SOCEM: Sub-Orbital CubeSat Experimental Mission

2009 Summer CubeSat Developers' Workshop

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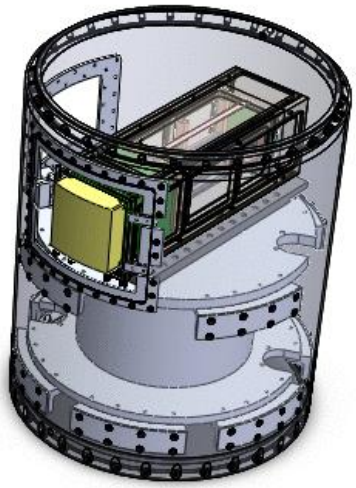
Anthony Karam

Space Systems Laboratory

University of Kentucky

Overview

- **S**ub-
- **O**rbital
- **C**ubeSat
- **E**xperimental
- **M**ission

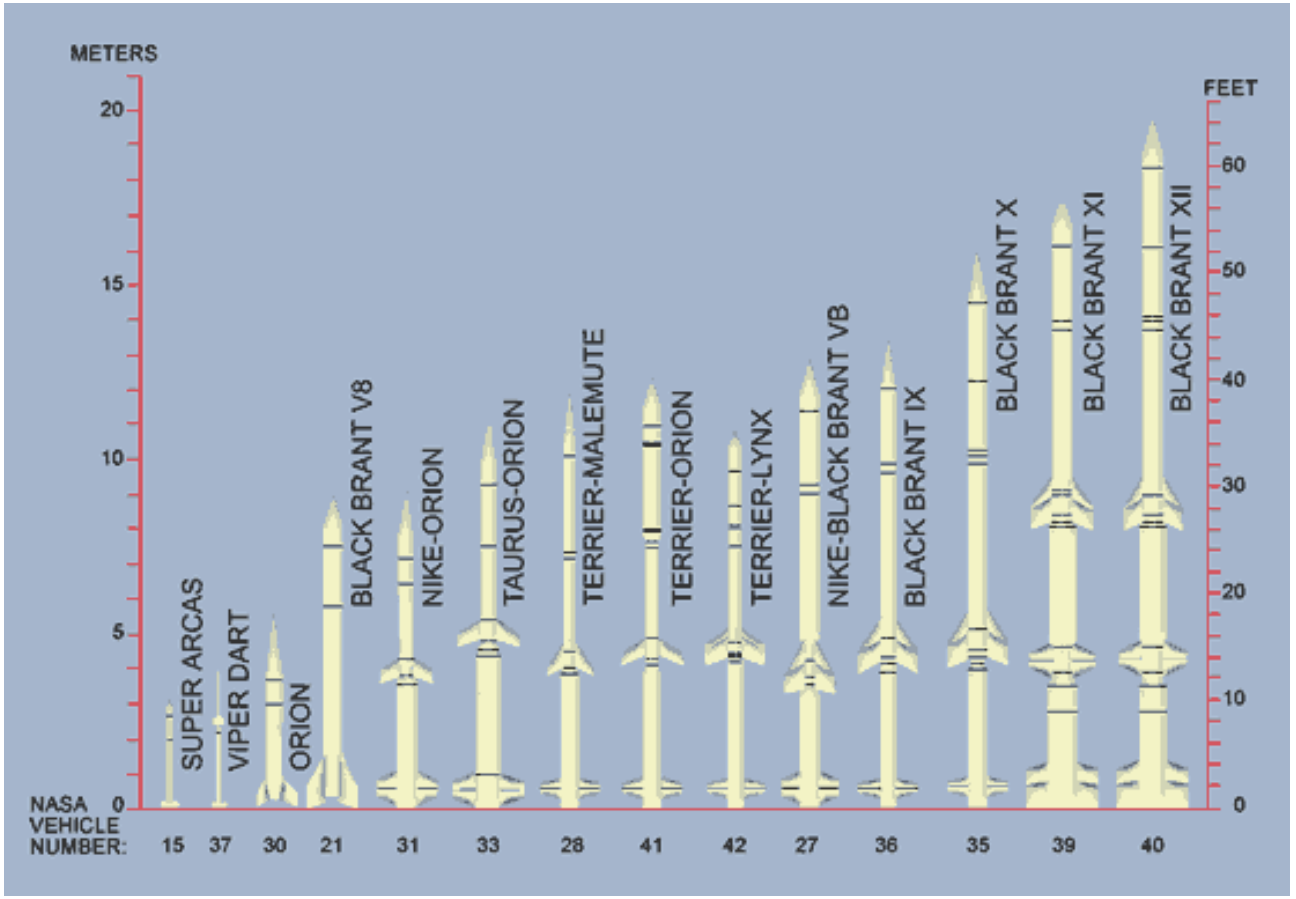


Mission Profile

- NASA Sounding Rocket Program Office
- Terrier Improved Malemute, 17” dia.
- Mission
  - feasibility of launching CubeSats from the Wallops 17” sounding rocket form-factor
  - Once ejected, the CubeSats will carry out experiments and return data to ground stations on site and in Kentucky

