



## Setting up a Tool Setter for Use with Acorn CNC

**About the Sherline Tool Setter Plate and the Acorn CNC Controller**  
The following information is for setting up our Tool Setter Plate (P/N 8702) for use with the Acorn CNC controller. The way we set it up is to have the tool setter on a specified location on the mill table or tooling plate. All of the tools are set to the top of the tool setter plate at that location for "Tool Zero." We then use G54 – G59 work offsets to set the top of the part as "Part Zero" (see Figure 1).

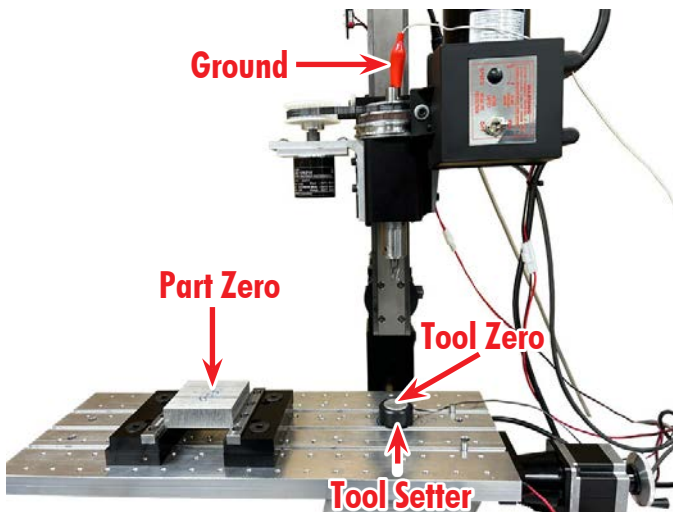


FIGURE 1

### Acorn Tool Setter Instructions

1. Setup F1 (see Figure 2).



FIGURE 2

2. F3 Config (see Figure 3).

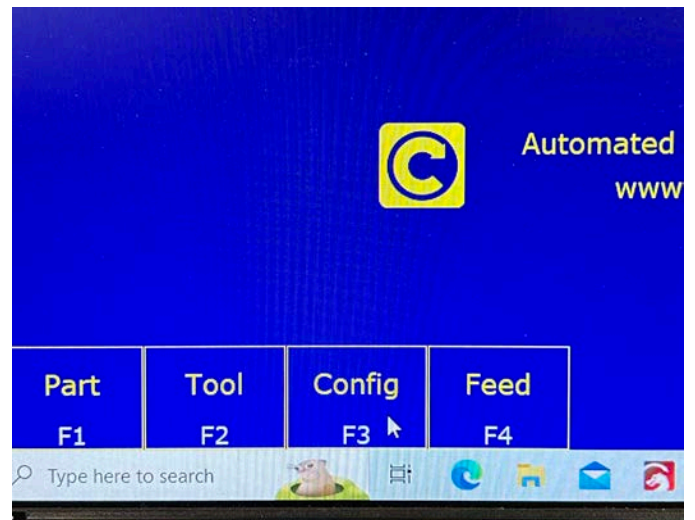


FIGURE 3

3. Enter password (137) (see Figure 4).

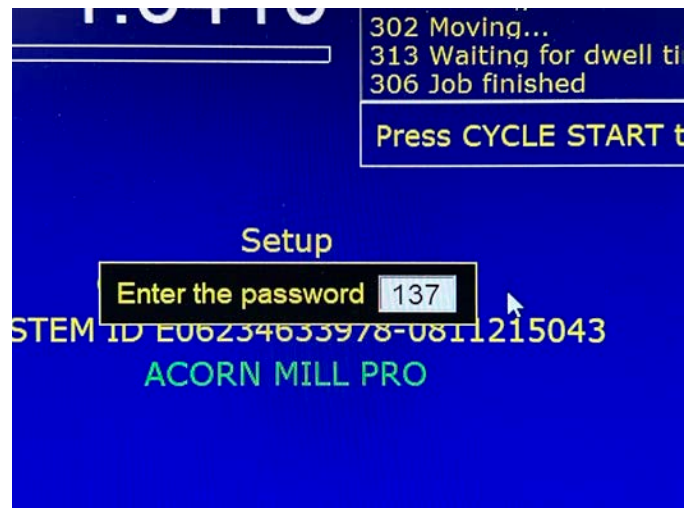


FIGURE 4

4. Parm's F3 (see Figure 5)

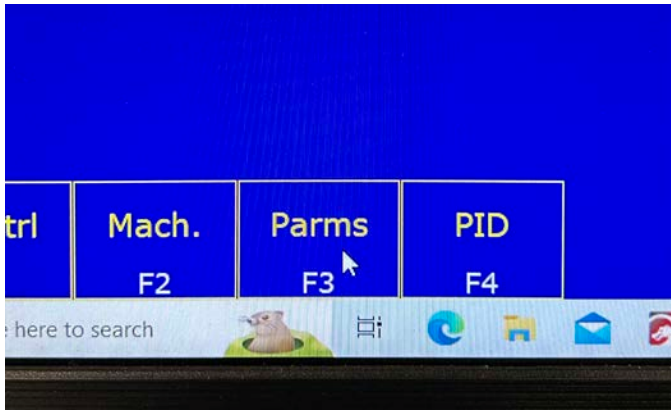


FIGURE 5

5. Scroll your cursor down to Parameter 003, enter (6.0000), then click on “Save F10” (see Figures 6 and 7). This sets up your tool page to use the tool setter without the reference Z.

000	-8.0000	020
001	0.0000	021
002	0.0000	022
003	6.0000	023
004	9.0000	024
005	0.0000	025
006	0.0000	026
007	0.0000	027
008	2.0000	028
009	0.0000	029

FIGURE 6

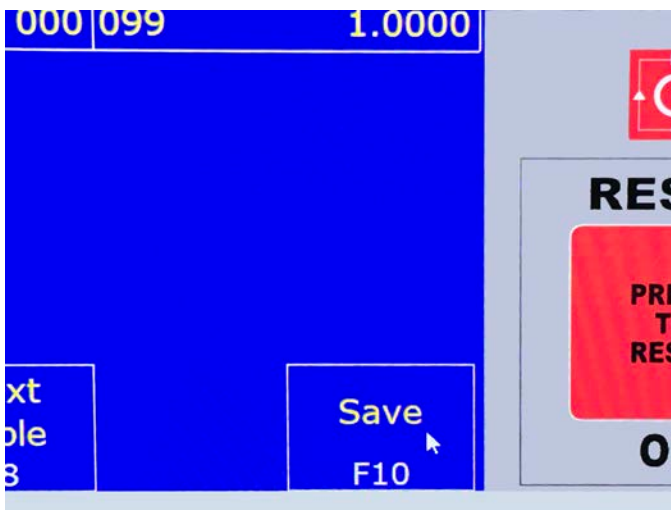


FIGURE 7

**NOTE:** With Parameter #3 set to (0.0000) the Tool – Offset Lib will look like this and use a Z Reference Tool (see Figure 8).

