TL518

CNC TABLETOP MILLING MACHINE

INSTRUCTION MANUAL

www.townlabs.com

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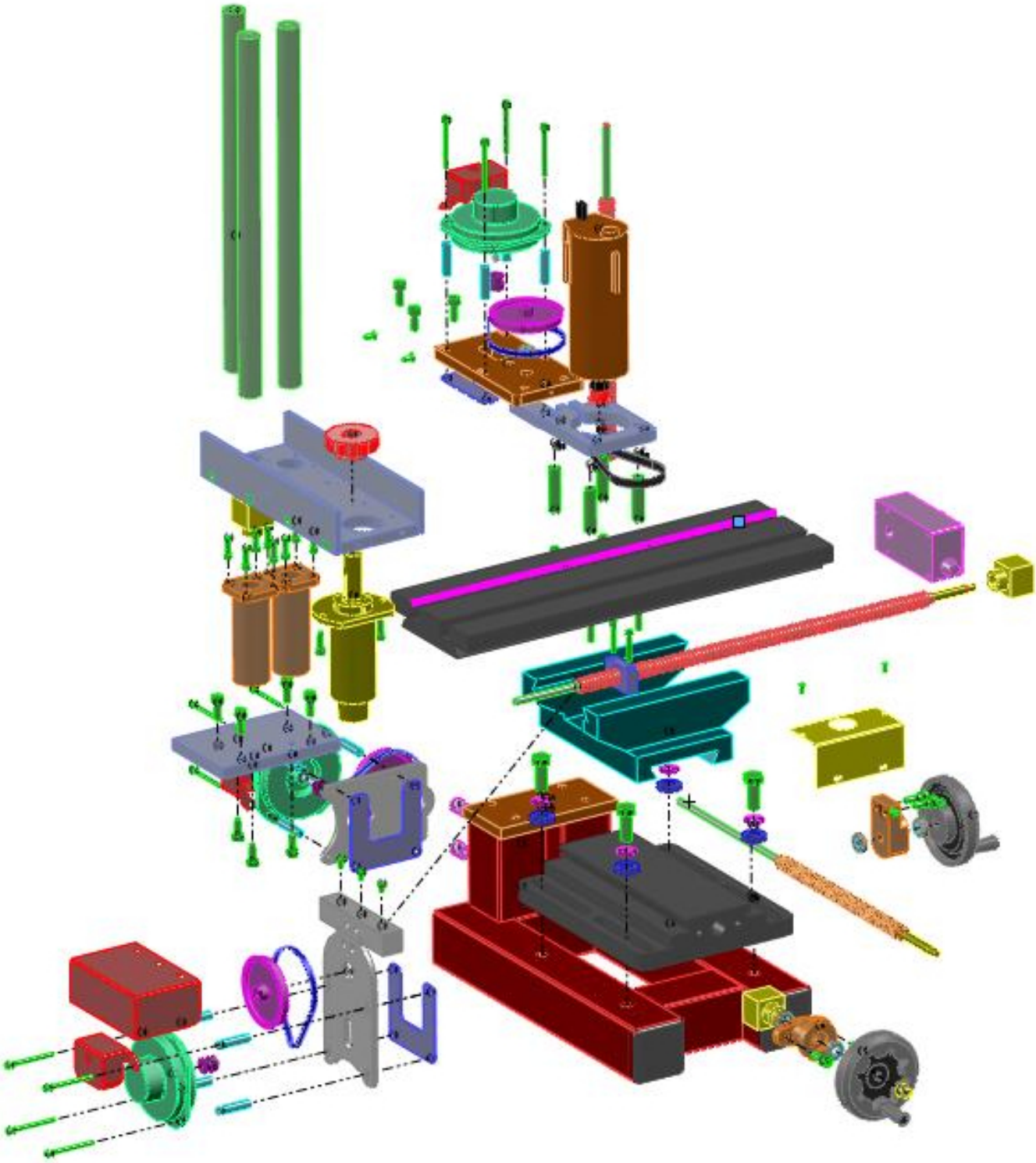

