CP9 – StangSat Systems Overview

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10th Annual CubeSat Developer's Workshop

April 24, 2013

CAL POLY

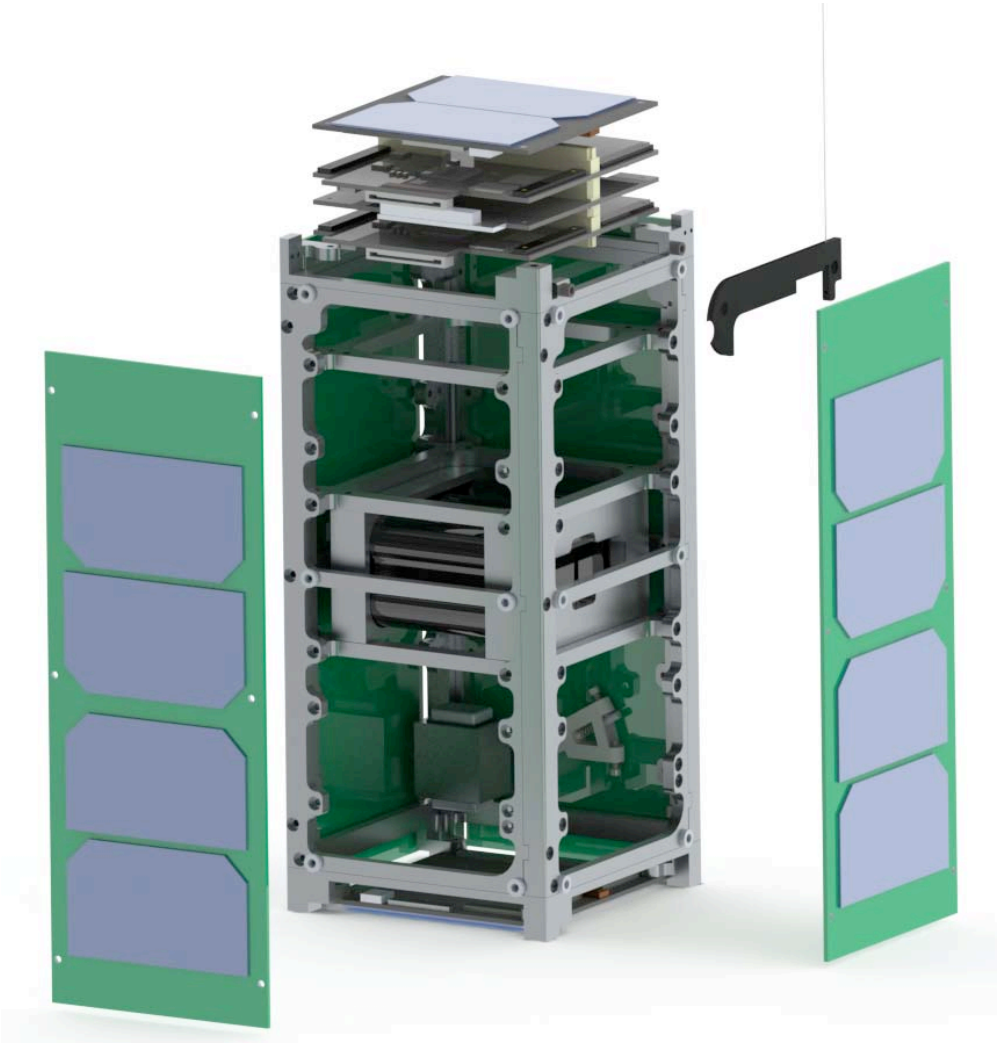
Agenda

- Mission overview
- Collaboration
- CP9 spacecraft details
- Future development

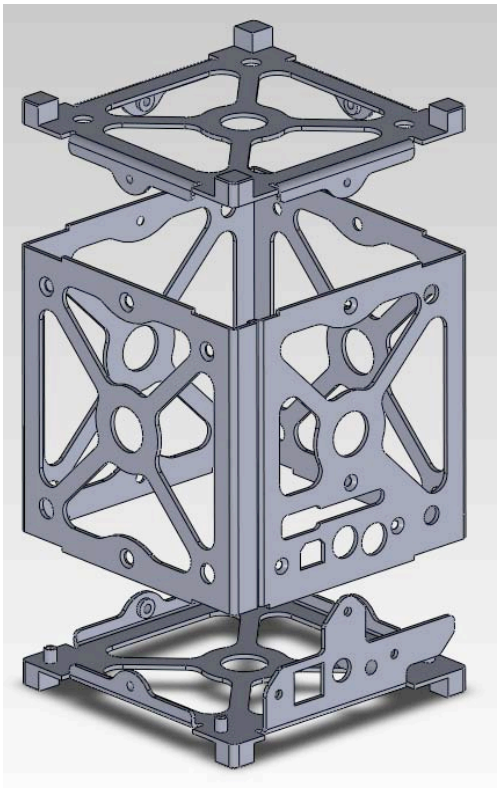
Mission Overview

- NASA Launch Services Program (LSP) telemetry study
  - Record dynamic and thermal data during launch vehicle flight
- Collaboration between Cal Poly, Merritt Island High School, Kennedy Space Center
- Cal Poly designs a 2U payload, CP9
- MIHS designs a 1U payload, StangSat

