


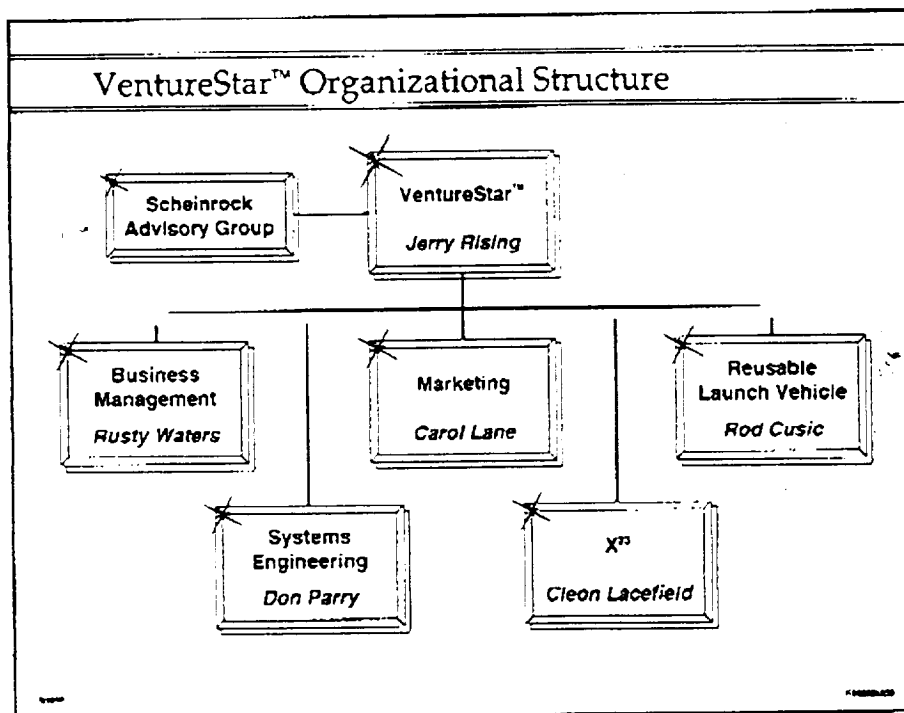
The X-33/VentureStar™ Program



Why VentureStar ??

- Expendables cost too much
- Commercial space market is growing
- Meets NASA's goals
- Users want fast ground turnaround
- Users want quick access to space
- "Offline" payload processing saves time
- Low cost to space enables new markets
- Because we can!!

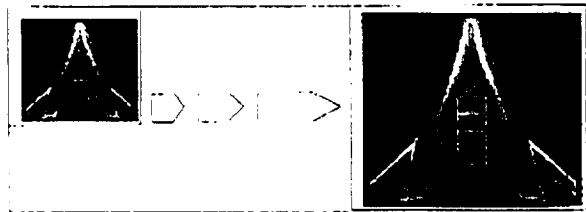
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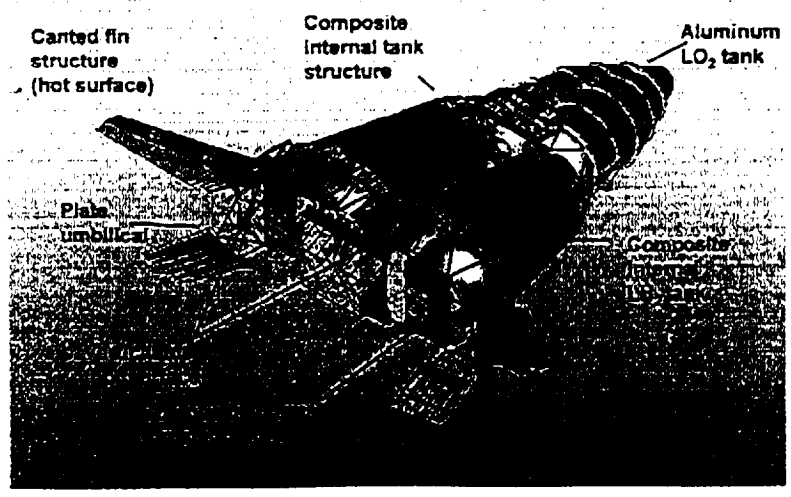
X-33 Flight Tests Build Credibility for VentureStar™

