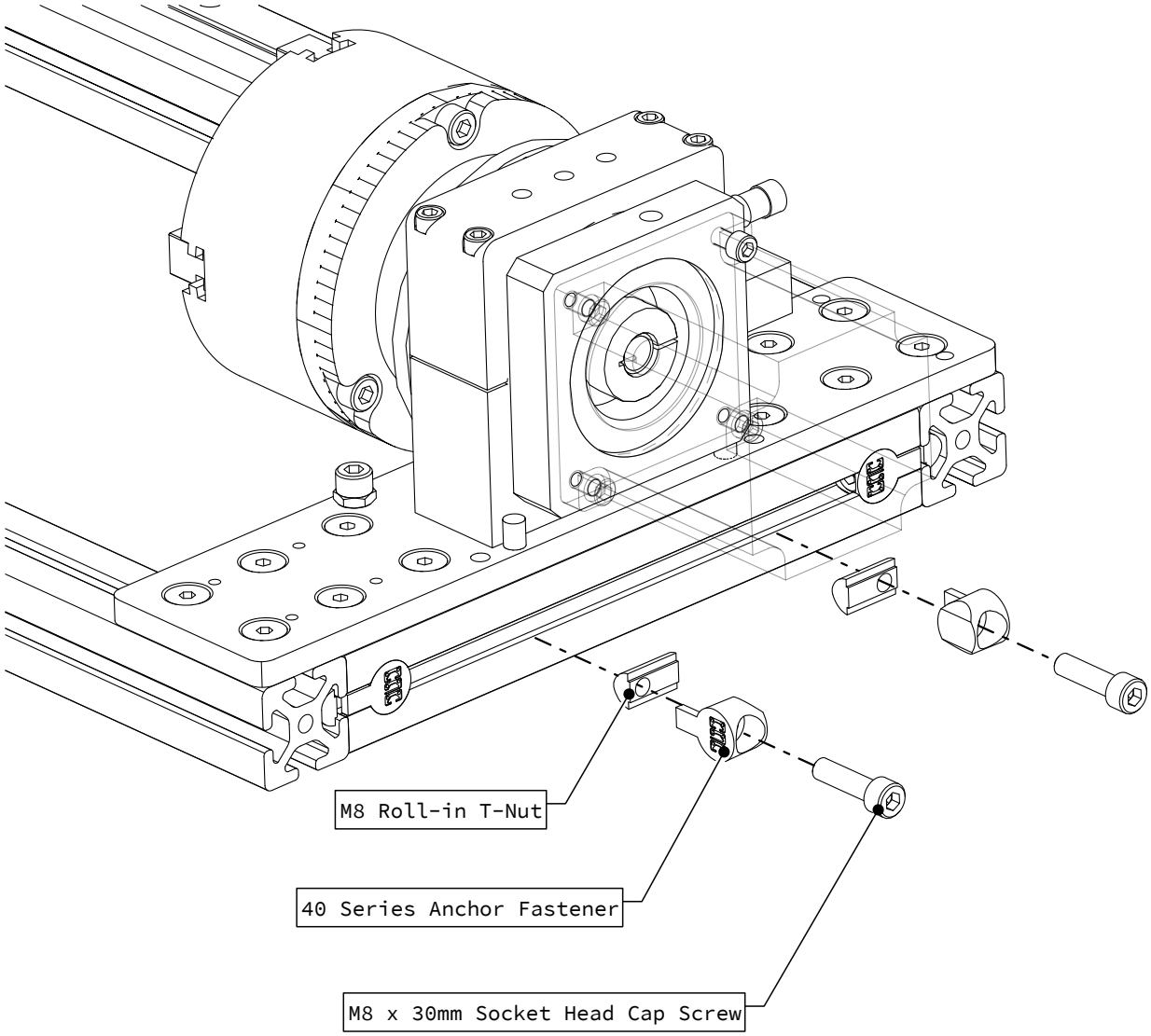
1.1.1.2



- Assemble anchor fasteners as indicated.

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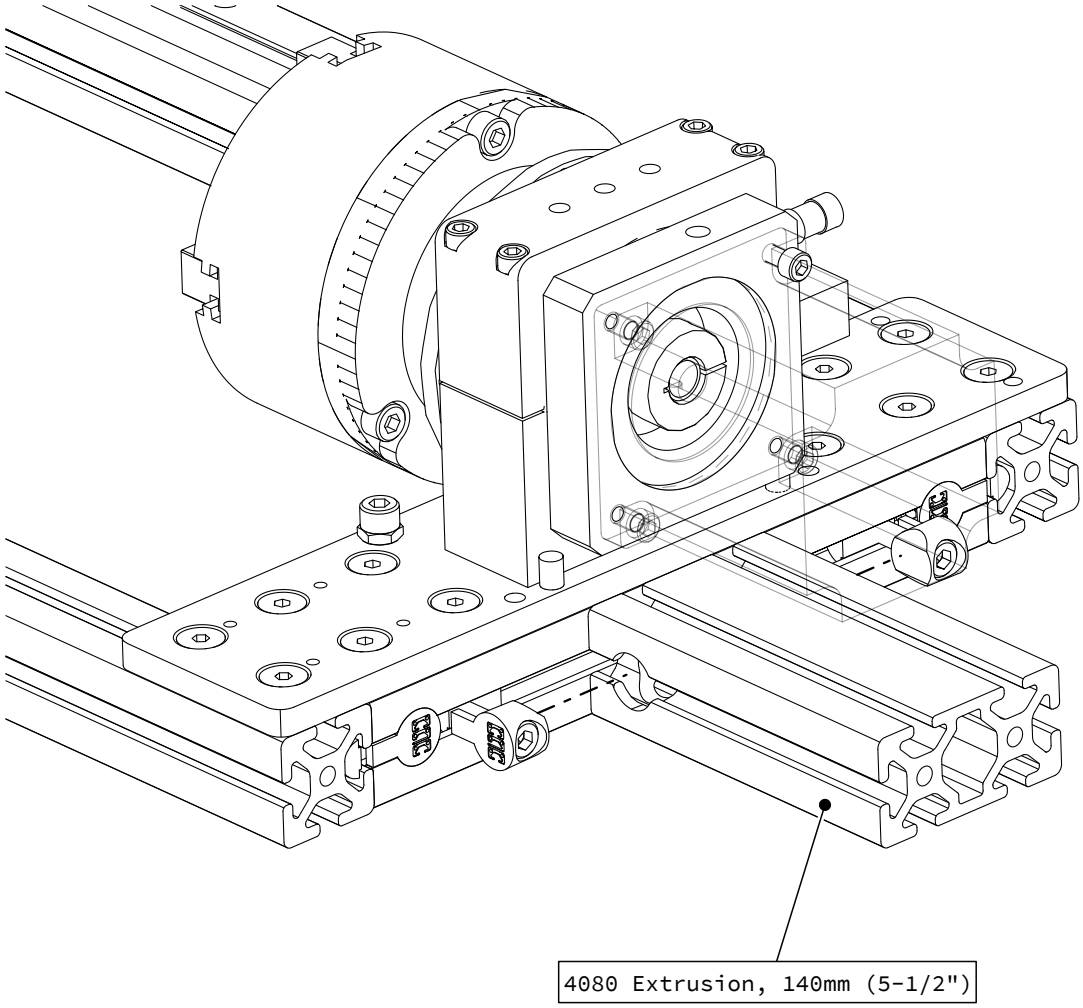

- Attach the 140mm (5-1/2") 4080 extrusion to the back of the rotary assembly.

Assembly Note

Center the extrusion on the rotary frame.

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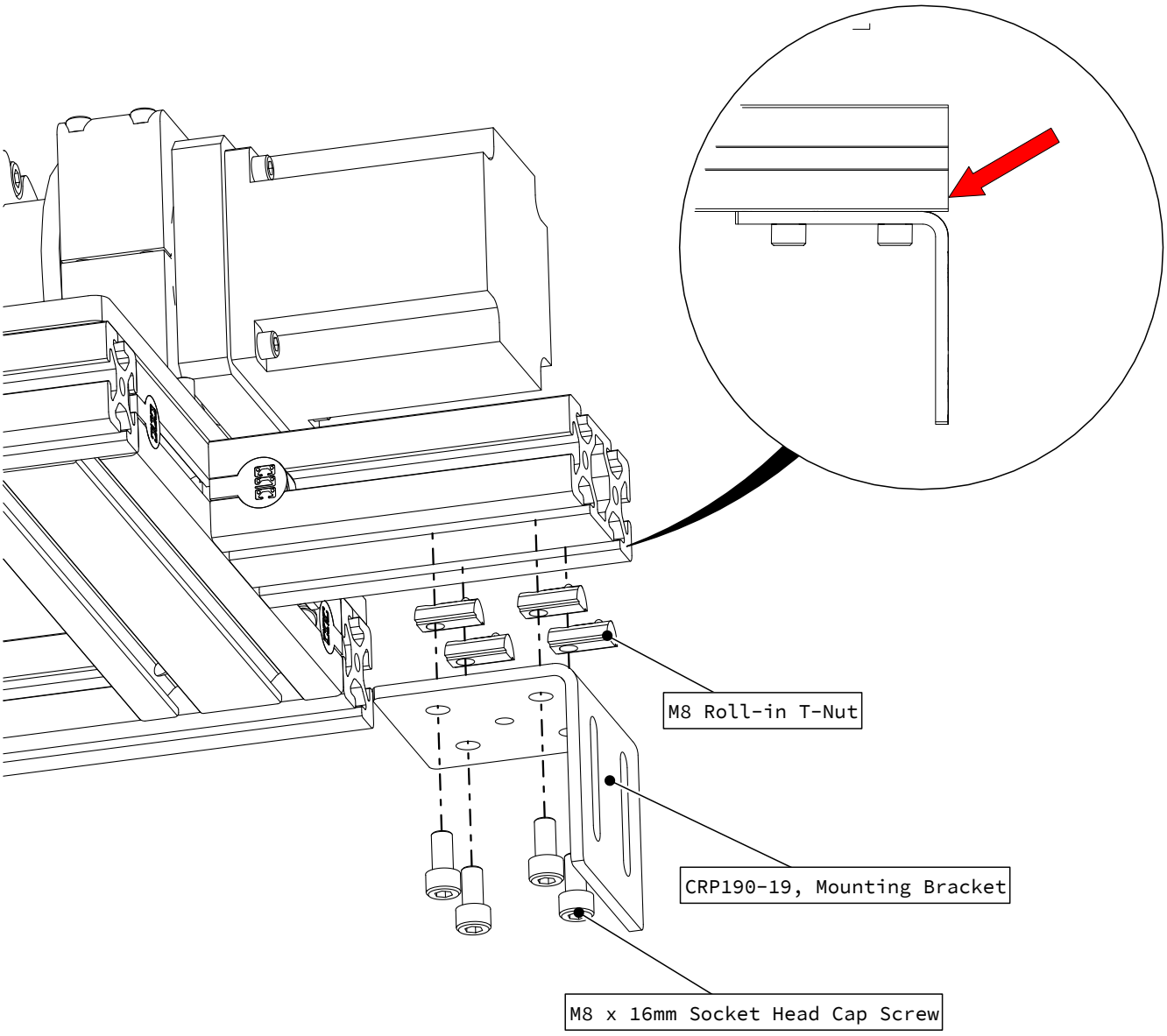

- Attach the headstock mounting bracket to the extrusion as indicated.

Assembly Note

Position the bracket flush with the end of the 4080 extrusion.

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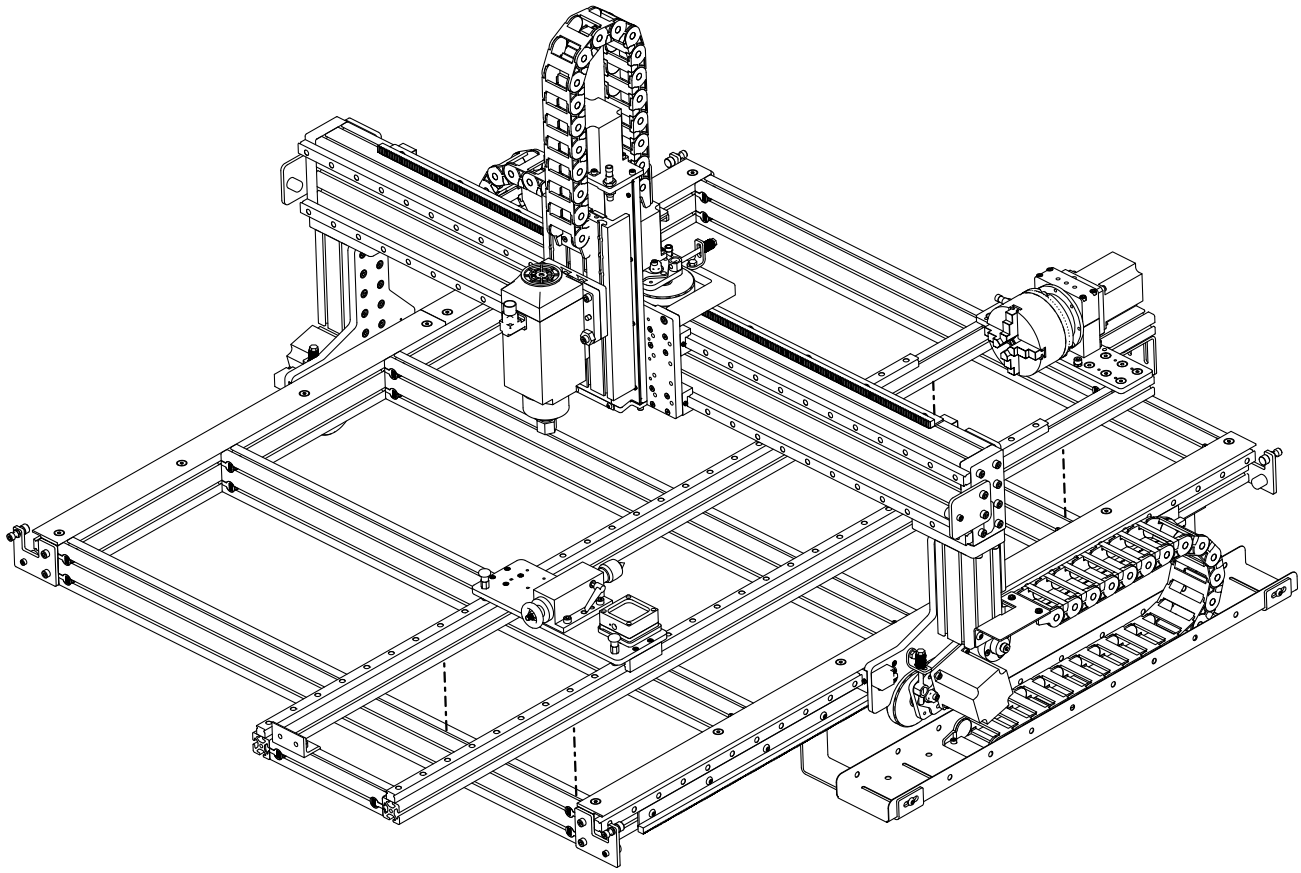

- Place the rotary assembly on the machine table.

Assembly Note

Locating the rotary assembly at the outer edges of the machine table will maximize routing work area.

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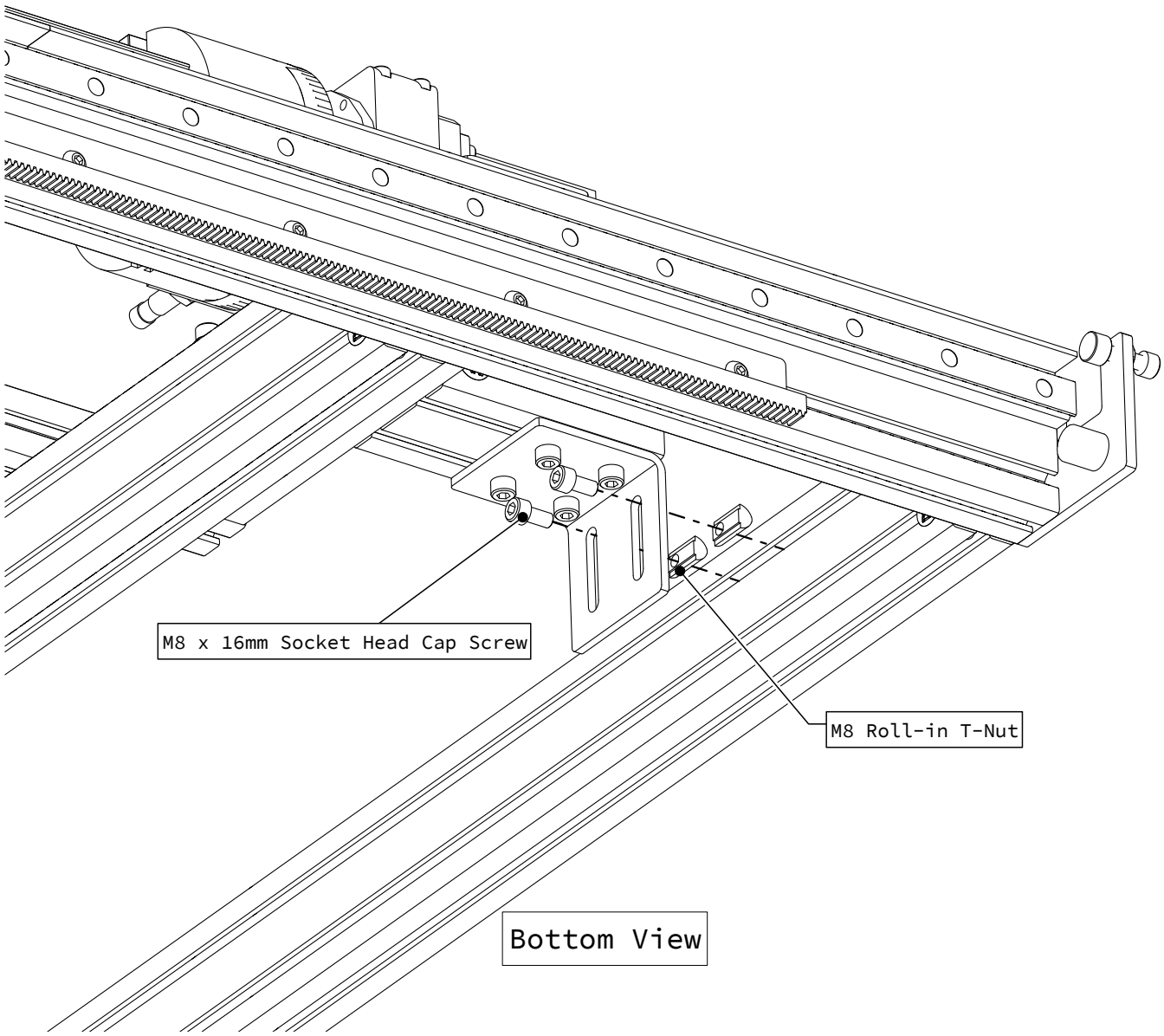

- Attach the headstock mounting bracket to the rear table crossmember as indicated.

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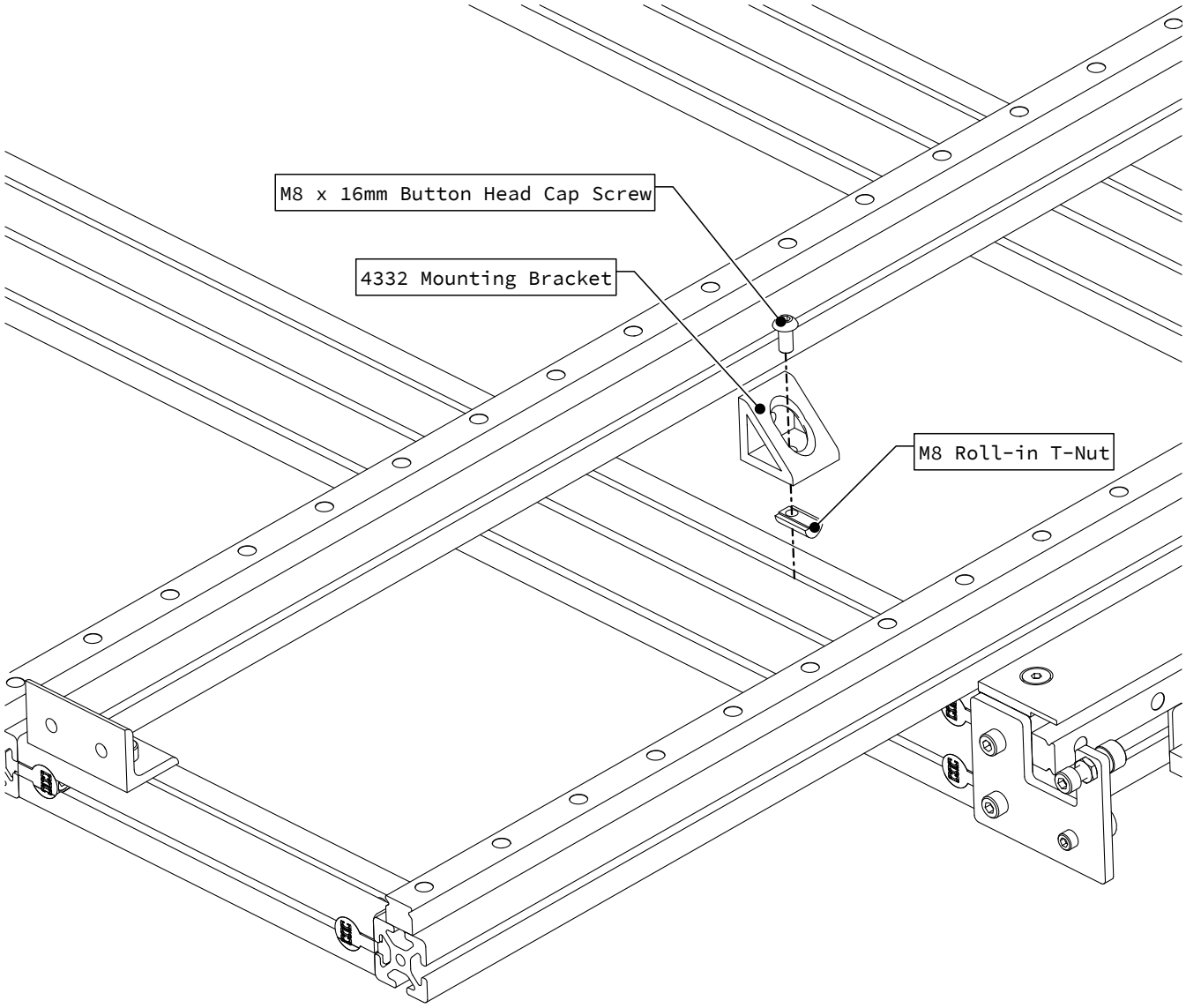

- Attach a 4332 mounting bracket to the front table crossmember, partially tightening the fasteners.

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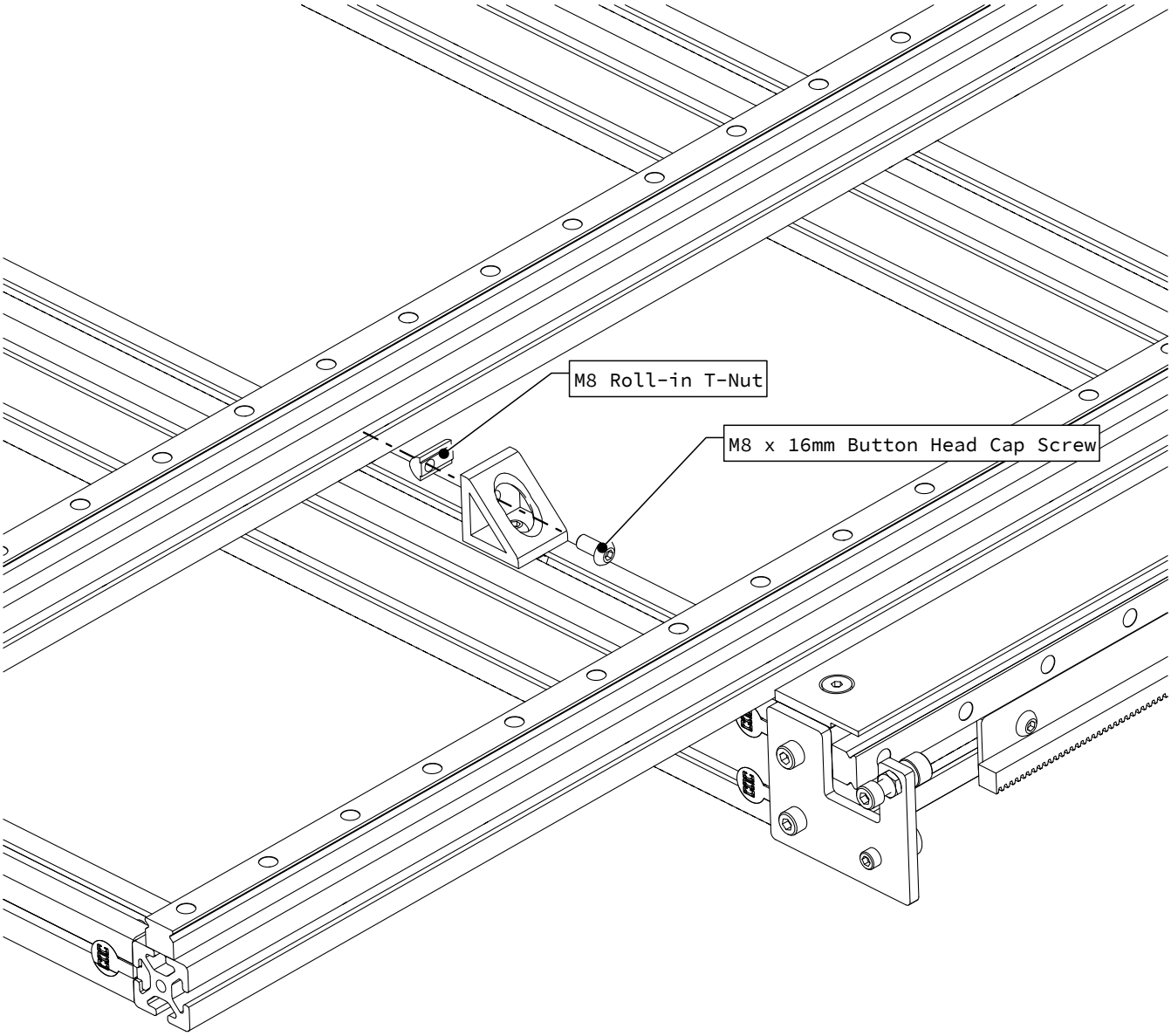

- Attach the bracket to the rotary frame as indicated, partially tightening the fasteners.

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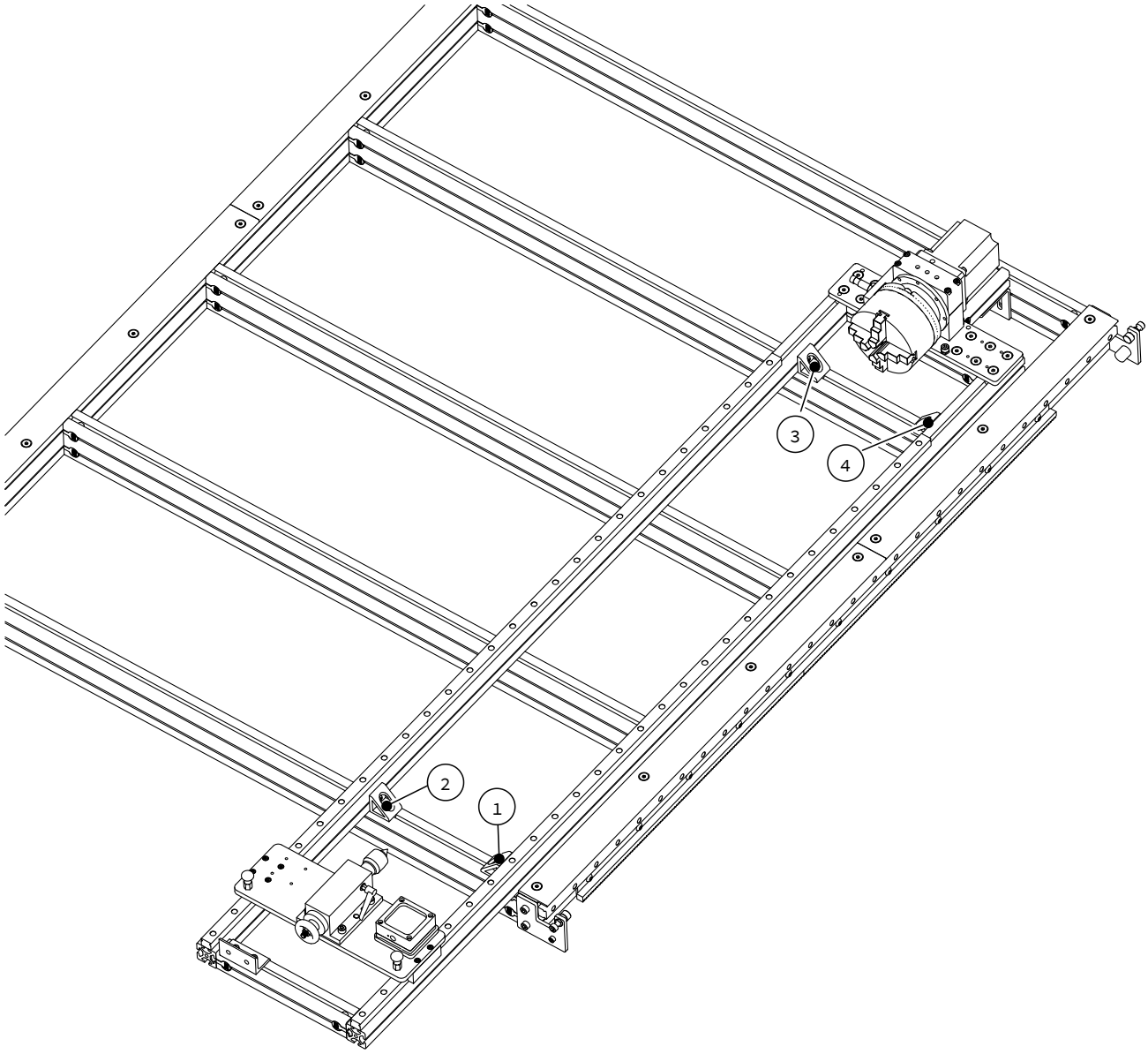
1.1.1.9



- Use this process to install brackets at the four indicated locations.

