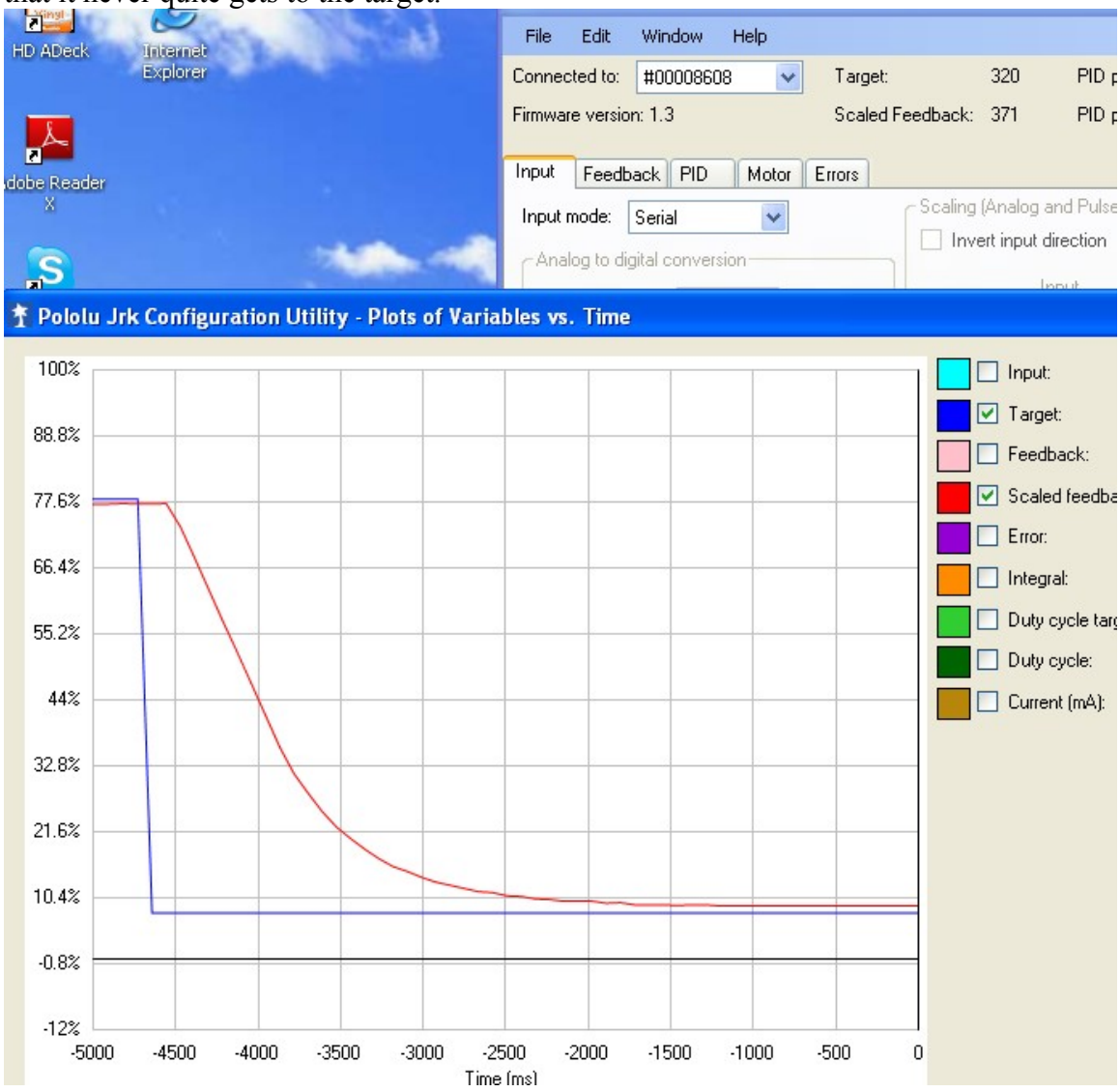
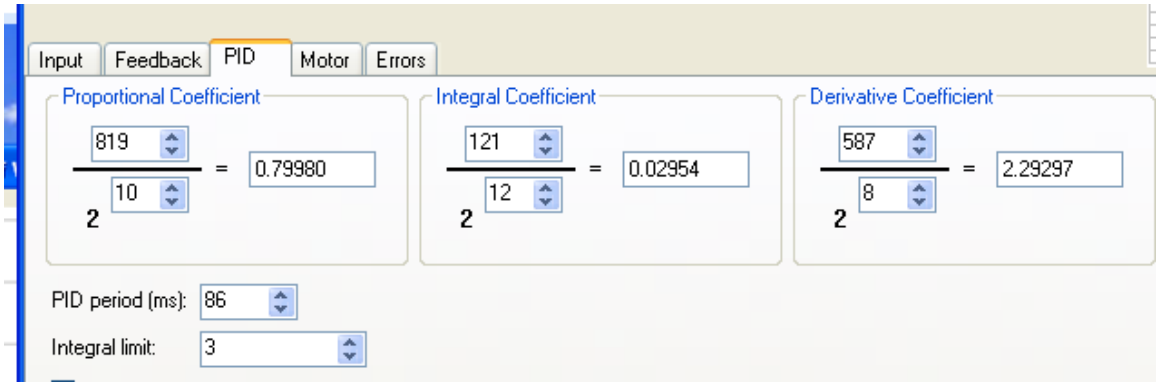
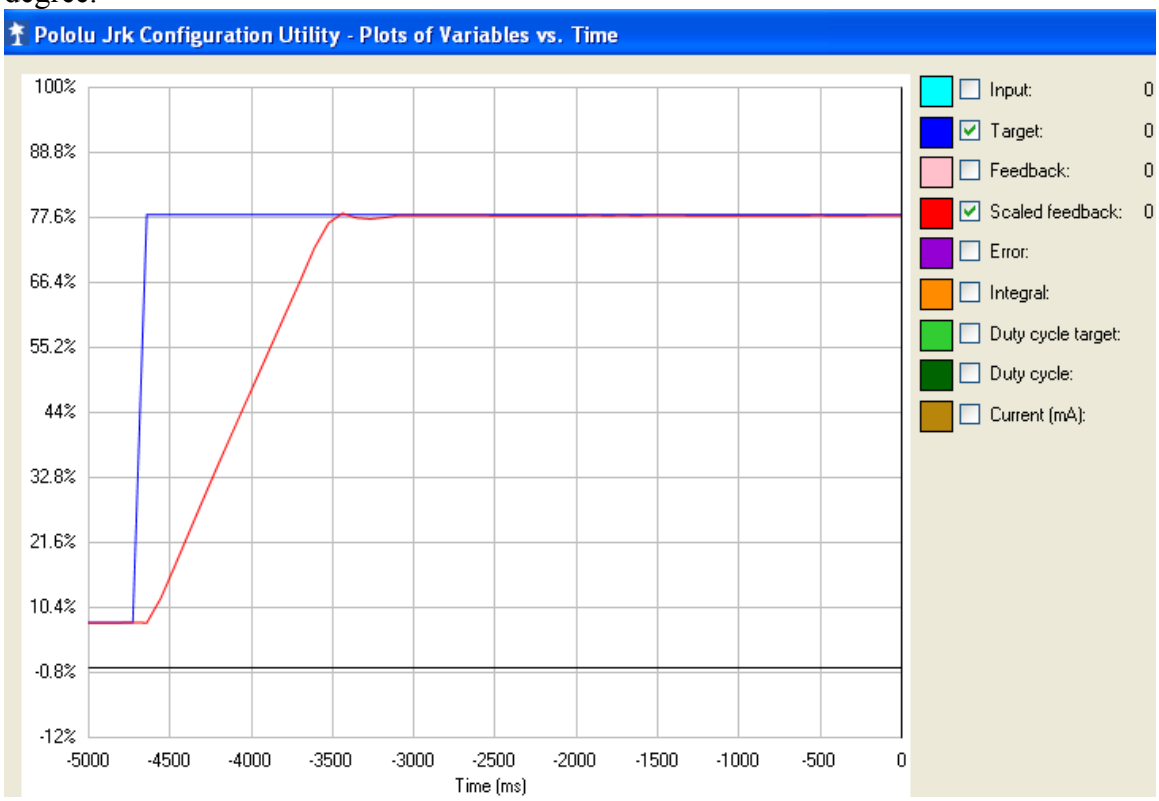
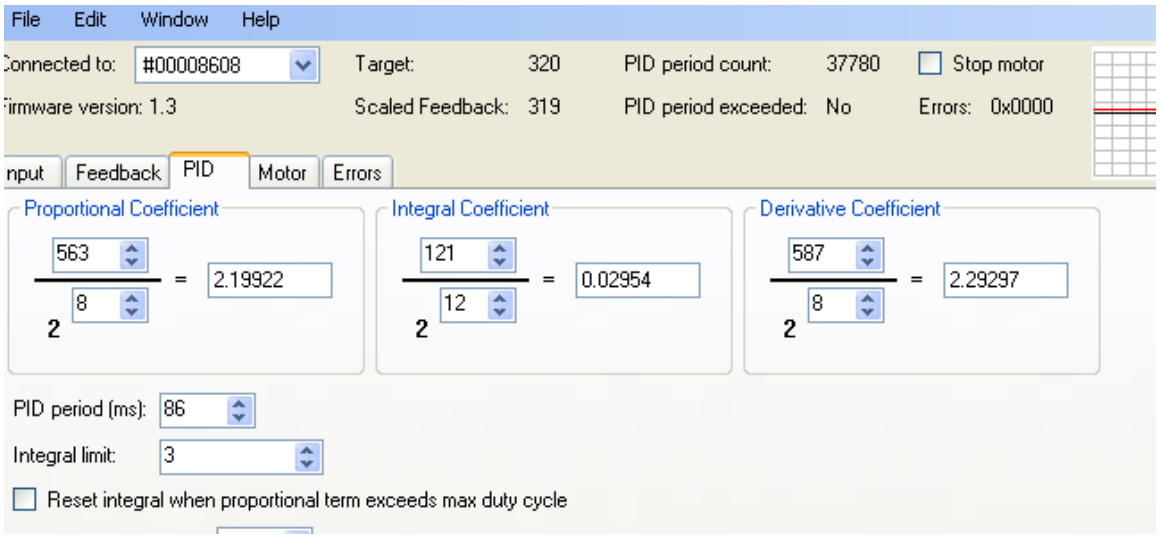
