

Heritage to Flight: The Test Program that Brought an Inflation System Back to Life for LOFTID

H. Blakeley

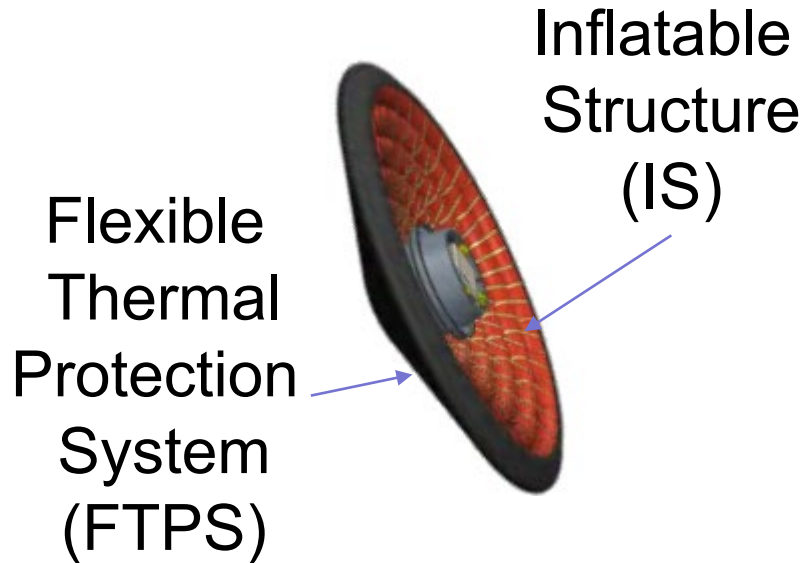
NASA/D202

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HIAD Technology

Hypersonic Inflatable Aerodynamic Decelerator



HIAD Successful Flight Tests

3m Diameter:

- IRVE-II, 2009
- IRVE-3, 2012



6m Diameter:

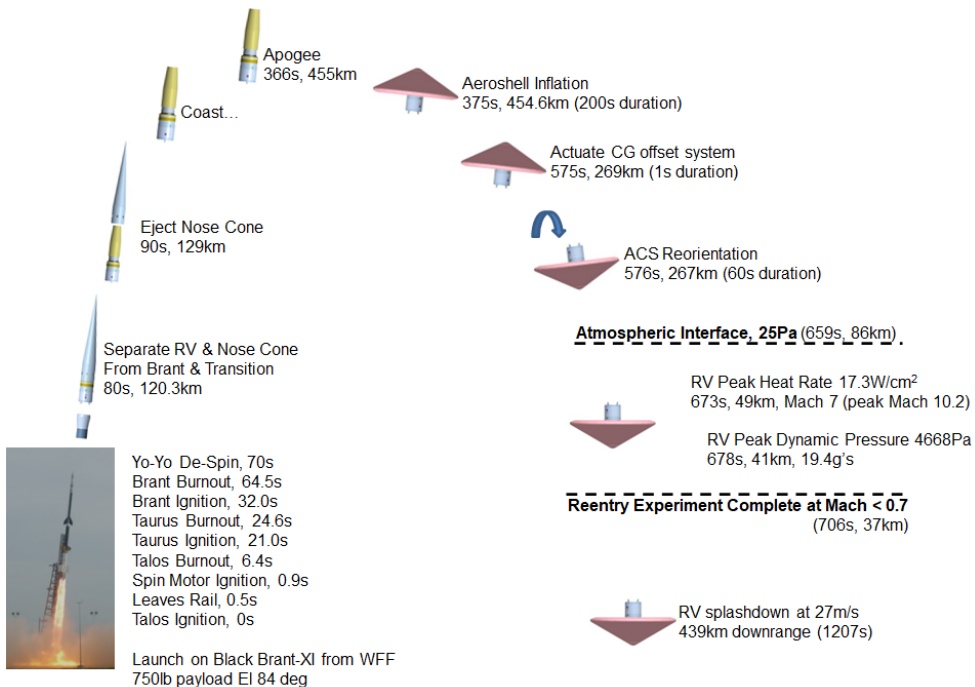
- LOFTID, 2022



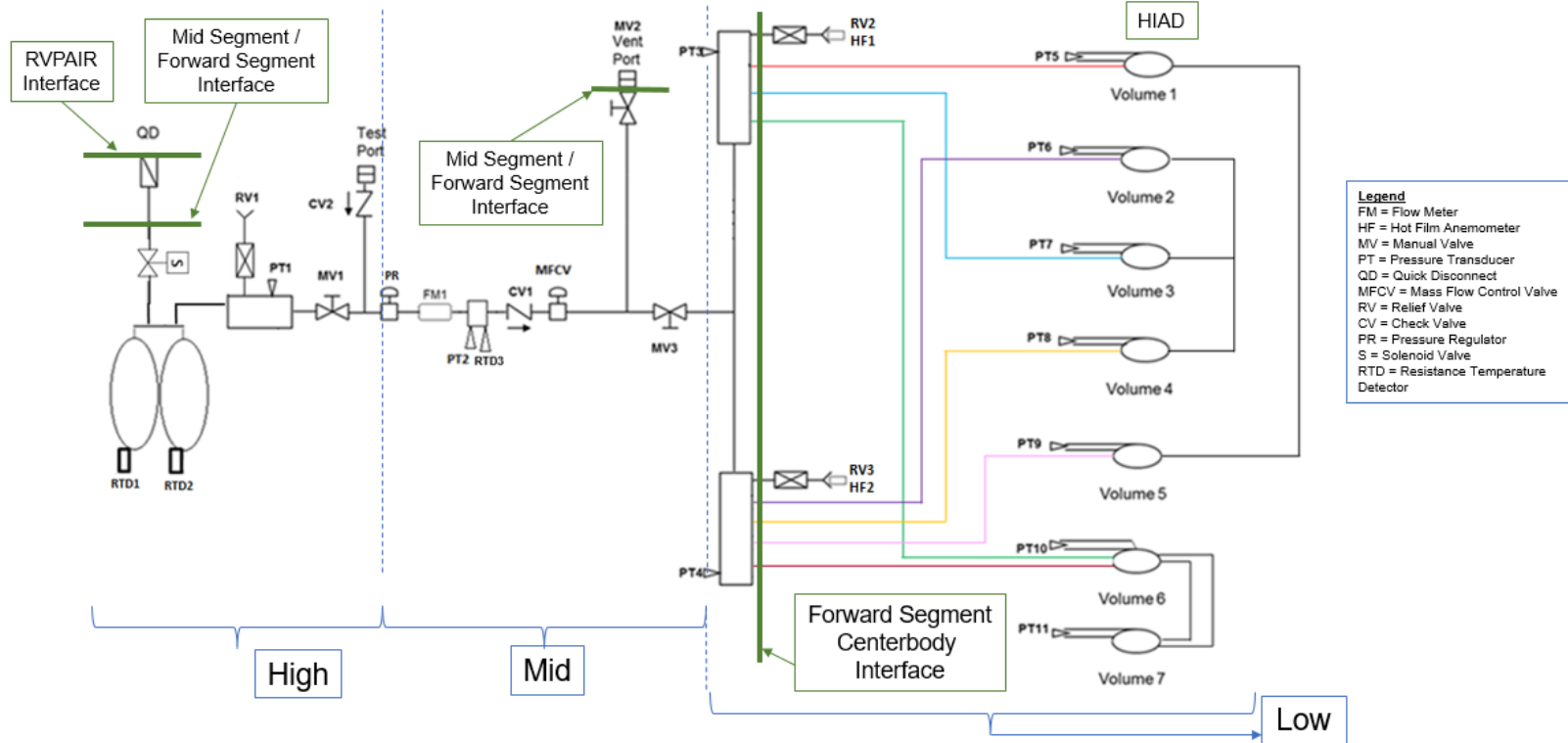
LOFTID



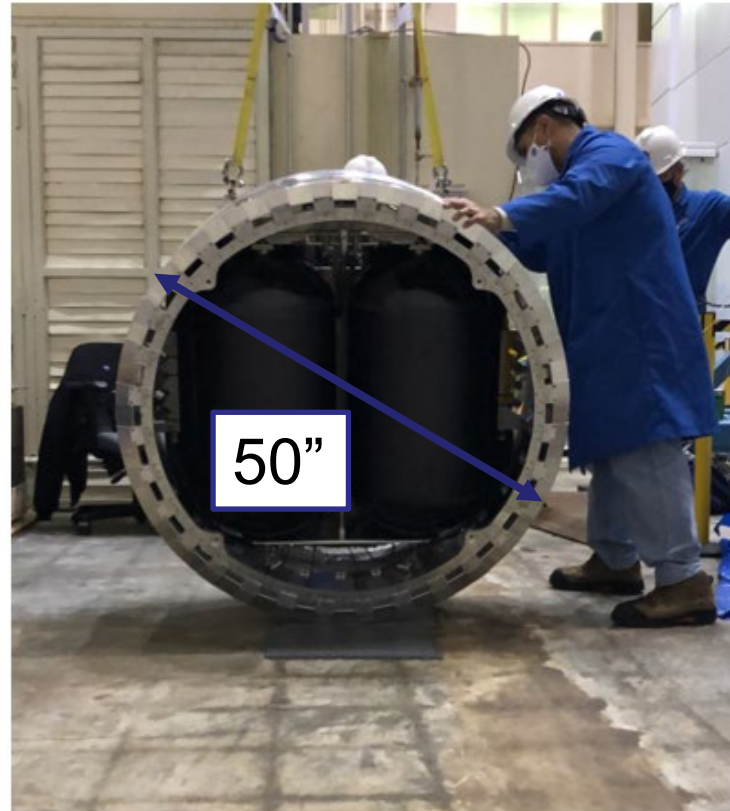
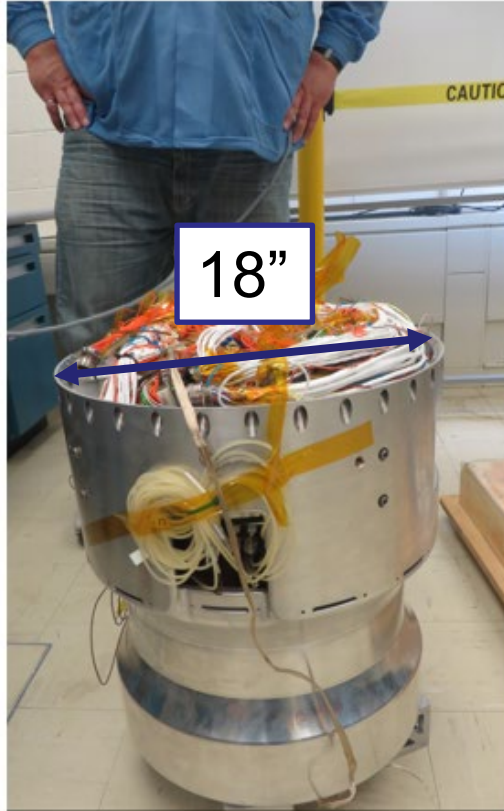
IRVE vs LOFTID



LOFTID Inflation System

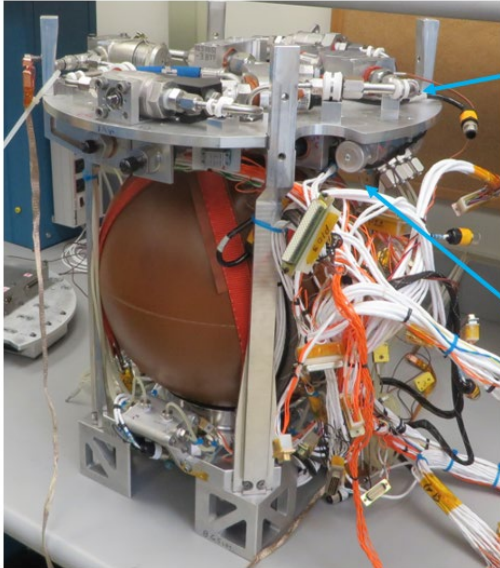


IRVE-3 vs LOFTID Centerbody

