



Guided Parafoil High Altitude Research

Problem Statement

- Limited experience and data related to high altitude performance of ram-air parafoil parachutes
- High altitude balloon drops will expand the knowledge of ram-air aerodynamic behaviors at high altitudes and validate advanced guidance algorithms and parachute designs
- Potential application to space system recovery and interplanetary descent and landing systems requiring increased crossrange and landing precision

Technology Development Team

- PI: Bill Gargano, Airborne Systems New Jersey, bill.gargano@airborne-sys.com
- Airborne Systems
- 5800 Magnolia, Pennsauken, NJ
- 1-856-663-1275

Proposed Flight Experiment

Experiment Readiness:

- A similar payload (ram-air parachute and lightweight guidance unit) has been dropped 15 times at low altitude
- The components will be integrated with a drogue and repackaged into an aerodynamic drop fixture for this test
- The drop test payload will be ready within 90 days of award of flight opportunity

Test Vehicles:

- NSC SBS Balloon System

Test Environment:

- Airborne Guidance Unit and ram-air parachute have flown at altitudes up to 25,000ft
- We propose balloon drop tests that will incrementally increase the altitude up to 55,000ft

Test Apparatus Description:

- Payload will consist of an aerodynamic drop test fixture, guidance unit, ram-air parachute, high speed drogue, test instrumentation including video, and pressure/temperature transducers



Technology Maturation

- Current TRL of tested components are level 4
- Proposed testing will enable maturation to level 6 through testing in a relevant environment
- Components will be integrated into a system and tested at expected operational environments and conditions

Objective of Proposed Experiment

- Demonstrate low density/high velocity ram-air deployment and flight
- Demonstrate high altitude ram-air guidance algorithms and ability of the AGU to adaptively shape the parafoil during flight
- Demonstrate sequential staging using the new lightweight high altitude guidance unit
- Aerodynamic flight data will be used to advise next generation ram-air parachute designs for high altitude applications