

F-15EX Eagle II



The F-15EX Eagle II entered integrated developmental and operational test in FY22, completing 8 of 17 planned two-ship missions. Five four-ship missions are planned for FY23 when the Lot 1B aircraft are delivered. Testing was paused due to restrictions on the use of Link 16. Initial effectiveness data from the missions flown show the F-15EX performed as well as, or better than, the F-15C it is intended to replace.

SYSTEM DESCRIPTION

The F-15EX is a two-seat, twin-engine, multi-role fighter aircraft. It is a derivative of the Qatari F-15QA, which is a derivative of the U.S. Air Force F-15E Strike Eagle. The F-15EX inherits modern advances such as “fly-by-wire” flight controls, dual Digital Helmet Mounted Cueing Systems, a large touchscreen display, and additional improvements such as the Eagle Passive/Active Warning Survivability System for electronic warfare.

MISSION

Although the aircraft is multi-role capable, the U.S. Air Force intends to use the F-15EX with a single pilot, primarily in an air superiority role, for the near-term. Units equipped with the F-15EX will provide offensive counter-air, cruise-missile defense, and defensive counter-air capabilities, including escort of high-value airborne assets. The F-15EX is capable of employing a full complement of air-to-air weapons and has two additional weapons stations compared to the F-15E. In addition, the F-15EX will have a very limited capability to employ precision-guided, air-to-surface munitions due to lack of conformal fuel tanks.

PROGRAM

The F-15EX is an Acquisition Category IC program that transitioned from a Rapid Fielding

Middle Tier of Acquisition (MTA) program to a Major Defense Acquisition Program on September 6, 2022. The MTA process allowed the Air Force to rapidly obtain two test aircraft within months of program initiation, and begin testing the aircraft within the program’s first year. The Air Force intends to procure 78 F-15EX aircraft, trainers, and support equipment over five procurement lots in five years. As part of the MTA approval process, DOT&E approved the Operational Test and Evaluation section of the Program Strategy Document (i.e., Section 4) in July 2020.

» MAJOR CONTRACTOR

- The Boeing Company, Integrated Defense Systems – St. Louis, Missouri

TEST ADEQUACY

In May 2021, prior to beginning formal IOT&E, the Air Force flew the first two F-15EX aircraft for early operational assessment within two months of initial delivery. The F-15EX, along with F-15C and F-15E aircraft, deployed to Joint Base Elmendorf–Richardson, Alaska, to participate in the Northern Edge large-force exercise. This exercise provided significant feedback on initial aircraft systems and software, and early discovery of mission planning hardware deficiencies, which have since been corrected.

The Air Force started integrated testing in October 2021, in accordance with the DOT&E-

approved test plan, and DOT&E observed the testing. The Air Force collected data to evaluate the F-15EX performing the missions of the F-15C it is replacing. A portion of the missions were flown alongside the F-15C, and other missions were executed by the F-15EX without any F-15C. While it is not a true comparative test, the use of the F-15C was required due to the rapid fielding and having only two Lot 1A F-15EX aircraft delivered for Phase 1 of the operational test and evaluation. With the addition of six Lot 1B F-15EX aircraft expected in FY23, Phase 2 of the test will only use F-15EX aircraft for the effectiveness evaluation.

The Air Force completed eight of 17 planned Phase 1 test missions before the Air Force Operational Test and Evaluation Center declared a pause to testing due to a Federal Aviation Administration imposed restriction on the use of Link 16. At the time of writing, the F-15EX has Federal Aviation Administration approval to transmit Link 16. Testing is expected to resume in 1QFY23.

Following the initial portion of Phase 1 testing, the Air Force’s Air Combat Command clarified that the aircraft configuration for the first operational F-15EX units will not include conformal fuel tanks (CFT). The lack of CFTs will limit the number of external pods and air-to-ground weapons the F-15EX will be able to employ. While the initial Phase 1 testing was done with CFTs, it is likely that the test data produced will still be representative of the production aircraft equipped with two external

tanks, as now planned. Until CFTs are procured and provisioned, F-15EX's air-to-ground capabilities will be very limited.

