

AN/SQQ-89A(V)15 Integrated Undersea Warfare (USW) Combat System Suite

Executive Summary

- In March 2016, the Navy's Operational Test and Evaluation Force (OPTEVFOR) completed operational testing on the Advanced Capability Build (ACB)-11 variant of AN/SQQ-89A(V)15, with the exception of an operational cybersecurity evaluation. The Navy was unable to schedule the cybersecurity evaluation in FY18. DOT&E submitted an IOT&E report in 1QFY19. DOT&E will submit an updated to the IOT&E report upon completion of the operational cybersecurity evaluation.
- DOT&E approved the Test and Evaluation Master Plan (TEMP) for the ACB-13 variant of AN/SQQ-89A(V)15 in December 2017.

System

- The AN/SQQ-89A(V)15 is an integrated undersea warfare (USW) combat system that is deployed on *Ticonderoga*-class cruisers and *Arleigh Burke*-class destroyers. It is composed of the sensors, processors, displays, and weapons controls to detect, classify, localize, and engage threat submarines and alert on threat torpedoes. It is an open-architecture system that includes staggered biennial software upgrades (ACBs) and biennial hardware upgrades (Technical Insertions).
 - Acoustic sensors include a hull-mounted array, Multi-Function Towed Array (MFTA) TB-37 (including a towed acoustic intercept component), calibrated reference hydrophones, helicopter, and/or ship-deployed sonobuoys.
 - Functional segments process and display active, passive, and environmental data.
- The AN/SQQ-89A(V)15 interfaces with the Aegis Combat System to prosecute threat submarines using MK 46 and MK 54 torpedoes from surface vessel torpedo tubes, Vertical Launch Anti-Submarine Rockets, or MH-60R helicopters.



Mission

- Theater and Unit Commanders use surface combatants equipped with the AN/SQQ-89A(V)15 to locate, monitor, and engage threat submarines.
- Maritime Component Commanders employ surface combatants equipped with the AN/SQQ-89A(V)15 as escorts to high-value units to protect against threat submarines during transit. Commanders also use the system to conduct area clearance and defense, barrier operations, and anti-submarine warfare (ASW) support during amphibious assault.

Major Contractor

Lockheed Martin Mission Systems and Training – Manassas, Virginia

Activity

- In December 2014, DOT&E submitted a classified Early Fielding Report for ACB-11. This report was submitted due to the installation of ACB-11 on ships that deployed prior to IOT&E.
- In March 2016, OPTEVFOR completed operational testing on ACB-11, with the exception of an operational cybersecurity evaluation. Testing was conducted in accordance with DOT&E-approved test plans.
- In September 2017, the Navy commenced development of a General Threat Torpedo (GTT) using the Resource Enhancement Project. GTT is a surrogate for threat torpedoes and supports testing torpedo defense capability. GTT is

expected to overcome several current test limitations. The project delivers a single prototype.

- In FY17, the Navy scheduled the operational cybersecurity evaluation three times. Each event was deferred due to test platform operational commitments or maintenance requirements. The Navy did not schedule an operational cybersecurity evaluation in FY18.
- In December 2017, DOT&E approved the TEMP for the ACB-13 variant of AN/SQQ-89A(V)15.

Assessment

- DOT&E submitted a classified IOT&E report for ACB-11 in 1QFY19. The preliminary analyses indicate the following.
 - Testing was sufficient to evaluate ACB-11 operational effectiveness and operational suitability.
 - ACB-11 capability against cyber-attack is untested by operational testers.
 - ACB-11 submarine detection capability met Navy requirements in one test environment.
 - ACB-11 capability to support prosecution (simulated kill) with an ASW-capable aircraft (MH-60R helicopter or P-8A fixed-wing) is uncertain from the ACB-11 test events. This capability will be a primary component of ACB-13 operational effectiveness and Littoral Combat Ship operational effectiveness in ASW.
 - ACB-11 is untested against operationally relevant midget and coastal diesel submarine threats. The Navy has no representative surrogate for this type of submarine to use for test.
 - ACB-11 met Navy performance metrics for torpedo detection against a limited set of torpedoes. The Navy expects to meet these metrics against the remaining torpedoes with capability delivered in the ACB-19 variant.
 - ACB-11 software had no significant reliability or operational availability deficiencies.
 - Operational availability of MFTA is low, primarily due to extensive logistical delays associated with its repair.

ACB-11 uses MFTA as a primary sensor for submarine search and torpedo defense. MFTA operational availability has demonstrated some improvement, likely due to Navy action to increase MFTA spare parts inventory.

- An updated to the IOT&E report for ACB-11 will be submitted upon completion of the operational cybersecurity evaluation. The Navy expects to schedule the cybersecurity evaluation in FY19.
- The GTT is being developed to overcome several test limitations when assessing torpedo defense capability. However, the utility of GTT in operational test depends on future Navy decisions to procure a sufficient quantity of GTTs.

Recommendations

The Navy should:

1. Complete the cybersecurity evaluation of ACB-11 as soon as practical.
2. Develop a representative surrogate for testing AN/SQQ-89A(V)15 performance against midget and coastal diesel submarine threats
3. Continue efforts to improve the operational availability of MFTAs.