

From BarnacleSat to Explorer 1 (Prime)

Repurposing the Electra Cubesat bus

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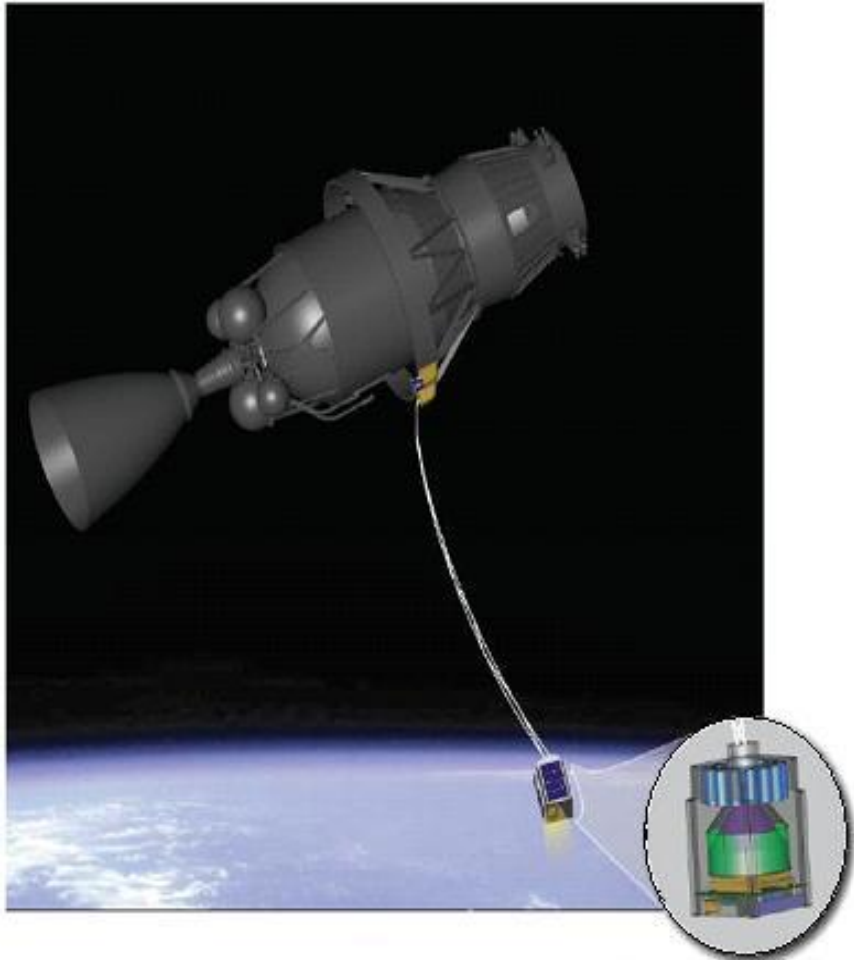
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Some Terms