F-15EX operational testing requires a real-time, high-fidelity kill-removal system, known as Open Air Battle Shaping (OABS). The current OABS system is transitioning to the Common Range Integrated Instrumentation System architecture as the DOD continues to incorporate OABS into multiple CONUS ranges and fighter aircraft. Efforts are underway to complete the integration, along with updates to OABS in F-15 operational flight program Suite 9.2 and all F-15 operational flight program releases, to support future operational test requirements. Utilization of OABS enhances the realism of testing against current and future high-fidelity active electronically scanned array threat radar emulators, while providing critical data from open-air, mission-level testing for use in verification, validation, and accreditation of modeling and simulation solutions.

In FY22, the Air Force completed low-level lightning, external radio frequency, electromagnetic environmental, and high-altitude electromagnetic pulse testing at Naval Air Station Patuxent River, Maryland. The Air Force and Boeing are completing vulnerability assessments for ballistic, low-power lasers, and chemical and biological weapons as part of the F-15EX Alternate LFT&E strategy approved by DOT&E in January 2021. Additional susceptibility studies assessing vulnerability to enemy air and surface-to-air

defenses, taking into account F-15EX performance and countermeasures, are planned and on track to be completed before the end of operational testing.

PERFORMANCE

» EFFECTIVENESS

Results from the first eight test missions provided compelling data that show the F-15EX was effective, although the limited number of missions did not cover all the planned mission conditions. In particular, threat levels were limited to fourth-generation adversaries with commensurate electronic warfare capabilities. Subsequent testing will assess the system against higher threat levels in more complex mission scenarios. An F-15EX successfully guided a long-range AIM-120 Advanced Medium-Range Air-to-Air Missile in June 2022 as part of a series of integrated (developmental and operational) weapons tests. The final assessment of F-15EX operational effectiveness will be published in the F-15EX IOT&E report in FY24, after the completion of operational testing.

» SUITABILITY

Due to the preliminary, limited data collected to date, DOT&E is unable to make a suitability assessment. However, the data indicate the F-15EX meets (or is close to meeting) its reliability, availability, and maintainability (RAM) requirements and is on track to demonstrate operational suitability.

Initial survey data assessing human-systems interactions show the aircrew had positive opinions of F-15EX cockpit usability. While training for both aircrew and maintainers on new systems is lacking, the Air Force plans to have all training available in time for initial operational capability. The program has not yet finalized a charter nor established the Joint Reliability and Maintainability Evaluation Team to review and categorize discrepancies.

» SURVIVABILITY

The Air Force conducted a Mission-based Risk Assessment Process for Cyber that concluded in May 2022. Vignettes developed during the event will form the basis of an integrated cybersecurity test plan for the new F-15EX hardware. The Air Force intends to conduct a cooperative vulnerability and penetration assessment of the Lot 1B F-15EX in 2QFY23, followed by an adversarial assessment. Data from these two assessments should provide insight into the capabilities and limitations of the new F-15EX hardware in a cyber-contested environment.

The Air Force plans to complete Alternate LFT&E assessments and analyses in February 2023. DOT&E will submit a report in 4QFY23 to support the Full-Rate Production decision.

RECOMMENDATIONS

The Air Force should:

1. Ensure the F-15EX test fleet, in particular the Lot

1A aircraft, is modified to include any configuration or equipment changes that occur in later deliveries, so they are representative of the fielding configuration.

2. Complete the Joint Reliability and Maintainability Evaluation Team charter and establish quarterly failure scoring boards to adjudicate reliability data to ensure the F-15EX remains on track to demonstrate operational suitability.
3. Incorporate OABS and high fidelity, active electronically-scanned array, threat radar emulators into future test events, to include any F-15EX FOT&E.

