Landing on Mars: Operations Engineering

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Background

Preliminary Research AerodyNamic Design To Land on Mars (PRANDTL-M) is a glider with a two-foot wingspan, weighing less than twelve ounces. This lightweight efficient design gives a higher glide range, and makes it significantly less expensive to launch than conventional aircraft. The PRANDTL-M glider is being tested, redesigned, and is having scientific testing equipment installed. The added weight of the instruments compared to the original design of the vehicle led to a change in its moment of inertia, which caused instability. Several flight tests, in which the glider or its components were launched and analyzed, were conducted with variations on the dihedral and sweep angles to determine the best combination for a stable flight, as well as to ensure the functionality of the scientific equipment installed. The operations engineering position for this project focused on managing flight tests, being responsible for configuration control, and overseeing safety protocols while conducting tests. The success of this aircraft and its mission would greatly improve current knowledge about the Martian environment.

Methods

As Operations Engineering Student Lead, I was responsible for scheduling and directing flight tests, compiling all necessary flight documents, and ensuring proper documentation of flight tests and vehicle configurations.

- Multiple drop tests were performed for the PRANDTL-M from 500ft altitude.
- The Carbon Cub was used to drop the PRANDTL-M
- Carbon Cub was also used to test the autonomous flight system that will be installed on PRANDTL-M at a later date
- DROID was flown carrying PRANDTL-M imaging equipment to test the imaging system for functionality.

Other Projects

- Assisted in constructing and presenting a safety training program for the Model Lab for NASA Armstrong interns.
- Researched applications of new teaching tools for physics classrooms at both high school and college levels.
- Completed wiring for the Carbon Cub (shown below)

Conclusion

- Drop tests continue to improve, but PRANDTL-M is suffering from inertial coupling issues.
- The Carbon Cub's flight was very successful, requiring only one minor adjustment to fly autonomously

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