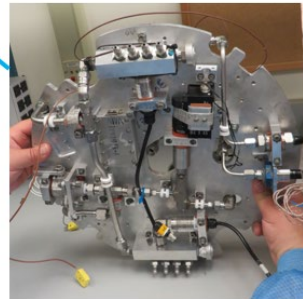


IRVE-3 vs LOFTID Inflation System

IRVE-3 Pneumatics Plates



Top of Inflation Plate



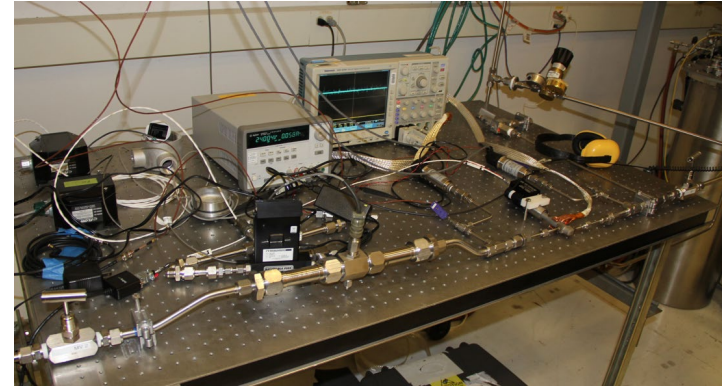
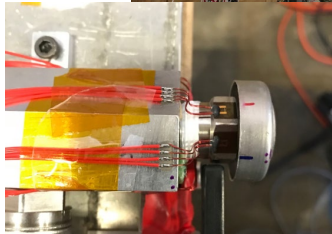
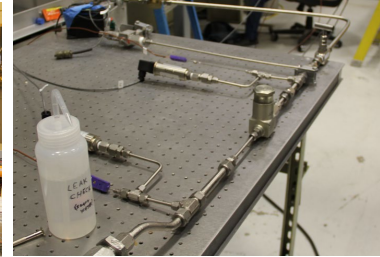
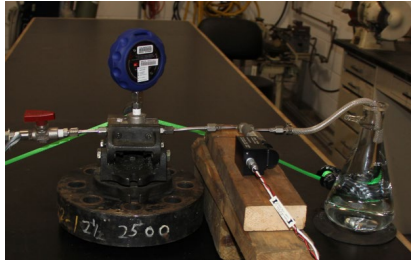
Bottom of Inflation Plate