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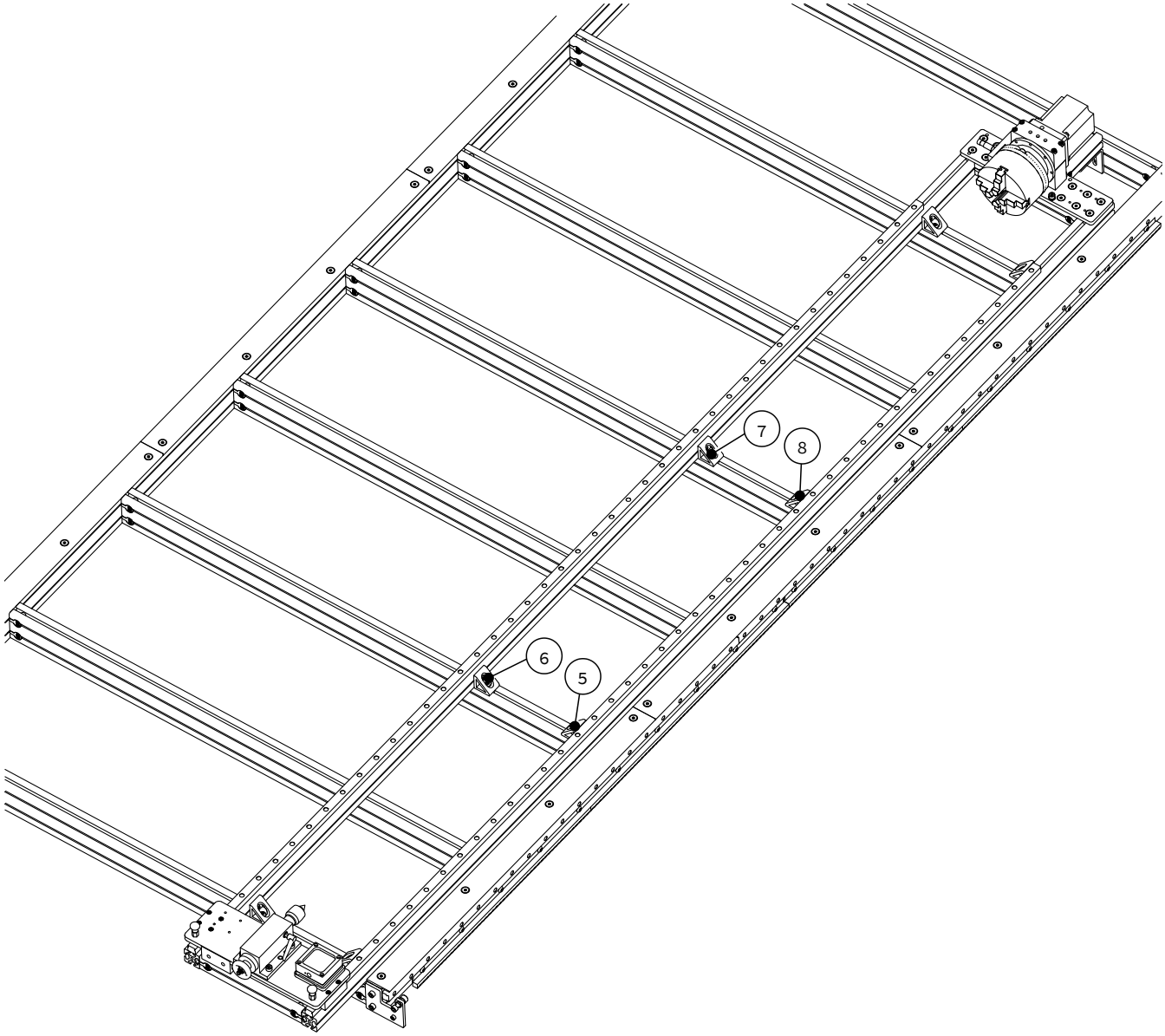
Rotary Length Option

This step is only applicable for rotary frame lengths 1850mm (72") and longer.



- Install an additional four brackets along the middle of the rotary frame, leaving the fasteners loose.

Assembly Note

These mid-support brackets will not be tightened until the Mid-Support Calibration section.

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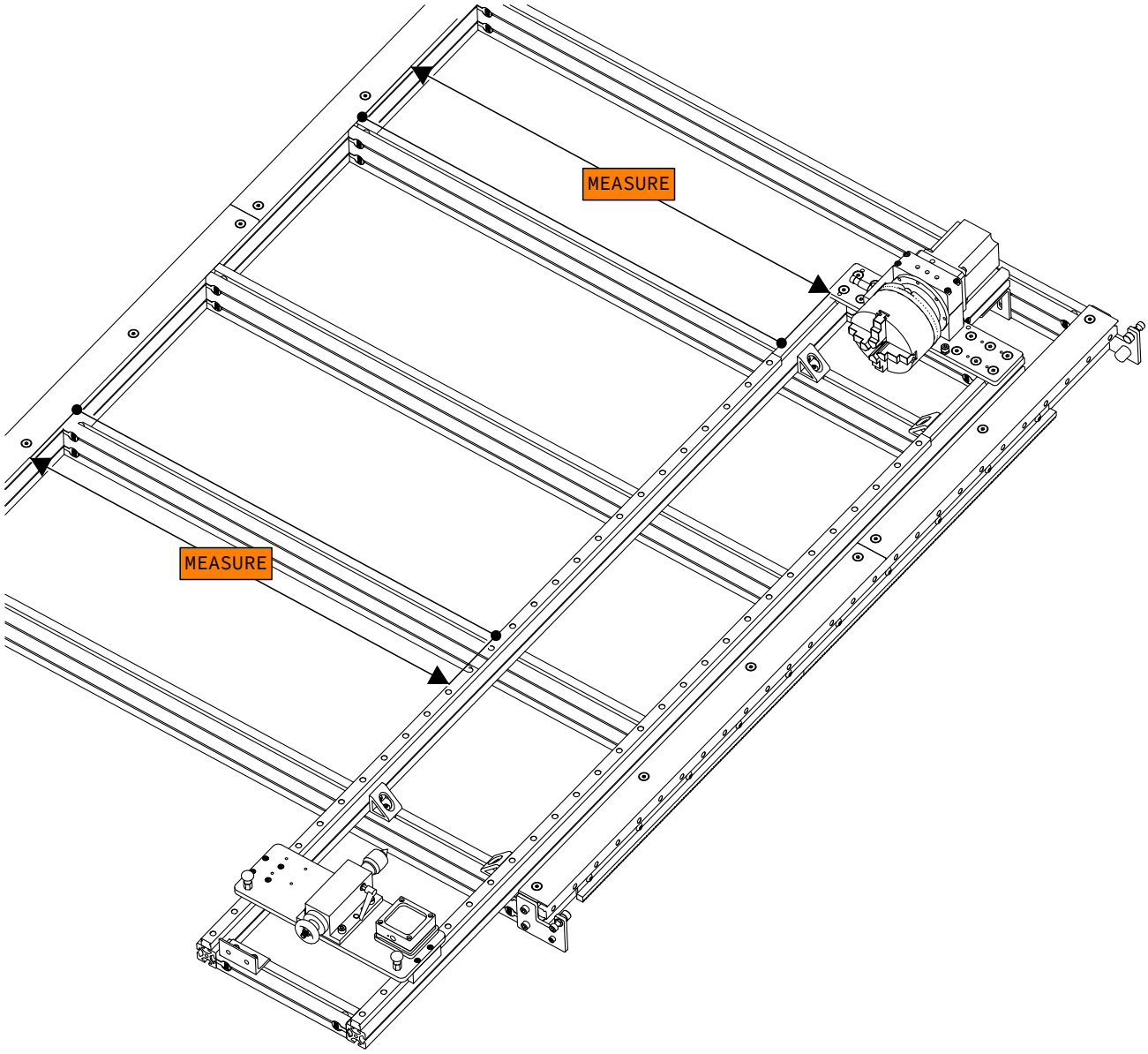

- Measure between the machine table and rotary frame at multiple locations.
- Adjust the rotary frame until the measurements are within 1mm (1/32") of each other.

Assembly Note

Final alignment of the rotary frame will occur in the Calibration Section.

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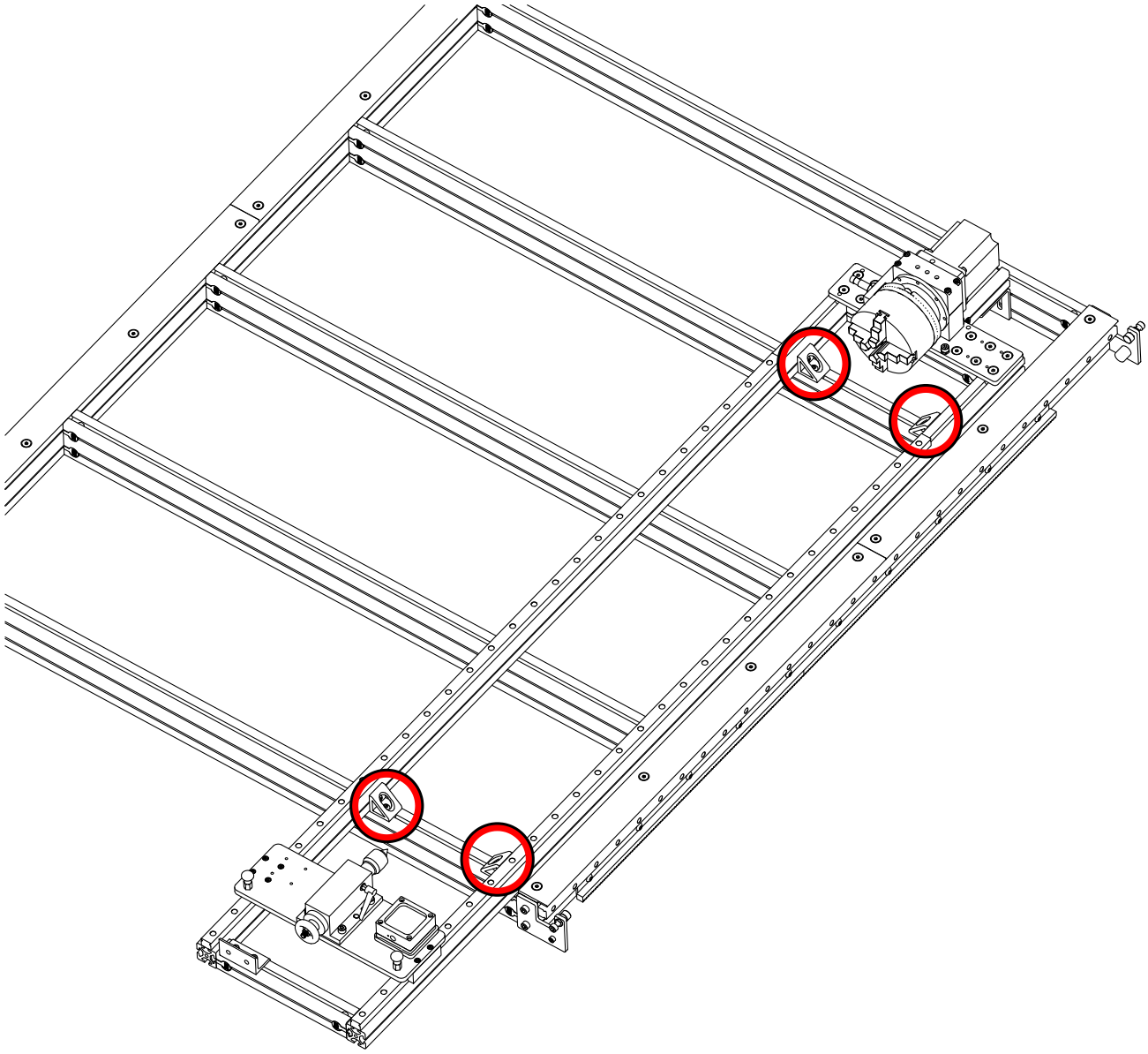

- Fully tighten the indicated mounting brackets.

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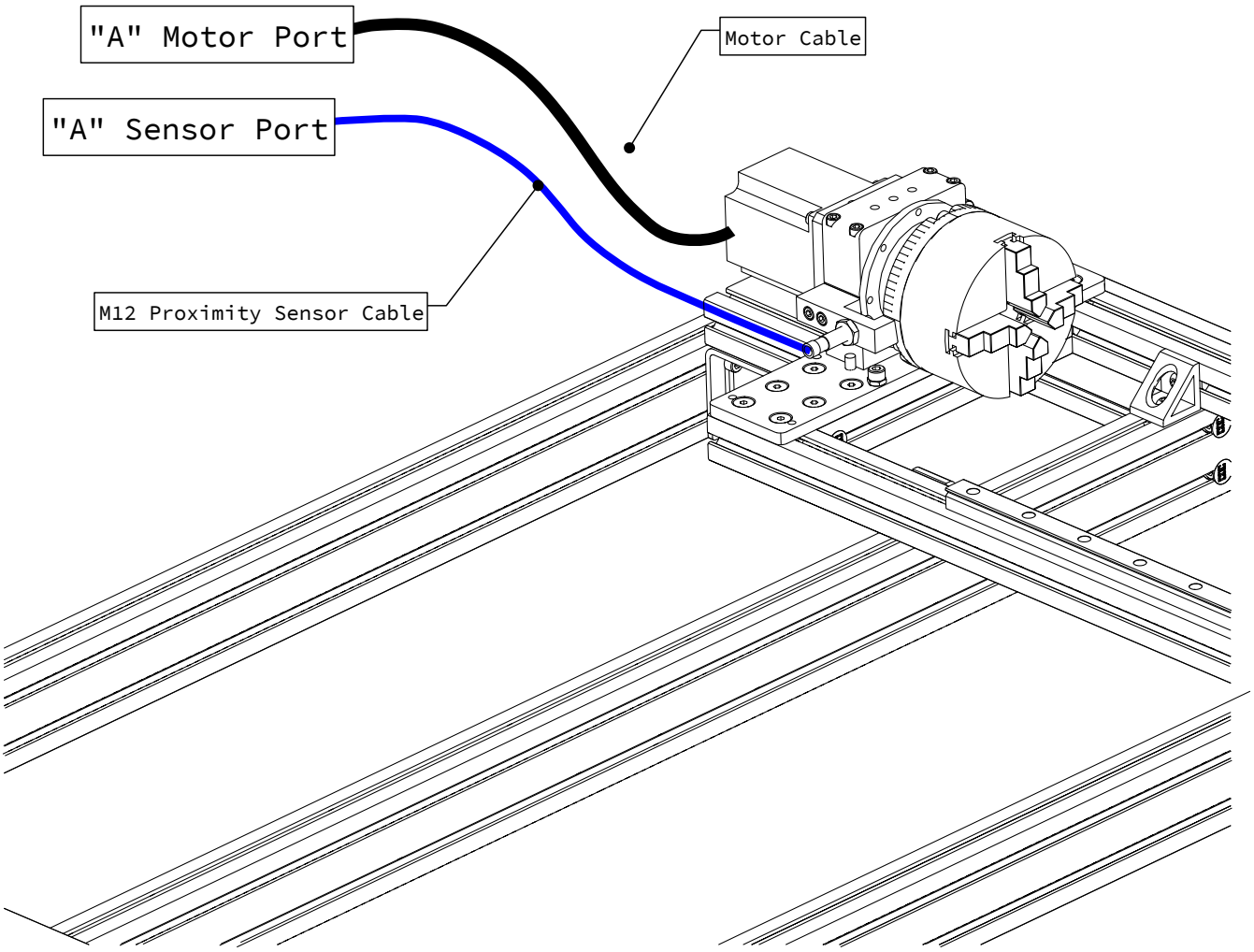
1.1.2 Motor & Sensor Connections

1.1.2.1



- 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.

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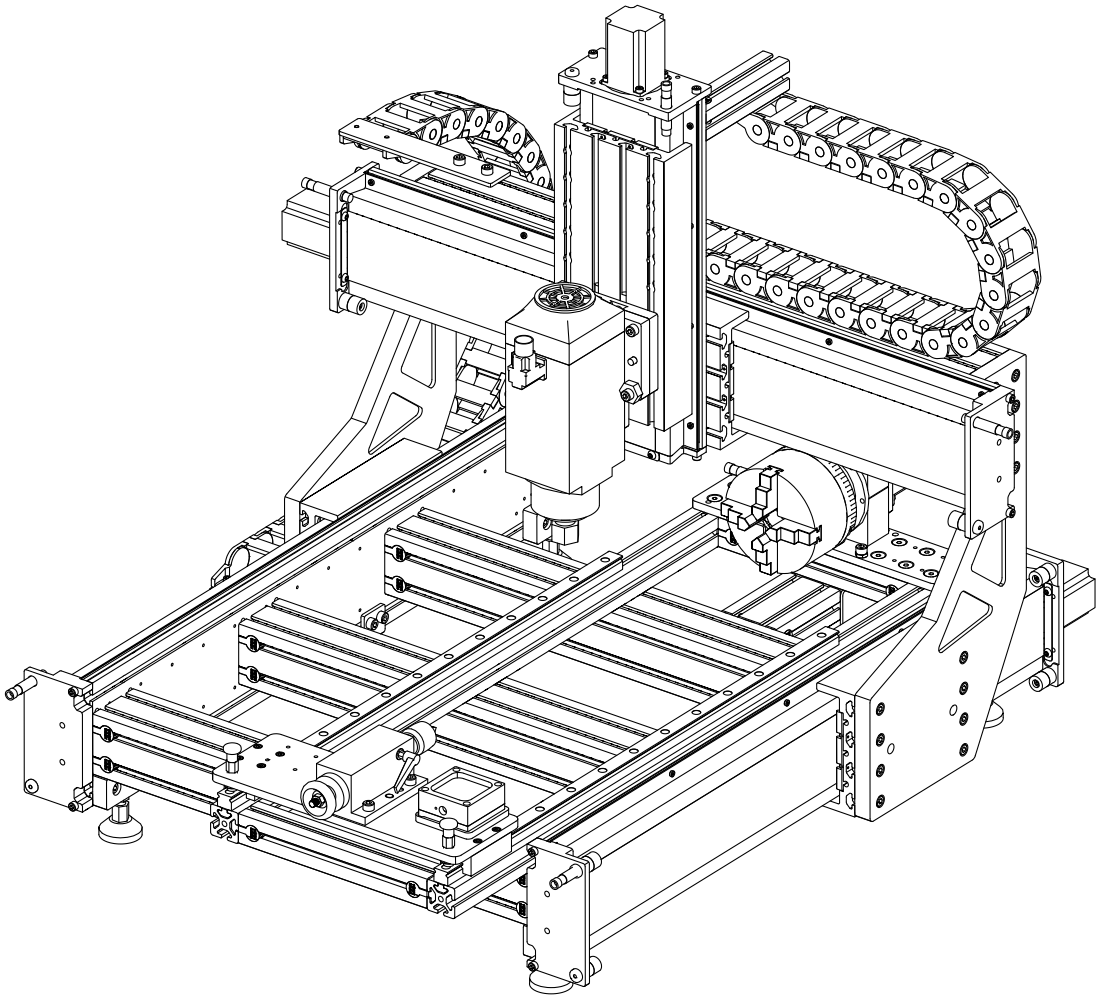
1.2 Table Top Installation - Benchtop

Machine Type Option

To continue with PRO CNC installations, skip to Section 1.3.



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Parts and Tools Required

The following parts and tools will be used in Section 1.2 for installation on Benchtop machines

QTY	Part/Description	Packaged In
1	CRP110-09, Tailstock End-Stop	CRP195-00-BTP
4	40-4332 Mounting Bracket	CRP195-00-BTP
10	M8 Roll-in T-Nut	CRP195-00-BTP
2	M8 x 30mm Socket Head Cap Screw	CRP195-00-BTP
8	M8 x 16mm Button Head Cap Screw	CRP195-00-BTP
1	4080 Extrusion, 122mm (4-3/4")	CRP195-00-BTP
1	CRP190-19, Headstock Mounting Bracket	CRP195-00-BTP
2	M8 x 16mm Socket Head Cap Screw	CRP195-00-BTP
1	M12 Proximity Sensor Cable, 20'	CRP190-00-BASE
1	NEMA 34 Motor Cable, 20'	Rotary Electronics
1	CRP195-00-FAST: - (2) 40 Series Anchor Fastener - (8) M8 Roll-in T-Nut - (6) M8 x 16mm Socket Head Cap Screw *Remaining parts from this kit used in Section 1.3*	CRP195-00-BTP

Note: Benchtop Standard installation parts will be packaged in CRP195-00-SHORT and does not include the 4080 extrusion, CRP190-19, or CRP195-00-FAST.

Required Tools:

- 6mm Ball-End Allen Wrench
- 5mm Allen Wrench
- Tape Measure

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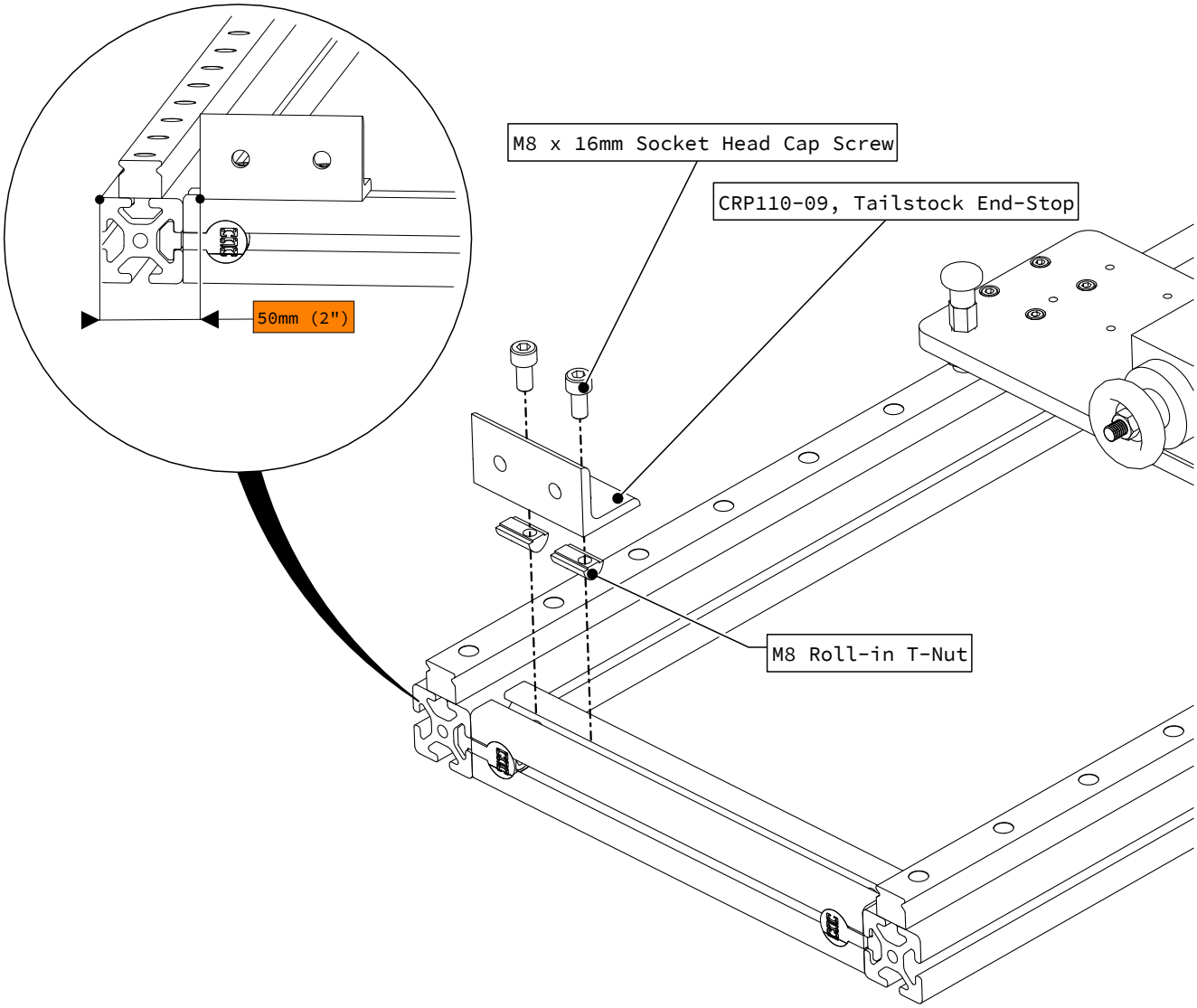
1.2.1 Installation Steps

1.2.1.1



- Attach the tailstock end-stop to the tailstock end of the rotary frame as indicated.

Model Revision

For rotary axes purchased prior to April 2020, refer to the Previous Revision Table Top Installation and Calibration Instructions (https://www.avidcnc.com/cad/2019Q4/Rotary_Axis_Table_Top_Installation_and_Calibration_Instructions_v2019Q4_2.pdf#pa to install the tailstock end-stop. You can then return to these current instructions for the remaining installation and calibration steps.

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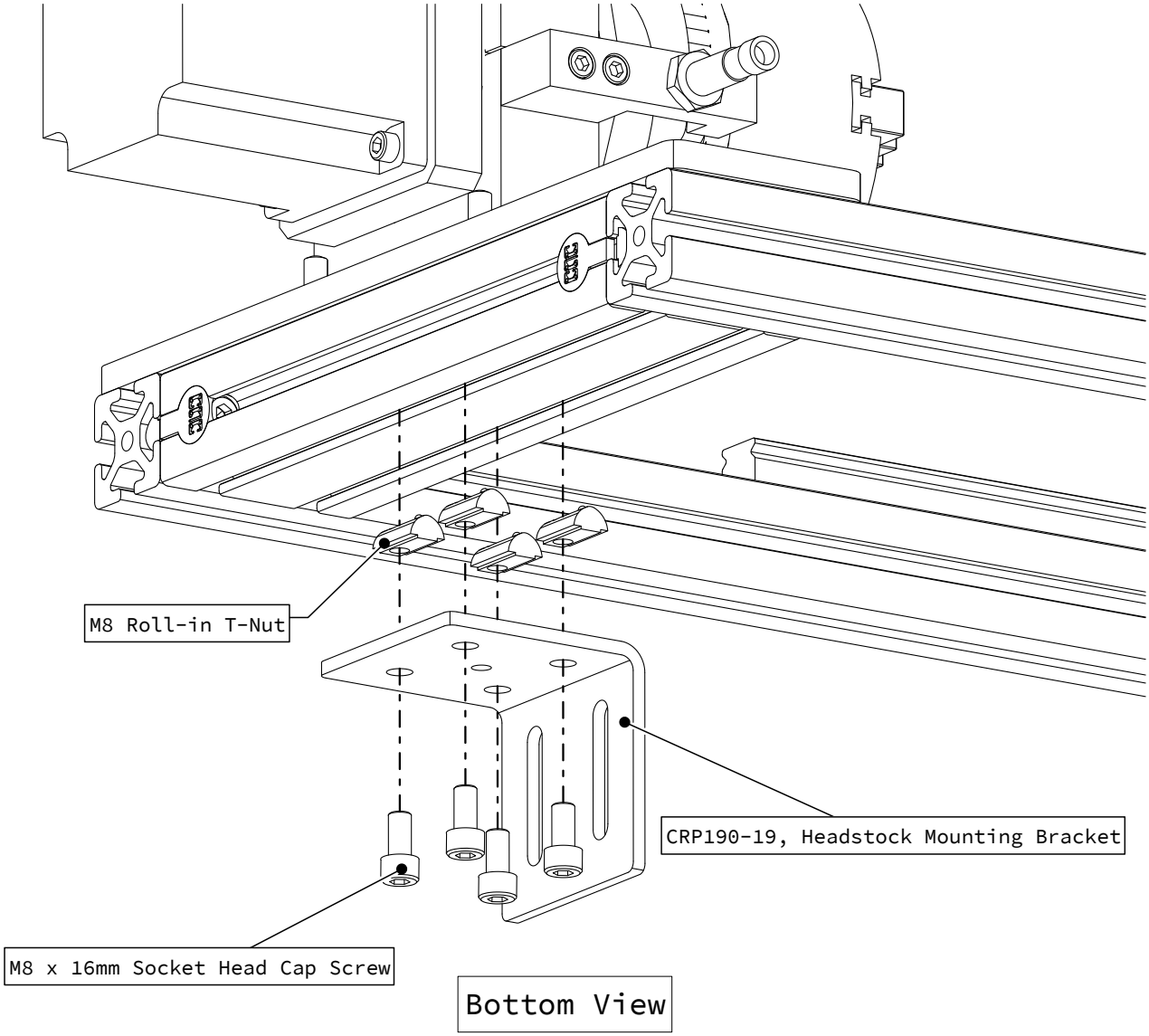
Machine Type Option

This step is only applicable for Benchtop PRO installations.