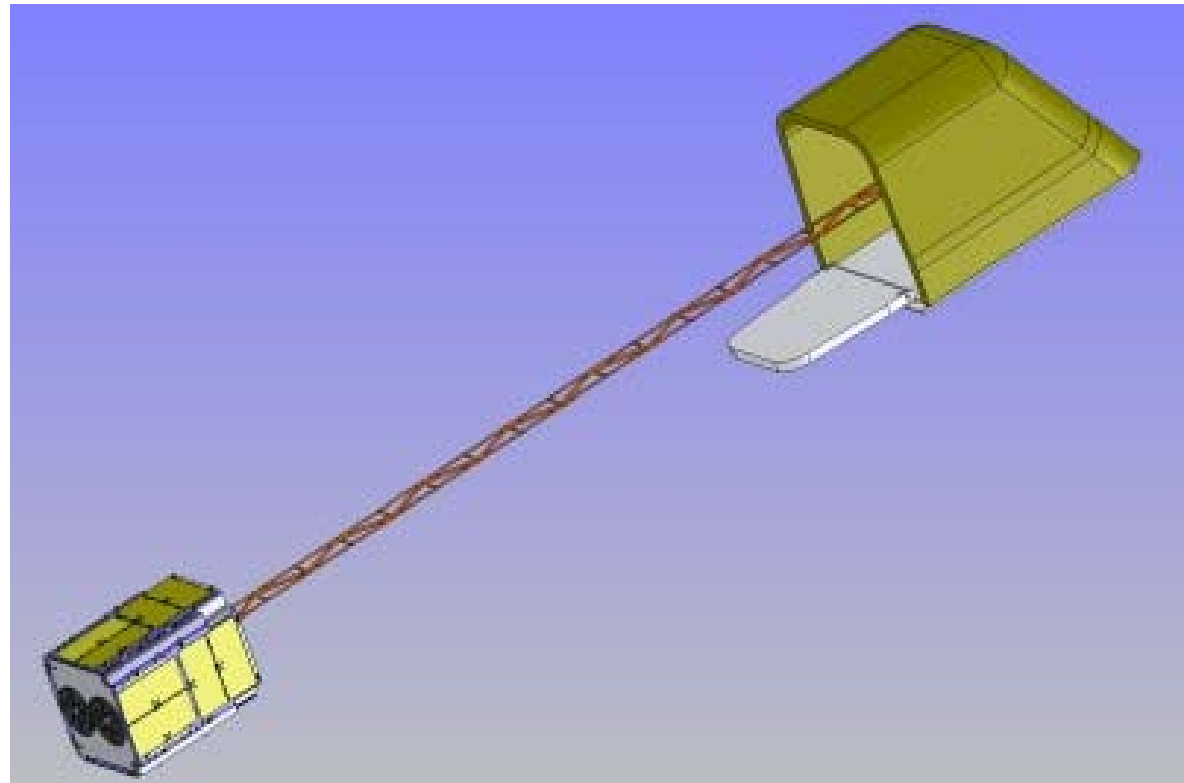
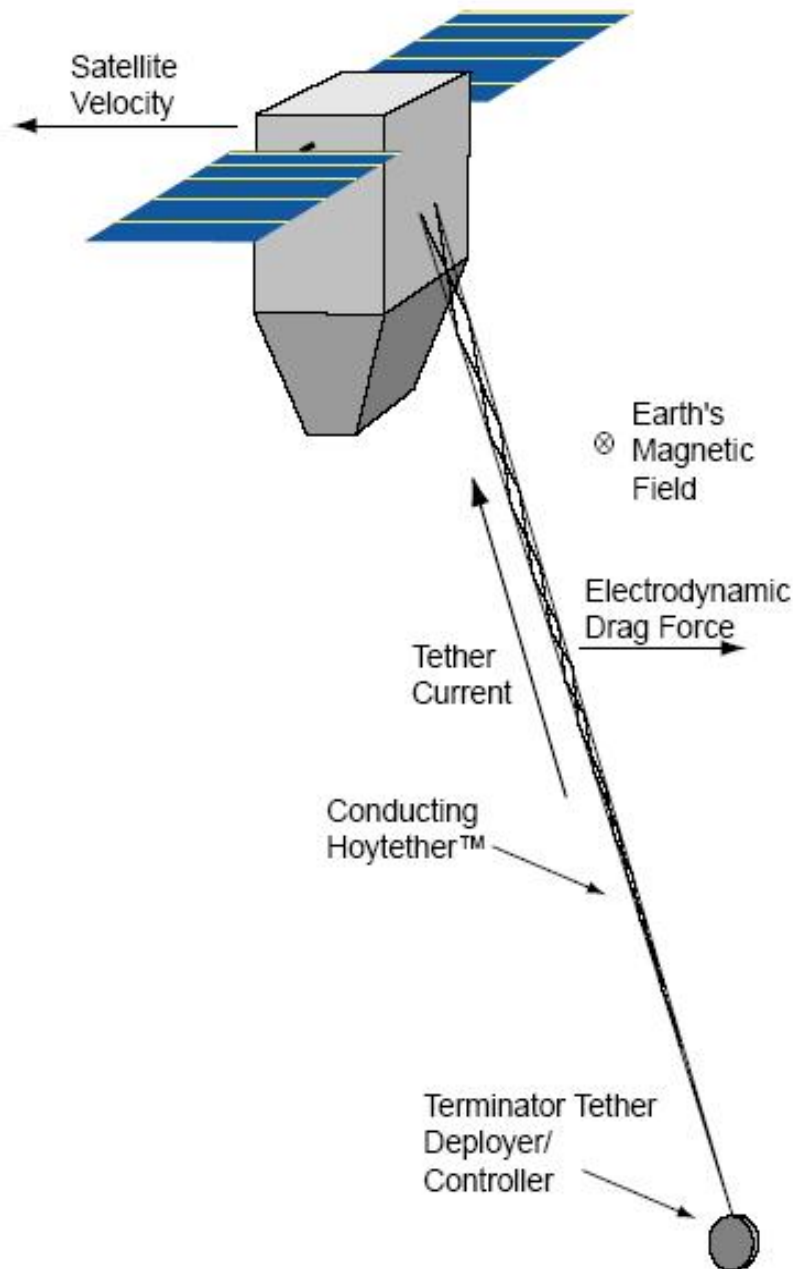
- **Electra** – A cubesat bus under development at SSEL.
- **BarnacleSat** – A cubesat mission, on the Electra bus, to test the RocketPod deployment mechanism and a T.U.I. electrodynamic tether.
- **Explorer 1 (Prime)** – A cubesat mission, being built on the Electra bus, to repeat the science mission of America's first satellite.