CP9

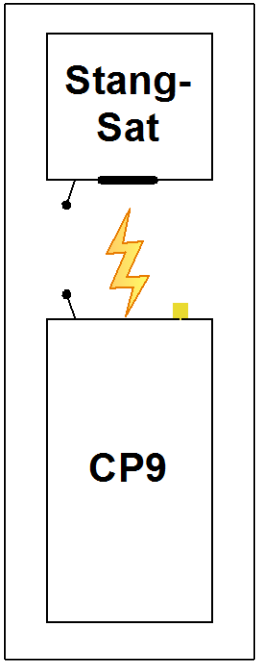


StangSat



Mission Overview

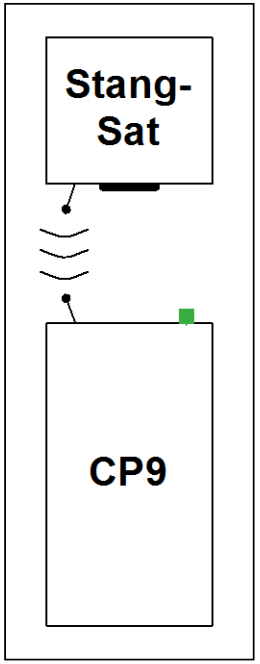
T-0 + ~500ms



Power On

CP9 sends StangSat a serial optical command to power on.

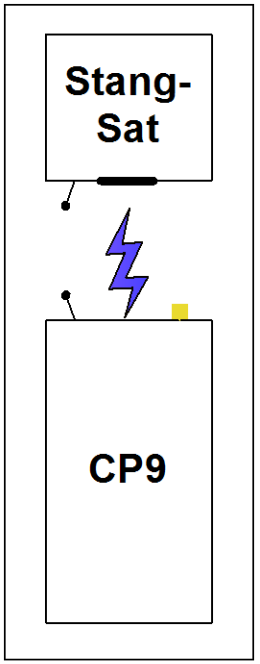
T-0 + ~15s



Transmission

StangSat streams data to CP9 continuously once the CTS C&DH board has booted

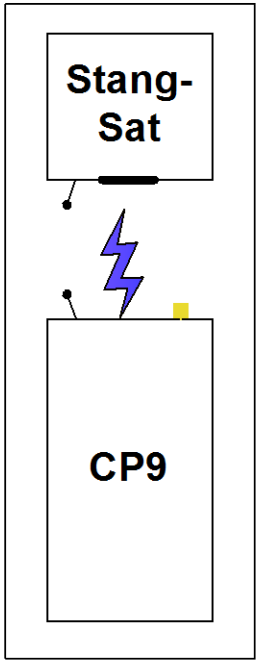
T-0 + 35 s



Launch Abort

If CP9 detects a launch abort, a command is sent to StangSat and both power down

Ejection - Y s



P-POD Ejection

Y-seconds before P-POD ejection, send optical command to cease data transmission and power off wifi modules

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STEM In Action

“I wish I had this back in high school! I didn’t do this kind of work until I was a junior in college. This is what STEM should be.”

–Mentor Shaun Daly

“I've never done what the students are doing, even as a Satellite Mission Manager. I want to inspire the next generation.”

