X-37 Flight Demonstrator

X-40A Flight Test Approach

Dan Mitchell
X-37 Systems Engineering
NASA Marshall Space Flight Center
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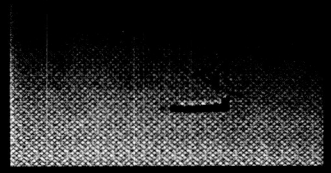
Phased Approach to Orbital Flight Demonstrations

X-40A Completed Seven Successful Flights in 2001



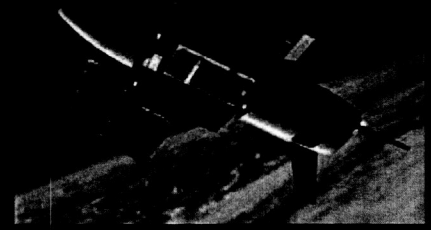
Drop Tests

Approach and Landing Test Vehicle Flies 2004

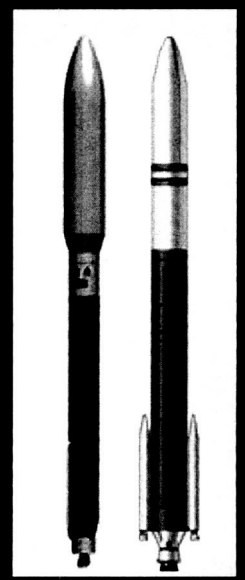
B-52 will carry ALTV up to 40,000 feet

Streamlined Ground Operations

Orbital Vehicle Flies 2006 - 2007



On Orbit



EELV

FLIGHT DEMONSTRATOR

X-40A History

- Air Force owned vehicle developed by Boeing
  - Phase 1: One successful flight performed August 1998
  - Phase 2: Loaned to X-37 to provide early flight test data

Improved Instrumentation & Telemetry
- Frequency agile
- Improved Data Rate
- Added Temp/Strain Sensors
- Improved Pressure Sensing
- Surface Position Sensors

Modification of surface actuator mounts

Upgraded Avionics Systems
- New dGPS Receiver/Modem and Command Receiver/Modem
- New uplink antennas
- Ruggedized Steering Controller & improved Actuator
- Addition of Heaters
- Power System Upgrades
- Additional Safing Systems

Add Landing Gear Doors

Add X-37 Sensors
- GPS/INS (SIGI)
- Air Data (CADS)

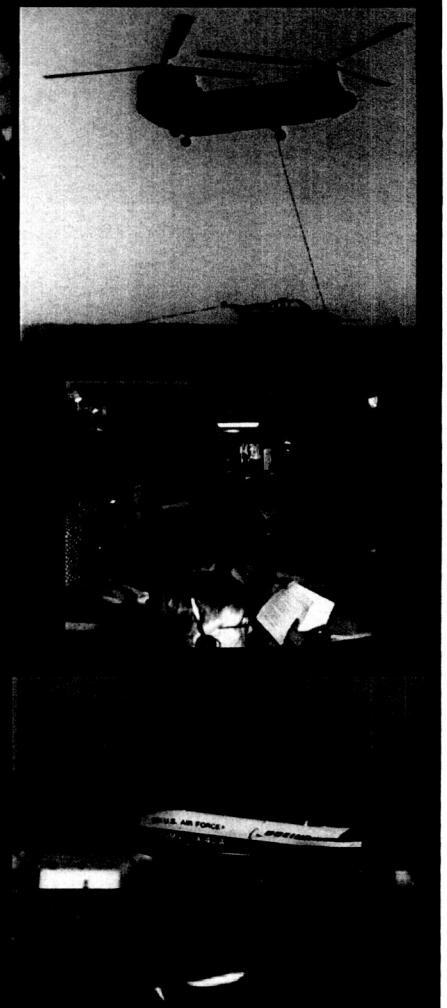
Modified Flight Termination System

FOCC Trailer Upgrades (Replaced Phase 1 DCV)

FLIGHT DEMONSTRATOR

X-40A Flight Test Objectives

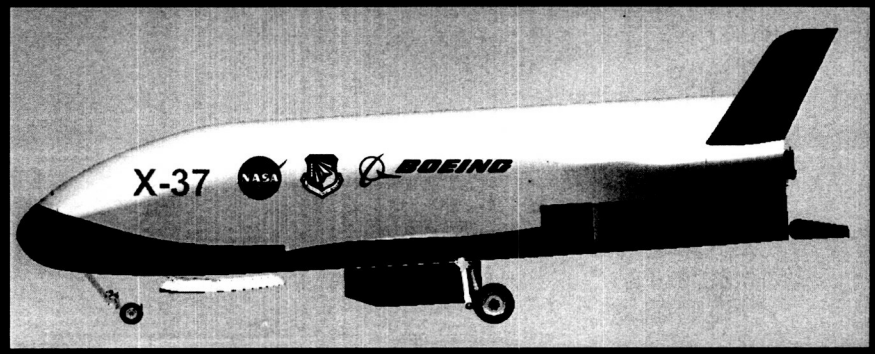
1. Evaluate Calculated Air Data System (CADS) experiment
2. Evaluate Honeywell SIGI (GPS/INS) under flight conditions
3. Flight Operation Control Center (FOCC) site integration and flight test operations
4. Flight test and tune GN&C algorithms
5. Conduct PID maneuvers to improve the X-37 aero database



FLIGHT DEMONSTRATOR

Comparison to X-37

X-37	
Landed Weight	7,500 lbs
Payload Weight	500 lbs
Fuselage Length	25.7 ft
Wing span	14.9 ft