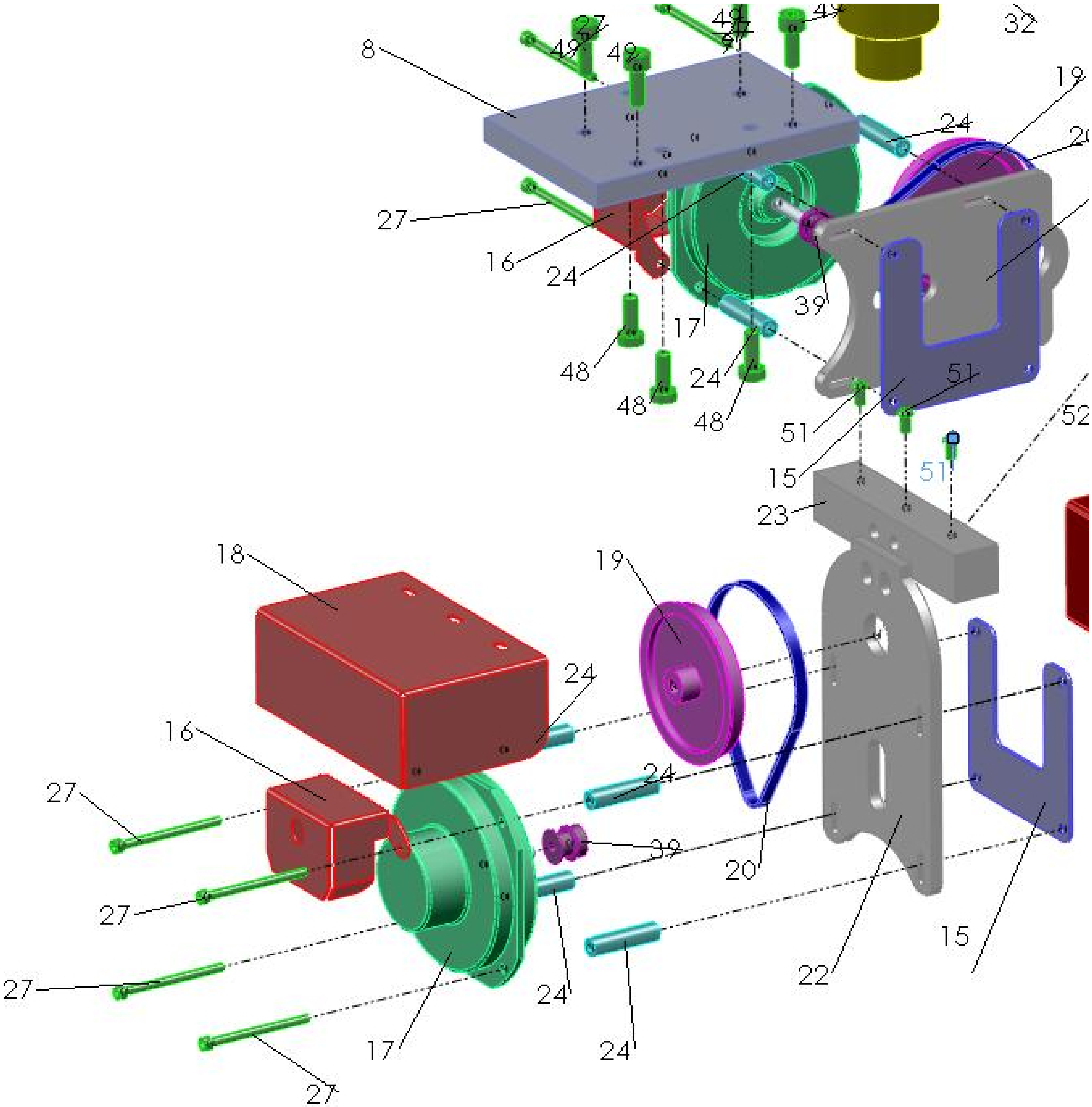
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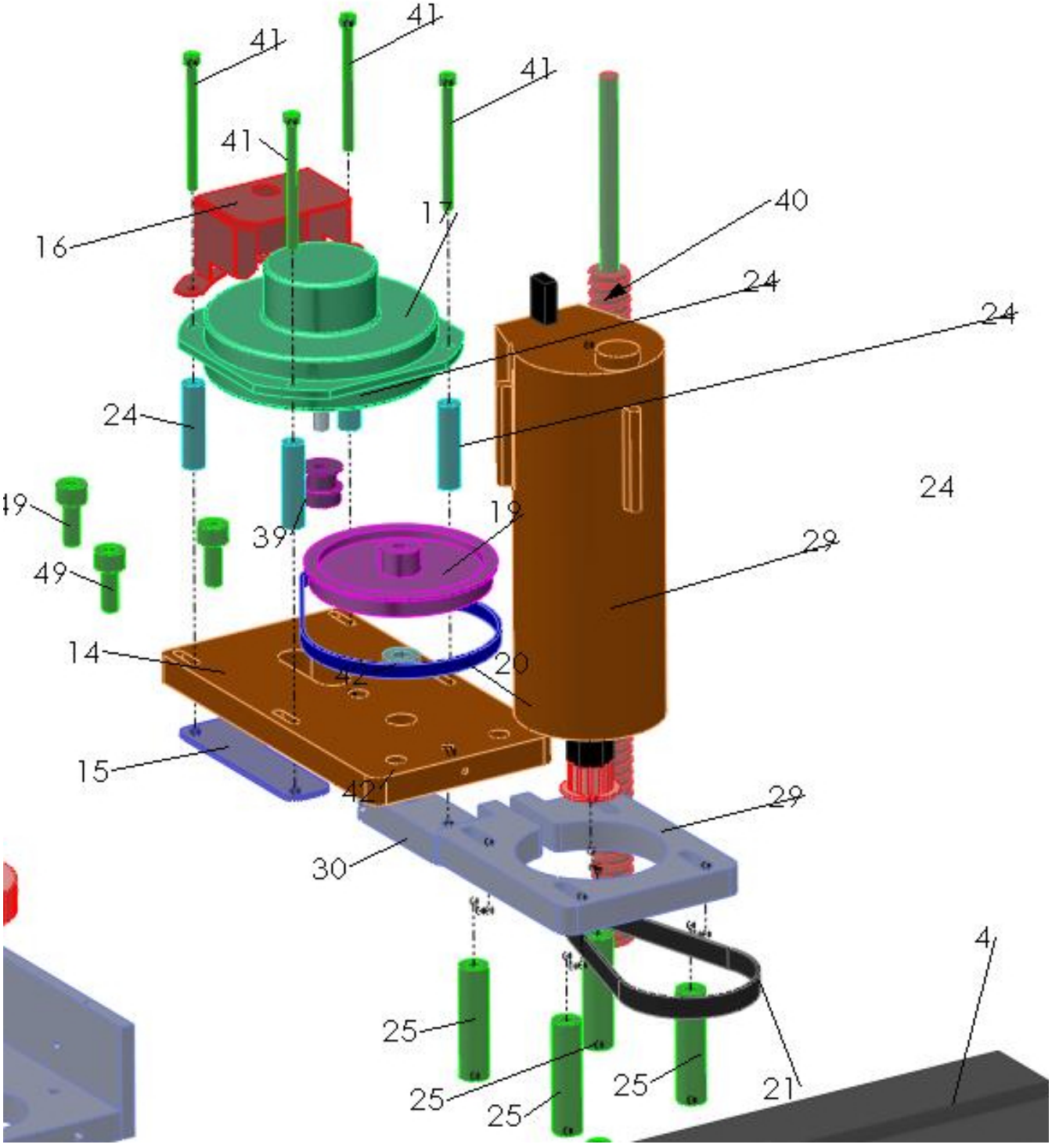
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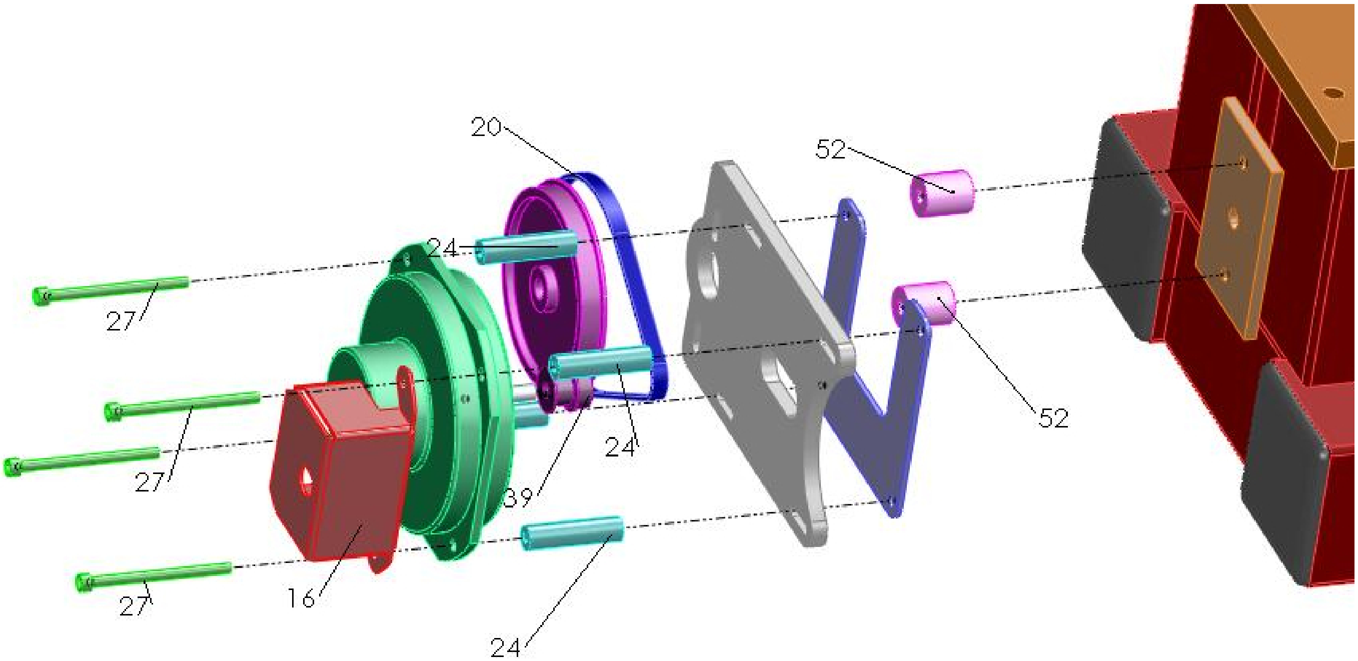
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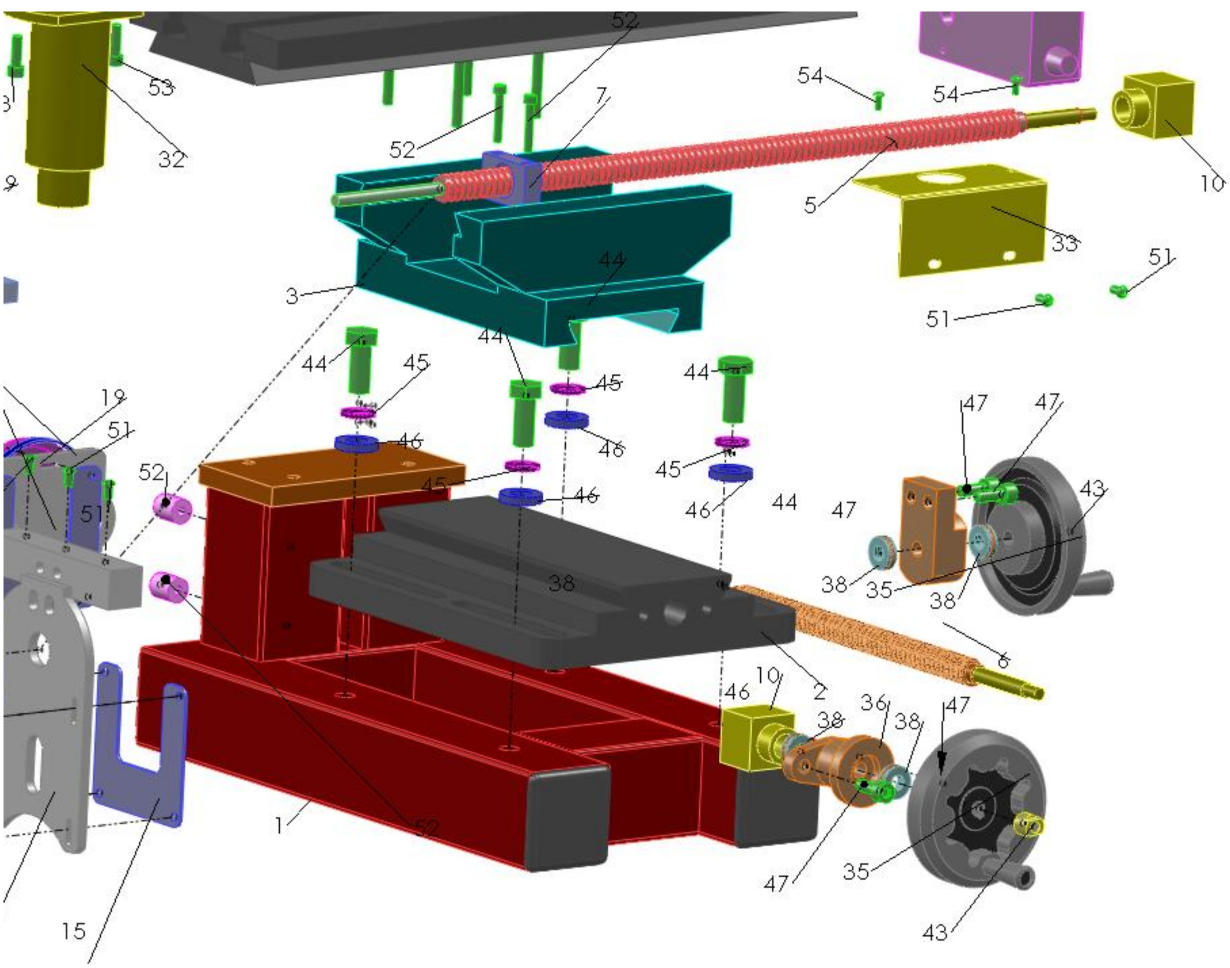
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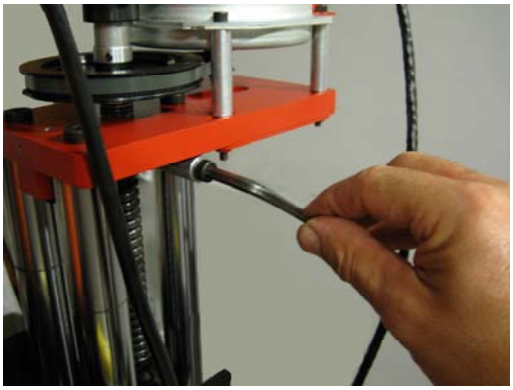
Unpacking

