ASE 375 Laboratory 8: Landing gear drop test

Week of 1 April 2024

The goals of this laboratory are to:

- Learn how a photodiode works
- Perform triggered data acquisition

Lab exercises:
In this lab you will measure the acceleration and stroke of a landing gear undergoing a vertical drop. The goal is to learn how to make triggered, time-resolved measurements.

1. Drop the landing gear from several heights (at least three) and record the transient acceleration (use an accelerometer) as well as stroke. You will have to choose an appropriate sampling frequency to capture the transient. Use the photodiode to trigger the data acquisition.
2. Plot the transient acceleration and landing gear stroke for each test. Discuss the results and the sources of error.

NOTES:

- The circuit for the photodiode is shown in figure 1 - use a bias voltage of 5V and a resistance $R_L = 10\text{k}\Omega$. The output of the circuit V_o will be connected to an analog input channel on the NI 9215 and used as a trigger.
- Use the piezoelectric accelerometer to measure the acceleration of the landing gear.
- Use the rotary potentiometer to measure the angle of the landing gear linkage and calculate the stroke of the landing gear from the geometry of the landing gear shown in figure 2.

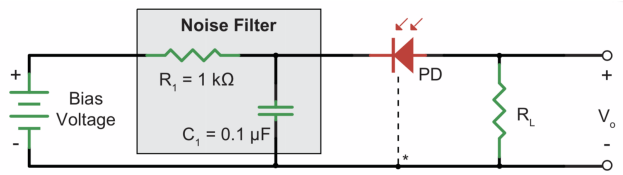

Figure 1: Photodiode circuit

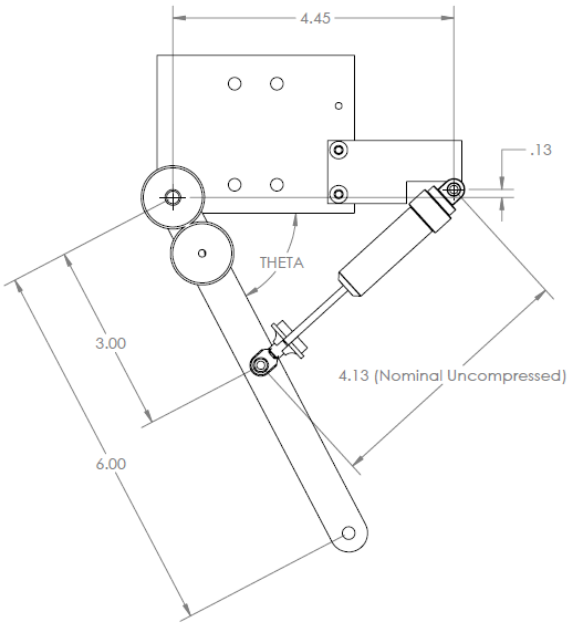

Figure 2: Landing gear dimensions (inches)