Service Bulletin – 147B

DATA I/O Corporation

10525 Willows Road NE
Redmond, WA 98052
Phone: 1.425.881.6444
Phone: 1.800.247.5700 (press 2)
FAX: 425.867.6972
support@dataio.com

Subject: PnP (SMAC) Head Tuning Guide

This document provides guidelines on tuning the PnP (SMAC) head, especially if it exhibits errors while homing the Z-Axis or the probe "vibrates" when it is at home position. It also outlines configuring (calibrating) MEI and saving MEI parameter file.

These errors, especially "vibration" on the SMAC head may be due to some output voltage "drift" from either the SMAC head or MEI card.

First "configure" the MEI card. This will test the MEI card, configure its internal DAC offsets and re-load the motion parameters from motion parameter file.
Exit completely from AH400, navigate to "C:\Install\MEI and Autopak\" directory.

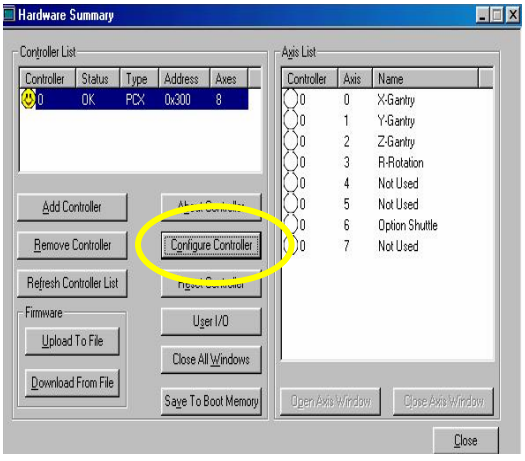
DOS Mode

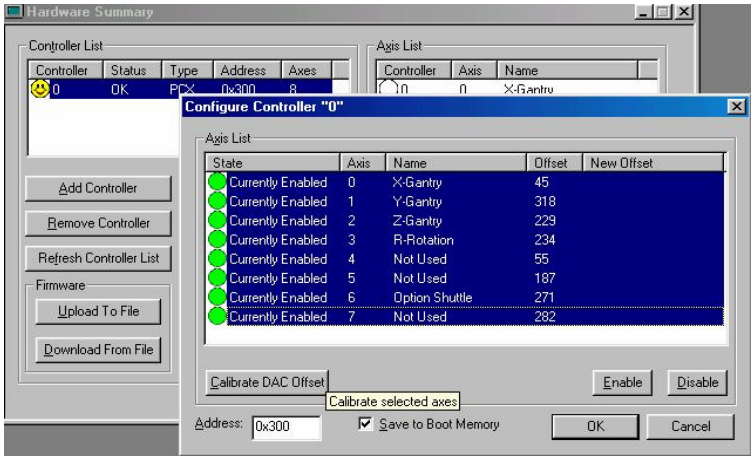
Open DOS window and at DOS command prompt type config –f mei.abs -f
C:\Install\MEI and Autopak\config –f mei.abs -v
Where mei.abs should be the actual file name of MEI motion parameter on Handler Computer for the particular PP100/PS-System, for example 102002M.abs

Windows Mode (*recommended*)

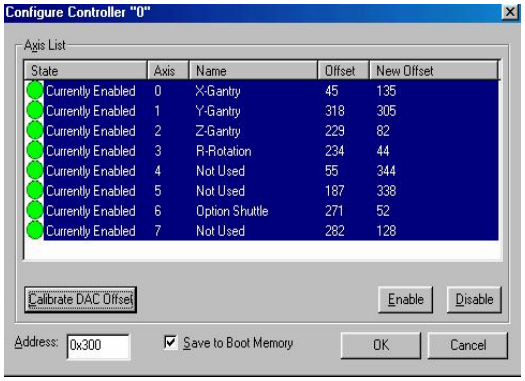
Invoke the Motion Console program **MC_DSP_95.EXE**

Click on "Configure Controller", select all axes, check the box labeled "Save to Boot Memory" and then click on "Calibrate DAC Offset" button



