F-15 Eagle Passive Active Warning Survivability System (EPAWSS)

Executive Summary

- The Eagle Passive Active Warning Survivability System (EPAWSS) is performing as expected at this point in its development and test cycle. The Air Force has tested some radar warning and countermeasure functions, and identified software issues are being corrected.
- The first contractor and government developmental cybersecurity testing was completed in FY20 and no major problems were identified. Additional government cybersecurity testing is planned for FY21.
- The limited number of flight test hours accomplished during FY20 is insufficient to assess operational suitability; however, a hardware issue was identified, and the redesign is undergoing test.
- In October 2020, DOT&E provided the Air Force with a classified assessment of the available integrated test and evaluation (IT&E) results that informed the Air Force's Milestone C Decision Point 1.

System

- EPAWSS is a defensive system designed to provide F-15 aircrews with situational awareness of, and countermeasures against, radio frequency (RF) surface and airborne threats. It is designed to integrate and replace three of the F-15 legacy Tactical Electronic Warfare System (TEWS) components: the AN/ALR-56C Radar Warning Receiver, AN/ALQ-135 Internal Countermeasures Set, and AN/ALE-45 Countermeasures Dispenser Set.
- The EPAWSS radar warning function scans the RF environment and provides the aircrew with identification and location information on potential threat signals. If necessary, the system can respond with countermeasures (jamming or expendables) to defeat the threat radar or missile.
- EPAWSS was intended to replace the TEWS on the F-15C and F-15E aircraft. This year, the Air Force directed that the F-15C be excluded from the EPAWSS upgrade because the F-15C will be replaced by the new F-15EX aircraft. The EPAWSS test program is now focused on the F-15E as the lead aircraft.

Mission

- The Air Force employs the F-15E Strike Eagle as a dual-role fighter, designed to perform air-to-air and air-to-ground missions. EPAWSS provides the primary defensive suite to protect the F-15E during the conduct of both offensive and defensive missions.
- The Air Force plans to employ the F-15EX in an air-to-air role similar to the F-15C aircraft it will replace. It is planned to be an air superiority fighter, flown by active duty and Air National Guard units, and designed to perform both offensive and defensive air-to-air missions. EPAWSS will provide the defensive suite to protect the F-15EX during counter-air missions.

Major Contractor

The Boeing Company – St. Louis, Missouri

Activity

- DOT&E approved the Milestone B Test and Evaluation Master Plan (TEMP) in 1QFY18; a TEMP update is planned for 4QFY21, midway between the Milestone C program Decision Points, per agreement with DOT&E.
- The Air Force continued EPAWSS IT&E activities during FY20. Specific accomplishments included an installed system test event at Benefield Anechoic Facility (BAF), Edwards AFB, California, and three hardware-in-the-loop test events at the Multi-Spectral Test and Training Environment (MSTTE), Eglin AFB, Florida; the Integrated Demonstrations and Applications Laboratory (IDAL), Wright-Patterson AFB, Ohio; and the Advanced Threat Simulator System (ATSS), Point Mugu, California. The Air Force also accomplished flight testing on early versions of the EPAWSS software on the open-air ranges at MSTTE, and the Nevada Test and Training Range (NTTR), Nellis AFB, Nevada.

- The Air Force accomplished the following during EPAWSS IT&E:
  - Integration of the EPAWSS with an F-15E aircraft, its associated avionics, and weapons during an installed system test at the BAF in 2QFY20.
  - Evaluation of the EPAWSS radar warning function in dense RF signal environments at the IDAL in 3QFY20. An initial assessment of the countermeasures function was also completed.
  - Development of countermeasures techniques against two threats at the ATSS during 4QFY20.
  - Flight testing of the initial EPAWSS software, and the EPAWSS-related software changes to both the F-15Es Advanced Display Core Processor II (aircraft mission computer) and the AN/APG-82 radar.
  - Boeing conducted a cyber-vulnerability assessment of EPAWSS at their St. Louis, Missouri, F-15 Electronic Systems Integration Lab in July 2020, followed by the Air Force's first cooperative vulnerability identification test in August 2020.
- In October 2020, DOT&E provided the Air Force with a classified assessment of the available IT&E results that informed the Air Force's Milestone C Decision Point 1.

Assessment

- EPAWSS is performing as expected at this point in its development and test cycle.
- The Air Force has not yet completed the planned F-15 aircraft cybersecurity baseline evaluation. The results of this platform-level cybersecurity evaluation may affect the scope of the planned EPAWSS cybersecurity testing, scheduled for FY22.
- No significant cybersecurity vulnerabilities have been identified to date.

Recommendation

1. The Air Force should conduct a cybersecurity test and evaluation of the F-15 platform to properly inform the EPAWSS cybersecurity test and evaluation.