Objectives demonstrate:

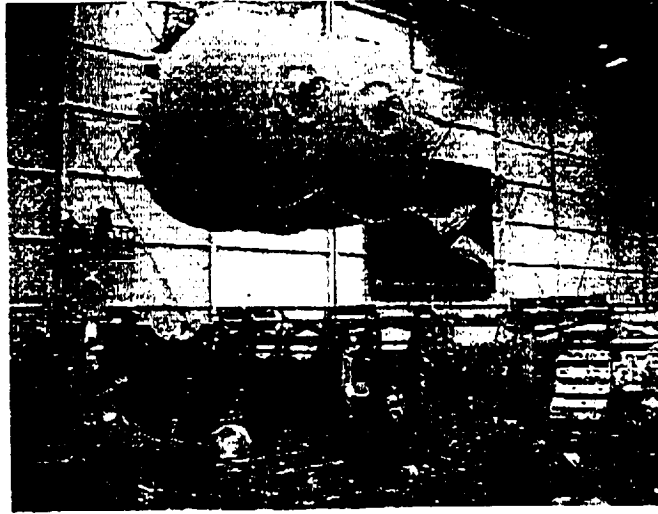
- Lifting body/aerospike engine configuration to predict VentureStar™ flight performance
- Prediction of engine thrust vectoring and throttling dynamics
- Thermal performance/structural integrity of the thermal protection system
- Autonomous flight management from launch, entry, approach and landing through rollout and vehicle safing
- Payload environment
- Simplified ground operations