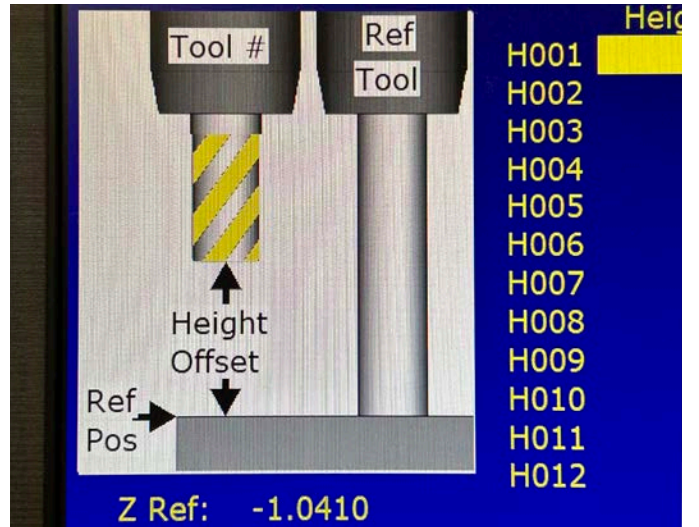


FIGURE 8

With Parameter #3 set to (6.0000) the Tool – Offset Lib will look like this and only use the Tool Touch Plate (see Figure 9).

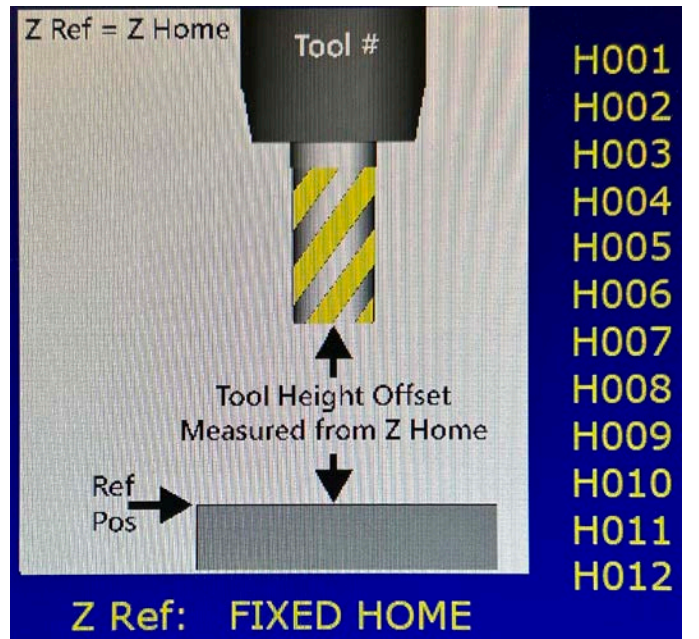


FIGURE 9

6. Go back to the main page and click on Utility F7, the Acorn Wizard F10 (see Figures 10 and 11).

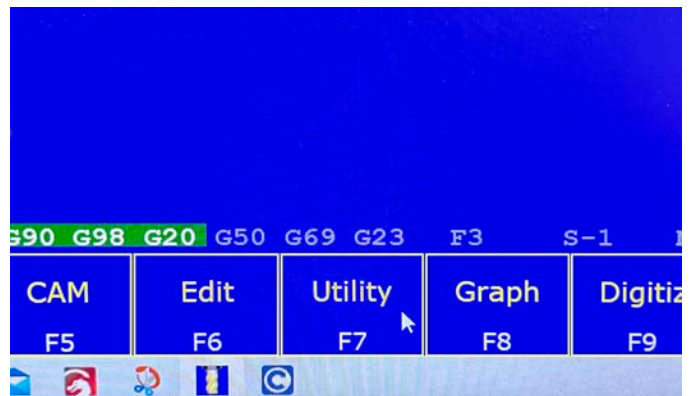


FIGURE 10—Utility F7.





FIGURE 11—Acorn Wizard F10.