1. Release the gib and the Z-jam screw.



2. This screw is useful during manual machining operations. Do not over tighten it.

3. 

4. 

5. Wipe clean all the grease from the machine and oil all the moving parts.

6. Make sure that all moving parts are moving freely.

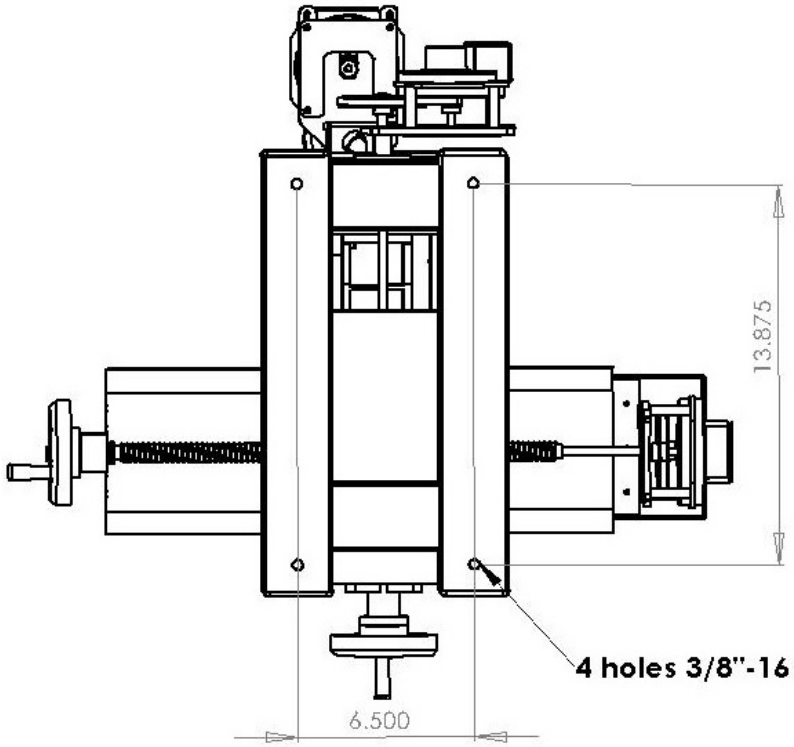
7. Make sure that the spindle timing belt is stretched enough and that the motor sprocket doesn't rub on the Z-plate.

8. Clean thoroughly ball screws. During machining protect the ball screws from the metal chip particles. Keep them clean all the time.

9. Wipe clean all the grease from the machine and oil all the moving parts.

Installation

The machine has four threaded holes on the bottom of the base. It is recommended to install leveling legs or 3/8”-16 screws to level the machine on sturdy surface. Alternatively it is possible to bolt the machine base to the table surface. This method is preferable if you will be machining heavy parts and the part weight may tilt the machine when the X-carriage is in the extreme right or left position.
The location of the threaded inserts on the bottom of the base is shown on the picture below.