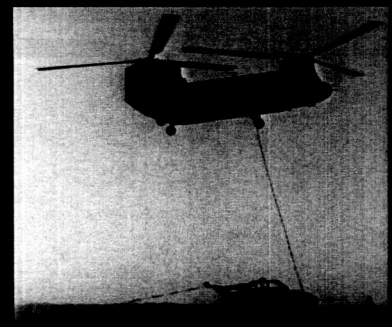
X-40A	
Landed Weight	3,000 lb
Fuselage Length	21.5 ft
Wing span	11.5 ft
Length scale of X-37	80%

FLIGHT DEMONSTRATOR

Stepping Stone Flight Test Approach

Flight Tests Completed at DFRC with Cooperation from Edwards AFB

Free Flights

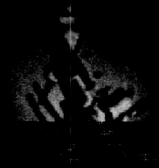


Captive Carry Flights

Autonomous Approach & Landing

Tow/Taxi Tests

Tow/Taxi Test Objectives



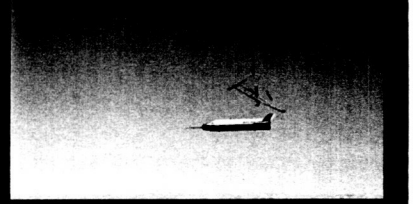
- Verify navigation system performance
- Evaluate performance of X-37 navigation system experiment
- Verify closed-loop performance of the landing system
- Obtain data to substantiate landing system models
- Evaluate integrated X-40A subsystem operations

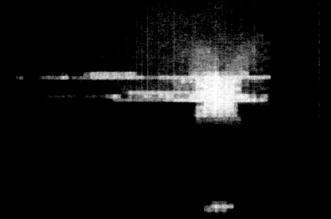
Captive-Carry Flight Via CH-47 Helicopter

- Verify X-40A Vehicle & Ground System Performance
- Verify X-40A & Helicopter Performance and Behavior
- Rehearse GO/NO-GO and release procedures

Seven Successful Free-Flight Approach & Landing Tests From 15,000 Feet

- Flight-to-flight conditions varied to gage vehicle response:
  - Released off centerline
  - Aerodynamic measurements made during vehicle maneuvers
  - Demonstrated unpowered flight and landing characteristics
- Collected data from onboard X-37 experiments
- Demonstrated operations concept

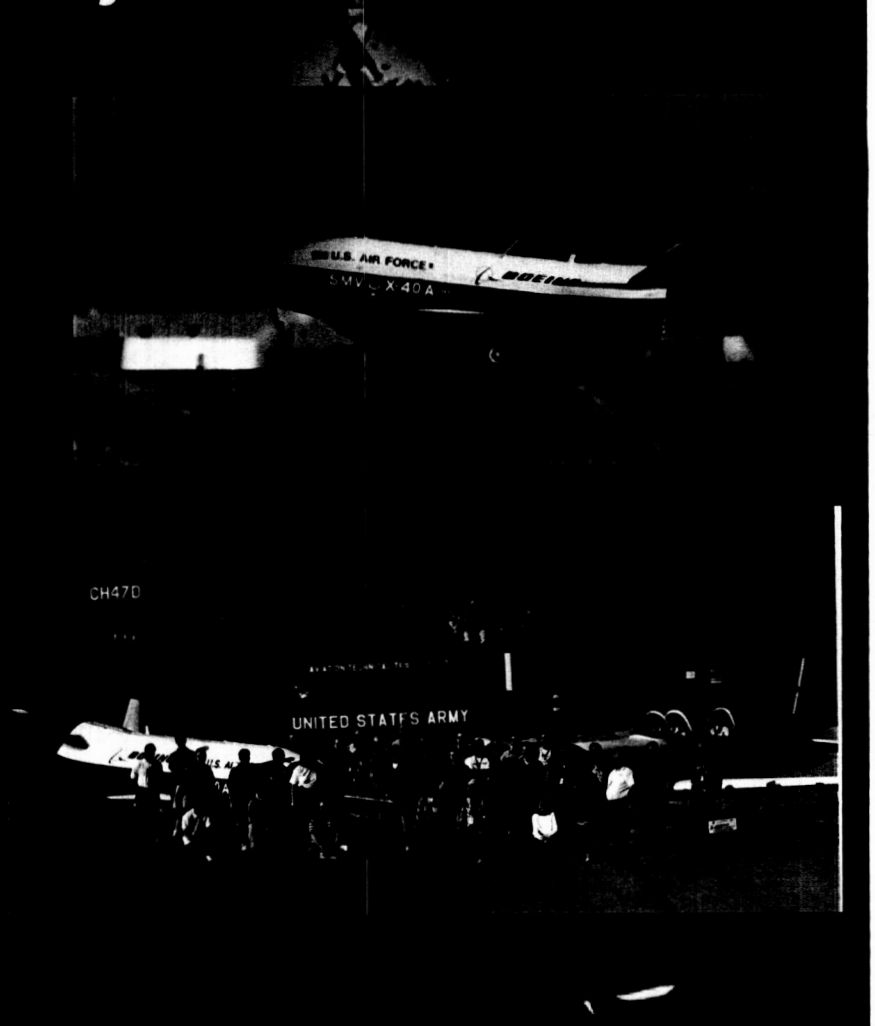




FLIGHT DEMONSTRATOR

The X-40A Flight Test Program Achieved Planned Objectives

- Develop Computed Air Data System (CADS) flight data to support X-37 system design
- Evaluation of Honeywell SIGI (GPS/INS) under flight conditions
- Flight Operation Control Center (FOCC) site integration and flight test operations
- Flight test and tune GN&C algorithms
- Base pressure instrumentation and PID maneuvers to improve the X-37 aero database



For More Information: