E-2D Advanced Hawkeye



In FY24, the Navy continued operational testing (OT) on the E-2D with Delta System Software Configuration Build 4 (DSSC-4). DSSC-4 improves the Advanced Hawkeye's command and control capability and is the fourth in a series of biennial hardware and software upgrades to the E-2D. The Navy deployed DSSC-4 in FY24 and plans to complete DSSC-4 testing in FY25. As a result of the Navy's decision to deploy DSSC-4 before the completion of OT, DOT&E published an early fielding report (EFR) in June 2024, based on testing completed to date. The Navy intends to continue developmental testing on the first iteration of DSSC-5 software, DSSC-5.1, through 1QFY25 and commence OT in 3QFY25.

SYSTEM DESCRIPTION

The E-2D Advanced Hawkeye is a carrier-based, airborne tactical command and control platform that enables offensive and defensive carrier strike group missions including airborne early warning. Its sensors and communications systems are designed to detect, track, and identify air and surface targets in blue-water, littoral, and overland environments.

The following subsystems and capabilities enable the Advanced Hawkeye to perform its mission:

- AN/APY-9 phased array radar that combines mechanical and electronic scan modes
- Tactical Targeting Network
 Technology data link
- Multifunctional Information
 Distribution System
- Cooperative Engagement Capability
- Communications suite
- Electronic support measures
- Electronic protection
- Aerial refueling

The E-2D Advanced Hawkeye Program also includes all simulators, interactive computer media, and documentation to conduct maintenance, as well as aircrew initial and follow-on training.

MISSION

Carrier strike group and joint force commanders use the E-2D Advanced Hawkeye to provide all-weather airborne early warning, airborne battle management, and command and control functions, and to support Navy Integrated Fire Control and theater air and missile defense missions. Additional missions include surface surveillance coordination, air interdiction, offensive and defensive counter air control, close air support coordination, time-critical strike coordination, search and rescue coordination, and communications relay.

PROGRAM

The E-2D is an Acquisition Category IC program. In FY23, the Navy fielded DSSC-4 prior to completing the OT requirements. DOT&E published an EFR in June 2024, in advance of DSSC-4's first operational deployment. Between 3QFY23 and 1QFY24, the Navy conducted its fourth follow-on test and evaluation period (OT-D4) for DSSC-4 to complete the remaining OT requirements. During OT-D4, the Navy assessed DSSC-4 improvements in beyondline-of-sight communications, sensor integration, and tactical targeting networking technology. The Navy is also planning a fifth follow-on test and evaluation period (OT-D5) for DSSC-5.

DSSC-4 serves as the baseline for integration of communication and data processing capabilities that the Navy will fully deliver in DSSC-5. After DOT&E approved TEMP Revision F, the Navy decided to release DSSC-5 capabilities in two increments: DSSC-5.1 and DSSC-5.2. The Navy is working on a TEMP update to address those changes.

The TEMP presents a modeling and simulation framework for developing DSSC capabilities using the E-2D Systems Test and Evaluation Laboratory (ESTEL). The Navy intends to certify ESTEL capabilities in an incremental fashion, but as of this writing, the ESTEL is not accredited for use during OT.

» MAJOR CONTRACTOR

 Northrop Grumman Aeronautics Systems – Melbourne, Florida

TEST ADEQUACY

The evaluation of DSSC-4 involves a cumulative collection of integrated testing and OT data. Shortfalls in E-2D aircraft systems' maturity, reliability, and test resource availability challenged data collection during OT-D4, but OT was adequate for DOT&E to evaluate DSSC-4's operational effectiveness, suitability, and cyber survivability.

In 1QFY24, the Navy conducted DSSC-4 operational effectiveness and suitability testing in accordance with a DOT&Eapproved FOT&E test plan. Testing occurred on the Atlantic Test Ranges using an Aegis land-based test site at Wallops Island, Virginia. DOT&E observed these events. The Navy intended to conduct OT on the Hawkeye Integrated Training System at the Collins Aerospace facility in Sterling, Virginia, in FY24, but testing was delayed until FY25 to resolve deficiencies with the Hawkeye Integrated Training System software.

As reported in the FY23 Annual Report, the Navy conducted a DSSC-4 cyber survivability test in accordance with a DOT&Eapproved test plan. Testing occurred in 1QFY23 at Patuxent River, Maryland. That test included a cooperative vulnerability and penetration assessment (CVPA) and an adversarial assessment (AA). The test, observed by DOT&E, was adequate to support a partial cyber evaluation, but it was not adequate to characterize the impact of E-2D operations from all cyber-attacks outlined in the test plan.

» EFFECTIVENESS, SUITABILITY, AND SURVIVABILITY

In June 2024, DOT&E assessed the operational effectiveness, suitability, and cyber survivability of the E-2D with DSSC-4 in a classified EFR. DOT&E will publish a classified, final DSSC-4 FOT&E end-of-test report in FY25.

During OT-D4, E-2D operational test aircraft suffered shortfalls in overall availability, reliability, and logistic supportability. DOT&E's July 2020 FOT&E report on the previous variant, DSSC-3, had similar assessments on the suitability of the E-2D. The Navy did not meet all DSSC-4 cyber test objectives because of insufficient supporting information provided to the cyber assessment team and data link reliability problems encountered during cyber testing. The DSSC-4 cyber assessment failed to meet all test objectives, and DSSC-5 will introduce new mission-critical capabilities, so the Navy should conduct a cyber assessment for the DSSC-5 aircraft and software configuration.

RECOMMENDATIONS

As recommended in the FY23 Annual Report, the Navy should:

- Increase aircraft availability and reliability at operational test squadrons to facilitate efficient execution of large, complex test events.
- Continue to leverage largeforce exercises and Navy Aegis Combat Systems ships' qualification trials to maximize OT data collection opportunities in operationally representative environments.
- Develop a TEMP update to address planned DSSC-5 capabilities not covered in the current TEMP Revision F.
- 4. Accredit the ESTEL for use during OT of future DSSC builds.

Additionally, the Navy should:

 Conduct cybersecurity testing for DSSC-5 in accordance with DOT&E guidance.