General Safety and Warnings

- Wear appropriate safety glasses.
- Install machine on a sturdy surface and bolted to the tabletop using 3/8x16 machine screws.
- Ensure that the work piece and cutter are mounted securely before taking a cut.
- Check that work is mounted squarely.
- Mount work in a vise that is bolted or held magnetically to the table. Use proper hand tools to make adjustments.

- Hold milling cutters with a cloth to avoid being cut when handling them.
- Move table as far as possible from cutter while setting up work to avoid injuring your hands.
- Mill the largest surface first.
- Keep hands, brushes and rags away from the revolving milling cutter.
- Use a vacuum, brush or rake to remove cuttings only after the cutters have stopped moving.
- Change cutting compounds periodically.
- Keep cutters sharpened correctly and in good condition.
- Keep working surface clear of scraps, tools and materials.
- Keep floor around the milling machine free of oil and grease.
- Use lifting equipment when appropriate to move heavy work to or from milling machines.

Before starting, make sure that:

- All guards are in place
- Work is properly secured in place
- Bolts used to hold down work clear the tooling
- Tooling and supporting pieces are properly tightened in position
- Table stops are secured properly
- Handles on all feed screws are in neutral
- Table is free of stock, tools or other loose material
- The arbor and arbor support are clear of the work

Ensure that the following factors are considered when setting cutting speed:

- Material to be machined
- Type of cutter
- Finish required
- Depth of cut
- Rigidity of machine and work piece

- Do not wear gloves, rings, watches or loose clothing. Tie back long hair.
- Do not attempt to mount, measure or adjust work until cutter is completely stopped.
- Do not use an excessively heavy cut or feed as it can cause the cutter to break. The flying pieces could cause serious injury.
- Do not reach over or near a revolving cutter. Keep hands at least 30 cm (12 in.) from a revolving cutter.
- Do not lean or rest hands on a moving table.
- Do not make any adjustments while the machine is running.
- Do not use paper shims to check the distance from the cutter to the stock.

- Do not move the operating levers without knowing what they control and what action is going to take place.
- Do not leave machine unattended while it is running.
- Use liquid cooling when possible to prevent airborne dust especially when working with plastics such as fiberglass or phenolics.

Specifications:

Spindle Motor	120 V, 28000 RPM
Spindle Speed	100 - 6500 RPM,
Electronic Speed Control	
Spindle Rotation	CW
Milling Capacity	¾ Face Mill on mild steel
Ball Screws Pitch	0.200”
Maximum X Travel	10”
Maximum Y Travel	6”
Maximum Z Travel	10”
Swing	11”
X/Y Dial Resolution	0.001”
Table Size	18 5/8” x 6”
Base Size	10 1/8” x 9 3/8”
Spindle taper	MT2
Weight	**170 Lb.**
Shipping weights	200 Lb.

Printer Port and Input Connector Wiring

Printer port connector Input Connector

PIN	PRINTER PORT CONNECTOR	INPUT CONNECTOR PIN
1	Spindle Power	
2	Step X	
3	Direction X	
4	Step Y	
5	Direction Y	
6	Step Z	
7	Direction Z	
8	Step A	
9	Direction A	
10	Input	3
11	Input	4
12	Input	7
16	Cooling Pump Power	
18	Common	9
		1 Is connected to +5VDC

Important:

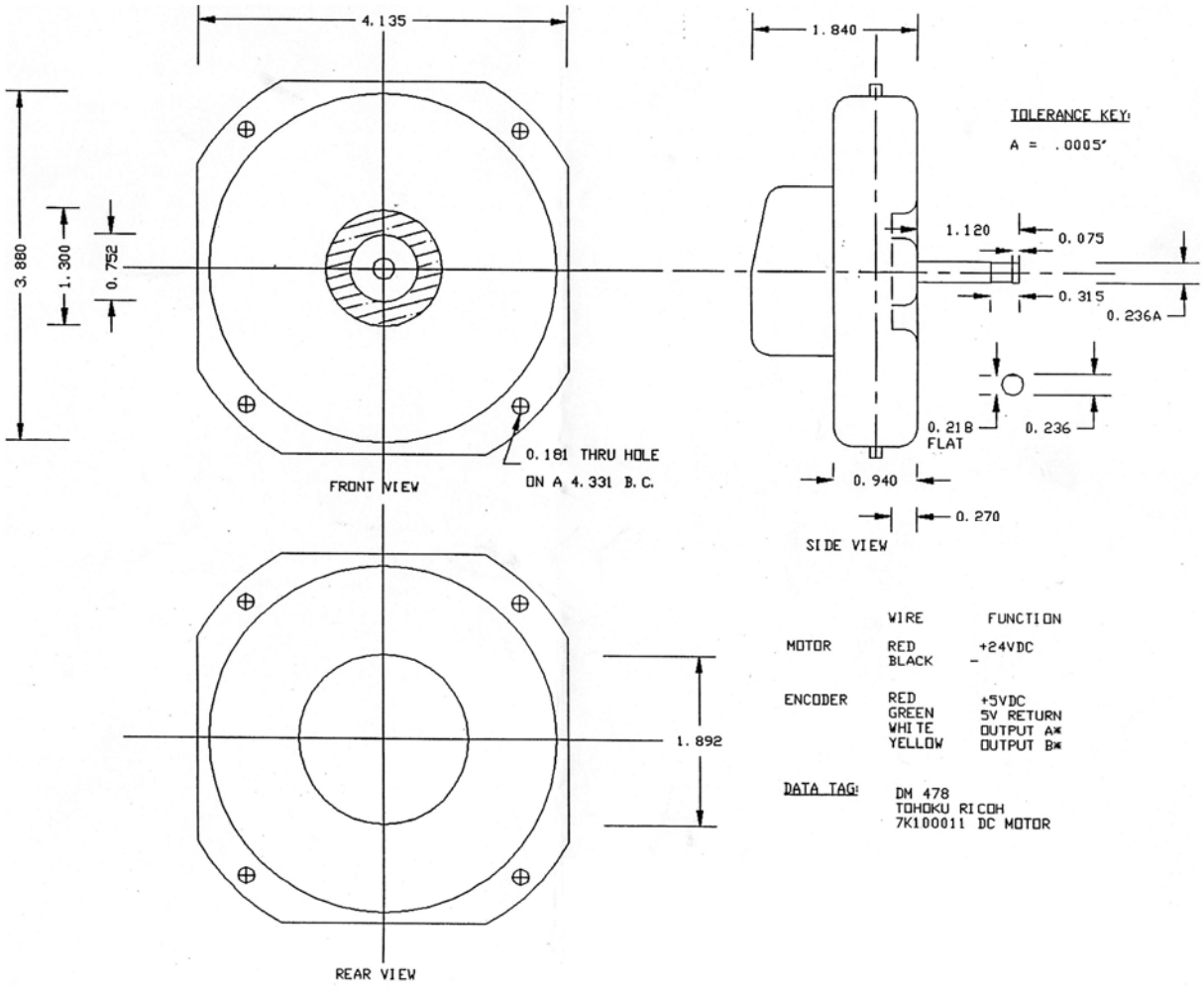
LEDs can be seen through the controller cover are lit under normal operation.
If one of the axes reaches the end of motion or cannot move for any reason, all axes will stop moving to prevent damage to the machine and motors.
The LEDs will blink indicating the need for a reset.
In order to reset the controller you have to shut it off and then turn it on again.
All previous axes position will be lost.

