Eliminate Use of Closed Compartments

Space Propulsion Technology
Assessment Workshop

April 2001

Current Baseline
Eliminate Use of Closed Compartments

- Desire is to eliminate the closed boattail compartment and the requirement for a broad heat shield in the compartment

- Very major impact on operations

  - Access to most propulsion components is here

  - Limited access with severe safety related restrictions
    - Special Equipment
    - Purged
    - Two people have died servicing this compartment

  - Result is long timelines and large logistic requirements

Problem
Eliminate Use of Closed Compartments

- During ascent
    - Vents are opened from this compartment and the pressure is reduced
    - Compartment fills with turbulent recirculated hot gases
    - Significant radiant heat input from thrust augmentation devices (SRBs)
- Heat shield is to protect heat sensitive components (e.g., hydraulics) from failure
- Solution must remove/replace/refresh hot gases and remove the need for the heat shield

Technologies to Implement Solutions (TRLs)
Eliminate Use of Closed Compartments

- Eliminate broad area heat shield
    - Eliminate hydraulics and other distributed heat sensitive systems where possible
        - EMAs (5)
        - EHAs (4/5)
    - Shadow with other components, and/or insulate specific, local heat sensitive areas (5/6+)
    - Placement of thrust augmentation devices (Design)
- Eliminate closed compartment
    - Open or truss boattail (3/4)
    - Duct ram air to boattail (4)
    - Aerodynamic shaping of rear of vehicle and/or boattail (4)

Cost to Mature Technology
Eliminate Use of Closed Compartments

- There would probably be an added cost to the development program for a large scale, detailed test of the final implementation approach in wind tunnel or flight