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CNC ROUTER SYSTEMS

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TECHNO CNC SERVO G-CODE INTERFACE

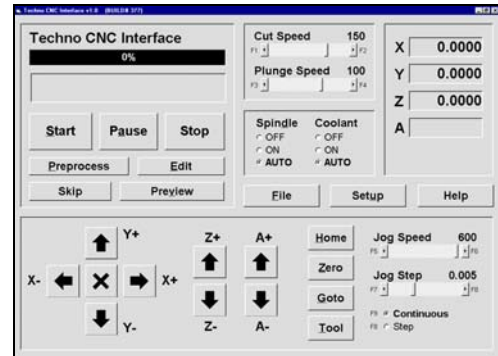
From Build #400

Quick and User-Friendly Tutorials

**For More Documentation See the PDF Files Located On Your
 Techno CD-ROM in the MORE MANUALS Folder**



BUILD #400



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SAFE OPERATION OF YOUR MACHINE

Read these instructions thoroughly BEFORE operating machine

WARNING: IMPROPER OR UNSAFE OPERATION OF THE MACHINE WILL RESULT IN PERSONAL INJURY AND/OR DAMAGE TO THE EQUIPMENT.

1. Keep fingers, hands, and all other objects away from machine while power is on.
2. Disconnect power to all system components when not in use, when changing accessories, and before servicing.
3. Do not loosen, remove, or adjust machine parts or cables while power is on.
4. Exercise care with machine controls and around keyboard to avoid unintentional starting.
5. Make sure voltage supplied is appropriate to specifications of components.
6. Machines must be plugged into three-pronged grounded outlets. Do not remove the grounding plug or connect into an ungrounded extension cord.
7. Keep cables and cords away from heat, oil, and sharp edges. Do not overstretch or run them under other objects or over work surfaces.
8. Use proper fixtures and clamps to secure work. Never use hands to secure work.
9. Do not attempt to exceed limits of machine.
10. Do not attempt to use machine for purposes other than what is intended.
11. Use machine only in clean, well-lit areas free from flammable liquids and excessive moisture.
12. Stay alert at all times when operating the machine.
13. Always wear safety goggles.
14. Do not wear loose-fitting clothing when operating machine. Long hair should be protected.
15. Always maintain proper balance and footing when working around the machine.
16. Maintain equipment with care. Keep cutting tools clean and sharp. Lubricate and change accessories when necessary. Cables and cords should be inspected regularly. Keep controls clean and dry.
17. Before using, check for damaged parts. An authorized service center should perform all repairs. Only identical or authorized replacement parts should be used.
18. Remove any adjusting keys and wrenches before turning machine on.

PREVENT FIRE HAZARDS by using the proper feeds, speeds, and tooling while operating your Techno machine. For example, setting feeds and speeds too low and/or using dull tool bits creates friction at the material. The friction generates heat which can result in a fire that can be drawn through the vacuum table without you knowing it. Be very careful when cutting composite material, especially wood composites like MDF and Particleboard.

DO NOT OPERATE MACHINE IF YOU ARE UNFAMILIAR WITH THESE SAFE OPERATING INSTRUCTIONS. DO NOT OPERATE MACHINE WITHOUT KNOWING WHERE THE EMERGENCY STOP SWITCH IS LOCATED.

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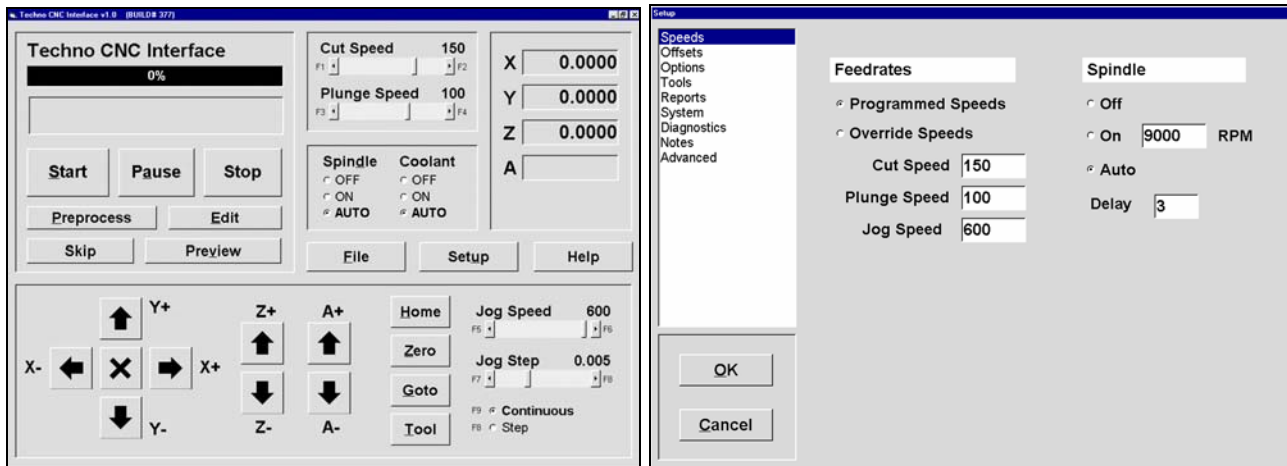
Entire Agreement/Governing Law

The terms and conditions contained herein shall constitute the entire agreement concerning the terms and conditions for the limited warranty described hereunder. No oral or other representations are in effect. This Agreement shall be governed in all respects by the laws of New York State. No legal action may be taken by any party more than one (1) year after the date of purchase.

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I. The Techno CNC Interface

NOTE: For *Standard LC Machines* and *Tabletop Routers* the 5.75" long **PCI Interface Card** is installed. For the *LC Plus*, *LC "X"* and *RG Series Machines* the 9.25" **PCI Controller Card** and Riser Card are installed. For *Premium Class Machines* the PCI Controller Card is factory installed.

Loading Card(s) & Software

1. Turn off your computer, unplug the power cord and remove the cover.

WARNING: Ground yourself during installation.

2. Remove PCI card from its protective packaging and locate an available PCI slot.

NOTE: The PCI card's connectors mate with the PC Mother Board in only one way. Do not force installation.