LED blinking CODES:

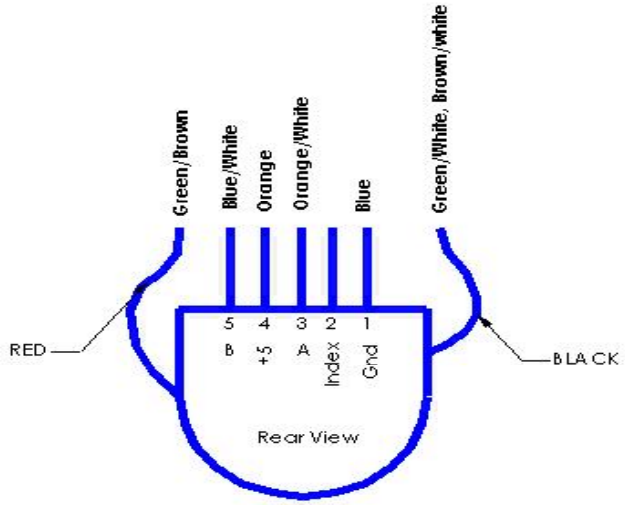
- 1 BLINK: Stuck motor. The encoder error exceeded maximum allowed error
- 2 BLINKS: Motor Halt Command from other motor. The other motor signaled en error causing the controller to halt all the motors.
- 3 BLINKS: Over-current.
- 4 BLINKS: Thermal overload.

If the controller stops during machining, low the feed, axis acceleration or depth of cut.

Tohoko Ricoh Type 7K00011 Servo Motor Specifications



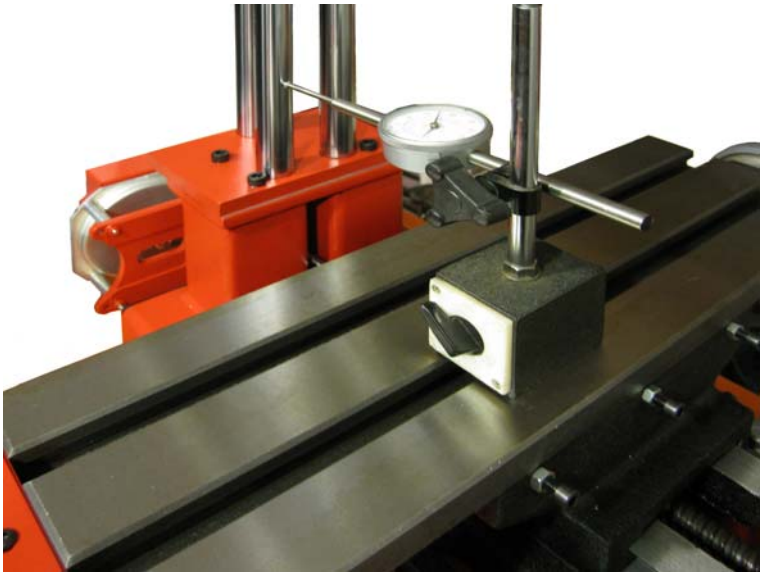
- Nominal voltage 24VDC
- No load power 55 watt
- No load speed 4600 RPM.
- Nominal torque 12 oz.in. @ 2.3 amp, 4000 RPM.
- Maximum current 10 Amp.
- Encoder resolution 400 per rev.



Rotary Table Motor Wiring

Servo Motor wiring

Fine-tuning.



Number of step per inch for each axis may change slightly according to the precise lead screw pitch for a particular machine. It is a good practice to fine-tune each axis number of steps per inch according to a dial indicator reading as it is shown on the picture.
Using your software move the corresponding axis by one inch and adjust if necessary the software setup according to the actual indicator reading.
Repeat this procedure for all axes.

DSP Servo Controller

1. **X, Y, Z, A** connectors are for motors of the corresponding axis.
2. **Input** connector is not used for normal operation. It is intended for future add-ons, such as Home or Limit switches.
3. **Printer Port** connector is connected to a computer printer port with the furnished cable.
4. **Spindle** receptacle on the front panel energizes by the M3 or M03 statement in the program. It turns off with M5 or M05 statement in the program. The spindle speed controller should be plugged into it.
5. **Cooling** receptacle energizes by the M8 or M08 statement in the program. It turns off with M9 or M09 statement in the program. This receptacle is used to control a cooling pump. Don't plug a vacuum cleaner into this receptacle because of the current limitation.
6. **120 V** Power input has a built in fuse holder. The fuse is 10amp, 5mm size.
7. The manual On-Off switch may be used during tool change. When a program calls for a tool change it is possible to shut of the controller, change the tool and manually bring the Z-axis to the previous position. Then turn the controller on again to continue the program.
8. When operating the mill manually, unplug motors from the controller.
9. For a safety reason turn the controller power on only after the computer program is on the computer screen. During computer boot-up the printer port outputs are in unpredictable state and the controller can randomly turn the spindle or cooling pump on without warning.

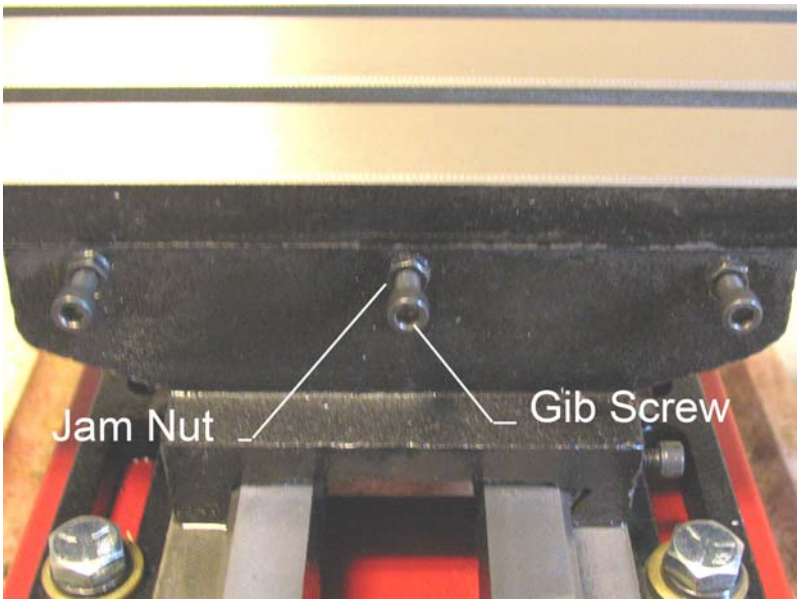
The fuse is located in the bottom portion of the power entry on the back of the controller. Use a small screwdriver to pull open the fuse compartment. The fuse is 5mm size and rated 10 amps.

Spindle Speed Control

Spindle speed control adjustment is located on the right side of the spindle carrier. The front switch central position turns spindle off. In VAR-position spindle RPM is adjustable. In FULL-position spindle turns at full speed regardless of the know position. The spindle RPM scale is not calibrated. It is ratiometric to the maximum speed.

Periodic maintenance.