7. Click on “Input Definitions” and the Input Definitions page will open (see Figure 12).

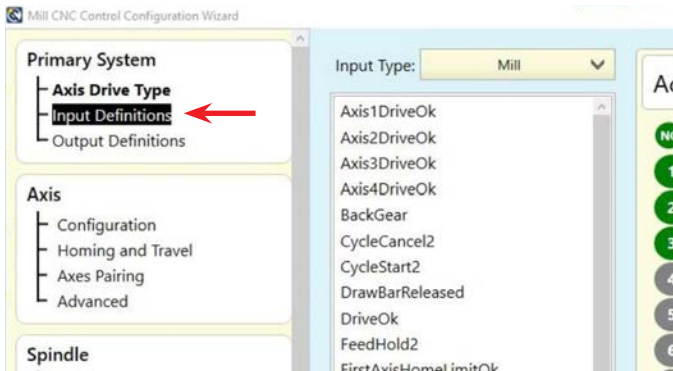


FIGURE 11

8. From the input table, select and drag over “ProbeDetect” and “ToolTouchOffTriggered” to IN6 and IN7 (see Figure 12).

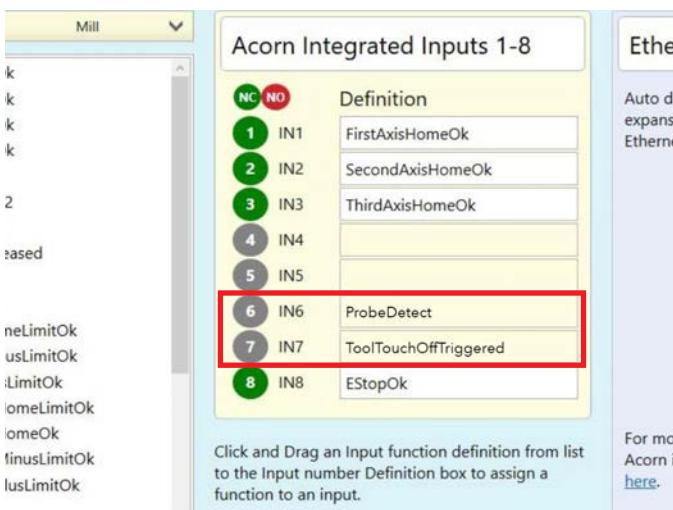


FIGURE 12

9. Click on “Tool Touch Off” to open the Tool Touch Off page (see Figure 13).

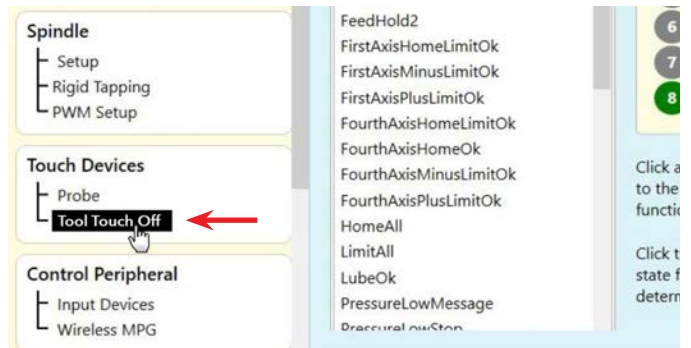


FIGURE 13

10. Tool Touch Off Configuration “Settings” (see Figure 14).

**Touch Off Tool PLC input:** Will show “Input 7” from your entry on “8” above.

**Tool Touch Off Type:** Choose “Conductive”

**Input State When Triggered:** Will auto set to “Closed”

**Subtract height of Tool Touch Off devise:** We set this as “No.”

**Tool Touch Off/Surface Plate:** Height for setting part zero: We enter (0).

**Use Tool Touch Off Devise to set Z reference:** We set this as “No.”

**Inhibit Spindle when Detect is on (Green):** This will auto set to “No.”

**Fixed Tool Touch Off X Y Position (machine coordinates) and Z (Position Above TT):** This is where you enter the “machine position” for your tool setter location. In our example we have X-1.5, Y-3.5, and Z-4.0.

**Fixed TT for Tool Offset Library:** We set this as “Yes.”

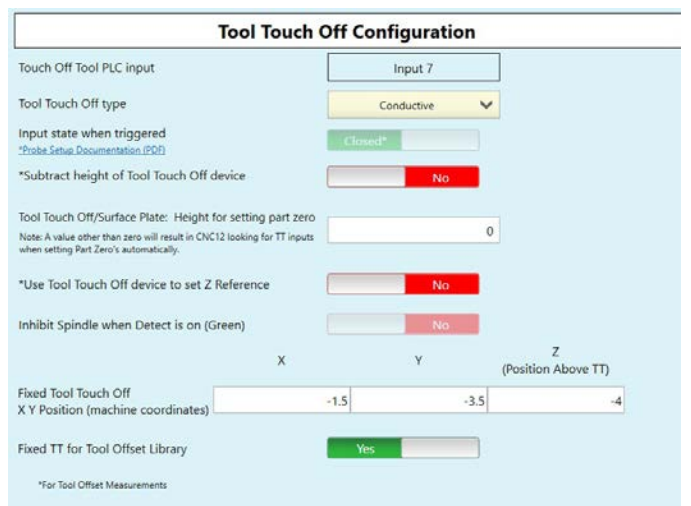


FIGURE 14

When all of your settings have been input, click on “Write Settings to CNC Control Configuration” (see Figure 15).