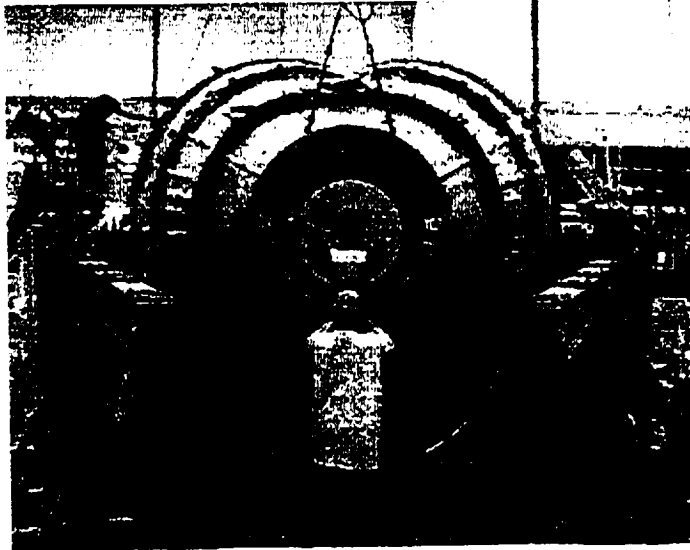
X-33 Isometric Cutaway



Moving I.O. Tank for Assembly into Vehicle

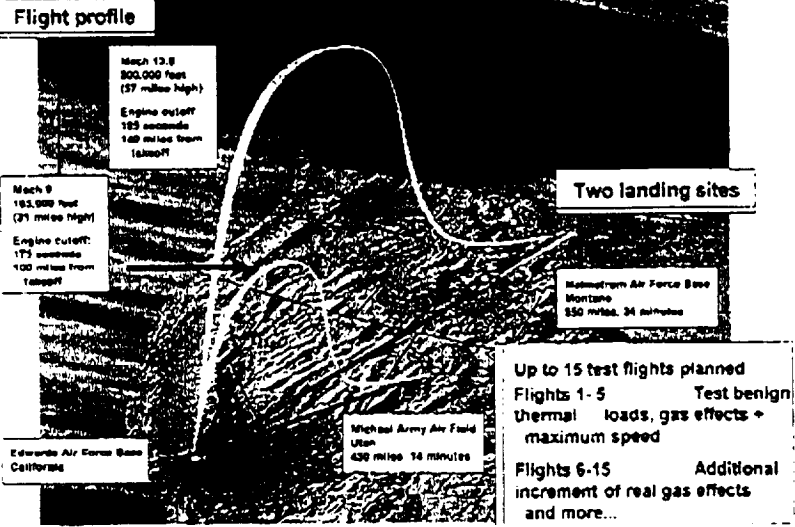


