# AN/BLQ-10 Submarine Electronics Warfare Support System

Executive Summary

The Navy conducted an FOT&E of the AN/BLQ-10 system with the Technical Insertion 10 (TI-10) upgrade and the Multifunction Modular Mast (MMM) in August 2016. Analysis of the test results is in progress. DOT&E will provide the final assessment in a 2QFY17 FOT&E Report.

System

- The AN/BLQ-10 system is an electronic warfare support system for U.S. submarines. It provides automatic intercept capability (detection, classification, localization, and identification) for both radar and communications signals. Multiple subsystems process radar and communications signals.
- The AN/BLQ-10 processes signals collected with the submarine's masts. Radar signals are collected by the imaging mast, which is either a photonics mast (on the *Virginia* class) or a periscope (on all other classes). Communications signals are collected from both the imaging mast and a dedicated communications intercept mast, which is either an AN/BRD-7 (on the *Los Angeles* and *Seawolf* classes), an AN/BSD-2 (on the *Virginia* class), or an MMM (recently fielded on some *Los Angeles*- and *Virginia*-class ships). These masts provide largely the same functionality but with different frequency coverage and localization accuracy.
- The program is adopting an open architecture, incremental development process. Hardware and software updates, referred to as a TI, will be fielded every 2 years. TI-08 was the first such upgrade, which added a subsystem to intercept some Low Probability of Intercept (LPI) radar signals.
- The AN/BLQ-10 provides support for specialized, carry-on electronic warfare equipment and personnel.
- TI-10 has been fielded. It consists of updates to commercial off-the-shelf (COTS) processors and displays, as well as upgrades of the Radar Narrowband to improve reliability and maintainability, the addition of Auto Specific Emitter Identification (Auto SEID) to enable automation of the SEID collection processes, and a Nonlinear Resonance Classifier
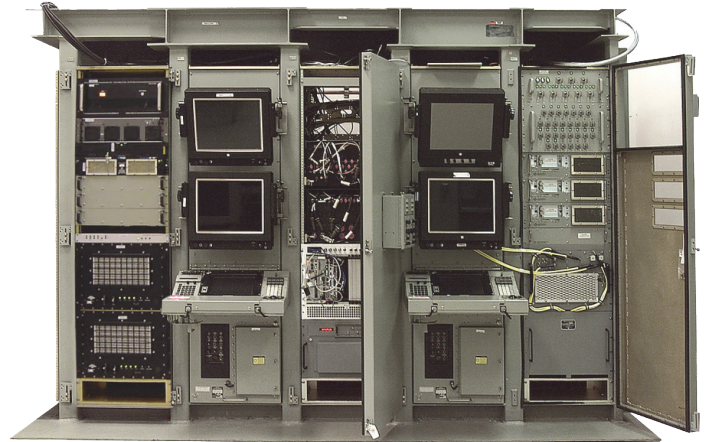
(NRC) upgrade for Improved Communications Acquisition and Direction Finding (ICADF).
- The first TI-14 installations will complete in early FY17, with the first deployment in late FY17 or FY18. It consists of updates to COTS processors and displays, Electronic Warfare Server First Generation, which provides the Electronic Support System operator and platform decision makers with improved tactical situational awareness, and a Radar Rules of Thumb algorithm to provide an assessment of counter detection.

Mission

Submarine Commanders use the AN/BLQ-10 electronic warfare support system to provide threat warning information to avoid counter-detection and collision, and to conduct intelligence, surveillance, and reconnaissance in support of fleet or battlegroup objectives

Major Contractor

Lockheed Martin Mission Systems and Training – Syracuse, New York

Activity

- The Navy:
  - Performed developmental testing on the radar cross section (RCS) of the MMM in June 2015, and released a classified report of the findings in 4QFY15. The Navy conducted additional developmental RCS testing of the MMM in August 2016.
  - Conducted system integration testing in September 2015, to support future developmental tests for TI-14, the next technical insertion release on AN/BLQ-10.
- Commander, Operational Test and Evaluation Force (COTF), the Navy operational test activity:

- Performed a maintenance demo of AN/BLQ-10 in December 2015 to assess maintainability at the Naval Undersea Warfare Center, Newport, Rhode Island.
- Conducted an FOT&E of AN/BLQ-10 TI-10 in August 2016 on a *Virginia*-class submarine while underway. This test assessed the improvement in the direction finding abilities of AN/BLQ-10, improvements in the probability of detection and identification of radar emitters, and the integration of the Auto SEID capability. The test was performed in accordance with the DOT&E-approved test plan.

Assessment

- This report provides only a preliminary assessment of the AN/BLQ-10 system with TI-10 based on a June 2015 developmental test report supporting the August 2016 operational test. DOT&E will provide the final assessment in the 2QFY17 FOT&E report after the August 2016 TI-10 operational test data have been analyzed.
- Based on results from the at-sea developmental test in August 2014, there have been no significant changes to communications Direction Finding or radar Direction Finding accuracy from TI-08 to TI-10.
- The addition of the NRC algorithm was intended to reduce workload and improve the performance of ICADF. Initial developmental test results suggest the algorithm has been integrated successfully, but the data analysis of the August 2016 TI-10 operational test must be completed before the operational effectiveness of the system for communications intercept can be assessed.
- Similarly, the performance and functionality of Auto SEID cannot be assessed until the data analysis of the August 2016 TI-10 operational test is complete.
- Several results from previous (TI-08) testing are still applicable to TI-10:

- The AN/BLQ-10 system is limited in operational effectiveness for some threat radars. The Navy has not yet conducted operational testing against some modern threat radars or appropriate surrogates. The system does detect some radars at long ranges; however, operational testing was inadequate to determine the extent operators can use the AN/BLQ-10 to support submarine missions.
- The TI-08 upgrade provided improved intercept capability against the intended LPI radars. However, the number of threat LPI radars in the world is increasing and the Navy will need to develop future upgrades to keep up with newer technology.
- The MMM provides communications localization accuracy that would be sufficient for most submarine missions. TI-08 operational testing showed the system did not meet the Navy's established thresholds.
- During the TI-08 operational testing, AN/BLQ-10 was not operationally suitable because the Navy's training system was not sufficient to allow fleet operators to maintain proficiency on the system. The Navy has updated their training program, both in classrooms and on individual submarine platforms. While data analysis is not complete, observations taken during the TI-10 operational test did not note any training shortfalls. DOT&E will assess TI-10 suitability once data analysis of the reliability data is completed.

Recommendations

- Status of Previous Recommendations. The Navy has addressed all previous recommendations.
- FY16 Recommendations. As the data analysis is currently ongoing, any future recommendations will be included in the 2QFY17 FOT&E Report.