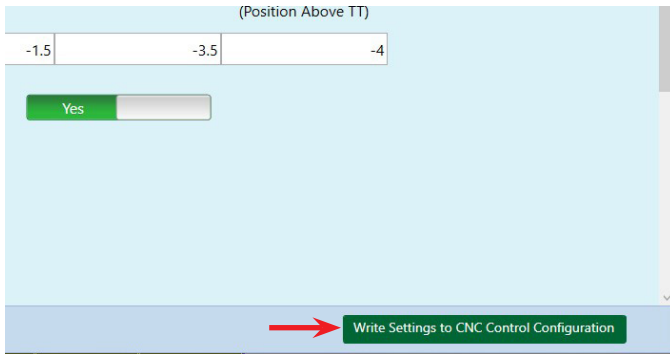


FIGURE 15

11. Write these changes to the CNC control Configurations? Yes (see Figure 16).

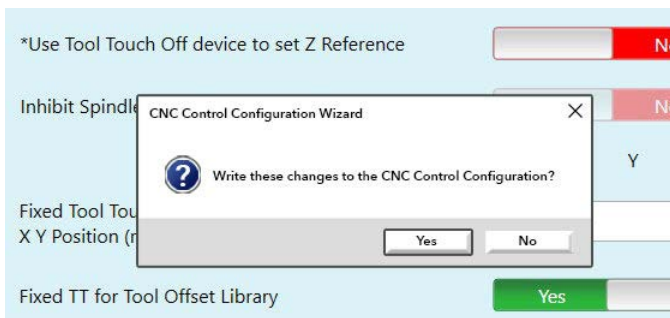


FIGURE 16

12. Saving CNC Control Configurations (see Figure 17).

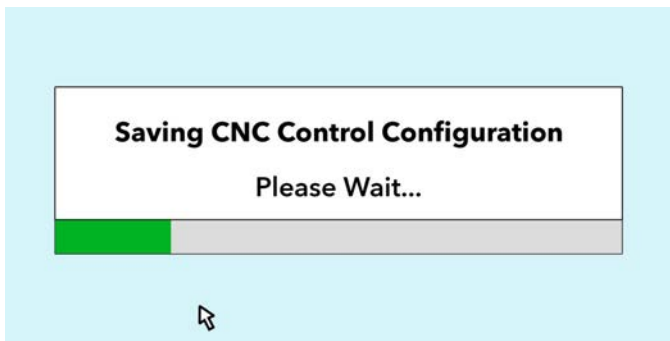


FIGURE 17

13. Settings Saved. Click OK (see Figure 18).

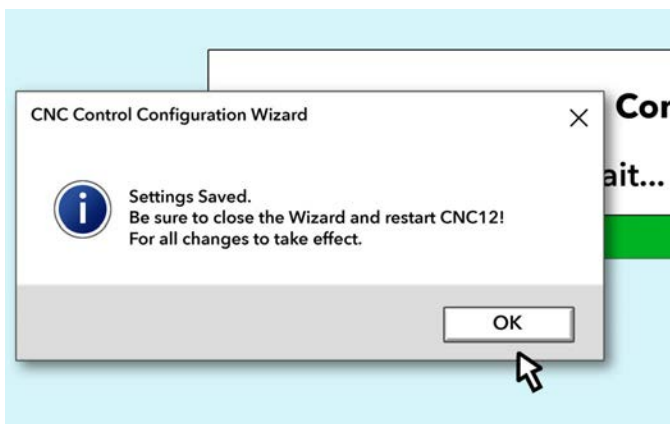


FIGURE 18

14. Turn the Control Off; wait one second, and then turn it back on (see Figure 19).

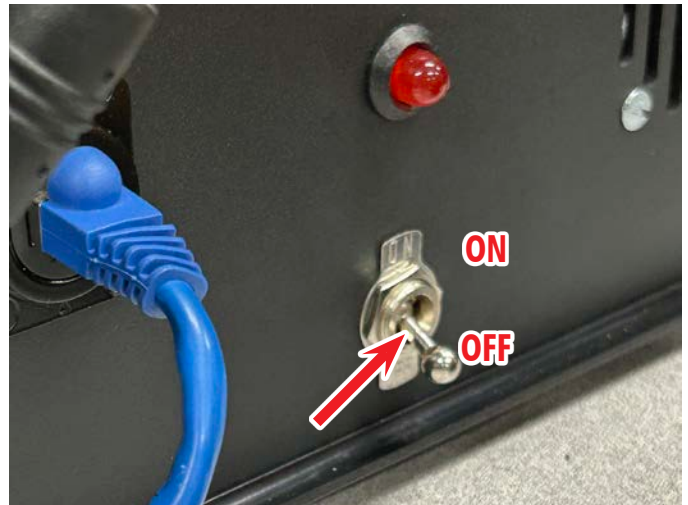


FIGURE 19

15. Now exit the Wizard. Then click Shut Down F10 (see Figure 20).



FIGURE 20

16. Then click on “Exit CNC12 F9” (see Figure 21).

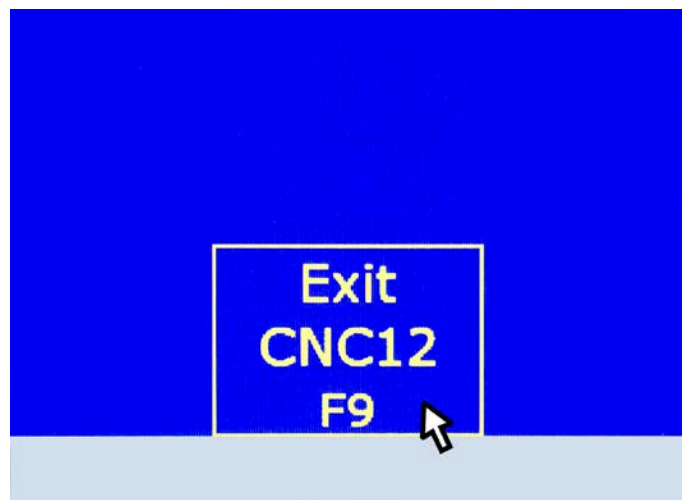


FIGURE 21



17. Then open the CNC12 Mill software again (see Figure 22).

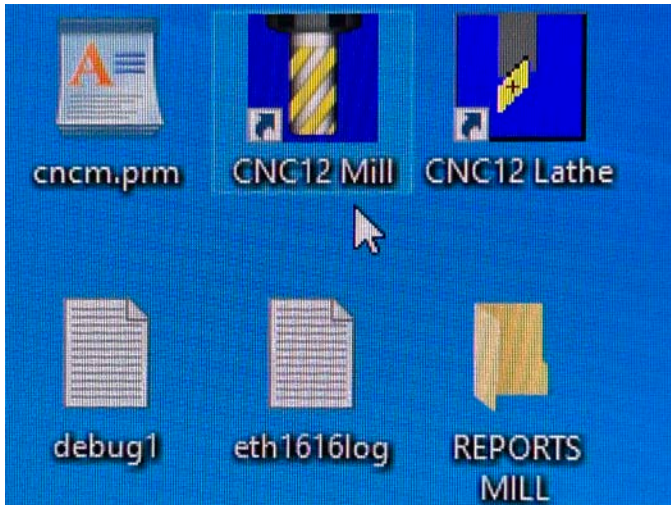


FIGURE 22

**NOTE:** You must follow steps 4-7 each time you save changes in order for the changes to take effect.

**Setting the Tool Heights, Tool Zero and Part Zero**

1. Plug your Tool Setter/Touch Probe cable (P/N 87837) into the bottom DB9 port on the back of the control (see Figure 23).

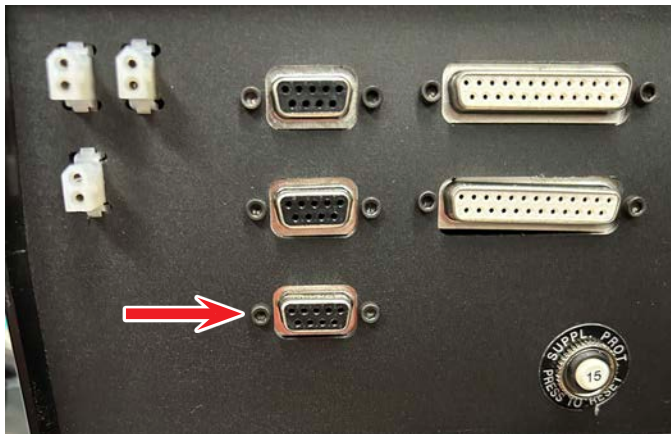


FIGURE 23—Back panel of the Acorn CNC Control unit.

2. Place your tool setter on your table or tooling plate in the location that you entered on “Fixed Tool Touch Off X Y Position (machine coordinates)” from the previous section “Acorn Tool Setter Instructions – #10.” We draw a circle around the tool setter on the table for easier position placement (see Figure 24).



FIGURE 24

3. Clip the alligator clip onto the end of the spindle (or the tool or tool holder as an alternative) (see Figure 25).

**NOTE:** We use an alligator clip so it will release itself from the spindle or tool if you mistakenly turn the spindle on.

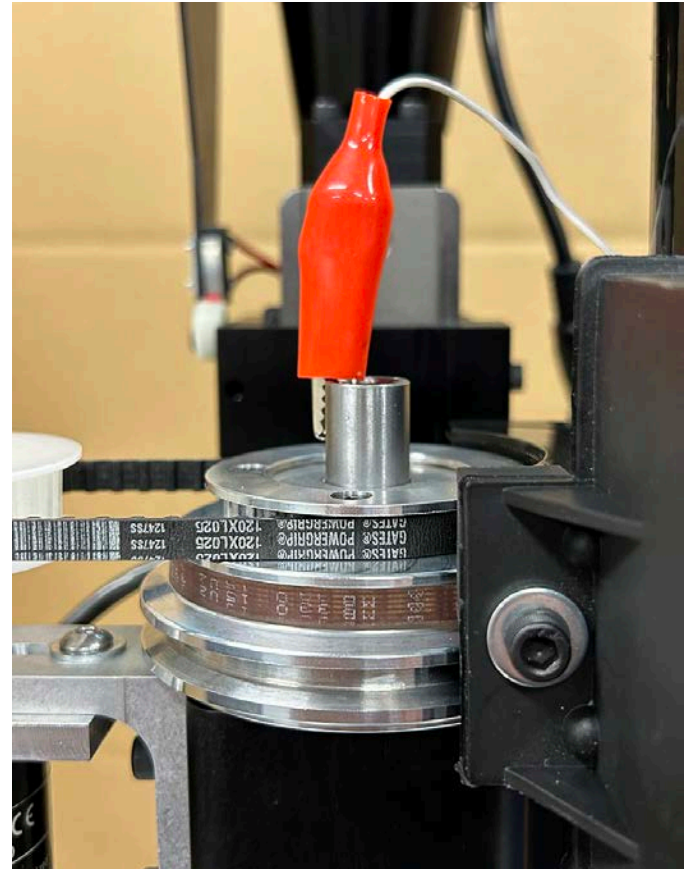


FIGURE 25

4. To pretest the tool setter to make sure that everything is connected and the control is receiving the signal, do the following.

