

Rolling Airframe Missile (RAM)

The Rolling Airframe Missile (RAM) program provides surface ships with a low-cost, lightweight, self-defense system to defeat anti-ship cruise missiles (ASCMs). RAM Block 0 uses dual mode, passive radio frequency/infrared (RF/IR) guidance. RAM Block 0 enhances ship self defense against several RF-radiating ASCMs while RAM Block I extends that defense against non-RF radiating missiles. The launching system and missiles comprise the weapon system.

Most current RAM weapon system installations are integrated with the AN/SWY-2 or -3 combat system. RAM is integrated with the Ship Self Defense System (SSDS) Mark 1 on the LSD 41/49-class of amphibious ships. AN/SWY-2 installations use RAM as the only hard-kill weapon. AN/SWY-3 installations use both RAM and NATO Sea Sparrow systems as the hard-kill weapons. RAM will be integrated with the SSDS Mark 2 on LPD 17-class and CVN 68-class ships (the NATO Sea Sparrow was also on the latter).

RAM was developed jointly by the United States and the Federal Republic of Germany. Block 0 Initial Operational Test & Evaluation was completed in FY90. The RAM Block 1 operational evaluation was conducted on the Self Defense Test Ship (SDTS) and on a fleet ship in 1999. In 1997, the resource sponsor requested that the Program Manager determine what RAM capability existed against helicopters, slow aircraft, and surface targets (HAS). This request stipulated that Block 1 anti-ASCM capability was to be retained, but was not accompanied by operational requirements for the additional target set. RAM HAS will be integrated with the SSDS Mark 2.

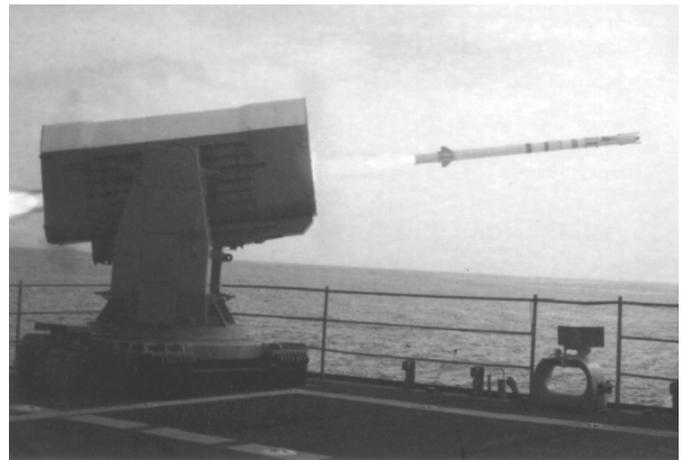
TEST & EVALUATION ACTIVITY

This past year's activity consisted of contractor testing that included firing a RAM Block 1 missile with HAS software against a subsonic drone in June at the Naval Air Warfare Center/Weapons Division sea range to ensure that capability against this class of targets had not been degraded. The RAM Test and Evaluation Master Plan was modified to incorporate the RAM HAS Test & Evaluation (T&E), but it has not been approved within the Navy.

TEST & EVALUATION ASSESSMENT

- RAM Block 1: RAM Block 1, as supported by an LSD 41-class combat system, is operationally effective against most current ASCMs. RAM Block 1 is operationally suitable and is lethal against most current ASCMs. Follow-On Test & Evaluation for Block 1 still needs to address missile capability against the threat category that was not tested during the operational evaluation (OPEVAL); missile capability against a supersonic, maneuvering sea-skimmer under more stressing conditions; and missile capability against ASCMs under conditions of electronic jamming of the combat system sensors, low visibility (high aerosol environment), and presence of other IR sources.

For the threat category not tested in OPEVAL, the Navy's subsonic target upgrade program should deliver targets in FY05 that will be adequately representative of the threat. The Program Manager considers examining missile capability against ASCMs under conditions of electronic countermeasures against the combat system sensors to be an area beyond his control and does not wish to



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fund such T&E. Overall testing of RAM will be inadequate without such testing, and the fleet users of the system will not be informed about their capability to defend themselves in that environment.

- RAM HAS Mode: The program sponsor has not issued detailed performance goals for RAM HAS. From an Operational Test & Evaluation perspective, the absence of operational requirements undermines objective assessment of operational test results and hampers the Program Manager's ability to understand the impact of performance trades on mission accomplishment and operational effectiveness. The current proposal is to conduct combined Developmental Test/Operational Test (DT/OT) of Block 1A rounds (Block 1 rounds upgraded with HAS software) against ASCMs in FY03 on the SDTS to demonstrate retention of capability. DT will be conducted in FY03-04 with the same missile round configuration against a small number of representative HAS targets from an upgraded RAM launcher, operated in a standalone mode. DT/OT will be conducted from a manned ship against an aerial target drone in FY04, accompanied by a maintenance demonstration and evaluation of the Mod 3 launcher. This will be followed by DT/OT in FY05-06 from a manned ship, with RAM HAS fully integrated with SSDS Mark 2, against HAS targets.

During the June 2002 contractor regression testing to ensure retention of capability against a subsonic, low altitude ASCM surrogate, the software did not perform properly and the target presentation was not at low altitude. That test will be repeated after software correction.

RAM Block 0 and Block 1 Live Fire T&E (LFT&E) evaluated lethality against various ASCMs. RAM HAS was designated for lethality LFT&E oversight based on its new target set. There is little data on RAM warhead lethality against those targets. Testing is needed to gather information on the lethality of the weapon and to develop simulations that can be used to predict lethality/effectiveness against threats under a variety of scenarios. The LFT&E strategy for RAM HAS should include ground testing of the warhead against whole targets and/or components, flight testing, and simulation-based analyses.