The BarnacleSat Mission



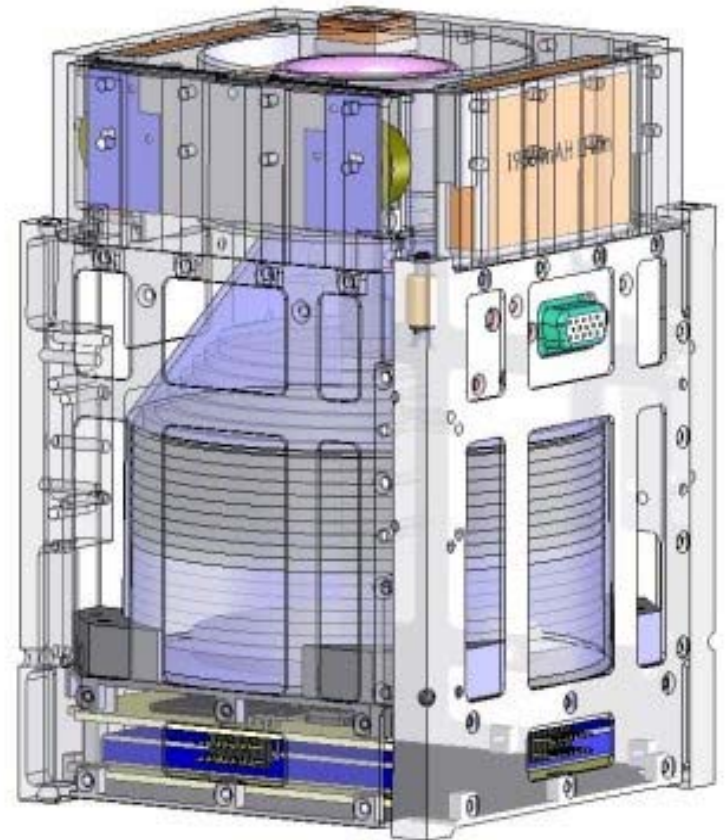
- Test RocketPod™ deployer developed by Ecliptic Enterprises.
- Test T.U.I. space tether deployment.
- Track movements of satellite on end of tether.
- Test feasibility of booster de-orbit mechanism.