A. On your keyboard, press (Alt + I). This will bring up the Input/Output screen on the control monitor. Without any contact between the tool and the tool setter, Input #7 will be red (see Figure 26).

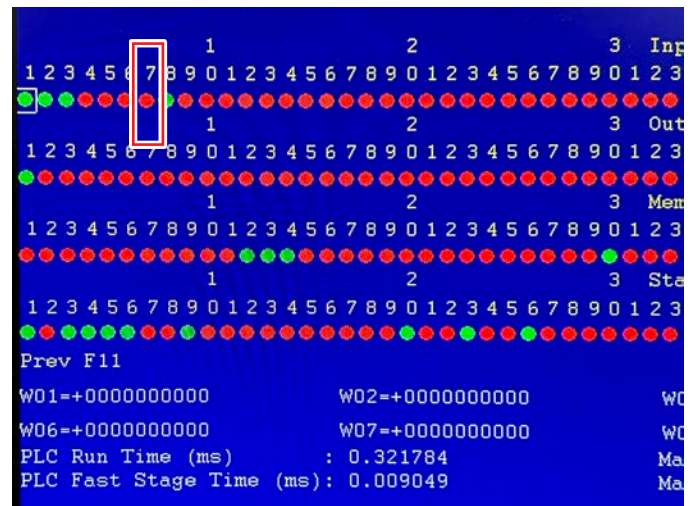


FIGURE 26



B. With a tool loaded into the spindle, raise the tool setter up and touch it to the end of the tool (see Figure 27).



FIGURE 27

C. With the tool setter touching the end of the tool, the red light on Input #7 should turn to green. If so, your connections are correct and the control is receiving the signal (see Figure 28).

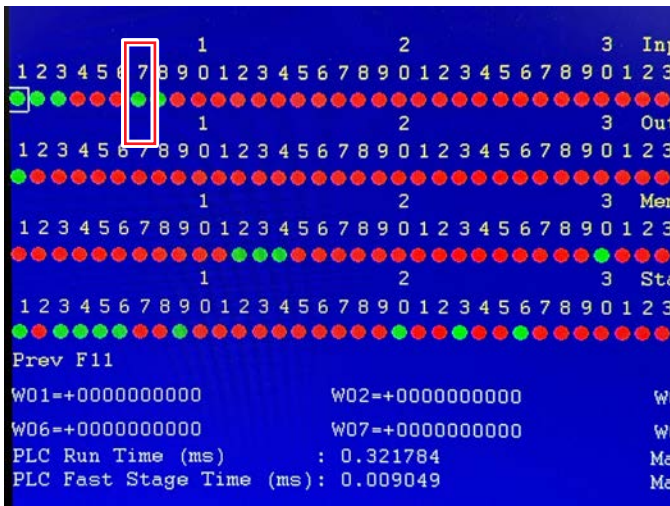


FIGURE 28

D. To clear the Input/Output screen from the monitor, push the Alt + I keys on the keyboard again.

5. Now click on Setup F1 (see Figure 29).

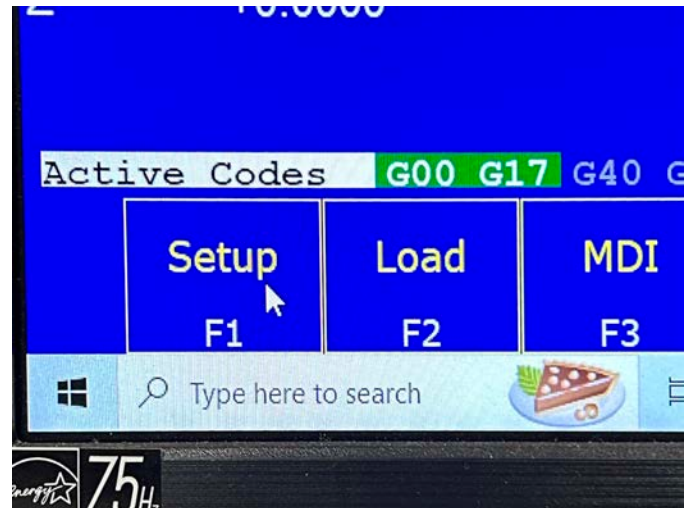


FIGURE 29

6. Click on Tool F2 (see Figure 30).

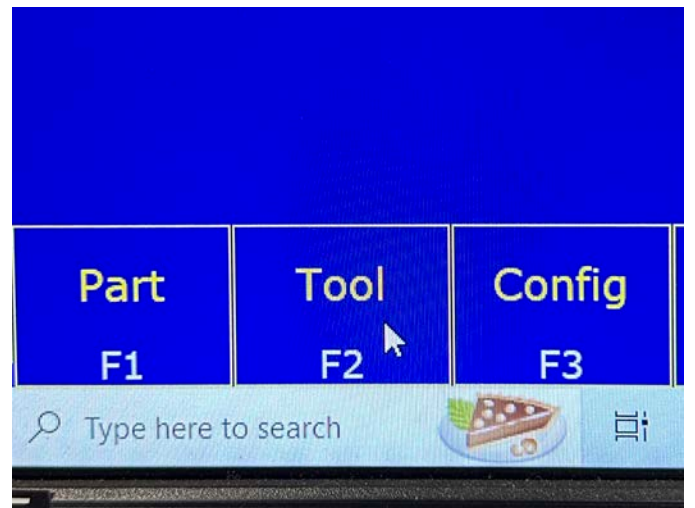


FIGURE 30

7. Click on Offset Lib. F1 (see Figure 31).

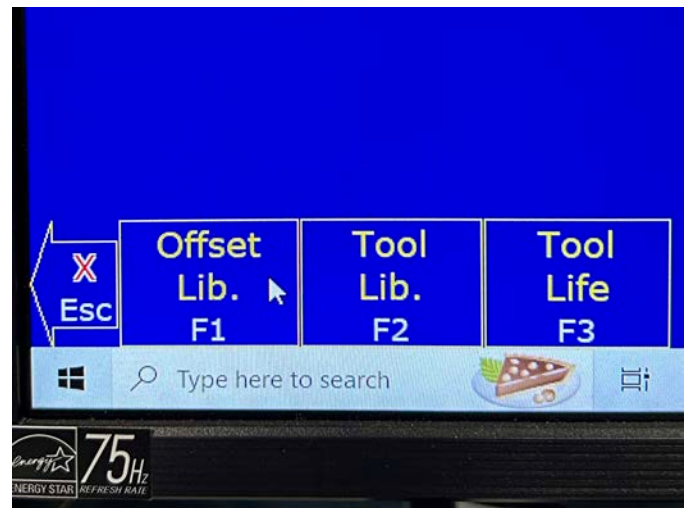


FIGURE 31

- On the Offset Lib page, click on the tool that is in the tool holder that you want to set. In the picture below we have chosen Tool 1 (H001) and the Height Offset number is highlighted in yellow (see Figure 32).