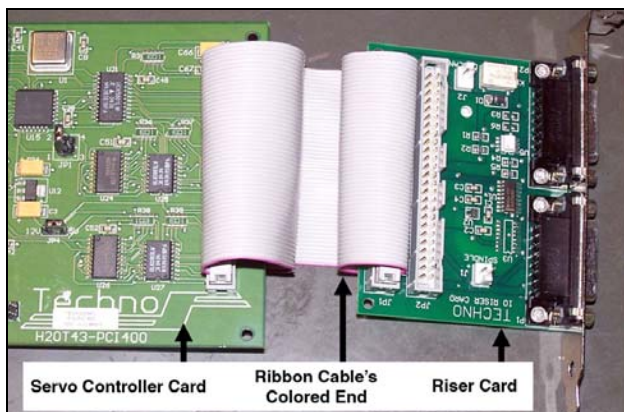
3. Gently but firmly insert the PCI card into the vacant PCI slot. Secure with screw.

For Standard LC Machines and Tabletop Routers, Skip to Step 4.

For LC Plus, LC "X" and RG Series Machines continue to Step 3a.

- 3a. Locate another available PCI slot and secure Riser Card (no PCI connections required).

- 3b. Connect the Riser Card to the PCI card using the ribbon cable provided.



System Requirements

To use the Techno CNC Interface, you must have a PC with these minimum requirements:

- § Windows 98, ME, 2000, XP, or Vista*
- § PC with 800Mhz Pentium 3 Processor, 2 GB Memory, 256 Ram, CD-ROM
- § Two available PCI slots

* Techno Technical Support will provide the required instructions to accommodate software compatibility.

WARNING: The colored end of the ribbon cable **MUST** be attached to each card's PIN 1 connector. On PCI card, PIN1 is side closest to Techno logo. On Riser card, it is the side where "TECHNO IO RISER CARD" is printed.

- 3c. Connect Start Stop Box connector to the P2 Riser Card Connector (opposite side of the colored ribbon).

NOTE: If you are operating a four axes machine, then you will have to connect the touchpad to the Riser Card's P1 connector.

4. Close the computer.
5. Connect the cable from the Servo Control Box to the PCI card. Power on.

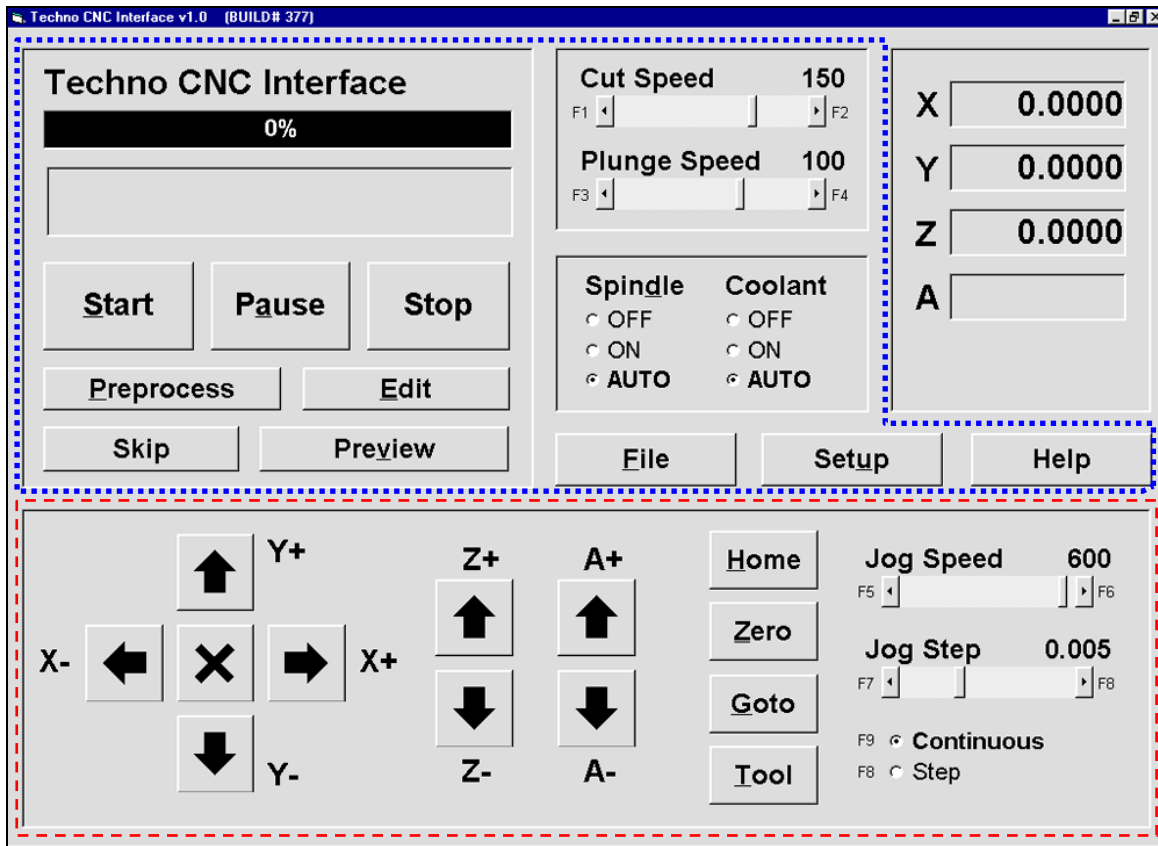
WARNING: Make sure all other applications are closed before attempting to install the Interface, including virus protection software and disable any network card connections.

6. When Windows starts, it will detect the PCI card as "new hardware." When prompted to search for a suitable driver, insert the Techno CD-ROM.
7. When prompted for "optional search locations" choose computer's CD-drive.
8. Select the **Setup Techno CNC Interface** button on the Interface prompt and follow the onscreen instructions.

NOTE: Keep the Techno CD in a safe place. It contains addition documentation (PDF files).

