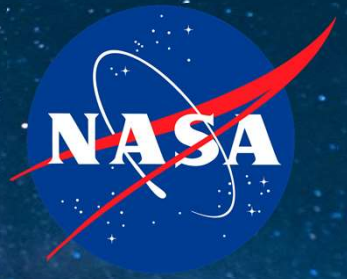
Balloon Payload Workshop

Testing



Partner

Payload Testing

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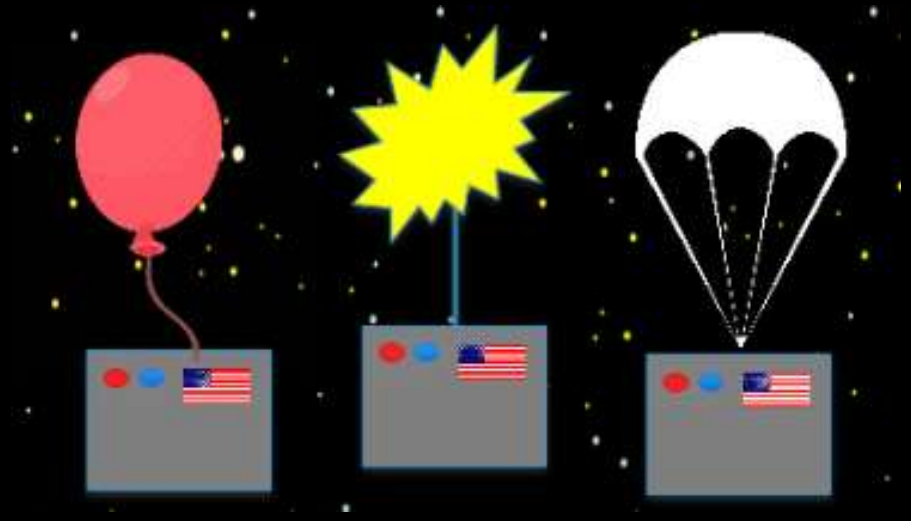
Payload Test and Analysis Requirements

Test & analysis of the payload shall be performed to ensure survivability and mission success. All tests shall be documented and/or recorded and made available at the launch readiness review.



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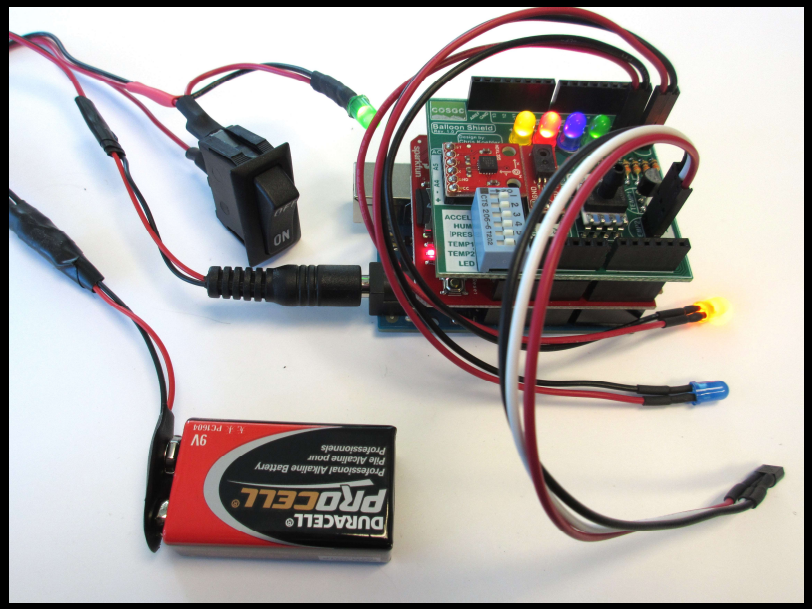
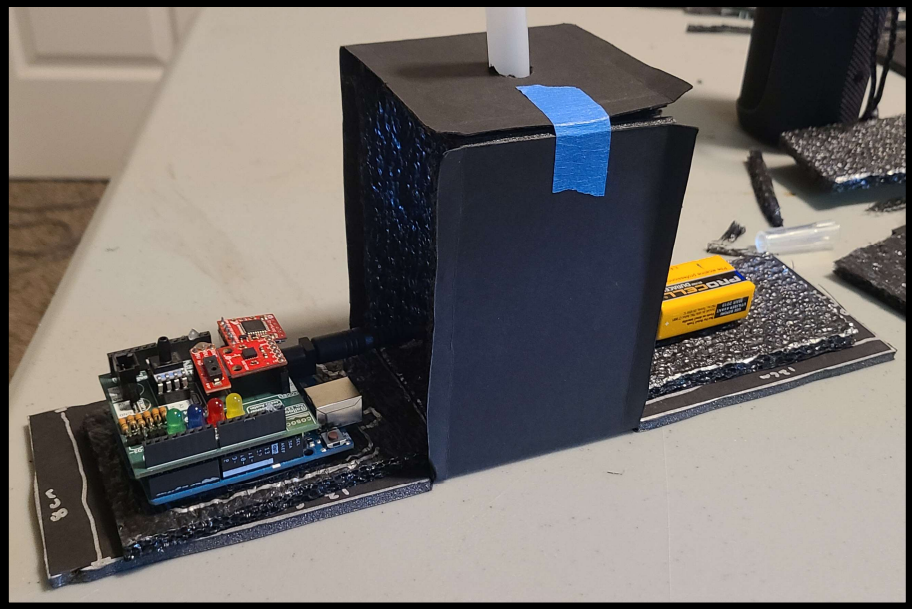
It is recommended that all subsystems be tested independently before integration. The modules will walk you through this. Be sure everything works independently before integrating into the structure.