I.O. Tank in Position in Nose of Vehicle

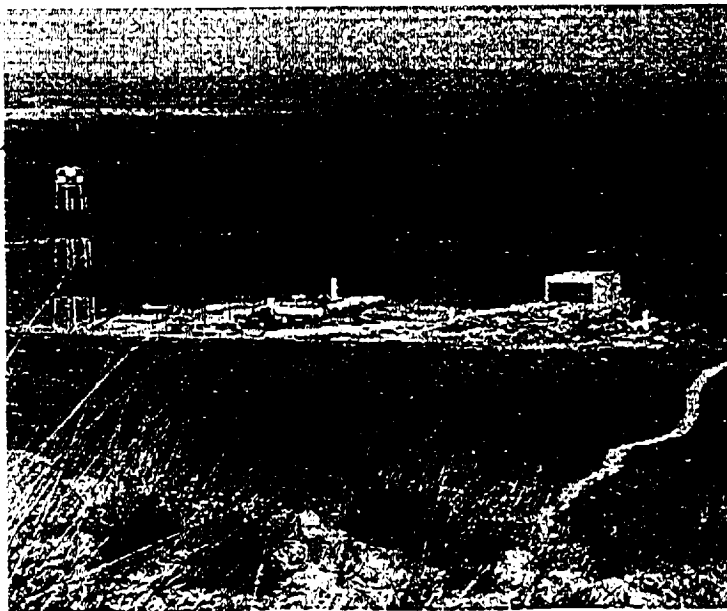


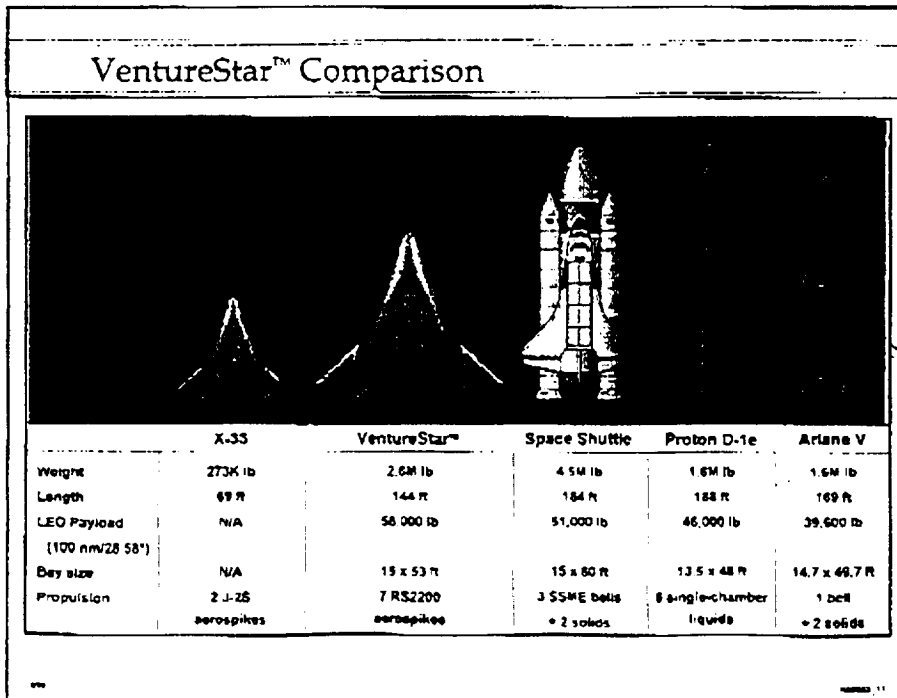
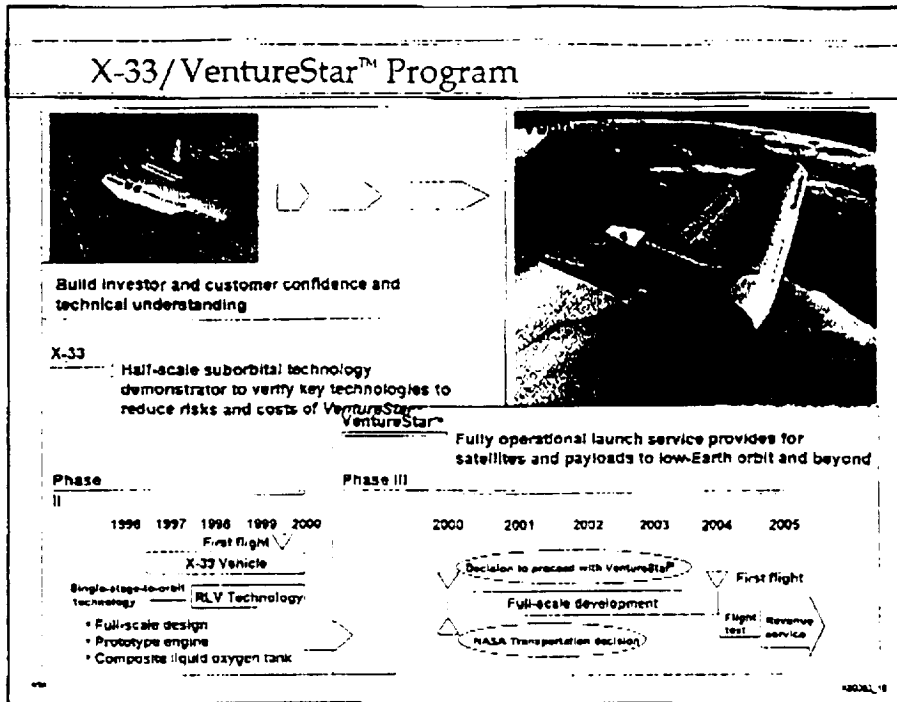
Expanding the X-33 Envelope