9. Start the Interface by selecting **TECHNO CNC INTERFACE** in your **START/PROGRAMS** menu.

Main Menu



 = File Execution Functions  = Jogging Functions

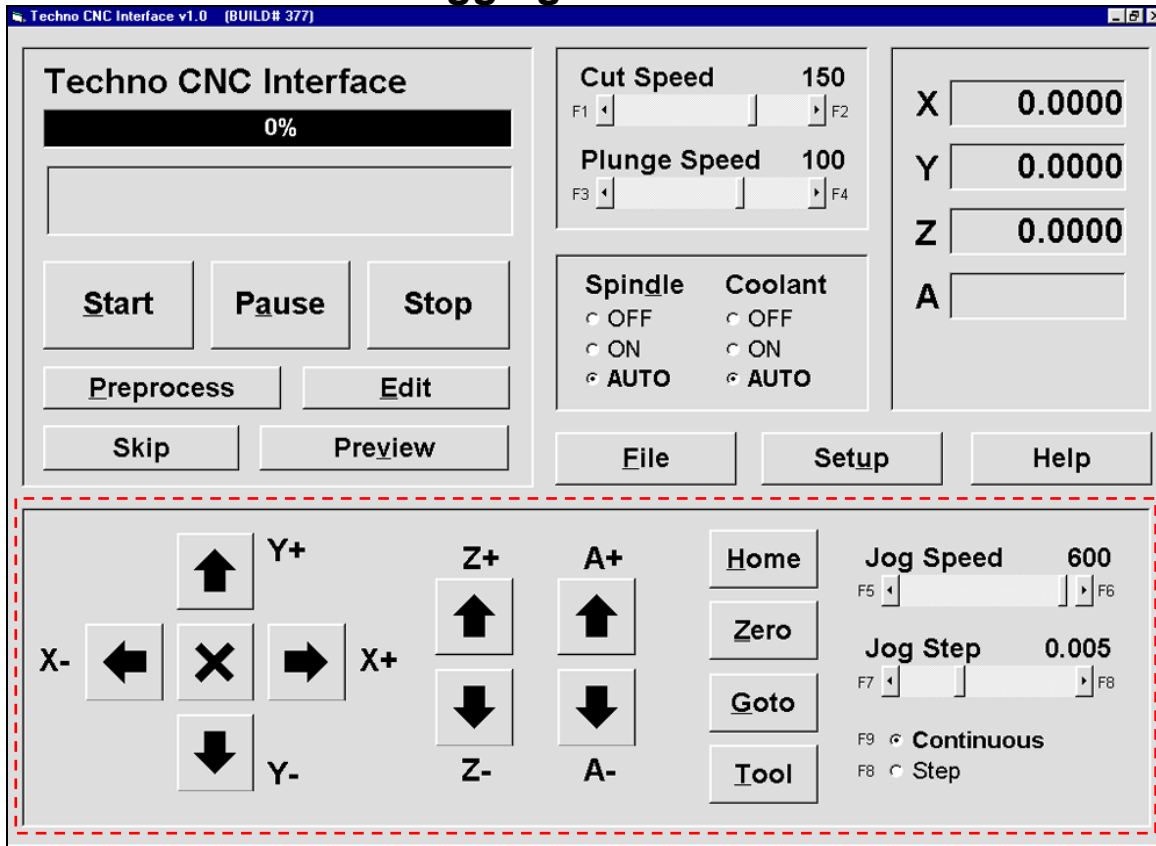
The Techno CNC Interface Main Menu is extremely user-friendly. There are two primary functions through which all the controls are used: **JOGGING** and **FILE EXECUTION**.

Jogging the machine is synonymous with *moving the machine's axes*. All of the Main Menu's jogging functions either actively jog the machine or set up parameters and controls to jog the machine. In the lower portion of the Main Menu (shown above) are the jogging controls. Also, see the Position Counters in the top right quadrant of the Main Menu. These counters give a constant numerical position of where you jog any axis. The following page will provide a brief overview of the jogging functions.

File execution refers to the *retrieval, manipulation and actual running of a G-Code file*. In this Main Menu you can: view the file's toolpath, edit code, set speeds and parameters and start-pause and-resume a program run. The upper portion of the Main Menu allows you do perform all these tasks and more. See page 8 for a brief overview of the various file execution functions.

The Main Menu's upper right quadrant displays the Interface's *Positional Display*. This function is useful in both Jogging and File Execution operations. While jogging, you can track the distance of travel for your axes, and while running a file, the Positional Display shows the actual travel of the axes in motion.

Jogging Functions



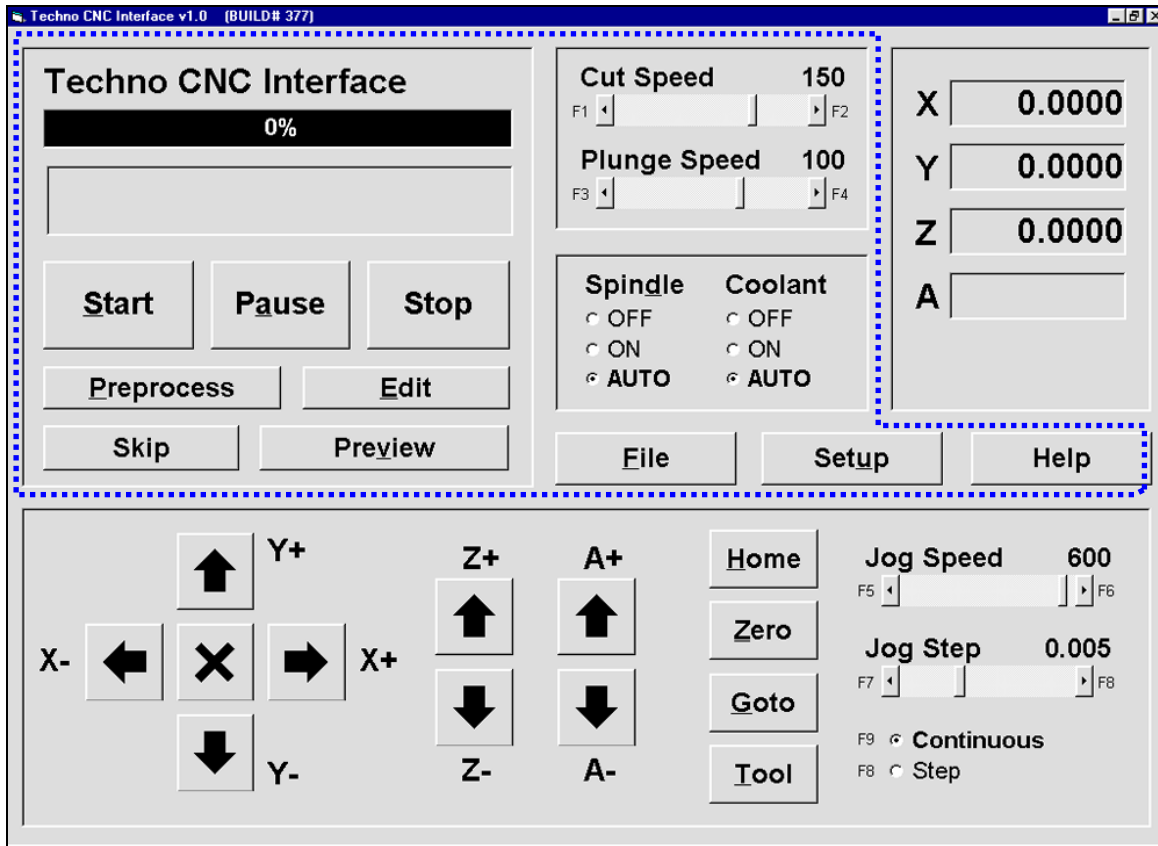
Notice the square buttons with the black arrows. Each of those buttons will move an axis in the direction designated by the letter and value adjacent to it (i.e. Y+). If the **Continuous** radio button is selected, you can hold down a jog button and the axis will move 'continually'. If you have **Step** selected, the axis will only move one step-size at a time. The **Jog Step** scroll bar sets the incremental distance. The **Jog Speed** scroll bar sets the speed at which the axes will travel while jogging.