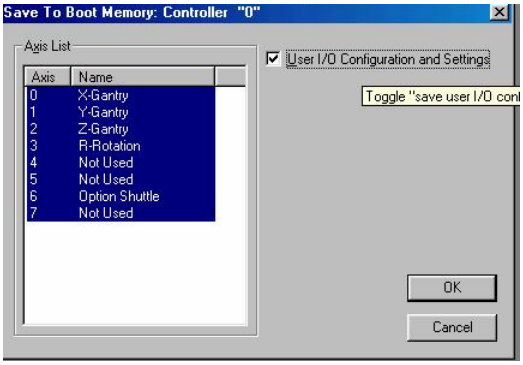


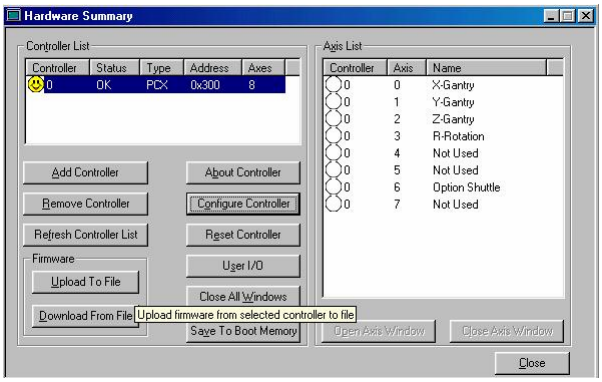
Once calibration is done, the screen will contain New Offset Values.



Saving Parameter File

- Save values to Boot Memory, ensuring "User I/O Configuration and Settings" box is checked.
- Save parameters to file, by clicking on "Upload To File" button, which will upload firmware from controller's memory into a parameter file.

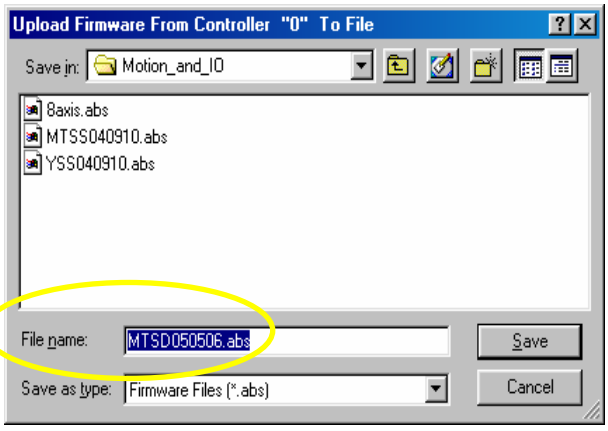




When saving the parameter file, give it a name in format **MTSSyymmdd.abs**
M = Servo Motor and Amplifier type
M for Mitsubishi,
Y for Yaskawa
T = Gantry Type,
T for THK,
N for NSK
S = PnP Head type,
S for SMAC
I for IntellePro
S = Shuttle Transfer Motor,
S for Single Stack (2" tall) and
D for Double Stack (3" tall)
yymmdd = Year, Month Day
Extension MUST be abs

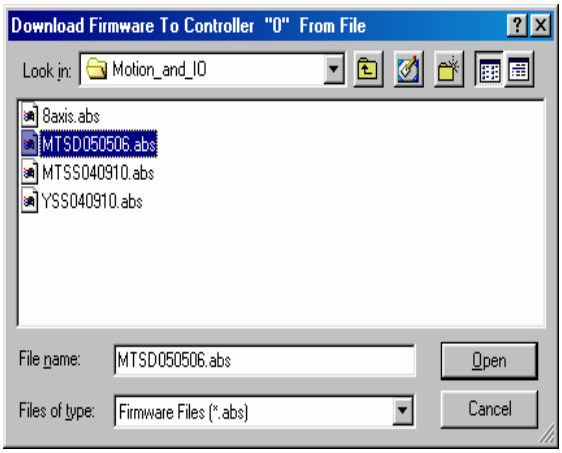
Here file is: MTSD050506.abs

After Saving the file, delete the file 8Axis.abs and then Copy this new file and rename the copied version to 8Axis.abs



