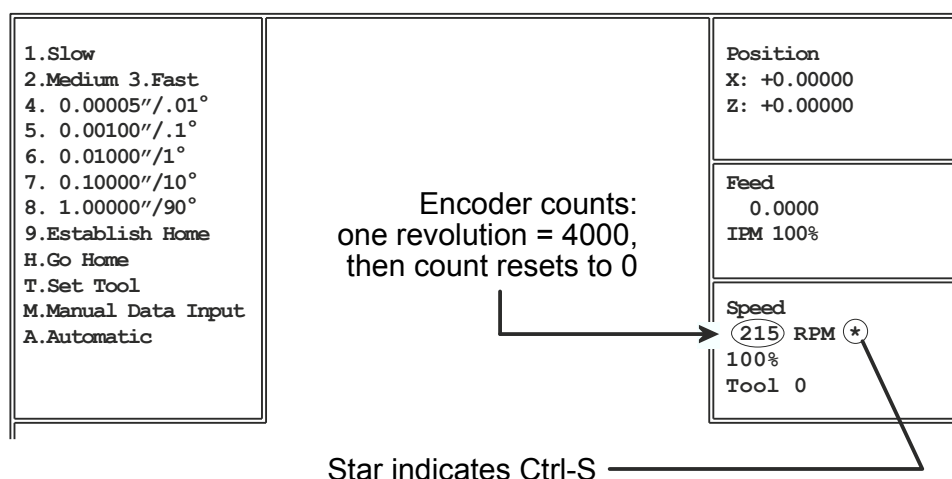


G4 CNC Diagnostics

Spindle Encoder Counts (Ctrl-S Diagnostic)



Spindle Encoder Counts (Ctrl-S Diagnostic)

Pressing Ctrl-S in Jog Mode enables display of spindle encoder counts and marker.

If the slide doesn't move, or moves erratically in any "inches per revolution" mode (g95, g33, g83 etc) Ctrl-S is a quick way to determine if the spindle encoder is at fault.

When Ctrl-S is active, a star (*) appears to the right of RPM in the spindle speed box. The numbers to the left of RPM are encoder counts. Turning the spindle by hand will increase or decrease the numbers until the marker is encountered. There are 4000 encoder counts and one marker. When the marker is encountered, the numbers will increase to 3999, then reset to zero.

To verify that the spindle encoder is functional, go to Jog Mode, press Ctrl-S, then slowly turn the spindle while watching the encoder count.

Initially, turn the spindle first one way, then the other less than 1/8 turn: unless you are right at the marker, the numbers should count up in one direction and count down in the other. If the numbers don't change, or if they only change in one direction, the encoder is faulty.

If the numbers increase and decrease, turn the spindle to increase the numbers. If the marker is working properly, the numbers should count to 4000, then start over at zero. If the numbers don't reset, the encoder is faulty. To alert you to this, the color of the numbers will reverse at about 4100 counts.

To cancel Ctrl-S press Ctrl-S again.

G4 CNC Diagnostics

Input Monitor Function (Alt-I Diagnostic)

1.Slow 2.Medium 3.Fast 4. 0.00005"/.01° 5. 0.00100"/.1° 6. 0.01000"/1° 7. 0.10000"/10° 8. 1.00000"/90° 9.Establish Home H.Go Home T.Set Tool M.Manual Data Input A.Automatic	X+ Jog: 1 X- Jog: 1 Z+ Jog: 1 Z- Jog: 1 C+ Jog: 1 C- Jog: 1 Left CS: 1 Right CS: 1 Motion Stop: 1 Collet Open: 1 Collet Close: 1 Spin. Off/Auto: 0 Guards: 0 Inhibit: 1 M91 input: 1 M93 input: 1 M95 input: 1 X Ref LS : 1 Z Ref LS : 1 0 indicates active input	Position X: +0.00000 Z: +0.00000 Feed 0.0000 IPM 100 % Speed 0 RPM 100 % Tool 0
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Input Monitor Function (Alt-I Diagnostic)

Pressing Alt-I in Jog Mode displays status of inputs.

Active inputs (on) are displayed as 0, inactive inputs (off) are shown as 1.

This diagnostic is helpful for quickly determining if the states of the various switches and M-functions are being communicated to the motion control card.

For example: if the machine won't jog, you can quickly verify that the motion control card is reading the state of the Jog Stick by moving the Jog Stick and watching the 1's change to 0's.

Also, when door interlock switch (Guards, above) is open (1), the Motion Stop is shown as on (0) regardless of its actual condition.

To cancel Alt-I press Alt-I again.

Temporarily Bypass Guards (Alt-G Diagnostic)

If the slide won't jog, and "Guards" stays at 1 and Motion Stop stays at 0 regardless of whether the door is open or closed, press and hold the Alt key, then press G key (Alt-G), then press Esc. Note that Motion Stop will change to 1, but Guards will remain at 1.

Select a jog speed and attempt to jog: if the slide jogs with Alt-G active, the problem is a bad door switch or open connection in the door interlock string.

Alt-G is cancelled if Auto mode is selected.

