# Advanced Anti-Radiation Guided Missile – Extended Range (AARGM-ER)



In FY24, the Navy conducted one Advanced Anti-Radiation Guided Missile – Extended Range (AARGM-ER) integrated test (IT) weapon event from an F/A-18F and a cooperative vulnerability and penetration assessment (CVPA). Flight testing planned for FY24 was delayed by software changes required to address problems identified in testing. Developmental captive-carry events began in June 2024 to verify the software updates designed to fix discrepancies discovered during developmental test (DT) and IT events. AARGM-ER free-flight IT events are scheduled to resume in 1QFY25. Formal IOT&E weapons employment test events are scheduled to begin in 2QFY25.

## SYSTEM DESCRIPTION

The AGM-88G AARGM-ER is an air-to-ground missile that

employs a multi-mode seeker to passively detect and guide on radio frequency (RF) emissions from a threat radar site, and then transition to an active millimeter wave terminal radar seeker to detect, track, and suppress or destroy RF-enabled, surface-toair missile systems. AARGM-ER uses the same millimeter-wave radar as AARGM, but has a new warhead, a larger diameter, a shorter length to enable F-35A/C internal bay carriage, and a new rocket motor that provides increased lethality at longer range against modern surface-to-air threats. The F/A-18E/F and EA-18G are threshold employment platforms for the AARGM-ER. The F/A-18C/D and F-35A/B/C (internal carriage for the F-35A/C variants and external carriage for all variants) are designated as objective employment platforms.

## MISSION

Commanders will use aircraft equipped with AARGM-ER to suppress or destroy enemy air defenses. AARGM-ER will target relocatable threat radars that employ shutdown tactics. The multi-mode seeker of AARGM-ER is intended to counter enemy radar shutdown tactics.

# PROGRAM

AARGM-ER is an Acquisition Category IB program. DOT&E approved the AARGM-ER Milestone C TEMP in May 2021 and an updated cybersecurity test strategy in August 2022. The production and deployment phase, along with the award of the low-rate initial production contract, came after the Navy's Knowledge Point-4 program review in July 2021. DOT&E approved the IT portion of the IOT&E test plan in October 2023. The Navy will submit an IOT&E test plan to DOT&E for approval prior to operational testing. The first phase of cyber survivability testing began in September 2023 with a

CVPA. IT free flights are scheduled to resume in 1QFY25. The Navy is planning for AARGM-ER initial operational capability in 4QFY25.

#### » MAJOR CONTRACTOR

 Northrop Grumman Corporation – Northridge, California

# **TEST ADEQUACY**

The program completed six DT weapons employment events between FY21 and FY23, using F/A-18E/F aircraft, in accordance with the DOT&E-approved TEMP. These test events were conducted to identify problems prior to beginning integrated testing. In October 2023, the program attempted one IT weapons employment test event from an F/A-18F against a threatrepresentative integrated air defense land target at the China Lake Range in California. The test was conducted in accordance with the DOT&E-approved IT plan. DOT&E observed this IT event. AARGM-ER exhibited performance discrepancies during each of the six DT weapons employment events and the single IT weapons employment event. The DT captive-carry test events revealed potential discrepancies, but the compressed schedule challenged the program's ability to implement fixes and resulted in at least four of the seven DT/ IT weapons employment test events occurring with unresolved discrepancies. Most discrepancies found during DT and IT flight

test events required missile software updates. However, none of the implemented software updates were accomplished as quickly as forecasted, resulting in test delays. The Navy has not accomplished any free flight events with EA-18G aircraft.

Additional weapons employment testing was not accomplished in FY24 due to software updates required to address the problems identified during the IT event and subsequent captive-carry test events. A series of previously unplanned DT captive-carry test events began in June 2024 to confirm the software fixes, characterize performance, support problem identification and correction, and to collect data for modeling and simulation (M&S) verification and validation.

The extended range and advanced capabilities of AARGM-ER, along with the requirement to test against advanced target sets in threat-representative and contested electromagnetic operational environments, exceed the infrastructure capabilities of most test ranges. As a result, range availability has been a challenge for the program, necessitating adjustments to the test plan and contributing to schedule delays. The two most recent weapons employment tests demonstrated progress in this regard, as cooperation among the Air Force's Nevada Test and Training Range, the Navy's China Lake Range, and the Federal Aviation Administration enabled employment of AARGM-ER shots from one range to a complex target set in the other

range at almost the threshold employment range of the missile.

The program did not conduct the adversarial cyber developmental test required by the DOT&Eapproved cybersecurity test strategy prior to beginning operational cyber survivability testing with the CVPA. The Navy conducted an AARGM-ER CVPA in September 2023, but there were deviations from the DOT&Eapproved cybersecurity test plan. The Navy conducted a second CVPA in April 2024, during which the Navy completed all the testing in the DOT&E-approved test plan. However, the significant software changes since April might require additional CVPA testing prior to the adversarial assessment. DOT&E observed both CVPA events.

The program completed five arena tests of the newly designed AARGM-ER warhead between December 2021 and September 2023 and provided data from these tests to DOT&E in June 2024. These data are used to create lethality data files required by the M&S to evaluate effectiveness against modeled targets. The data are also used to optimize system weaponeering and fuzing against a range of operational targets. These tests were conducted in accordance with the approved test plan, with one deviation. DOT&E is analyzing the potential impacts of this deviation from the approved test plan and will work with the program office to determine if testing needs to be re-accomplished.

## PERFORMANCE

#### » EFFECTIVENESS, LETHALITY, SUITABILITY, AND SURVIVABILITY

The current data available are insufficient to provide a preliminary assessment of AARGM-ER operational effectiveness, suitability, survivability, or lethality. Additional testing and flight data collection of the AARGM-ER are required from both F/A-18E/F and the EA-18G threshold platforms. Successful end-to-end functionality of all AARGM-ER-designed missile components, employed from the threshold range or beyond, has not yet been demonstrated.

## RECOMMENDATIONS

The Navy should:

- Update the IOT&E test plan with DOT&E recommendations and submit for DOT&E approval prior to operational testing.
- 2. Demonstrate a successful end-to-end operational test of AARGM-ER by employing at or beyond the threshold range out to the objective range, including guidance and warhead lethality, in a threat representative environment, as discussed in the FY23 Annual Report.
- Increase the completeness and adequacy of data for M&S by incorporating the EA-18G threshold platform for free flight events, with an overall increase of

captive-carry events, to better identify discrepancies before initial operational capability and assist during a compressed FY25 testing period, as discussed in the FY23 Annual Report.