**ASEN 2003**

**Locomotive Crank Setup and Operational Procedure**

**Materials:**

* 1 – 7-11 VDC, 5 amp Regulated Power Supply
* 2 – Rulers
* Locomotive crank with MyDAQ device

**The hardware will be setup in advance by the lab manager and assistants. You can use the following setup procedure to verify or troubleshoot the connections if necessary:**

**Setup Procedure:**

1. Plug the National Instruments cable from MyDAQ into the USB port on the computer
2. Open the Measurement & Automation Explorer:
   1. Under Devices and Interfaces:

Verify the NI myDAQ is listed as “**MyDAQ 1**” if not rename it

1. Power the locomotive crank motor:
   1. Set the power supply voltage knob to 0V.
   2. Plug red banana connector **(**labeled **MOTOR V+)** to the positive terminal of the power supply. This powers the motor of the locomotive crank.
   3. Plug black banana connector **(**labeled **MOTOR V-)** to the negative terminal of the power supply
   4. Verify that the current limit is set to (5A).
   5. Do not power the locomotive motor just yet.

**Note:**

* Motor voltage polarity determines direction, be careful that your crank is always going counter-clockwise.

**Operational Procedure:**

1. Open **Locomotive\_NewDerivative.vi** (Shortcut in courses ASEN 2003 folder).
2. Measure **r**, **l**, and **d.**
3. Measure the vertical displacement of the slide by subtracting the lowest position form the highest in units of (mm). Record in your lab notebook.
4. **Before starting the VI, set the collar to the minimum (lowest) position by hand.**

This step is important. The VI calculates theta by assuming that you always start at this position of theta (approximately 152.5o).

1. Start running the VI by clicking the play button. At this point the VI is not logging data to a file yet.
2. Turn wheel 360 counter clockwise to do a verification check that the wheel position box reads approximately 512.5o (360o + 152.5o).
3. With the potentiometer calibration box set to 1 mm/V, the program will display the raw measurement in volts. Record the slide position from plot 2 (slide position) at its highest and lowest point in VOLTS.
4. Use the displacement data in step 3 as well as the calibration data in step 7 to calculate the new potentiometer calibration in mm/V. (This should be between 48-51 mm/V.) (**Note:** check units!)
5. Stop the VI, select cancel and lose data when prompted to save
6. **Before starting the VI, set the slide collar to the minimum (lowest) position by hand.**
7. Enter the new potentiometer calibration value from step 8 and restart the VI.
8. Begin turning crank by raising voltage of power supply to desired voltage setting. A voltage setting between 6-11V works well. **(DO NOT EXCEED 11V!)**
9. Click the ‘Begin Data Capture’ button to start logging data. After 8-10 rotations, click the button again to stop logging data. The VI will then prompt you for a filename. For ease of analysis later in Matlab, use the same data file naming convention as the sample data files:

Test#\_xxV

Where # is the trial number and xx is the voltage, i.e. 06, 07,…11 etc (ex. Test1\_10V)

(Note: The LabVIEW program *does not* record the motor voltage setting.)

**Note:**

To take data at several different motor speeds (crankshaft motor voltages), you will need to:

* turn the motor off (reduce power supply voltage to 0V)
* stop the VI
* reset the collar back to the minimum position before running the VI another time
* run the vi and take data at a different voltage
* repeat for each different voltage setting