

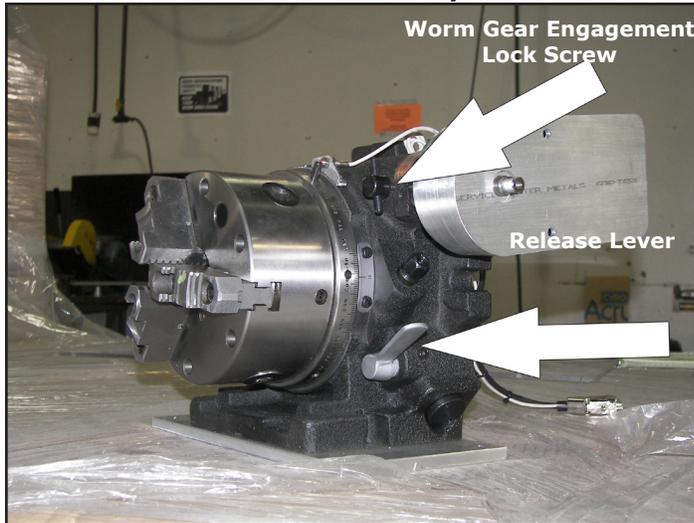


DO NOT DISCONNECT THE CABLES WHILE THE POWER SWITCH IS ON.

PREMIUM CLASS ROTARY TABLE PARTS REFERRENCE

These pictures reference the complete contents of your Premium Class Rotary Table shipment. Before setting up the unit, check that each part pictured below has been included in your package.

Premium Class Rotary Table



- The *Worm Gear Engagement Lock Screw* determines backlash by the amount of pressure between the worm gears. Backlash will increase if there is a decrease in the amount of pressure between the gears. Too much pressure will create a control error in the motor.
- The *Release Lever* is locked in the up position to prevent it from engaging the index plate. Never release it, for damage to the servo drive will occur.

Adjustable Tale Stock



Face Plate



Chuck Wrench



Allen Wrenches & Hardware



Motor Cable



Encoder Cable



The next section of this document provides information on how to use a 4th axis rotary table. For futher inquiries, contact a Techno Support Representative at (516) 328-3970.

The following pages provide a basic understanding of the 4th Axis Rotary Table.

G-CODE:

The 4th axis or "A" axis may be moved like any other axis with a G0 or G1 command. For example:

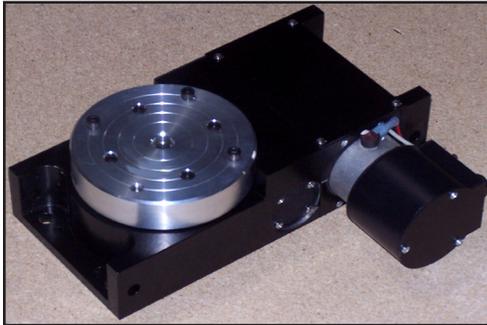
G0 A180

G1 Y10 A135 F75

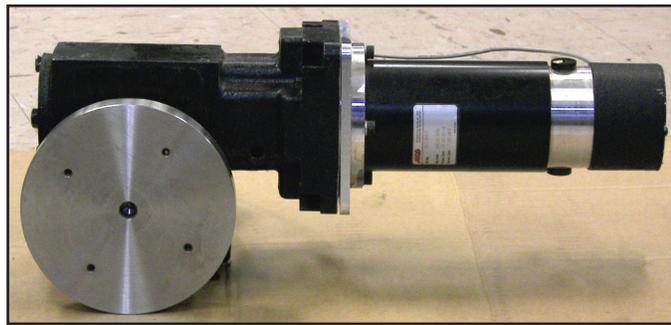
SCALE FACTOR:

Each rotary table has number of encoder pulses per revolution. To determine a rotary table's number of pulses, multiply the gear ratio times 4000. The basic rotary table, picture 1 below, has a 100:1 ratio so it has 400,000 pulses per revolution $[(100 \cdot 1)4000=400,000]$, while the heavy duty rotary table, picture 2 below, has a ratio of 60 :1 so it has 240,000 pulses per revolution $[(60 \cdot 1)4000=240,000]$.