Payload Section

Wallops Sounding Rockets

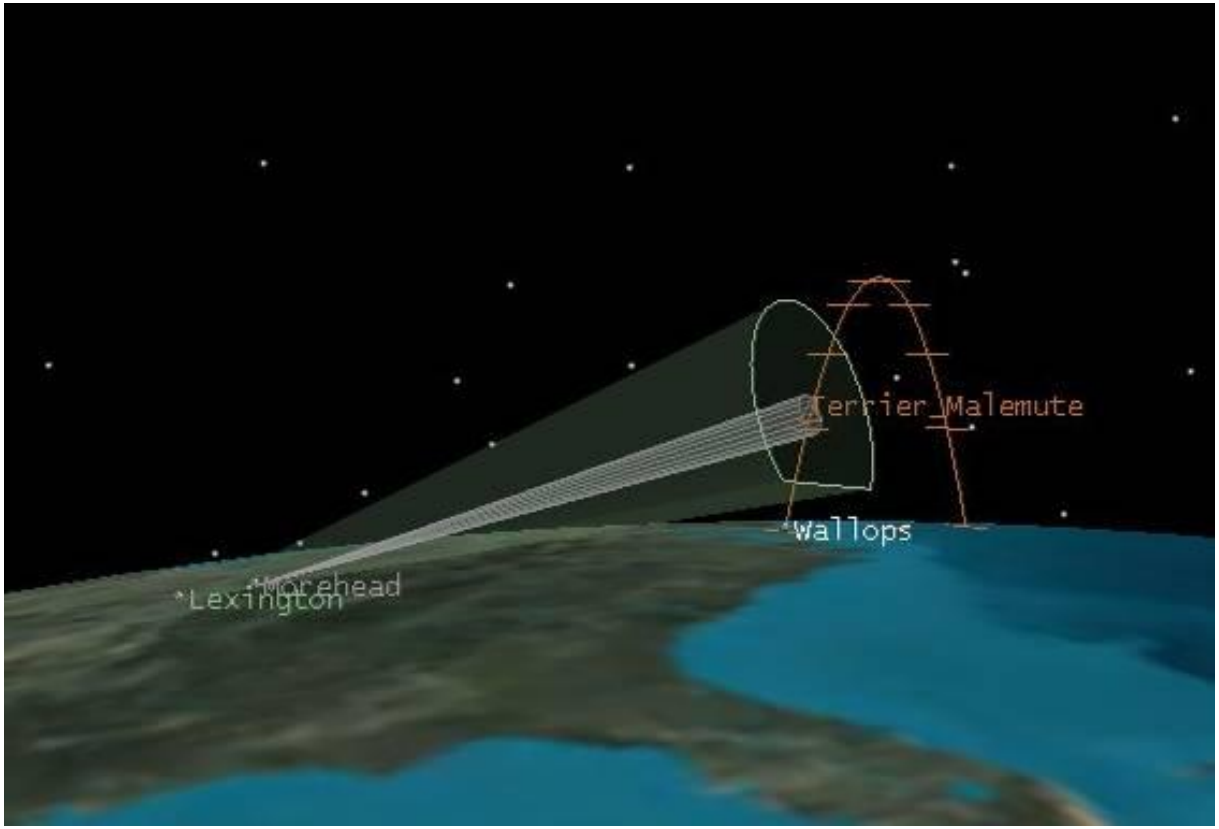


Terrier-Malemute

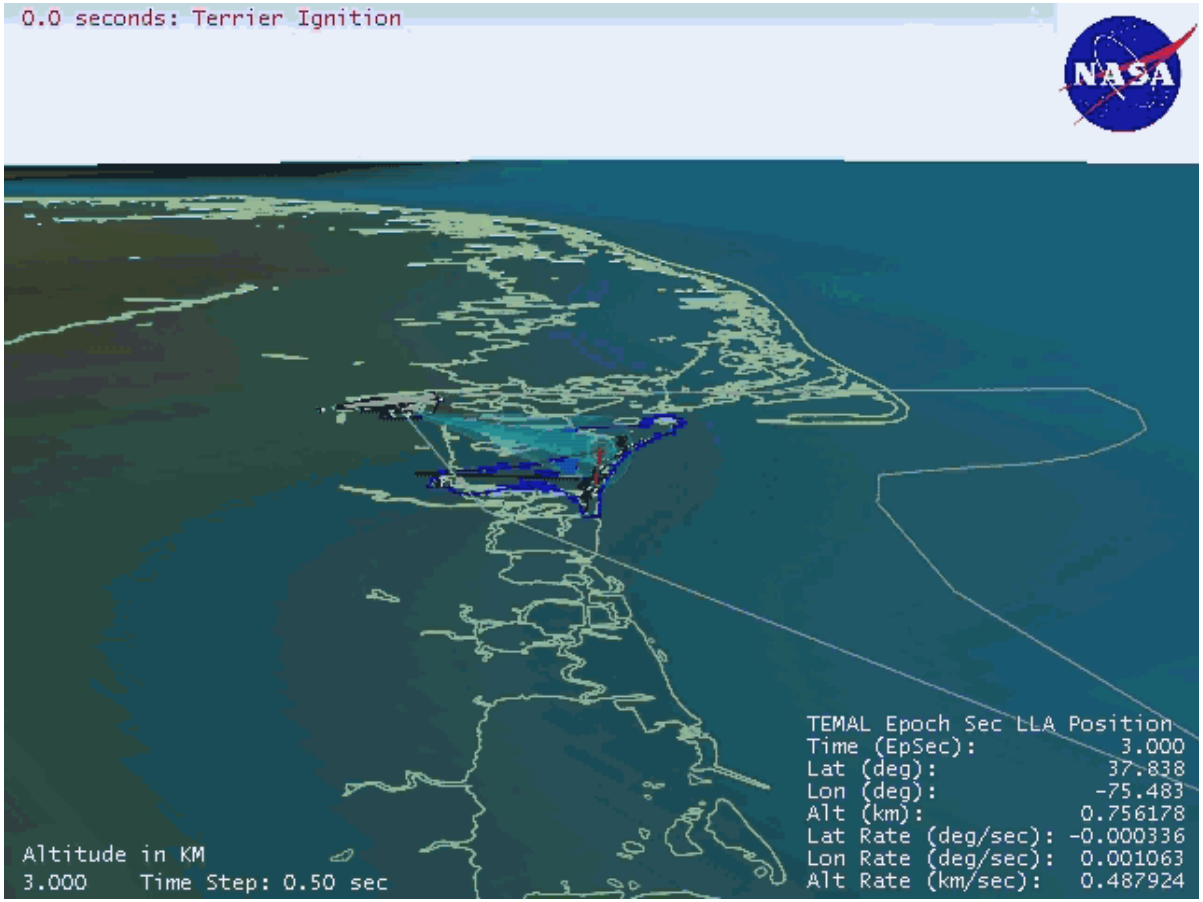
The Terrier-Malemute is a two-stage, solid fuel rocket consisting of a Terrier 1st stage and a Malemute 2nd stage. It is capable of lifting a 200 lb payload to an apogee of approximately 700 km or a 500 lb payload to approximately 400 km.