- Do not over tight gib screws on dovetail axes. Gibs are metal strips that sit on one side of a dovetail slide, such as the cross-slide and compound, and which are adjustable to take up any slack or slop so that the dovetail slide is very smooth. The table should move smooth by hand cranks. All dovetails are hand lapped. However as any mechanical equipment the mill requires some running time to make the matching parts fit. After 10-20 hours of operation it may be necessary to adjust gib screws on all axes.



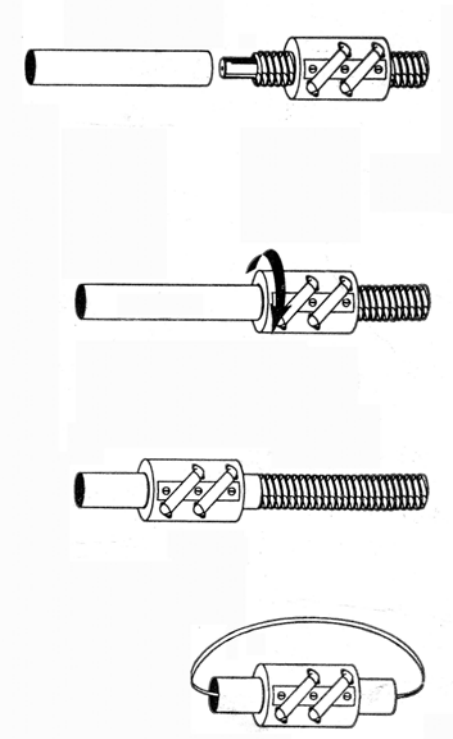
After gib screws adjustment secure all jam nuts.

- Use good quality machine oil to lubricate all moving surfaces. Avoid using WD40 and such products with additives. They may create residue build-ups.
- Use lubricating grease on all lead screws.
- Never use a drill chuck in milling operation. Use only supplied MT2 collets.

Removing Ball Screws

Do not remove ball screw from the ball nut without inserting an arbor into a ball nut to prevent loosing balls.

Follow the procedure:

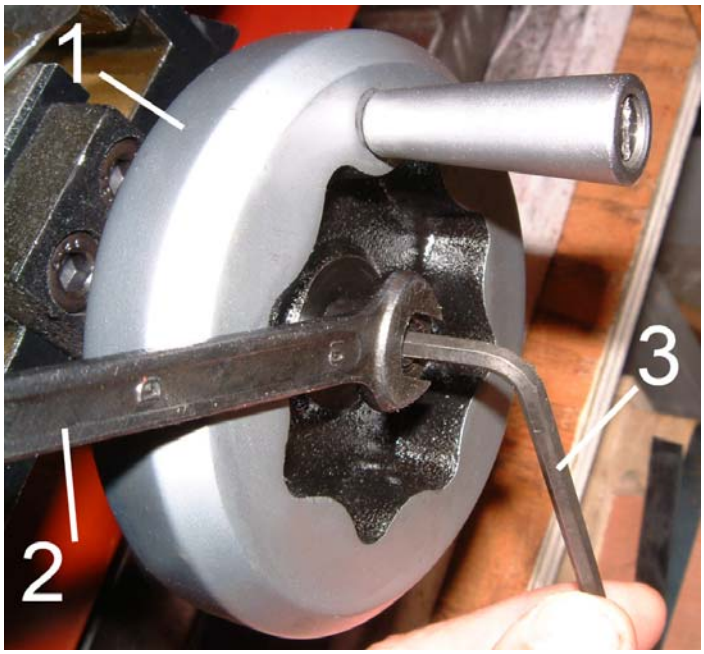


1. Attached an cardboard arbor tight to the end of the ball screw
2. Engage and rotate both the arbor and the ball screw.
3. Make sure that the arbor is inserted into entire screw
4. Secure the arbor with a plastic tie.

When re-assemble follow the reverse procedure.
The cardboard arbor is included with the mill

X and Y Lead Screws Axial Free Play Adjustment

An excessive axial free play in the thrust bearings may be compensated as follow:

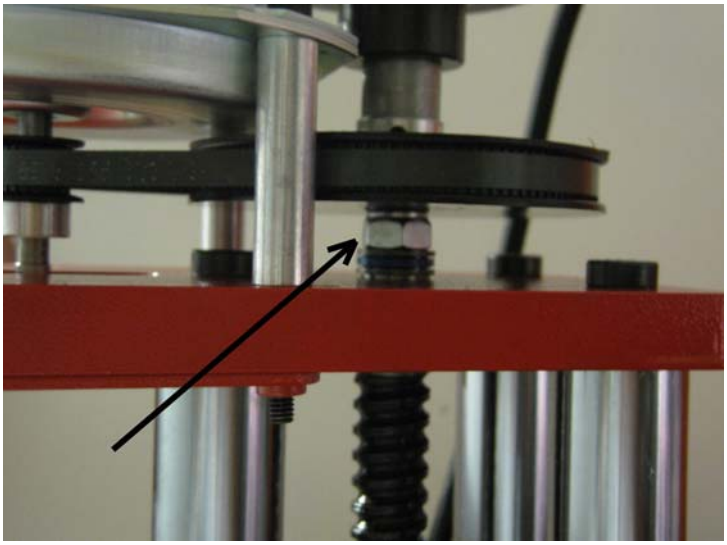


1. Hold the wheel nut with the 10mm ranch (Pos. 2) and release the hex jam screw with the hex driver (Pos. 3).

2. Holding wheel (Pos. 1) with your hand tight the wheel nut with the ranch (2). Don't over tighten it.

3. Holding the ranch (2) tight the hex jam screw with the driver (3).

Z-Axis Free Play Adjustment



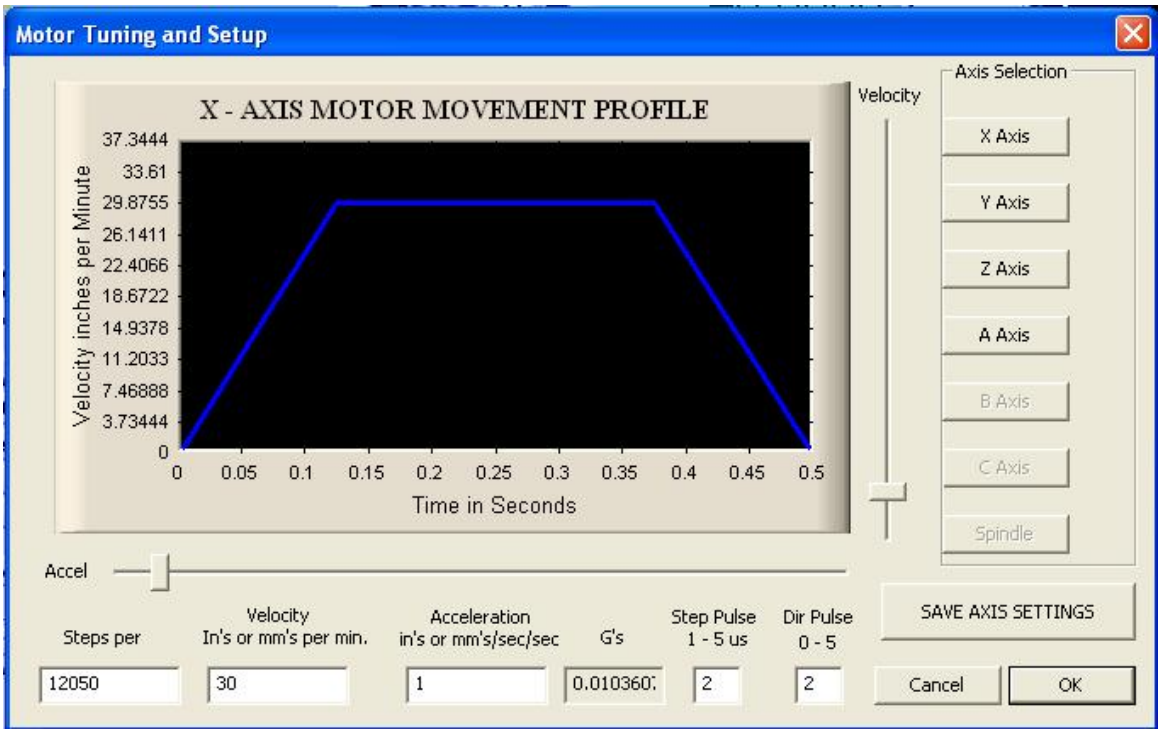
Adjusting the nut as shown on the picture below may compensate an excessive axial free play in the thrust bearings on Z-axis. You may hold the Z-Ball Screw when doing this. Don't over-tighten the nut!

