

# Boeing X-45

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The **Boeing X-45** unmanned combat air vehicle is a concept demonstrator for a next generation of completely autonomous military aircraft, developed by Boeing's Phantom Works. Manufactured by Boeing Integrated Defense Systems, the X-45 was a part of DARPA's J-UCAS project.

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## X-45

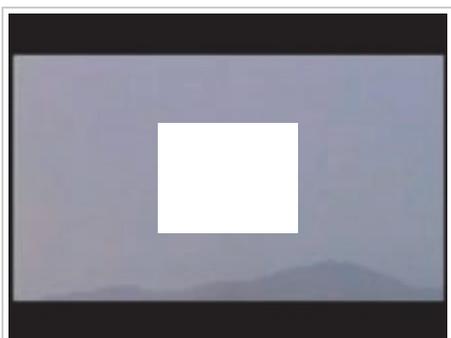


Boeing X-45A

<b>Role</b>	Unmanned Combat Air Vehicle
<b>Manufacturer</b>	Boeing Integrated Defense Systems
<b>First flight</b>	22 May 2002
<b>Primary user</b>	United States Air Force
<b>Number built</b>	2
<b>Variants</b>	Phantom Ray

## Development

Boeing developed the X-45 from research gathered during the development of the Bird of Prey. The X-45 features an extremely low-profile dorsal intake placed near the leading edge of the aircraft. The center fuselage is blended into a swept lambda wing, with a small exhaust outlet. It has no vertical control surfaces — split ailerons near each wingtip function as asymmetric air brakes, providing rudder control, much as in Northrop's flying wings.



X-45A test flight

Removing the pilot and its associated facilities dramatically reduces the aircraft's cost. Operators may remotely command the aircraft, but the actual piloting is autonomous.

## Variants

### X-45A

Boeing built two of the model X-45A; both were scaled-down proof-of-concept aircraft. The first was completed by Boeing's Phantom Works in September 2000.<sup>[1]</sup> The goal of the X-45A technology demonstrator program was to develop the technologies needed to "conduct suppression of enemy air defense missions with unmanned combat air vehicles."<sup>[1]</sup> The first generation of unmanned combat air vehicles are primarily planned

for air-to-ground roles with defensive air-to-air capabilities coupled with significant remote piloting.

The X-45A had its first flight on May 22, 2002, and the second vehicle followed in November of that year. On April 18, 2004, the X-45A's first bombing run test at Edwards Air Force Base was successful; it hit a ground target with a 250-pound inert precision-guided munition. On August 1, 2004, for the first time, two X-45As were controlled in flight simultaneously by one ground controller.

On February 4, 2005, on their 50th flight, the two X-45As took off into a patrol pattern and were then alerted to the presence of a target. The X-45As then autonomously determined which vehicle held the optimum position, weapons (notional), and fuel load to properly attack the target. After making that decision, one of the X-45As changed course and the pilot-operator allowed it to attack the simulated anti-aircraft emplacement. Following a successful strike, another simulated threat, this time disguised, emerged and was subsequently destroyed by the second X-45A.<sup>[2]</sup> This demonstrated the ability of these vehicles to work autonomously as a team and manage their resources, as well as to engage previously-undetected targets, which is significantly harder than following a predetermined attack path.

After the completion of the flight test program, both X-45As were sent to museums, one to the National Air and Space Museum, and the other to the National Museum of the United States Air Force at Wright-Patterson Air Force Base, where it was inducted on November 13, 2006.<sup>[1][3]</sup>

## X-45B/C

The larger X-45B design was modified to have even more fuel capacity and three times greater combat range, becoming the X-45C. Each wing's leading edge spans from the nose to the wingtip, giving the aircraft more wing area, and a planform very similar to the B-2 Spirit's. The first of the three planned X-45C aircraft was originally scheduled to be completed in 2006, with capability demonstrations scheduled for early 2007. By 2010 Boeing hoped to complete an autonomous aerial refueling of the X-45C by a KC-135 Stratotanker. Boeing has displayed a mock-up of the X-45C on static displays at many airshows.

