Space Grant 2015 Post Flight Report

University of Illinois

Student Space Systems

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Flight Summary

The flight of the Student Space Systems rocket at the Midwest Competition was not a success. The parachutes on the dart failed to deploy, and the dart came down ballistic. The booster was recovered in flyable condition, but the dart was not intact upon recovery.

All electronics onboard the dart were damaged beyond repair, and we were not able to extract any data from either the Altimeter 2 or the Stratologger. The Altimeter 2 and Stratologger aboard the booster were recovered intact. While we were able to get a maximum altitude from the booster's Stratologger due to the beep code, we found that we were unable to download data to a laptop from the altimeter. We would like to note that this altimeter may have been defective. During launch prep the morning of the flight, the Raven 3 altimeter on our dart was damage, along with its switch. Fortunately, we had brought a backup Stratologger. This altimeter was found in a package labeled "defective", and we never had the chance to test it properly. For safety purposes, this potentially defective altimeter replaced the flight-tested Stratologger on the booster, due to the motor-ejection of the booster. The flight-tested altimeter was placed on the dart.

We believe that, during the ascent, the wires connecting the battery to the Stratologger on the dart may have come loose, leading to the parachute failure. We were unable to perform a complete analysis due to the destruction of the avionics payload on the dart. However, this seems to be the most likely possibility, as neither of the ejection chargers were ignited when we recovered the dart.

The end result of the flight is that the only data we have is the max height of the booster, 2434 feet. We believe this to be close to the max height of the dart, as we did not observe them separating mid-flight. We observed this behavior during our test flight, where the booster and the dart achieved a separation of less than 200 feet.

Flight Performance Comparison

	Predicted	Actual
Booster Max Altitude	1600 ft	2434 ft
Dart Max Altitude	3900 ft	Unknown (believed ~2500ft)

The discrepancy in max altitude between the predicted and actual flights for the booster is most likely due to the separation failure. The momentum of the combined rocket carried the booster to a height several hundred feet higher than it would have achieve on its own. Indeed, when we ran a simulation of the booster dart not separating, we achieve a maximum altitude of roughly 2400ft.