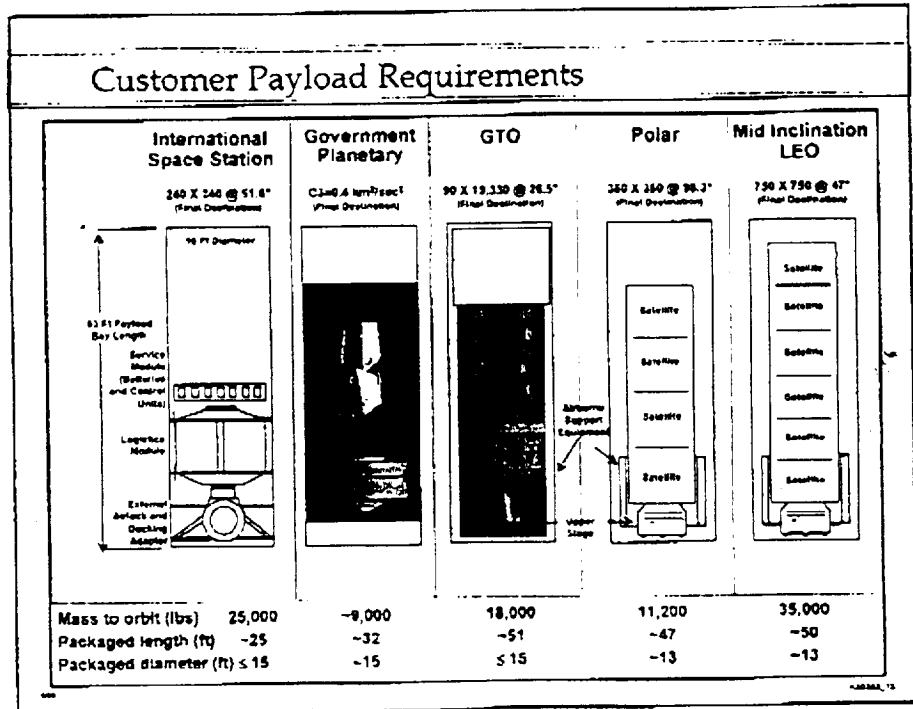
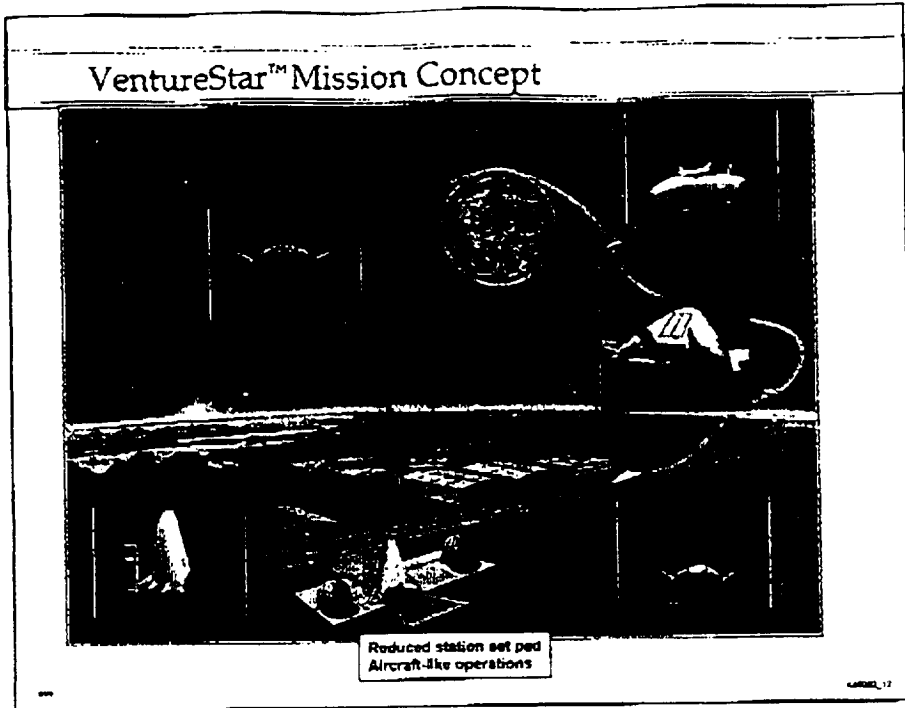
Higher - Faster - Farther Starting in 1999