Notice the Positional Display Counters during jogging. The travel values will go into negative numbers as well as positive numbers. The A-axis represents the availability for a fourth axis.

The column of four buttons (**Home**, **Zero**, **Goto**, and **Tool**) all allow you to perform shortcut operations. Submenus scroll-out on top of the Main Menu when these buttons are selected.

- The **Home** button moves an axis or all axes to a specified distance away from the axis' limit switch (also known as Machine Home).
-
- The **Zero** button allows you to set an axis or all axes' position counters to zero.
-
- The **Goto** button allows you to move an axis or all axes to a specified location or move them all to the Machine Origin, which refers to the last Zero position defined by the user.
-
- The **Tool** button brings up a tool change operations window that allows you to manipulate the different aspects of a tool change application (i.e. touch off Z-axis zero position).
-

File Execution Functions



In any File Execution, the first step is to retrieve a file. The **File** button opens a window that allows you to search your PC to retrieve and open a file.

Once you have your file, if you want to edit the code, click the **Edit** button. If you want to Preview the file's toolpath, use the **Preview** button. And before you can even use the **Start, Pause or Stop** functions, the file must always be **Preprocess**-ed. Notice how the Progress Bar displays the status of the preprocess function (in a completion percentage) as well as the percentage and current G-Code commands of a file being run.

The **Cut & Plunge Speed** scroll bars are file execution parameters. Use them to adjust the speed at which the axes (X, Y = **Cut**; Z = **Plunge**) travel during a cutting command. The **Spindle & Coolant** radio buttons are another set of controls for file execution. Use these controls according to your program requirements.

The **Setup** button brings up the Setup Window with its bookmarked submenu display screen. From here you can set file execution parameters ranging from Feedrates to Scale Factors.

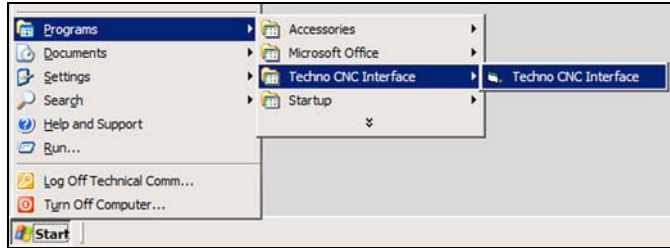
II. Basic Machine Operations Tutorial

This simple tutorial employs and explains the main functions of the Techno CNC G-Code Interface by running the sample program, **2box.nc**. If you have any difficulty with the tutorial or are just learning to use your machine, we recommend reading the INTERFACE FUNCTIONS before proceeding.

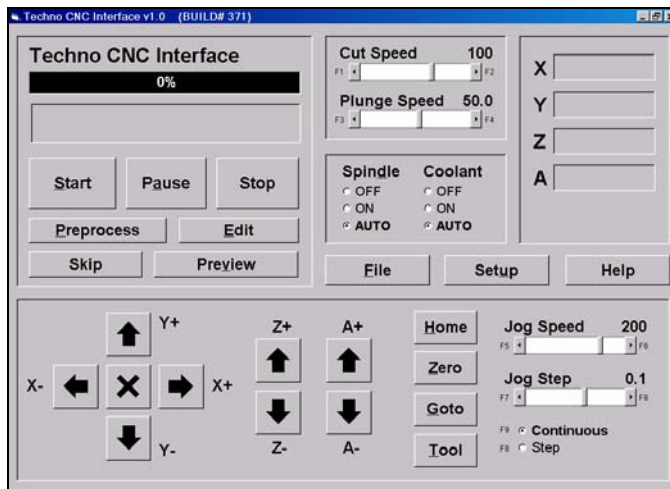
Note: This Tutorial was written assuming you have already setup the touchpad and have a tool bit loaded.

1. Start the Interface

- A. From your computer's Start menu, choose Programs/Techno CNC Interface.



The **Main** Menu appears:



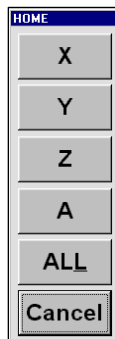
Note: This tutorial is written assuming your **X/Y Machine Orientation** is set to the Interface default setting of -1. If this has somehow been altered, go into **SETUP/SYSTEM** and make sure the X/Y Orientation is set to -1.