Below is JRK setup (P=0.79980) to move load with full power until within a few degrees of the target when it starts to slow down to approach the target value ever slowly. Note that it never quite gets to the target.



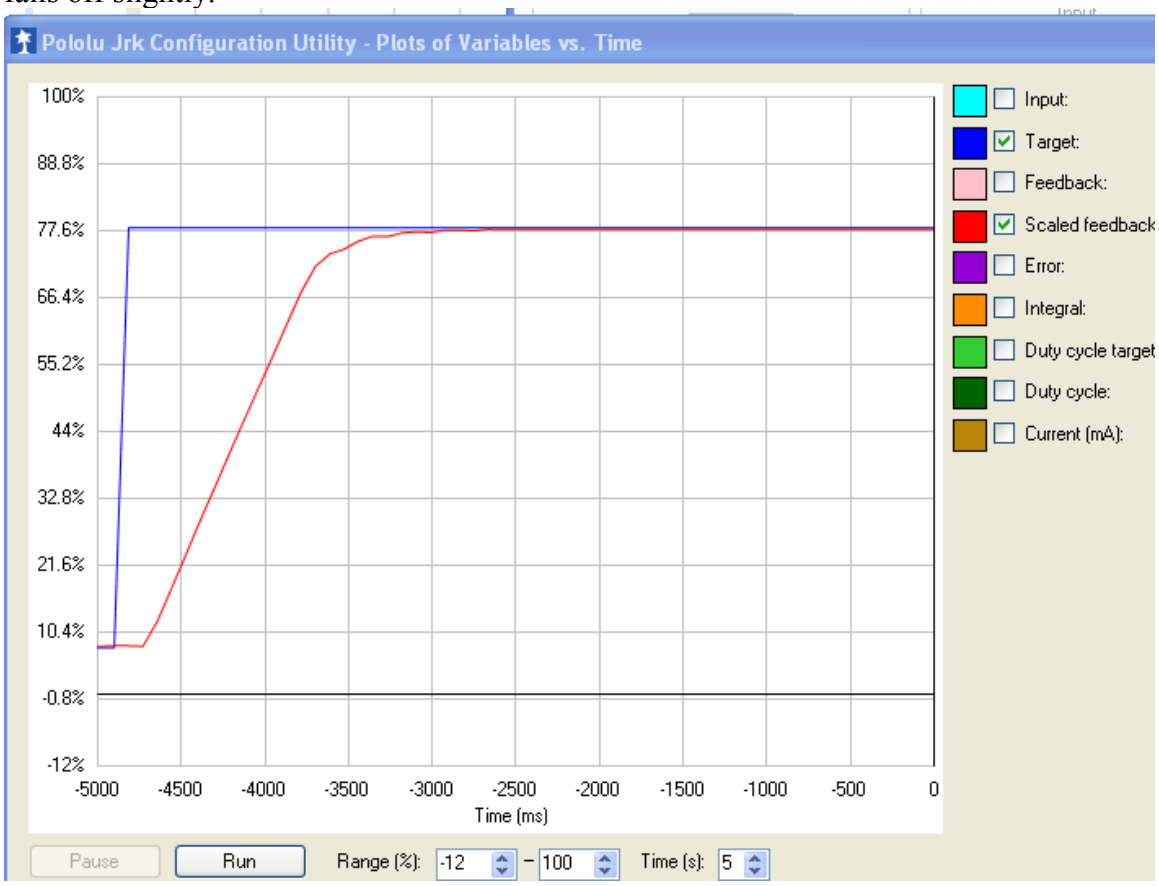


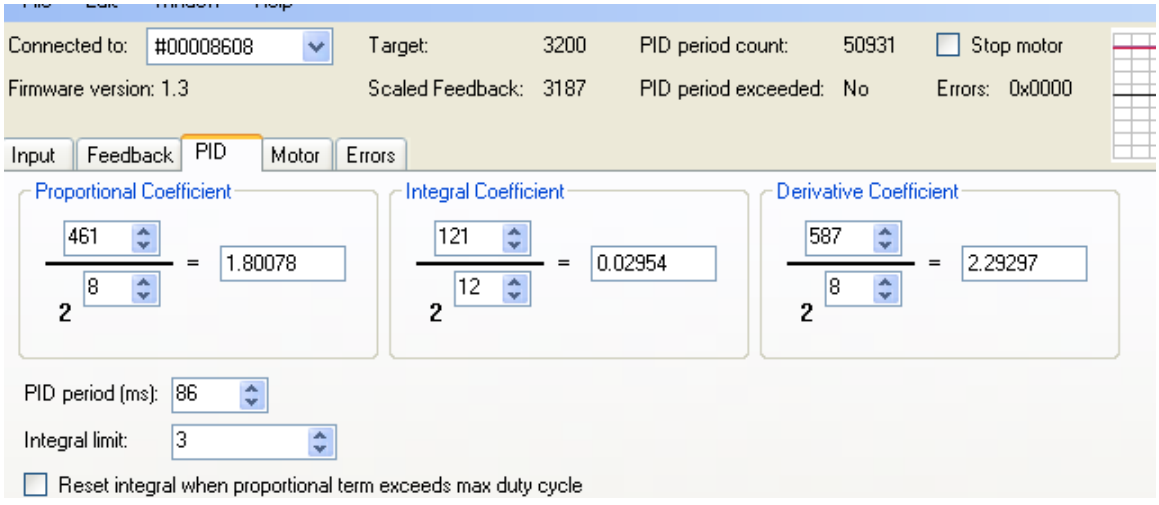
Below is JRK setup (P=2.19922) to move load with full power to the target. Note the accuracy is very good. Target value 320 & Scaled Feedback 319. There are 22 counts per degree.