Mach 3 software setup

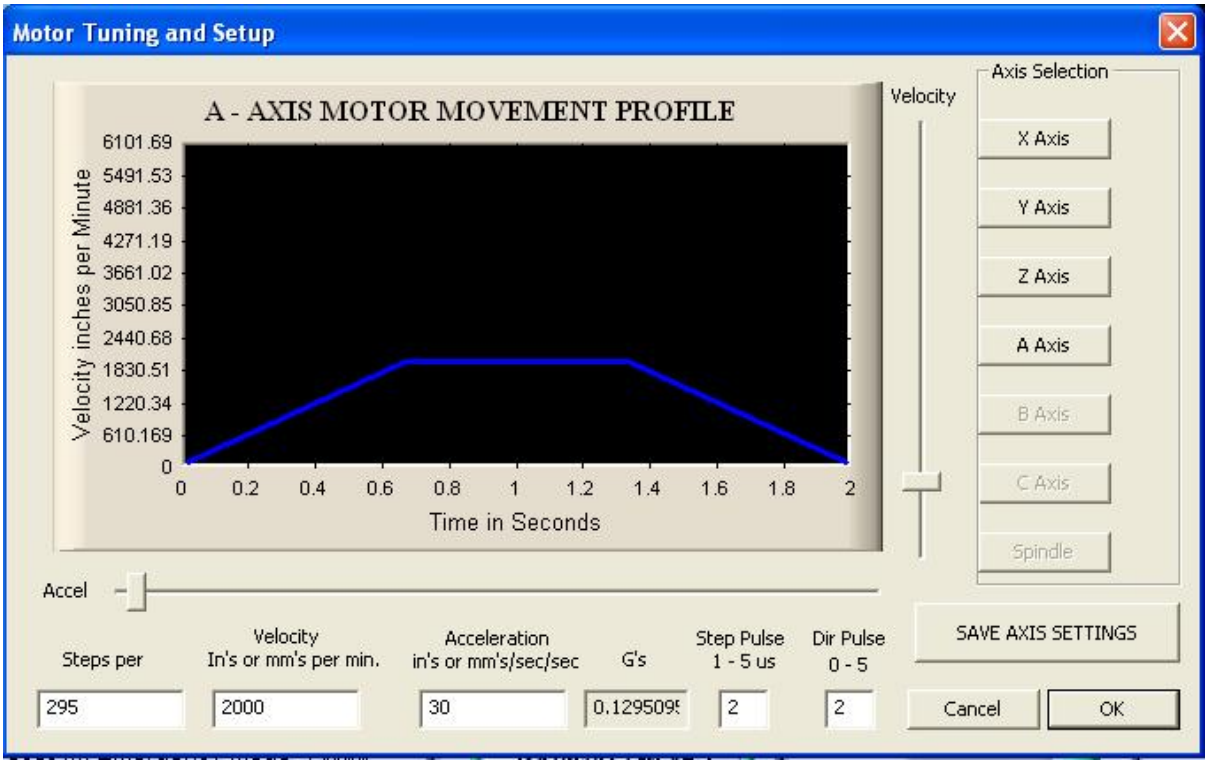
The Mach3 software is highly recommended to use with the mill.
It can be obtained from http://www.machsupport.com/. This is Windows based software.
The mill setup, or configuration file for this software, TL518.xml, is provided on the supplied CD.
After you install the Mach 3, copy this file into Mach3 directory on your hard disk.
Reboot the computer. Click on the "Mach3 loader" icon (not the"Mach3 lathe" or the" Mach 3 Mill"). Highlight the TL518 profile and click OK.
When you get a Mach 3 screen the software will be set for the mill.

The following Mach3 screen shows the TL518 configuration.
Please note that the velocity value may be changed.