2. Home the Machine

- A. Press **Home**

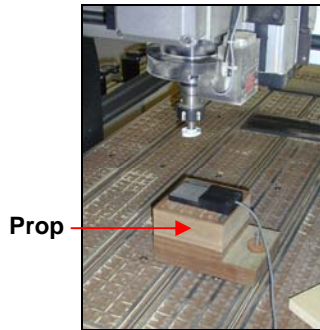
The **Home** Menu appears:

- B. Press **ALL**



3. Zero the Z-axis

Note: Prop the touchpad on top of something high enough so that your Z-axis zero position is well above the table surface (see picture below). Do this to ensure that the tool bit does not travel into the table. The prop height is supposed to represent the height of the material to be cut. After you zero the Z-axis, remember to remove the prop.



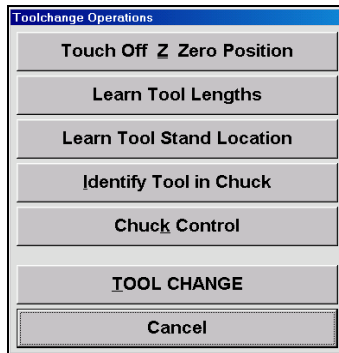
A. Jog your tool over the touchpad

Note: Prior to zeroing the Z-axis, we will test the touchpad and see if it is working properly. Follow the Steps and Warning below.

Warning: If at any time you need to stop the touchpad test, hit the ESC button on your keyboard or the red E-stop button.

B. Press

The **Tool** Menu appears:



The Test: Here we will start the *Touch Off Process*. The Z-Axis will automatically travel down to the touchpad. If the touchpad is working properly, once the tool bit (or spindle head) comes into contact with the pad, the Z-axis will retract immediately. This test involves the user manually raising the touchpad up to the spindle during the *Touch Off Process* as the Z-axis is descending (see picture below). When you lift the touchpad up to the tool bit, if the Z-axis retracts, then the touchpad is operational. If the Z-axis DOES NOT retract, then immediately press the ESC keyboard button (or E-Stop button) to stop the *Touch Off Process*. Then, check your touchpad setup before returning to this tutorial.

C. Press

The Z-axis will automatically descend.



D. Manually lift the touchpad to the tool bit and then gently touch the pad to the tool.

Note: If the Z-axis retracts upon contact, continue to Step 3-E. If it does not retract, check your touchpad setup before returning to this tutorial.

E. Using the arrow buttons on the Interface's Main Menu jog your tool over the touchpad, which should be placed on top of a prop.

F. Press

G. Press

The Z-axis will automatically lower the Z-axis to the touchpad and retract when it makes contact. This *Touch Off Z Zero Position* process sets your Z-axis zero position automatically.

Note: You can now remove the touchpad and the prop from the table surface.

4. Zero the X and Y Axes

A. Jog the X/Y axes to a central position on your gantry table.

Note: Zero positions are frequently set at the front left corner of your workpiece.

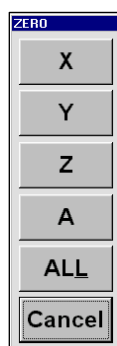
B. Press

The **Zero** Menu appears:

C. Press

This will Zero the X-axis.

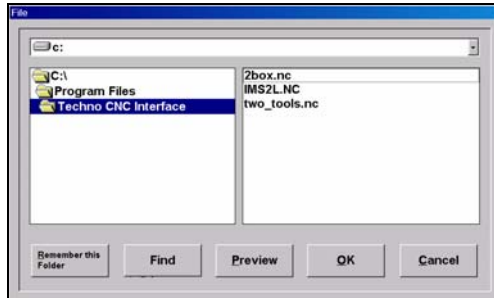
D. Repeat process for Y-axis.



5. Open File to Run

A. Press **File**

The **File** Window appears:

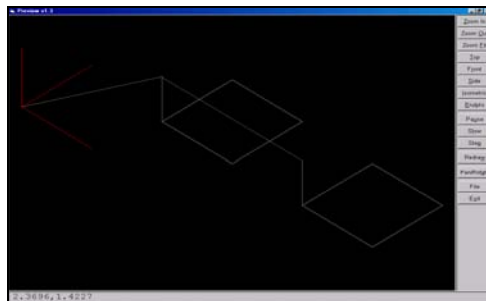


B. Highlight **2box.nc** and press **OK**

6. Preview the File

A. Press **Preview**

The **Preview** Window appears



B. Manipulate the toolpath using the buttons along the right side.

C. Press **Exit** to close window

D. Press **Edit**

The **Edit** Window appears:



IV. Tool Lengths Tutorial

For Automatic & Manual Quick-Change Tool Change Spindles Only!

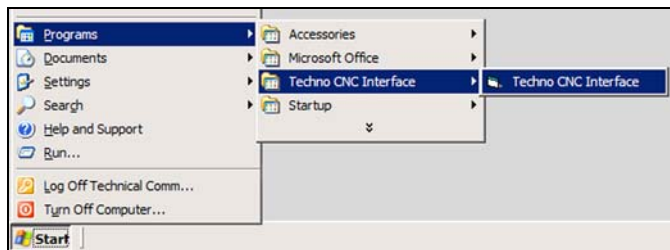
Tool Change operations often involve tool bits of varying lengths. The touchpad is used to record each tool length for one reason: to compensate and thus maintain a consistent Z-axis zero position. In this Tutorial, you learn the important task of calibrating the length of each tool bit for each tool holder. You will learn this process for the first two tool holders; after that follow the same directions for any additional tool holders. You must complete this (and the previous) Tutorial before starting the Automatic Tool Change Tutorial.

Note: This Tutorial was written assuming that:

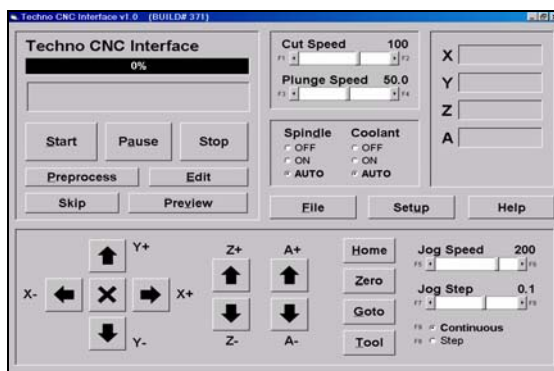
1. You have already setup the touchpad.
2. Your tool stands are located at the side of the machine the X-axis will home to (left if you are standing in front of the machine).
3. You have already completed *III. Tool Stand Locations Tutorial*.
4. You have loaded two tool bits of varying lengths into two tool holders.