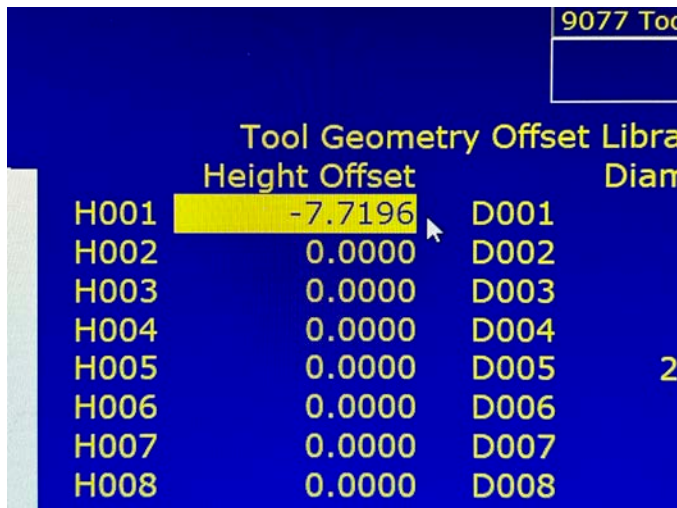


FIGURE 32

- Now click on Auto Measure F3 (see Figure 33).

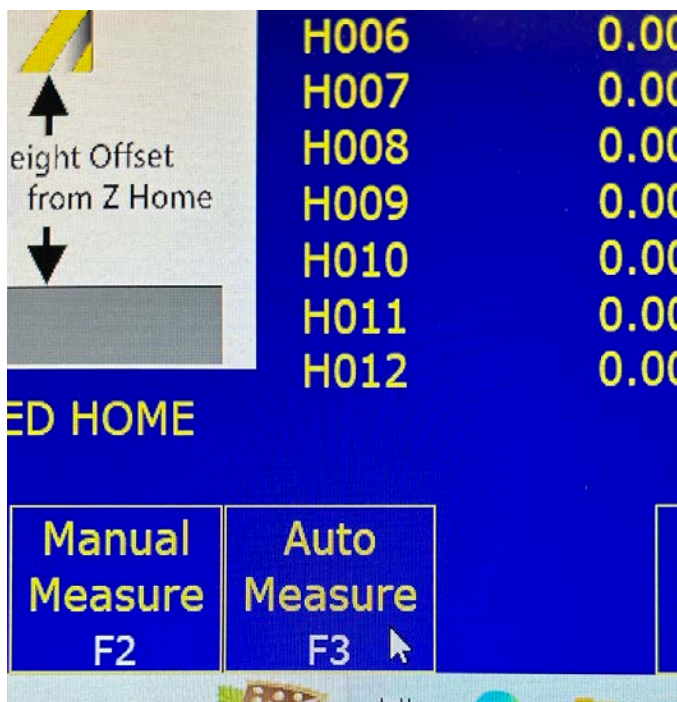


FIGURE 33

- At this time you will be asked to click on Cycle Start. After clicking on Cycle Start, you will be asked to verify that the tool touch off is functioning properly and then either push Cycle Start, or ESC. We just verified that the tool setter is functioning correctly in step “Setting the Tool Heights, Tool Zero and Part Zero – #4.” Therefore, push Cycle Start.
- At this time, the machine will move to the tool setter position and the Z-axis will start to feed downward. As a second check, raise the tool setter above the table and bring it up to touch the end of the tool while it is

feeding down. Once the tool touches, the Z-axis will stop feeding down, it will move up, and then move down one more time to touch the tool setter again. Hold the tool setter still until the second touch has happened. Then the tool will retract all the way up to the home position (see Figure 34).



FIGURE 34

- At this time the errant Height Offset value will show in Green. Place the tool Setter back in its position on the table. Then click on Auto Measure F3 again. This time allow the touch off cycle to bring the tool all the way down to make contact with the tool setter (see Figure 35).

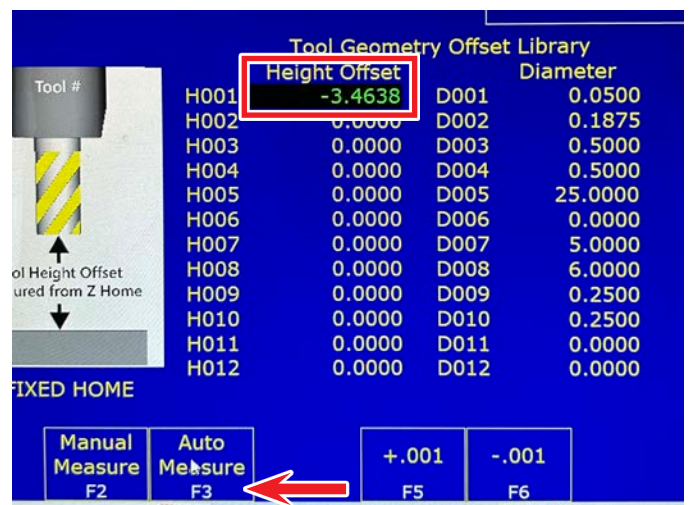


FIGURE 35



- After the touch off cycle is complete and the Z-axis has retracted to the Z home position, the correct Height Offset value will show in green (see Figure 36).

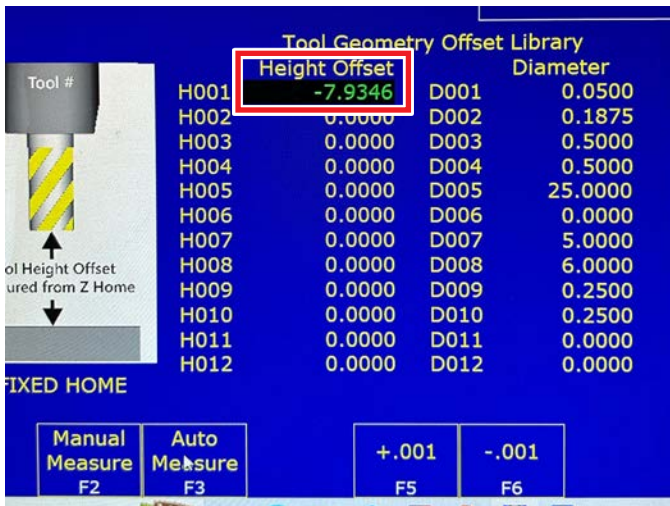


FIGURE 36

- Click on Save F10 to save the value. The value color will change to yellow when it is saved (see Figure 37).

