1 Data Acquisition

r1c1	r1c2	r1c3
r2c1	r2c2	r2c3

Table 1: Subsystem Specifications

1.1 Design

1.1.1 Data Requirements

Discuss the data needs: thrust, tank pressure, chamber pressure, ambient temperature, chamber (x2) temperature, and tank temperature. Show a diagram of the rocket engine in the test stand with the location of each sensor.

Figure 1: System Diagram

1.1.2 Hardware Discussion

Load Cell Discuss the load cell type, the precision, output voltage, and operating conditions. Discuss the inputs/outputs. Discuss the need for a signal conditioner and how it's used.

Pressure Transducer Discuss the PT types, precision, and inputs/outputs.

Thermocouple Discuss the TC types, precision, and inputs/outputs. Discuss why K-type is used. Discuss the need for analog amplifiers and the type used.

DAQ Board Discuss the DAQ board used (NI 6341) and its specifications. Discuss how each sensor is connector to the DAQ board. Quantify the ADC precision for each sensor.

1.1.3 Software Discussion

Discuss the Labview SRT DAQ program: its function, input/outputs, and a view of the front panel.

Figure 2: Font Panel Screenshot

1.2 Manufacturing

1.2.1 Circuit Diagram

Show a circuit diagram of the DAQ system.

Figure 3: Circuit Diagram

1.2.2 Physical Schematic

Show a physical schematic of the DAQ system in the junction box.

Figure 4: Physical Schematic

1.2.3 Communication Schematic

Show a schematic of the DAQ system communication (Control Room — External Computers — DAQ Boards — Junction Box — Sensors)

Figure 5: Communication Schematic

1.3 Testing

1.3.1 Noise & Filters

System Noise Characterize the system noise and its source(s). This should include an FFT.

Filter Design Design an analog filter for the Thermocouples.
Discuss digital filters for the Load Cell and Pressure Transducer data.

1.3.2 Sensor Calibration

Load Cell Discuss load cell calibration, with regards to Gain and Balance. Show calibration curve(s).

Pressure Transducer Discuss Pressure Transducer calibration technique(s) and results.

Therocmouple Discuss Thermocouple calibration technique(s) and results.

References

[1] Fernandez, M.M., "Propellent Tank Pressurization Modeling for a Hybrid Rocket," Thesis, Mechanical Engineering Dept., Rochester Institute of Technology, Rochester, NY, 2009.