-Teacher Sponsor Tracey Beatovich

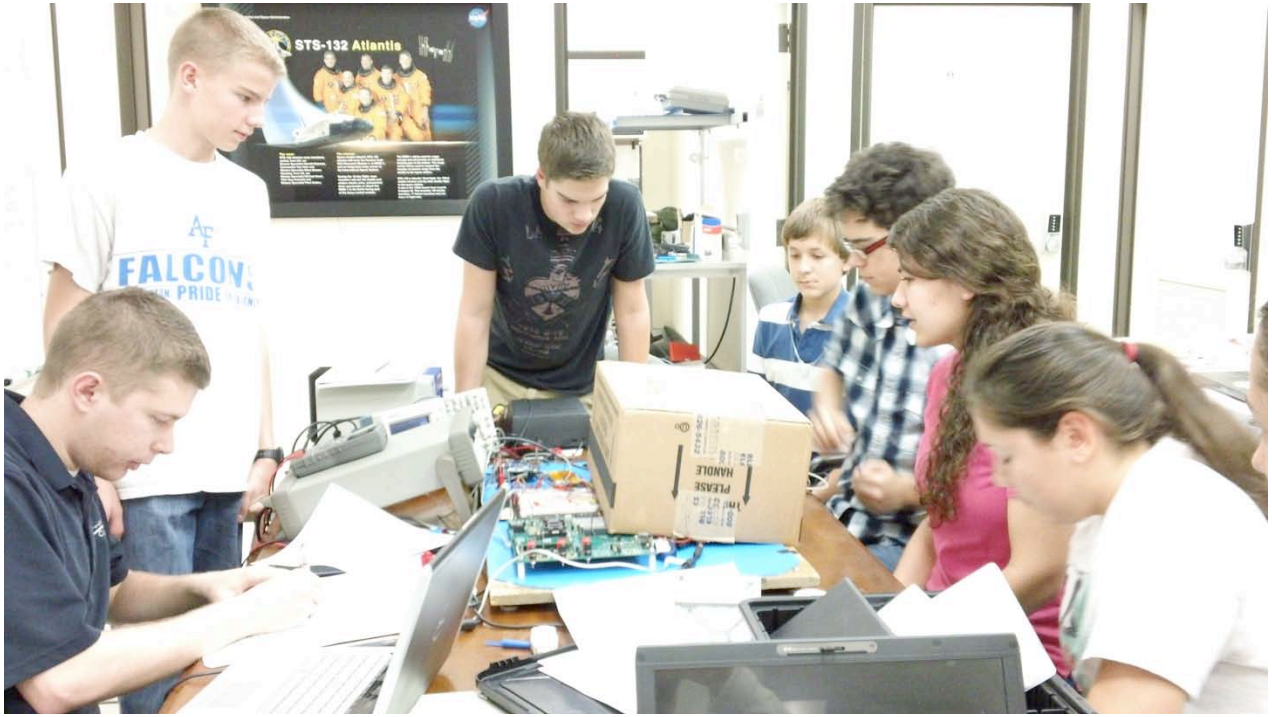
Wireless Interface

- Both CP9 and StangSat must comply with an Interface Control Document (ICD) that describes the wireless interface

- Interface includes
  - Wireless modules on each spacecraft
  - Blinking LED on CP9
  - Phototransistor receiver on StangSat

Integrated Testing

- In December 2012, two students from PolySat flew to Florida to test different aspects of the interface



- Tested and validated LED commands

CubeSat Launch Initiative Proposal

- Both teams collaborated to author a proposal for the CubeSat Launch Initiative
  - Mission was selected in fourth round of ELaNa

- Miscellaneous
  - Teams meet weekly for status updates
  - Software development meetings

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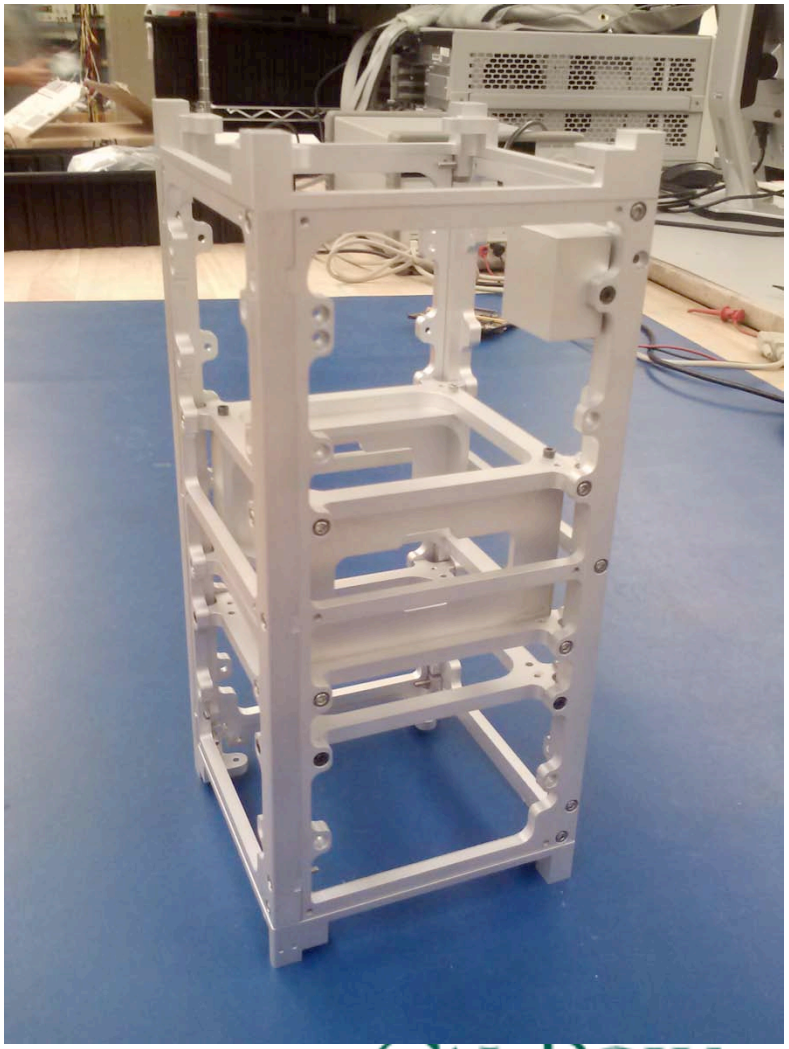
Processor