To load a particular MEI firmware file into MEI card's memory:-

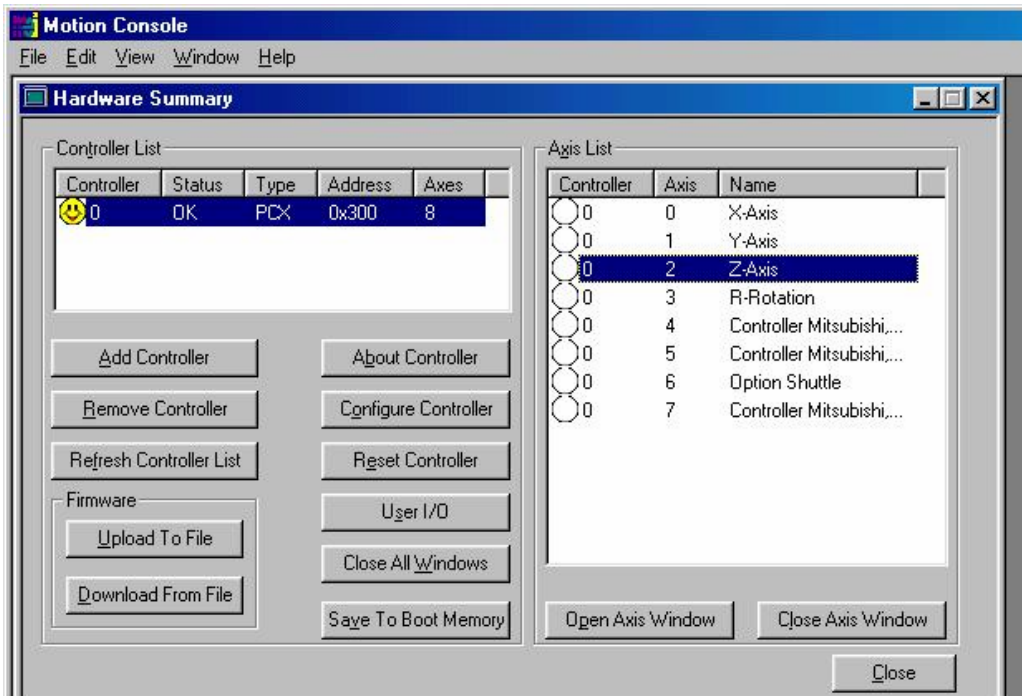
Click on the button "Download From File"
IN the dialog window select the required file, here the selected file is MTSD050506.abs
And click on Open.



If Configure and Calibrate DAC Offsets procedures do not solve the problem, then proceed with the following guidelines.

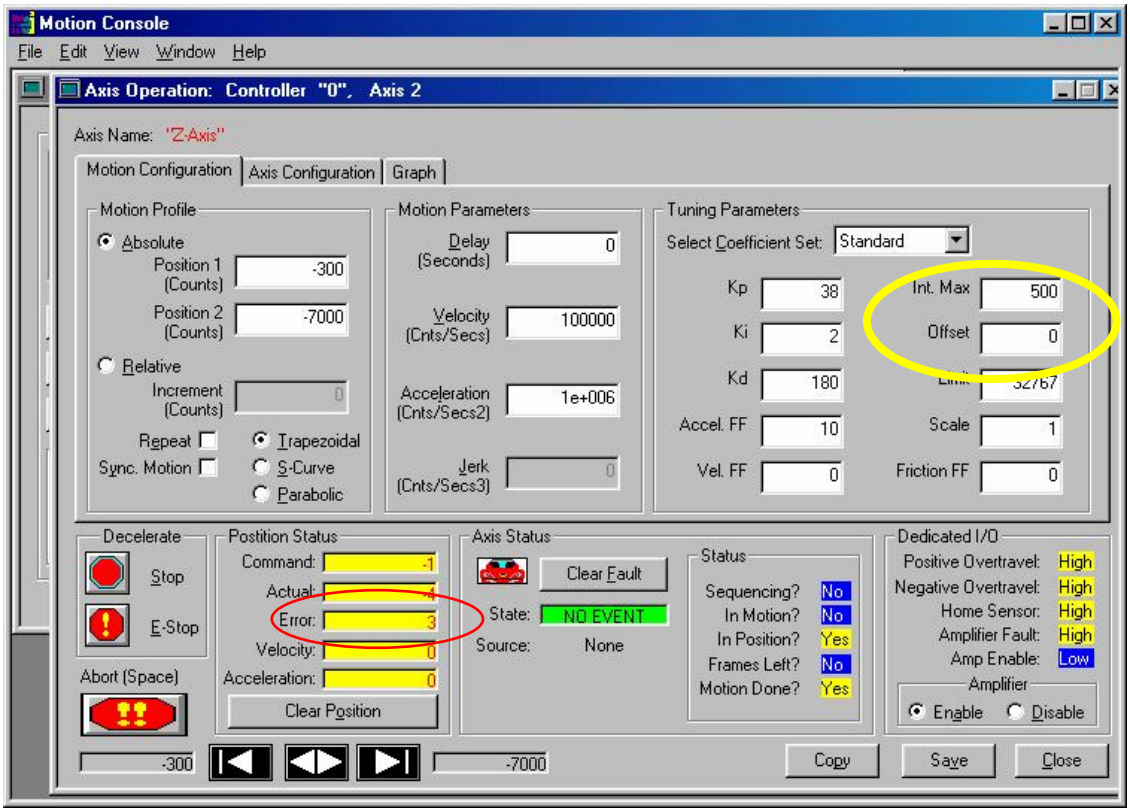
Invoke AH400, go to System → Servo, and select Z-Axis and "Home" the Z-Axis.
Note: If vibration occurs at "Park" position, then repeat following steps with SMAC head in the "Park" position.

