

F-16 Radar Modernization Program (RMP)



The APG-83 F-16 Radar Modernization Program (RMP) is currently on track, with some schedule risk, for a planned Full-Rate Production decision in mid-FY23. The IOT&E to support the decision began in September 2022 under a DOT&E-approved test plan and is expected to complete in March 2023.

SYSTEM DESCRIPTION

The APG-83 Scalable Agile Beam Radar (SABR) is a multifunction, active electronically scanned array radar intended to replace the 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 accomplish the full kill chain against air, ground, and surface targets, from beyond visual range and in all weather conditions. As a specific improvement over the legacy system, the APG-83 allows for targeting and engagement from farther ranges with enhanced accuracy and combat identification.

PROGRAM

The APG-83 F-16 RMP is an Acquisition Category II program. DOT&E concurs with the program's test approach as it is being executed; however, the Test and Evaluation Master Plan (TEMP) has not been formally submitted to DOT&E for approval. The Air Force is conducting final coordination on the draft TEMP for planned submission in November 2022.

The F-16 RMP acquisition approach initially included two phases and was not under DOT&E oversight. In Phase 1, the Air National Guard tested, fielded, and acquired 24 radars to meet a U.S. Northern Command Joint Emergent Operational Need Statement (JEONS) requirement for homeland defense. Phase 1 completed in FY20, then 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 mid-FY23.

» MAJOR CONTRACTOR

- Northrop Grumman Mission Systems – Linthicum, Maryland

TEST ADEQUACY

F-16 RMP IOT&E is being conducted in accordance with a DOT&E-approved test plan and observed by DOT&E. The testing is adequate to assess the radar capabilities currently being delivered for the F-16. However, inconsistent program funding and unexpected engineering challenges have delayed other components of the overall F-16 system, which has prevented full realization of APG-83 capability. When those

components are available, the Air Force should assess any remaining untested expanded radar capabilities in FOT&E.

Cyber survivability testing is being conducted in accordance with a DOT&E-approved test plan and observed by DOT&E. The Program Office conducted a cooperative vulnerability investigation of the radar installed in an F-16 aircraft in April 2022 at Eglin AFB, Florida. Portions that could not be tested on the aircraft are scheduled for laboratory testing at Hill AFB, Utah, in February 2023, along with an adversarial assessment that will close out IOT&E.

PERFORMANCE

» EFFECTIVENESS

APG-83 operational testing conducted to date, including the IOT&E Force Development Evaluation in September 2022, provided 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 aging F-16 mission computers, obsolete data system, and insufficient network architecture. Upgrades to these aircraft systems have been delayed or have failed to meet mission requirements. The most significant such upgrade would be the transition from MIL-STD-1553 data buses to Ethernet, which is part of the high-speed data network project.

» **SUITABILITY**

Early data suggest that the APG-83 will be suitable. Although the Air Force has identified some maintenance challenges due to tight clearances between the radome and air data system, the radar has shown vast improvements in overall maintainability over the legacy APG-68. Pilots are generally satisfied with the human-systems interface, although some limitations and tradeoffs were required to integrate it with existing F-16 systems. The tradeoffs result in increased pilot workload for some tasks, such as switching

between different displays based on radar mode and function in use.

» **SURVIVABILITY**

The APG-83's survivability in a cyber-contested environment cannot yet be assessed. Data from the cooperative vulnerability investigation and upcoming adversarial assessment will provide insights into the capabilities and limitations of the new equipment in a cyber-contested environment. The cooperative vulnerability investigation also provided useful system stability information to the program independent of threat cyber effects.

RECOMMENDATIONS

The Air Force should:

1. Submit the TEMP for DOT&E approval.
2. Complete IOT&E and correct any deficiencies.
3. Ensure any remaining expanded radar capabilities are tested via FOT&E after associated aircraft systems, such as the mission computer and data architecture, are modernized.