G4 CNC Diagnostics

Following Error Display (Ctrl-E Diagnostic)

1.Slow 2.Medium 3.Fast 4. 0.00005"/.01° 5. 0.00100"/.1° 6. 0.01000"/1° 7. 0.10000"/10° 8. 1.00000"/90° 9.Establish Home	Alt-C will enable C axis Following Error X: 0 Z: -1 C: 0 Set X and Z to 70 at Medium jog	Position X: +0.00000 Z: +0.00000 Feed 0.0000 IPM 100%
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Following Error Display (Ctrl-E Diagnostic)

Servo Errors:

If your OmniTurn occasionally throws a servo error, especially between tool calls, one of the servo amplifiers may need to be readjusted.

Pressing Ctrl-E in Jog Mode enables display of the Following Error. At rest, both X and Z should show Following Error between -1 and +1. Press the 2 key (Medium Jog), and jog the slide back and forth in each axis. The Following Error should be between 65 and 75 while jogging.

If the numbers at rest are not 0 ± 1 , you must readjust the servo amplifier Balance and the motion card Zero. If the numbers while jogging are not 70 ± 5 , you must readjust the servo amplifier Signal Gain and Tach. Servo amplifier adjustment instructions are available online and in the manual.

Encoder Count Captured (Ctrl-H Diagnostic)

1.Slow 2.Medium 3.Fast 4. 0.00005"/.01° 5. 0.00100"/.1° 6. 0.01000"/1° 7. 0.10000"/10° 8. 1.00000"/90° 9.Establish Home	Alt-C will enable C axis Encoder Count Captured X: 0 Z: 0 C: 0 ctrl-h_screens.dpp	Position X: +0.00000 Z: +0.00000 Feed 0.0000 IPM 100%
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Encoder Count Captured Display (Ctrl-H Diagnostic)

Positioning Problems:

Your parts are not maintaining size; measurements are different part to part.

Using Ctrl-H to diagnose repeatability problems

Pressing Ctrl-H in Jog Mode enables display of the Encoder Count This test will quickly determine if the problem is electrical or mechanical. It is not necessary to load any special program, or to re-home the machine.

Select Jog 1 (Jog Slow) and jog the slide toward the nearest mark on the scale in the axis you're having trouble with. When the "Position" counter passes 0.20000, the "Encoder Count Captured" number should change to 4000 (either plus or minus, depending on the direction you jogged).

If the *both* axes read 4000 , the problem is mechanical: loose coupler, excess backlash, entire slide loose on ways, bad spindle, tooling, etc. Review the suggestions on the next page for help in determining the mechanical cause of the repeatability or size problem.

Encoder Count Captured (Ctrl-H Diagnostic) *con't*

1.Slow 2.Medium 3.Fast 4. 0.00005"/.01° 5. 0.00100"/.1° 6. 0.01000"/1° 7. 0.10000"/10° 8. 1.00000"/90° 9.Establish Home	Alt-C will enable C axis Encoder Count Captured X: 4000 Z: -4000 C: 0 ctrl-h_screens.dpp	Position X: +0.20535 Z: -0.20615 Feed 0.0000 IPM 100%
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If *either* axis reads other than 4000, the problem could be a bad bad motor encoder, or some trouble on the motion card.

At this point, to narrow it down, you must load a test program that can run with the motor cables swapped. Controls ship with a program named *smaltest* on the harddrive. *Smaltest* only moves the slide one inch from home in X & Z, so it is safe to run with tooling on the slide.

Run five or ten cycles of *smaltest*, then do the Ctrl-H test again. Note which axis is not 4000.

Set the E-Stop to turn off servos, and swap the motor cables at the back of the control. Run five or ten cycles of *smaltest* and do Ctrl-H test again: If the same axis doesn't read 4000, the problem is on the motion card. If that axis reads 4000, but the other axis is now not reading 4000, the problem is in the motor encoder.

Mechanical Positioning Problems:

The slide has mechanical problems with repeating a size. (Both axes read 4000, Ctrl-H test)

- The part is moving, check your work holding fixture
- Be sure the tooling is held tightly
- If you have an *attachment*, see if the slide is loose on the lathe
- The ball screw nut has come loose in it's housing
- Loose encoder at the end of the axis motor
- Loose coupling between the Servo motor and the ball screw for axis movement

To see if it is a mechanical problem, turn servos on and position the slide close to the spindle. Mount an indicator on the tooling plate so it touches the headstock, zero out the indicator and then push and pull the slide with servos on. The indicator should show some movement as you push and pull on the slide. However it should return to Zero when you let go. If the slide does not come back to Zero then there is something loose, (Slide, Ballscrew nut, Ballscrew support bearing, etc)

To check if the slide doesn't repeat, write a program to rapid back and forth in the axis you're testing. Mount an indicator on the tooling plate and zero it at the program end location. Be sure to slow down the feed before the indicator hits. Run cycle repeat for 100 cycles and see if the indicator is zero at the end.

After running the program and studying the way the indicator repeats, or doesn't, you should have an idea of what your mechanical problem could be. If not, call the factory and describe the type of error that you are seeing, for example: constant creeping in one direction, random movement in both directions, jumping.