Mission Timeline

- 2nd Stage Burnout (~M8, ~20 km)
- Door Deploy (~M5, ~100 km)
- Apogee (~M1, ~300 km)
- Ocean Impact (~M6)

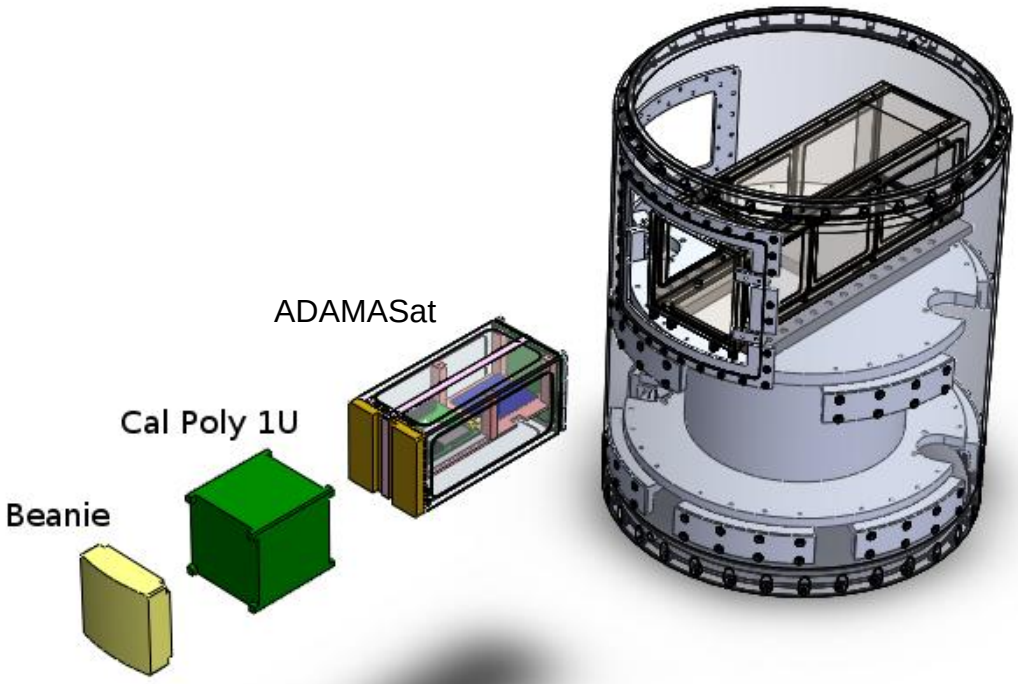