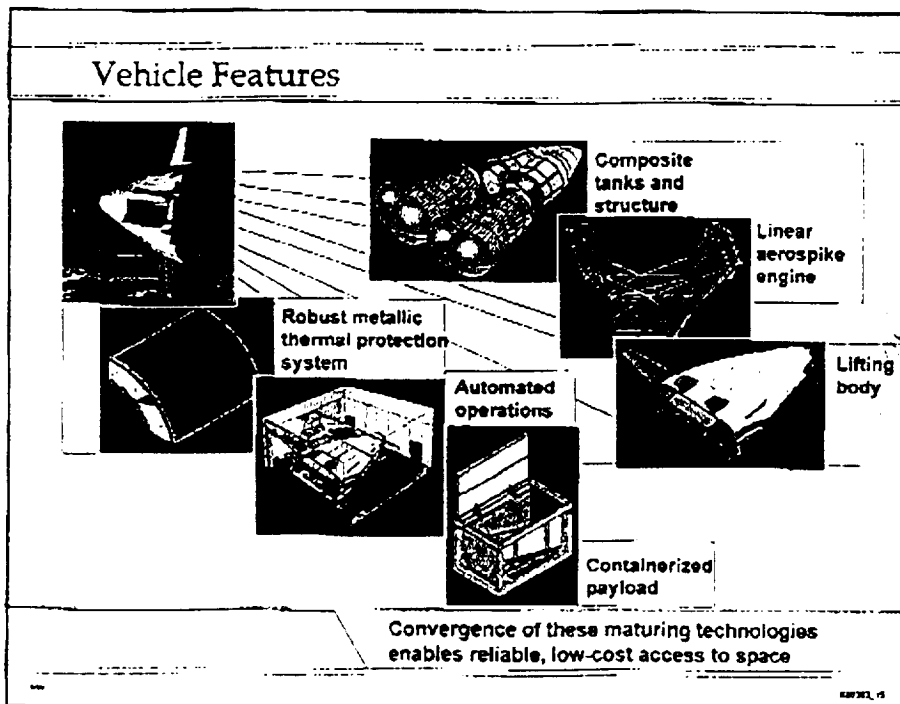
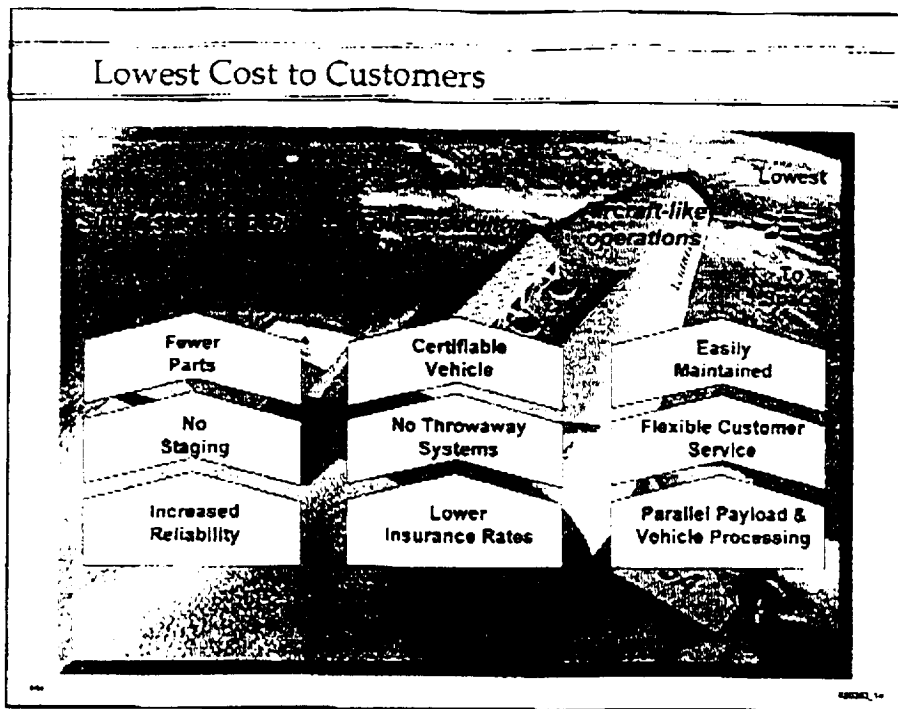