- Attach the headstock mounting bracket as indicated.

Assembly Note

Center the bracket on the rotary frame.

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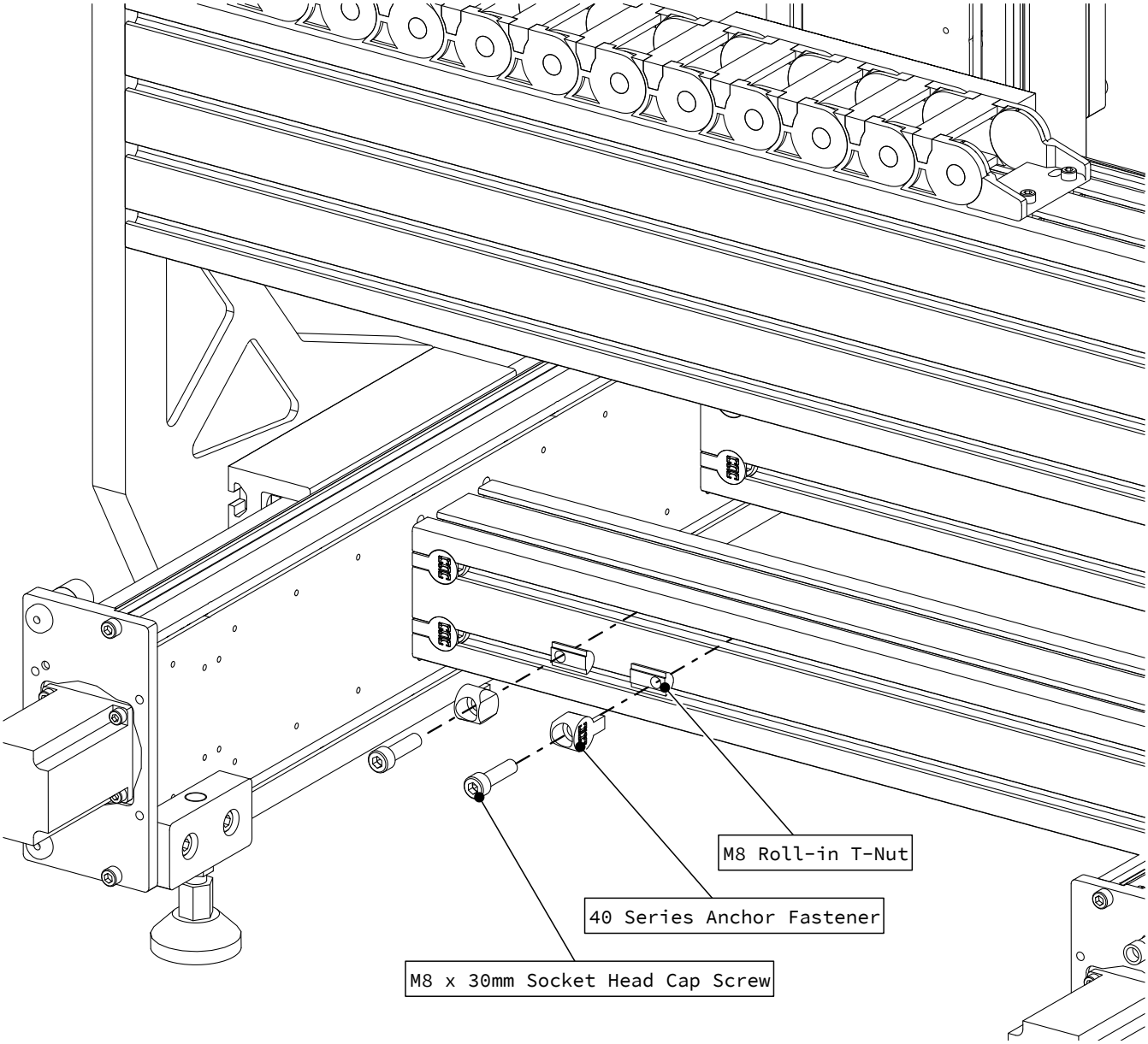
Machine Type Option

This step is only applicable for Benchtop PRO installations.



- Assemble anchor fasteners as indicated.

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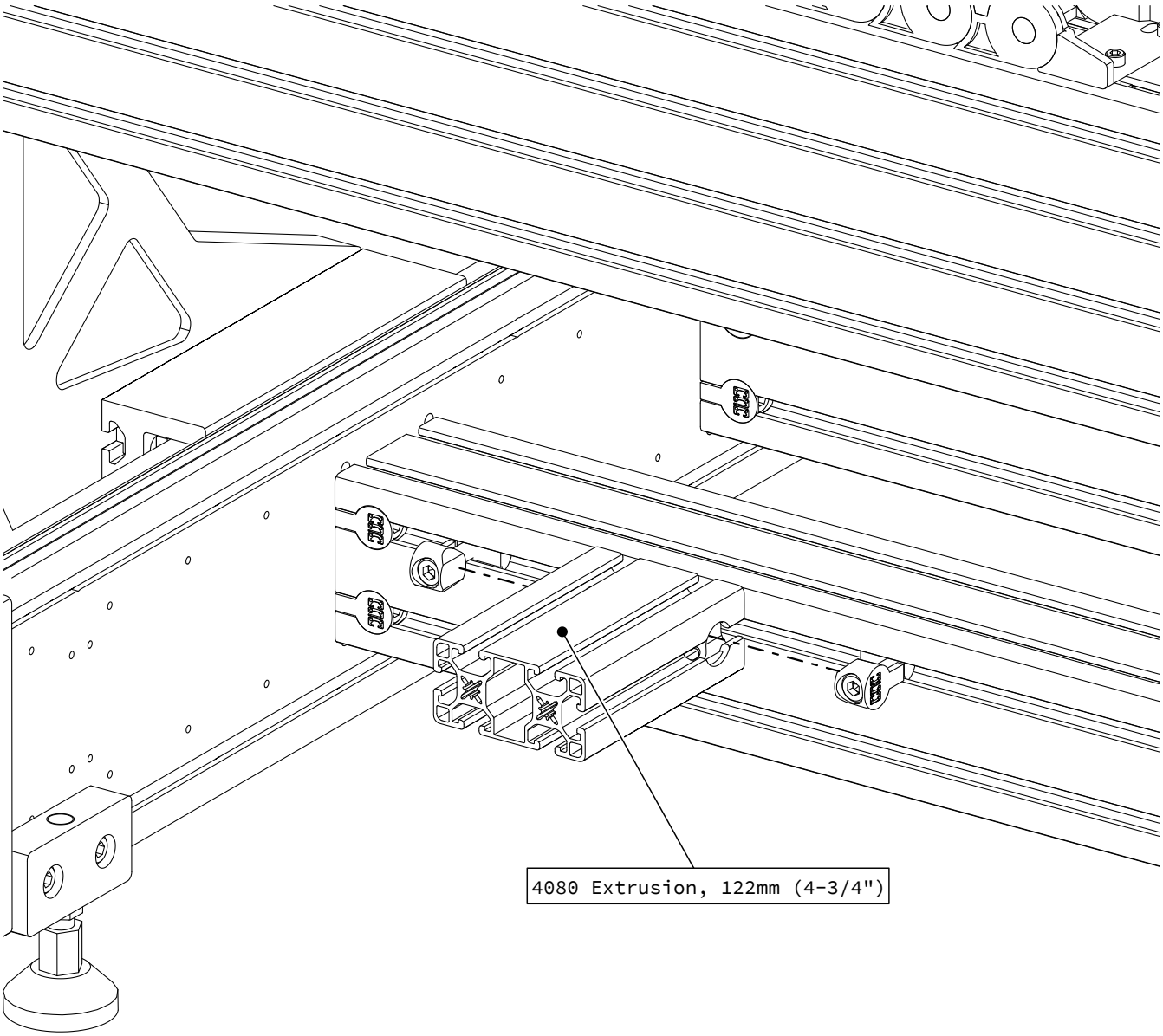
Machine Type Option

This step is only applicable for Benchtop PRO installations.



- Attach the 122mm (4-3/4") 4080 extrusion to the rear crossmember, partially tightening the fasteners.

Assembly Note

Use the upper t-slot of the rear table crossmember.

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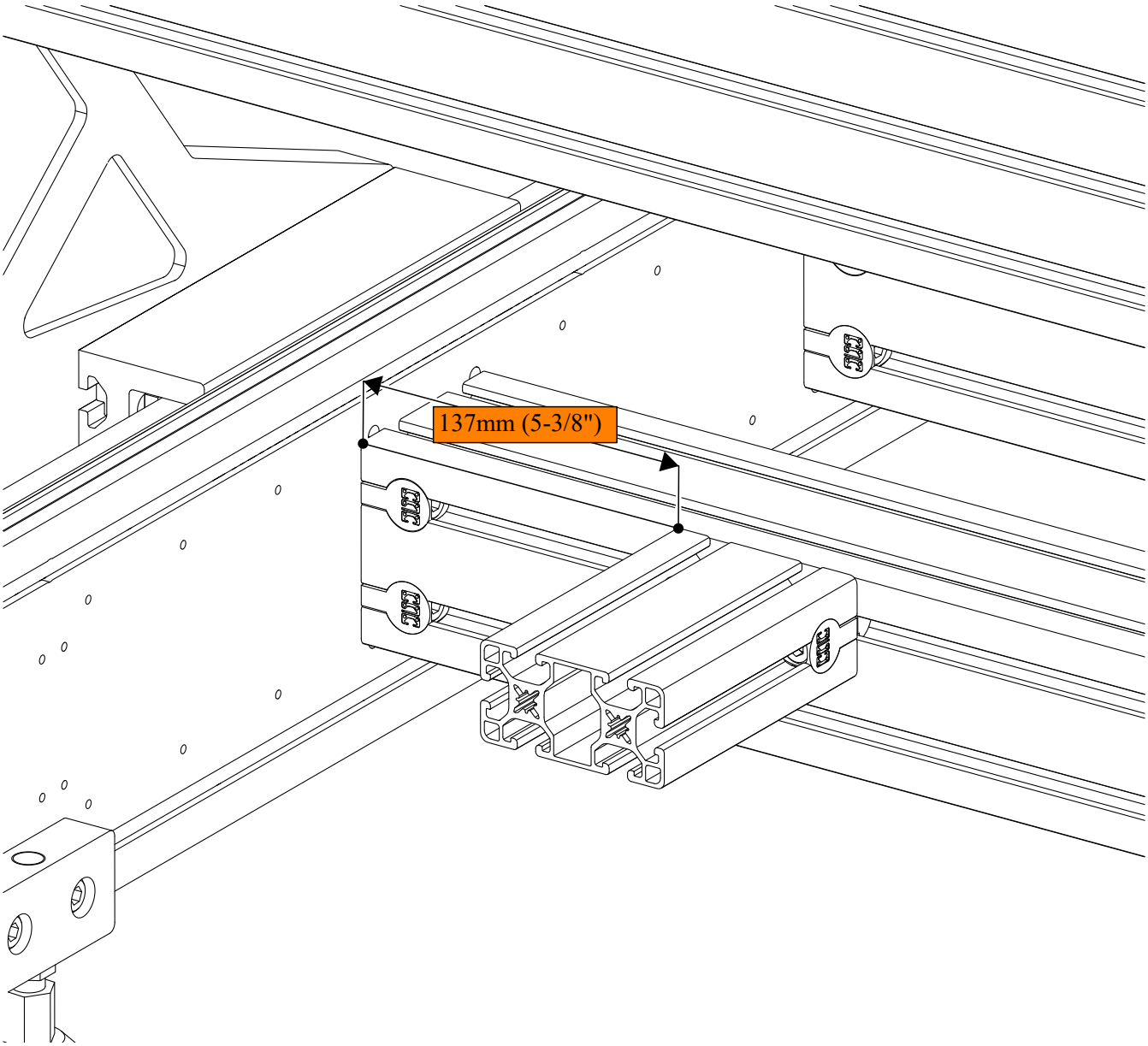
Machine Type Option

This step is only applicable for Benchtop PRO installations.



- Position the extrusion as indicated and fully tighten the fasteners.

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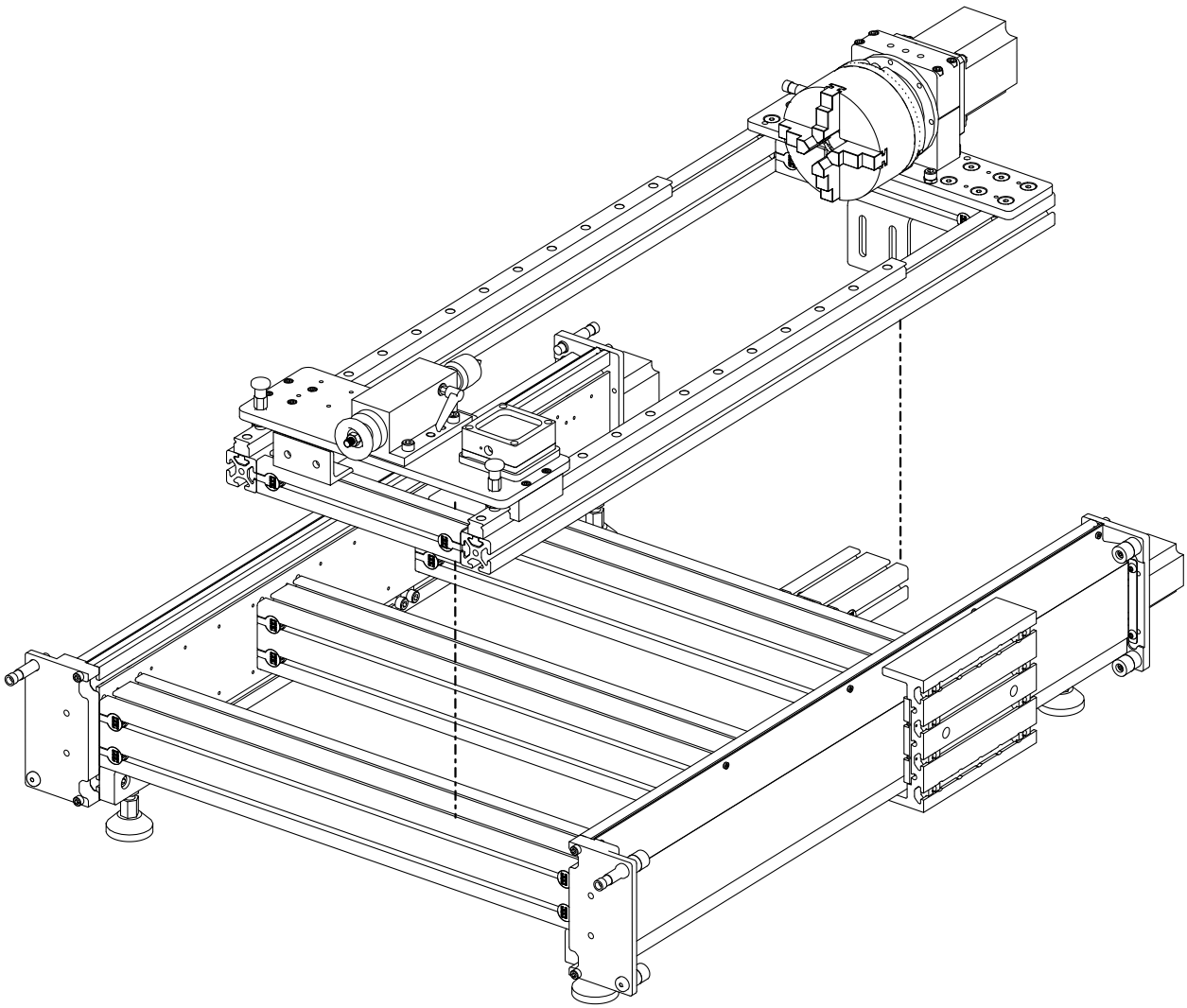

- Place the rotary assembly on the machine table.

Assembly Note

Some parts of the machine are hidden for illustrative purposes.

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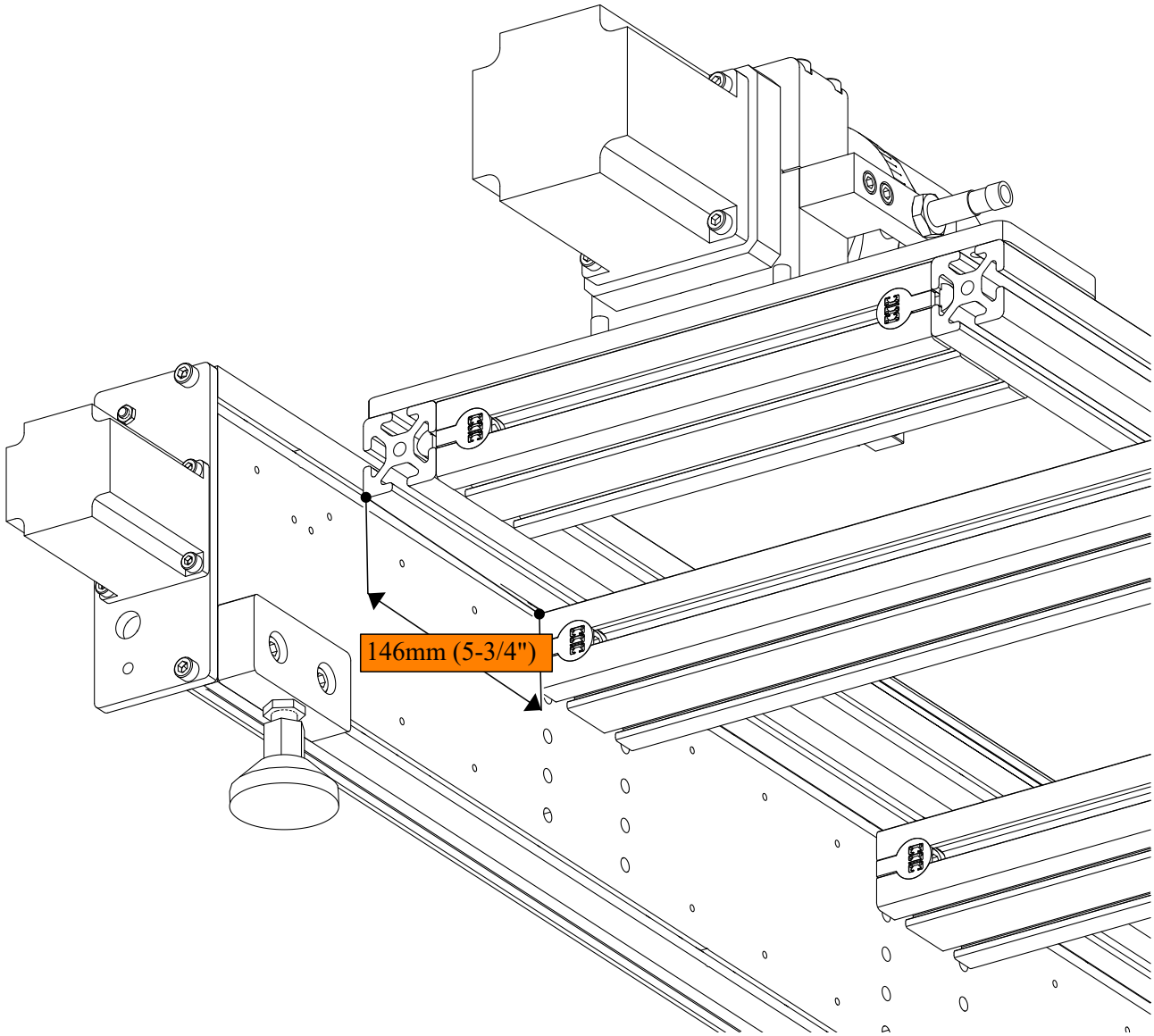
Machine Type Option

This step is only applicable for Benchtop Standard installations.



- Position the rotary frame as indicated.

Assembly Note

Measurement shown is from the back of the table crossmember to the back of the rotary frame.

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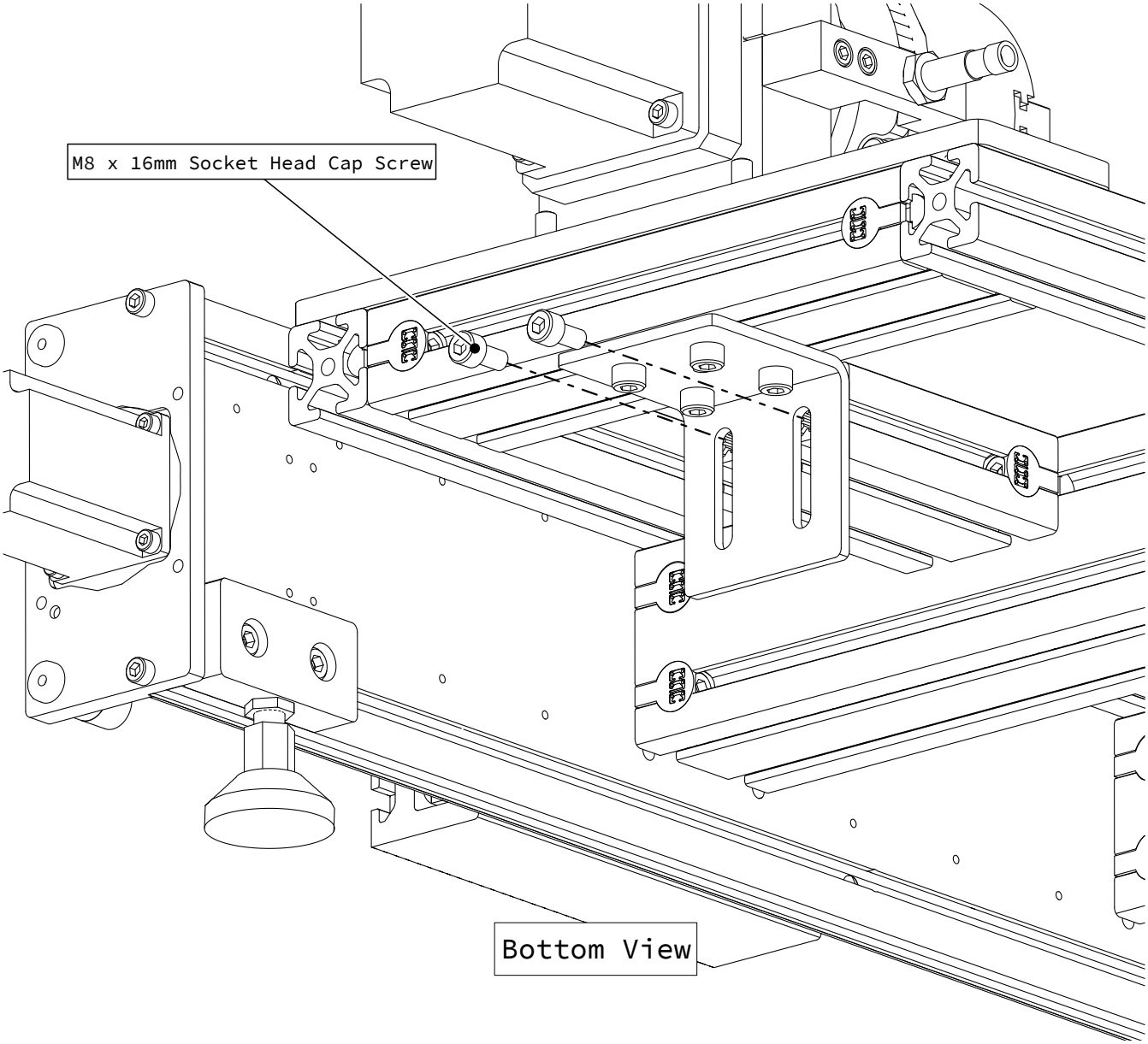
Machine Type Option

This step is only applicable for Benchtop PRO installations.



- Attach the headstock bracket to the 4080 extrusion as indicated.

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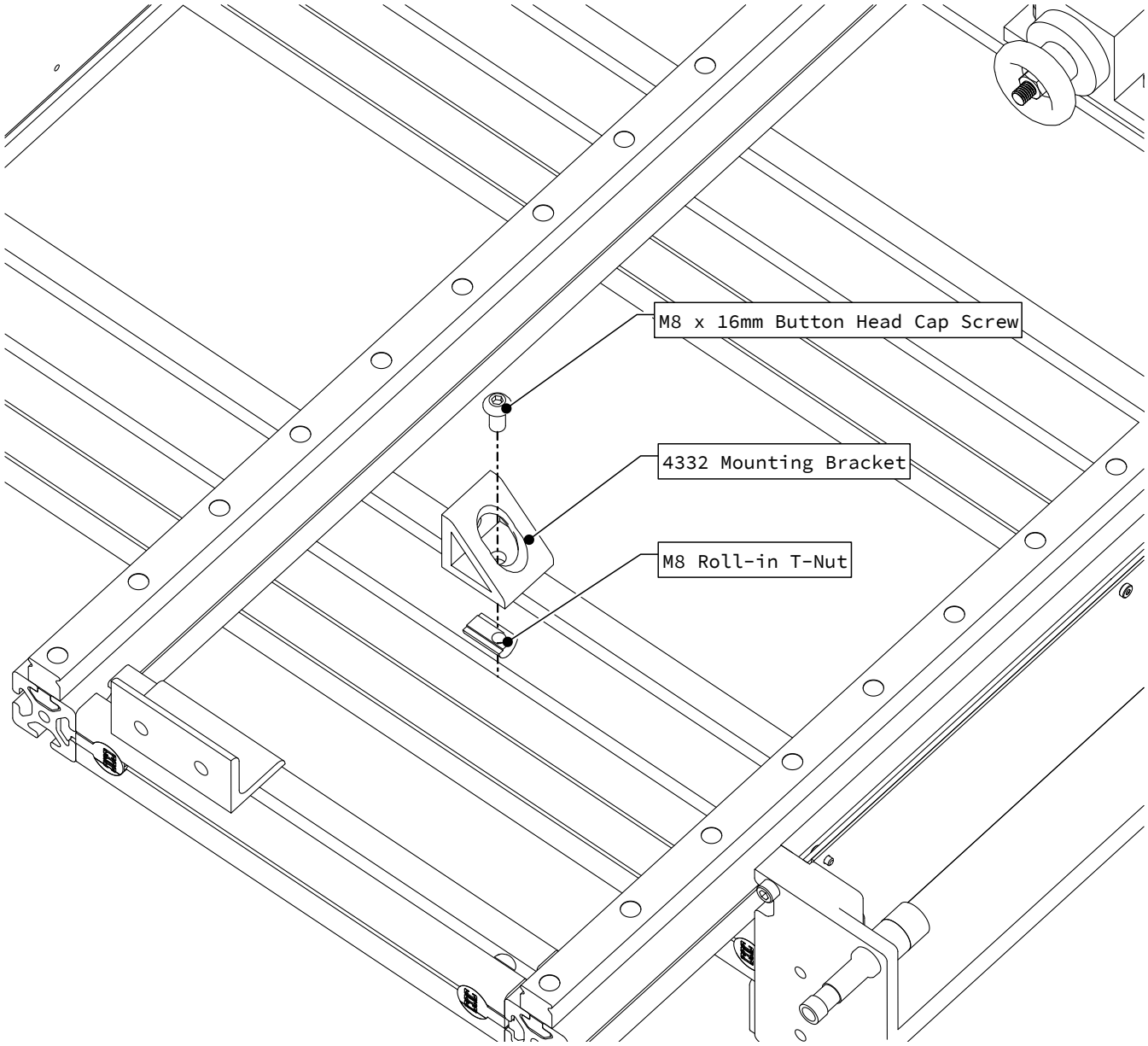

- Attach a 4332 mounting bracket to the front table crossmember, partially tightening the fasteners.