The BarnacleSat Mission



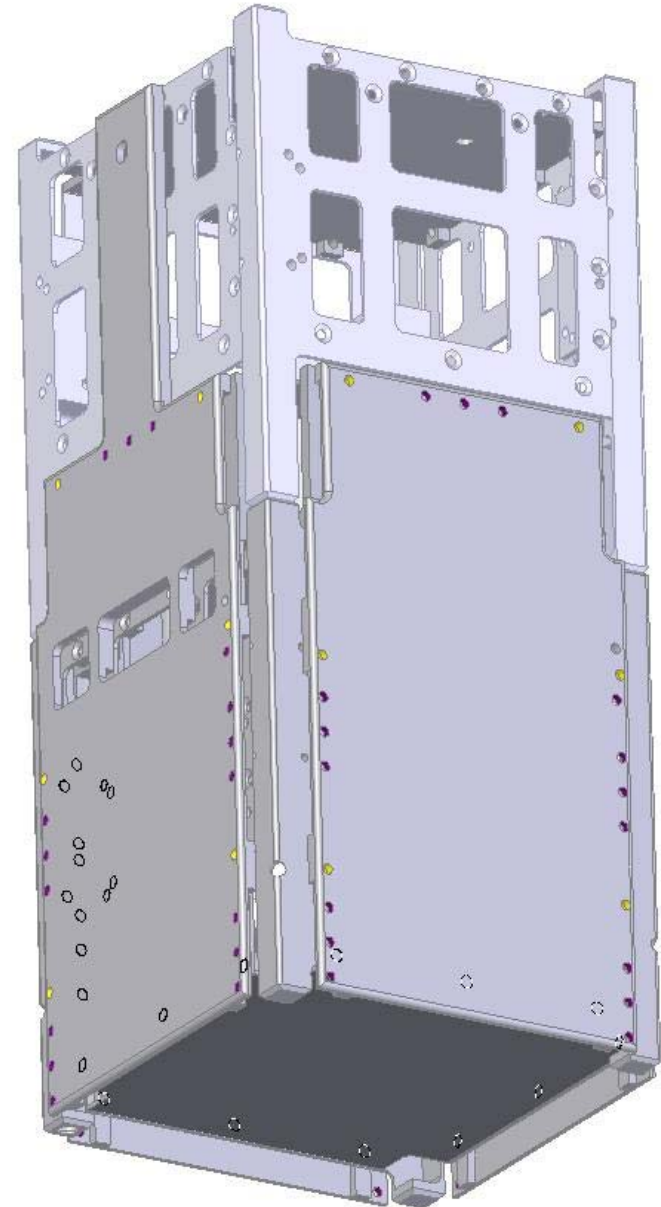
The BarnacleSat Electra

- Cubesat+ formfactor takes advantage of extra space available in RocketPod™.
- Even so, the tether shroud takes up the majority of the available space.



Disadvantages of BarnacleSat

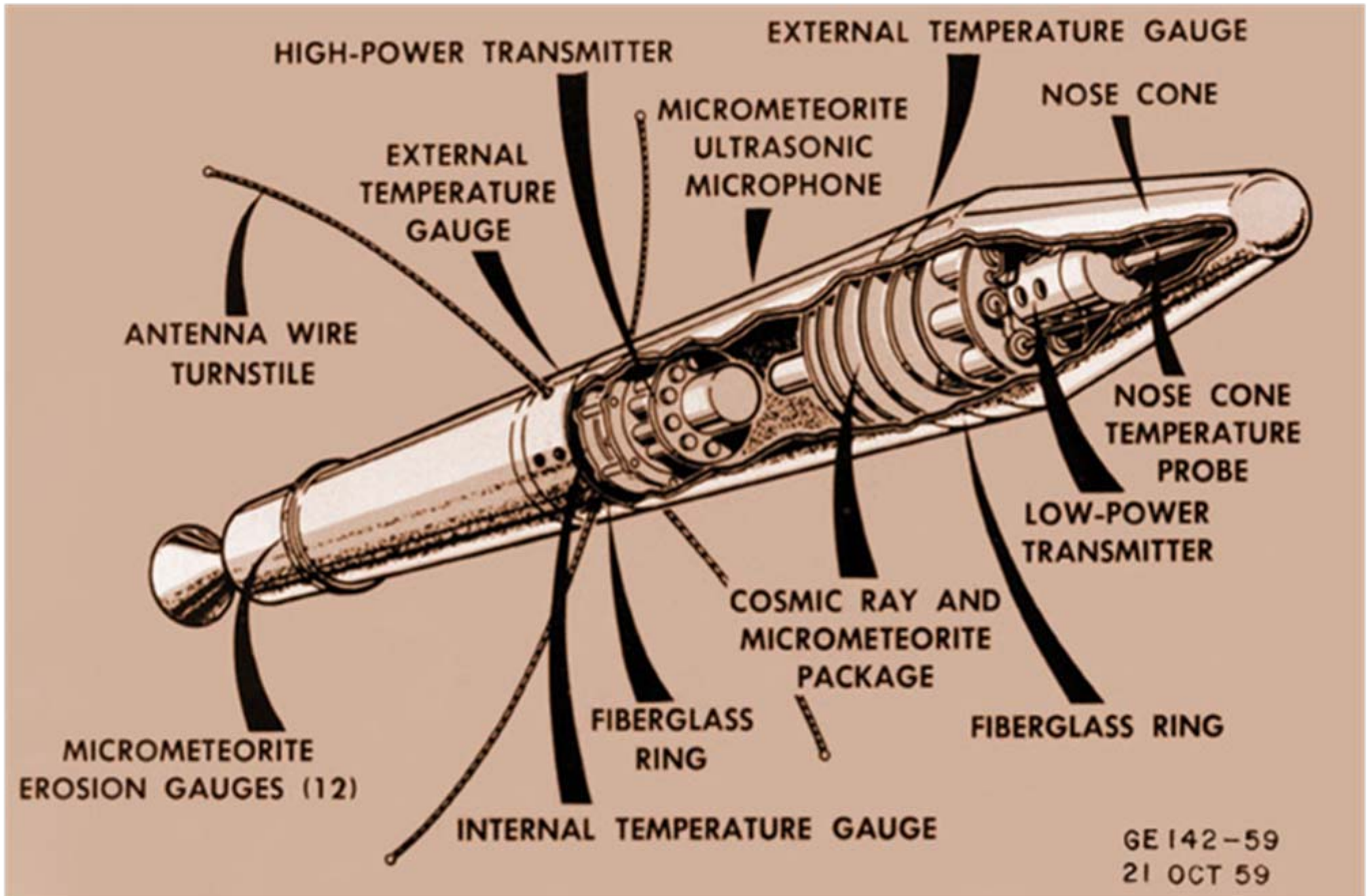
- Malfunction of tether deployment could put other payloads at risk
- GPS margin of error greater than the length of the tether.
- Smaller components mandated by payload size had long development times.
- May have found a P-Pod launch prior to a RocketPod launch opportunity.