X-33 Aerial Launch Site View

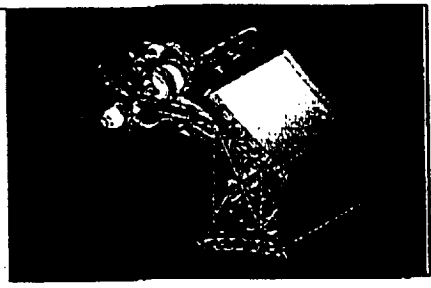
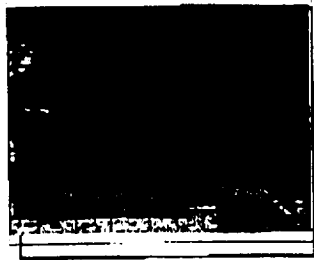








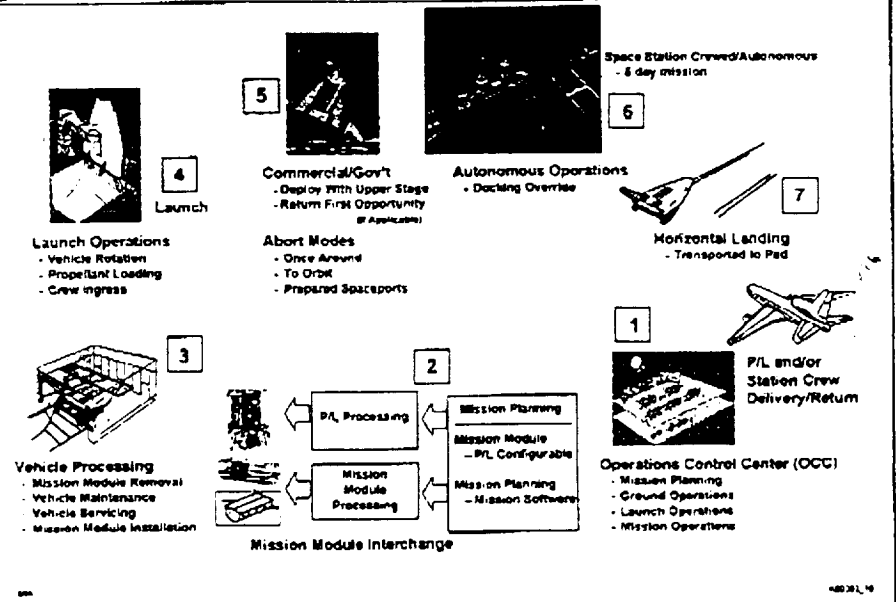
Linear Aerospike Engine



Extensive testing + performance and integration advantages = medium risk with high potential payoff

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Runway-to-Pad-to-Orbit Operations



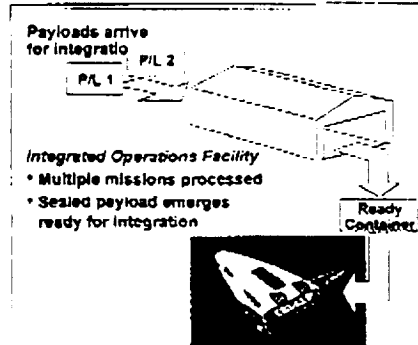
VentureStar™ Encapsulated Payload Mission Module

- Payload integration & parallel processing of multiple missions outside RLV
- Includes structure, thermal environment, power, and communications
- Provides flexible mission scheduling & manifesting
- Standard payload interface to RLV



- Encapsulated payload incorporates lessons learned from STS / ELV
- Near term focus: Incorporate ISS & commercial customer requirements

Concept of Operations



Parallel processing of encapsulated payloads are key to supporting VentureStar increased flight rate

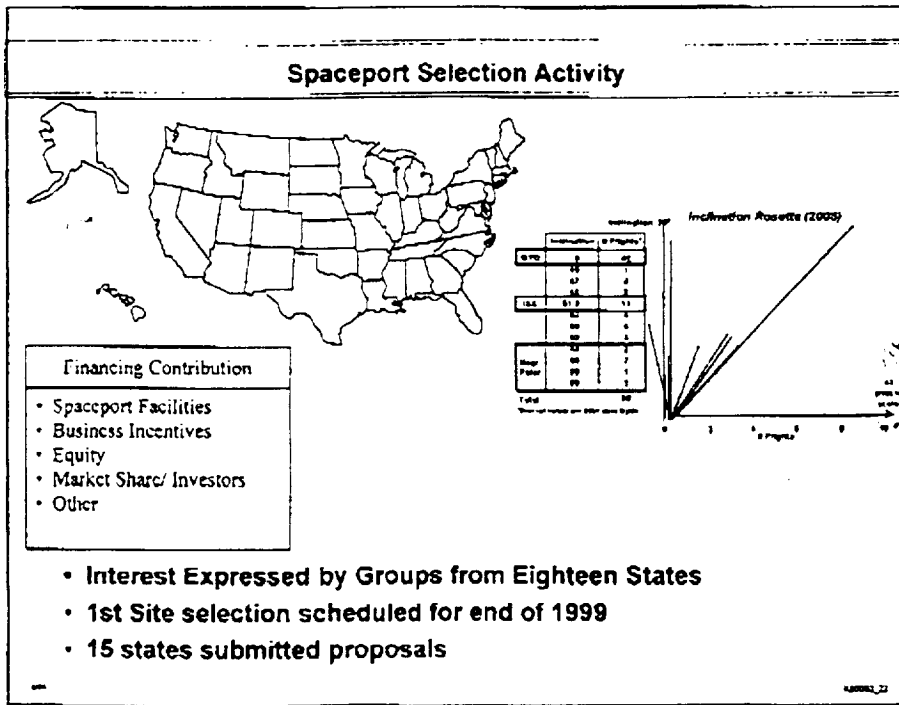
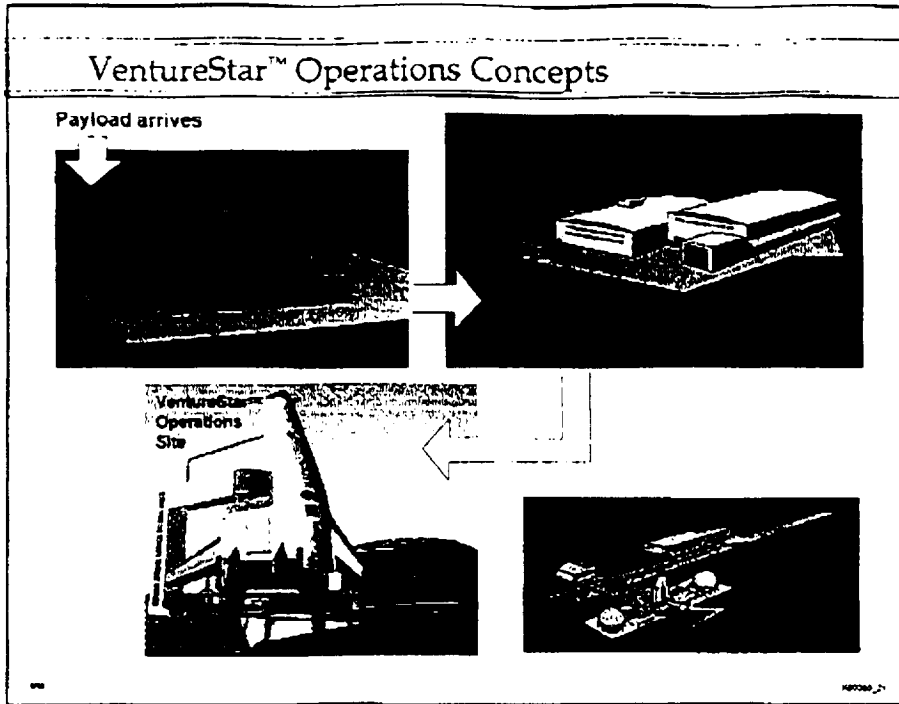
VentureStar™ Operations - 7 Day Turnaround

