Full Mission Simulation Report

University of Wisconsin--Milwaukee
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User Notes

• Please follow this template – I expect each and every question in here to be addressed in your presentation, plus anything else you would like to discuss.

• Although it seems short, most items will take multiple slides, and please include data and pictures because they are the best way to show off your awesome payloads!
FMSTR Purpose

By the time this report is scheduled to be reviewed, your payload should have reached a point to where it has been fully integrated and run in a flight condition. This allows you to see if the systems are performing together and collecting data as expected, and to ensure the payload will run for the entire flight. Any action items that come out of this will be critical to complete before the Launch Readiness Review to ensure your payload is, in fact, fully functional and will fly successfully in June.
Pictures

- You don’t need to put all pictures here, this is just a note to please include as many payload pictures from the test and graphs of testing results as possible!
Presentation Outline

• Section 1: Mission Overview
• Section 2: Integrated Subsystem Testing Status
• Section 3: Full Mission Simulation Results
• Section 4: Project Management Update
1.0 Mission Overview

Name of Presenter(s)
Mission Overview

• Through this experiment we would like to observe the effects of rocket flight to the lower atmosphere on bacterial DNA using multiple sensors to measure conditions during the flight.

• We will also observe the effects that minimizing radiation has on DNA through the use of radiation shielding.
ConOps

**Altitude**

- **High Concentration of N2**
  - $t \approx 1.3$ min
  - Altitude: 75 km

- **Apogee**
  - $t \approx 2.8$ min
  - Altitude: $\approx 115$ km

- **High Tumble Rate**
  - $t \approx 4.0$ min
  - Altitude: 95 km

- **End of Orion Burn – Spin Rate Largest**
  - $t \approx 0.6$ min
  - Altitude: 52 km

- **Low N2, Low spin**
  - $t \approx 5.5$ min
  - Chute Deploys

- **t = 0 min**
  - All systems on
  - Begin data collection

- **t = 15 min**
  - Splash Down

-T-minus 3
Changes since STR

• Re-designed plate
  – All holes are M4 or 8-32 (standoffs)
  – Payload physically simplified
  – No physical flaws observed

• Re-designed electronics mounting to one piece
2.0 Integrated Subsystem Testing Status

Name of Presenter(s)
Integrated Subsystem Testing Status

- Mechanical and Electrical systems were integrated simultaneously
Integrated Subsystem Testing Status

- 1.0 Electrical System
- Enough power from battery and power boost
- The electrical system has been fully integrated
- No voltage on the canister
- Test was completed on May 6th
- Additional tests will be conducted over the next month
Integrated Subsystem Testing Status

2.0 Mechanical system

Vibration tests need to be redone with new plate
3.0 Full Mission Simulation Results

Name of Presenter(s)
Full Mission Simulation Results

• Testing completed at UWM
  – Payload mounted in canister for testing
  – Geiger readings ✔
  – Data received ✔
  – Sensors ✔
    • Orientation ✔
    • Acceleration ✔
    • Temperature ✔
Full Mission Simulation Results - Geiger readings

Geiger Counts Per Second - Test 1

Geiger Counts Per Second - Test 2

Geiger Counts Per Second - Test 3

Geiger Counts Per Second - Test 4
Full Mission Simulation Results - Orientation readings

Orientation Test - Degree vs Time (s)

Orientation (°)

Time (s)

Orient_X
Orient_Y
Orient_Z
Full Mission Simulation Results - Acceleration readings

![Acceleration vs Time graph]

- Blue line: High_Accel_X
- Orange line: High_Accel_y
- Gray line: High_Accel_Z

Time (ms) vs Acceleration
Full Mission Simulation Results - Temperature readings

- **Test 1**: Temperature readings range from 27.5°C to 29°C with a steady increase at specific intervals.
- **Test 2**: Temperature readings start at 28°C and increase to 31.5°C with a steady pattern.
- **Test 3**: Temperature readings fluctuate around 30°C with occasional drops.
- **Test 4**: Temperature readings show a steady increase from 25°C to 32°C.

Temperature vs. Time graphs are provided for each test, illustrating the temperature changes over time.
Full Mission Simulation Results

• What action items do you have left between now and the LRR?
  – Vibration Testing
    • TBD
  – Integration with canister partner
    • Sending full new STEP model by end of week
  – Weight and C.G.
    • More weight needed
4.0 Project Management Update

Name of Presenter(s)
Action Item Summary

• Mechanical Subsystem
  – Vibration testing TBD; Searching for new method (previous table not available)
  – Acquire shorter fasteners for some mounting (end of week)
  – Acquire new ballast to meet weight requirement (payload is underweight)
## User Guide Compliance

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Status/Reason (if needed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center of gravity in 1&quot; mid-can?</td>
<td>1.3&quot; currently</td>
</tr>
<tr>
<td>Contained in can</td>
<td>Good</td>
</tr>
<tr>
<td>Connected to can by 4/5 bulkheads on top and bottom only</td>
<td>Good</td>
</tr>
<tr>
<td>Mass at $20 \pm 0.2$lbs</td>
<td>19lb (Currently making 1lb ballast)</td>
</tr>
<tr>
<td>Shared canister clearance</td>
<td>~0.5” from center of can</td>
</tr>
<tr>
<td>No voltage on the can</td>
<td>Good</td>
</tr>
<tr>
<td>No voltage on multipurpose port</td>
<td>Good</td>
</tr>
<tr>
<td>Activation wires at least 4 ft</td>
<td></td>
</tr>
<tr>
<td>Activation wire at least 24 gauge and Teflon coated</td>
<td>22 gauge</td>
</tr>
<tr>
<td>Early Activation: current &lt; 1 A</td>
<td>Good</td>
</tr>
<tr>
<td>T-0 Activation: current &lt; .1 A</td>
<td>NA</td>
</tr>
<tr>
<td>Battery Type</td>
<td>Lithium Polymer (will not charge at Wallops)</td>
</tr>
</tbody>
</table>
Biggest Worries

• No show-stopping worries at this time
  – Vibrational testing - top priority
  – Weight & C.G.
  – Wiring
• User manual to be completed prior to launch
  – All attending members to receive training
  – Dan will not be in attendance
Conclusions

• Issues and concerns?
• Closing remarks

• Discuss Check-In Procedure – you don’t have to put anything here, this is just an FYI that we will be talking about this (I will be quizzing you on it so be familiar!)
• Discuss Presentation to RockOn! 2019
• Discuss Final Report
• Discuss extra launch attendees