Considering a new payload

- Several ideas tossed around
 - Ham beacon/repeater
 - Camera
 - Ground-visible lasers
- One idea kept recurring which was feasible, and of both scientific and of historical interest.

Explorer 1



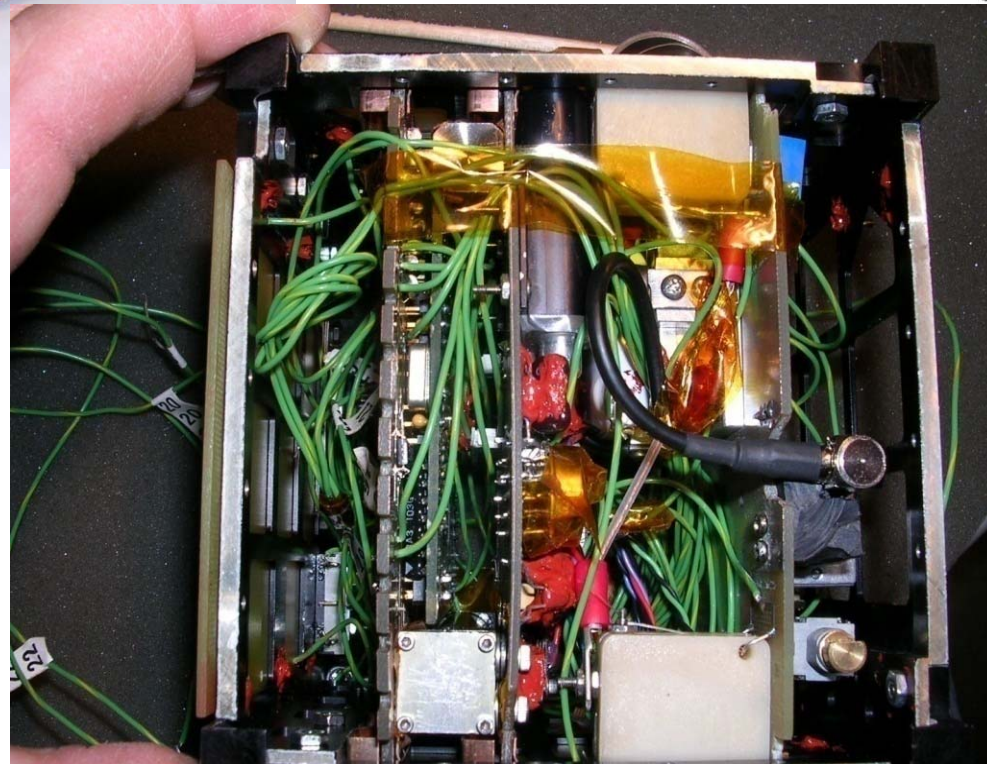
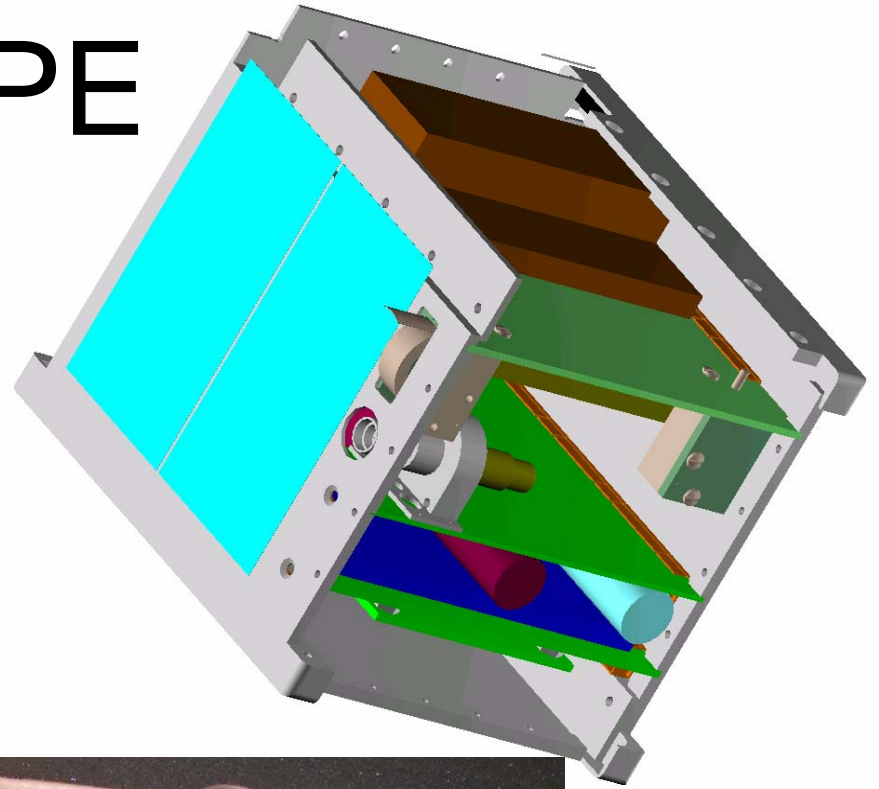
