



FTM-18 Fact Sheet

Aegis BMD 4.0.1 and SM-3 Block IB

As Aegis BMD continues to evolve to defeat the advancing ballistic missile threat, the focus of the second generation Aegis BMD Weapon System is centered on the regional and global trends in the development, deployment and proliferation of ballistic missiles. As per the Ballistic Missile Defense Review Report, "Two additional factors stand out in the proliferation landscape. First, there is the potential for a substantial increase in the transfer of advanced capabilities from both government and non-government entities in some technically advanced countries. Second, there is the potential for increasingly sophisticated regional missile threat capabilities. Proliferators are increasing the number of deployed systems (and thus raid sizes), shifting from liquid- to solid-fueled systems and deploying missile defense countermeasures. These threats are inherently difficult to predict, but indicators and warnings associated with such threats remain under intense scrutiny by the U.S. and our allies and friends."

The second generation Aegis BMD Weapon System is designed to defeat the "increasingly sophisticated regional missile threat capabilities." This Aegis BMD system enables the engagement of increasingly longer range and more sophisticated ballistic missiles launched in larger raid sizes. A series of intercept firings are being conducted to validate the operational effectiveness and suitability of Aegis BMD 4.0.1 and the SM-3 Block IB missile against an increasingly sophisticated set of targets and scenarios.

On May 9, 2012 Aegis BMD 4.0.1 / SM-3 Block IB achieved the first successful intercept of a ballistic missile target, verifying the proper performance of all the Aegis BMD 4.0.1 / SM-3 Block IB upgrades. This test event (FTM-18) is part of a series of operational and developmental flight tests to prove the systems effectiveness against increasingly difficult environments to include countermeasures. FTM-18 demonstrates the system discrimination capability of the ship's

radar BMD Signal Processor (BSP) and the missile's two-color infrared seeker to identify the lethal object of a separating, medium range ballistic missile target.

Ship and Missile Improvements

Aegis BMD's 4.0.1 improvements include the addition of the Aegis BSP and a new kill vehicle engine, two-color seeker and processor on the SM-3. The Aegis BSP enables tracking of individual objects and uses advanced algorithms to identify various objects. The two-color seeker improves sensitivity for longer range targets, high speed processing for multiple tracks and improved performance against sophisticated threats.

The new kill vehicle engine, Throttleable Divert and Attitude Control System (TDACS), provides enhanced divert capability to maneuver the kinetic warhead to intercept. The Advanced Signal Processor increases data processing capability to sort-out and analyze the information gathered by the upgraded seeker.



SM-3 Block IB Firing



FTM-18

The primary objective of FTM-18 is to “conduct a lethal engagement of a separating ballistic missile target in a complex debris environment with the Aegis BMD 4.0.1 Weapon System and an SM-3 Block IB missile.” Test participants include two Aegis BMD 4.0.1 cruisers (the firing ship and a cruiser assigned to the Forward Deployed Naval Force (FDNF), an Aegis BMD 3.6.1 destroyer, Aegis BMD 4.0.1 and 3.6.1 laboratories at the Space and Naval Warfare Center (SPAWAR), and Space Tracking and Surveillance System (STSS). Leveraging FTM-18 as a risk reduction event for an upcoming test, the Aegis BMD destroyer receives a cue from STSS and the Aegis BMD 3.6.1 laboratory and STSS exchange Link 16 tracks and simulated engagement status messages over a different tactical data link than the data link used for the flight test.

Continuing Aegis BMD’s tradition of operationally realistic testing, the FTM-18 event begins as the BMD 4.0.1 ship receives operational intelligence that hostile forces are making preparations to take aggressive action against a friendly nation. The ship’s mission is to protect this hypothetical friendly nation from ballistic missile attacks. The ship’s crew uses this intelligence information with the Aegis BMD Mission Planner to determine an acceptable ship patrol area along with recommended search sectors for the Aegis AN/SPY-1B(V) radar. The timing of the target launch is not revealed to any of the participants. The target is launched from the Pacific Missile Range Facility (PMRF), Barking Sands, Kauai, Hawaii.

The target follows a ballistic trajectory. After booster motor burnout occurs, the Lethal Object (LO) is separated from the lower stage, resulting in a cloud of separation debris. Shortly after the target is declared engageable by the weapon system, the ship’s crew fires a SM-3 Block IB missile. The system tracks the SM-3 missile throughout the remainder of its flight.

After SM-3 booster burnout and during second stage rocket operation, the weapon system continuously uplinks guidance commands to the missile. The second stage Dual Thrust Rocket Motor separates after motor burnout. Pulse 1 of the Third Stage Rocket Motor (TSRM) fires, providing the thrust required to maintain the missile’s trajectory. The TSRM’s Attitude Control System (ACS) performs a pitch maneuver, ejecting the nosecone and exposing the Kinetic Warhead’s (KW) Infra-Red (IR) seeker. The ACS re-aims the missile

towards the target. The TSRM executes the Pulse 2 burn.

The weapon system performs track correlation between the Aegis BMD radar and the KW’s IR seeker, identifying which object is the LO target. Through these uplinked guidance commands, the weapon system positions the SM-3 missile so that the target is in the center of the IR seeker’s field of view. After ejection of the KW from the missile, the KW’s new TDACS fires to maintain the necessary heading for the two-color IR seeker to acquire the target (inset A).



Upon acquiring the LO target, the KW performs divert maneuvers to approach the target. Additional refinement of the intercept calculations are made by the KW and final intercept divert maneuvers are conducted. The KW impacts the target, destroying it with the sheer energy of impact (inset B).

Certification

Aegis BMD 4.0.1 Weapon System has successfully completed certification testing for delivery to the Fleet. Certification is an independent assessment of the readiness of the Aegis BMD 4.0.1 Weapon System to perform not only the BMD mission, but also a readiness assessment for operational use, sustainment and ability to perform other Aegis ship missions (e.g. Anti-Air Warfare (AAW), Strike, Anti-Submarine Warfare, Anti-Surface Warfare, etc.). Testing is accomplished at land-based test sites (LBTSS). Whenever possible, actual at-sea event data is used to supplement the LBTSS results and contributes to the technical evaluation of the system. In order to thoroughly evaluate the Aegis BMD 4.0.1 capability to operate in an operational, multi-warfare environment, such as AAW and BMD, and obtain actual tracking and firing data to support certification testing, FTM-16 Event 2 (September 2011) engagement data was used. After certification, the system is ready to be used and supported by operational forces.

Deployment

Two Pacific Fleet Aegis BMD cruisers, *USS LAKE ERIE* (CG-70) and *USS SHILOH* (CG-67), have the Aegis BMD 4.0.1 Weapon System installed. Two Atlantic Fleet destroyers, *USS CARNEY* (DDG 64) and *USS DONALD COOK* (DDG-75), are scheduled to be upgraded to the Aegis BMD 4.0.1 configuration during FY 2012.