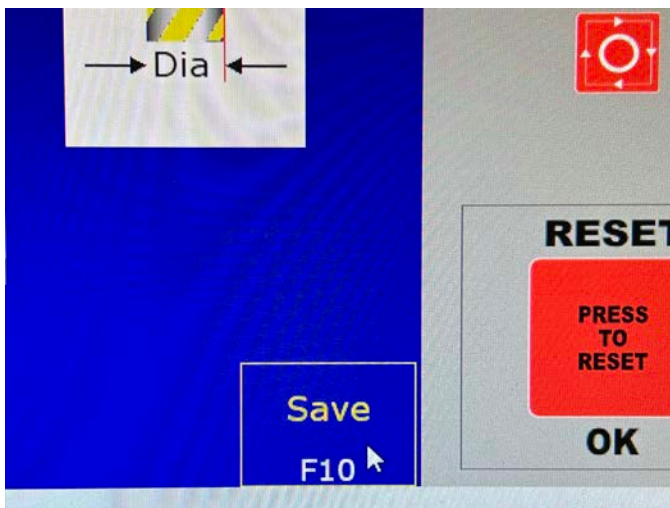


FIGURE 37

- For additional tools, follow the instructions above and be sure that you highlight the tool on the Offset Library page that is in the holder (see section *Setting the Tool Heights, Tool Zero and Part Zero – #8*). Then click on Auto Measure.

### Setting the Part Zero

- Mount your part in your vise or holding fixture.
- Mount a tool in the spindle. This is generally either the longest tool or the tool that will be cutting the top surface of the part.
- Jog the tool over the top of the part and bring the Z-axis down until the tool is close to the top of the part (A: Jog, Rapid, Continuous). When the tool is close to the top of the part, change the Jog mode (B)

from Continuous (CONT) to Incremental (INCR) and choose an Increment amount (C) (see Figure 38).

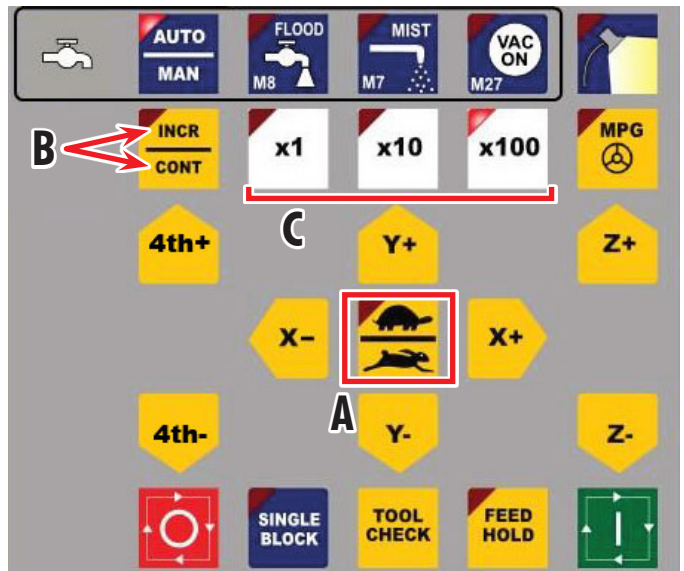


FIGURE 38—A=Jog Speed, B=Jog Mode, C=Increment Amount.

- Place a piece of shim stock (feeler gage, or paper also work) on top of the part and step the tool down in the Z-axis until the end of the tool touched the shim stock (see Figure 39).



FIGURE 39



- With the tool touching the top of the part, write down the Z-axis position that is shown on the “Machine Coordinate” position screen (see Figure 40). For our tool, the Z is Z-6.9332



FIGURE 40

- Now go back to the Tool Offset Library and write down the Height Offset value for the same tool. In this case we are using Tool #1 and the Z value is Z-7.9346 (see Figure 41).

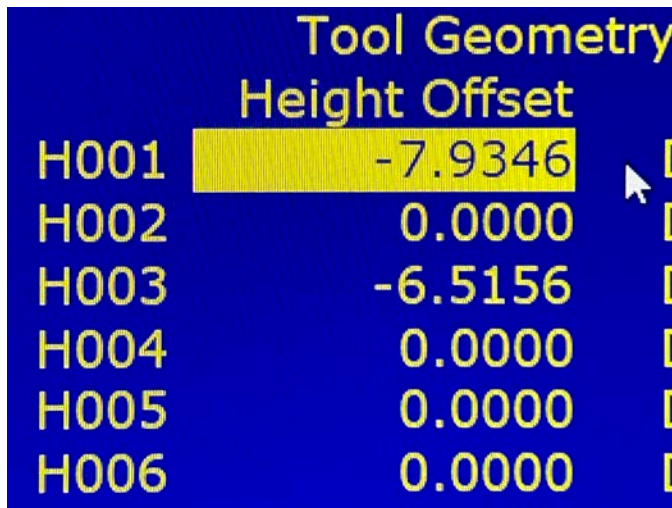


FIGURE 41

- Now subtract the Z-axis Machine Position number from the Height Offset number. In this case we have  $7.9346 - 6.9332 = 1.0014$ . This is the height difference from the top of the tool setter to the top of our part (1.0014). Our part is higher than the tool setter.
- Now choose which G54 – G59 Work Coordinate System (WCS) you are going to use in your program. In our program we are going to use G55 for this part. Now do the following:

