NS-62 Debrief

04/05/2017 Debrief of NS-62

* Launched at 9:37AM from Fayettesville, PA; launched 1hr37min after ideal launch time due to late departure from Manufacturing
* Had a number of issues including GPS, GLIDR drop, HELIOS
* Dropped GLIDR, spent 1hr with no comms to or from balloon, got empty cell tracker messages until finally received coordinates
* Payload overviews (from bottom of string, upwards)
  + GLIDR
    - Lot of alterations made the night before; lack of drop testing.
    - Should not have been allowed to fly/drop without proof that it was balanced (esp. due to addition of mass)
    - Should have been tested repeatedly ahead of time
    - Good location; no trees or highway. Assuming EMI problem is not associated with Chambersburg, the site was very good.
    - GPS is likely dead from impact, also dropped before problems started -> exempt from bench test of electronics/payload string test
  + MARS
    - First time triggered in flight using LINK, although only a few thousand feet up
    - -60 degrees – actuator stopped working, need to prove that the thermal issues are resolved before higher altitude drops are conducted.
    - Lost contact with LINK at 9:59AM; most likely due to cloud cover since it relies on line of sight communications
    - Had to command 4 times over 20sec; received acknowledging packet on 4th command
      * May have been due to the fact that the response is only sent after the actuator is triggered; will be changed to respond when command is received and when actuator is retracted.
  + Bach’s box
    - Had issues with communication
    - Radios worked perfectly on the ground the night before; had interference with radios on the launchpad. No apparent issues with code; LoRa was sending out packets and something was receiving them, but it was not the server. Could be the GPS, since the unit in the box needs to be replaced. Worked on ground post-flight
    - Good job de-scoping payload when LoRa was malfunctioning
  + Glen Elg
    - Pictures were good, box stayed intact, no apparent problems with payload
    - Data has not been reviewed yet.
  + BASIC
    - Had a lot of sensors, flew GPS unit on behalf of CMD
    - Unsure about O2 sensor – was ordered and installed last minute
    - Flew BMPs, CO2 sensor, and other flight-tested sensors
    - Killed a LiPo because they neglected to wire in a LVC
    - GPS unit did not output data multiple times as it did with FLI (i.e. no choppy data); most likely due to the parse rate of the data (FLI used a higher parse rate than the Adafruit GPS unit could handle)
      * Failed after 10000m
  + IRENE
    - Logged data well, did not get high enough to get requisite data
    - Lack of good GPS data poses slight hindrance to data analysis
    - Will be included in bench test for the sake of completeness
  + Mini Command
    - GPS issues – HABduino lost GPS lock as soon as box was closed, never got GPS lock again
      * HABduino flown on the flight was new not flight-tested
      * Use 8 and 12 in future – all others are new or have been re-flashed due to Ardunio Unos attached to HABs being separated
        + Arduino Unos should never be reflashed with code unless changing callsign (which shouldn’t happen anyways)
        + 13,14 are the new HABduinos that require flight testing
    - Cell tracker lost GPS after 8000m, was unstable for a while, regained GPS after landing
    - Issue: lack of redundancy. Big Command designed to have backups in case of power failure, plus multiple
    - May add another battery+LVC to provide separate cell tracker power supply
    - Antennas need to be pointing towards the sky
    - Assuming that it is tested and that we are confident in this and command, we still may be able to fly two balloons, else we may have to de-scope
  + Big Command
    - -8 (top panel)
      * Cell tracker lost GPS at 12000m; got lock at certain points on ascent and descent; no consistency. Did not know if it had lock until receiveing text messages after landing
      * HABdino lost GPS at 27000ft
        + Lost GPS lock, got it again after landing
      * All connected to 1 power supply; no power issues apparent on failure analysis
    - -12 (bottom panel)
      * Lost lock at 12000ft, powered by individual power supply, got lock again after landing
      * No apparent power issues
  + HELIOS
    - Lost box mid-flight (sometime after burst but not in vicinity of due to securing with zipties and duct tape
      * Zipties broke because of cold, will be replaced with thin paracord
      * Duct taped item will be placed inside box and glued
      * Lost an Adafruit Feather
    - GPS was supposed to be in box but was pulled out due to issues coding it