Payload Testing - STRUCTURAL

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- Testing required to demonstrate containment and survivability of contents under extreme flight conditions.
- It is your responsibility to ensure safety to other payloads.
- For more sophisticated payloads, it is suggested that a test structure be built and integrated with mass simulators of experiment hardware. This test structure can be used for all structural tests.
- **For your project, since you will use your actual payload, some structural tests will be skipped.**

Payload Testing - STRUCTURAL

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The Whip Test - REQUIRED

- This crude test simulates the post burst environment where maximum g's will be experienced.
- Attach the test structure to a similar flight string cord with knots on each end.
- Spin the payload overhead, spinning the payload as fast as possible.
- At some point, try to impart a directional change to the payload, the more abrupt, the better. This test will take some practice.

Ensures that the flight tube is integrated solidly and that integrated systems will stay in place.

Payload Testing - STRUCTURAL

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The Shake Test - REQUIRED

- This crude test will verify all integration of your components into your structure are sound and will not become dislodged during launch to rattle around during flight.
- Hold the payload between your hands and shake the payload well.
- Toss the payload gently in the air and catch it.

Payload Testing - STRUCTURAL

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The Stair Pitch Test (informational only)

- Pitch a **test structure** down a full flight of concrete steps.
- This test will crudely simulate the worst-case conditions of the payload being dragged across a field after landing due to high winds re-inflating parachute.
- This test can be completed with out hardware installed in the structure (using mass simulators).

Payload Testing - STRUCTURAL

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The Drop Test (informational only)

- Another crude test for the landing environments the payload will experience can be simulated in the Drop Test.
- Drop a test structure from a height of 15 to 20 feet onto a hard surface. This will represent a worst-case parachute landing.
- This test can be completed with out hardware installed in the structure (use mass simulators).

Payload Testing - ENVIRONMENTAL

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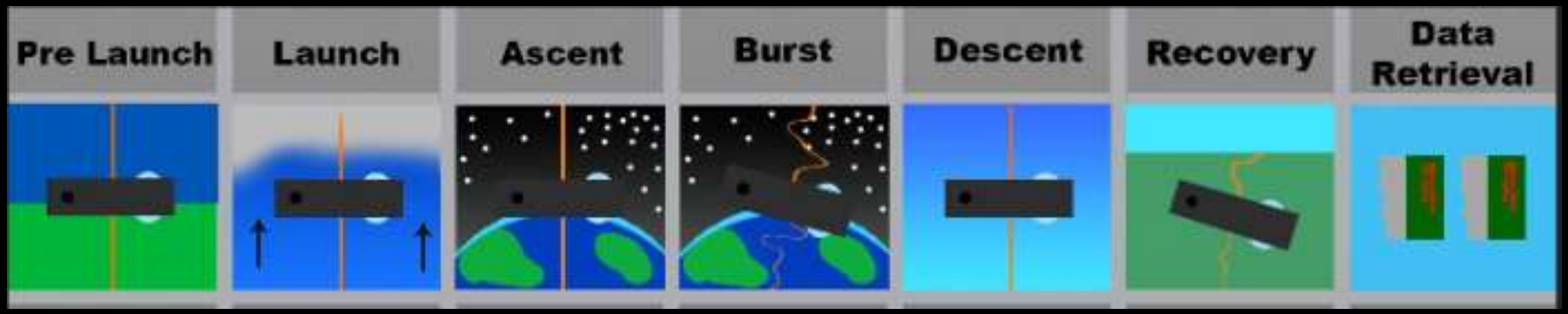
Environmental Testing

The environmental conditions the payload will experience during the flight will be extreme. The following tests simulate some of the worst-case environmental conditions the payload will experience.



Payload Testing - ENVIRONMENTAL

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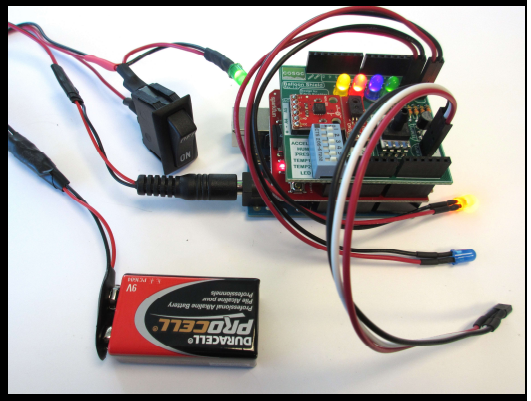
Functional Testing - REQUIRED

- Payload should be operated “on the bench” for the entire mission time - typically 90 minutes during ascent and 45 to 60 minutes during descent.
- This test will ensure that your system is functional for the mission life. Recorded data and failures should be noted. Multiple successful tests should be conducted to ensure mission success. A summary of this testing and the recorded data and failures shall be presented at the LRR.

* In more sophisticated payloads, this test should be performed before the cooler test. If significant failures occur during the cooler test, it may be necessary to carry out more functional testing once the failures have been resolved.



Payload Testing - ENVIRONMENTAL

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Cold Test (informational only)

- Place 7 to 10 pounds of dry ice into a medium to large cooler.
- Distribute dry ice uniformly in the cooler. Place a non-conductive material (Styrofoam, wood, etc) in the center.
- Activate payload, and place the payload onto the non-conductive material, and shut the lid.
- Return in three hours.
- It is highly recommended that a temperature recorder be used during this test. Place a sensor inside the payload and one outside the payload but still in the cooler.

Payload Testing - ENVIRONMENTAL

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Vacuum Test (informational only)

- If a bell jar or other vacuum chamber is available, a vacuum test on the operating flight payload may be beneficial.
- **If the payload has a high voltage device this test is required.**