Appendix A: Quick Calibration Guide

The `Quick_Calibration_BIN_FILE.bin` file is meant to help you find a polynomial fit (a linear equation) to the encoder calibration curve. That is, an equation that give you the height of the elevator in inches using the encoder output (counts). In addition, the program computes the polarization of your DC motor (how the motor is connected with respect to the power supply) and the duty cycle required to keep the elevator "steady" at any position (a value required to compensate for gravity and static friction).

(a) Before you run the program, it is important to have the power supply ON at 12 V and the elevator in the downward position.

(b) Download the bin file into your mbed and open Tera Term.

(c) The program will give you four main choices.

(d) **[Enter 't']** The first time you run the program, you should check for the polarization of your station and dc requirements. Enter 't' to find out those values and record them. You will need them for your controller. After that, the program will continue with the calibration process. During the calibration process, the program will ask you at intervals of approx. 6-8 seconds to enter the current height of the elevator in inches. They should be close to 9, 13, 17, and 21 inches (they are not always the same values). **Always wait until the system settles. The very first time may take more than 10 seconds.** It is also important to be as accurate as possible. After the four heights have been entered, the program will proceed to compute the calibration curve. The calibration curve is:

$$Height = p[0] * Counts + p[1]$$

Then, you have the choice to test the calibration by pressing 'y'. Check the accuracy of the fitting curve by moving the elevator up and down (by rotating the motor manually).The error should not be higher than 0.5 inches. If it is, you will need to run the calibration process again.

(e) **[Enter 'r']** To check if your motor encoder is working properly, enter 'r' in to Tera Term. The program should print the output of the encoder. It should be approximately zero at the lowest position and close to 1000 counts near the highest position. If this is not case, check if the power supply is ON and check for loose cables. Press any key to exit.

(f) **[Press any other key]** Pressing other key besides 't', 'r', or 'q' (for quitting the program) will execute the calibration process by skipping the polarization test.