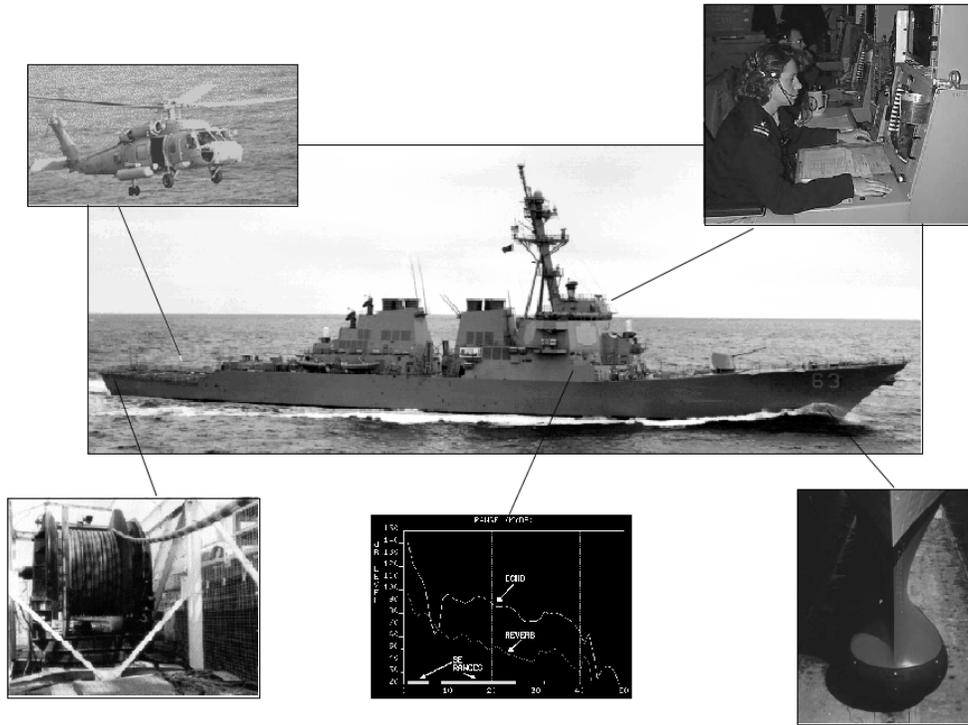


INTEGRATED SURFACE SHIP ASW COMBAT SYSTEM (AN/SQQ-89)



Navy ACAT IC Program

Total Number of Systems:	144
Total Program Cost (TY\$):	\$7097.3M
Average Unit Cost (TY\$):	\$39.3M
Full-rate production:	3QFY94

Prime Contractor

Lockheed Martin

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The AN/SQQ-89 (V) is an integrated ASW combat system combining improved sensors and weapon control systems with advanced acoustic data processing and display. The system integrates the AN/SQS-53B/C/D hull mounted sonar, the AN/SQR-19 (V) Tactical Towed Array Sonar and the AN/SQQ-28 (V) LAMPS MK III Shipboard Electronics with the ASW Control System (ASWCS) MK 116 MOD 5/6/7/8/9. It supports the *Joint Vision 2020* concepts of *full-dimensional protection* and *precision engagement* by providing long-range detection, tracking, localization and correlation of surface and sub-surface contacts and engagement of sub-surface contacts via the ship's Combat Direction System or Command and Decision sub-system. Various combinations of the AN/SQS-53B/C/D, the AN/SQR-19 (V), the AN/SQQ-28 (V) and the MK 116 constitute the AN/SQQ-89 variants installed in the CG 47, DDG 51, and DD 963. Only combinations of the AN/SQR-19 (V) and AN/SQQ-28 (V) are included in the AN/SQQ-89 (V) variants installed in the FFG 7 class. The AN/SQQ89 (V) 6 is the baseline system for towed array ships and underwent OPEVAL in 1994.

The baseline AN/SQQ-89 (V) system is being modified. The program office is backfitting several Commercial-Off-The-Shelf (COTS) engineering changes into in-service ships and will forward fit

additional changes into future combatants. The change evaluated in FY00 testing was the AN/SQQ-89(V)6 Torpedo Alertment Upgrade, which includes installation of the Torpedo Recognition and Alertment Functional Segment (TRAFS), (formerly called Multi-Sensor Torpedo Recognition and Alertment Processor) and operability improvements such as the System Level Recorder, the Tactical Decision Support Sub-system, a COTS-based Sonar In-situ Mode Assessment System and a Common Integrated Tactical Picture capability.

BACKGROUND INFORMATION

SQQ-89 integrates individual and operationally tested major components. These major components were all determined to be operationally effective and suitable. In FY90, DOT&E suggested the creation of a TEMP to operationally test the integrated SQQ-89 system with the first TEMP approved by OSD in 1991.

Previous testing of the AN/SQQ-89 system (OT-IIIIF) was completed in June 1994 in conjunction with platform level FOT&E of the DDG 51 class guided missile destroyer. Overall, DOT&E assessed the AN/SQQ-89 (V) 6 ASW combat system installed in the DDG 51 class ship to be operationally effective and operationally suitable. However, when faced with an attacking submarine in a one-on-one encounter, the 1994 baseline system did not afford a survivability advantage to the surface combatant.

The Torpedo Recognition and Alertment Functional Segment (TRAFS) began as a standalone system as part of the Surface Ship Torpedo Defense program, and was not subject to DOT&E oversight. It underwent OPEVAL in 1997, designated OT-III. In its report, COMOPTEVFOR concluded that the standalone system was operationally effective for DD 963 class ships with a specific acoustic sensor not operationally effective otherwise. Additionally, the system was found to be not operationally suitable due to severe software reliability problems. COMOPTEVFOR did not recommend the standalone system for Fleet introduction.

