

F-15EX Eagle II



The F-15EX Eagle II completed all 19 planned two-ship integrated developmental and operational test missions in FY23. Phase II, which consisted of five four-ship missions, was cancelled due to already having sufficient data to complete an assessment to support the full-rate production (FRP) decision. The cyber survivability evaluation was extended to Lot 2 due to a change in the fielding configuration.

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 and Survivability System for electronic warfare, which is being reported on in a separate article.

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 can employ a full complement of air-to-air weapons and has two additional weapons stations compared to the F-15E. In the near term, the F-15EX will have a very limited capability to employ precision-guided, air-to-surface munitions.

PROGRAM

The F-15EX is an Acquisition Category IB program that transitioned from a rapid fielding Middle Tier of Acquisition program to a major capability acquisition program in September 2022. The Air Force intends to procure 104 F-15EX aircraft, training systems, and support equipment over 6 procurement lots. As part of the transition process, DOT&E approved the OT&E section of the Program Strategy Document in October 2022. DOT&E will provide an IOT&E report in 1QFY24 to support the program’s FRP decision in November 2023.

» MAJOR CONTRACTORS

- Boeing Defense, Space & Security – St. Louis, Missouri
- RTX (formally Raytheon Technologies), Agile Radar Solutions – El Segundo, California
- General Electric – Cincinnati, Ohio

TEST ADEQUACY

The Air Force completed integrated testing in August 2023, 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 test missions were flown alongside the F-15C, and other missions were executed by the F-15EX without any F-15Cs

participating. While not truly a 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 I of the OT&E.

The Air Force completed all 19 planned Phase I test missions. During the Phase I 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). While the initial Phase I testing was conducted with CFTs, the test data produced is representative of the production aircraft equipped with two external tanks, as now planned. The lack of CFTs will limit the number of external pods and air-to-ground weapons the F-15EX will be able to employ. Until CFTs are procured and provisioned, F-15EX’s air-to-ground capabilities will be limited.

F-15EX operational testing requires a real-time, high-fidelity kill-removal system, known as Open Air Battle Shaping (OABS). The Air Force is transitioning the current OABS system 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 subsequent F-15 operational flight program releases, to support future operational test requirements. Utilization of OABS enhances the realism of open-air testing against current and future high-fidelity

active electronically scanned array threat radar emulators, while providing more accurate data including mission-level results for use in verification, validation, and accreditation of modeling and simulation solutions.

The threat levels were limited to predominantly fourth-generation adversaries with commensurate electronic warfare capabilities, with limited testing against fifth-generation adversaries. Subsequent FOT&E testing will be required to assess the system against higher threat levels in more complex mission scenarios. An F-15EX successfully employed three AIM-120s in June 2023 as part of a series of integrated weapons tests. The F-15EX successfully employed the GBU-39 Small Diameter Bomb and GBU-38 Joint Direct Attack Munition in a preplanned attack during Air Combat Command's Combat Hammer weapons evaluation program at Hill AFB, Utah. In addition, the F-15EX demonstrated the ability to launch the AGM-158B Joint Air-to-Surface Standoff Missile.

Due to the planned upgrades in Lot 2 and Lot 3 F-15EX aircraft, the Air Force Operational Test and Evaluation Center (AFOTEC) has eliminated the Phase II IOT&E and is working with the program office and DOT&E to start planning for a FOT&E in FY25 to assess the performance of the predominant operational configuration. The Program Strategy Document does not adequately address the resources and objectives of the FOT&E. The F-15EX Program

Office should submit a Test and Evaluation Master Plan (TEMP) to address the requirements for the FOT&E.

In FY23, the Air Force completed vulnerability assessments for ballistic, low-power laser, and air-to-air threat susceptibility studies as part of the F-15EX Alternate LFT&E strategy approved by DOT&E in January 2021. Planned chemical and biological hardness and operational studies are on track to be completed in 2QFY24, as are susceptibility studies that will assess vulnerability to enemy air and surface-to-air defenses given F-15EX performance and countermeasures. DOT&E will provide an addendum to the LFT&E report in 3QFY24.

PERFORMANCE

» EFFECTIVENESS

DOT&E's operational effectiveness assessment is ongoing with the data collected to date. The final assessment of F-15EX operational effectiveness will be published in the classified F-15EX IOT&E report in 1QFY24 to support the FRP decision.

» SUITABILITY

DOT&E's operational suitability assessment is ongoing with the data collected to date. Initial survey data assessing human-systems interactions show the pilots had positive opinions of F-15EX cockpit usability. While training for both pilots and maintainers on new systems is currently lacking,

the Air Force plans to have all training available in time for initial operational capability.

As recommended by the FY22 Annual Report, the program chartered and established the Joint Reliability and Maintainability Evaluation Team to review and categorize discrepancies. The F-15EX program office is actively working to resolve an issue with the Technical Orders (T.O.) for the F-15EX, as the current T.O.s are not accurate regarding the production model, impacting pilot and maintenance crews' ability to effectively complete tasks. The final assessment of F-15EX operational suitability will be published in the classified F-15EX IOT&E report in 1QFY24 to support the FRP decision.

» SURVIVABILITY

DOT&E's survivability assessment is ongoing with the data collected to date. The Air Force completed a mission-based risk assessment process for cyber in 2022 and employed the resultant test cases during a developmental cyber survivability assessment in February 2023. The Air Force intends to conduct a cooperative vulnerability and penetration assessment of a Lot 1B F-15EX for insights on the capabilities and limitations of new F-15EX hardware in a cyber-contested environment. AFOTEC intends to complete a nose-to-tail cyber survivability evaluation of Lot 2 F-15EX in FY25.

The Air Force plans to complete Alternate LFT&E assessments and analyses in November 2023,

except for chemical and biological hardness testing, which will be completed in March 2024. DOT&E will submit a report in 1QFY24, to support the FRP decision, and an addendum for the outstanding testing in 3QFY24.

RECOMMENDATIONS

The Air Force should:

1. As recommended in the FY22 Annual Report, ensure the F-15EX test fleet is production representative by modifying test jets to include any configuration or equipment changes that occur in future production lots.
2. Continue to incorporate OABS and high-fidelity, active electronically scanned array, threat radar emulators into the F-15EX FOT&E.
3. Complete all planned LFT&E analyses.
4. Submit a cyber survivability test plan for a nose-to-tail evaluation of Lot 2 aircraft.
5. Submit a TEMP that outlines test events and allocates resources for the period between the FRP decision and the fielding of Lot 6 in FY29.