STK Simulation of a Similar Mission

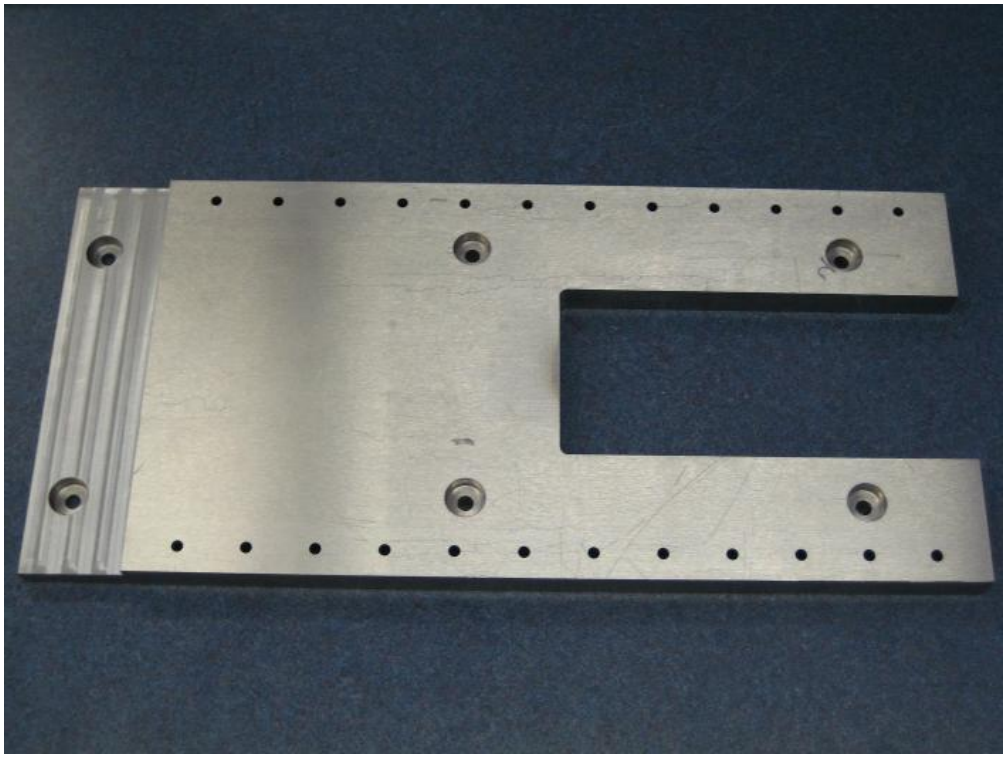


Parts Overview

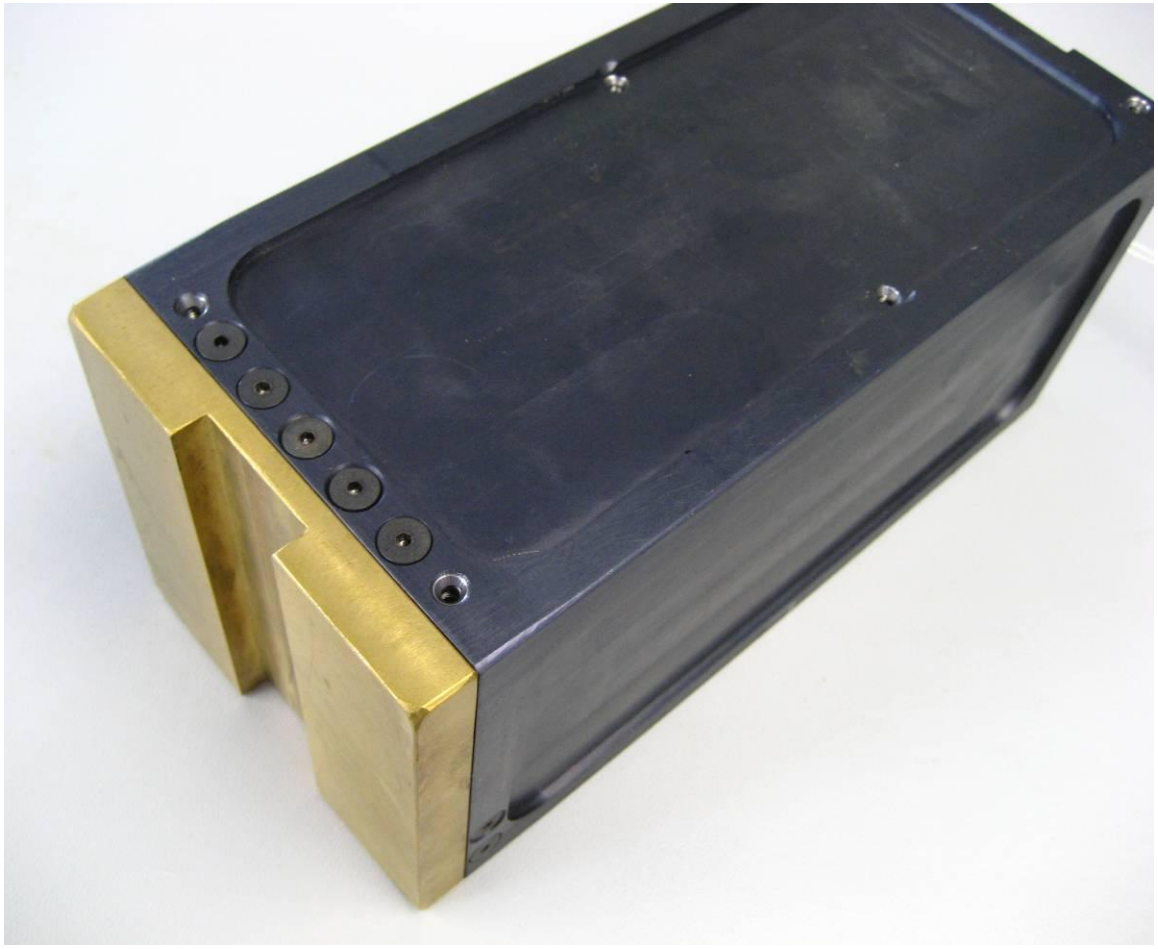
- Beanie
- Cal Poly 1U
- ADAMASat
- PCL (Cal Poly)
- Pedestal



