

Small Unit Space Transport and Insertion (SUSTAIN)

Study prepared for:

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Report Documentation Page

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Requirement

- Marine squad of 13 riflemen
- Field supplies
- Any potentially hostile area in the world
- 2 hours transport
- Retrieve

Specification

- Life support for up to 4 hours
- 220 pounds per man
- 150 pounds of supplies per man
- Times 13 men
- Deliverable payload of 4,810 pounds
- Plus the life support system
- Near term assumed to be 5 to 10 years

Solution

- Near term assumed to be 5 to 10 years
- Solution: Existing technology or slight extension
- Far term: Better materials, exotic propulsion, etc.
- Issues: Technical, security, safety, logistical
political, policy, economic

Goals of Presentation

- Open session:
 - Characterize concept
 - Outline issues
- Closed session:
 - Specifics
 - Quantitative

Overview - 1

- Hypothetical future
- US may lack network of foreign bases
- Ability to project small force units rapidly
- Essential to US interests

Overview - 2

- LEO requires 90 minutes
- Allowing 15 minutes for orbital insertion
- Allow 15 minutes for de-orbit, re-entry, and landing
- Any location on earth within about 75 minutes of travel time
- Proven aviation technology limited to several thousand MPH
- Worst case of about 12,500 miles requires **average** speed of at least 6,250 MPH
- R&D almost certainly falls outside 5 to 10 year range
- Use of, and travel through, space required for near term

Overview - 3

- Extraction is tough nut
- Many conceivable solutions physically possible
- Without enormous R&D budgets, most technically possible approaches are not feasible
- Several are potentially feasible but not practical with current technology
- Timetables exceeding 10 years rejected

Overview - 4

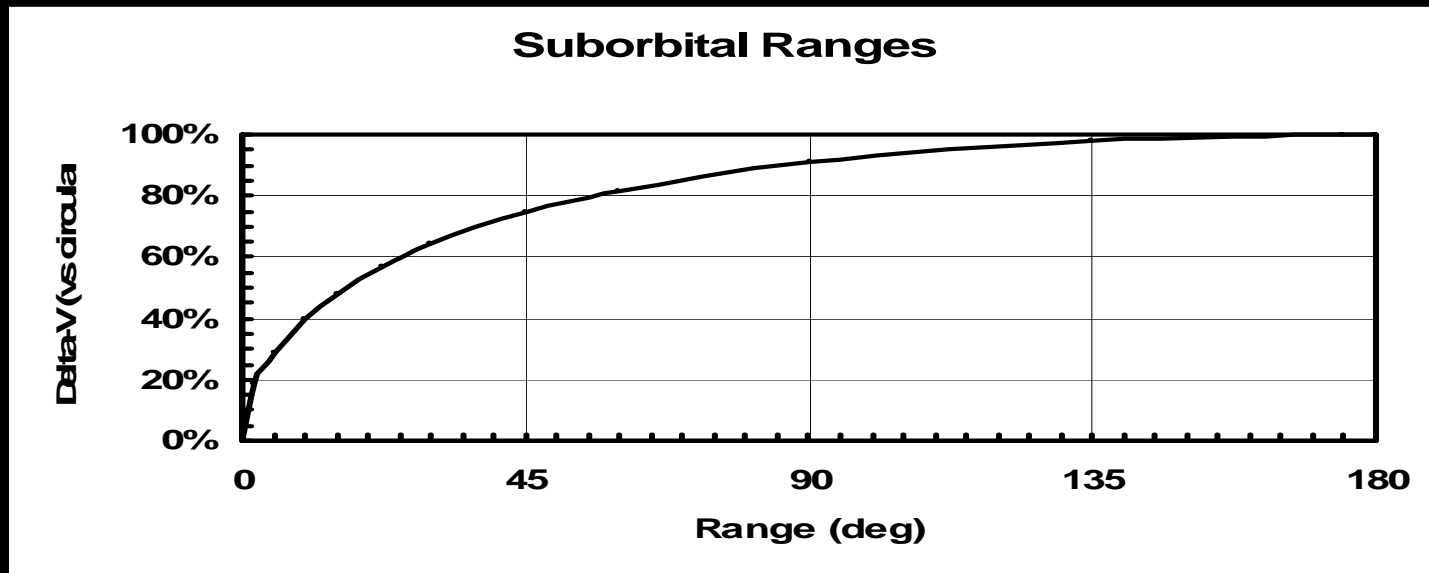
- Vertical take off and landing
- Similar to DC-X concept
- Blue Origin, Armadillo
- High delta-V
- Can't withdraw and re-enter LZ

Overview - 5

- Aerospace Plane
- Similar to Saenger concept
- Payload, R&D time problematic
- Suborbital space plane payload, TPS
- Delta-V of current concepts

Overview - 6

- Aerospace Plane
- Delta-V = LEO vs current concepts



Overview - 7

- Delta-V = LEO vs current concepts
- Basing on both coasts doesn't gain much
- Staffed multiple space bases with RVs prohibitive

Our Approach - 1

- Infrequent use - storage
- Cost, simplicity, responsiveness, reliability
- 15,000 lb capsule landed
- Existing insertion vehicle concept
- Capsule recovery

Our Approach - 2

- Microcosm Scorpius – Exodus (19,700 lbs to LEO)
- Significant R&D via Responsive Space
- Most major systems developed and flight tested
- Cheap, simple, responsive, reliable, scalable
- Modular 1st and 2nd stages
- Ablative, composite, Tridyne pressurized
- Very few parts, modules drive down production costs
- WSMR 2 flights within 8 hours < 20 men

Our Approach - 3



Our Approach - 4

- Extraction – use AES rocket & FRS
- Fulton Recovery System (FRS) exists
- First tests involved airmen and a very nervous sheep
- The sheep died (strangled)
- Multiple FRS recovery variants

Our Approach - 5

- Pitch capsule after liftoff (alternative)
- Quantitative analysis & defense discussed in closed session
- Timing, security, safety, AC, logistics, mission constraints discussed in closed session

Big Issues - 1

- Political, policy, economic issues may be more difficult than technical and engineering issues
- Byzantine policy organizations, panels, committees influence multiple targets

Big Issues - 2

- Institute For Defense Analysis 2008 report
- National Space Forum 2008, sponsored by Eisenhower Center for Space and Defense Studies at the US Air Force Academy and by the Center for Strategic and International Studies (CSIS)
- Various other CSIS space policy statements
- Center for Defense Information (CDI)
- Private organizations such as the Secure World Foundation
- Relevant books in popular press, such as *Twilight War*

Conclusions

- Doable in 5-10 year timeframe
- Technically feasible
- Capsule and recovery R&D dominate program cost
- Politics & economics trump all
- Detailed report & spreadsheet available for govt and other appropriate people

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