Human Factors Problems
Of Flying Wingless Lifting Body Vehicles

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Disclosure Information

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I have no financial relationships to disclose.

I will not discuss off-label use and/or investigational use in my presentation
Lifting Body Configurations
Ballistic Capsules
Lifting Reentry

Gemini
Advantages of Lifting Bodies

- Increased mission flexibility and versatility
- Greater reentry cross-range than capsule
- Reduced $g$-loading and reentry heating
- Conventional seating arrangement
- Capable of precision runway landing
Human Factors Challenges

Pilot workload – Vehicle was prone to longitudinal and lateral oscillations

Pilot-induced oscillation – Simulation predicted potential for PIO

Simulation fidelity – Early simulator design was poor

Need for increased attention to Human Factors Engineering
Case Study 1: Milt Thompson, M2-F2, 12 July 1966

Pilot-Induced Oscillation

Habit Pattern Transfer

Lack of Simulation Fidelity
Case Study 2: Bruce Peterson, M2-F2, 10 May 1967

Habit Pattern Transfer

Spatial Disorientation

Distraction

Task Saturation
Lifting Body HFE Lessons

Accurate Simulation
Practice in the simulator reinforces cognitive habit patterns

Human-Machine Interface
Logical placement of cockpit displays and controls

Automated Flight Management Systems
Appropriate use of automation

Learning from past experience is fundamental to the development of safe and efficient new systems and to improving existing systems.

Future mishaps might be avoided through the collection, archiving, and study of data on past accidents and incidents to learn valuable lessons.
Resources

Books and eBooks available

http://www.nasa.gov/