1. START THE INTERFACE

A. From your computer's Start menu, choose Programs/Techno CNC Interface.



The Techno CNC Interface Main Menu appears:

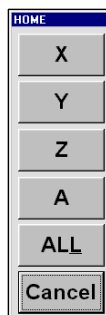


2. HOME THE MACHINE

A. Press **Home**

The **Home** Menu appears:

B. Press **ALL**



A Word on Chuck Control for Manual Quick-Change Tool Changes

The process of Learning/Calibrating Tool Lengths entails opening and closing the chuck, while selecting a specified time delay to either load the tool holder into the chuck or retrieve a tool holder as the chuck opens and releases it. Make sure you are not distracted when performing OPEN/CLOSE chuck operations.

A Word on the Touchpad

The touchpad should always be placed in the same place for all the tools being calibrated. The Interface already knows the thickness of the touch pad (0.375). So, when the tool bit comes in contact with the touchpad and retracts the Z-axis, the Interface records the position, less the touchpad thickness.

3. PLACE THE TOUCHPAD ON THE TABLE SURFACE

Note: For Automatic Tool Changers: We begin this section assuming you have already set tool stand locations 1 & 2. If you have not done so, complete the previous tutorial (III. Tool Stand Location).

Automatic or Manual Quick-Change, that is the question...

The previous tutorial, Learn Tool Stand Locations, applied to Automatic Tool Change operations, only. The subject of this tutorial, however, applies to both Automatic and Manual Quick-Change spindles. Thus, when relevant, we will explain the appropriate procedure for both.

4. LOAD TOOL 1

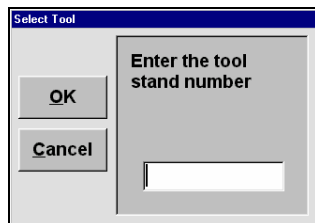
Tool 1 should be the tool holder with the longest tool bit.

For Automatic Tool Changer

If tool holder 1 is in the chuck, skip to Step 5. If tool holder 1 is not in the chuck, continue to Step 4-A.

A. Press , then .

The **Select Tool** pop-up window appears:



B. Type 1 and press .

The machine will now retrieve tool holder 1 from tool stand 1.

For automatic tool changers, skip to Step 5.

For Manual Quick-Change Tool Changer

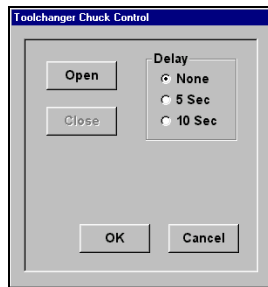
If tool holder 1 is in the chuck, skip to Step 5; if tool holder 1 is not in the chuck, continue to Step 4-C.

Note: If there is not a tool holder present in the chuck, then continue to Step 4-C, BUT skip over Step 4-E. (so, in this case your progress would be as follows: Step 4-C, Step 4-D, Step 4-F, Step 4-G, etc.)

Warning: Manually retrieve a tool holder in this manner: firmly cradle and grip the sides of the tool holder prior to the chuck opening. When the chuck opens it will release the tool holder into your grip. Do not place your hand, palm-up, under the tool to catch the tool holder. A sharp tool may cut you when the tool is released.

C. Press **Tool**, then **Chuck Control**.

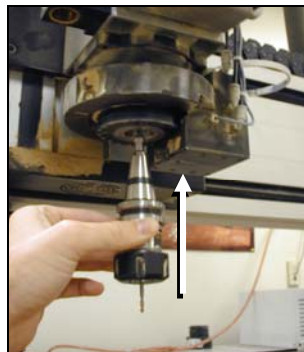
The **Chuck Control** window appears:



D. Select '10 Sec' Delay and press **Open**.

E. Go directly to the chuck and place your hand firmly around the tool holder, above the tool bit. When the chuck opens, it will release the tool holder into your hands. Place the tool holder off to the side.

F. Place tool holder 1 in chuck.



Note: Prepare to load tool holder 1 and close the chuck around it. Place the top of the tool holder cone all the way up into the spindle chuck. When the chuck closes, it will grasp the tool holder and lift it into the chuck a fraction of an inch. Allow for this lift.

G. Select '10 second' delay, and press **Close**.

H. Press **Cancel** to return to Main Menu.

5. JOG TOOL HOLDER 1 INTO POSITION AND TEST TOUCHPAD

Calibrating tool lengths is a pre-programmed process of the Interface. Once you activate this process the machine runs on its own. However, we will perform a test prior to going all the way through this process to make sure the touchpad is activated and working properly.

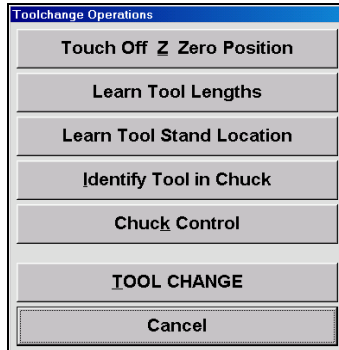
Warning: Remember to use the **E-Stop Button**, located on your controller or start stop box, to immediately stop the machine.

A. Jog tool holder 1 over the touchpad, about 4 to 5" above.

Note: Although in this Tutorial we are learning how to set tool lengths, for the purpose of *testing* the touchpad, it's better to use **TOUCH OFF Z ZERO POSITION**, rather than the **LEARN TOOL LENGTHS** button. After the test is complete, then we will use the **LEARN TOOL LENGTHS** button.


B. Press .

The **Tool** Menu appears:



In Step 5-C the Z-axis will start to descend. Normally, you would wait until the Z-axis brings the tool bit to the touchpad and then, if working properly, the Z-axis would retract. For our test, however, we want you to pick up the touchpad and bring it to the tool holder right after the Z-axis begins its descent (see picture below). If the touchpad is working properly, the Z-axis will retract as soon as it makes contact with the tool.



C. Press .

Warning: If the Z-axis DOES NOT retract (after Step 5-D), press the **E-Stop Button**, located on your controller or start stop box, to immediately stop the machine.