On Handler computer, navigate to "C:\Install\MEI and Autopak\" directory and invoke the MC_DSP_95.EXE Motion Console program.

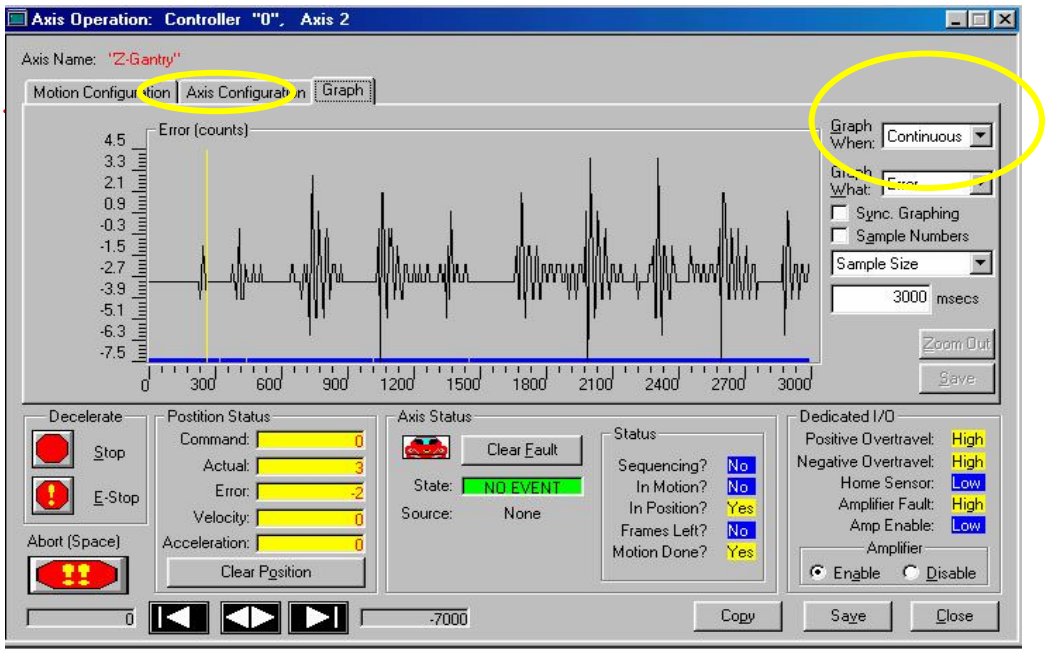


Select Axis-2, which is the Z-Axis

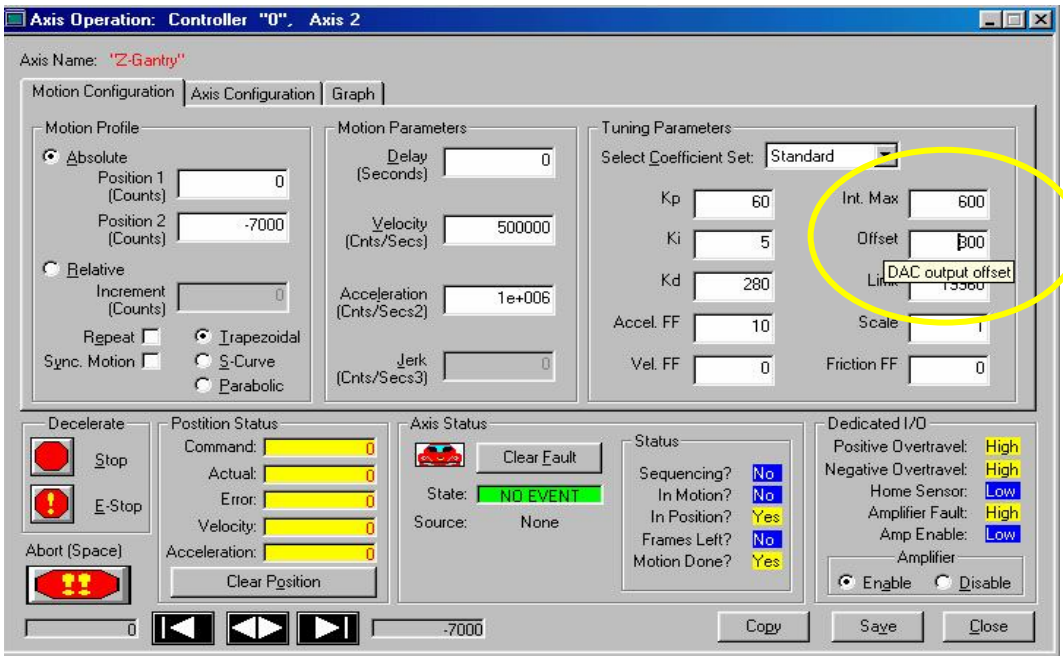
Within “Motion Configuration” tab note the value for “Int. Max”, “Offset” and “Error”. Here, the error is –3 when Offset is 0 (zero)



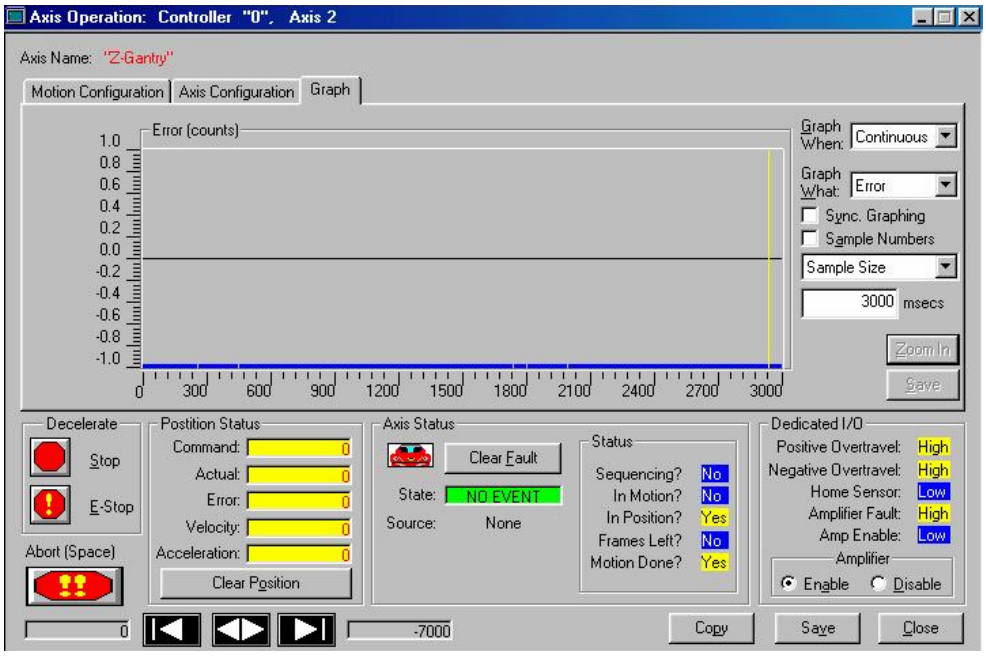
Switch to “Graph” tab, click on the drop down arrow for “Graph When” and select “Continuous” from the options. Similarly, for “Graph What” select “Error”. Observe the “Error (counts)”