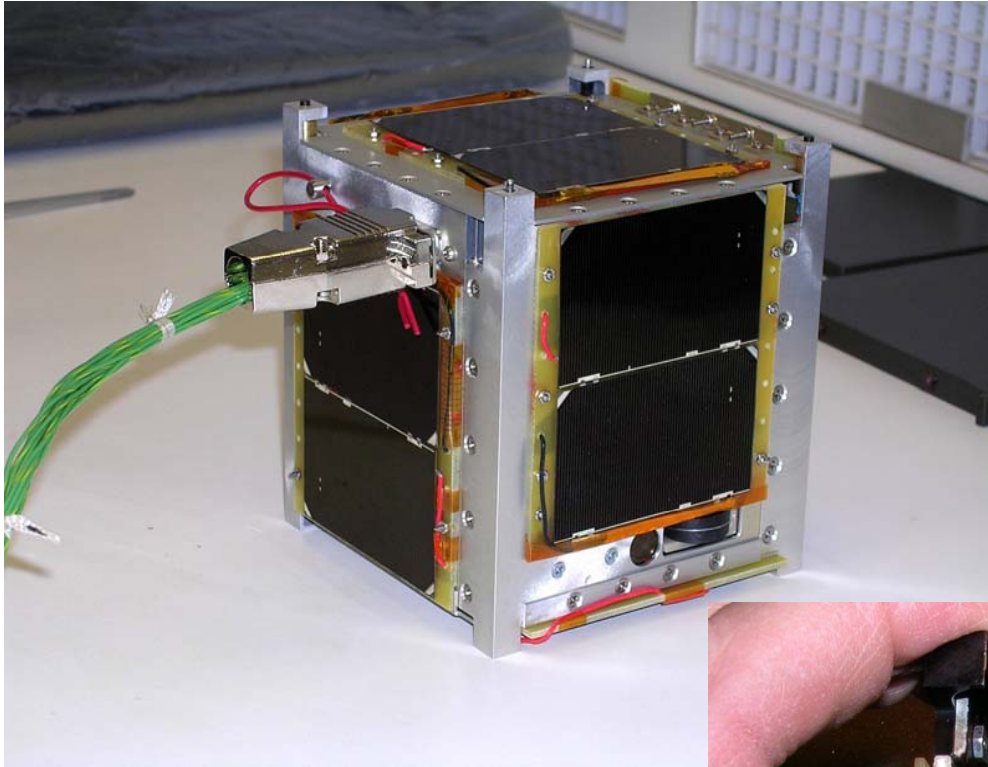
Explorer 1

- America's first satellite, launched January, 31, 1958
- Carried instrumentation designed and built by Dr. James Van Allen.
- Discovered the existence of the Van Allen radiation belts.
- Established a U.S. Presence in space.

