

PATRIOT/Medium Extended Air Defense System Combined Aggregate Program (PATRIOT/MEADS CAP)

Executive Summary

- The Army conducted five separate PATRIOT flight tests during FY05.
- PAC-3 and PAC-2 Guidance Enhanced Missiles (GEM) successfully intercepted their intended ballistic and aerodynamic Tactical Ballistic Missile (TBM) targets on three of those tests.
- The Ballistic Missile Defense System (BMDS) integrated testing with the Terminal High-Altitude Area Defense (THAAD) system is necessary to evaluate interoperability with Joint and coalition forces.

System

- PATRIOT/Medium Extended Air Defense System (MEADS) Combined Aggregate Program (CAP) is the program the Army is using to transition PATRIOT, the current theater air and missile defense system, to MEADS.
- PATRIOT includes:
 - A mix of hit-to-kill PAC-3 missiles and blast-fragmentation PAC-2 missiles
 - Engagement control stations, radar sets, electric power plants, launching stations, and associated communications equipment
- MEADS development and improvements will include:
 - A mix of PAC-3 missiles and improved Missile Segment Enhancement missiles
 - Battle management, command, control, communications, computers, and intelligence elements; UHF-band 360-degree surveillance radars; X-band multifunction fire control radars; missile launchers; and missile reloaders

Mission

- Combatant commanders will use the PATRIOT capability to:
 - Detect, track, engage, and destroy short-range ballistic missiles, cruise missiles, and fixed-wing aircraft



- Conduct multiple simultaneous engagements in all weather conditions and in hostile electronic countermeasures environments
- Combatant commanders will use MEADS to expand PATRIOT's mission and capabilities to provide:
 - Capability against large caliber rockets, rotary-wing aircraft, unmanned aerial vehicles, tactical air-to-surface missiles, and anti-radiation missiles
 - Three hundred and sixty-degree radar surveillance, acquisition, and tracking capability
 - Netted and distributed architecture with modular, configurable battle elements
 - Increased interoperability with airborne, ground-based, and sea-based sensors
 - C-130 aircraft transportability

Activity

- Flight Test 12, a combined developmental/operational event, was conducted on November 18, 2004, at White Sands Missile Range, New Mexico (WSMR). Using tactical firing doctrine, the Army fired four PAC-3 missiles simultaneously engaging two TBM targets. In each engagement, the first PAC-3 missile intercepted the target.
- Flight Test 2-1 was conducted on June 14, 2005, at WSMR. Using tactical firing doctrine, the Army fired two GEM interceptors to engage an aerodynamic TBM target. The first

- GEM intercepted and damaged the target. The target self-destructed before the second GEM could intercept.
- Flight Test 2-2 was conducted on September 8, 2005, at WSMR. Using tactical firing doctrine, the Army fired two PAC-3 missiles to engage an aerodynamic TBM target. The first PAC-3 missile intercepted the target. The second PAC-3 missile automatically self-destructed when it was no longer needed for an intercept.

ARMY PROGRAMS

- Flight Test 2-3 was conducted on November 11, 2005, at WSMR. Test objectives of this mission included demonstrating the performance of PAC-3 missile software changes and associated ground system software improvements to detect, track, engage, and intercept a short-range aerodynamic target with two PAC-3 missiles. The Fire Unit detected, tracked, and engaged the target with the two PAC-3 missiles, but fired a third missile after receiving a false launch failure indication. All three missiles, each launched from separate launching stations, failed to intercept the target. The Army is currently analyzing the flight test data to determine the root cause of the failures.
- Flight Test ATM-46 was conducted on November 17, 2005, at WSMR. The test objectives of this mission included demonstrating integration of the Missile Defense Agency Block 04 Command, Control, Battle Management, and Communication (C2BMC) with PATRIOT during the execution of a TBM engagement using Post Deployment Build 6 software and a GEM interceptor. The Fire Unit detected, tracked, and engaged the target and shared this data with the C2BMC via Link-16. However, the GEM interceptor failed to intercept the target. The Army is currently analyzing the flight test data to determine the root cause of failure.
- The Army conducted these tests in accordance with the DOT&E-approved Test and Evaluation Master Plan.
- Evaluation of PATRIOT performance at the battalion level requires the use of flight mission simulator hardware-in-the-loop systems to stress load the PATRIOT system with tactically representative types and numbers of targets - including friendly aircraft. These simulators will also be useful for training, verifying fixes, and minimizing the probability of undiscovered problems.
- Additionally, BMDS integrated testing with the THAAD system is necessary to evaluate interoperability with Joint and coalition forces and to evaluate information assurance.

Recommendations

1. Field one or two additional flight mission simulator hardware-in-the-loop systems as soon as possible.
2. Conduct PATRIOT air and missile defense testing during Joint and coalition exercises that include large numbers of different aircraft types, sensors, battle management elements, and weapon systems. Conduct Red Team penetration testing during these exercises to test PATRIOT information assurance.
3. Participate in THAAD flight tests to demonstrate PATRIOT-to-THAAD interoperability and the capability for PATRIOT to intercept TBM targets that are not intercepted by THAAD.

Assessment

- During 2004 and 2005, PATRIOT demonstrated the capability to intercept multiple TBMs simultaneously. Details of these tests are discussed in the classified FY05 BMDS annual report.