Backgrounder

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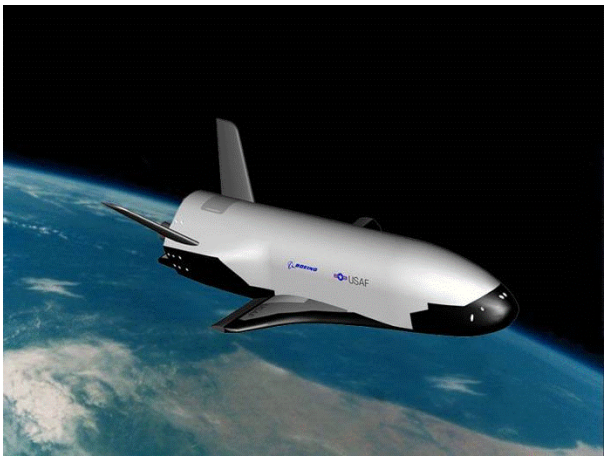

Photo courtesy of the United States Air Force

X-37B Orbital Test Vehicle

Description and Purpose:
Boeing Experimental Systems Group, a unit of Space and Intelligence Systems, is the prime contractor for the X-37B Orbital Test Vehicle, an unmanned space vehicle that will be used by the United States Air Force to explore reusable space vehicle technologies in support of long-term space objectives. Objectives of the X-37B program include space experimentation, risk reduction, and concept of operations development. Boeing's involvement in the program dates back to 1999.

Customer:
The Rapid Capabilities Office of the United States Air Force is the customer for the X-37B Orbital Test Vehicle. Originally a joint research effort between NASA, DARPA, and Boeing, the program transitioned to the United States Air Force in 2004.

General Characteristics:
The X-37B is one of the world's newest and most advanced re-entry spacecraft. Designed to operate in low-earth orbit, 110 to 500 miles above the Earth at a nominal speed of about 17,500 miles per hour, the vehicle is the first since the Space Shuttle with the ability to return experiments to Earth for further inspection and analysis.

Because the X-37B can be returned to Earth, reused, and is designed to be highly flexible and maneuverable, its contributions to space exploration will result in making space access more routine, affordable, and responsive.

The X-37B features many elements that mark a first in space use. The X-37B is one-fourth the size of the Space Shuttle, and relies upon the same family of lifting body design. It also features a similar landing profile. The vehicle was built using lighter composite structures, rather than traditional aluminum. A new generation of high-temperature wing leading-edge tiles will also debut on the X-37B. These toughened uni-piece fibrous refractory oxidation-resistant ceramic (TUFROC) tiles replace the carbon carbon wing leading edge segments on the Space Shuttle. The X-37B will also use toughened uni-piece fibrous insulation (TUFI) impregnated silica tiles, which are significantly more durable than the first generation tiles used by the Space Shuttle.

Advanced conformal resuable insulation (CRI) blankets are used for the first time on the X-37B.

All avionics on the X-37B are designed to automate all de-orbit and landing functions. Additionally, there are no hydraulics onboard the X-37B; flight controls and brakes use electromechanical actuation.

The on-orbit duration of the X-37B will vary based upon mission requirements, but has the ability to perform missions lasting up to 270 days.

The first X-37B was launched on April 22, 2010 and became the United States' first unmanned vehicle to return from space and land safely on its own on December 3, 2010. A second vehicle was launched on May 5, 2011; the mission is still underway.

The first flight demonstrated that the X-37B is able to conduct long-duration operations and enabled scientists to understand the long-term effects on system components, such as the structure and future payloads. The successful first flight included achieving orbit, de-orbiting, and safely landing at the primary return location, Vandenberg Air Force Base.

Specifications:

DIMENSIONS

In Orbit	H, 9 feet, 6 inches L, 29 feet, 3 inches Wing Span, 14 feet, 11 inches
Experiment Bay Size	7 feet by 4 feet
Launch Weight	11,000 pounds
Orbit Range	Low-Earth Orbit, 110 – 500 miles above Earth

Miscellaneous:

The X-37B Orbital Test Vehicle was built at several Boeing locations in Southern California, including Huntington Beach, Seal Beach and El Segundo.

Early Boeing Involvement:

The X-37B orbital test vehicle program dates back to 1999, when Boeing, NASA and DARPA began researching two vehicles, an approach and landing test vehicle (ALTV) and an orbital vehicle. The ALTV was designed to validate flight dynamics and extend the flight envelope beyond the low speed/low altitude tests conducted by NASA from 1998 through 2001 on the X-40A, a sub-scale version of the X-37 developed by Air Force Research Labs. DARPA completed the ALTV in September 2006 by successfully executing a series of captive carry and free flight tests from the Scaled Composites

White Knight Aircraft. The X-37 vehicle envisioned by NASA was never built, however its design formed the basis for the Air Force's X-37B orbital test vehicle program.

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