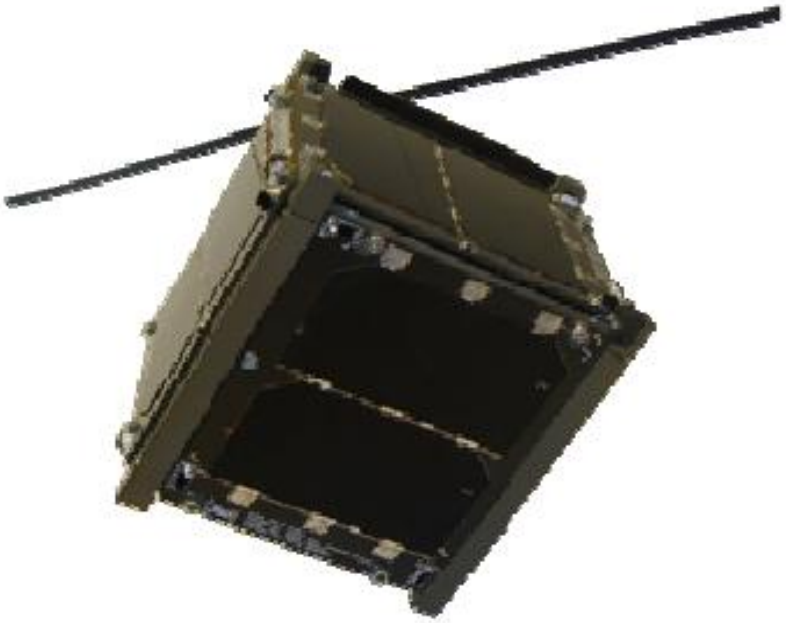
Mass & Thermal Considerations



Centripetal Force Considerations



Cal Poly 1U



- Comm Testing
- Flight Heritage Development

ADAMASat


Beanie
Cal Poly
1U Mass
Model
ADAMASat
Mass Model
PCL +
Pedestal

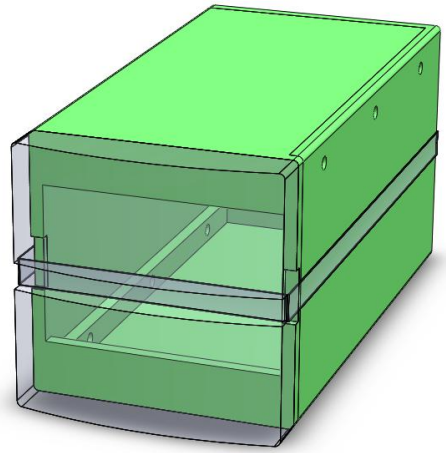
ADAMASat

- Antenna Deployment and Monofilament Actuator Satellite
- Space Qualifying PIM
- Space Qualifying Line Cutters

ADAMASat Radio Link

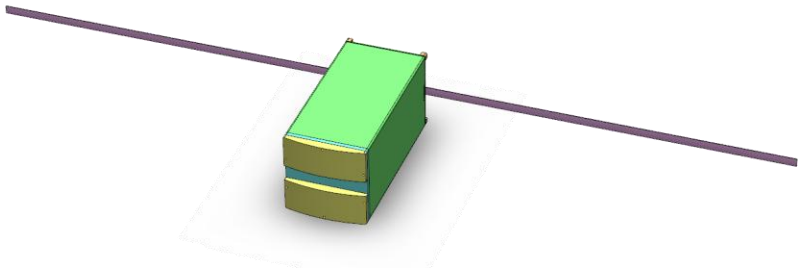
ADAMASat

- 1/2 wavelength dipole antenna; tape measure folded to sides of ADAMASat
- 300 mW Transmitter at 144.39 MHz
- 1200 baud AFSK