D. Once the Z-axis begins its descent, pick up the touchpad and gently make contact with the tool holder or bit.

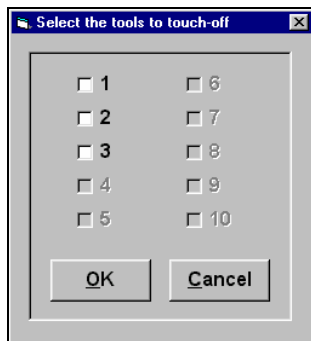
Note: If the Z-axis retracts upon contact, continue to Step 6-A. If it does not retract, press the **E-Stop Button** to stop the Z-axis and check your touchpad setup before returning to this Tutorial.

6. LEARN TOOL LENGTH FOR TOOL 1

A. Re-position tool holder 1 over the touchpad, about 4 to 5" above.

B. Press **Tool**, then **Learn Tool Lengths**.

The **Learn Tool Lengths** window appears:



C. Click inside the box next to #1 (so that a check appears) and press **OK**.

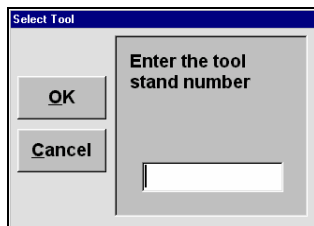
Note: After Step 6-C, the Z-axis will begin its descent toward the touchpad. When the tool bit contacts the touchpad, the Z-axis will travel back up and the Interface will record the tool length for tool holder 1.

7. RETURN TOOL HOLDER 1 AND LOAD TOOL HOLDER 2

For Automatic Tool Changer

A. Press **Tool**, then **TOOL CHANGE**.

The **Select Tool** pop-up window appears:



B. Type 2 and press **OK**.

Machine will return tool holder 1 to its tool stand, then retrieve tool holder 2 from its tool stand. For an ATC spindle, continue to Step 8.

For Manual Quick-Change Tool Changer

C. Press **Tool**, then **Chuck Control**.

D. In the **Chuck Control** window select '10 second' delay and press **Open**.

E. Go directly to the chuck and place your hand firmly around the tool holder 1, above the tool bit. When the chuck opens, it will release tool holder 1 into your hands. Place it off to the side.

F. Place tool holder 2 in chuck.

Note: Prepare to load tool 2 and close the chuck around it. Place the top of the tool holder cone all the way up into the spindle chuck. When the chuck closes, it will grasp the tool holder and lift it into the chuck a fraction of an inch. Allow for this lift.

G. Select '10 second' delay, and press .

H. Press to return to Main Menu.

8. REPEAT STEP 6 FOR TOOL HOLDER 2

Substitute the #2 for any instance the Tutorial mentions #1 (or tool holder 1).

9. REMOVE TOOL HOLDER 2 FROM CHUCK

For Automatic Tool Changer

A. Press , then .

B. Type 0, then press .

Machine will return tool holder 2 to its tool stand, without picking-up any other tool holder.

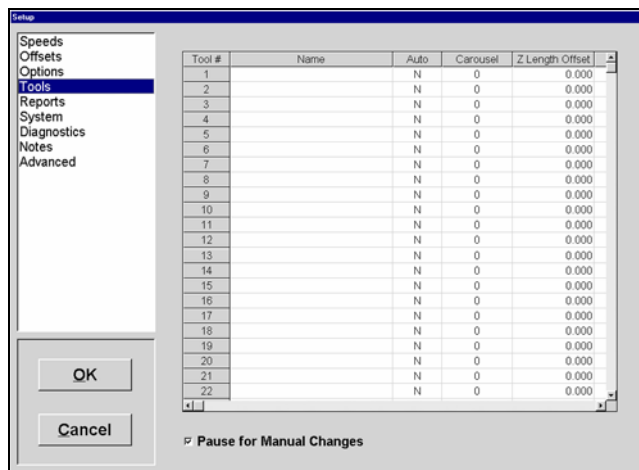
For Manual Quick-Change Tool Changer

C. Press , then .

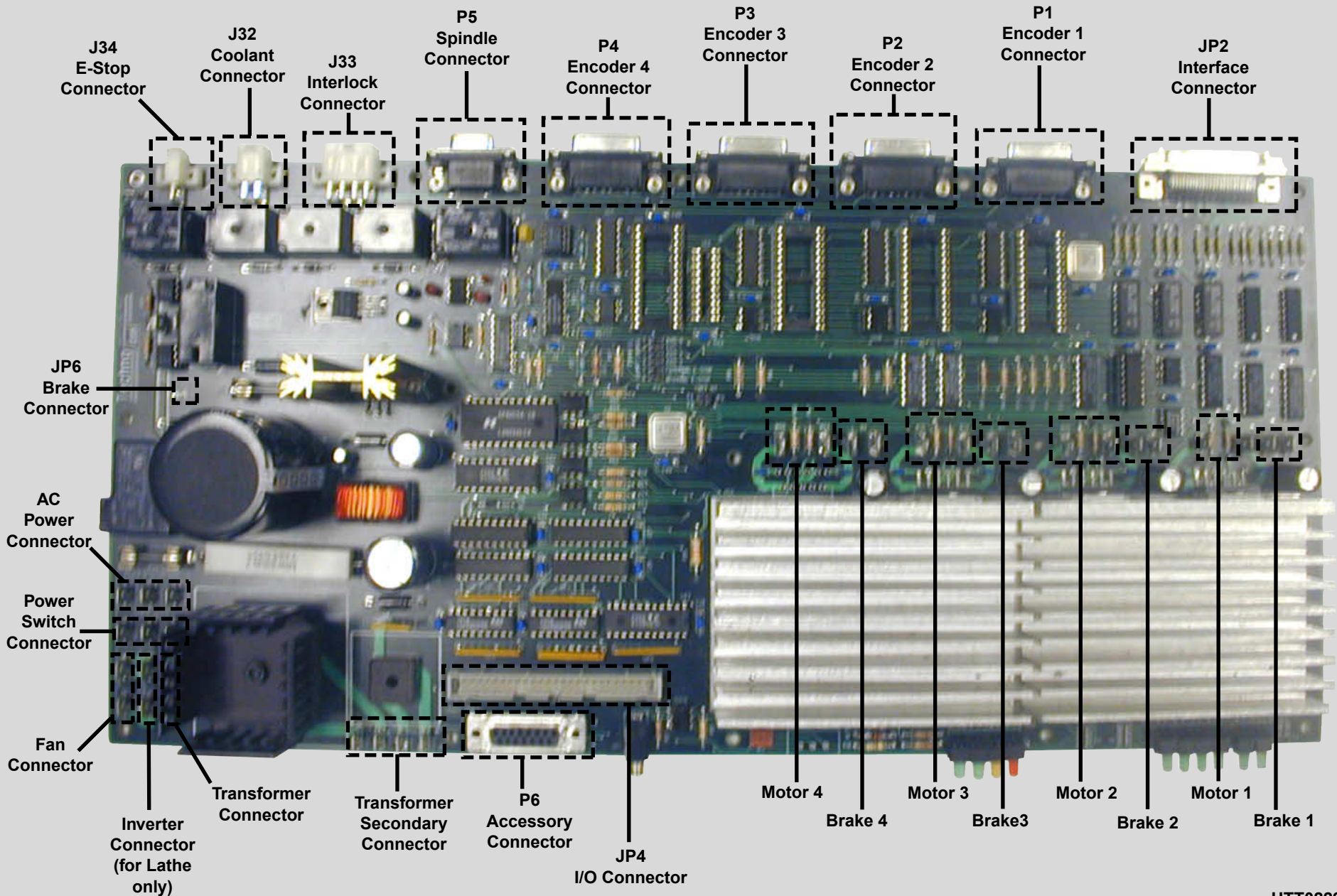
D. From the **Chuck Control** window select a '10 Sec' Delay and press .