A. Click on Setup F1 (see Figure 42).



FIGURE 42

B. Click on Part F1 (see Figure 43).

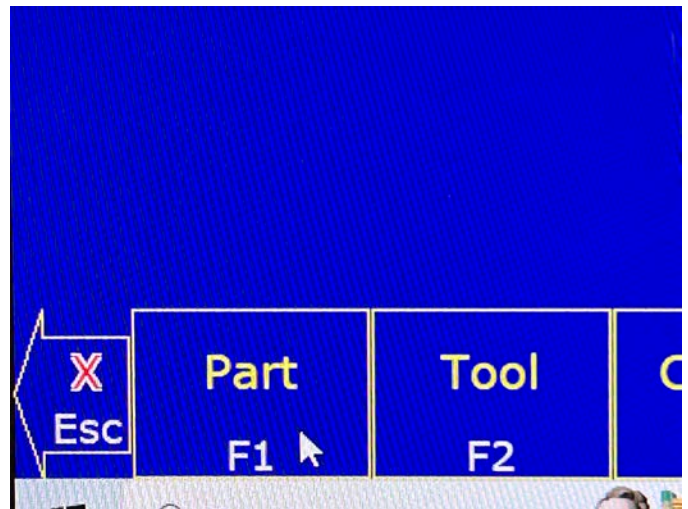


FIGURE 43

C. Click on WCS Table F9 (see Figure 44).

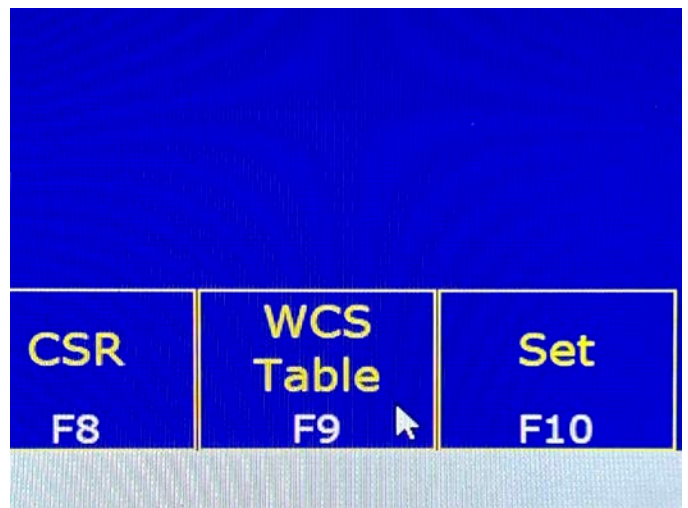


FIGURE 44

D. Click on Origin (see Figure 45).

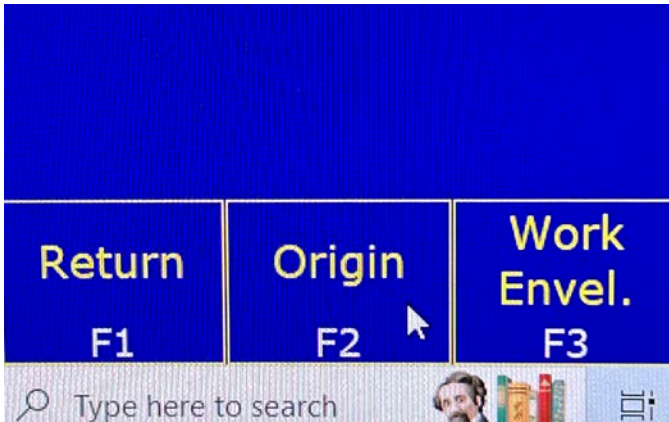


FIGURE 45

E. Click on the Z value for G55 and input your height difference (and Direction). For our part since the top of the part is higher than the top of the tool setter the Z-axis offset amount is (1.00140). If your part was clamped to the top of the table and the top of the part was lower than the top of the tool setter, than your height difference “Direction” would be a negative value (Ex. Z-.500) (see Figure 46).



FIGURE 46

F. After you enter your value, click on Save F10 (see Figure 47).

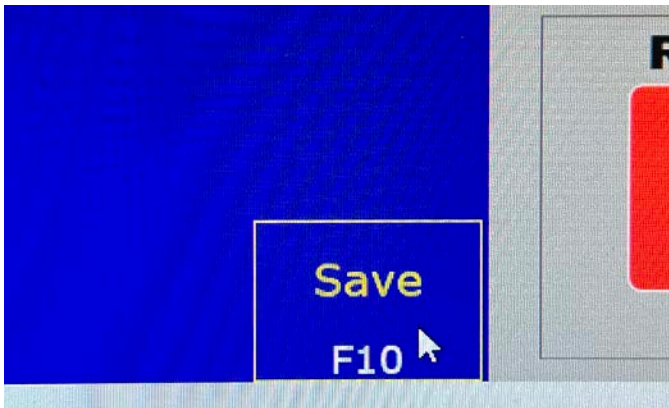


FIGURE 47

### Checking Your Tool Offset

1. Jog your tool to a clearance position so the tool is off to one side of the part and the vise. The reason we do this is in case there are any errors, the tool will not crash into the top of the part.
2. Have the E-stop button nearby in case there is an error and the tool looks like it may crash.
3. Go to MDI F3 (see Figure 48).

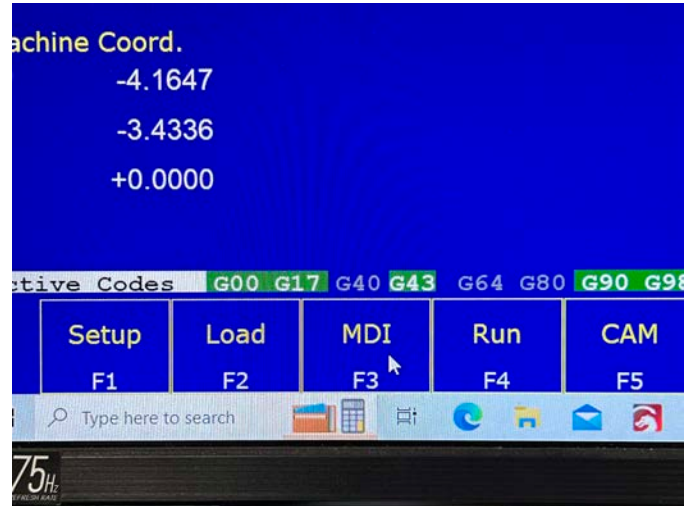


FIGURE 48

4. Input the following G-code and click on Cycle Start to activate each line of code.
  - A. **G55** (This is to make sure that your control is using the correct WCS.)
  - B. **T01 M06** (This calls for a tool change to tool #1. If you are using a different tool, then change the “T” value.)
  - C. **G53 G00 Z0.0** (This send the Z-axis to the home position.)
  - D. **G43 H01** (G43 is tool length compensation. This incorporates the Z value and direction for tool #1 from the Offset Library into the control to calculate the next move.)
  - E. **G00 Z.1** (when this command is activated the Z-axis should bring the tool down to a position where the tip of the tool is .100 above the top of the part.)
  - F. Once the tool is in position in the Z-axis, jog the tool over near the side of the part and see if the tip of the tool is actually .100 above the top of the part.
  - G. If all looks good, then you will want to cancel the length offset and send the Z-axis to the home position. To do this, go back to MDI and input **G49 H0 M25**. G49 will cancel the tool length compensation from the G43 and M25 will move the Z-axis to the Z home position.
  - H. To check additional tools, use the same G-Code as above and change the T01 and H01 to the tool number that you are using.



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### **Running Your First Part**

1. With the part mounted, run the program through without any tools mounted to the spindle. Look for any gross errors in your program. Common errors are axis values with the wrong sign (+ or -), and position moves that neglect to raise up the tool to a clearance position in the Z-axis to avoid hitting part clamps and other fixture parts. This is known as a Dry Run.
2. Use single step for as much of the program as you can on the first run and have the E-stop close and ready to activate if needed.
3. Have fun making chips.

Thank you,  
Sherline Products Inc.