EZ Path Lathe Start Up and Homing Procedure

1) Rotate the **On/Off** switch, located on the back panel above the head stock of the lathe and behind the monitor, to the **On** position.

   Note: This will take considerable force to activate.

The monitor will boot up and display **Alarm hit [key] to clear**. Check the Emergency/E-stops located on the monitor panel and down on the carriage control group and pull the red button out to reset the E-stop. Then hit one of the number keys on the keypad to clear the alarm.

2) **Machine not homed** will appear on the display. **Important checks to make** 1. Be sure that no objects are under or on top of the carriage that could be crushed by the movement of the carriage. 2. Move the tailstock so that 1 to 2 inches protrude past the end of the ways.

   The monitor will then display **Hit [Move ABS]** this is the number **3 MOV ABS** key and when pressed will display the **+ DO MOVE** and **ESC** prompt, press the **+** key to start the homing cycle for the X and Z axis.

The machine is now homed and ready for use.

Installation of Programs

1) Install the floppy disk into the floppy drive located on the panel next to the On/Off switch.

2) Call up the **Utilities** menu by pressing the **9Util** key on the keypad; this will take you to the DOS shell of the controller and give you loading options.

3) Press the number **3** key "**COPY files from FLOPPY DISK**"; a new screen will appear.

4) Press the number **7** key "**COPY AN EZPATH file from FLOPPY DISK to EZPATH**". A new screen appears. Type in the number you named your program and press **Enter**.

Press the **Enter** key again to bring up the first utility screen and then press the **ESC** key to return to the main screen.

5) Press the **5 Edit** key to verify your program loaded in the list then press **ESC** to return to the main screen.

Clearing the Tool Library and Tool Offsets pages

1) Press the **F1** key to access the tool library

2) Curser down to the first tool and press the **– DEL** key, you will see a confirmation "**DELETE TOOL**" screen press **0** and then the **Enter** key to complete the deletion. Continue to delete tools as needed and then press the **0 SAVE** key to save and exit the tool library page

3) Press the **F2** key to access the tool offsets screen.

4) Tool one should have been cleared and no numbers should be present, if not follow point 5)

5) Move down to the second tool offset and press the **–CLEAR** key which will then bring up a "**confirm to clear offset**" screen, press the **0** and then **Enter** key to finish clearing the tool number. Do this for all tool numbers that you will be using for you work and save the cleared offset page by pressing the **0 SAVE** key returning to the main screen.

Adding tools to the Tool Library

1) Press the **F1** key to access the tool library

2) Press the **+ADD** key to access tool options screen

3) This screen presents a graphical representation of tool types that can be utilized by the programmer. The tool choice is numbered from **0 to 8**. If you are turning the outer

diameter of a part use the number **5** key for the tool that is used for tuning and facing in the Z negative direction. For internal boring in the Z negative direction use the number **1** key**.** Threading on the outer diameter is performed with the number **7** key. Grooving on the outer diameter is the number **6** key.

4) Once the tool type is chosen a new screen will prompt you to fill in the geometrical data along with the tool number of the given tool. **Note:** tool numbers **MUST** match the same tool used in your FeatureCAM program. All tool offsets should reference the same tool number. All geometry of the tool insert must match exactly the tool used in FeatureCAM to turn out a part within tolerance.

5) As an example, for tool type 5 you will fill in; **Tool ID,** Give the tool a number (you will first have to hit backspace to delete the zeros),**0=inch 1=mm** use 0 for inch, **Dist To X** do not fill in this as it will be handled by tool offsets, **Touch off Z** do not fill in this as it will be handles by tool offsets, **Angle 1** fill in presentation angle of tool, **Angle 2** fill in the included angle of the tool insert such a 55 degree, **Angle 3,** is figured out automatically from the first two angles given, **Tip Radius,** fill in radius.

6) Continue filling in the information for each tool then press the **O Save** key to save the tool file in memory and return to the main screen

Preparing the Lathe for turning and tool number 1 setup

1) Make sure that the spindle is in neutral or free turning, by moving the red/blue gear change lever to a position between the red and blue indicators this will disengage the lathes gearing and allow the spindle to turn freely (check by spinning the chuck by hand).

2) Prepare your stock making sure that enough stock is held in the chuck for support of the work and adequate clearance is given so the chuck jaws are not contacted by the tool or the tool post.

