

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

Executive Summary

- The Army conducted two major developmental Patriot flight test missions. A test in December 2007 resulted in a no-test due to target failures and a test in May 2008 of the Patriot Advanced Capability-3 (PAC-3) Missile Segment Enhancement (MSE) was a success.
- Japan Air Self-Defense Force personnel conducted a successful Tactical Ballistic Missile (TBM) intercept with their first firing of a PAC-3 missile in September 2008.

System

- The Patriot system includes:
 - C-band phased-array radars for detecting, tracking, classifying, identifying, and discriminating targets
 - Battalion Information Coordination Central, Battery Command Posts, and Engagement Control Stations for battle management
 - 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 air and missile threats
 - The newest version of the PAC-3 interceptor is the Cost-Reduction Initiative (CRI) missile. In addition, the Army is developing the PAC-3 MSE missile with increased range and altitude capabilities and a lethality-enhanced warhead.
 - PAC-2 interceptors include the Guidance Enhanced Missile (GEM), the newest version of which is the GEM-T. The GEM-T has improved capability against aircraft including low radar cross-section cruise missiles and short-range ballistic missiles.
- Planned Medium Extended Air Defense System (MEADS) developments include:
 - 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
- MEADS International

Activity

- A Patriot battery performed a tracking mission on an anti-radiation missile target.
- A planned intercept flight test in December 2007 to verify classification algorithm improvements resulted in a non-test when both targets failed.
- During the first successful flight test of the MSE missile (Flight Test 7-1A), in May 2008, Patriot fired an MSE control test missile at a simulated aircraft target.
- A Japanese Air Self-Defense Force Patriot fire unit successfully launched two PAC-3 missiles in a ripple fire from a single launching station and intercepted a Patriot-As-A-Target (PAAT) with the first interceptor. The second interceptor had an in-flight failure.

Assessment

- During an anti-radiation missile tracking test, Patriot detected and tracked a threat-representative anti-radiation missile target. The Patriot operator manually classified the target as an anti-radiation missile. The test revealed procedural errors by the operators that were corrected after the test. These corrections were planned to be validated during intercept flight tests against two anti-radiation missile targets; however, both targets failed shortly after launch.
- During Flight Test 7-1A, all required data were collected and all objectives were met. The MSE interceptor's flight events were generally in good agreement with preflight predictions. The most significant differences were that the missile had a slightly higher velocity than predicted and one attitude control motor did not fire when ordered to do so. Neither issue affected the missile's ability to complete the scripted mission successfully.
- During the Japanese intercept flight test of the Patriot system, all required data were collected and all objectives were met. However, the second interceptor experienced an in-flight failure. In addition to successfully engaging a PAAT target, Japan Air Self-Defense personnel demonstrated integration of the PAC-3 missile with the Japanese Patriot ground system

and demonstrated system capability through the sequence from search, detection, track to fire, intercept, and kill of a tactical ballistic missile target.

Recommendations

- Status of Previous Recommendations. The Army resolved two of the seven recommendations from FY05-FY07.
- FY08 Recommendations. The Army should:
 1. Conduct Force Development Experimentation to test tactics, techniques, procedures, and training prior to Limited User Test operational testing.
 2. Provide probability of kill tables for all required ballistic missile, anti-radiation missile, cruise missile, and aircraft threats prior to the start of the Limited User Test. These probability of kill tables should be produced with models and simulations that have been verified, validated, and accredited by Army Test and Evaluation Command.
 3. Simulate MSE missile engagements throughout the battle space to determine the lethality-enhanced warhead contribution to effectiveness, which is necessary for planning the MSE missile LFT&E program.