TB026 (Rev1) - Position Error & Full Power Without Motion

Overview

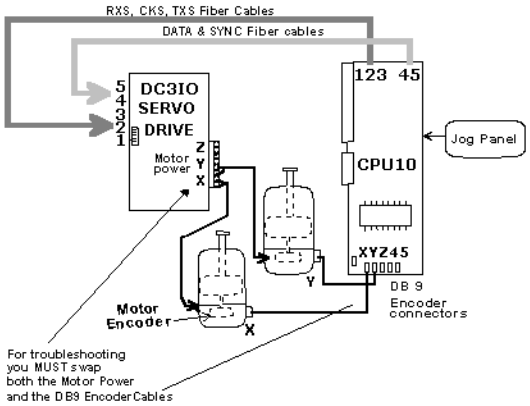
This document describes the steps needed to efficiently resolve the following error message: "410__ Axis position error" and "411__ Axis Full power without motion".

Understanding the theory

Any time that the CPU10 expecting the motor to turn, and not getting a correct encoder response for >.25", a "**Position error**" results.

When 90% power is applied and no motion is detected for the time specified in parameter 61 (usually .5 sec.), a "**Full power without motion**" error occurs.

In the following diagram, locate the CPU10, SERVO drive, and the MOTOR ENCODERS



- The CPU10 receives a command to move a motor either from a running program or the operator's jog panel.
- This command is then forwarded to the Servo Drive through the data & sync fiber cables. The servo drive outputs approximately 110 Vdc to the proper motor.
- The motor encoder turns along with the motor, and outputs digital pulses on A and B channels at an equivalent rate of 8,000 counts per revolution.
- The pulses are counted by a Lattice IC on the CPU10 that is used by the CNC10 software to determine the position of the motor relative to the machine home position. The DRO (Digital Read Out) is updated to display this correct value.

Example: A user is getting "Y axis position error". By swapping both the X and Y wires at the drive and also at the encoder DB9 cables, it is possible to determine whether the problem is in the motor or motor cable, or whether the problem is with the drive or CPU10. After swapping the motor and encoder cables between the X and Y axes, the error is "X axis position error". Thus, the X-axis motor and/or cable is the problem, which is physically the Y motor since it was just swapped with X.

What causes a position error?

Cause	Possible Problem	Troubleshoot / Cure
Bad encoder	Coolant, fluid, or dirt penetrating the seal and giving bad pulses to the CPU10 card	Replace motor with a known good motor, possibly from a different axis, or swap out the cables between two axes. The error will follow the motor. See diagram and example.
Bad encoder cable	Broken wire, or connection at the pins of the cable	Move the suspected bad motor power and encoder cables to another axis's motor. If the problem is in the cable, then you will still get an error on that cable.
Binding or mechanical problems such as excessive lash	The CPU10 board has detected >.25" error on an axis	Slow down the feedrate and watch for errors. If slower speeds or unbelting the motor eliminates the errors, have the machine mechanics checked out.
Encoder connectors are on the wrong axis	One motor is turning but the position displays on another axis	You can force position errors simply by wiring the motor wrong. Check and re-check for proper encoder wiring.
Motor power wiring is backwards	The CPU10 board is getting backwards encoder counts	Watch the DRO display. If the DRO is always increasing or decreasing regardless of the direction jogged, the motor wires at the drive are reversed.
Max. Rate in the parameters are set too high	The motor may not be capable of maintaining the maximum rate.	Autotune. F1-Setup, F3-Config, Password=137, F4-PID, and the F5-Tune. Try commanding slower speeds to check for a rate-related position error.
Bad CPU10 board	The CPU10 board is losing encoder counts and giving false DRO reading	Very low probability as the cause for errors. Note: 8 missing counts on the Lattice IC or DSP time out will produce an "Encoder connection" error.

What causes a "Full Power Without Motion" Error?

Cause	Possible Problem	Troubleshoot / Cure
Axis is against a physical stop.	Program exceeds the travel limit, or the part zero was set incorrect	Use the slow jog button to move the axis away from the end. Reset your part zero to a point which permits the CNC program move
Limit switch header cables or noisy limit switch.	The drive is seeing the limit switch input as open, but it is still closed at the PLC	Remove the limit switch header cable at the Servo Drive and defeat the limit switches as shown on the servo drive cover. Test.
Servo Drive failure	See "Servo Drive Troubleshooting"	Troubleshoot the servo drive for errors; call Tech Support.
Fiber Optics on DC brush system	Fiber optic cables to the drive are plugged in backwards, broken or not plugged in	Check the fibers labeled 4 and 5 (data and sync) in the above picture.
Encoder Loose	Set screw loose or missing that holds encoder onto motor shaft	Tighten set screw
No power to the moter	The motor is not getting power from the drive. See "Servo Drive Troubleshooting"	Check motor cable and connectors. Troubleshoot the servo drive for errors; call Tech Support.
Bad Motor	Coolant in motor or motor overheated and burned up.	Replace motor and ensure motors are protected from coolant (TB009) and/or check motor heating parameters.

WARNING: Never remove the brushes from a DC motor. They do not wear out and more costly damage my result by removing them unnecessarily.

Document History

Rev1 Created on ***1998-02-13***