Picture 1



Picture 2



To set your scale factor:

STEP 1: Divide the number of pulses by the number of units per revolution. A basic rotary table using 360 degrees per revolution would have a scale factor of: $400,000 / 360 = \underline{1111.11}$

STEP 2: Enter this number into the Techno CNC Interface under **Setup>System> M4 Scale**, and put a check mark next to "rotary." If the rotary table is spinning in the wrong direction, add a negative value to the number (i.e. -1111.11)

UNITS PER REVOLUTION:

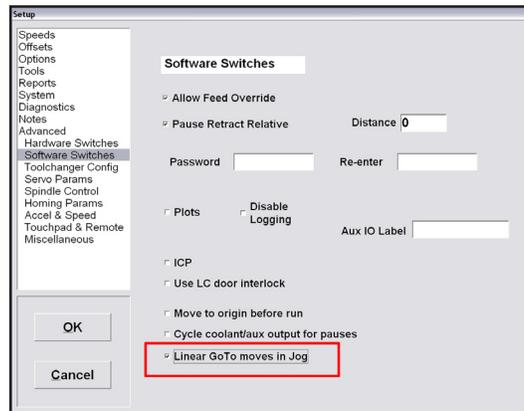
The number of units per revolution will have an effect on the part. It can effect the speed at which the rotary table turns and the final product. One method is to determine the circumference of your part, and round it off to an even number. This way, one rotary unit corresponds to 1 linear inch. For example, if you were using a 1" diameter part, you could use 3 units/rev. If using degrees, the rotary would need to travel 120 degrees to move 1 inch.

For indexing, an arbitrary value that gives you a good scale factor will work. Twelve or 16 units per revolution yields a scale factor close to the other motors and ends up placing the most commonly used indexing positions at whole number values. By keeping the scale factors similar, it helps keep the maximum speeds of each servomotor similar.

SETTINGS:

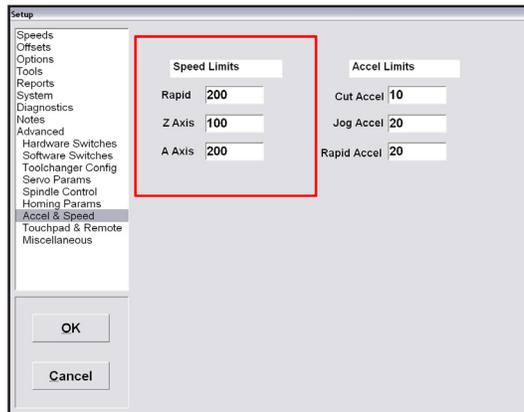
Besides scale factors, there are a few other settings in the Techno CNC Interface to look at.

Setup>Advanced>Software Switches>Linear GoTo moves In Jog



Normally, the GoTo command works like a G0, moving the Z-and A-axis independently from the other axes. Enabling this will cause the GoTo command to move all axes simultaneously like a G1 command.

Setup>Advanced>Accel & Speeds>Speed Limits



The A-axis needs to be set to a reasonable speed based on the number of units per revolution you choose. After making any changes, lower the jog speed to a low value, exit the software, and then restart the software.

(The jog speed slider is effected by maximum speeds. When the interface is turned on, and the current jog speed is higher than the maximum speed for the machine, it could complicate finding the optimal settings for the rotary)

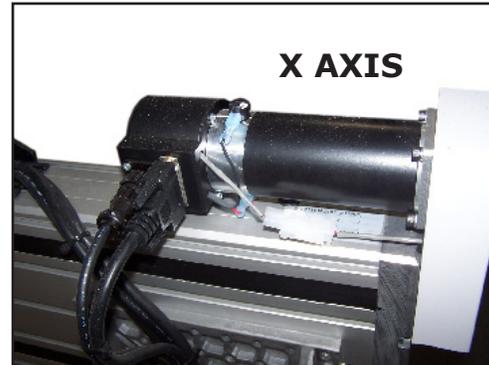
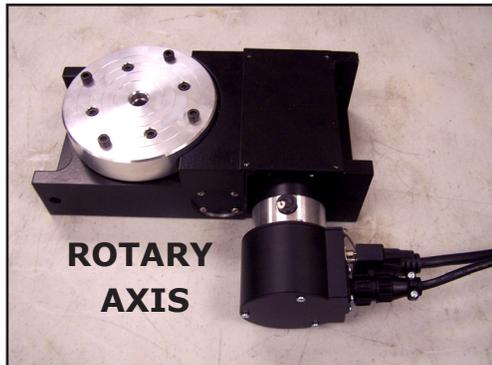
Keep in mind that the software restricts the speed at which you can jog the Z-and A-axis. When experimenting with settings, it may be a good idea to set all the speed limits to the same value. It may also help to write a test file to jog the A-axis around to determine the maximum speed of the rotary.