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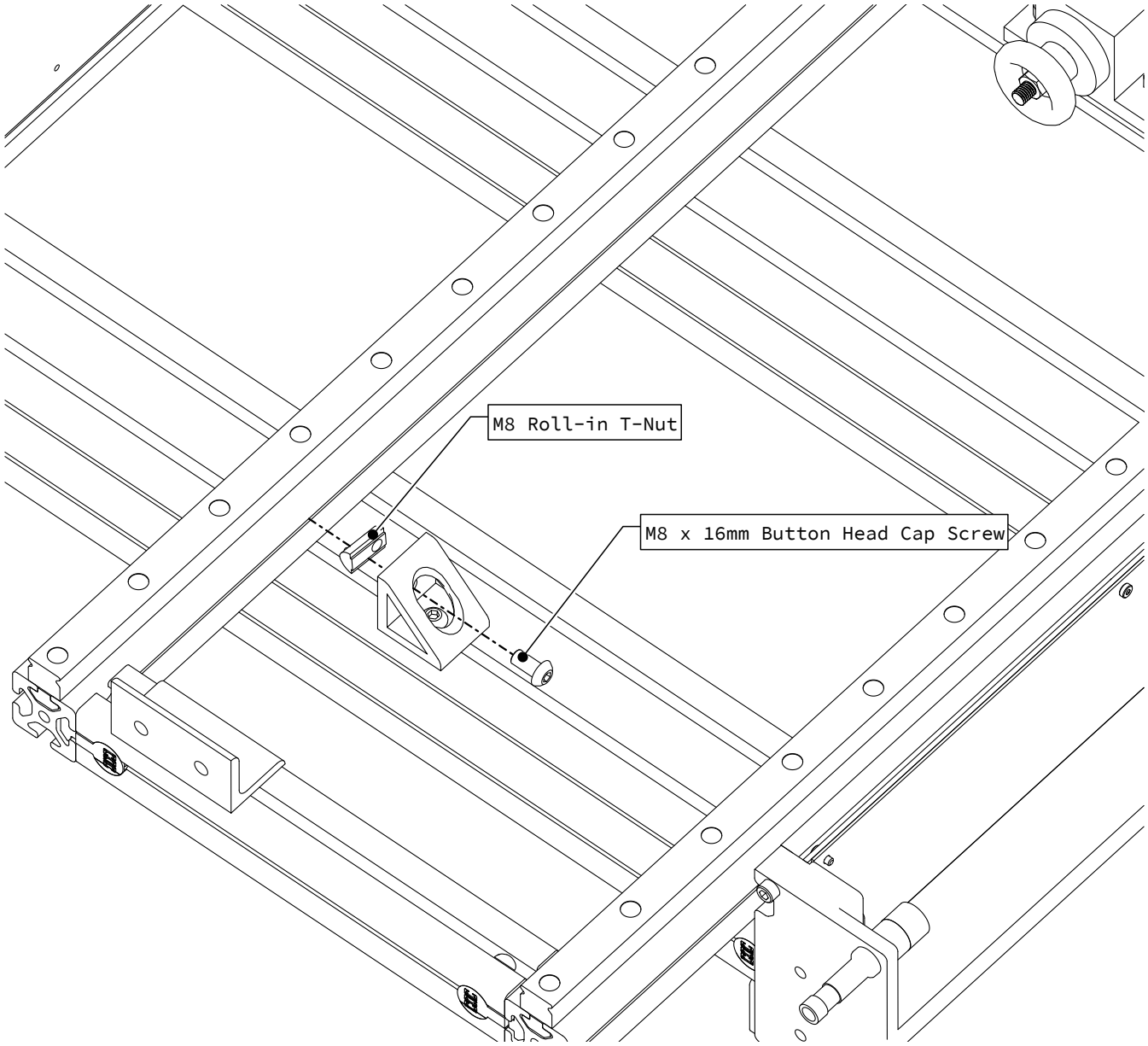

- Attach the bracket to the rotary frame as indicated, partially tightening the fasteners.

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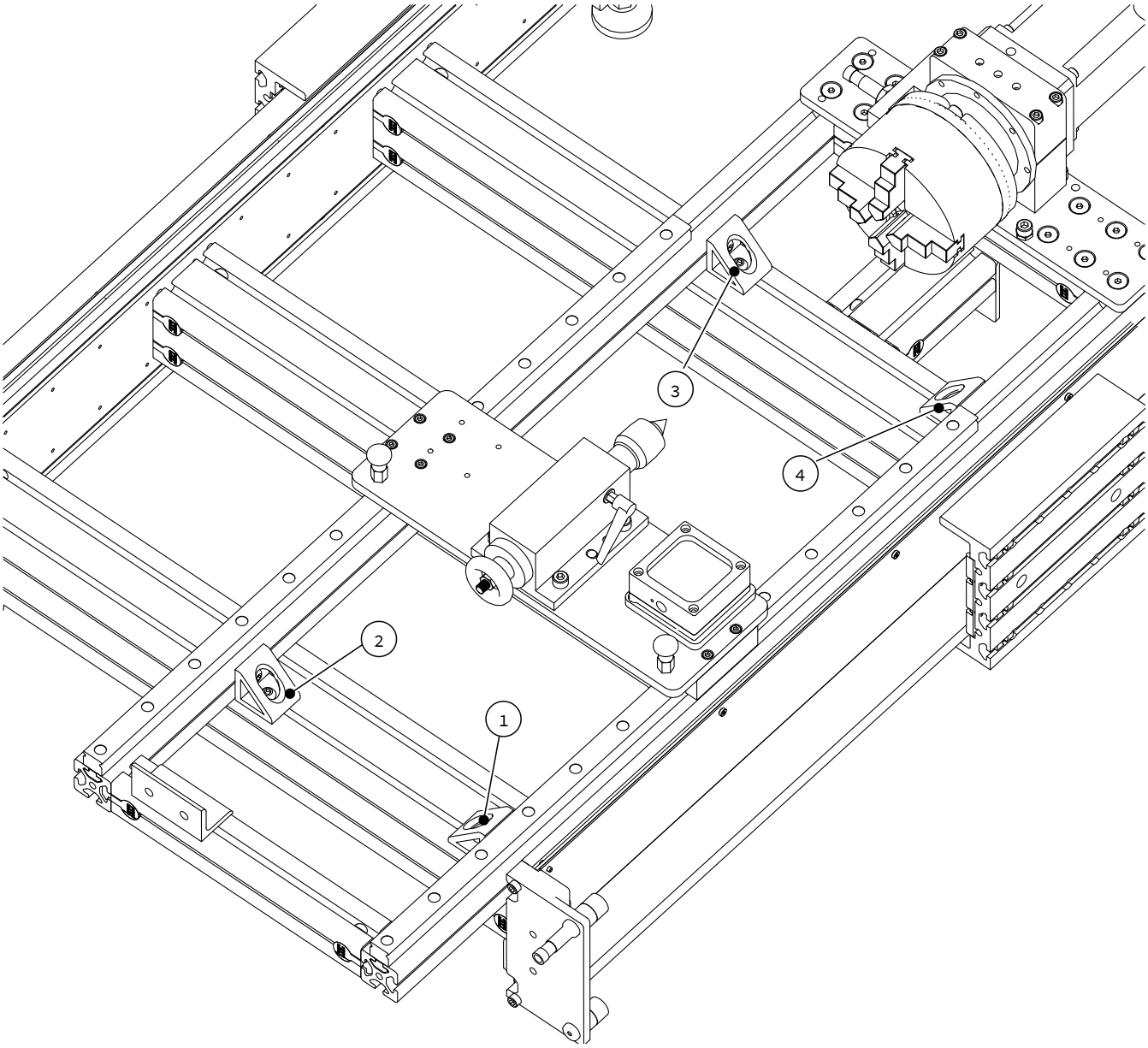
1.2.1.11



- Use this process to install brackets at the four indicated locations.

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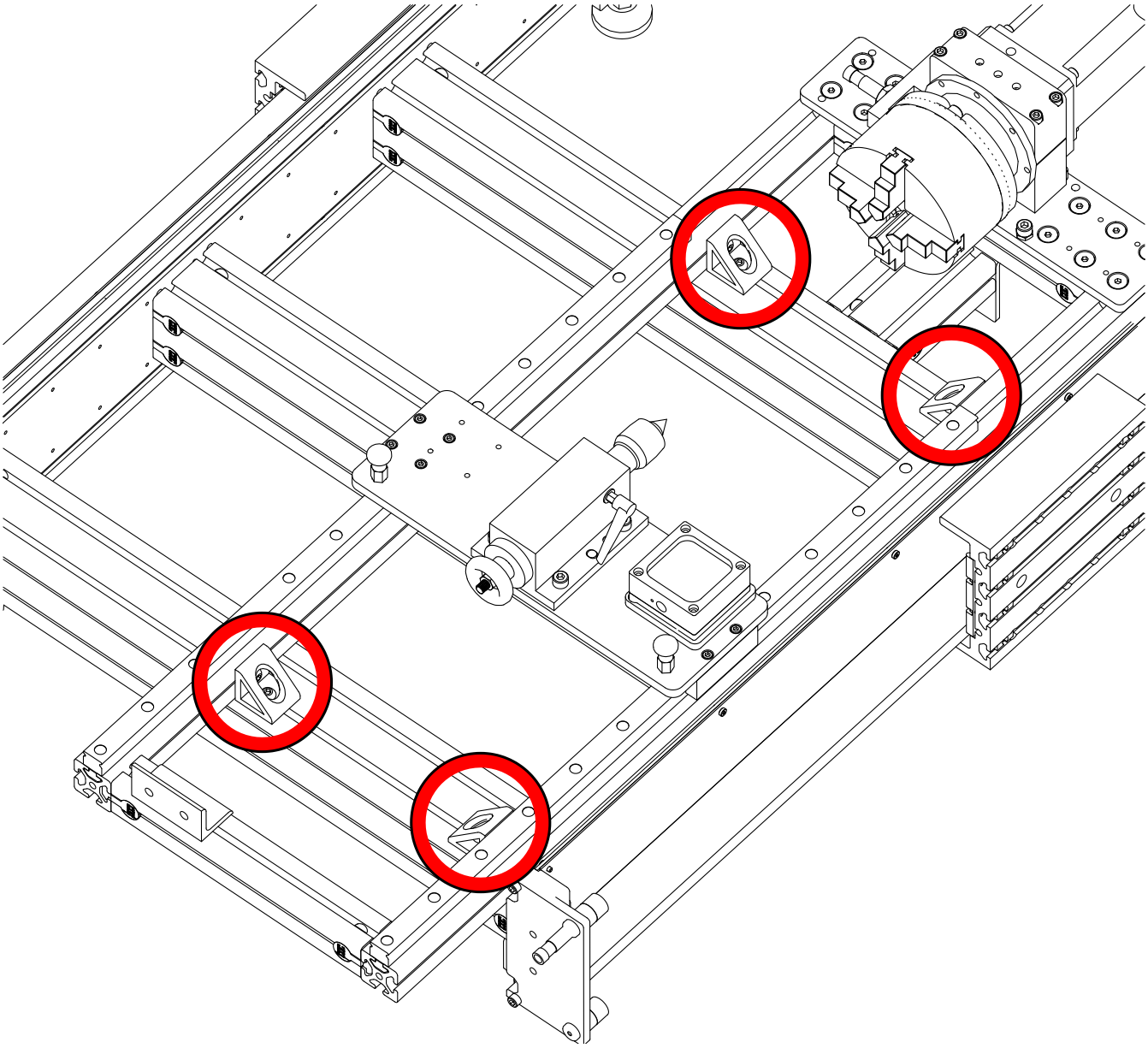

- Fully tighten the indicated mounting brackets.

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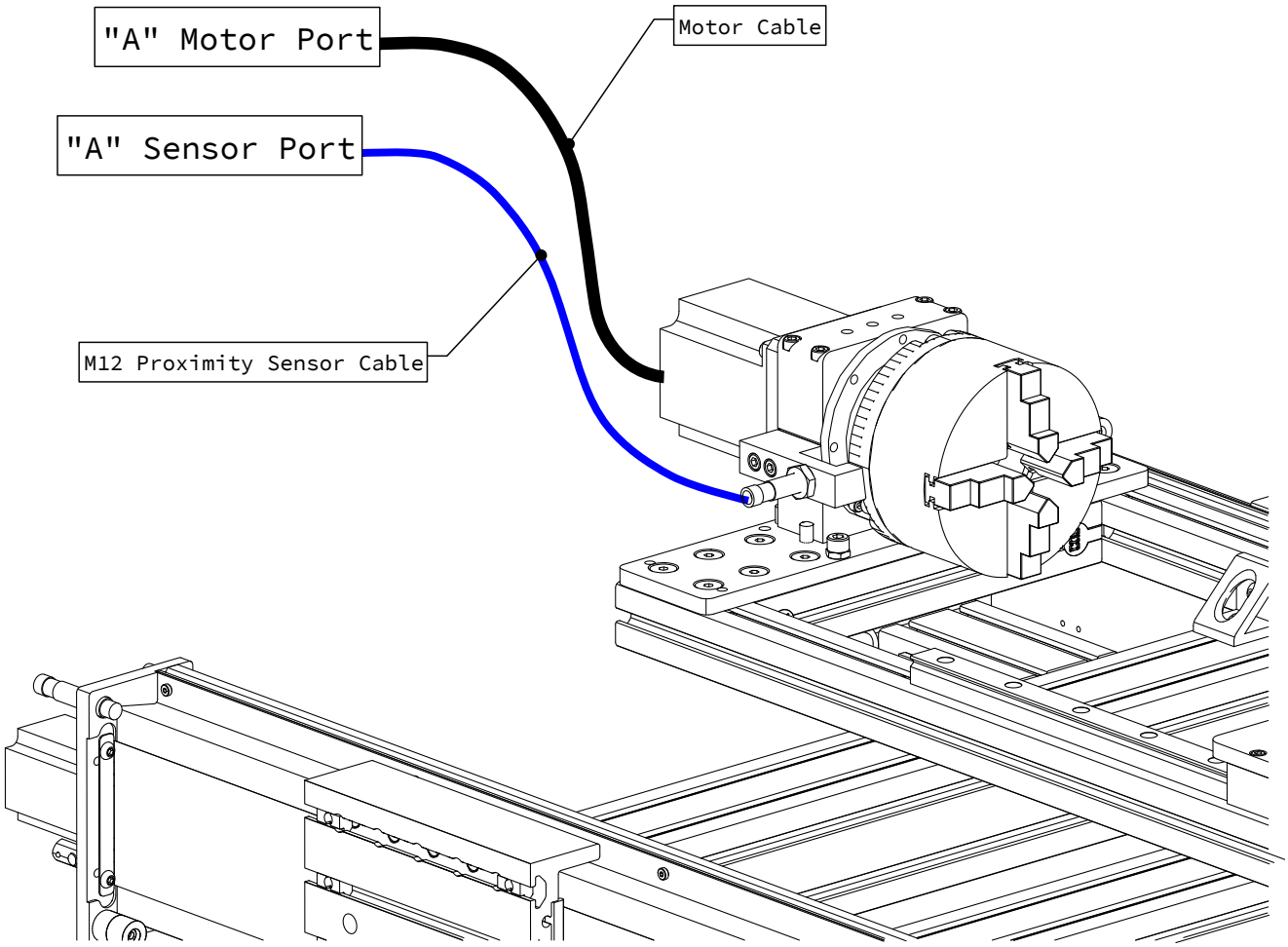
1.2.2 Motor & Sensor Connections

1.2.2.1



- 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

An M12 splitter is required to connect the X+ and X- limit switches to the X- port on the control box.

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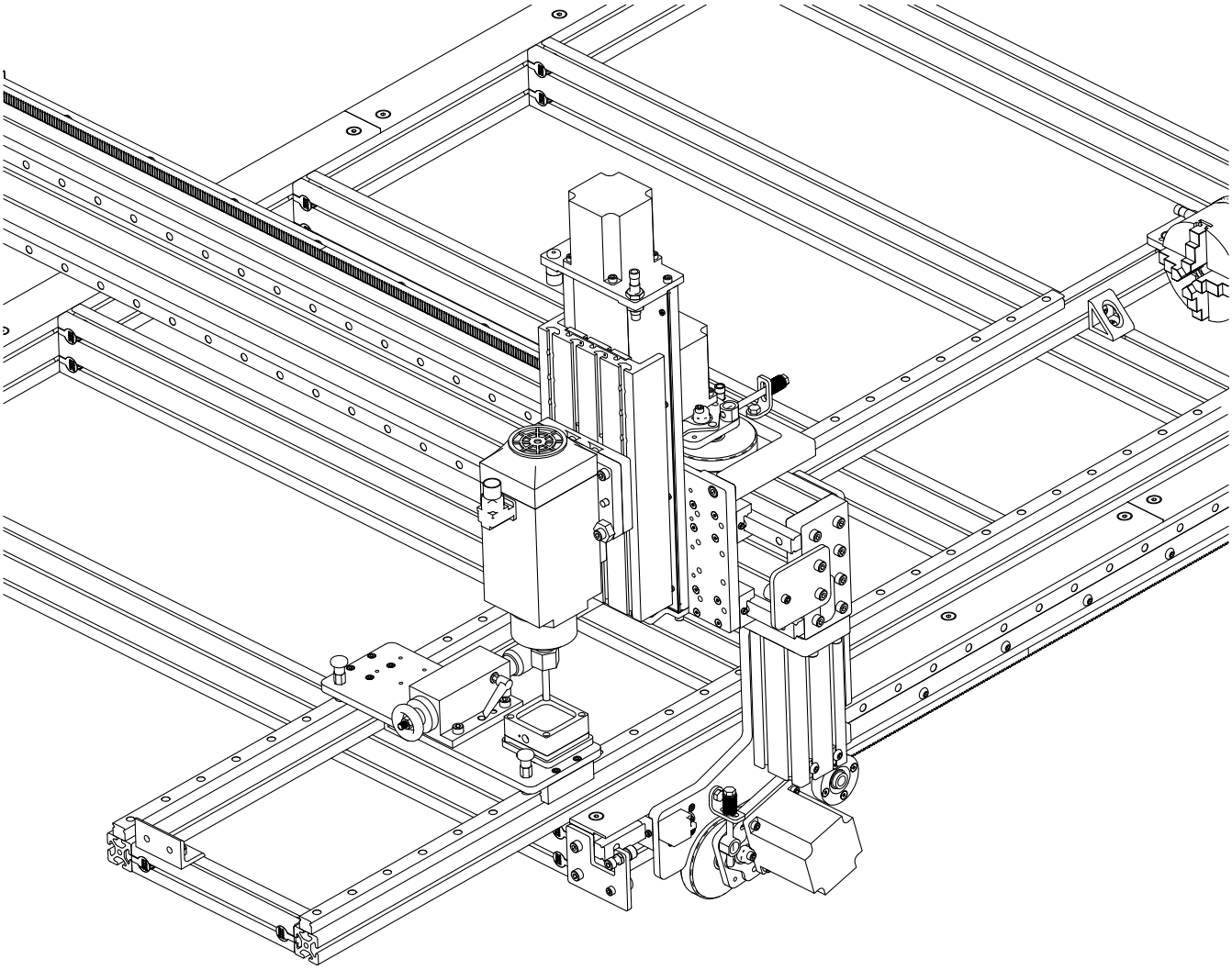
1.3 Calibration

Rotary Calibration

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



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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
1	CRP195-00-FAST: - (1) M8 x 25mm Socket Head Cap Screw - (1) M8 Hex Jam Nut	CRP195-00-PRO-SHORT

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.

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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.

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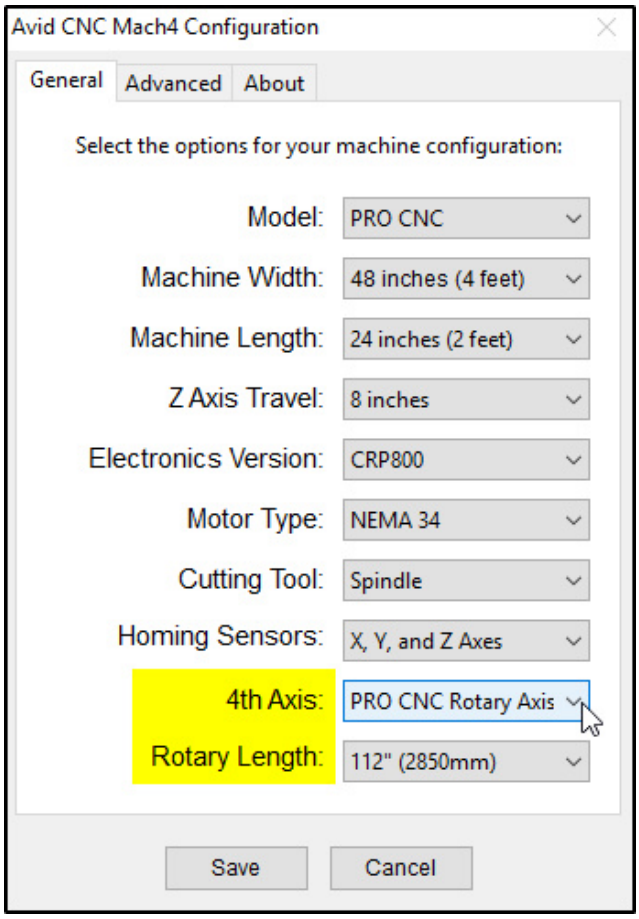
1.3.1.1



- 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.

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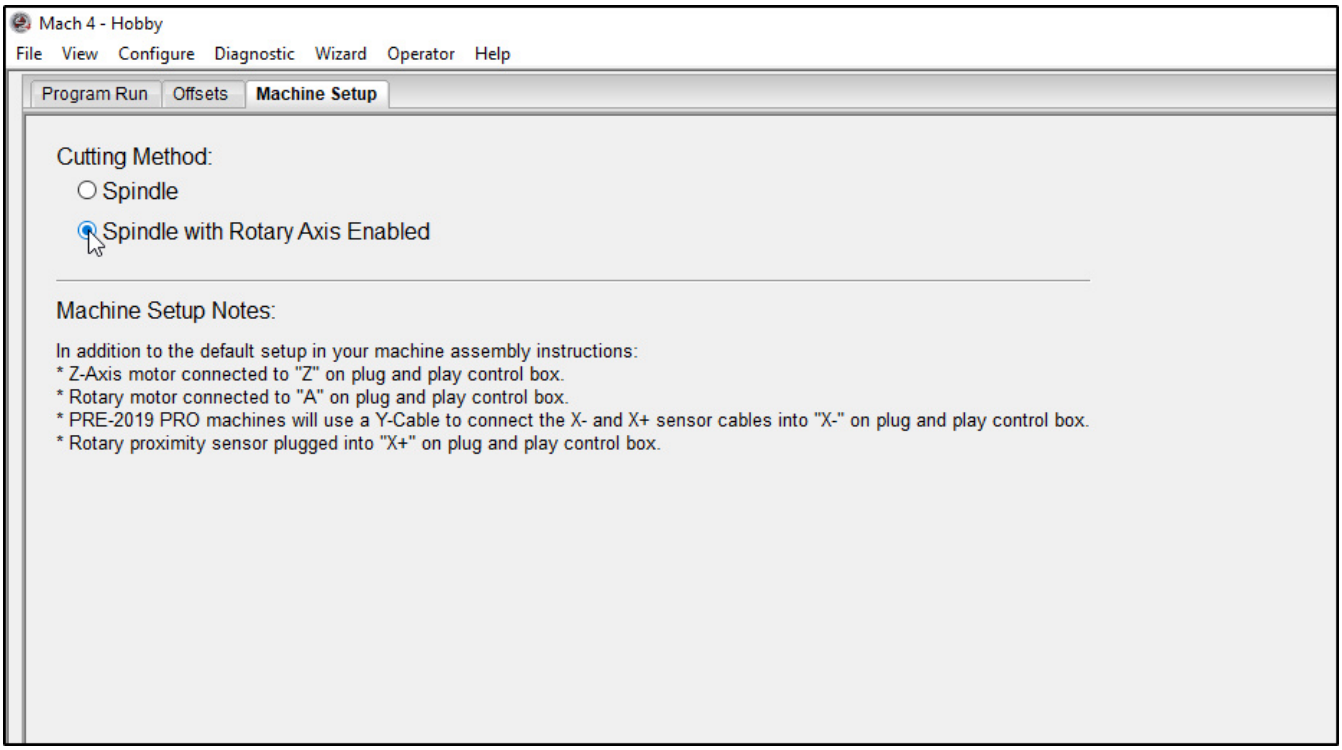
1.3.1.2



- 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.

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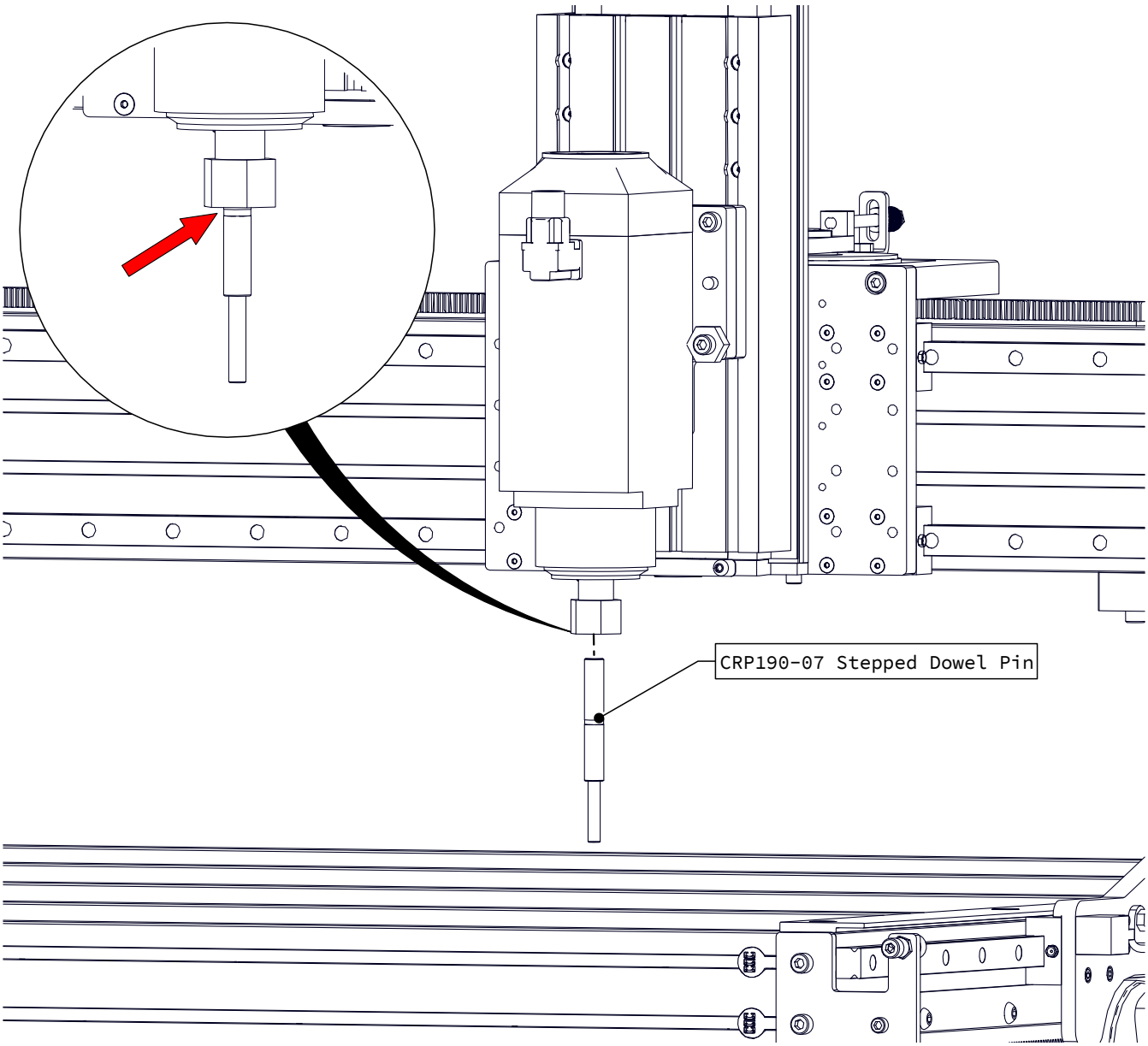
1.3.2 Frame Alignment

The frame alignment procedure will assist in leveling and 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.

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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.

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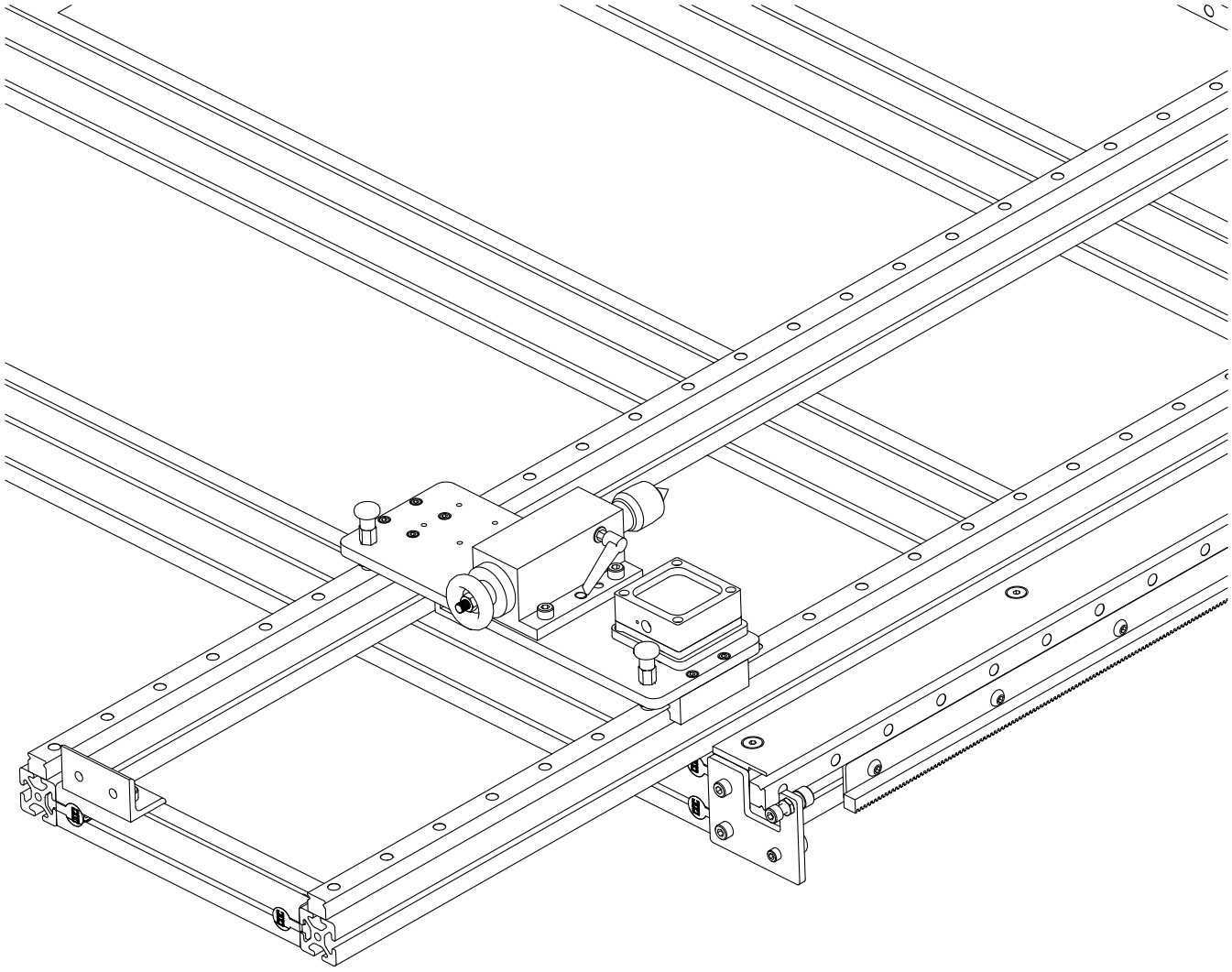

- Position the tail stock at the front table crossmember as indicated.
- Lock the tail stock in place using the spring plungers.

