

F-15E Radar Modernization Program (RMP)

Executive Summary

- The Air Force Operational Test and Evaluation Center (AFOTEC) conducted IOT&E from March through September 2013 to assess the system's operational effectiveness, operational suitability, and mission capability. The IOT&E included 85 F-15E Radar Modernization Program (RMP) sorties and 175 hours of dedicated flight testing in which AFOTEC evaluated the F-15E RMP in an operationally representative cross-section of counterair and counterland operations employing both live and simulated air-to-air and air-to-ground weapons in realistic tactical scenarios.
- Preliminary IOT&E results indicate the F-15E RMP:
 - Is operationally effective and provides significantly improved capability in the air-to-air operational environment compared to that of the legacy radar system.
 - Demonstrated comparable air-to-ground radar performance compared with that of the legacy system and realized some improvements in target location accuracy.
 - Achieved improved system reliability and maintainability with a reduced deployment footprint of personnel, spare parts, and maintenance equipment compared to that of the legacy system.
 - Does not meet the user's software stability requirement of 30 hours Mean Time Between Software Anomaly (MTBSA). The inability to meet this requirement diminishes the effect of the overall mission capability improvements that the RMP system is intended to provide to operational F-15E units.
- The Air Force plans to conduct the Full-Rate Production decision in March 2014.

System

- The F-15E is a twin engine, tandem seat, fixed wing, all weather, multi-role fighter aircraft. The F-15E has a fully missionized cockpit and a multimode air intercept and air-to-ground radar, giving the aircrew the capability to employ air-to-air and air-to-ground munitions, a 20 mm cannon, and countermeasures for evading enemy fire.
- The RMP replaces the F-15E legacy APG-70 mechanically scanned radar with an active electronically scanned array (AESA) system designated the APG 82(V)1. The RMP is designed to retain functionality of the legacy radar system while providing expanded mission employment capabilities to include:
 - Near-simultaneous interleaving of selected air-to-air and air-to-ground functions
 - Enhanced air-to-air and air-to-ground combat identification capabilities
 - Longer range air-to-air target detection and enhanced track capabilities



- Longer range and higher resolution air-to-ground radar mapping
- Improved ground moving target track capability
- The RMP upgrade is also intended to address legacy F-15E radar system suitability shortfalls including: poor reliability, parts obsolescence, and high sustainment costs. The Air Force intends to retrofit the RMP across the existing F-15E fleet.
- The RMP APG-82(V)1 design leverages capabilities from currently fielded AESA radar systems. The APG 82(V)1 antenna and power supply are currently in use on the F-15C APG-63(V)3 program, and the radar receiver/exciter and Common Integrated Sensor Processor are based on the F/A-18E/F APG-79 AESA system.
- Other hardware and software modifications comprising the RMP effort include a more powerful Environmental Control System, updates to the aircraft Operational Flight Program and Electronic Warfare software, a new radio frequency tunable filter, and aircraft modifications to include a new wideband radome and wiring changes.

Mission

A unit equipped with the F-15E conducts all weather, day and night missions to include:

- Offensive and Defensive Counterair
- Conventional Air Interdiction and Nuclear Strike
- Close Air Support and Strike Coordination and Reconnaissance
- Suppression of Enemy Air Defenses
- Combat Search and Rescue

Major Contractors

- The Boeing Company – St. Louis, Missouri
- Raytheon – El Segundo, California

Activity

- The Air Force conducted F-15E RMP testing in accordance with the DOT&E-approved Test and Evaluation Master Plan and test plan.
- AFOTEC conducted IOT&E from March through September 2013 to assess the system's operational effectiveness, operational suitability, and mission capability. The IOT&E included 85 F-15E RMP sorties and 175 hours of dedicated flight testing in which AFOTEC evaluated the F-15 E RMP in an operationally representative cross-section of counterair and counterland operations employing both live and simulated air-to-air and air-to-ground weapons in realistic tactical scenarios.
- The Air Force plans to conduct the Full-Rate Production decision in March 2014.

Assessment

- Preliminary IOT&E results indicate the F-15E RMP:
 - Is operationally effective and provides significantly improved capability in the air-to-air operational environment compared to that of the legacy radar system.
 - Demonstrated comparable air-to-ground radar performance compared with that of the legacy system and realized some improvements in target location accuracy.
 - Achieved improved system reliability and maintainability with a reduced deployment footprint of personnel, spare parts, and maintenance equipment compared to that of the legacy system.
 - Does not meet the user's software stability requirement of 30 hours MTBSA. The inability to meet this requirement diminishes the effect of the overall mission capability improvements that the RMP system is intended to provide to operational F-15E units.
- The primary emphasis behind the RMP upgrade is to improve the reliability, maintainability, and sustainability of the F-15E

radar system while significantly improving the aircraft's air-to-air and air-to-ground capabilities. As has been the case in similar fighter AESA upgrades (e.g., F/A-18 APG-79 AESA), preliminary RMP IOT&E results indicate improved operational capabilities, hardware reliability, and system maintainability. However, as has also been the case with similar AESA upgrades, the inability to achieve the level of software stability necessary to meet the users' operational mission requirements detracts from the overall effectiveness and mission capability of the F-15E RMP system.

- The F-15E RMP system software architecture shares significant commonality with that of the F/A 18 APG-79, and the APG-79 has yet to resolve the software stability deficiencies identified in its 2007 IOT&E. Therefore, it is unlikely that the Air Force will achieve the stability necessary to achieve the full potential operational capability of the F-15E RMP system unless significant effort and resources are directed towards improved software stability.

Recommendations

- Status of Previous Recommendations. In FY12, DOT&E recommended that the Air Force should consider either amending the RMP 30-hour MTBSA requirement or structuring the program (in particular, adding time and resources for additional development) to achieve the desired performance measure. The Air Force did not amend the requirement, and preliminary IOT&E results indicate the Air Force did not meet the MTBSA requirement.
- FY13 Recommendation.
 1. The Air Force should place increased emphasis and provide necessary resources to improve RMP software stability in order to achieve the user's desired MTBSA requirement and realize the full operational potential of the F-15E RMP system.