LOFTID Pneumatics Plate

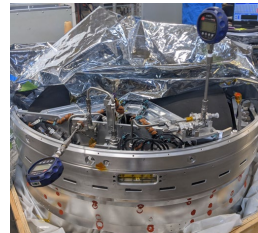
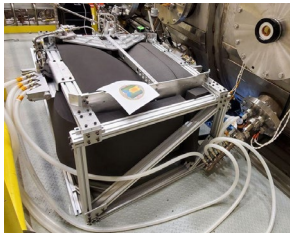
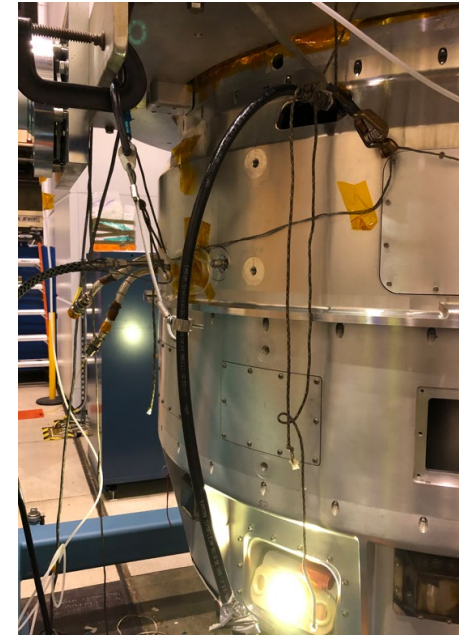
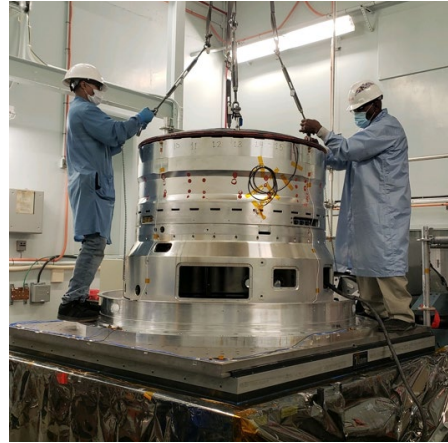
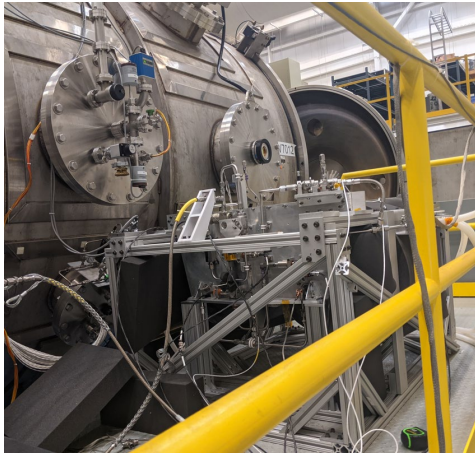
Test Campaign, Phase I