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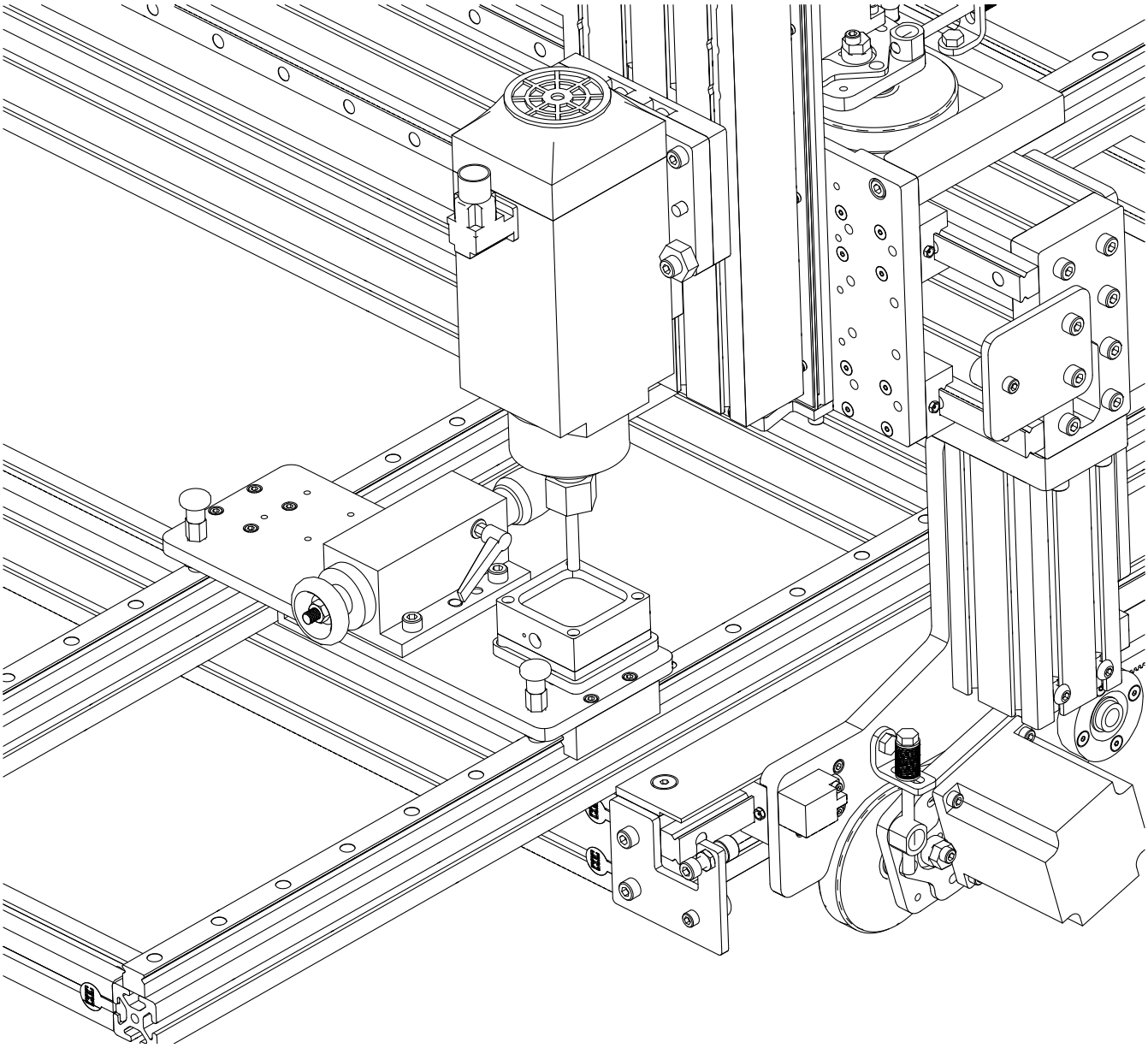

- Place your auto Z touch plate on the touch plate isolator.
- Position the bottom of the dowel pin roughly 25mm (1") above the center of the touch plate.

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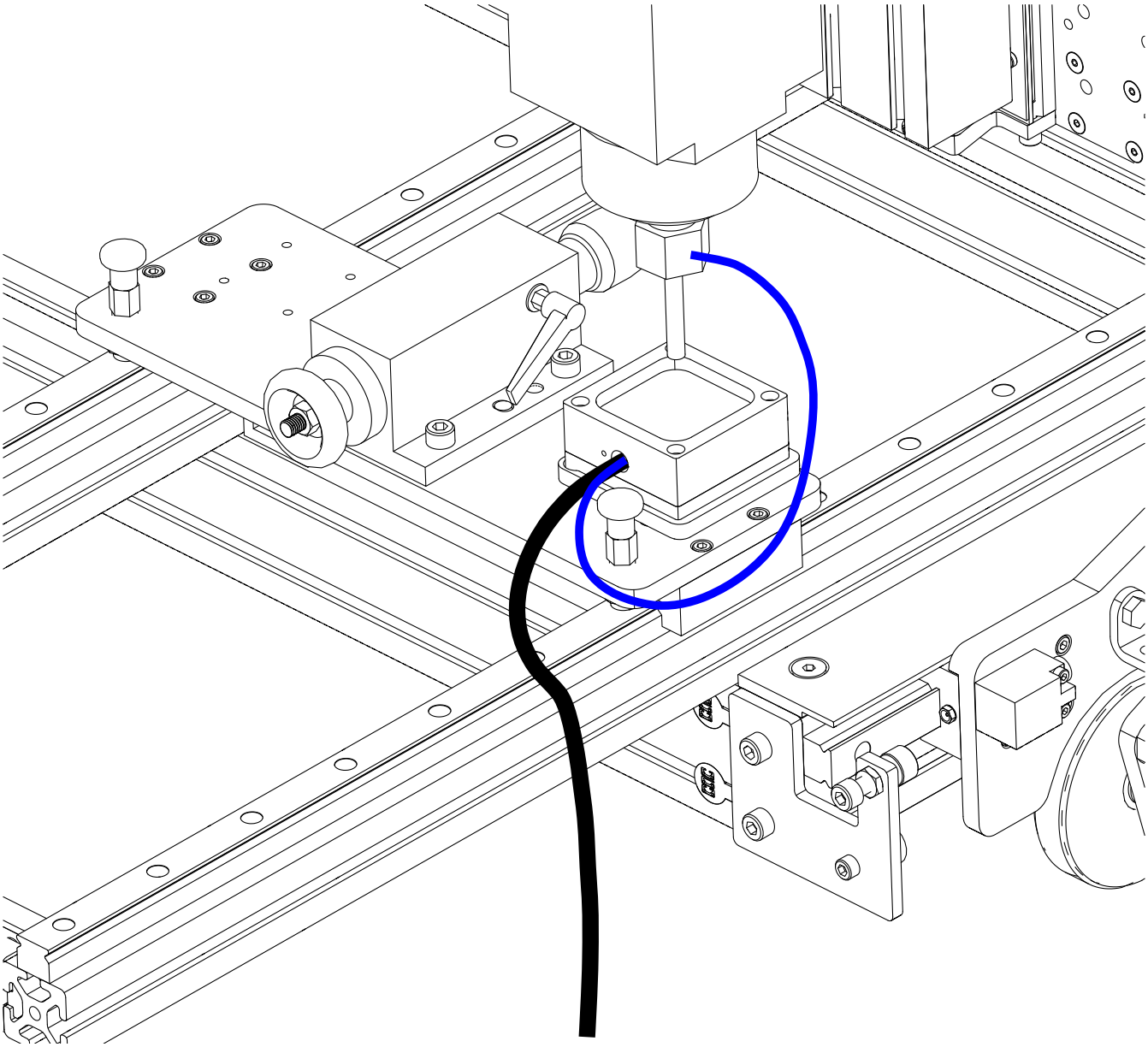

- Ensure the magnet from the touch plate is attached to the collet nut on the spindle.

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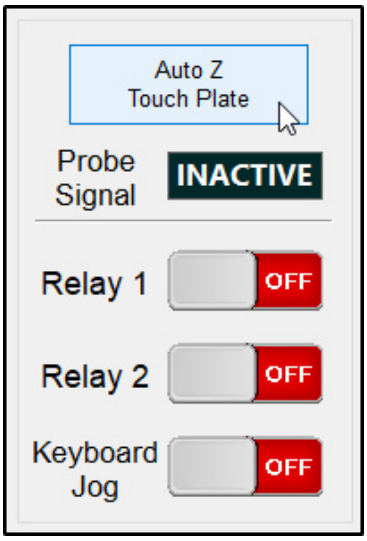
1.3.2.5



- 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.

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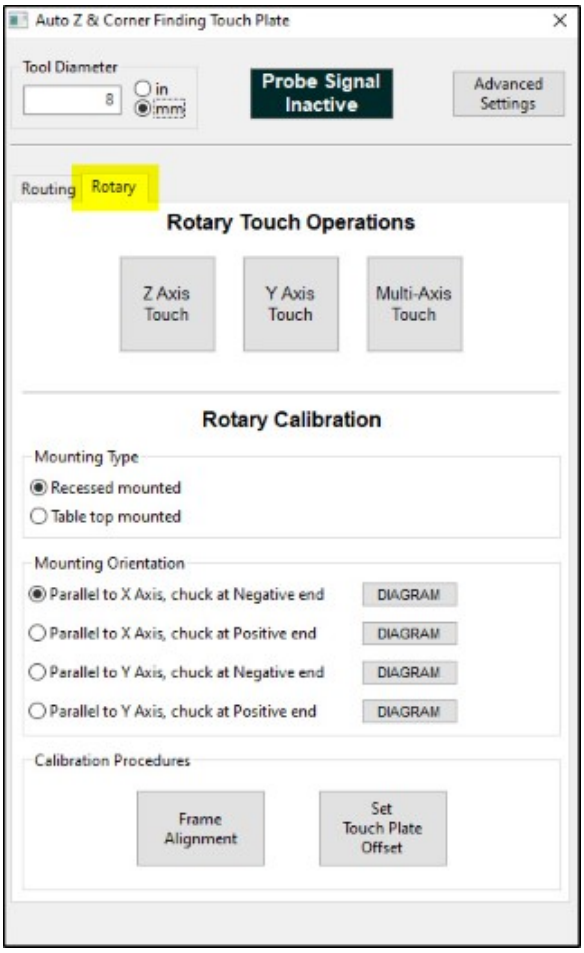
1.3.2.6



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

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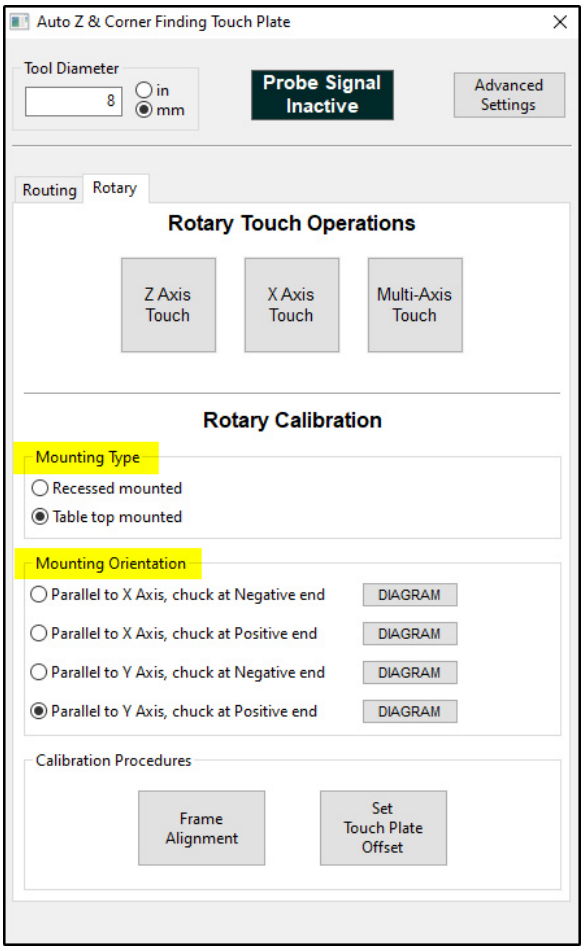

- In the **Rotary Calibration** section, select the Mounting Type and Orientation of your rotary assembly.
- The **Diagram** buttons show the orientation for each Mounting Orientation option.

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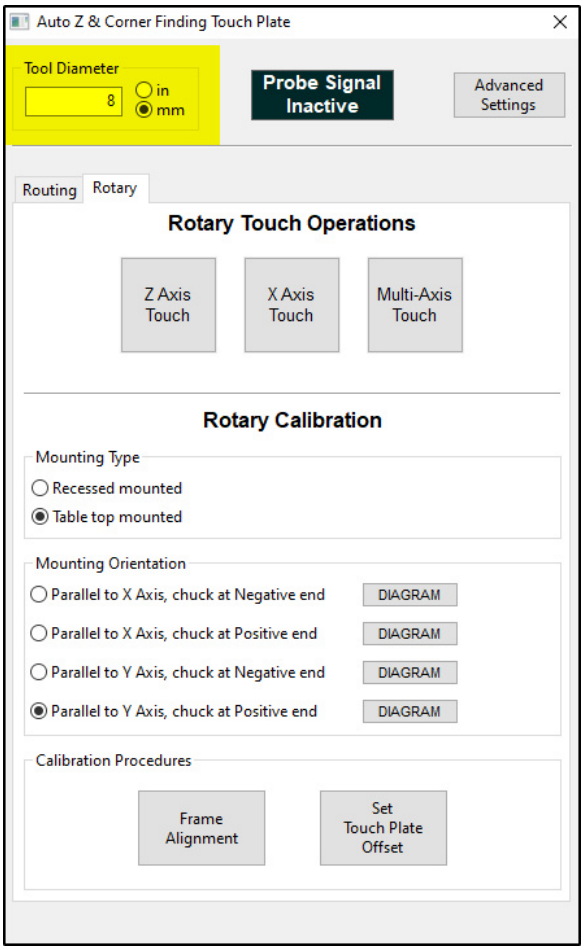

- Enter the tool diameter of **8** and select **mm** for the units.

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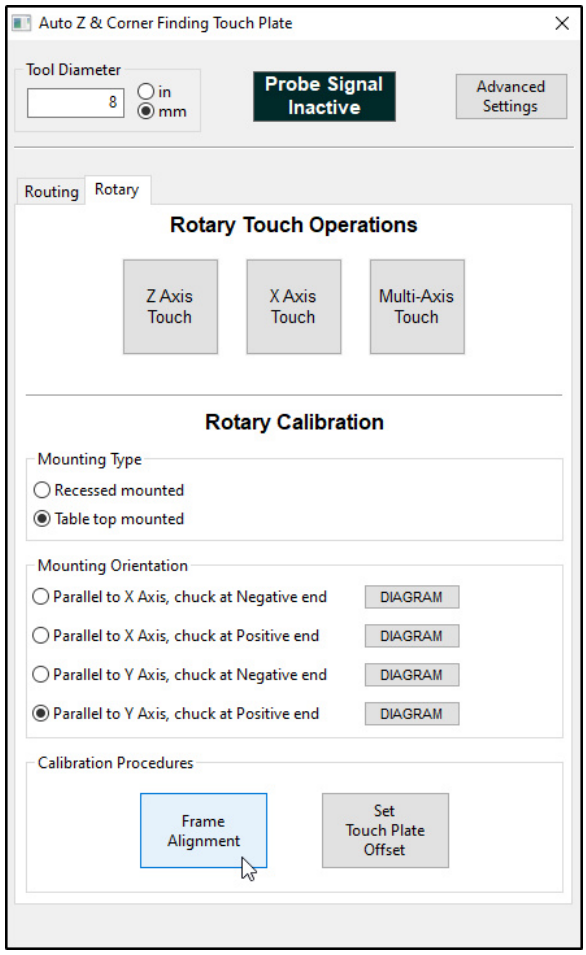

- Click the **Frame Alignment** button.

> **Mach4 Usage Note**
>
> Use of the Rotary Touch Operations require your X, Y, and Z axes to be homed.

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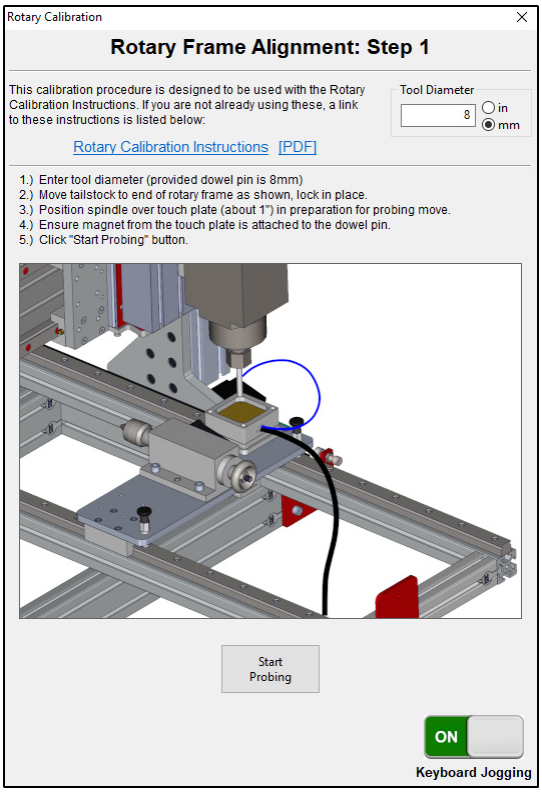
1.3.2.10



- 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.

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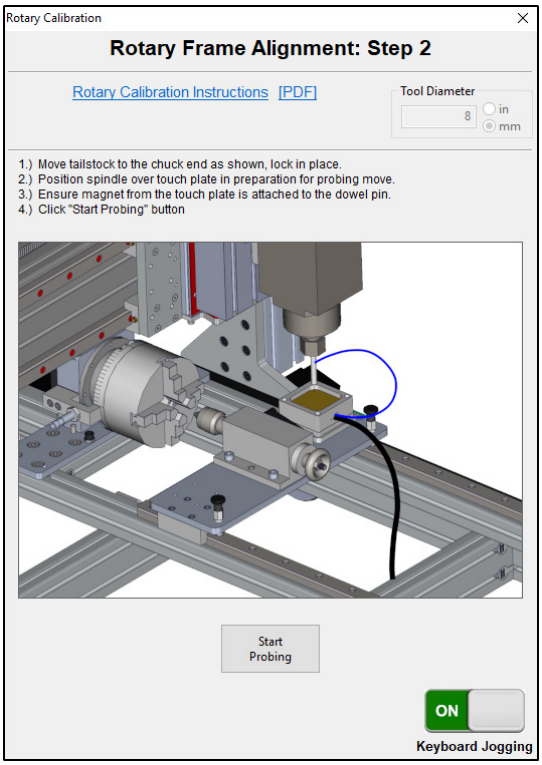

- Follow the instructions shown in Mach4 for **Rotary Frame Alignment: Step 2** to probe the second position.

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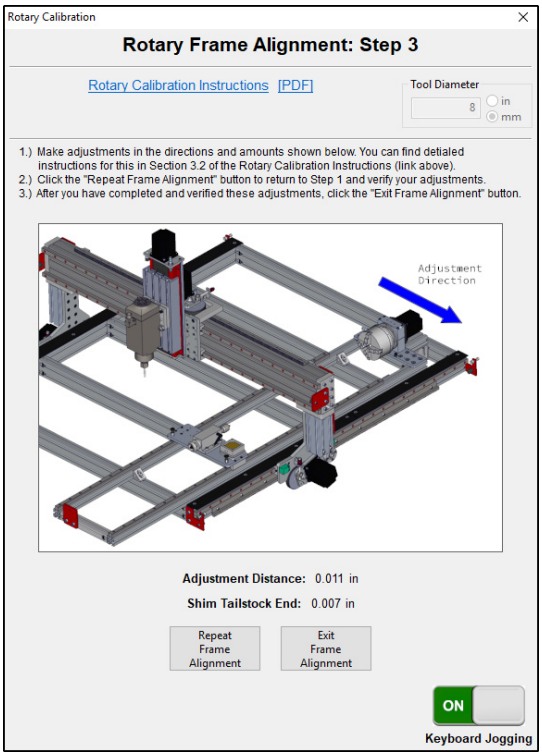

- You will now see two values on the screen:
  - **Adjustment Distance**: Amount to adjust the end of the rotary frame shown in the image. This will square the rotary frame to the gantry.
  - **Raise Chuck/Tailstock End**: Amount to raise the designated end of the rotary frame. This will level the rotary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

Assembly Note

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

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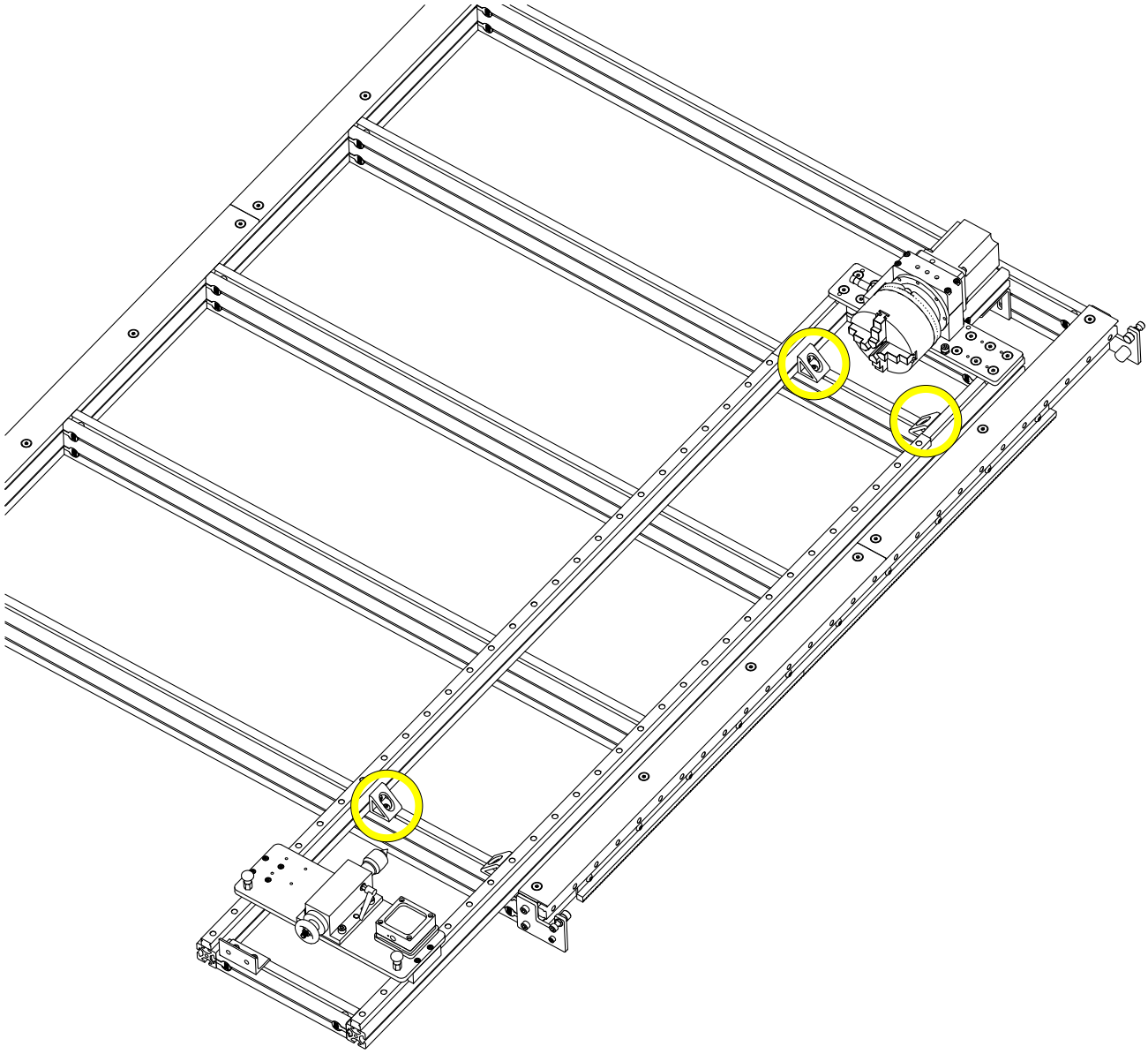

- At the three indicated corners, loosen the bracket fasteners.

Assembly Note

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

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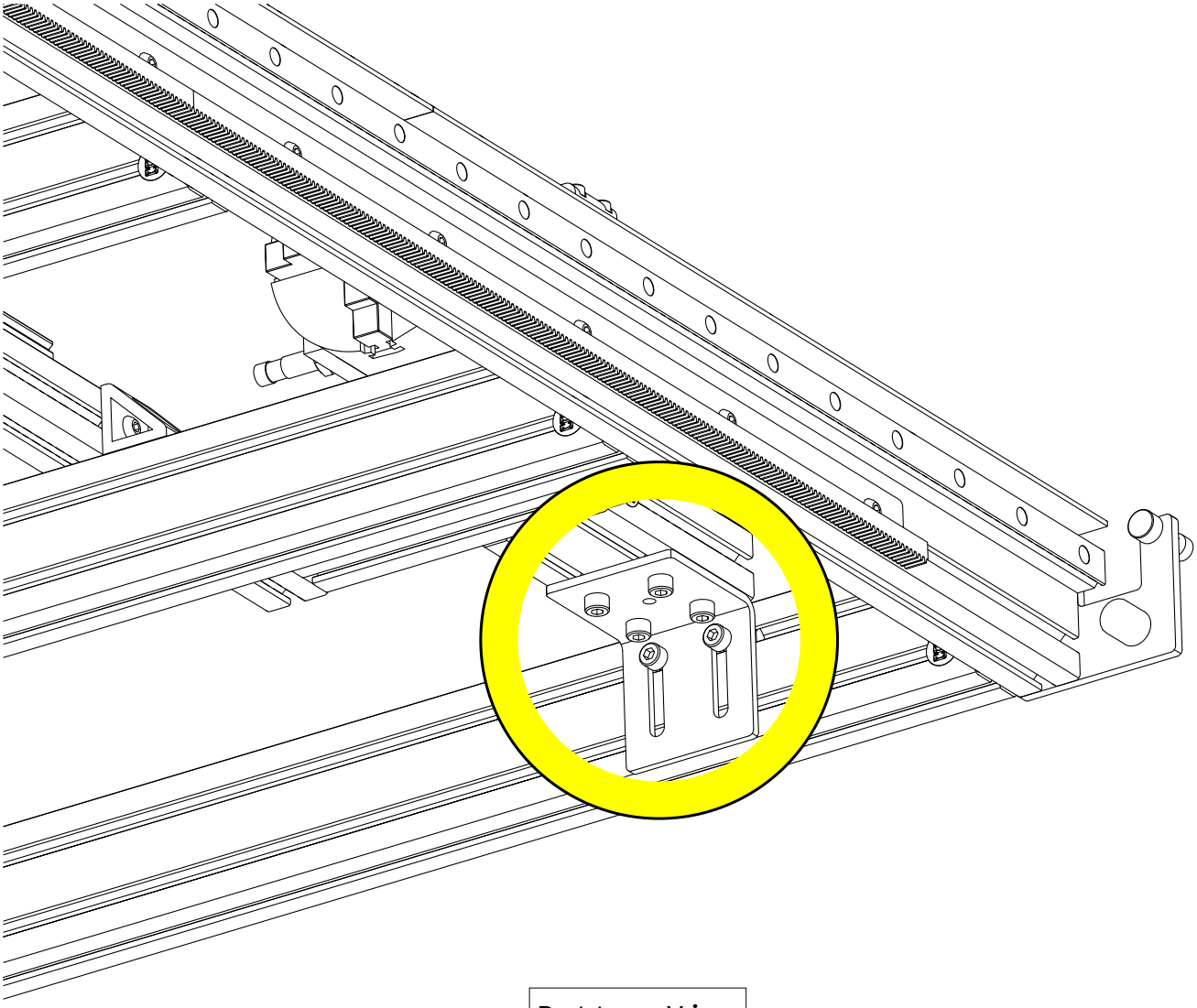
Machine Type Option

This step is applicable only for PRO CNC and Benchtop PRO installations.



Bottom View

- Loosen all of the headstock bracket fasteners.