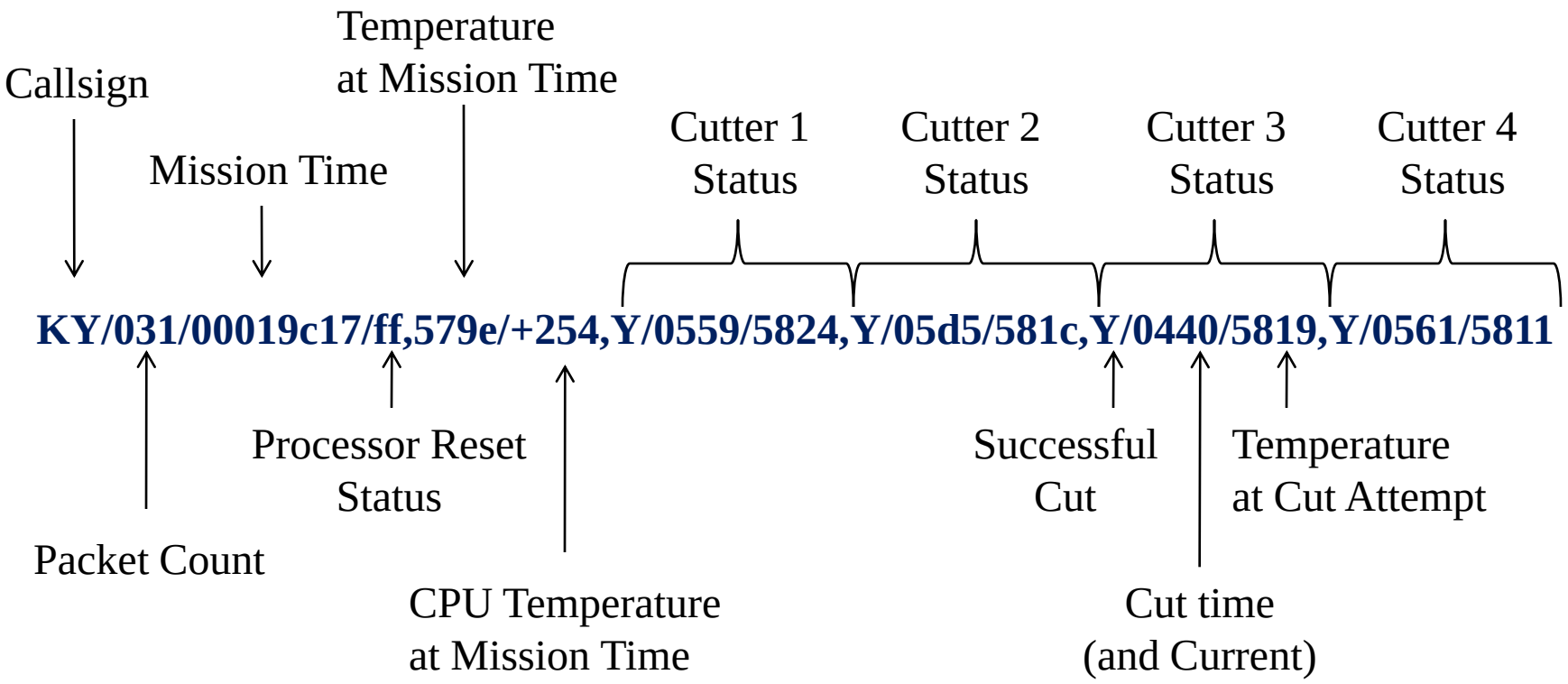


Ground Stations:

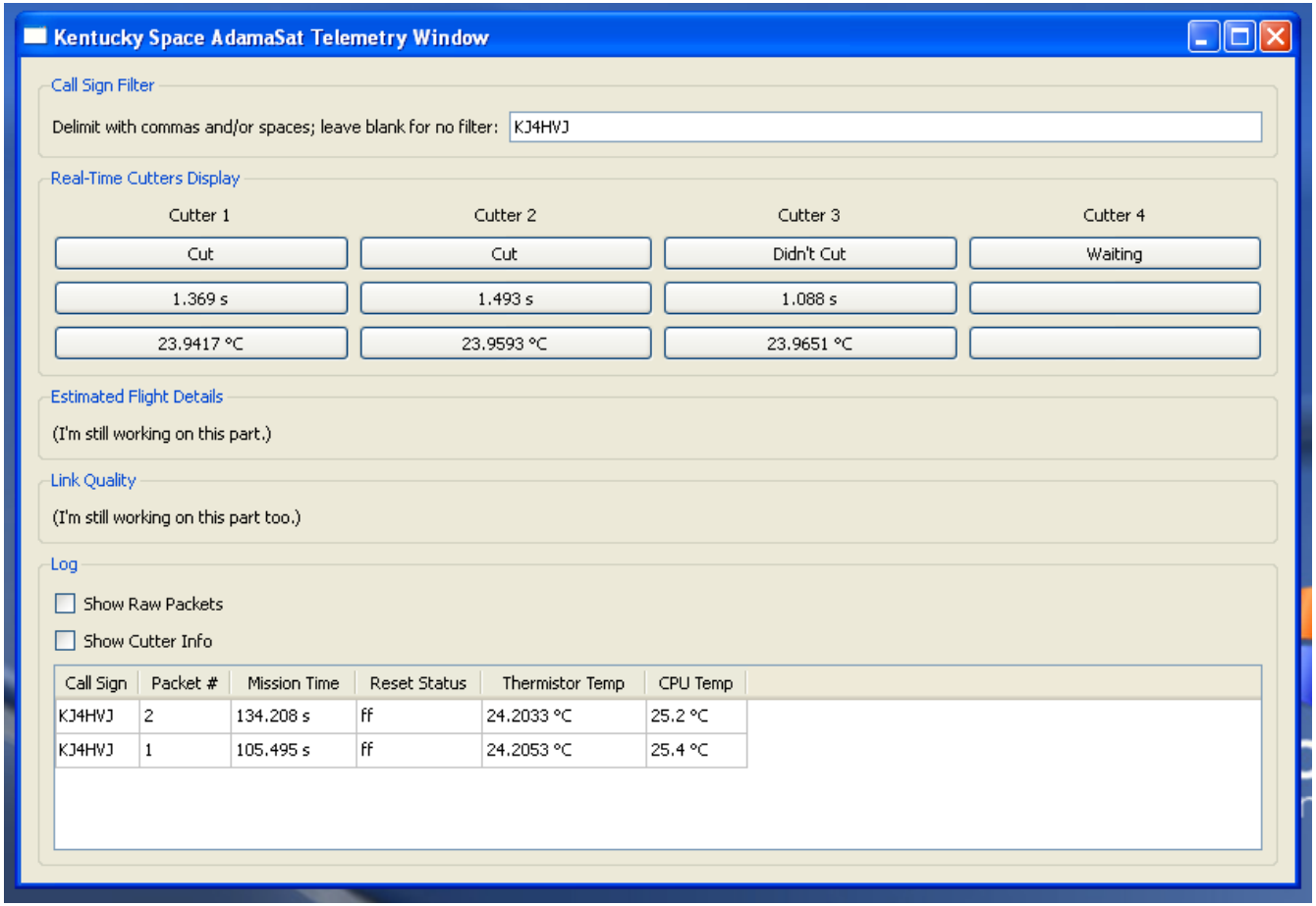
- Deployed at Wallops:
  - 3dB CP arrow antennas
  - 24dB Link Margin
- Kentucky:
  - 10dB CP yagi antennas
  - 20dB Link Margin



Transmitted Status Packet



ADAMASat: GUI



Mission Milestones

- Test Fit SOCEM Hardware and Satellite Mass Models
- Vibes, T-Vac, Ejection Test (Wallops)
- Flight Model Integration
- Launch

Mass Model Fit Check

Thanks!

Anthony Karam

t.k@uky.edu

453 F Paul Anderson Tower

University of Kentucky

Lexington, KY 40506