The X-45C portion of the program received \$767 million from DARPA in October 2004, to construct and test three aircraft, along with several supplemental goals. The X-45C included an F404 engine.<sup>[4]</sup> In July 2005 DARPA awarded an additional \$175 million to continue the program, as well as implement autonomous Aerial Refueling technology.<sup>[5]</sup>

As of March 2, 2006, the US Air Force has decided not to continue with the X-45 project. However, Boeing submitted a proposal to the Navy for a carrier based demonstrator version of the X-45, designated the X-45N.

## X-45N

The X-45N was Boeing's proposal to the Navy's Unmanned Combat Air Systems demonstration project. When



X-45A underside with weapons bay door open



The newer, larger X-45C



X-45C from the side

it became known that the US Air Force would end funding to the Joint Unmanned Combat Air System program<sup>[6]</sup> (which included the X-45 and X-47), the US Navy started its own UCAS program.<sup>[7]</sup> Requirements were defined over the summer of 2006, and proposals were submitted in April 2007.<sup>[8]</sup>

The first flight of the X-45N was planned for November 2008, had Boeing won the contract.<sup>[9]</sup> The contract was eventually awarded to Northrop Grumman's proposed naval X-47, thus ending the X-45 program.<sup>[10]</sup>

The software Boeing developed to allow the X-45N to land and takeoff autonomously on aircraft carriers has recently been installed on the first F/A-18F, which has used it to perform autonomous approaches. All autonomous approaches ended with a wave-off by design. This Super Hornet is expected to be able to hook the carrier's arrester cables autonomously by the 2009 timeframe,<sup>[11]</sup> setting the stage for carrier-borne UAV operations.

## Phantom Ray

*Main article: Boeing Phantom Ray*

Boeing planned to develop and demonstrate an unmanned flying test bed for advanced air system technologies. The internally funded program, called Phantom Ray, uses the X-45C prototype vehicle<sup>[12]</sup> that Boeing originally developed for the Defense Advanced Research Projects Agency (DARPA)/U.S. Air Force/U.S. Navy Joint-Unmanned Combat Air System (J-UCAS) program. The UAV was not aimed at any particular program or competition.<sup>[13]</sup> However, Boeing may plan to use a design based on the Phantom Ray for the Navy's unmanned carrier-launched surveillance and strike (UCLASS) program.<sup>[14]</sup>

## Specifications (X-45A)

*Data from* Airforce Technology,<sup>[15]</sup> Boeing page<sup>[16]</sup>

### General characteristics

- **Crew:** 0
- **Length:** 26 ft 6 in (8.08 m)
- **Wingspan:** 33 ft 10 in (10.3 m)
- **Height:** 6 ft 8 in (2.14 m)
- **Empty weight:** 8,000 lb (3,630 kg)
- **Powerplant:** 1 × Honeywell F124-GA-100 turbofan

### Performance

- **Maximum speed:** Mach 0.75 (571 mph, 919 km/h)
- **Range:** 1,300 nmi (2,405 km)
- **Combat radius:** 375 miles (600 km)
- **Service ceiling:** 40,000 ft (13,200 m)

### Armament

- **Hardpoints:** 8 - 2 weapon bays with 4 in each - and provisions to carry combinations of:
  - **Bombs:** JDAM, Small diameter bomb

## See also

### Related development

- Boeing X-46
- Boeing Phantom Ray

### Aircraft of comparable role, configuration and era

- Northrop Grumman X-47A Pegasus
- Lockheed Martin Polecat
- Dassault nEUROn
- BAE Taranis