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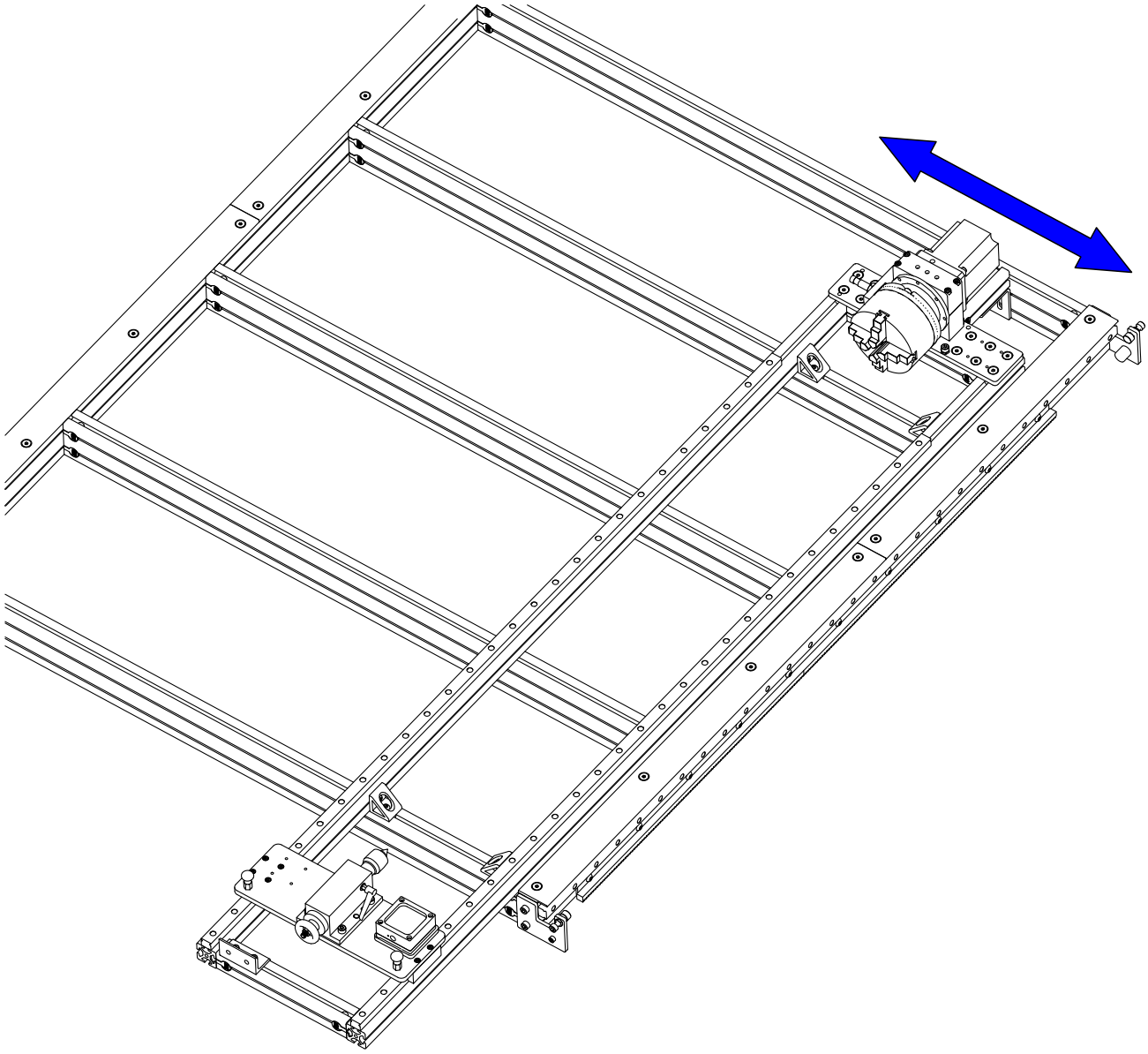
1.3.2.15



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

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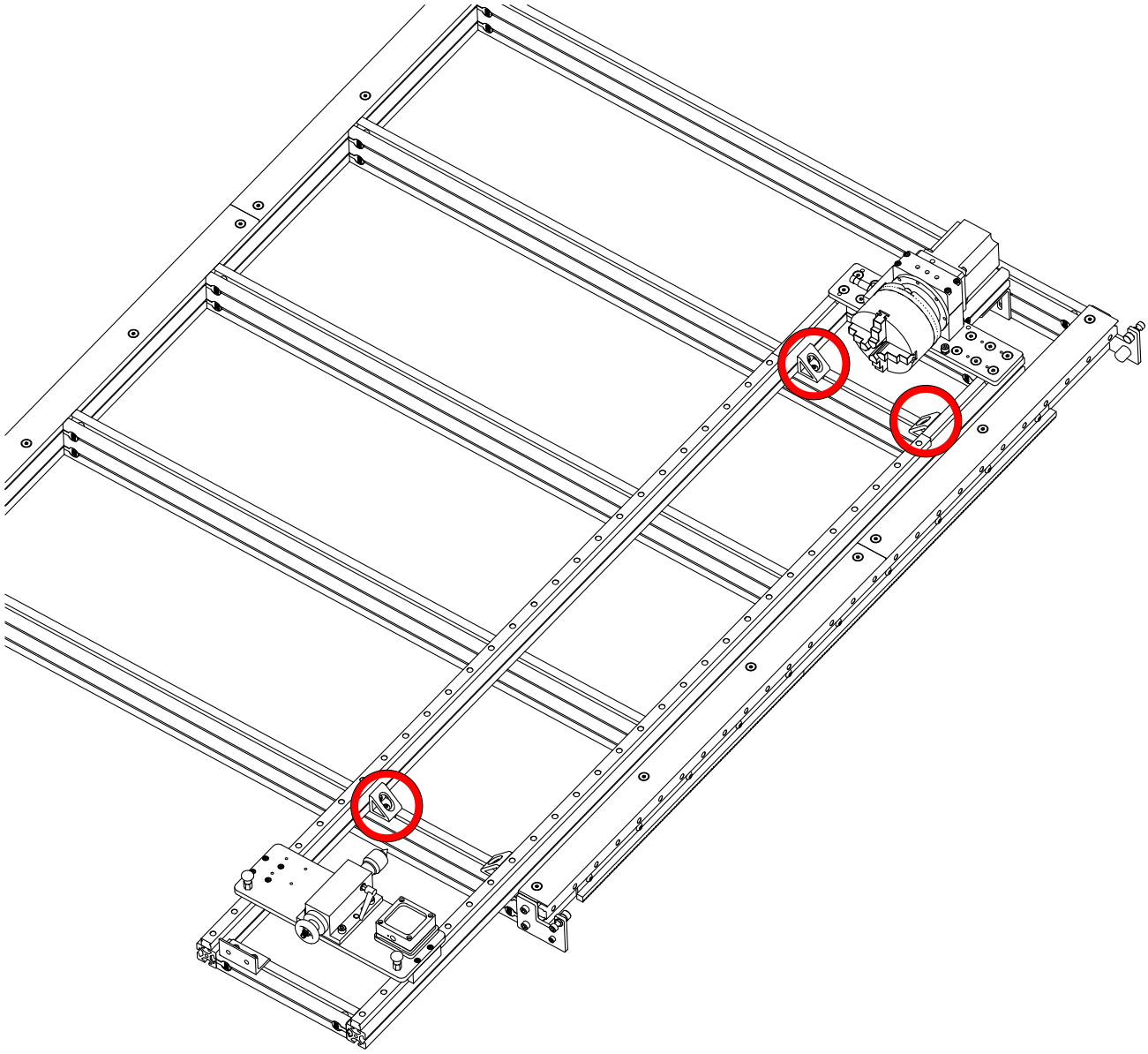

- At the three indicated corners, tighten the fasteners.

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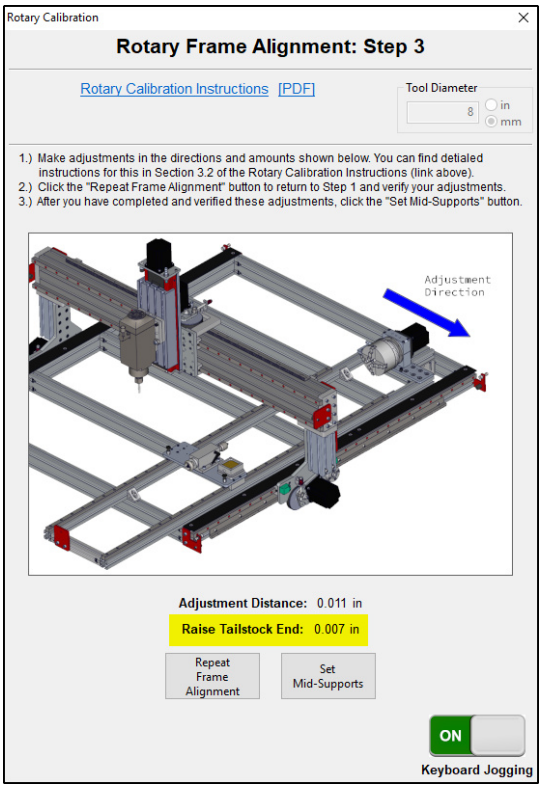

- In the following steps, shim at the location indicated on the screen in Mach4.

Assembly Note

If shim stock is not available, aluminum foil can be used. Typical heavy-duty aluminum foil is 0.024mm (0.001") thick.

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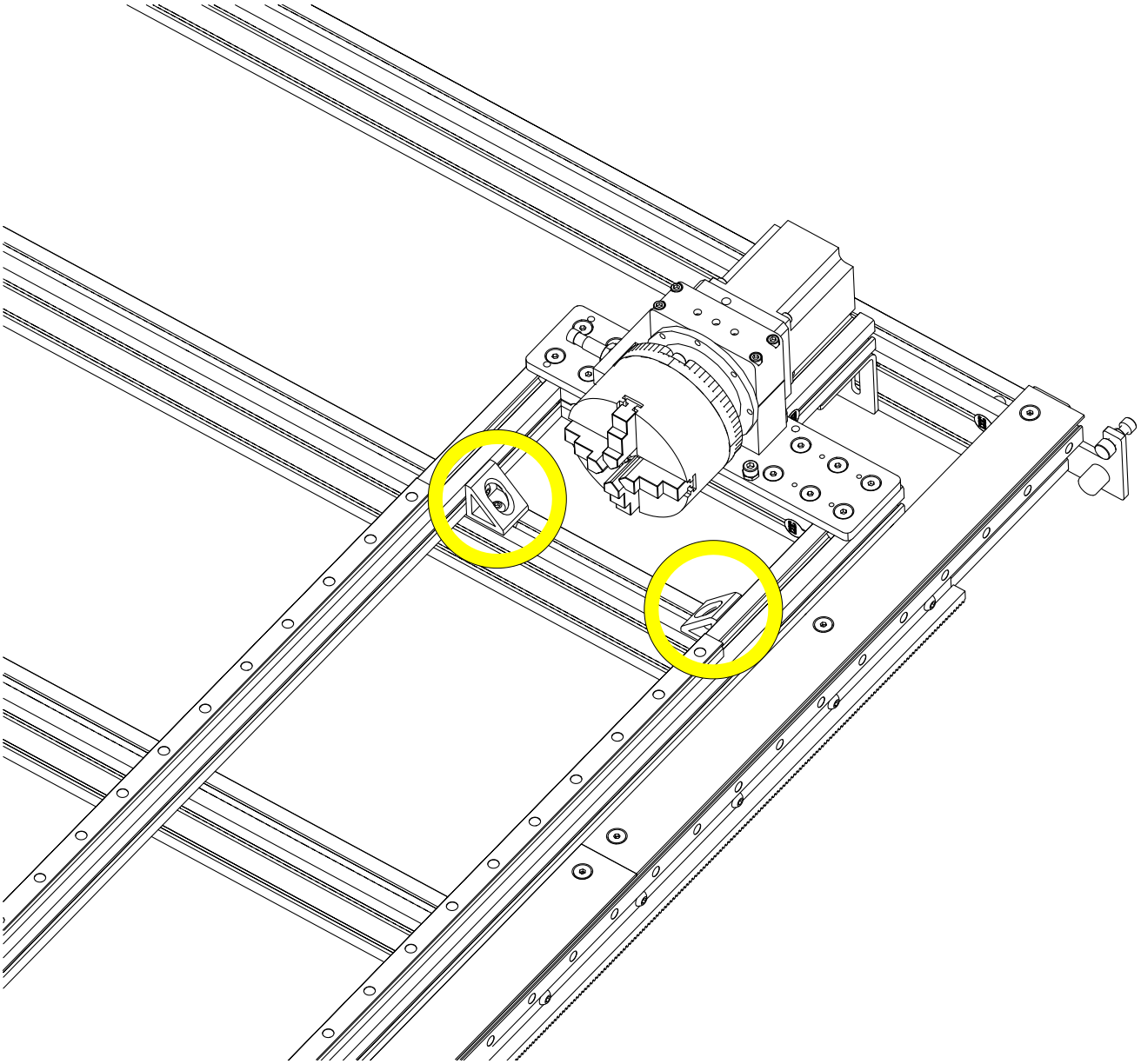

- At the tailstock or headstock end, loosen the brackets attaching the rotary frame to the machine table.

Assembly Note

Shimming at the tailstock end will follow the same procedure.

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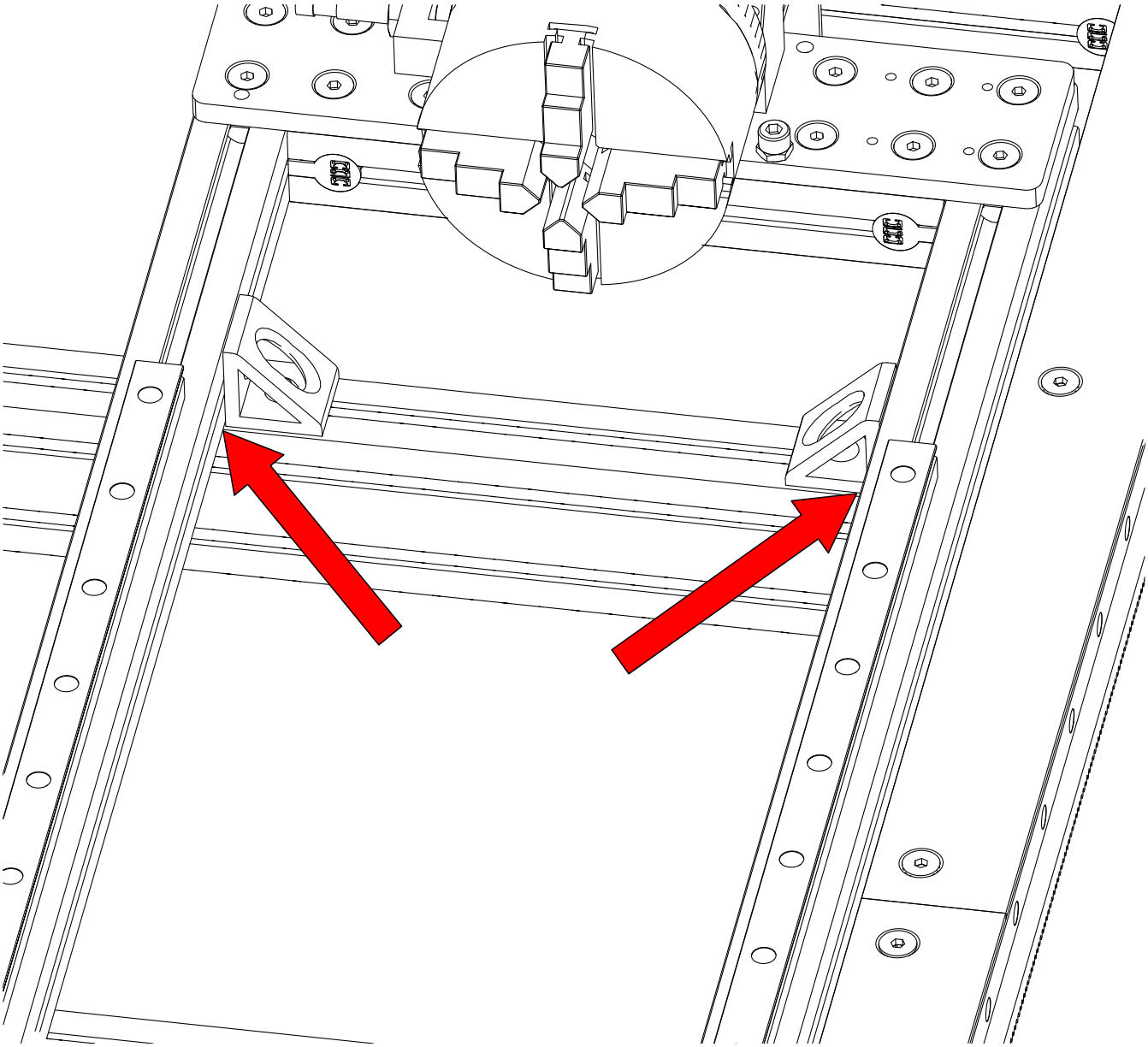

- Shim in between the rotary frame and machine table crossmembers the appropriate amount.

Assembly Note

Shim equally on each side of the rotary frame.

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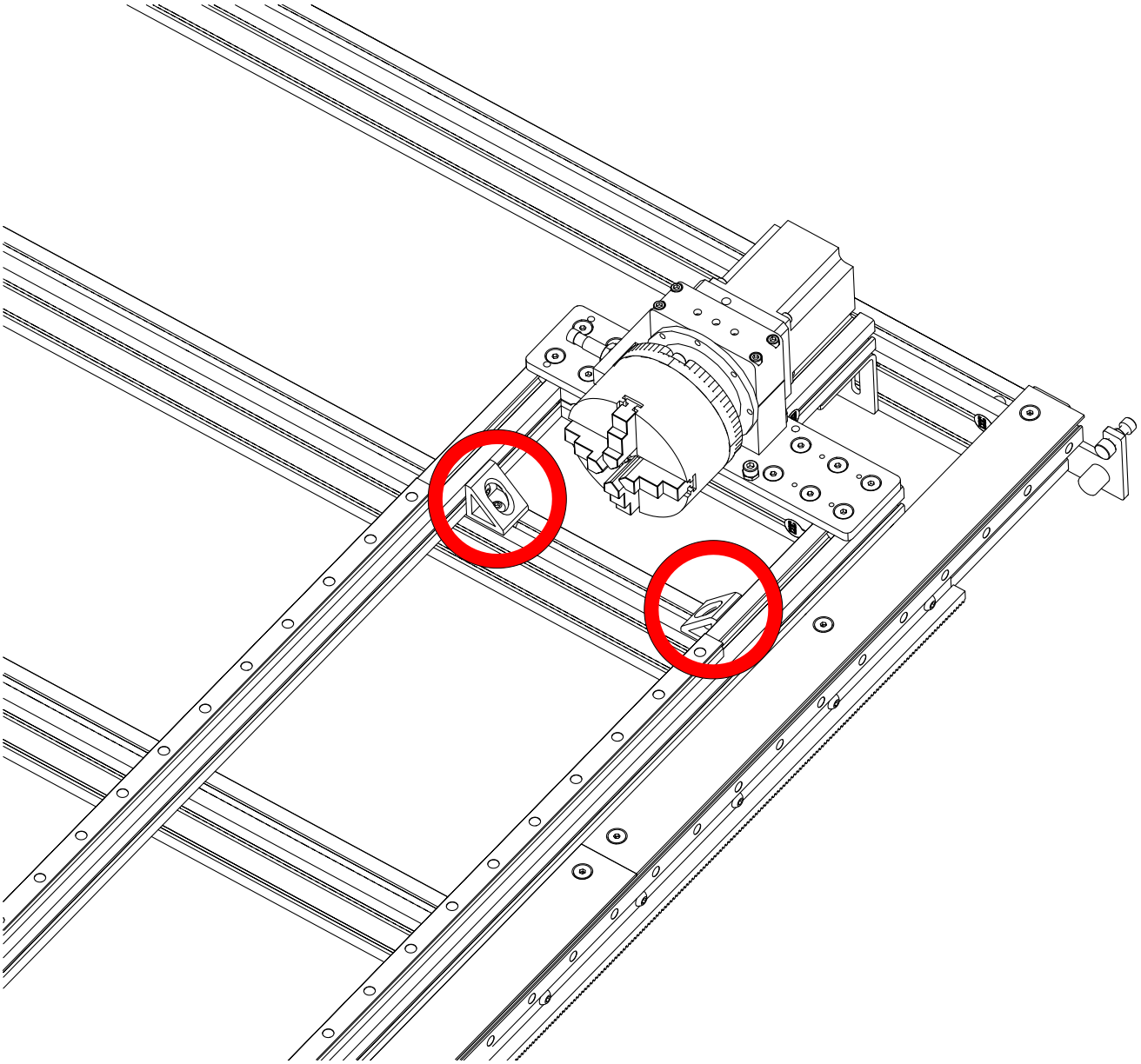

- Tighten the bracket fasteners.

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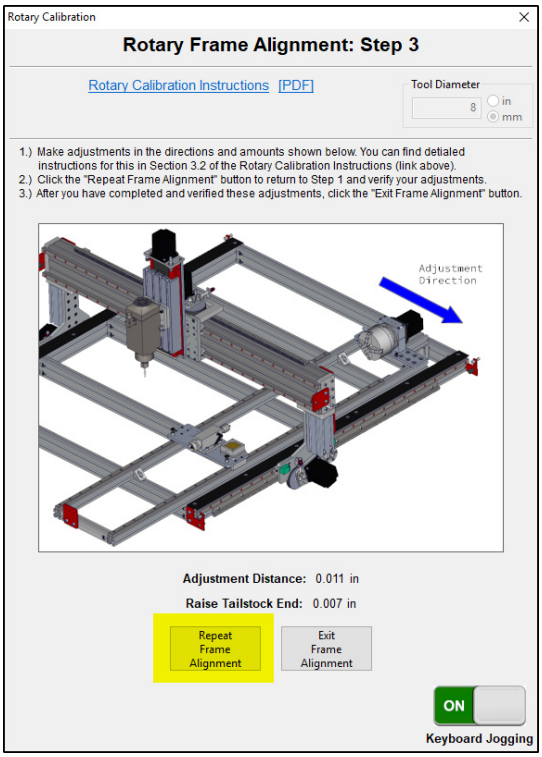
1.3.2.21



- Use the **Repeat Frame Alignment** button to verify your adjustments using the touch off routine.
- You may need to repeat the frame alignment procedure more than once to achieve proper alignment.

Rotary Length Option

- If your rotary frame is 1850mm (72") or longer, continue to Section 1.3.3.
- If your rotary frame is 1550mm (61") or shorter, click the **Exit Frame Alignment** button and skip to Section 1.3.4.

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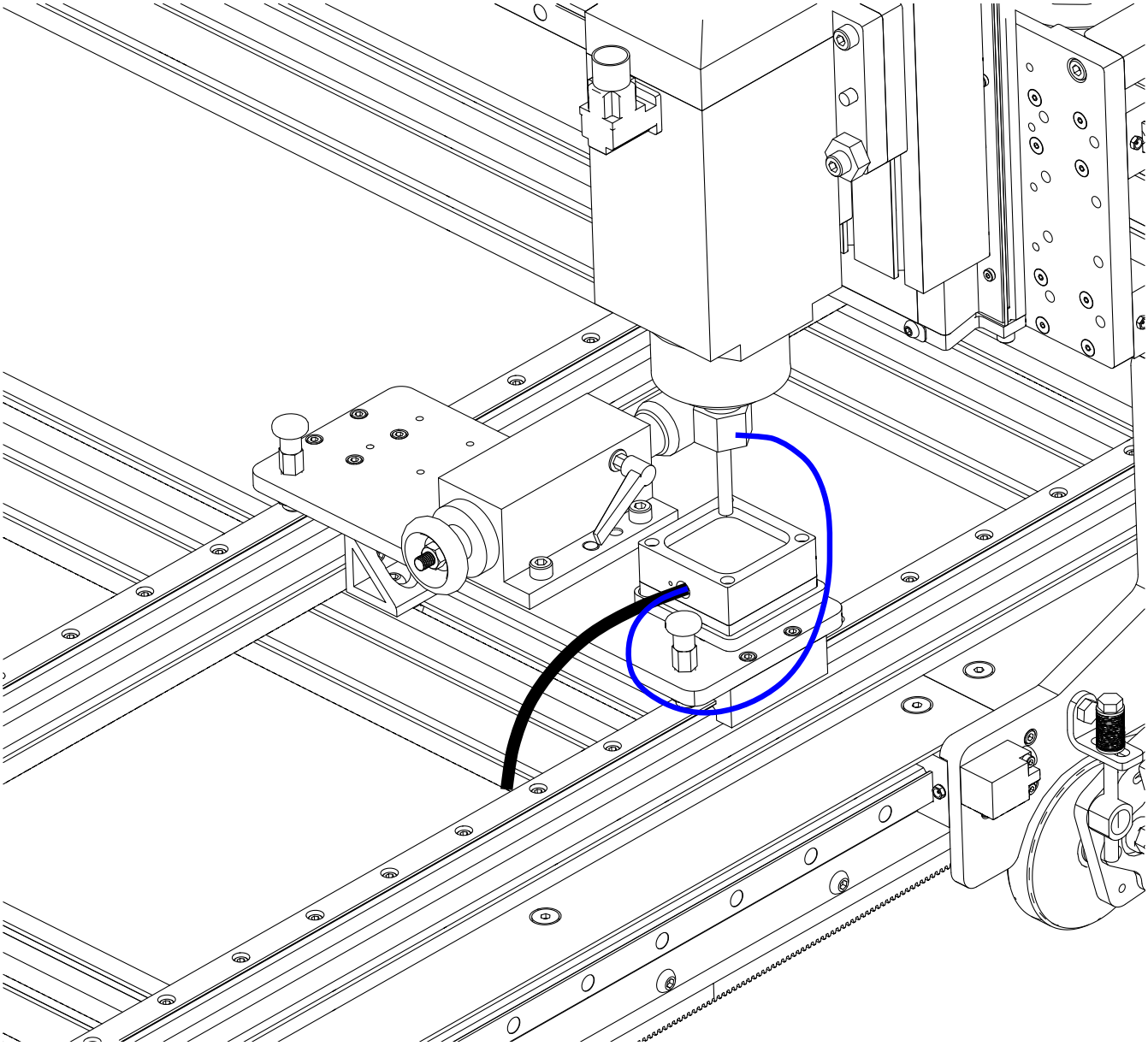
1.3.3 Mid-Supports

1.3.3.1



- Position the tailstock at one of the mid-support locations, lock in place.
- Position the spindle over the touch plate as indicated.

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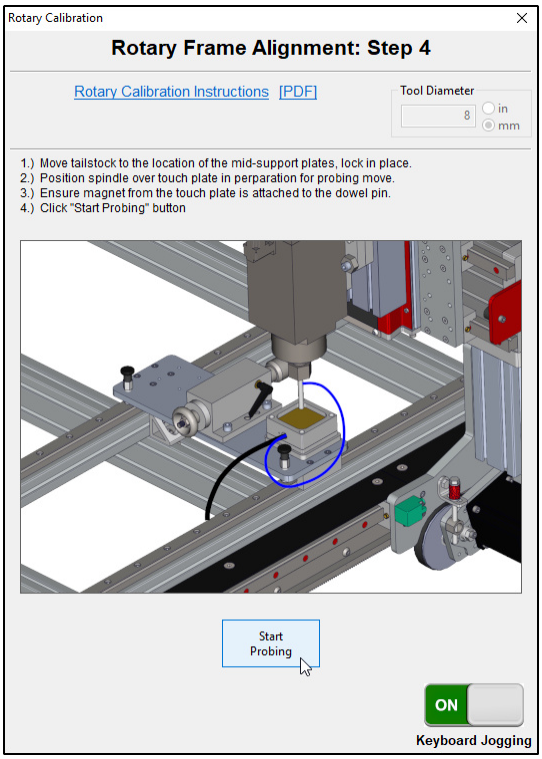

- Follow the instructions shown in Mach4 for **Rotary Frame Alignment: Step 5** to probe at the mid-support location.

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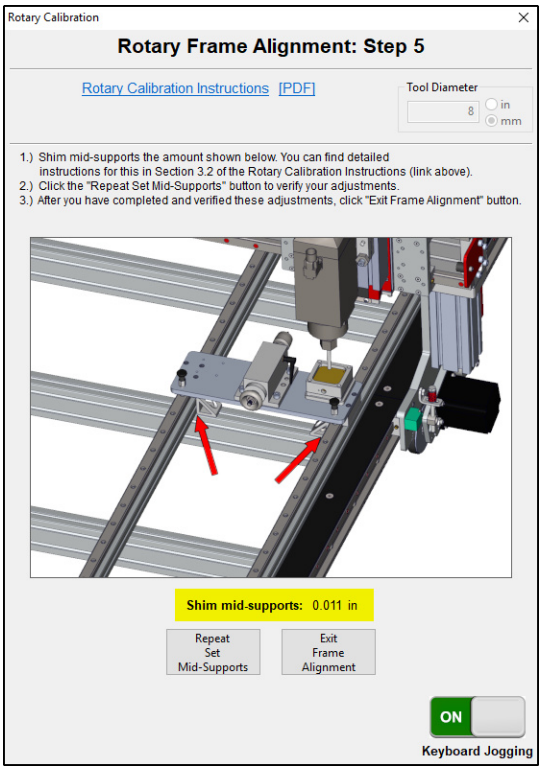

- You will now see an amount to shim at the mid-support location.