E. Go directly to the chuck and place your hand firmly around the tool holder, above the tool bit. When the chuck opens, it will release the tool holder into your hands. Place the tool holder off to the side.

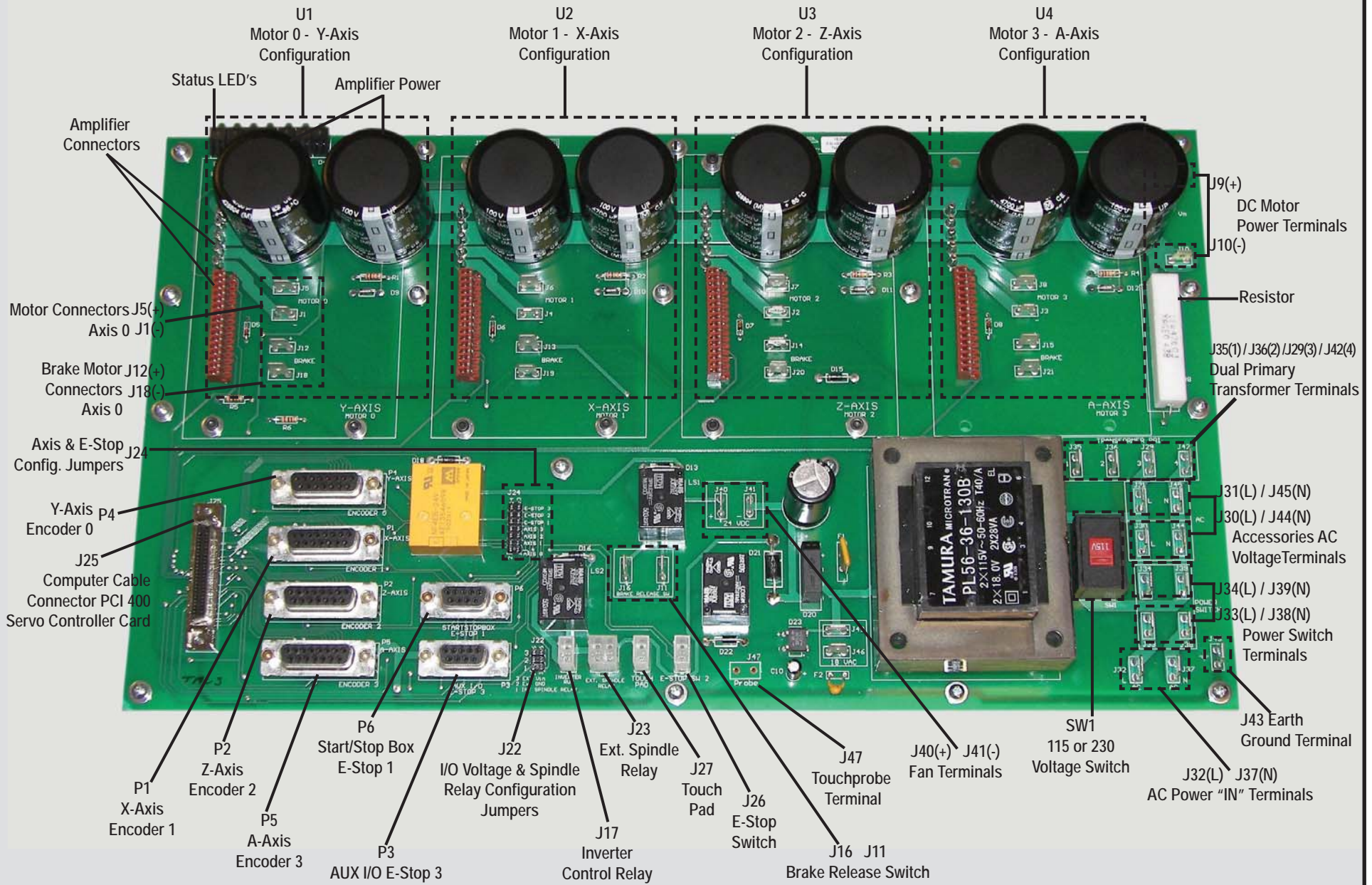
Now tool 1 and tool 2 should have the same zero position, even if they have radically different tool lengths. The Interface will remember and keep these tool length offsets until you go through the process re-teaching them again. To view the tool lengths in the Interface go to **Setup/Tools**.



LC Series and Lathe Control Board Callouts



HP SERVO CONTROLLER 3 MOTHERBOARD



High-Power Electronics Servo Board with Callouts