

E-3 Airborne Warning and Control System (AWACS)

Executive Summary

The Air Force conducted an operational assessment (OA) of the Block 40/45 upgrade to the E-3 Airborne Warning and Control System (AWACS). The OA included data from modeling and simulation at Boeing's Virtual Warfare Center (VWC), St. Louis, Missouri, and developmental flight testing using Test System 3 (TS-3). With the retirement of the test support aircraft, Big Crow, there are insufficient resources to test AWACS system's resistance to Electronic Warfare (EW).

System

- The E-3 AWACS is an air battle command and control system and an airborne surveillance system. It includes surveillance radar, identification friend or foe system, and an electronic surveillance measures system installed on a Boeing 707. It also has an extensive voice and data communications suite. The mission computing system displays the surveillance and data link information to the crew and enables their conduct of the mission. The current fielded system is the Block 30/35 Radar System Improvement Program E-3.
- The Block 40/45 program replaces the mission computing subsystem with a local area network using commercial off-the-shelf servers and workstations. The upgraded computing hardware enables the implementation of multi-sensor correlation and fusion algorithms, new tracking algorithms, improved data link management, and a user-friendly interface. The upgrade also includes improvements to the electronic surveillance measures subsystem.
- Test System 3 (the AWACS test aircraft), used in the developmental testing of Block 40/45, is not production



representative because it includes an upgraded surveillance radar (single cabinet) and a computer-controlled communications suite, which are not included in Block 40/45.

Mission

- The AWACS aircrew provides command and control for the aerial refueling mission and air combat missions, which include air defense and strike missions.
- The AWACS aircrew provides air surveillance, monitors data link information, and provides airborne early warning to other command and control aircraft and command and control ground units.

Prime Contractor

- Boeing

Activity

- The Air Force Operational Test and Evaluation Center (AFOTEC) conducted an OA during 2QFY08 and 4QFY08. This OA included flight test data and modeling and simulation data. The OA included participation in the Joint Integrated Air and Missile Defense Organization's Nimble Fire simulation exercise at the VWC, St. Louis, Missouri.
- The Joint Interoperability Test Command tested the Block 40/45 software to assess its potential joint interoperability. The AWACS test community conducted interoperability testing.
- The program plans to have a Milestone C decision for low-rate initial production in 1QFY09.

Assessment

- The Block 40/45 software has been very stable.
- The Block 40/45 system has a Combat Identification (CID) Key Performance Parameter (KPP) to provide accurate CID information to the warfighter. The primary cause of incorrect or unknown CID is uncertainties from sensor inputs. When those uncertainties are removed, Block 40/45 software performs well.
- The Block 40/45 system has a KPP to provide the operator with a single track for each target. However, the system has been unable to demonstrate an ability to provide the operator with a single track for all targets. Thus far, the program has

been able to demonstrate 94 percent correlation between a single track to a single track.

- The developmental flight test program included interoperability testing. That testing demonstrated the system's ability to enter data links and to exchange data. However, because of the limited amount of interoperability flight testing done to date, future flight testing is required to fully evaluate systems interoperability.
- There are insufficient resources to adequately test the AWACS system's resistance to EW. Block 40/45 does not change the E-3's previous ability to resist EW, as there are no changes to the S-band radar or any of its radios. However, EW does affect how the mission computer processes the information and displays it to the operators.

Recommendations

- Status of Previous Recommendations. This is the first annual report for this program.
- FY08 Recommendations.
 1. The Air Force should conduct additional flight testing focused on interoperability. This testing should include verification of fixes as well as interoperability issues not yet tested.
 2. The Air Force needs to develop adequate EW test resources to fully characterize AWACS system performance in a realistic EW environment.