

Rolling Airframe Missile (RAM) Block 2

Executive Summary

- DOT&E issued a classified Early Fielding Report to Congress on March 23, 2016, because a ship deployed with the Rolling Airframe Missile (RAM) Block 2 system prior to completion of IOT&E. Based on all the results of the completed IOT&E tests, DOT&E stated that:
 - Insufficient data exist to characterize RAM Block 2's performance against all the anti-ship cruise missile (ASCM) threats the missile is intended to defeat. This condition will continue until the Navy completes RAM Block 2 IOT&E, which is expected in late 2017.
 - Completed testing has demonstrated that RAM Block 2 incorporates several improvements over its RAM Block 1 and 1A predecessors.
 - Deficiencies in RAM Block 2 integration with the Ship Self-Defense System (SSDS)-based combat system caused several RAM Block 2 missiles to miss their target during one of the IOT&E missile firing scenarios.
 - Due to the Navy's inability to develop a Multi-Stage Supersonic Target (MSST), no assessment of RAM Block 2's capability against MSST-like ASCM threats is possible.
 - RAM Block 2 met its in-flight reliability requirement.
- The Navy's Commander, Operational Test and Evaluation Force (COTF) continued the IOT&E with one RAM Block 2 missile firing scenario at the Naval Air Warfare Center, Point Mugu, California, in April 2016 from the Self-Defense Test Ship in accordance with a DOTE-approved test plan.

System

- The RAM, jointly developed by the United States and the Federal Republic of Germany, provides a short-range, lightweight self-defense system to defeat ASCMs. There are three RAM variants:
 - RAM Block 0 uses dual mode, passive radio frequency/infrared guidance to home in on ASCMs.
 - RAM Block 1A adds infrared guidance improvements to extend defenses against ASCMs that do not radiate radio frequencies.

Activity

- DOT&E issued a classified Early Fielding Report to Congress on March 23, 2016, because a ship deployed with the RAM Block 2 system prior to completion of IOT&E.
- COTF continued the IOT&E with one RAM Block 2 missile firing scenario at the Naval Air Warfare Center, Point Mugu, California, in April 2016 from the Self-Defense Test Ship in accordance with a DOTE-approved test plan.



- RAM Block 2 incorporates changes to improve its kinematic capability and capability to guide on certain types of ASCM radio frequency threat emitters in order to defeat newer classes of ASCM threats.
- RAM Block 2 can be launched from the 21 round RAM Guided Missile Launch System resident on LPD 17, LHA 6, LSD 41/49, LCS *Freedom*, and CVN 68 ship classes or from the SeaRAM standalone self-defense system composed of the Close-In Weapon System radar/electronic warfare sensor suite and command/decision capability combined with an 11-round missile launcher which is resident on selected Aegis DDG 51 Destroyers and the LCS *Independence* ship class.

Mission

Commanders employ naval surface forces equipped with RAM to provide a defensive short-range, hard-kill engagement capability against ASCM threats.

Major Contractors

- Raytheon Missiles Systems – Tucson, Arizona
- RAMSys – Ottobrunn, Germany

Assessment

- The classified March 2016 DOT&E Early Fielding Report, based on results of all completed IOT&E tests, stated that:
 - Insufficient data exist to characterize RAM Block 2's performance against all the ASCM threats the missile is intended to defeat. This condition will continue until the Navy completes the RAM Block 2 Probability of Raid

Annihilation modeling and simulation IOT&E phase, which is expected in late 2017.

- Completed testing has demonstrated that RAM Block 2 has demonstrated several improvements over its RAM Block 1 and 1A predecessors.
- Deficiencies in RAM Block 2 integration with the SSDS-based combat system caused several RAM Block 2 missiles to miss their target during one of the IOT&E missile firing scenarios.
- Due to the Navy's inability to develop an MSST, no assessment of RAM Block 2's capability against MSST-like ASCM threats is possible.
- The current steerable antenna system used on Navy aerial targets does not allow for an adequate emulation of specific ASCM threats.
- The Navy has not tested RAM Block 2's ability to home-on and destroy helicopter, slow aircraft, and surface threats thus no assessment of RAM Block 2's capability in this secondary mission area is possible.
- RAM Block 2 met its in-flight reliability requirement.

Recommendations

- Status of Previous Recommendations. The Navy has not completed the following previous recommendations:
 1. Correct the identified integration deficiencies with the SSDS-based combat system and RAM Block 2. Demonstrate these corrections in a phase of operational testing.
 2. Correct the SSDS scheduling function to preclude interference from prior intercepts and warhead detonations with RAM's infrared guidance. Demonstrate corrections in a phase of operational testing.
- FY16 Recommendations. The Navy should:
 1. Develop an MSST adequate for use in FOT&E. See the Test Resources section in this Annual Report for further details.
 2. Conduct FOT&E to determine RAM Block 2's capability to home-on and destroy helicopter, slow aircraft, and surface threats.
 3. Develop an improved steerable antenna system for its ASCM surrogates.