RocketPod™ Update

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Flagship Product: RocketCam™

RocketCam™ is Qualified for These Systems, Plus Several Spacecraft and Other Platforms

**MER A “Spirit”**
2003

**SpaceShipOne**
2002-2004

**Shuttle Discovery**
2005

2006 Aug 13
RocketCam Space Heritage

- Launched on 41 projects since 1997
  - 29 rockets to orbit (61 cameras)
  - 11 suborbital launches (20)
  - 1 spacecraft (1)
- All relatively simple integrations
- All relatively low cost
- All successful
- Many more to come
RocketPod™ Objectives

• Leverage RocketCam interfaces and experience
• Create cost-effective nanosat launch program
• Address selected responsive space objectives
  – U.S. ELVs (multiple families and models)
  – Predictable and reliable launch opportunities
  – <<1-year integration time (<1 week for selected payloads?)
  – Multiple launch opportunities on a single launch
• Enable multi-mission capability
  – Tech demo and operational
  – Deployable and attached payloads
  – Varied orbits (or suborbital)
• Migration path to spacecraft host platforms
RocketCam to RocketPod
(Delta II example)
RocketPod Integration
(Delta II example)
RocketPod Key Features

- Sized to hold one CubeSat
- Sized to fit on Delta II miniskirt structure
- Provides more payload mass and volume than CubeSat

- Payload is kinematically restrained during launch
- Release behavior is independent of payload mass
- Fault-tolerant with respect to premature release

- Payload final integration is completed before shipping
- Environmental closeout protects payload after integration
- Electrical access to payload until mounting to host
- Nitrogen purge option
Baseline Delta II Configuration

"Go" Command from RIFCA

RocketPod Controller w/ Digital Video and Internal Battery

Other Camera Inputs

RF Output (Antenna)

Delta II Miniskirt Structure

- RocketPod #1: 345°
- RocketCam: 0°
- RocketPod #2: 15°
- RocketPod #3: 165°
- RocketCam: 180°
- RocketPod #4: 195°

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RocketPod Internal View

Separation velocities:
- 2.6 m/s for 0.6 kg payload
- 2.0 m/s for 1.0 kg payload
- 1.4 m/s for 2.0 kg payload
What Makes RocketPod™ Attractive?

### Traditional Secondary Payload Model
- Unique payload design
- Single payload per launch
- Mission-specific interfaces
- Mission-specific analyses
- Mission-specific trajectory
- Mission-specific safety requirements
- Unique launch-site processing

### RocketPod™ Secondary Payload Model
- Standard payload design
- Multiple payloads per launch
- Standard interfaces
- Enveloping analyses
- Standard deployment options
- Standard safety requirements
- Standard launch-site processing

Standardization enables lower recurring launch cost and a low-cost secondary launch program; can be key component of Responsive Space for kg-class systems.
Launchable Hardware
Zero-G Tests

2004 Sep 16
Fit Check and Deployment Tests

2005 Aug 11

2006 Aug 13
Current Near-Term Activities

• Currently assessing integration issues for other U.S. ELVs besides Delta II, plus on spacecraft
  – E.g., Delta IV, Atlas 5, Minotaur, Taurus, SpaceX Falcons
• On contract to provide flight system for suborbital launch in about a year
• Working several ways to take advantage possible launch opportunity to orbit mid next year
• Working w/SAT to assess launch option for Falcon launch next year (Malaysians)
Longer-Term Efforts

• Discussing CubeSat payload opportunities with several interested parties
  – U.S. government
  – Commercial

• Discussing business case for recurring RocketPod launch program with one U.S. ELV supplier

• Pursuing RocketPod improvements via IRAD
  – Concept and design details
  – Integration and test process

Making progress!