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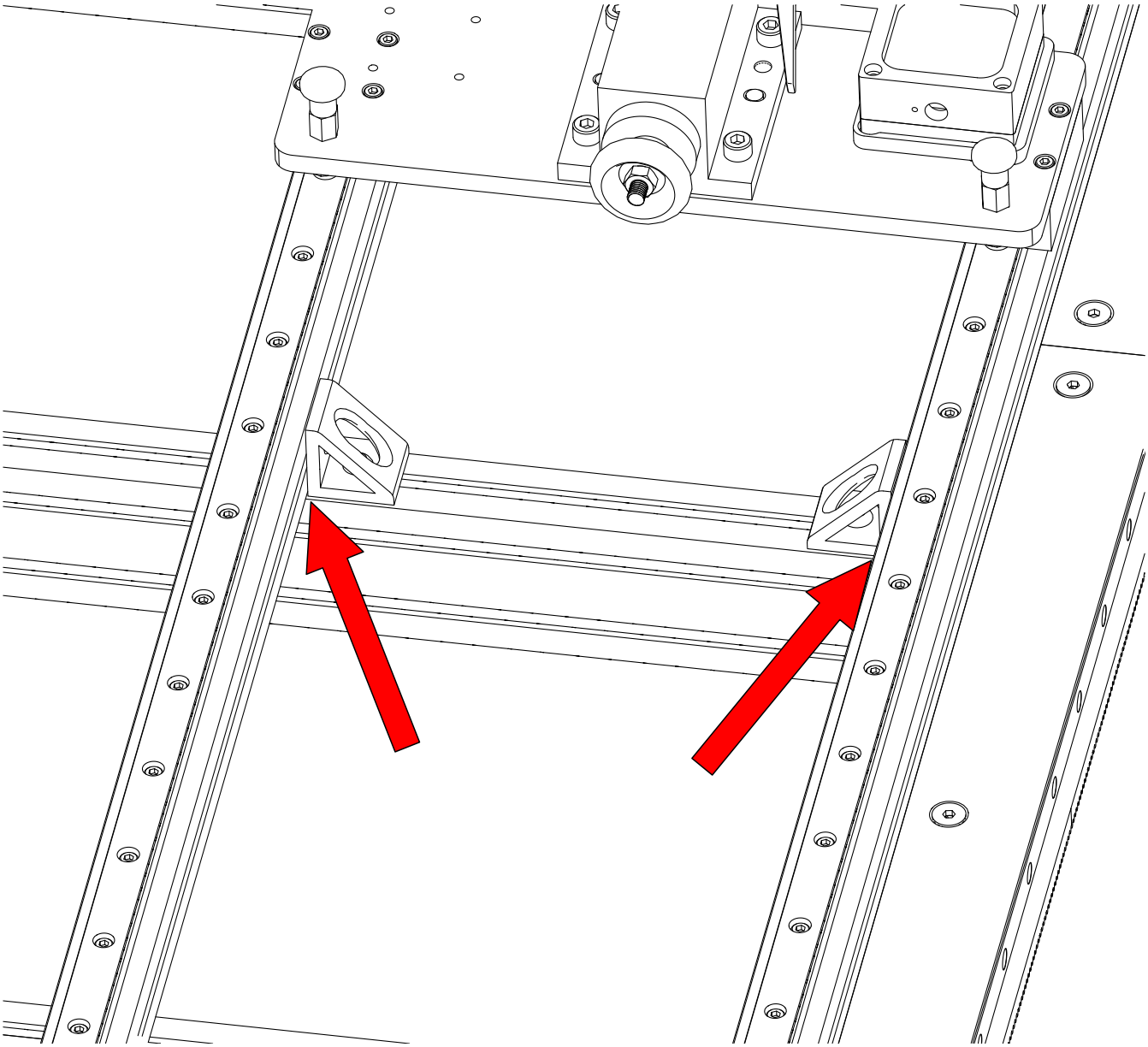
1.3.3.4



- Shim the appropriate amount between the rotary frame and machine table crossmember.

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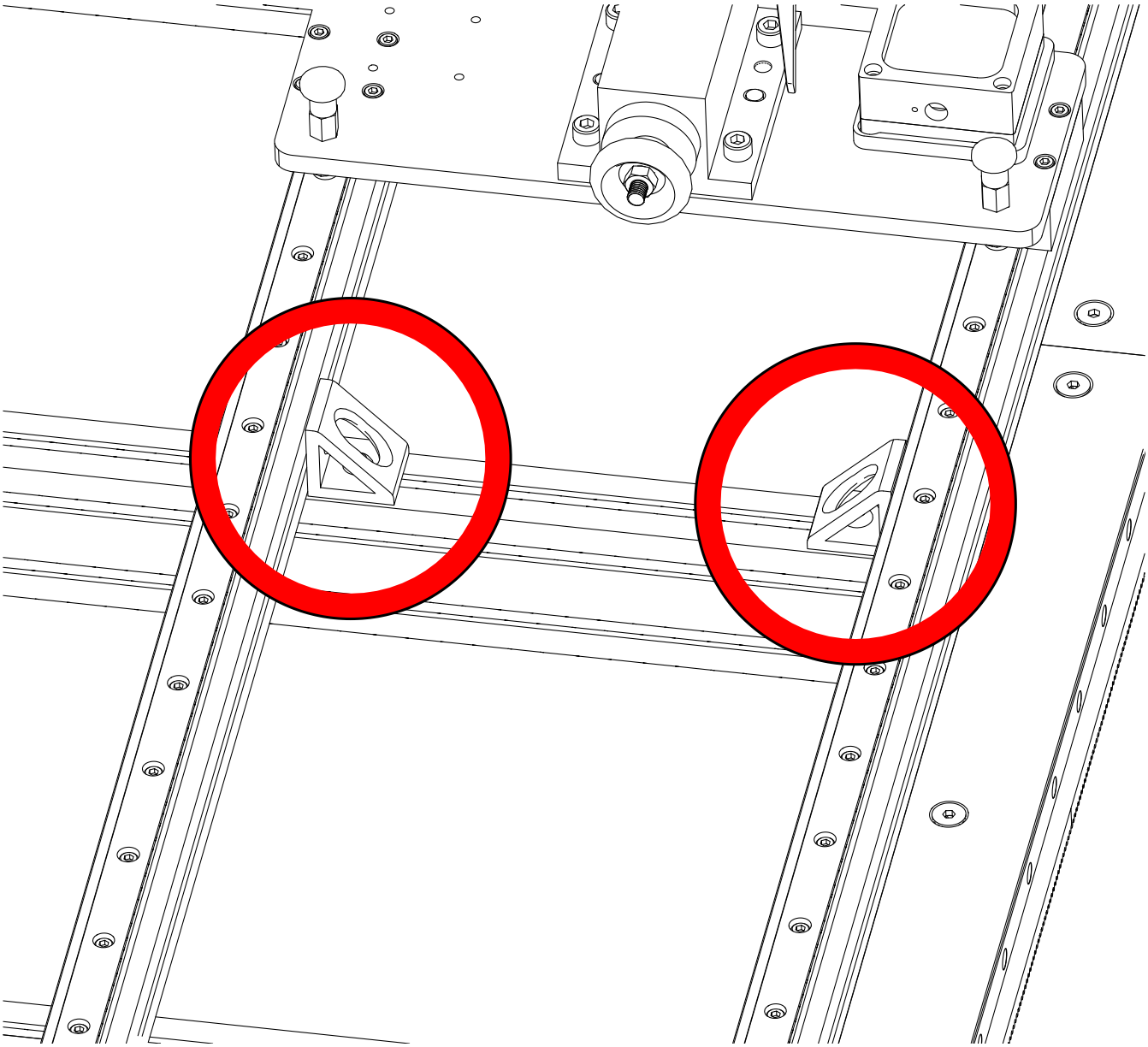

- Tighten the bracket fasteners.

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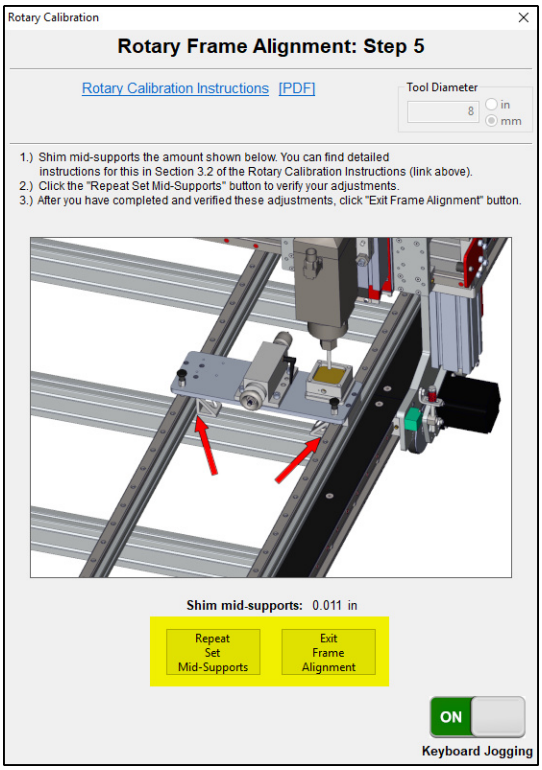

- Use the **Repeat Set Mid-Supports** button to verify your adjustments using the touch off routine.
- If no more adjustments are required, click the **Exit Frame Alignment** button.

Assembly Note

Repeat the mid-support procedure if you have mid-support brackets at multiple locations.

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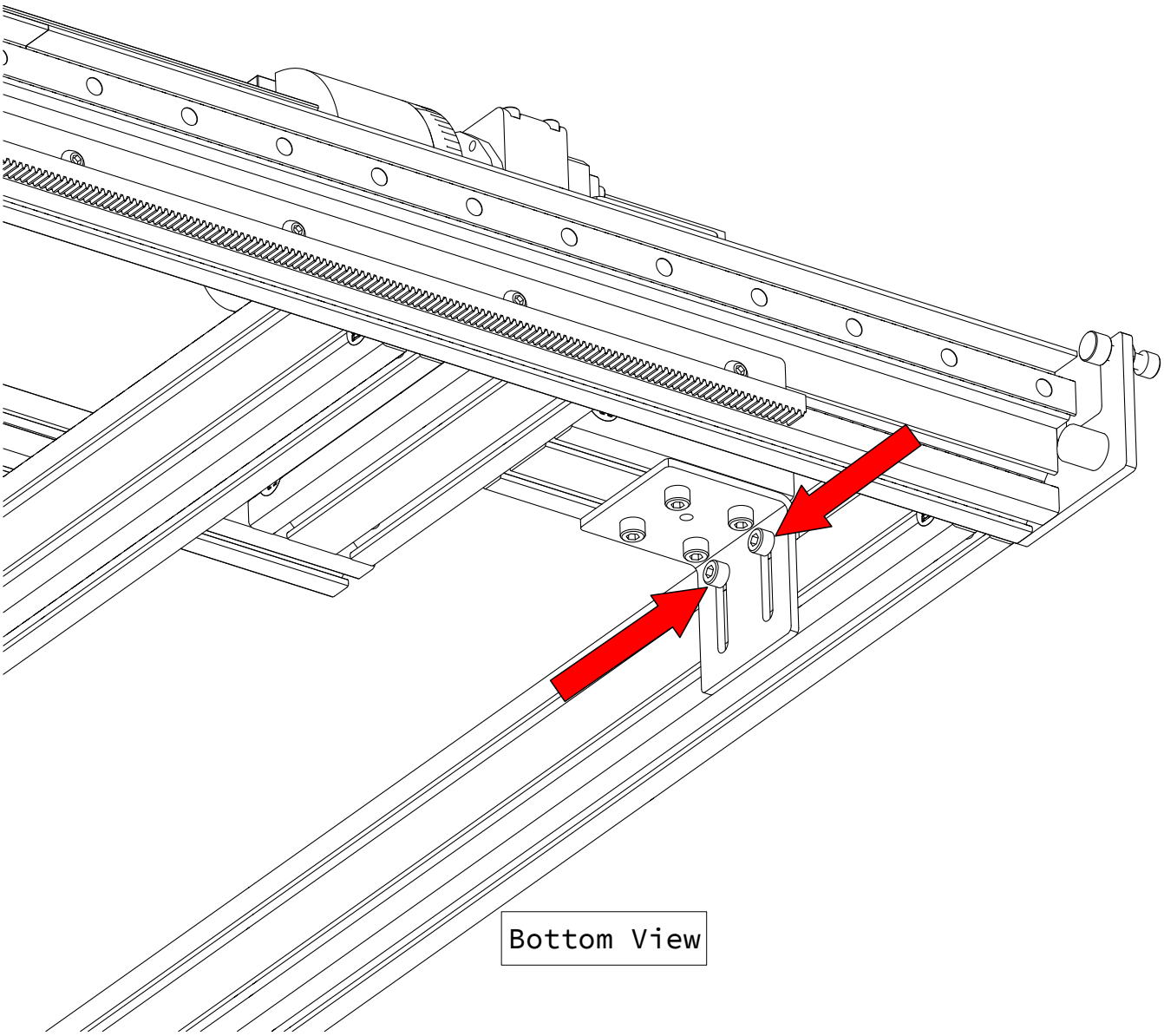
1.3.4 Headstock Support

Machine Type Option

This section is applicable only from PRO CNC and Benchtop PRO installations.

1.3.4.1



- Tighten the two fasteners attaching the headstock bracket to the machine table crossmember.

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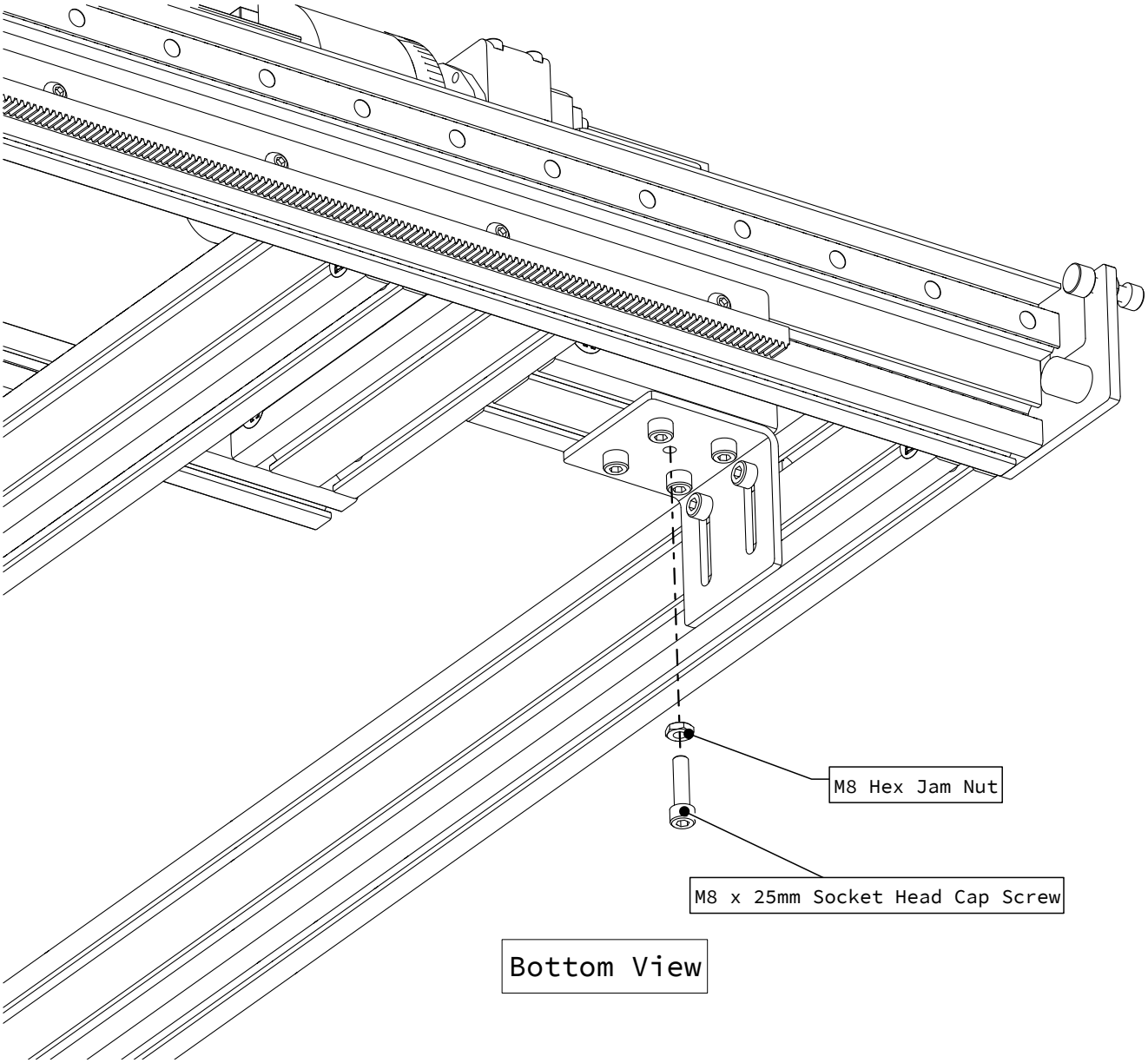

- Insert the indicated fasteners, hand tightening only.

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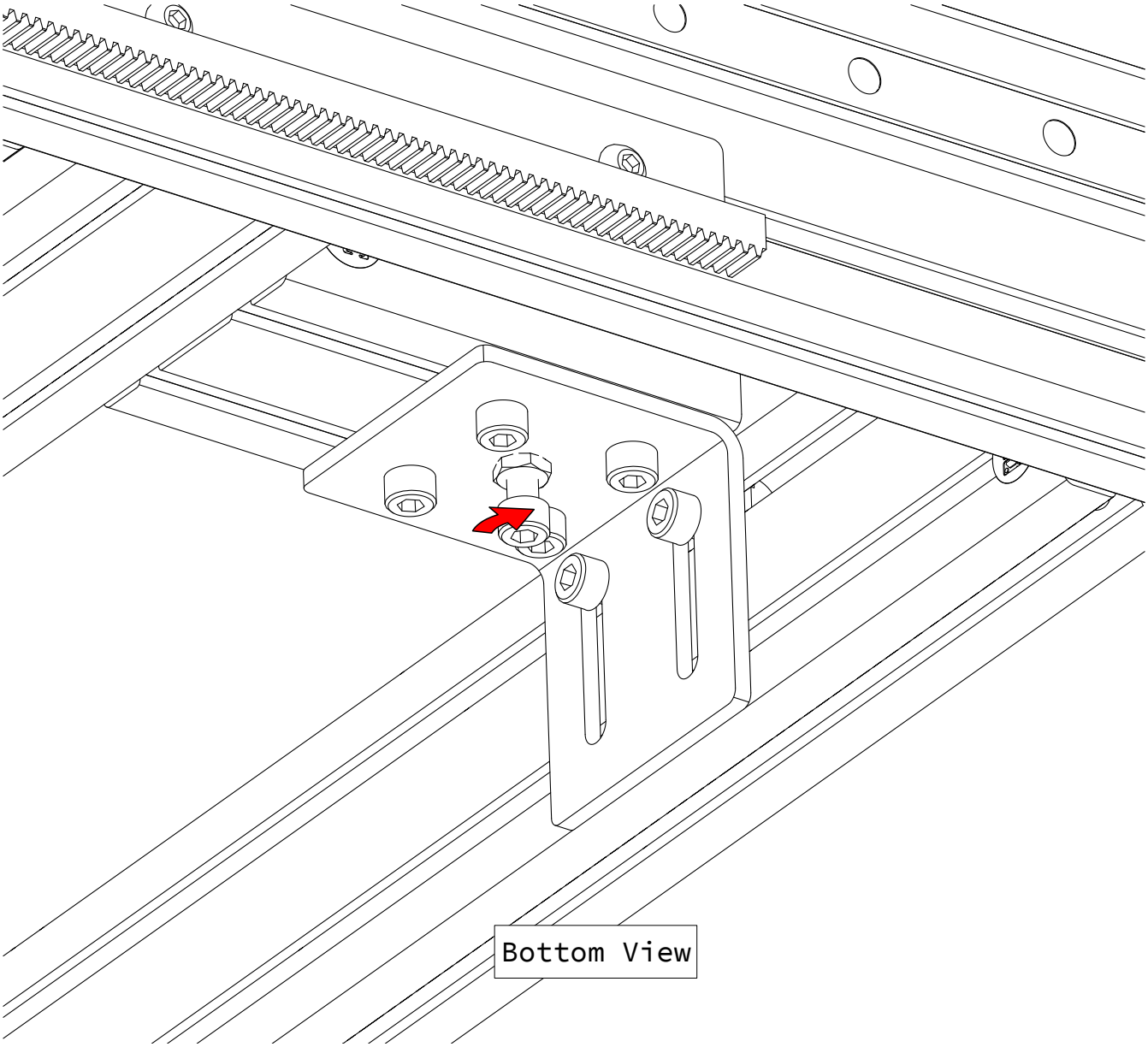

- Tighten an additional 1/8 turn.

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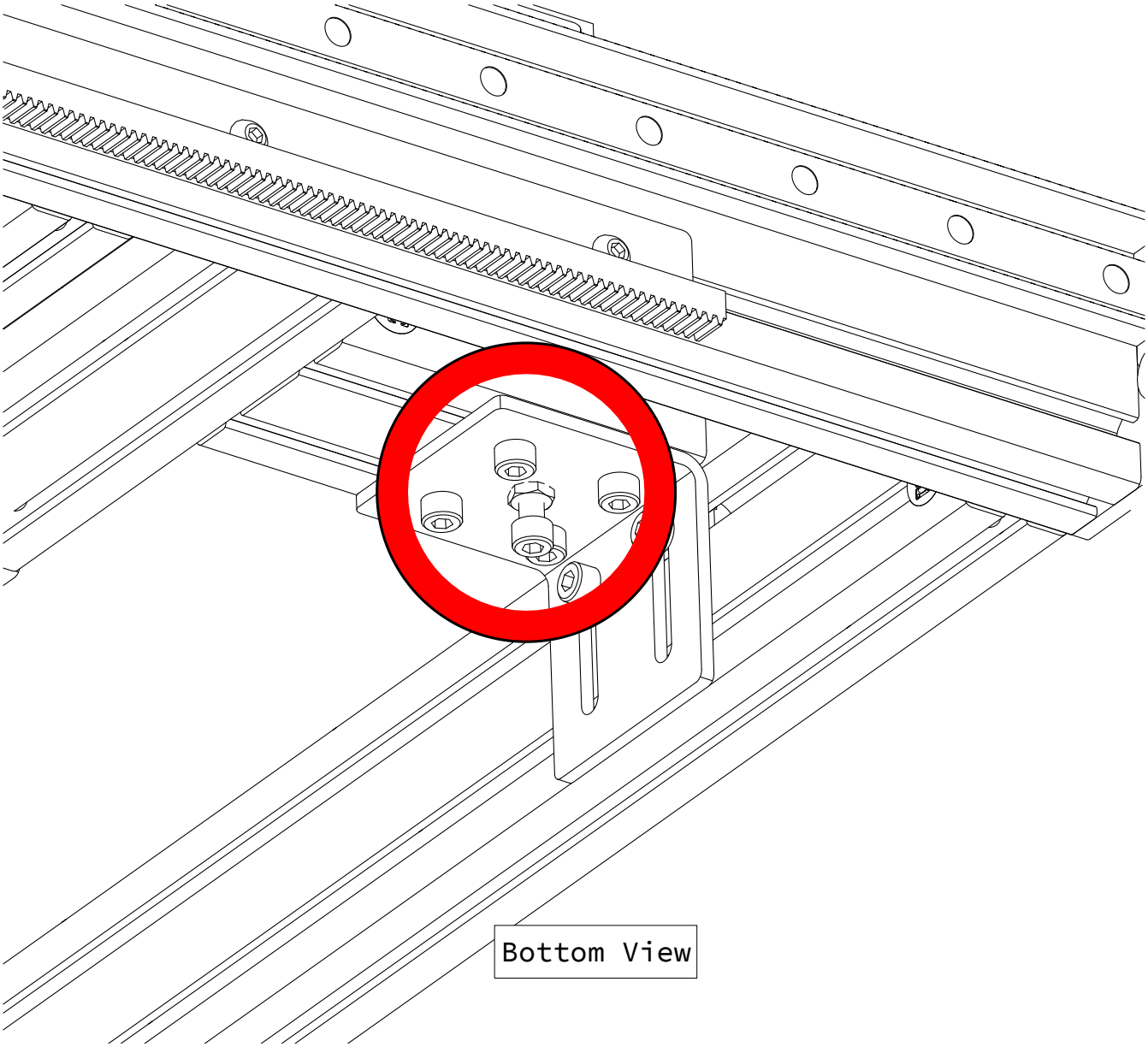

- Fully tighten the remaining fasteners and jam nut.

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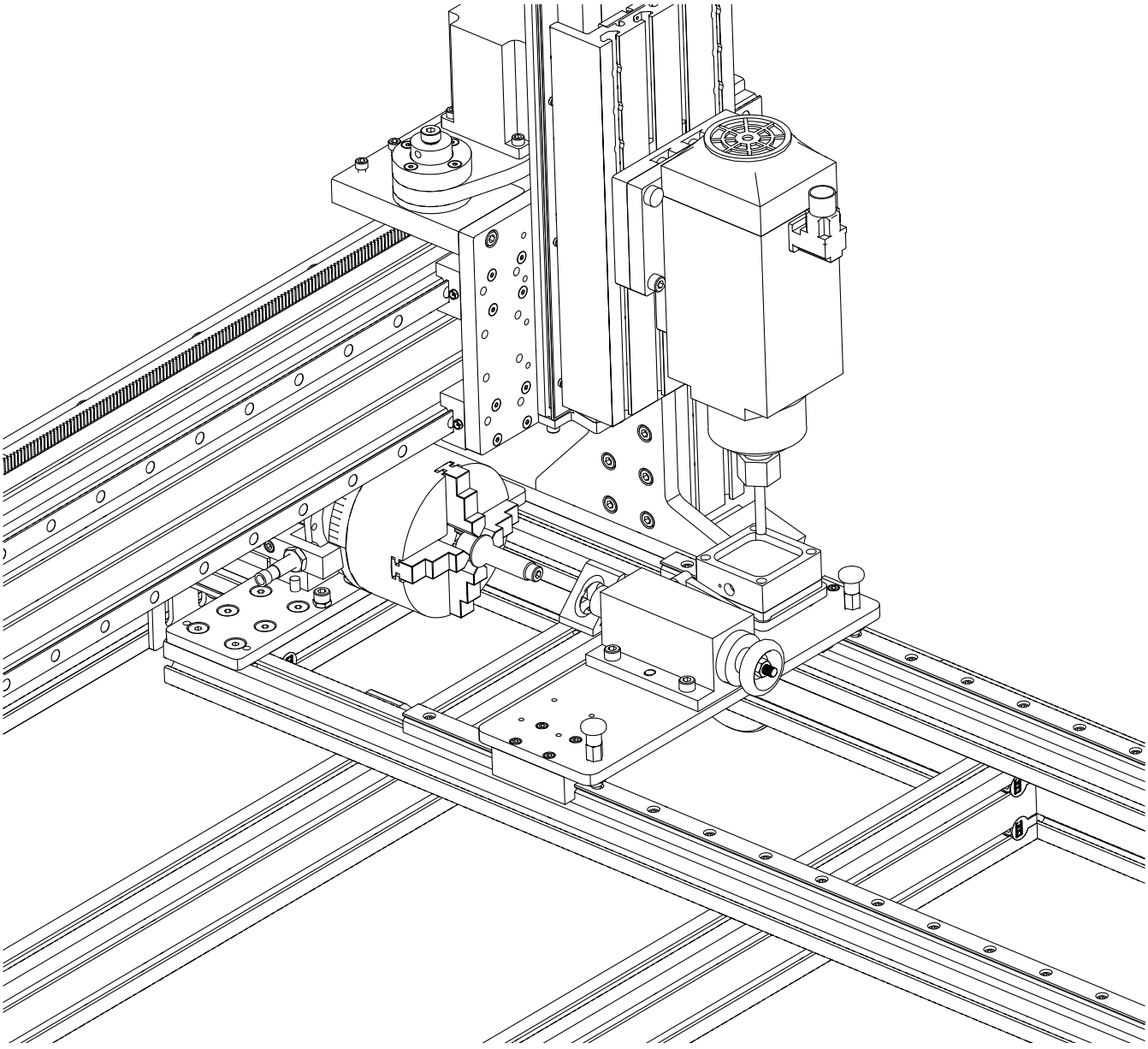
1.4 Touch Plate Offset

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.



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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.

