

F-16 Radar Modernization Program (RMP)



The F-16 Radar Modernization Program (RMP) completed IOT&E in 4QFY23. DOT&E is drafting an IOT&E report to inform a full-rate production decision anticipated in 1QFY24.

SYSTEM DESCRIPTION

The APG-83 SABR is a multifunction, active electronically scanned array (AESA) radar intended to replace the F-16's legacy APG-68 radar. It provides F-16 pilots with air-to-air and air-to-ground situational awareness, high-resolution synthetic aperture radar mapping, fire control, and datalink support to air-to-air missiles.

MISSION

F-16 pilots use the APG-83, along with onboard weapons, to complete the full kill chain against air, ground, and surface targets, from beyond visual range and in all weather conditions. The APG-83 is an improvement over the legacy system that allows for targeting and engagement from farther ranges with enhanced accuracy and improved combat identification.

PROGRAM

The APG-83 F-16 RMP is an Acquisition Category II program. DOT&E expects to approve the program's updated Test and Evaluation Master Plan (TEMP) in 1QFY24.

The F-16 RMP acquisition approach included two initial phases not under DOT&E oversight. In Phase 1, the Air National Guard tested, acquired, and fielded 24 radars to meet a U.S. Northern Command joint emergent

operational need statement requirement for homeland defense. After completing Phase 1 in FY20, the Air National Guard acquired an additional 48 radars under RMP Phase 2, which completed in FY22.

In March 2021, the Air Force approved F-16 RMP Phase 3 with a Milestone C decision. Phase 3, which is under DOT&E oversight, develops full APG-83 capability and equips up to 450 active component F-16s. The program office plans to make a full-rate production decision in 1QFY24.

» MAJOR CONTRACTOR

- Northrop Grumman Mission Systems – Linthicum, Maryland

TEST ADEQUACY

F-16 RMP conducted IOT&E in accordance with a test plan approved and observed by DOT&E. IOT&E data collection concluded in May 2023 with over 2,200 flight hours. While data analysis is ongoing, the testing appears to be adequate to assess the radar capabilities currently being delivered to the F-16. However, inconsistent program funding and unexpected engineering challenges have delayed other upgrades to the overall F-16 system, which has prevented full realization of APG-83 capability. Once those components are available, the Air Force should assess all remaining untested radar capabilities in FOT&E.

The program completed three cyber survivability test events as part of developmental testing. In

accordance with the approved TEMP, DOT&E observed the events and concurred with using their results for integrated testing purposes. In April 2022, the program office conducted a cooperative vulnerability investigation of the radar installed in an F-16 aircraft at Eglin AFB, Florida. System capabilities that could not be tested on the aircraft were tested in a second cooperative vulnerability investigation in December 2022, and in an adversarial cyber developmental test and evaluation in May 2023. Both subsequent tests were conducted in a laboratory environment at Hill AFB, Utah. The Operational Test Agency (the U.S. Air Force 53d Wing) accredited the laboratory environment for this specific purpose.

PERFORMANCE

» EFFECTIVENESS

Early analysis of the data from the operational testing provides compelling evidence that the APG-83 is a significant improvement over the legacy APG-68, even though it cannot yet provide all required capabilities. The radar is limited by the F-16's aging mission computers, obsolete data system, and insufficient network architecture. Upgrades to these systems have been delayed or have failed to meet mission requirements. The most significant pending upgrade is the transition from MIL-STD-1553 data buses to Ethernet, which is part of the high-speed data network project.

» **SUITABILITY**

Although data analysis is ongoing, the APG-83, as installed on the F-16, has shown vast improvements in overall reliability, maintainability, and availability over the legacy APG-68 and is comparable to other AESA radars in these criteria. Pilots are generally satisfied with the human systems interface, although some limitations and tradeoffs were required to integrate the new radar with legacy F-16 systems. The tradeoffs result in increased pilot workload for some tasks, such as switching between different displays based on the current radar mode and function in use. The Air Force intends to address these interface concerns after the transition to Ethernet.

Pilots noted during IOT&E that training systems have not kept up with APG-83 capabilities. While training systems are not part of the RMP, the Air Force will need to ensure that F-16 training reflects modernized aircraft systems.

» **SURVIVABILITY**

The survivability of the APG-83 in a cyber-contested environment was assessed during IOT&E. While data analysis is ongoing, testing identified some deficiencies comparable to other AESA radars. Details will be published in DOT&E's classified F-16 RMP IOT&E report in 1QFY24.

RECOMMENDATIONS

The Air Force should:

1. Correct the cyber survivability deficiencies identified during IOT&E.
2. Ensure all remaining expanded radar capabilities are tested via FOT&E after associated aircraft systems, such as the mission computer and data architecture, are modernized.
3. Continue to update supporting training systems to reflect modernized aircraft systems.