Component Level: Sealing, Pressure Capability, and Flow Characterization



Test Campaign, Phase II

Subsystem Level: Flow Characterization, Leak Checks, Functionals, Vibration



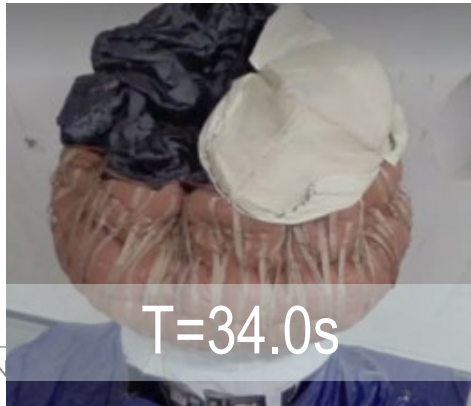
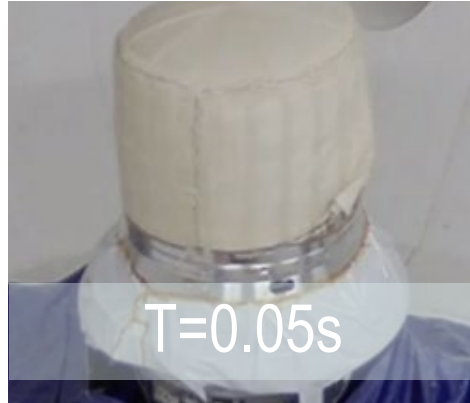
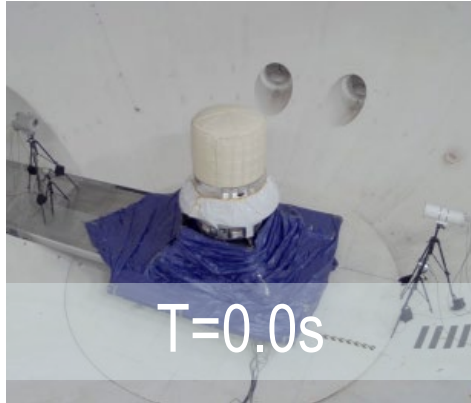
Test Campaign, Phase II

Subsystem Level: Inflatable Volume Tori Simulator (IVTS) Test

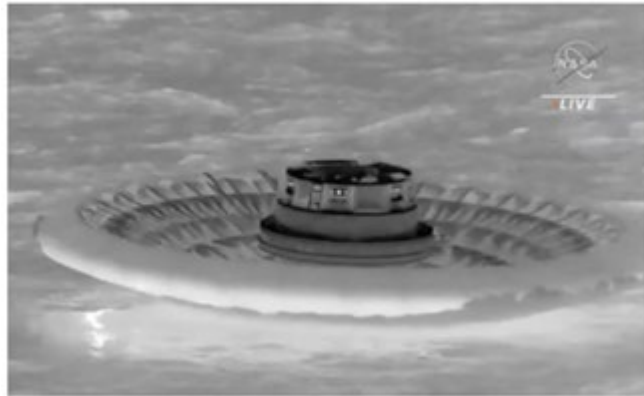
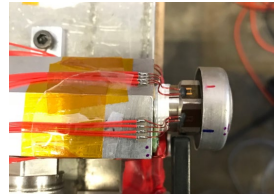


Test Campaign, Phase III

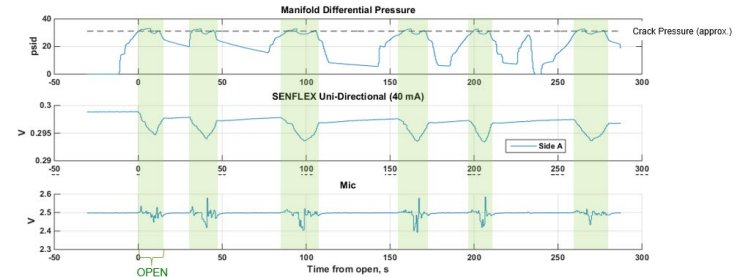
System Level Testing: CST, RV Level Vibe



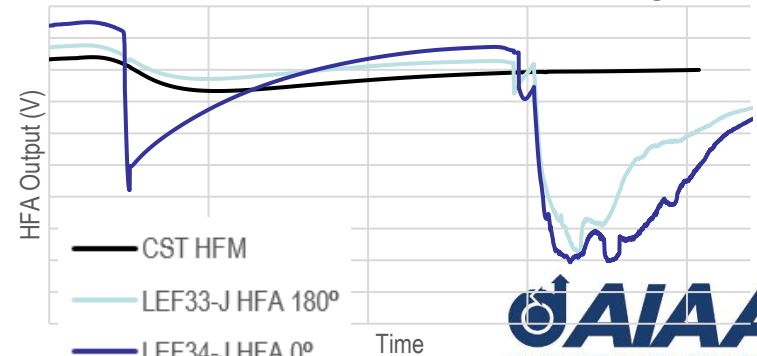
Inflation System Flight Performance



Hot Film Anemometer Excitation, Component Level Testing



Hot Film Anemometer Excitation, Component Level Testing



Test Campaign Summary Take Aways

- Extensive testing at the component level enables a flexible and adaptive system
- Greatest risks to an aggressive pneumatics campaign are the soft seals
- No test, or test results are inconsequential



Questions?



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