    - Probably would not have worked due to cloud cover inhibiting LINK
      * Very low chance of valve opening during flight. Would have had to fail in 2 different ways
      * No commands were sent (due to lack of response from LINK)
    - Would like to use Balloonduino
    - Filling the balloon seemed to work (100psi/min).
      * Filling process took 45min (overfilled balloon)
    - Will be redesigning box to be horizontal not vertical to avoid board-board contact, and using larger components
      * May be slightly heavier
* GPS issues
  + May have been due to destructive interference between multiple GPS units
    - Unlikely due to the fact that GPS is passive
  + Could be due to antenna orientation and proximity between GPS units, resulting in jam
    - Similar to past tests with Tyrion’s antenna placement being important in avoiding interference from LoRa/omnidirectional antennas
    - MiniCommand’s antennas were pointing to the side as opposed to towards the sky, which raises other issues
  + May have created a Faraday cage
  + It is NOT due to Raven Rock jamming the 1.5GHz frequency!
  + Tomorrow (Thursday@5pm) testing will reveal more about it
* De-scoping for next launch
  + Depends on confidence in command
  + May not fly or may avoid flying expensive hardware
  + RockSat will not be flying for sure
* Radio interference test – tomorrow at 5pm in Manufacturing conference room
  + Stack everything in as close to flight config as possible (including parachute and strings). Will be basing on photos taken by Sky on launch day.
  + HELIOS is unable to participate, GLIDR is exempt and has already been disassembled
  + May try turning off one of the command modules to see if it has any effect.
    - Might look into possibility of one of the two command modules having rotated in relation to each other (unlikely given the way that they were attached)
    - Minicommand’s issue was primarily the antenna placement
  + Will have to conduct test outside for it to be a valid test, and ideally vertically
    - Turn everything on inside the conference room, then take it outside
    - Hang payload string over edge of Terp Trail Garage by cantilevering a long pole
    - Trees are not a good test because it obstructs the GPS signal; also buildings may interfere.
  + Incrementally try different configurations to see what works
  + **TL;DR: NEED ONE REPRESENTATIVE FROM EVERY PAYLOAD TO BE THERE (except for HELIOS and GLIDR, who are exempt)**
    - If you can’t be there, send someone who knows how to turn on/set up/turn off your payload.
* Drop procedures
  + Drop testing before flights (repeatedly over the course of a week) is important
  + Should be ready for flight at least 1 week in advance if dropping
  + May abstain from dropping anything for the rest of the semester, but our last drop was in a safe location
* May reimplement flight rule (go/no go checkpoint) – if payload not complete (full physical configuration) by 5pm the night before the launch, you cannot fly the next day
  + 5pm mandatory payload check; if there is a quick fix, you have until 8pm.
  + Tie-in immediately after the meeting
  + Software cutoff between 8pm (up to this point you can still edit code while your payload is on the string)
  + Waiver if you cannot physically be present; deadline for review can be extended to 8pm the latest
  + Bring in the completed payload to the Friday meeting 1 week before launch
  + Authority to determine something as being unsafe to fly
    - Might consider designating a small group of people (3-4 people) with authority to make the final call about safety (most senior/experienced people)
    - Anyone else who spots a potential safety issue should definitely mention it

Intro

* Summary of events
* Purpose & format of meeting
  + Go thru each payload from the bottom of string up
  + General safety announcements
  + Radio interference test

GLIDR - exempt from radio test

* Night before alterations
* Drop testing
* Location picking/procedure was good!

MARS

* Worked! (in flight thru link for the first time)
* Resolve thermal issues for higher drop

Bach’s Box

* Lora stuff?
* Good descope :)

Glenelg

* Update from Tyler?

Basic

* Updates
* Ji’s GPS data?
  + Dead LiPo

IRENE

* Updates?

MiniCMD

* GPS/Power issues
* Dead LiPo

CMD

* GPS issues
* Link

Helios - “exempt” from radio test

* Pre launch Friday functionality
* Structures!

General safety

* Drop procedures
* Payload construction
  + Mandatory pre-launch payload check (flight configuration)

Radio interference test

* 5pm Thursday, MFG
* Fully assembled payload string
  + Need EVERY payload that flew!!!!!!!!!

**MEETING MINUTES**