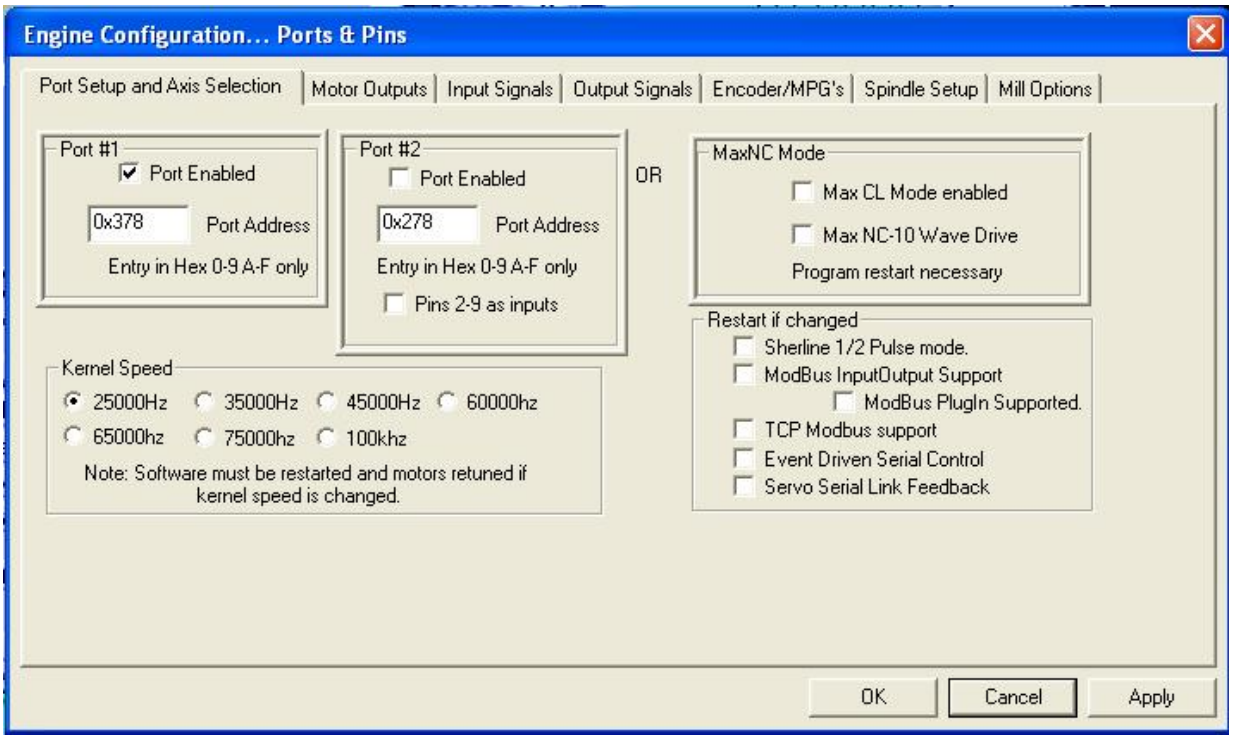
X, Y, and Z Motor Tuning



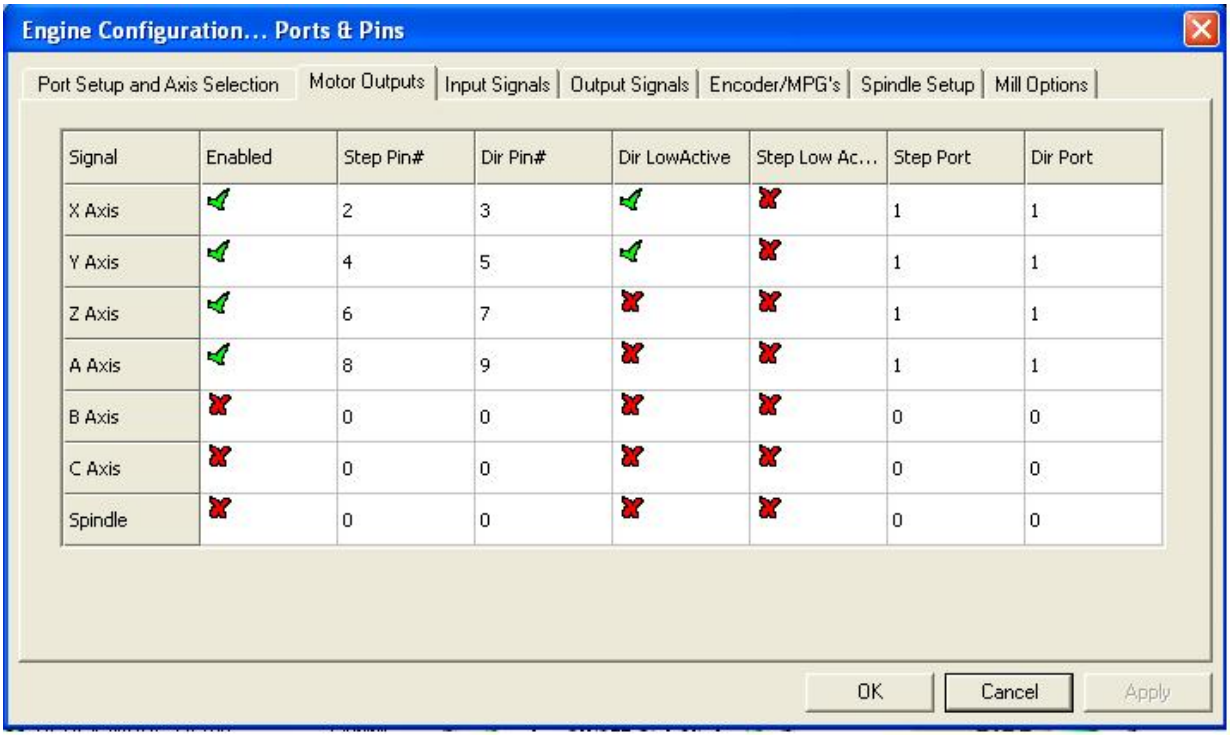
A-axis Motor Tuning



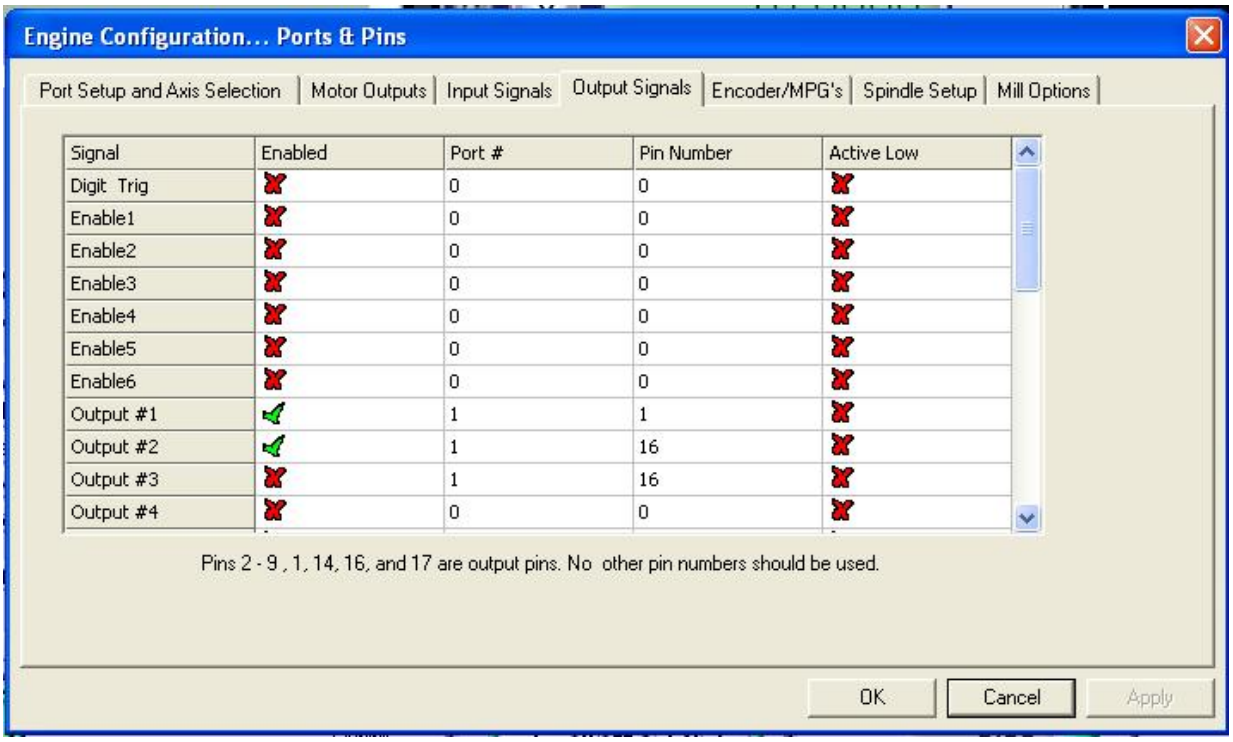
Port Setup



Motor Outputs configuration



Output Signals configuration



Sources for replacement Parts

Spindle Timing Belt	McMaster	www.mcmaster.com	Part # 1679K23
Axis Timing Belt	SDP	http://www.sdp-si.com/estore	Part # A 6B16-145025
Timing Pulley Large	MSC	www.mscdirect.com	Part # 04894937
Timing Pulley motor	MSC	www.mscdirect.com	Part # 04895132

Cutting tools and accessories links

www.ese-enco.com
www.mcmaster.com
www.mscdirect.com
www.pantoolco.com