

F-22A – Raptor Advanced Tactical Fighter Aircraft



In FY23, the F-22A program completed FOT&E on the Release 2 (R2) Operational Flight Program (OFP), their second annual capability release. Operational testing for the next capability release, R3, is planned to begin in 1QFY24. The Federal Aviation Administration (FAA) currently restricts Link 16 transmission, an ongoing issue that has impeded both testing and utilizing a combat capability already installed in the aircraft.

SYSTEM DESCRIPTION

The F-22A Raptor is a fifth-generation, air-superiority fighter aircraft that delivers low observability versus threat radars, high maneuverability, sustained supersonic speed, and advanced integrated avionics. The capability release program adds to the F-22A's already significant combat capability via annual increments. The specific capabilities delivered in every two releases are documented in the corresponding Test and Evaluation Master Plan (TEMP).

MISSION

Units equipped with the F-22A conduct offensive counter-air, defensive counter-air, and limited ground attack missions in high-threat environments, delivering air superiority to enable coalition air operations.

PROGRAM

The F-22A Raptor started as a major capability acquisition program, with the first production aircraft fielding in 2003. Since 2019, the Air Force has been implementing hardware and software modernization efforts as capability releases. The Tactical Link 16 and Tactical Mandates TEMPs, approved by DOT&E in 2018, supported testing through the R2 Force Development Evaluation (FDE). Planning for the next F-22A capability release, R3,

is ongoing, and operational testing is planned to begin in 1QFY24. The R3 and R4 capstone test strategies and test concepts are covered in a combined R3/R4 TEMP. DOT&E expects incremental updates to the TEMP every two capability releases, beginning with R5, planned for FY25.

» MAJOR CONTRACTOR

- Lockheed Martin Aeronautics Company – Fort Worth, Texas

TEST ADEQUACY

The Air Force completed the R2 FDE and cyber survivability testing in January 2023. The test was observed by DOT&E and was executed in accordance with the DOT&E-approved test plan, with one exception. The R2 FDE included successful live employment of Air Intercept Missile (AIM)-120 Advanced Medium Range Air-to-Air Missiles and five large-force employment, mission-level trials covering both defensive and offensive counter-air mission areas. However, the required Open Air Battle Shaping (OABS) capability was not properly integrated into the F-22A and was therefore not ready for use during the R2 FDE mission-level trial evaluation. The OABS limitation, which was also present in R1 testing, stemmed from omissions in F-22A software and delays integrating the Common Range Integrated Instrumentation System (CRIIS) into the F-22A. CRIIS is the current flight test instrumentation capability needed for OABS in the

F-22A and will enable high-fidelity, real-time kill removal and data collection. Data collected by the OABS system will also be essential during the verification, validation, and accreditation of the F-22A model in the Joint Simulation Environment.

One longstanding test limitation stems from FAA restrictions on Link 16 transmission, which continue to prevent testing and fielding of this important capability. A more thorough evaluation of the Link 16 capability in the F-22A will occur as soon as the FAA lifts the restriction and/or the DoD develops a method to accommodate FAA protocols and restrictions.

PERFORMANCE

» EFFECTIVENESS

Analysis of the operational effectiveness of the F-22A in tasked missions with R2 capabilities is ongoing and will be reported in the classified DOT&E R2 OFP test report, planned for 2QFY24.

» SUITABILITY

Analysis of the suitability of the F-22A with R2 enhancements is ongoing will be reported in the classified DOT&E R2 OFP test report, planned for 2QFY24.

One suitability issue that remains from R1 testing is the significant delay in receiving an avionics component from the vendor that is

critical to enabling F-22A Link 16 capabilities.

» **SURVIVABILITY**

Analysis of the cyber survivability of the F-22A's Integrated Maintenance Information System (IMIS) will be reported in the classified DOT&E R2 OFP test report, planned for 2QFY24.

RECOMMENDATIONS

The DoD should:

1. Solidify a plan to accomplish Link 16 testing that demonstrates operational effectiveness and cyber survivability while accommodating FAA protocols, restrictions, and test-specific operating procedures, as recommended in the FY22 DOT&E Annual Report.

The Air Force should:

1. Conduct all future mission-level evaluations of the F-22A with OABS to enable high-fidelity, holistic mission evaluations with new capabilities in operationally representative environments.
2. Continue to work with the vendor to remedy the Link 16 avionics component delivery delays.