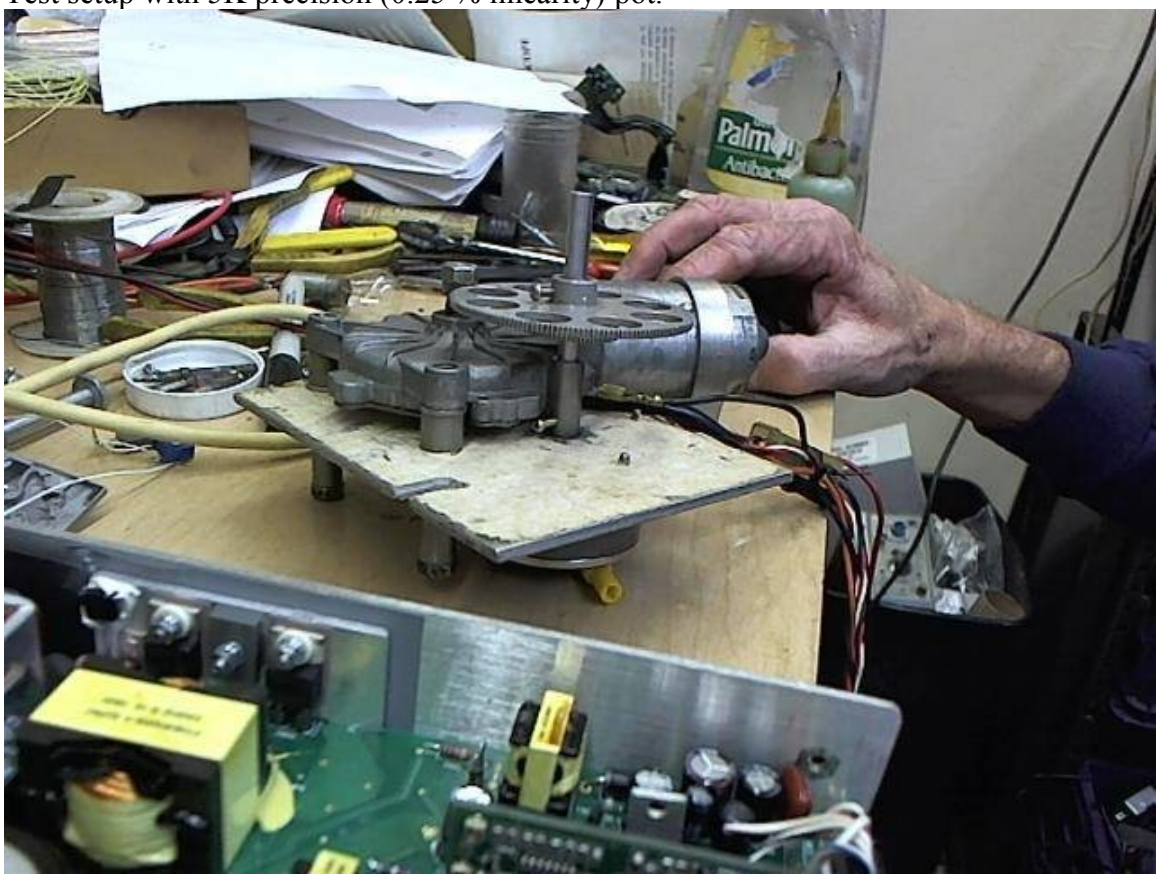


P value set to a compromise value of 1.80078. No overshoot of position but accuracy falls off slightly.





Test setup with 5K precision (0.25 % linearity) pot.



I was wrong about the pots. AB carbon pots do not cut it you need precision wirewound. Value should be above 1500 ohms to minimize loading of the AUX output. Accuracy is slightly improved if the motor power input (12.5 VDC) is regulated.

Conclusion: If you want high accuracy the load relative to power input needs to be as linear as possible. You need to minimize the slop in the drive train. Adverse over shoot effects due to non linearity of load can be minimized by having the gear ratio high enough to move the load only slightly faster than that required to track the target. You need lots of reserve torque.