SAMPLE SETTINGS:

	Rotary Table 1	Rotary Table 1	Heavy Duty Rotary Table	Heavy Duty Rotary Table
Rotary Table:				
Gear Ratio (pulses/rev)	400,000	400,000	240,000	240,000
Units/rev	360	16	360	12
M4 Scale Factor	1111.111	25,000	666.667	20,000
Speed Limit: Rapid	200	200	800	800
Speed Limit: Z axis	200	200	250	250
Speed Limit: A axis	6000	200	6000	250

ROTARY SWAP:

Sometimes the best way to make a 4th axis part is to swap the cables between the rotary axis and the X-axis. This allows you to create a flat toolpath and wrap it around the rotary axis.



Take the diameter of your part, lets say 2" in diameter, and calculate the circumference, about 6". Using a Rotary table 1, we take 400,000 and divide by 6 to get a scale factor of 66,667.

M1 Scale	20320	Rotary
M2 Scale	20320	Rotary
M3 Scale	20320	Rotary
M4 Scale	66667	X Rotary

Swap the settings for M2 and M4, and swap the motor/encoder cables for M2 and M4.

M1 Scale	20320	Rotary
M2 Scale	66667	X Rotary
M3 Scale	20320	Rotary
M4 Scale	20320	Rotary

Now the X-axis will rotate the part. You can create a flat rectangular toolpath that will wrap around the part or you could create a long toolpath in a diagonal direction so that it wraps around the part like a candy cane.

INDEXING:

Indexing is when you cut one side of the part, rotate the part to a new angle, and then cut a new face of the part. You can manually paste toolpaths together and insert rotations in between, but some CAM packages will do this for you.

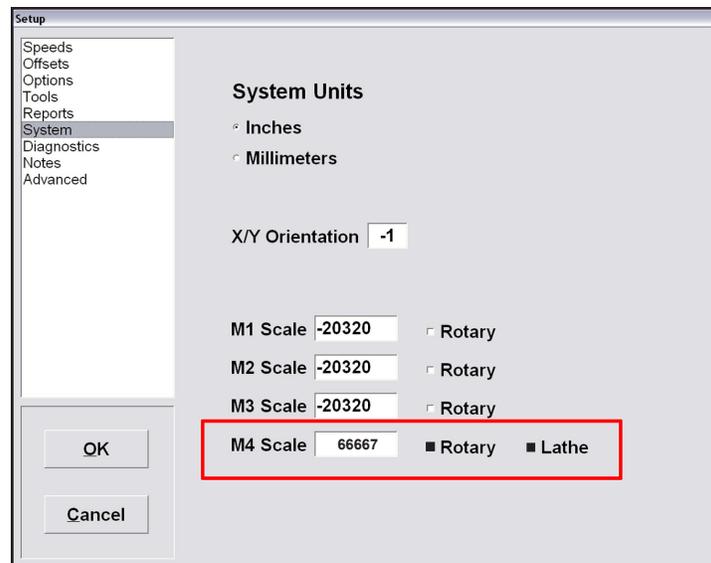
TRUE 4TH AXIS:

Some CAM packages will utilize true 4th axis toolpaths which move all 4 axes simultaneously to machine all sides of the part in one operation.

LATHE ATTACHMENT:

The latest versions of the interface allow the rotary table to be set to lathe mode.

Setup>System>M4 Scale>Lathe



When the interface is enabled with Lathe Mode on, the rotary jog buttons will be replaced with a slider. When the interface is first turned on, the interface is still in rotary table mode. You can home the rotary table, apply offsets and move it with the "<" and ">" buttons. Once you turn on the lathe with the On button, it will cease to be in rotary mode and will be in lathe mode. It will stay in lathe mode until the interface is turned off. This is important because lathe files must be preprocessed in lathe mode or else the interface will crash. Starting off in rotary mode allows the operator to home the machine and enable offsets to recover saved zero points, before going into lathe mode which does not allow the rotary to home.

Lathe files are ordinary G-Code files. You may put any type of cutter on the Z-axis; an endmill, saw blade or lathe tool. You may position the tool on top of the stock or next to the stock. Just remember to turn on the lathe so that it is spinning before you start your G-Code file.