- Using two Tyvak Intrepid system boards
- Command and Data Handling board
  - Embedded Linux OS
- Telemetry board
  - Programmed in C
  - Used strictly for data acquisition

Tyvak.com

Structure

- Using the Cal Poly-developed Hypercube platform modified to a 2U form factor
- Modular design, easily adjusted bracket mounts



Accelerometers and Thermocouple

Measurement Specialties model 832M1-0025	Range: +/ 10g	
Measurement Specialties model 832M1-0100	Range: +/- 100g	
K-type thermocouple	Range: -25 –125 degrees Celcius	

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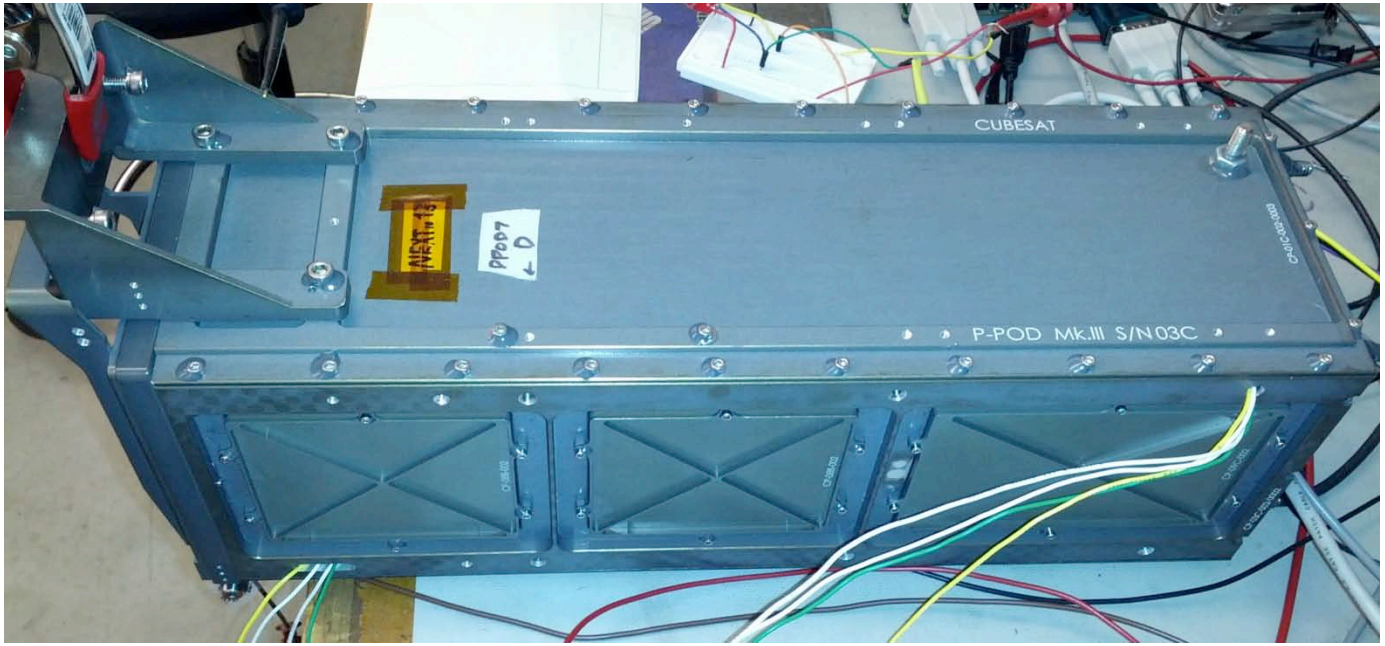
More Integrated Testing

- Two students from PolySat flying to Florida in May to verify remaining ICD requirements



Garvey High Altitude Launch

- Flight scheduled for June 15, 2013
- Mission will fly in flight configuration inside the PPOD
- Teams will work together to integrate spacecraft before launch
- Both teams will be present at the launch site

Garvspace.com

Questions?

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