3) Place tool number 1 (usually an OD turning tool) on to the tool post and adjust to the centerline of the lathe.

4) Set you spindle speed with the change gearing and by following the charts located next to the change gears on the front surface of the head stock. Remember the spindle motor has a high and low speed range. This high/low range is changed with the **Spindle** turn switch located above the red E-stop button next to the display screen.

5) Make a test cut on the face of the stock, check each tool to see that the tool is on center and adjust if necessary. If correction is needed take another .010 to .020 facing cut and withdraw the tool in the X direction without any movement in the Z direction. **Note:** It is very easy to move the lathes carriage control hand wheels out of position as they are in close proximity to each other and they give no tactile feedback to the user.

6) On the display screen locate the **1 TL CHG** key. This key allows the operator to change which tool is active and relate that tool to its proper offset. In the **Tool No** box fill in 1 and press enter which moves you to the **Offset No** box, fill in 1, and press enter. The main display will show that tool 01 is the active tool and its offset is 01.

7) On the main display locate the **7 W SHFT** key. The purpose of this key is to set the user coordinate system for the part being made. Note: this will be the same as "part zero" or the USC located in FeatureCam. This is always set with tool number one (1). After the key is pressed empty **ABS DIA** and **ABS Z** boxes will be showing. Press enter on the ABS DIA box and in the ABS Z box press 0 and then enter. You will return to the main display and the Z coordinate will change to 0.0000

8) Next take a cut to clean up the outside diameter of the work going in about a ½ inch in the Z negative direction. Stop the lathe and without moving the X hand wheel, retract the carriage in the Z positive direction giving enough room to measure the O.D. of the work with a micrometer.

9) Press the **7 W SHFT** key and enter your reading in the **ABS DIA** box and press enter twice. Now your main coordinate display will show the number you just entered.

Qualifying tooling with offsets

1) Install the next tool, tool 2, onto the tool post making sure the tool is set to the centerline of the work

2) Press the **F2** key to access the tool offsets page.   **Note:** a small display labeled **UCS LOCN** will be displayed on the lower right of the screen this shows the same X and Z numbers as the coordinates on the main display. Tool 1 offset should have been cleared if not do so now.

3) Cursor down to the 02 offset. Lightly touch the tip of tool two (2) to the face of the part in the Z direction. Press the **/ SET Z** key and a small screen will appear labeled **SET OFFSET** in the box that is labeled **ACTUAL Z 0.0** press enter and the Z offset will show up giving you the difference, ether positive or negative, from your first tool. Next take a cut on the outside diameter, if turning, or the inside diameter, if boring, and measure the part with a micrometer without moving the X axis hand wheel. Press the *__SET X__ key and the box labeled **ACTUAL DIA** will appear, type in the measurement from the micrometer and press enter. This is the difference in the X direction ether positive or negative from you first tool.

4) Change to your next tool and repeat this operation for each tool that is used to make the part. Save your tool offsets by pressing the **0 SAVE** key this will also return to the main screen.

5) Verification of each tools offsets is the next operation. Install tool two (2) on to the tool post. Press the **1 TL CHNG** key in the insert screen to change the TOOL NO to "2" and press enter. At OFFSET NO change to 2 and press enter twice to return to the main screen. Check to see that T02 and #02 are active. Visually bring the tool up to the parts

surface in the Z and X directions and the digital readout should display the Z axis to approximate zero plus or minus .010 and the X axis to the diameter of the part be it internal or external. Do this for each tool used.

Verification of Program

1. Install tool 1 onto the tool post. Do a tool change for tool 1 with its correct offset. Position the tool at the tool return location given in the program.
2. Press the **5 EDIT** key and scroll down the program list until program number is highlighted then press the **+ SELECT** key and the screen will change to the program editing screen with the program showing. Press the **0 EXIT** key that will bring up options for selection. Select the **/ SAVE: VIEW** option and if all tools for that program exist a new screen will appear.
3. This grid screen is set for the length and diameter of the part with the lighter lines representing the machine axis. The extra grids represent the tool change location. Preview gives two options press **[1]** key run auto or **[2]** to run block. Press the **[1]** key for auto run and then press the **[+]** key to run the program from tool change to tool change. At each tool change press the **[+]** key to continue with the next tool until all tools are used and end of program appears. If a closer look is required the program is reset by pressing the **[3]** key then the **[2]** key is pressed and held down. This single step the program on the screen, when the key is let up the program will pause at that point. The screen can be cleared at any point and restarted for a clear view of each individual move by pressing **4 CLR SCR**.
4. If all is correct push the **0 EXIT** key. This puts the program into the active buffer of the machine and puts the machine into run mode.

