

TB301 Using Absolute Encoders

Introduction

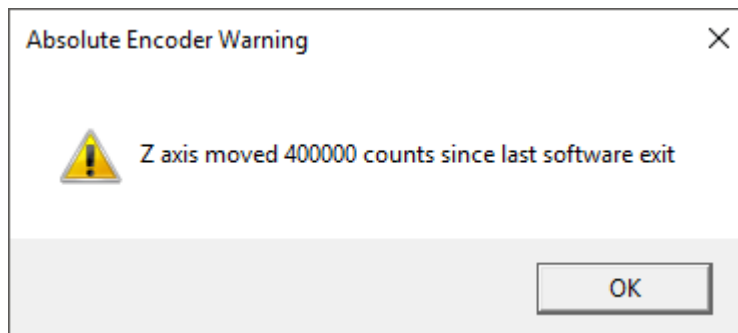
Support for absolute encoders was added in CNC12 version 4.06. Absolute encoder support is for Yaskawa drives connected to an OpticDirect or DriveComm interface. Using absolute encoders requires configuration of the Yaskawa drive as well as CNC12 parameters. See TB267 for information on how to configure the Yaskawa drive.

Prerequisite

- OpticDirect or DriveComm board with backup battery installed or Yaskawa cable, JZSP-CSP12-E, installed
- TB267 CNC11 Yaskawa Sigma5 Precision Mode Setup http://www.centroidcnc.com/dealersupport/tech_bulletins/uploads/267.pdf
- TB22 Modifying the "HOM" File http://www.centroidcnc.com/dealersupport/tech_bulletins/uploads/022.pdf

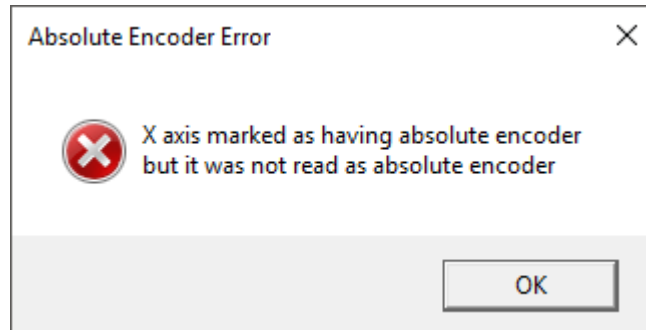
Initial Setup

- Configure the Yaskawa drive to use absolute encoders according to TB267
- Position the axes, using jogging or traditional limit switch homing to position the axes where the home position should be set. It is recommended to set this position near to where a machine would home if using limit switch homing.
- Set machine parameter 316 Absolute Encoder Bits appropriately. For example, assume all three axes (XYZ) have absolute encoders, and P308 Axis 1 (X) Encoder Index = 7, P309 Axis 2 (Y) Encoder Index = 8, and P310 Axis 3 (Z) Encoder Index = 9. In this case the correct setting is $P316 = 448 (2^{7-1} + 2^{8-1} + 2^{9-1})$.
- Power off the system and then power on again. You may see some warning dialogs related to the absolute encoders. If you see one about axis movement like below, this is not unexpected during initial setup and can be safely ignored.



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However, if you see an error dialog as below, something is surely wrong. See the troubleshooting section.



- Before homing, go to MDI and execute an M26/X/Y/Z. As long as parameter 316 is set to mark an axis encoder as having an absolute encoder, then when an M26 is executed, the MPU system will save the position in non-volatile memory and will use it as an offset to the home position so that if you power the system down and back up at this position, the DRO would read 0.0000 or very close to that since it probably moved a little after power was removed.
- Modify the cncm.hom or cncf.hom file to use the Q1 word, for example:

```
M26/Z Q1  
M26/X Q1  
M26/Y Q1
```

The Q1 word basically sets the machine home at the current position. This is a minimal example. It may be desirable to issue other commands as part of the homing procedure such as retracting the Z axis. **Caution:** If you forget the Q1 word, it will be the same as executing an M26 command while not at the home position and since there were no M91/M92 commands to home off limit switches, the machine positions would be incorrect.

- Reboot the system. After homing, check for proper position. It is a good idea to make a few checks by moving to different positions and rebooting the system to verify that after homing, the positions are correct.

Further information

At first power-up of CNC12, the debug_dump0.txt file has information related to absolute encoders. Here is a sample that is typical given the example above when there are no problems:

```
absolute encoder 6 on axis 0  
Yaskawa 0 multi turn 0 hi 0 lo 1383 full 0x000000000000567 (1383) CPR 32768 (Home Offset 2588681)  
absolute encoder 7 on axis 1  
Yaskawa 1 multi turn -22 hi 0 lo 13044 full 0xFFFFFFFFF532F4 (-707852) CPR 32768 (Home Offset -2948559)
```

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absolute encoder 8 on axis 2

Yaskawa 2 multi turn 4 hi 0 lo 2851 full 0x000000000020B23 (133923) CPR 32768 (Home Offset 1933322)

Other messages that may appear in this file if parameter 316 is set to mark an encoder as being absolute include:

```
Yaskawa _ data retrieve not finished
Yaskawa _ data retrieve error
Absolute encoder not mapped to a valid axis
```

If the messages above are seen in the file then it means that the CNC12 could not properly communicate with the absolute encoder for that particular axis. It could be that the Yaskawa drive was not properly setup.

When CNC12 software starts, there is a check of absolute encoders. The information gathered from these checks is appended to the `absolute-encoder-log.txt` file. One of the things that is checked is to see if the position where the machine was powered down (saved in the `last-absolute-position.txt` file) has changed from the power-up position. If this difference is greater than half a motor encoder turn, then a warning dialog will be displayed. If there was an improper shutdown, e.g., the system suddenly lost power or the software was terminated by task explorer, then CNC12 cannot properly record the last position, and in these cases, the warning dialog is expected and indicates that the cause may be due to an improper shutdown.

Another case where this dialog may be displayed is after a software update and the MPU reboots. In this case, the warning should not be ignored. The system should be powered cycled. Expect the warning to appear again after the power cycle, but this second one can most likely be ignored.

Document History

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