## References

- ↑ <sup>*a*</sup> <sup>*b*</sup> <sup>*c*</sup> Swan, Sarah (2006-11-17). "X-45A Unmanned Combat Vehicle on Display". *Aerotech News and Review*.
- ↑ The 50th flight: Two X-45s work autonomously as a group and successfully attack previously undetected targets (http://www.boeing.com/news/releases/2005/q1/nr\_050214s.html)
- ↑ Boeing news release (http://www.boeing.com/news/releases/2006/q4/061002a\_nr.html)
- ↑ "Boeing Receives First Engines for X-45C UCAV" (http://www.boeing.com/news/releases/2004/q4/nr\_041118t.html) . Boeing, November 18, 2004.
- ↑ "Boeing Awarded Additional \$175 Million for Joint Unmanned Combat Air Systems Capability Demonstration Program" (http://www.boeing.com/news/releases/2005/q3/nr\_050711n.html) . Boeing, July 11, 2005.
- ↑ "J-UCAS ending" (http://www.aviationweek.com/aw/generic/story\_generic.jsp?channel=awst&id=news/aw091627.xml) , *Aviation Week and Space Technology*.
- ↑ "Navy's UCAS program" (http://www.aviationweek.com/awe/generic/story\_generic.jsp?channel=hs&id=news/UCAS07216.xml) , *Aviation Week and Space Technology*.
- ↑ article; Navy UCAS proposals" (http://www.aviationweek.com/aw/generic/story\_channel.jsp?channel=defense&id=news/aw040207p1.xml) , *Aviation Week and Space Technology*
- ↑ "Winner to be selected in late 2007 or early 2008" (http://www.aviationweek.com/aw/generic/story\_channel.jsp?channel=defense&id=news/UCAS10196.xml) . *Aviation Week and Space Technology*.
- ↑ "Navy awards UCAS-D contract to Northrop Grumman X-47 team (http://www.forbes.com/prnewswire/feeds/prnewswire/2007/08/03/prnewswire200708031741PR\_NEWS\_B\_WES\_LA\_LAF053.html)
- ↑ "F/A-18F approaches carrier autonomously, will soon land autonomously" (http://www.aviationweek.com/aw/generic/story.jsp?id=news/aw060407p1.xml&headline=Super%20Hornet%20Demonstrates%20Unpiloted%20Approaches&channel=defense) . *Aviation Week and Space Technology*
- ↑ "Boeing's Phantom Ray - the 'Phoenix' of UCAVs" (http://www.aviationweek.com/aw/blogs/defense/index.jsp?plckController=Blog&plckScript=blogScript&plckElementId=blogDest&plckBlogPage=BlogViewPost&plckPostId=Blog%3a27ec4a53-dcc8-42d0-bd3a-01329aef79a7Post%3a0fc310f6-038d-410a-8d24-5daeb366ef29&plckCommentSortOrder=TimeStampAscending) . Aviation Week.
- ↑ "Breaking: Boeing resurrects X-45C as 'Phantom Ray' testbed" (http://www.flightglobal.com/blogs/the-dewline/2009/05/breaking-boeing-resurrects-x-4.html) . Flight Global.
- ↑ US Navy delays UCLASS RFP (http://www.flightglobal.com/news/articles/us-navy-delays-uclass-rfp-380098/) - Flightglobal.com, December 11, 2012
- ↑ X-45 J-UCAV Joint Unmanned Combat Air System, specifications (http://www.airforce-technology.com/projects/x-45-ucav/specs.html) . airforce-technology.com
- ↑ X-45 Joint Unmanned Combat Air System

(<http://www.boeing.com/history/boeing>

[/x45\\_jucas.html](#)) . Boeing.

## External links

- Boeing X-45 Site ([http://www.boeing.com/history/boeing/x45\\_jucas.html](http://www.boeing.com/history/boeing/x45_jucas.html))
- X-45 Video Collection (<http://www.darpa.mil/j-ucas/X-45/videos.htm>)
- NASA Dryden X-45A UCAV Photo Collection (<http://www.dfrc.nasa.gov/gallery/Photo/X-45A/index.html>)
- First bombing run test is a success (<http://www.msnbc.msn.com/id/4779727/>)
- X-45C information (<http://www.airforce-technology.com/projects/x-45-ucav/>)
- Composites combat ready in UCAVs (<http://www.compositesworld.com/articles/composites-combat-ready-in-ucavs>)
- Boeing X-45 / X-46 page on designation-systems.net (<http://www.designation-systems.net/dusrm/app4/x-45.html>)
- Photograph; X-45C unfinished prototype ([http://aviationweek.typepad.com/ares/2007/06/x45c\\_exclusive\\_.html](http://aviationweek.typepad.com/ares/2007/06/x45c_exclusive_.html))
- X-45C/N computer-rendered images (<http://www.globalsecurity.org/military/systems/aircraft/x-45c-pics.htm>)
- Boeing 'Phantom Eye' Hydrogen Powered Vehicle Takes Shape (<http://boeing.mediaroom.com/index.php?s=43&item=1108>)

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