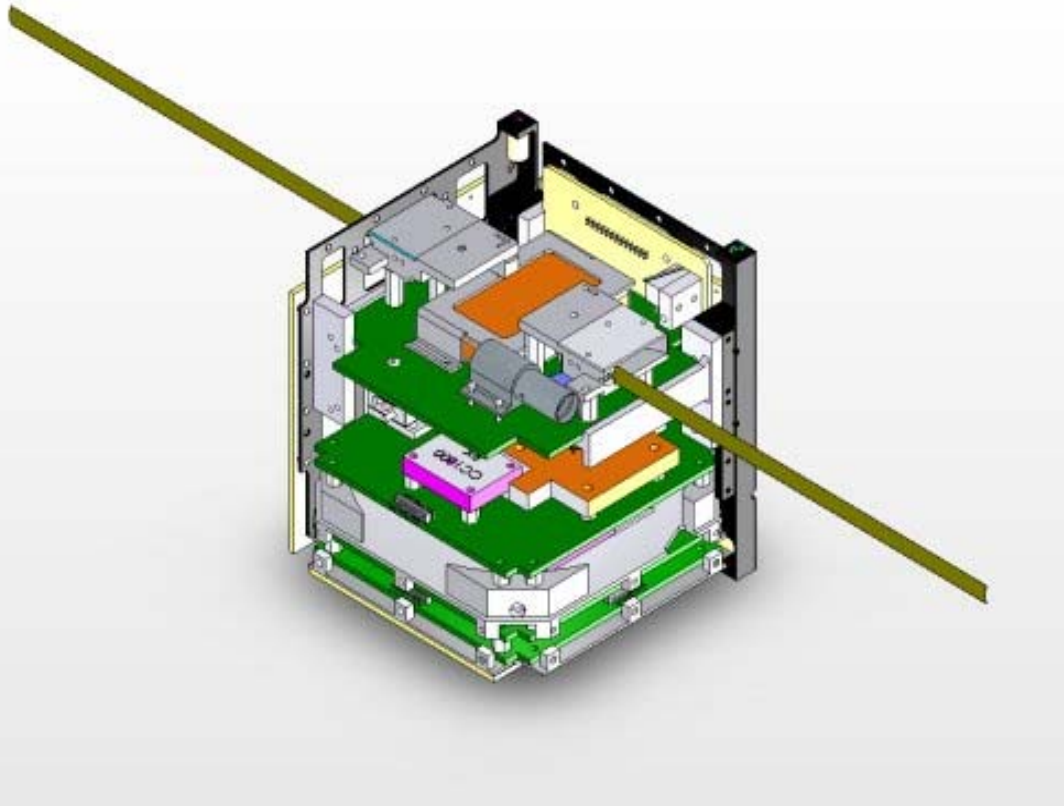
MEROPE

- Montana's (and SSEL's) first satellite
- Carried instrumentation donated by Dr. Van Allen.
- Intended to repeat the science mission of Explorer 1, a mission termed "Explorer 1 (Prime)" by Dr. Van Allen.
- Designed, built, tested, delivered, and integrated successfully.
- Lost in the failed July 2006 Dneper-1 launch.

MEROPE



The Explorer 1 (Prime) Electra



- Combines MEROPE and BarnacleSat heritage
- Space saved by eliminating tether shroud saves time by allowing prototype radio

The Explorer 1 (Prime) Electra



- Shows growth and learning as a lab.



Summary

- The BarnacleSat mission couldn't be completed in the desired timescale, and would not have been able to provide us the data we had hoped for, without significant additional development.
- A new mission was found for Electra, which requires less development time, provides measurable science results, and leverages existing SSEL heritage.
- The new mission is one which has a great deal of historic value, both to SSEL and to America.