Aegis Ballistic Missile Defense (Aegis BMD)

Executive Summary

- Aegis Ballistic Missile Defense (BMD) intercepted two medium-range separating targets during tests in FY06. During the third flight test, a warfighter procedural error prevented a successful intercept of a short-range, unitary target in the low exoatmosphere.
- Aegis demonstrated simultaneous BMD and ship self defense capabilities.
- Aegis demonstrated long-range surveillance and track capability and interoperability with the BMDS during FY06 exercises, including real-world observations.
- Involvement of operational test and warfighter communities in flight tests has proven valuable in planning operationally-realistic tests and in exposing operational design and training issues.

System

- Aegis BMD is a highly-mobile, sea-based missile defense system that employs the multi-mission shipboard Aegis Weapon System with new radar and missile capabilities to engage ballistic missile threats.
  - AN/SPY radar computer program modifications allow long-range surveillance and tracking of long-range ballistic missiles.
  - The modified Aegis vertical launcher system stores and fires the new, larger Standard Missile-3 (SM-3) missiles.
  - The SM-3 design delivers a maneuverable kinetic warhead to an intercept point in the upper atmosphere or in space.
- Aegis BMD is capable of autonomous missile defense operations and can accept external cues and tracks over tactical data links.

Mission

The Navy can accomplish three missions using Aegis BMD:

- Provide forward-deployed radar capabilities to enhance defense against long-range ballistic missile threats
- Provide all short- to long-range ballistic missile threat data to the Command, Control, Battle Management, and Communications system for dissemination to U.S. Strategic Command and U.S. Pacific Command to ensure situational awareness
- Defend deployed forces and allies by engaging and intercepting short- and medium-range theater ballistic missiles

Activity

- In FY06, the Aegis BMD test program continued to assess engagement and long-range surveillance and track capabilities. The program entered a combined developmental test/operational test (DT/OT) phase that will support transition of the Aegis BMD Block 04 system to the Navy in FY08.
- The Aegis BMD program completed two successful intercept flight tests against medium-range, simple-separating targets in November 2005 and June 2006. The program planned to conduct a multiple simultaneous engagement against a short-range, unitary target and an anti-ship cruise missile target in December 2006. During the test, a warfighter procedural error prevented successful engagement.
- Aegis BMD employed for the first time the multi-warfare version of the Aegis BMD combat system. This version enables simultaneous ship self defense and BMD capabilities. In June 2006, Aegis BMD conducted simulated firings against short-range ballistic missile and anti-ship cruise missile targets, demonstrating this simultaneous BMD and ship self defense functionality.
- Aegis BMD participated in the following tracking exercises of theater and intercontinental ballistic missile-class targets:
  - Two Air Force intercontinental ballistic missile tests: Safety Enhanced Reentry Vehicle-3 in February 2006 and Glory Trip-191 in June 2006; Aegis BMD plans to participate in a third Air Force intercontinental ballistic missile test in 2QFY07
  - Real-world events in the May - July 2006 timeframe
  - Two critical measurements and countermeasures tests in April 2006

  - Sea trials and tracking exercises in November 2005 and June 2006 using short- and medium-range Aegis Readiness Assessment Vehicles
- During the tracking exercises, Aegis BMD routinely collected data for Block 06 BMD signal processor and enhanced discrimination algorithm development.
- In March 2006, Aegis BMD demonstrated the stability and control of a proof-of-concept SM-3 nosecone, which employed a lightweight clamshell design developed by the Japan Defense Agency. The test supported research and development to enhance future SM-3 BMD capability.
- Aegis BMD conducted ground design verification tests of upgraded SM-3 Block IA missile components.
- Aegis BMD participated in flight and ground tests to enable an assessment of Aegis BMD interoperability and support to the BMDS. Aegis BMD plans to participate in a BMDS/Ground-Based Midcourse Defense (GMD) intercept test in FY07.

Assessment

- In FY06, the Aegis BMD test program took a significant step forward by conducting flight tests against medium-range, simple-separating targets. Previous flight tests used short-range unitary targets. Over the entire program history, Aegis BMD accomplished seven successful intercepts in eight attempts. The successful intercepts consisted of five short-range unitary targets and two medium-range simple-separating targets. The failed FM-5 attempt occurred in June 2003 and was attributed to a malfunctioning kinetic warhead divert valve.
- For the first time, flight tests in FY06 used an SM-3 missile equipped with a newly designed third-stage rocket motor. To date, neither the Block 04 design of the kinetic warhead divert system nor the zero-pulse mode of the third-stage rocket motor has been exercised in flight tests. However, the new kinetic warhead divert system is planned to be flight tested in FY07.
- In FY06, the Aegis BMD program enhanced the operational realism of its suite of flight test targets. During the June 2006 flight test, the Aegis BMD program flew a medium-range target that was modified to mitigate a non-threat representative behavior that had previously limited testing of the full endgame functionality of Aegis BMD. Use of the modified target in future flight tests will enable more realistic endgame scenarios. Tracking exercises in FY06 established the Aegis Readiness Assessment Vehicle target as an affordable risk reduction target for intercept tests. The program collected valuable data on the behavior and threat realism of the Aegis Readiness Assessment Vehicle toward its eventual use as an operationally realistic intercept target.
- To date, Aegis BMD has yet to participate in a GMD flight test in which Aegis BMD data contributes in real-time to the development of a GMD weapon task plan.
- The Aegis BMD program is progressively increasing the operational realism in its flight test program. In FY06, Aegis BMD began a combined DT/OT test phase, during which the Navy Operational Test Agency will evaluate the operational performance of the Block 04 system to support its transition to the Navy. Aegis BMD benefits from the active participation of the operational test and warfighter communities, as their recommendations are incorporated in system design modifications; tactics, techniques, and procedures; fleet training; and follow-on flight missions.

Recommendations

- Status of Previous Recommendations. The program completed one of the two DOT&E recommendations from FY05, but the following recommendation requires further attention:
  FY05 #2: DOT&E recommended that Aegis BMD participate in flight tests to provide real-time support to the development of GMD weapons task plans (no plans currently exist to do this). This remains a valid recommendation.
- FY06 Recommendations.
  1. Before the completion of the DT/OT phase, the Missile Defense Agency should flight test the multi-pulse modes of the kinetic warhead divert system against a medium-range target and the zero-pulse mode of the third-stage rocket motor.
  2. The Missile Defense Agency should continue to conduct increasingly stressing endgame scenarios during flight tests using the modified medium-range target.
  3. The Missile Defense Agency should continue efforts to accredit the Aegis Readiness Assessment Vehicle target for use as a threat-representative flight test target.
  4. The Missile Defense Agency should conduct a long-range surveillance and track event using the intended tactical BMDS architecture for a theater mission.