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

Executive Summary

The Army conducted four major developmental Patriot flight tests and a Force Development Experiment (FDE) in 2009. The first guided test flight of the Patriot Advanced Capability-3 (PAC-3) Missile Segment Enhancement (MSE) interceptor failed to intercept when the second pulse of the rocket motor failed to fire. Post Deployment Build (PDB)-6.5 flight tests conducted in April and June 2009 were successful, while a July 2009 flight test was partially successful when two of the three interceptors failed to launch, but the third missile achieved a successful intercept.

System

- The Patriot system includes the following:
  - C-band phased-array radars for detecting, tracking, classifying, identifying, and discriminating targets
  - Battalion and battery battle management elements
  - Communications Relay Groups and Antenna Mast Groups for communicating with battery and battalion assets
  - A mix of PAC-3 hit-to-kill missiles and PAC-2 blast fragmentation warhead missiles for negating aircraft and missile threats
    - The newest version of the PAC-3 interceptor is the Cost-Reduction Initiative missile. In addition, the Army is developing the PAC-3 MSE missile with increased battlespace defense capabilities and an improved lethality enhancer.
    - Earlier versions of Patriot interceptors include the Patriot standard missile, the PAC-2 Anti-Tactical Missile (ATM), and the Guidance Enhanced Missile (GEM) family.
- Planned Medium Extended Air Defense System (MEADS) developments include the following:
  - Battle management, command, control, communications, computers, and intelligence elements; Ultra High Frequency-band 360-degree surveillance radars; X-band 360-degree multi-function fire control radars; and missile launchers and reloaders
  - MSE missiles developed under the Patriot program

Mission

Combatant Commanders using Patriot have the capability to defend deployed forces and critical assets from missile and aircraft attack and to defeat enemy surveillance air assets (such as unmanned aerial vehicles) in all weather conditions, clutter, and electronic countermeasure environments.

Prime Contractors

- Lockheed Martin Missile and Fire Control, Dallas, Texas
- MEADS International, Inc., Orlando, Florida
- Raytheon Integrated Defense Systems, Tewksbury, Massachusetts

Activity

- The Army conducted the PDB-6.5 Developmental Test and Evaluation at White Sands Missile Range (WSMR), New Mexico, and at the Software Engineering Directorate, Redstone Arsenal, Huntsville, Alabama, in November and December 2008.
- The Army conducted the PDB-6.5 FDE at Fort Bliss, Texas, in May 2009. This test consisted of only a static phase of operations.

- During the first intercept attempt for the MSE missile (Flight Test 7-2) at WSMR in March 2009, Patriot fired one MSE interceptor at a ballistic missile target, but failed to intercept it.
- During PDB-6.5 flight test P6.5-4 at WSMR in April 2009, Patriot fired two PAC-3 missiles and successfully intercepted a short-range ballistic missile target with the first interceptor.
- During PDB-6.5 flight test P6.5-1 at WSMR in June 2009, Patriot fired a GEM missile that successfully intercepted a low-altitude cruise missile target in clutter.
- During PDB-6.5 flight test P6.5-3 at WSMR in July 2009, Patriot attempted to fire three interceptors against a subscale aircraft target. The first two Standard Patriot (MIM-104A) interceptors failed to launch. The third interceptor, a PAC-2 ATM, successfully intercepted the target. A flight test to retest the primary test objective using Standard Patriot interceptor missiles has been scheduled for December 2009 at McGregor Range, New Mexico.
- The next Patriot operational testing – the PDB-6.5 Limited User Test – is scheduled to occur during 1-2QFY10.

Assessment

- The Patriot system met most of the objectives during the PDB-6.5 Developmental Test and Evaluation; however, there were some incidents during the ground testing portion where Patriot misclassified targets, engaged targets that should not have been engaged, failed to engage targets that should have been engaged, or engaged targets with more interceptors than it should have. Also, during this testing, the Army could not test Mode 5 Identification, Friend or Foe (IFF) due to Federal Aviation Administration concerns regarding the Mode 5 IFF interrogators' ability to transmit Mode S waveforms. These air safety concerns were addressed by disabling this capability.
- The PDB-6.5 FDE deviated from the DOT&E-approved Patriot Test and Evaluation Master Plan due to funding and time constraints. Specifically, there were no maneuver or sustainment phases, which significantly limited the number of evaluation measures addressed. Out of 102 Patriot critical tasks, the Army validated 19, updated 19 with minor changes, rewrote 46, and was unable to test 18. These limitations precluded an adequate test of the changes to maintainability and a determination of any changes to the system's ability to meet its manpower and personnel integration requirements.
- During Flight Test 7-2, the MSE interceptor launched successfully, but the ignition safety device for the solid rocket motor second pulse failed to arm so it did not fire. The Army is investigating the cause of this failure, and plans to conduct a follow-on Flight Test 7-2A in January 2010. Doctrine dictates that Patriot fire two interceptors at ballistic missiles, but the Army had only one interceptor available for the 7-2 flight test.
- The Army collected all required data during flight tests P6.5-4 and P6.5-1 and the system met the objectives in these tests.
- The Army is investigating the causes of the launch failures of the two standard Patriot missiles during flight test P6.5-3. A retest is scheduled for December 2009 in conjunction with a Foreign Military Sales partner Field Surveillance Program flight test mission.

Recommendations

- Status of Previous Recommendations. The Army addressed one of the eight recommendations from FY08. The remaining seven recommendations merit additional emphasis.
- FY09 Recommendations. The Army should:
  1. Review the risks associated with not conducting all flight tests against ballistic missiles in accordance with published doctrine that requires the launch of two interceptors for each target.
  2. Plan to conduct an IOT&E prior to the MSE full-rate production decision.
  3. Prior to PDB-7 operational testing, conduct a robust FDE with static, maneuver, and sustainment phases to test 100 percent of the Patriot critical tasks.