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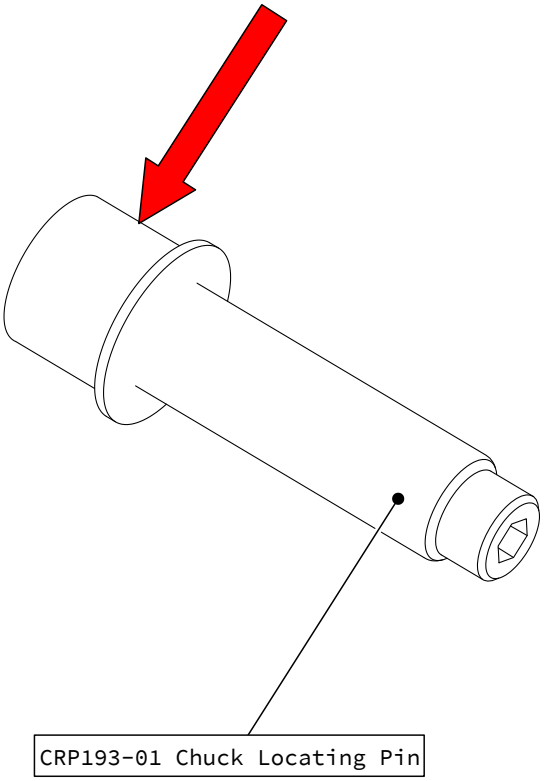
1.4.1 Set Offset

1.4.1.1



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

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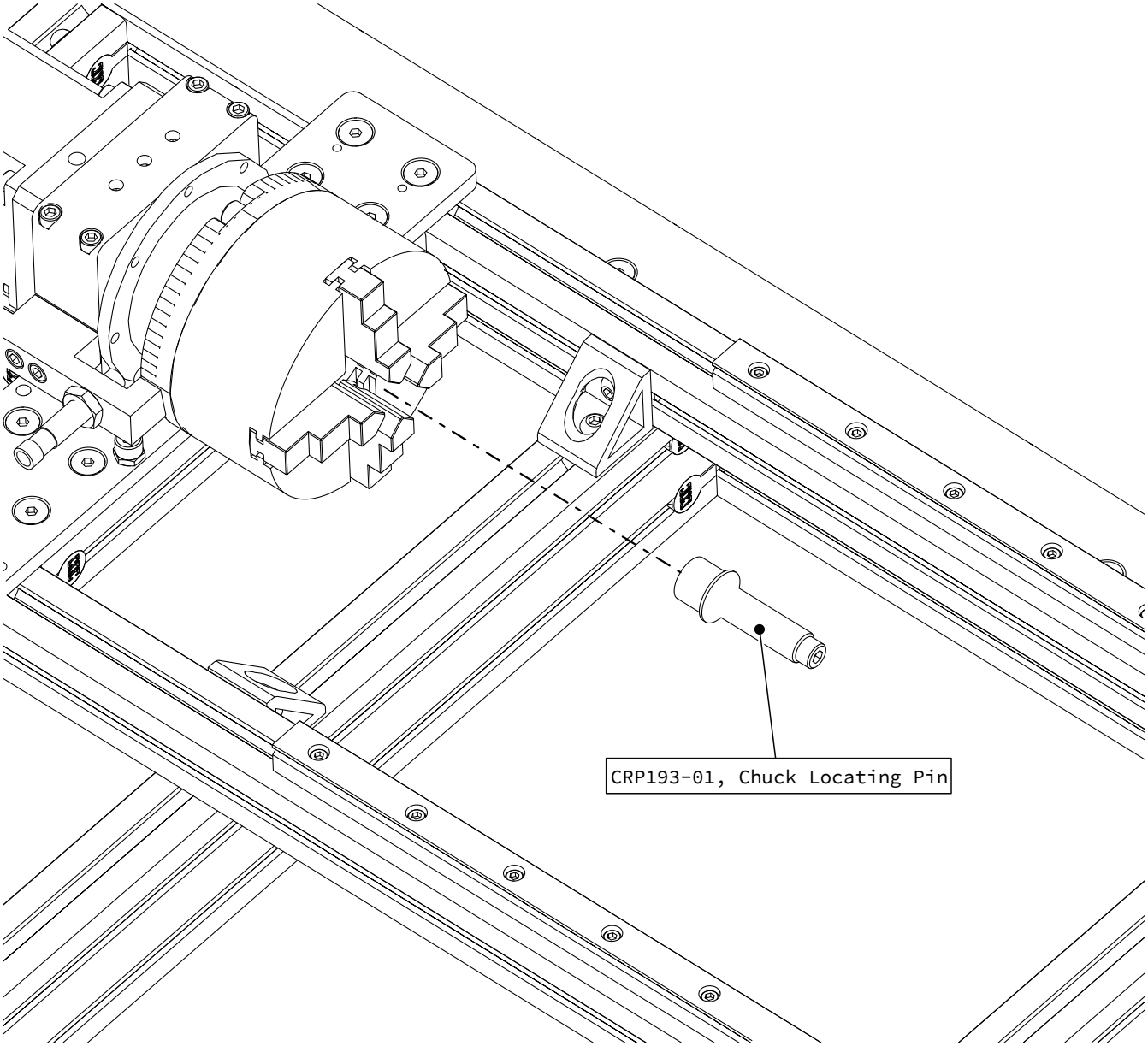

- Insert the Chuck Locating Pin into the chuck.

Assembly Note

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

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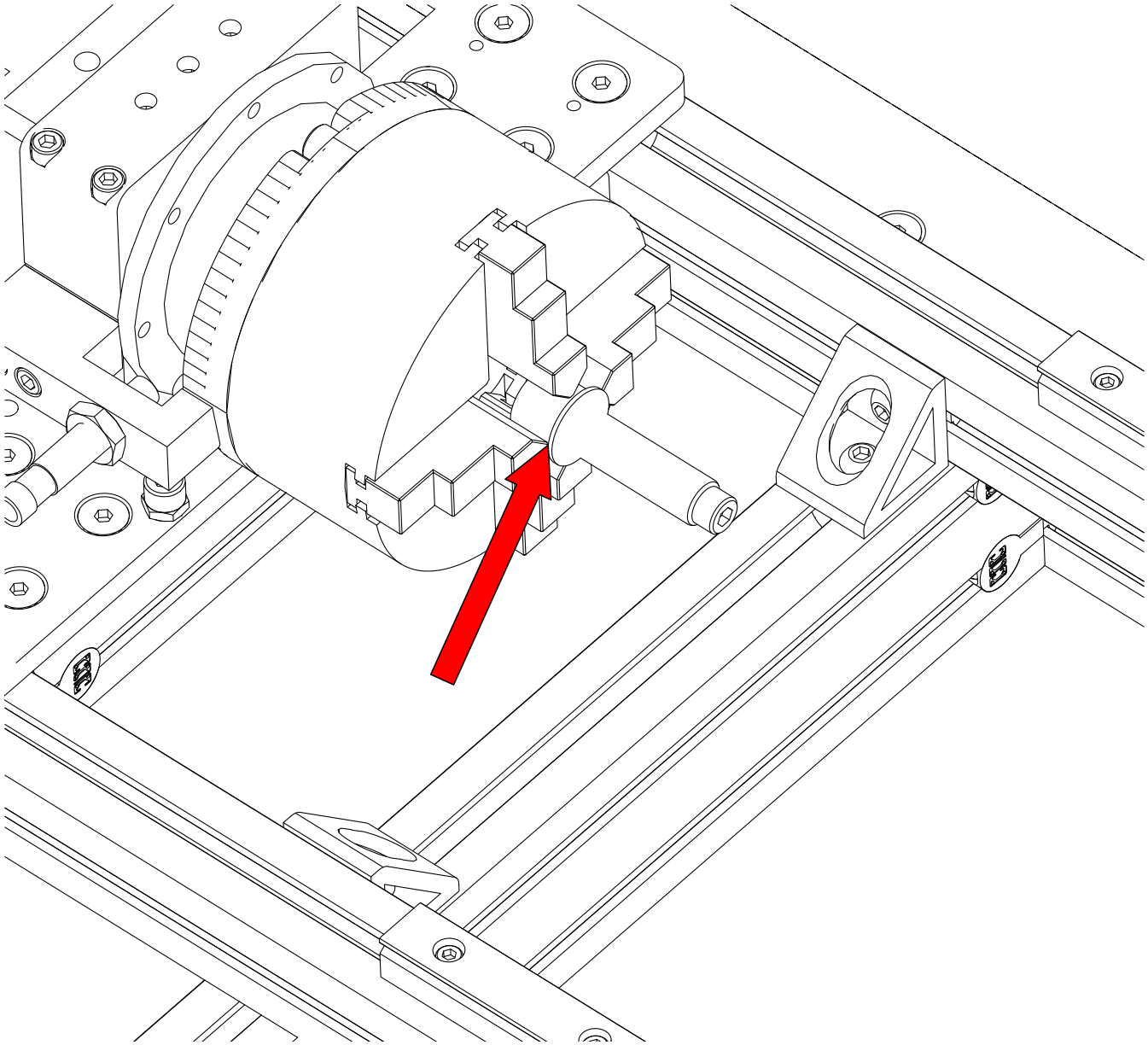

- With the flange of the bushing flush against the chuck jaws, tighten the chuck.

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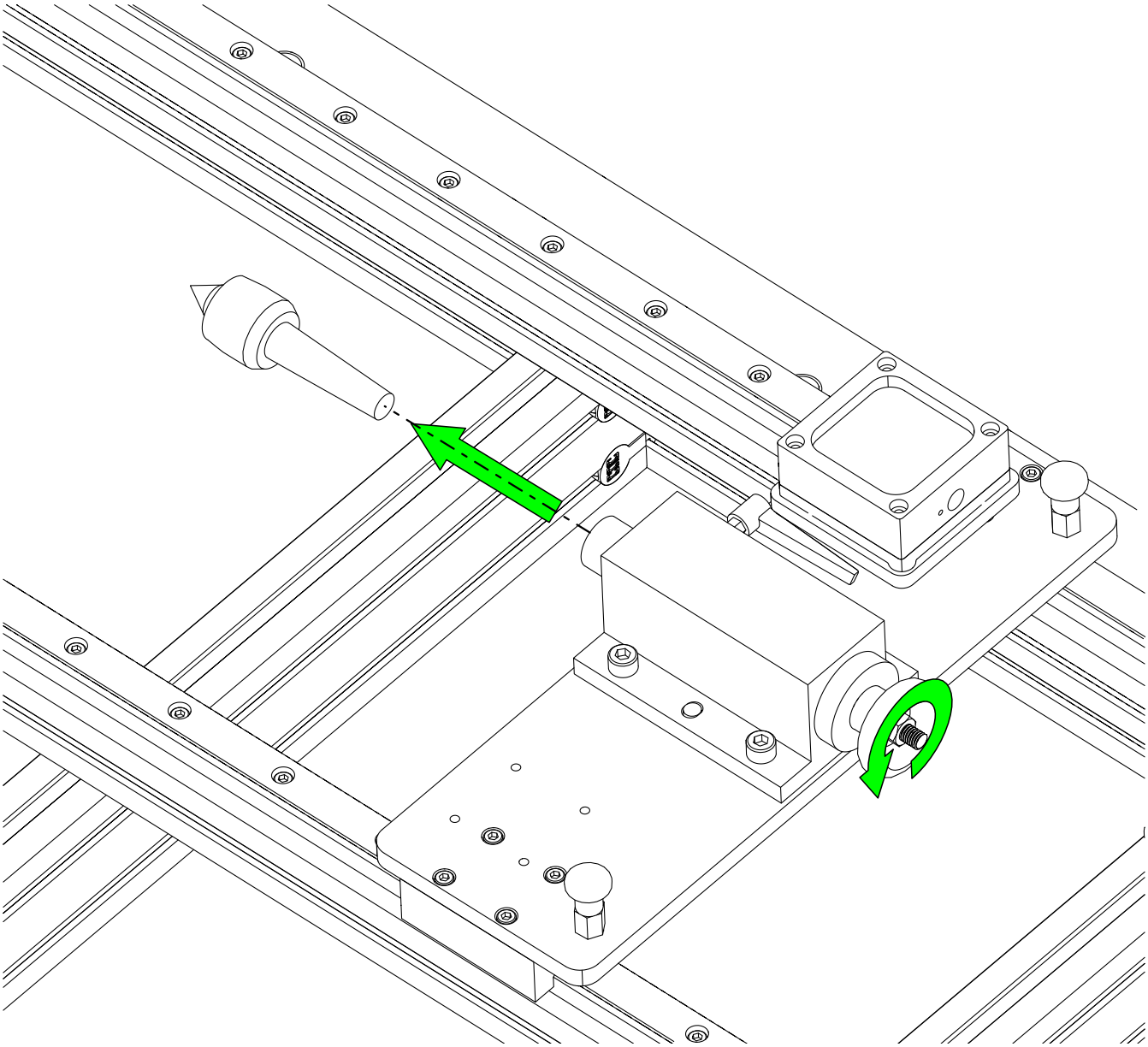

- Remove the tailstock live center.

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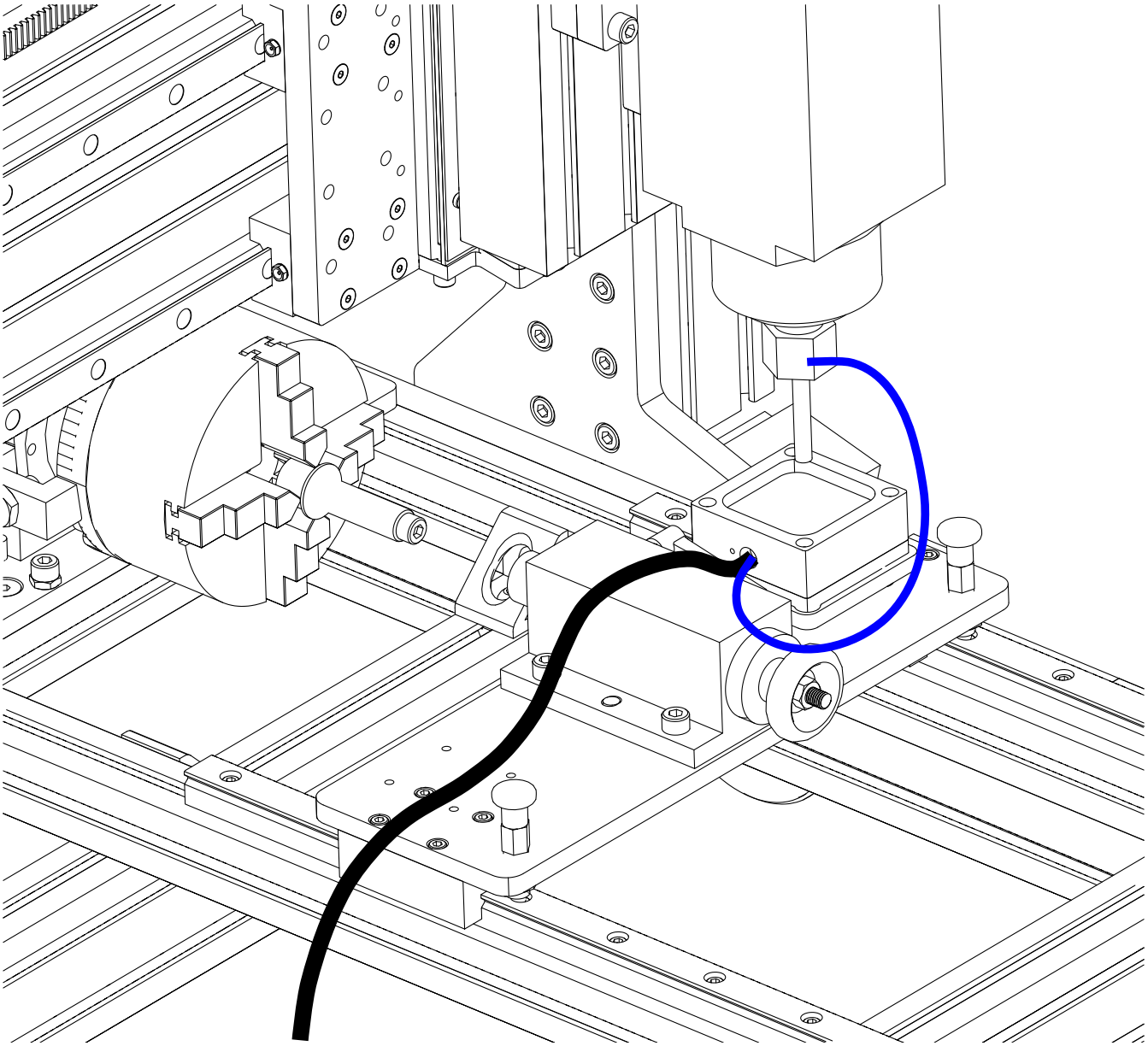

- Position the tailstock as indicated and lock in place.
- Ensure the magnet from the touch plate is attached to the collet nut on the spindle.

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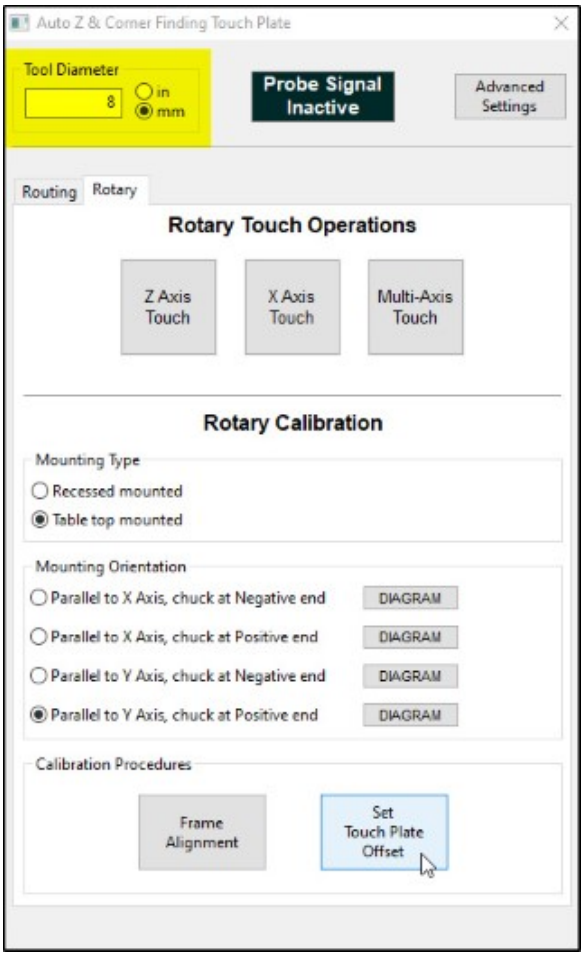

- Set the tool diameter to 8mm.
- Click the **Set Touch Plate Offset** button.

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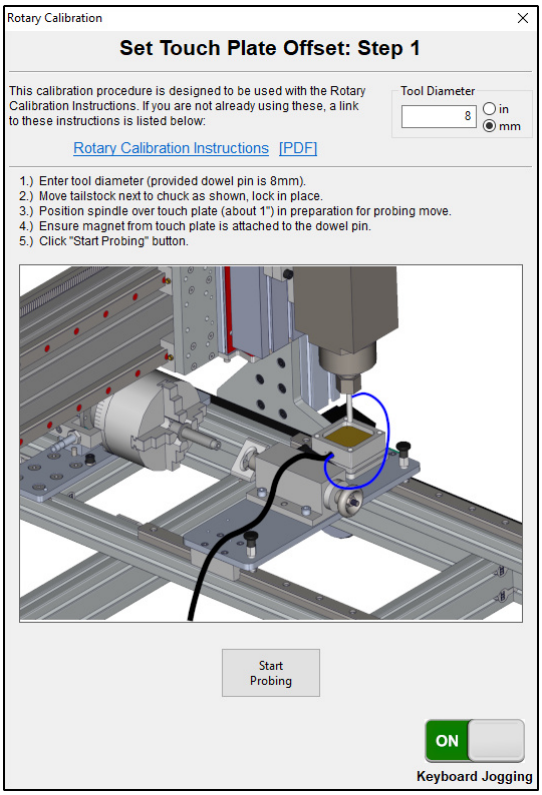
1.4.1.7



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

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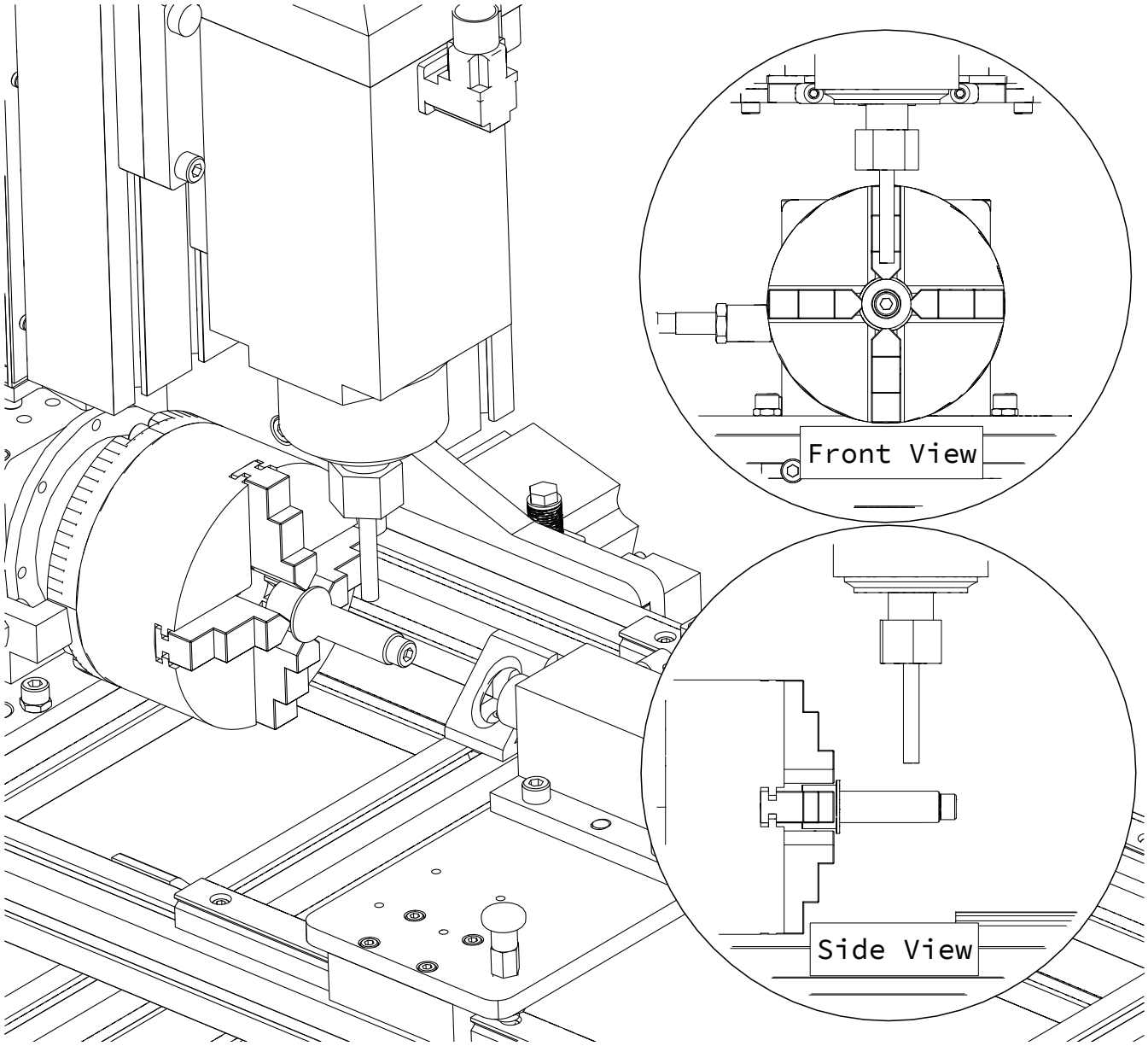

- Position the spindle over the over the Chuck Location Pin as indicated.

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

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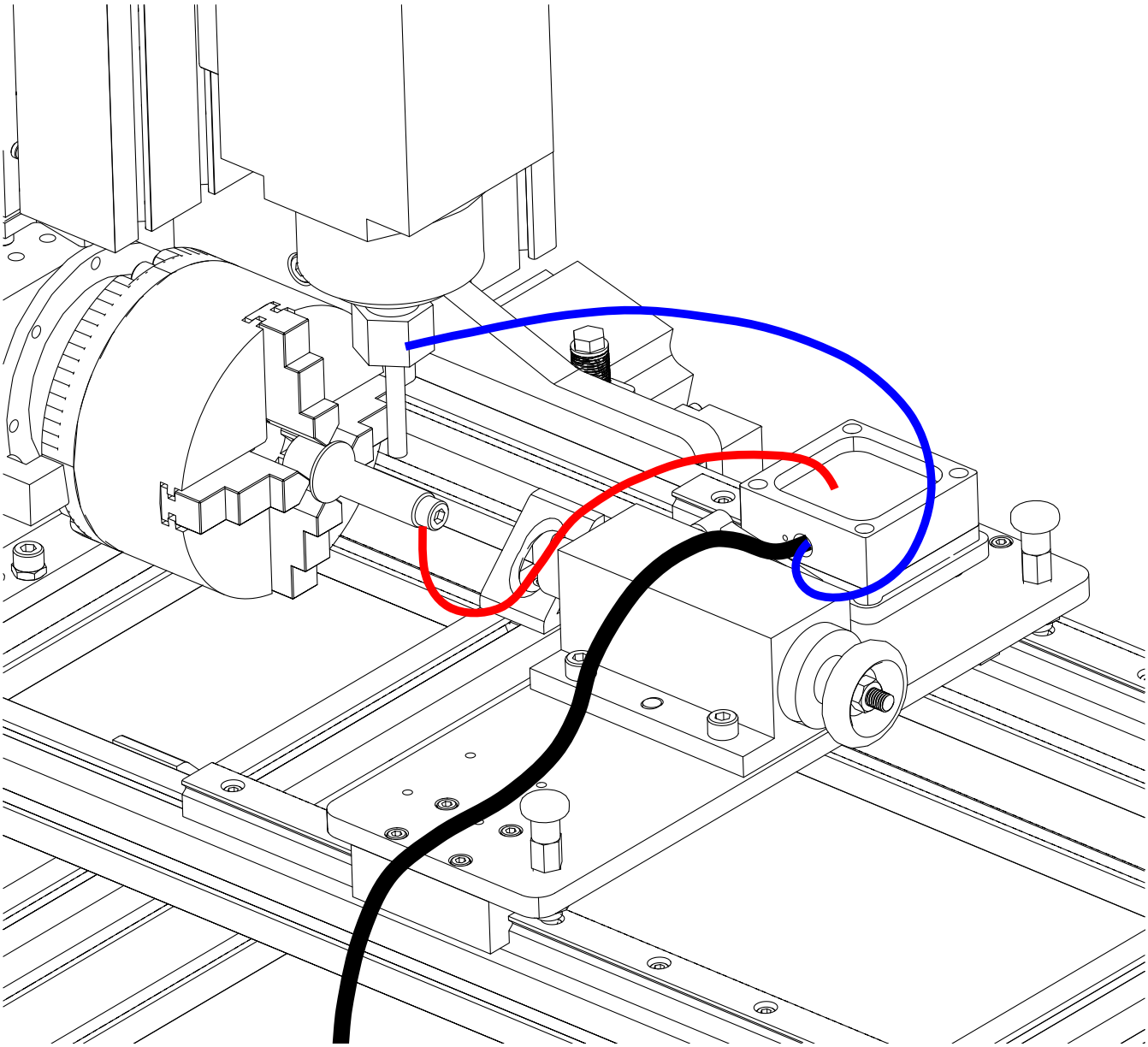

- Connect the magnet from the touch plate to the collet nut on the spindle.
- Connect the magnet from the Chuck Locating Pin to the touch plate.

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

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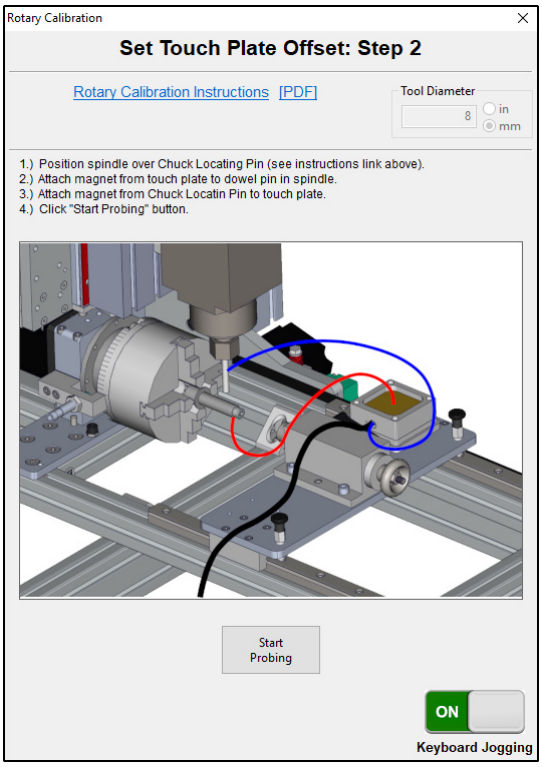
1.4.1.10



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

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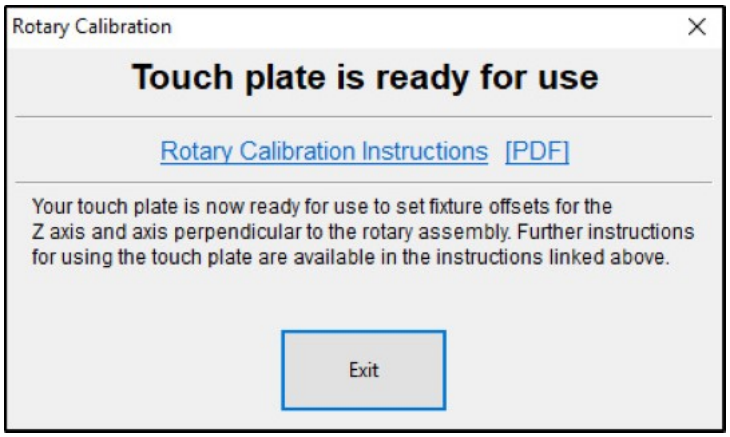
1.4.1.11



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

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