

## B-2 Radar Modernization Program (RMP)

### Executive Summary

- The B-2 Radar Modernization Program (RMP) completed FOT&E for Mode Set 2 in December 2009. Mode Set 2 includes nuclear mission capabilities and enables the delivery of conventional and nuclear weapons in a GPS-degraded/denied operating environment.
- B-2 RMP Mode Set 2 is operationally effective and suitable with limitations in the weather avoidance mode, maintenance technical publications, and integrated diagnostic software.

### System

- The B-2 is a multi-role, low-observable bomber capable of delivering conventional and nuclear munitions. It has four turbofan engines and twin side-by-side weapons bays.
- The B-2 RMP features an Active Electronically Scanned Array radar operating on a new frequency. The RMP replaces the B-2 legacy radar antenna and transmitter and changes radar operating frequency to avoid conflicts with other radio frequency spectrum users. The RMP does not add additional capabilities to the B-2 radar beyond those in the legacy system.
- System avionics include a multi-mode radar, GPS-aided navigation, and a Defensive Management System for radar warning functions.
- The bomber's principal conventional weapons are the 2,000-pound and 500-pound Joint Direct Attack Munition.
- The B-2 RMP delivers capability in two separate radar Mode Sets. Mode Set 1 consists of conventional mission and weapons delivery capabilities. Mode Set 2 incorporates nuclear mission capabilities and enables the B-2 to conduct both nuclear and conventional missions in a GPS-degraded/denied environment.



### Mission

- Combatant Commanders use the B-2 aircraft to attack global targets during the day or at night, in all weather, in highly defended threat areas at the strategic, operational, and tactical levels of warfare.
- Commanders use the B-2 to engage high-value, heavily defended target sets including: command and control facilities, airfields, industrial complexes, logistical and air defense systems, lines of communication, and battlefield forces and equipment.

### Major Contractor

Northrop Grumman – Los Angeles, California

### Activity

- The Air Force Operational Test and Evaluation Center (AFOTEC) conducted B-2 RMP Mode Set 2 FOT&E from November through December 2009 in accordance with the DOT&E-approved Test and Evaluation Master Plan and FOT&E plan.
- Air Combat Command conducted a B-2 Force Development Evaluation (FDE) assessing B-2 RMP Mode Set 2 performance in conjunction with an Integrated Functional Capability upgrade to the B-2 weapon system from November 2009 through January 2010.

### Assessment

- B-2 RMP Mode Set 2 is operationally effective and suitable with some limitations in the weather avoidance mode,

maintenance technical publications, and integrated diagnostic software.

- The RMP navigational update, targeting, and weapons delivery accuracy capabilities are no worse than those of the legacy radar system. B-2 aircrews can effectively use the RMP system to align the aircraft navigation system, fly formation, avoid weather, and deliver conventional and nuclear weapons in the GPS-available, degraded, and denied environments.
- Mode Set 2 FOT&E provided additional missions in which to examine RMP weather avoidance capabilities previously tested during FY09 RMP Mode Set I IOT&E. RMP detection and display of weather phenomena in the weather avoidance mode was inconsistent with the actual weather location relative to the aircraft, but the inconsistency is less

than previously reported in Mode Set 1 IOT&E. Weather phenomena such as thunderstorms were approximately two to three miles closer to the aircraft than cockpit-displayed RMP detections as opposed to five miles closer as previously reported in the Mode Set 1 IOT&E. DOT&E assesses that this does not adversely affect B-2 mission accomplishment.

- The RMP Mode Set 2 FOT&E and Air Combat Command FDE results demonstrated that RMP is suitable with some limitations. FOT&E results demonstrated that the RMP system mean time between failures is greater than that of the legacy system based on accumulated RMP system flight test data and modeling and simulation using component reliability data. However, both FOT&E and FDE results identified shortfalls in maintenance technical publications and integrated diagnostic software that precluded the ability to accurately diagnose all RMP system failures in a timely manner. The Air Force is in the process of updating technical publications

and incorporating B-2 software updates to improve RMP fault diagnostics, with planned fielding dates beginning in early FY11.

## Recommendations

- Status of Previous Recommendations. The Air Force is addressing B-2 RMP technical publications and fault diagnostics shortfalls identified in FY09 testing. Additionally, previously identified weather avoidance mode discrepancies proved to be smaller than previously reported, and do not adversely affect mission accomplishment.
- FY10 Recommendation.
  1. The Air Force should evaluate the efficacy of planned RMP fault diagnostics software improvements in conjunction with subsequent FY11 B-2 aircraft system operational flight program test and evaluation efforts.