- Designed for operability
- Robust vehicle design and operational concept enables repeatable, simplified, and automated turnaround processing
- Single Stage, horizontal processing with front-end RM&S + lessons learned incorporated
- Circa 2000 + fault detection / reconfiguration / prognostics
- Off line encapsulated payload module integration
- "Lock & Load" payload module to vehicle integration
- Automated mission planning

7 Day Turnaround

Activity	1	2	3	4	5	6	7
Wheels Stop							
Runway Operations							
Pad Operations							
Safing Operations							
Maintenance							
Payload Integration							
Prelaunch Prep							
Propellant Load / Launch Operations							
Launch Flight							

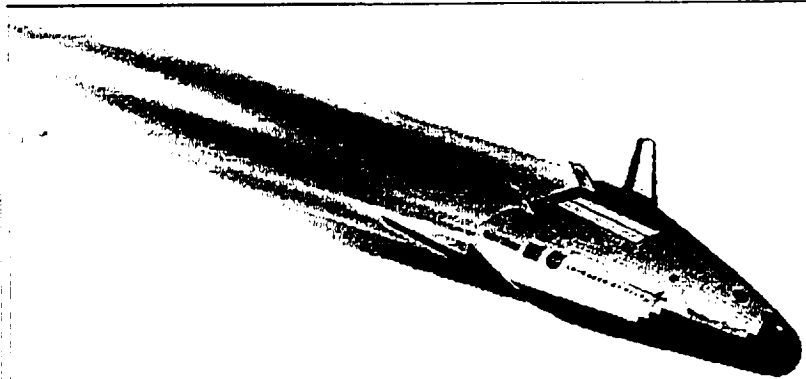
Complex system designed to enable simple operations



In Closing

- **Flight rate** - up to 40 flights per year
7 day standard turnaround, 2 day quick turnaround
- **Reliability** - .9998 vehicle safe recovery
- **Orbits** - LEO, MEO, GEO, ISS
- **Payload return capability**
- **First flight in 2004**

Price, Flexibility, and Reliability!



For more information, visit our web site at
www.venturestar.com