In response to the OT-III results, the program's sponsor, the Director of Surface Warfare (CNO N86), issued a letter in 1998 which stated the program was working to correct the deficiencies and authorized new construction and backfit installations of the SQQ-89 (V) 6 with a fully integrated TRAFS. The letter also concurred with the need for follow-on operational testing. At that time, TRAFS came under DOT&E oversight because it was now integrated into the AN/SQQ-89 program.

In June 1999, the integrated TRAFS, under the designation AN/SQQ-89(V)6 Torpedo Alertment Upgrade, underwent DT-IIIAN aboard USS PORTER (DDG 78) as part of that ship's Combat System Ship Qualification Trials. A January 25, 2000 Operational Test Readiness Review for OT-IIIIG reviewed the results of DT-IIIAN and cited failure to meet the ORD-specified false alarm rate and reliability thresholds. The program office responded that the false alarm problem was corrected through enhanced operator training while the reliability problem was corrected with a certified patch to the software. As a result, the system was certified ready for test.

During 1999, the Navy, at the urging of DOT&E, worked on revising the 1990 ORD, which focused on Cold War scenarios. The ORD was also intended to reflect the subsequent shift to littoral and regional threats and the evolving series of upgrades to the SQQ-89 program. Because there was insufficient time to route the ORD for approval prior to OT-IIIIG, the TEMP was updated to reflect proposed ORD requirements based on informal concurrence on the part of the key signatories, including DOT&E. However, since the conclusion of OT-IIIIG in February 2000, the Navy has still not completed the ORD approval process.

TEST & EVALUATION ACTIVITY

The AN/SQQ-89(V)6 underwent FOT&E, designated OT-IIIIG, from January 31-February 3, 2000, at the Atlantic Undersea Test and Evaluation Center (AUTEC), off Andros Island, Bahamas. The testing focused on TRAFS, but other sub-systems of the SQQ-89 (V) 6 Torpedo Alertment Upgrade were tested, including the Tactical Decision Support System, the Sonar In-situ Mode Assessment System II, and the System Level Recorder. In keeping with SECDEF testing themes of combining DT/OT and training, OT-IIIIG was conducted concurrently with a DT for the Submarine Combat Control System Mk 2 and a submarine Tactical Readiness Evaluation.

The purpose of OT-IIIIG was to determine the operational effectiveness and operational suitability of the SQQ-89 (V) 6 Torpedo Alertment Upgrade and its readiness for Fleet introduction. The test ship, USS PORTER, conducted assorted warfare tasks over the course of a 3-day period while under the constant threat of potential torpedo attack. This required a certain degree of vigilance be maintained around the clock. The test schedule was designed to avoid regular patterns of firings or other clues that might lead to unrealistically high levels of operator alertment, including a torpedo launch from a surface craft. This provided a fair assessment of the system under expected operational conditions. A total of 14 torpedoes were fired, resulting in 13 valid events. Overall, OT-IIIIG represented a realistic and challenging test.

TEST & EVALUATION ASSESSMENT

COMOPTEVFOR's final report on OT-IIIIG concluded that the SQQ-89 (V) 6 Torpedo Alertment Upgrade is neither operationally effective nor operationally suitable, and is not recommended for Fleet introduction. Sixteen major deficiencies were noted, including excessive false alert and false alarm rates and poor software reliability. On June 15, 2000, in response to the COMOPTEVFOR final report, the Commander, Naval Surface Forces Atlantic immediately suspended all future installations of the AN/SQQ-89 (V) 6 Torpedo Alertment Upgrade on Surface Force Atlantic ships. The suspension will remain in effect until all major discrepancies listed in the final report are certified corrected by COMOPTEVFOR and all current ship installations are corrected. Based on independent analysis of the test data, DOT&E concurs with COMOPTEVFOR's overall findings and the action taken by the Commander, Naval Surface Force Atlantic. Specific test results and DOT&E analyses are provided in the classified annex to this Annual Report.

CONCLUSIONS, RECOMMENDATIONS AND LESSONS LEARNED

Based on OT-IIIIG and previous observations from earlier tests and exercises, the Torpedo Alertment Upgrade does not enhance torpedo alertment and evasion over the legacy system. There is some evidence that, under operational conditions, it may serve to degrade operator performance. Fleet experience indicates operators will turn a system off rather than listen to incessant alerts. If sonar operators are properly trained and attentive, they may detect some of the threat themselves, without TRAFS. If the Fleet sees TRAFS as an opportunity to lower manning or training requirements for sonar technicians, the resulting operators are unlikely to be able to make effective use of the information provided by TRAFS. It is not clear that there is a simple solution to the TRAFS alert problem, and the entire concept may require extensive revision and redevelopment in order to be truly effective. Finally, TRAFS testing reinforces the dependence of torpedo alertment capability on appropriate sensors.

The larger “ship survivability/torpedo evasion” Measures Of Effectiveness cannot be answered through SQQ-89 program testing alone. Complete, in-water, end-to-end testing of torpedo evasion using countermeasures and evasion tactics outside the bounds of the SQQ-89 program is essential and intentions are for this testing to be conducted as part of DDG 51 class FOT&E. However, the next three SQQ-89 variants: (V)10, (V)14, and (V)15 will be built without towed arrays. Even though SQQ-89 testing is being integrated into DDG 51 FOT&E, DOT&E strongly believes the Navy must follow through with updating the SQQ-89 ORD to reflect current and future operational environments and threats.