WARNING: Things to check before continuing

- Is the proper tool located on the tool post?

- Is the tool matched up with its offsets?

- Is the spindle turned on?

- Is the coolant turned on and of sufficient pressure to clear chips?

- Is the tool nose given enough clearance so it does not move into the stock until the spindle is turning and coolant is on?

- Will the tool crash into the live center?

- At the end of a cut cycle is the tool retracted from the cut?

- Will the tool clear the chuck jaws?

- No retracts will pass thru the unmachined part?

5. In run mode you have two basic options, first is to run in auto mode and the second to run in block mode. Start in block mode. This mode will single step the operator through the startup of the lathe and its motions giving the operator time to preview what move will be made next. This will help minimize a crash.

6. Press the **2 BLOCK** key. A prompt to push the **+** key is given. With every press of that key it will execute one line of code with the next command shown and can be reviewed until the key is pressed again. Note: Keep your hand on the hold button just in case you need to stop suddenly. The hold button will stop axis, but not spindle, movement.

After one complete cycle of cutting has taken place in block mode the machine can then be put into automatic mode by pressing the **1 Auto** key and the next push of the **+** key will initiate the automatic cycle. This will continue until a tool change is called up and the tool retracts to its tool change location. Change to the next called out tool make sure the spindle is running and if in doubt one can always go back to single block mode until you are sure no crash will occur. Continue to the end of the program.

End of the program and other options

1. After the program has been run in its entirety it will reset for a new part

2. At this point press the **0 EXIT** key to return to the main screen.

3. Move the carriage to a safe location, put the spindle in neutral, and remove the part from the chuck.

4. Replace with new stock and check that it is located approximately the same distance from the chuck to the face of the stock.

5. Press the **1 TL CHNG** key and change to tool1 and #01 offset and enter.

6. Place tool 1 on the tool post and lock in place.

7. Reengage the spindle and take a facing cut on front of the stock in the Z direction. Without moving the carriage and retract in the X positive direction.

8. Press the **7 W SHFT** key and press **ENTER** to skip over the ABS DIA box and in the ABS Z enter 0 and press the **ENTER** key. This returns to the main screen and sets the Z coordinate to 0 zero.

9. Move your carriage to it tool change location

10. Press the **+ RUN** key to reactivate the run screen and continue in **1 AUTO** or **2 BLOCK** mode.

If one is not sure of what their program is going to do on the first run one option is to move the coordinate system used in the program to a safe location (at least 8" away from your part) and let the program run "cutting air". Use these steps:

1. Install tool 1 on the tool post.

2. Make sure that tool 1 is the active tool by use of the **1 TL CHNG** key.

3. Move the carriage in the Z positive direction a safe distance from your work pieces stock. Note: this should be at least 1 inch beyond the longest cut made in the –Z direction, keep this distance an even number that you can remember or write it down.

4. With the **7 W SHIFT** key, change the ABS Z to 0 and enter. All lathe movements will now start from this new location.

5. Press the **+ RUN** key to bring up your run screen and continue from this point. Note: Keep your hand on the hold button just in case you need to stop suddenly. The hold button will stop axis, but not spindle, movement.

6. If the run is successful use point 1 – 5 to reset your program to your original coordinates.

7. Run your part.

When you have finished cutting your parts the next order of operations is to clean up the machine. Remove, clean off, and return the tools used (cutting tool, drill chuck, etc.). With the spindle in neutral move the carriage to the tailstock end of the lathe and proceed to clean the chips off the machine, door slides, back of lath chip pan and any chips in the pan. With shop rags wipe down the way of the lathe then move the carriage forward and do the same behind it and repeat until coolant is removed from the surface. Oil ways with way oil and move carriage and cross slide to the tailstock end of the lathe and to the +X extent of the cross slide. Insert the plug/squeegee into the tailstock. Push in the red Emergency button and turn the main switch to the off position.