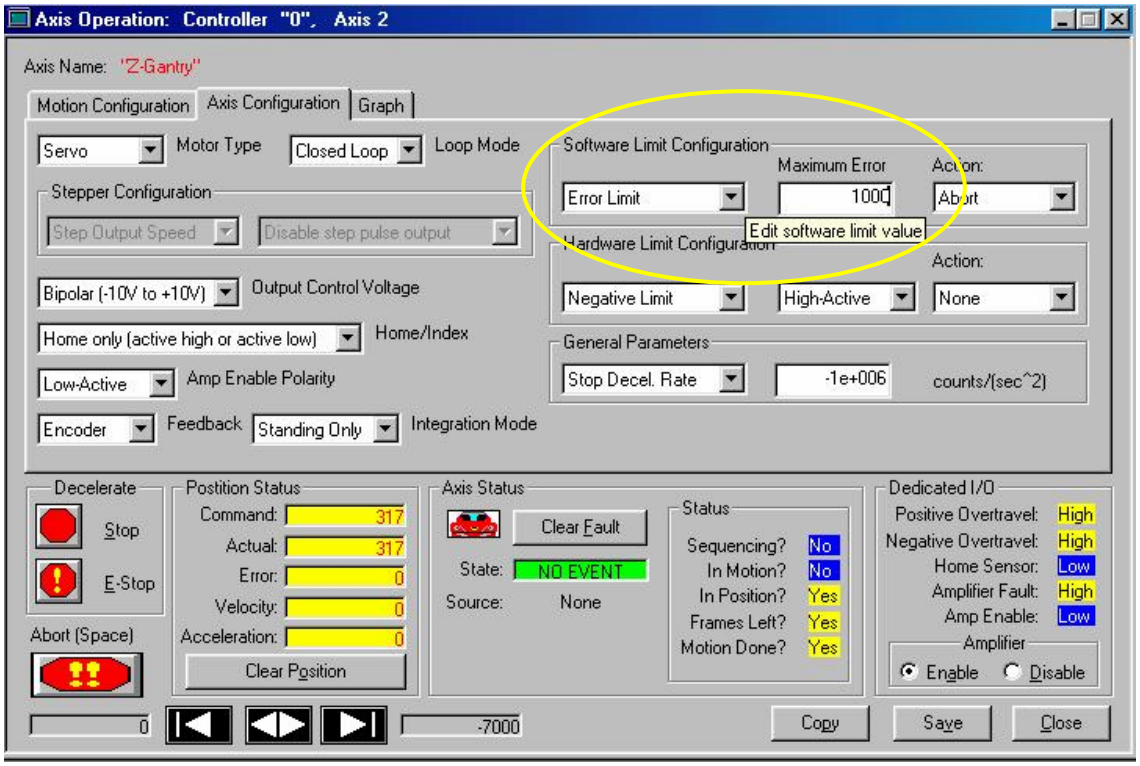
In Motion Configuration change the DAC output offset by setting the "Offset" value such that there is no vibration, typical values for some SMAC heads were 300, 400 and 450.
Set the "Int. Max" to about <u>twice</u> the value of "Offset", for example 600, 800 or 900.



After changing the "Offset" and "Int Limit" observe the "Error (counts)" on the Graph screen.
Ideally, there should be no error – zero error, like below.
If error is not close to zero, try different values for "Offset"



Within “Axis Configuration” tab, under “Software Limit Configuration” set the 1000 as “Maximum Error” value.



Save every thing – see **Saving Parameter File** on page-2

If the Error can not be brought near zero and there is still vibration on the PnP nozzle, then within AH400 Gantry screen, bring PnP head to “Park” position and change Z_{Drop} and Z_{Pick} from default value of –0.250 to –0.300 or –0.350 but not less than –0.400. Do the same for “Vision” location and save the package file. If this reduces Error and vibration, change all package files accordingly.

Technical Background

The MEI card produces an analog $\pm 10V_{DC}$ signal for motion control. While in a "wait" state, this voltage will drift and the encoders on the amplifiers will try to compensate for the change in position, these results in vibration. To nullify the drift on the SMAC, a voltmeter can be placed between GND (pin 1 of P7) to (Pin 9 of P7). The MEI motion parameters must be opened and the OFFSET box adjusted until the meter reading is $0V_{DC}$ $\pm$500mv. The OFFSET box value can be adjusted in either the positive or negative direction. For example - on one machine the value read $2.5V_{DC}$ $\pm$300mv, a value of -240 was placed into the OFFSET box and the value read at the meter dropped to $\pm$500mv from zero.

Watch the encoder count error displayed on the MEI Motion Console screen, with the objective of having the error as close to zero as possible.