A3 Altitude Test Facility
SSC Industry Day
September 2, 2009

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Propulsion Test Facility Trades for J-2X Altitude Testing

Altitude Test Facility Requirements

♦ A3 Facility Requirements

- Start/Run Pressure: 0.16-0.4 psia (100-80 Kft)
- Run Duration: 550 sec
- Gimbal Angle: 5° (square pattern)
- Maximum Thrust Load: 1.0 Mlbf (vertical)
- Provide maximum flexibility for future test configurations
  - Sea-level testing
  - Stage testing
- Utilize existing propulsion test infrastructure, including cryogenics, barges, high pressure water, high pressure gas, engine assembly and warehousing facilities, skilled workforce, etc.
A-3 Altitude Test Facility
Meeting J-2X Project Requirements

Design
- Simplicity of “open diffuser” eliminates need for complex spray condensing chamber, dewatering & exhaust systems
- Design maximizes use of commercially available industrial components
- Key design elements based on established traditional rocket diffuser and chemical steam generator concepts supported by extensive operational data (40+ years)
- Early design risk mitigation thru testing of subscale diffuser and chemical steam generators at SSC

SSC Location Benefits
- Experienced test crews available
- Enables workforce flexing across test stands
- Enables efficient utilization of SSC’s extensive propulsion test infrastructure
- Collocation of J-2X test facilities with engine assembly, integration and warehousing facility reduces logistics costs

A3 gives NASA at least one new large sea level & altitude capable test stand for the next 40 years
80,000 gallon LH tank, 13’ O.D., 103’ tall
35,000 gallon LOX tank: 13’ O.D., 47’ tall
Volume includes:
- 10% ullage
- Test duration: 600 seconds
- 10% remaining in heel of run tank
Volume not included:
- Chill down of run line
- Fill run line
- Chill test article
Tank will be topped off from the barge after chilling and filling
A3 Test Stand 3-D Layout

Engine Deck and Superstructure
A3 Test Stand 3-D Layout
Structure and Altitude Support Systems
Steam System

- A3 Steam System Schematic Diagram

First Stage Ejector

Steam Supply

LOX Feed
IPA Feed
Water Feed

2nd Stage Ejector

Steam

Typical 3-unit CSG Module Output
Chemical Steam Generators

- Igniter Assembly
- Water Inlet
- LOX Feed
- Alcohol Feed
- Water Inlet
- Water Cooling and Injection Spray Tubes
- Steam Generator Assemblies
- Steam Supply Header
- Steam Outlet

[Image of Chemical Steam Generators]

National Aeronautics and Space Administration
Chemical Steam Generators

♦ CSG cans for facility operation risk mitigate testing have been fabricated and tested
Subscale Diffuser
Stennis A3 Site Location
A3 Construction Site
A3 Construction Site