

AGM-88E Advanced Anti-Radiation Guided Missile (AARGM) Program

Executive Summary

- The Advanced Anti-Radiation Guided Missile (AARGM) remains operationally suitable, but not operationally effective due to multiple deficiencies discovered during IOT&E in FY11-12.
- After delivery of missile flight software version R2.1, Navy test squadrons VX-31 and VX-9 conducted integrated testing in 4QFY14-1QFY15. Based on deficiencies discovered during this first round of integrated testing (Phase 1), testing was halted, significant software updates were required, and an additional integrated test phase was introduced (Phase 1a). Software version R2.2 was delivered in 3QFY15 for Phase 1a testing, which was conducted 3-4QFY15.
- Phase 1a test deficiencies required more software changes, which DOT&E, Commander, Operational Test and Evaluation Force, and VX-9 are currently analyzing. If these changes are deemed significant, or if additional changes become necessary during Phase 2 of integrated testing, an additional test phase may be required to produce the required data to assess test adequacy, operational effectiveness, and operational suitability.
- Several operational mission failures (OMFs) occurred in Phase 1a. Based on final scoring, if further OMFs are discovered in Phase 2, reliability and performance data may be insufficient to assess suitability. Additional captive carry and live fire tests may be required for adequate IOT&E.
- The Navy conducted two live fire test events during Phase 1a, both successfully engaging their targets and test objectives were achieved. The first test was against a moving maritime target on the Point Mugu Sea Range. The second test was against a traditional air defense unit on the China Lake range.
- There were no dedicated operational test events scheduled or conducted during FY15.

System

- AARGM supplements the AGM-88B/C High-Speed Anti-Radiation Missile (HARM) and is specifically designed to prosecute targets that stop radiating, executing point to point missions against traditional and non-traditional air defense systems. AARGM uses a new guidance section and a modified HARM control section and fins. The Navy intends to employ AARGM on F/A-18C/D/E/F and EA-18G platforms.
- AARGM incorporates digital Anti-Radiation Homing, a GPS, Millimeter Wave guidance, and a Weapon Impact Assessment transmitter.



- Anti-Radiation Homing improvements include an increased field of view and increased detection range compared to HARM.
- The GPS allows position accuracy in location and time.
- The Weapons Impact Assessment capability allows transmission of real-time hit assessment via a national broadcast data system.
- The Millimeter Wave radar technology allows target discrimination and guidance during the terminal flight phase.
- The Navy expects the AARGM Block 1 Upgrade (a software only upgrade) to deliver Full Operational Capability, including Block 0 capability improvements and software changes to provide deferred capability requirements and address deficiencies identified during IOT&E.

Mission

Commanders employ aircraft equipped with AARGM to conduct pre-planned, on-call, and time-sensitive reactive anti-radiation targeting to suppress, degrade, and destroy radio frequency-enabled surface-to-air missile defense systems.

Major Contractor

Orbital/Alliant Techsystems – Northridge, California

FY15 NAVY PROGRAMS

Activity

- There were no dedicated operational test events scheduled or conducted during FY15.
- In June 2015, DOT&E approved the AARGM FOT&E test plan developed by the Program Office. The test plan was adequate to address the testing of deferred capabilities and deficiencies discovered during initial developmental test and evaluation and IOT&E.
- In FY15, Phase 1 integrated testing continued. Based on analysis of weapon performance data, the Navy determined that a software update was required and subsequently stopped the remaining captive-carry and live fire test events. During this phase, VX-31 and VX-9 conducted four test events comprised of 79 captive-carry test runs.
- In FY15, Phase 1a of integrated testing was conducted after the software corrections of earlier deficiencies were completed. VX-31 and VX-9 conducted 11 test events, comprised of 228 captive-carry test runs, and 2 live fire test shots during this test phase. The Navy conducted the first live fire test against a moving maritime target on the Point Mugu Sea Range. The second live fire test was against a traditional air defense unit on the China Lake range.
- During Phase 1a, navigational errors were noted on several occasions. The Navy believes they have identified the cause of the navigational errors and proposed software changes be made to fix these during Phase 2 testing.
- Phase 2 of integrated testing will begin in the fall of 2015.

Assessment

- The FY15 status remains unchanged from the FY14 report.
- Based on IOT&E test data, AARGM was determined to be operationally suitable, but not operationally effective. The details of these deficiencies are discussed in the classified DOT&E IOT&E report published in August 2012.
- The AARGM program has continued developmental and integrated testing, based on the delivery of the R2.2 missile flight software and additional software modifications added

from Phase 1 testing deficiencies. DOT&E does not have the final test results of Phase 1a testing. However, based on interim Phase 1a test results, additional software changes have been made to correct navigational errors. If these additional software changes are considerable, an additional phase of integrated testing will be required, including regression testing of capabilities already tested in Phase 1 and Phase 1a.

- Several hardware and software OMFs have been reported during Phase 1a testing. Depending upon final scoring of these potential Phase 1a OMFs and any found in Phase 2, there may not be sufficient flight hours remaining in the test program (both integrated and operational testing) to assess AARGM effectiveness and suitability. Additional captive-carry and live fire tests may be required for adequate IOT&E.
- The overall test design and identified resources should provide a rigorous evaluation of the corrections of deficiencies discovered in IOT&E and the deferred classified Key Performance Parameter, which is classified. The early integrated testing of captive-carry and live fire events are designed to provide insight and exposure to all capabilities and conditions. These initial test events should give an early indication of the performance of the missile and stability of the system.

Recommendations

- Status of Previous Recommendations. The Navy addressed all previous recommendations.
- FY15 Recommendations. The Navy should:
 1. Report the results of Phase 1a integrated testing in 1QFY16.
 2. Assess whether sufficient data exist to support independent operational test requirements based on results from Phase 1, Phase 1a, and Phase 2 integrated testing.
 3. Coordinate future AARGM operational test and resource requirements with DOT&E, as well as ensure production representative assets are used in the integrated test phase.