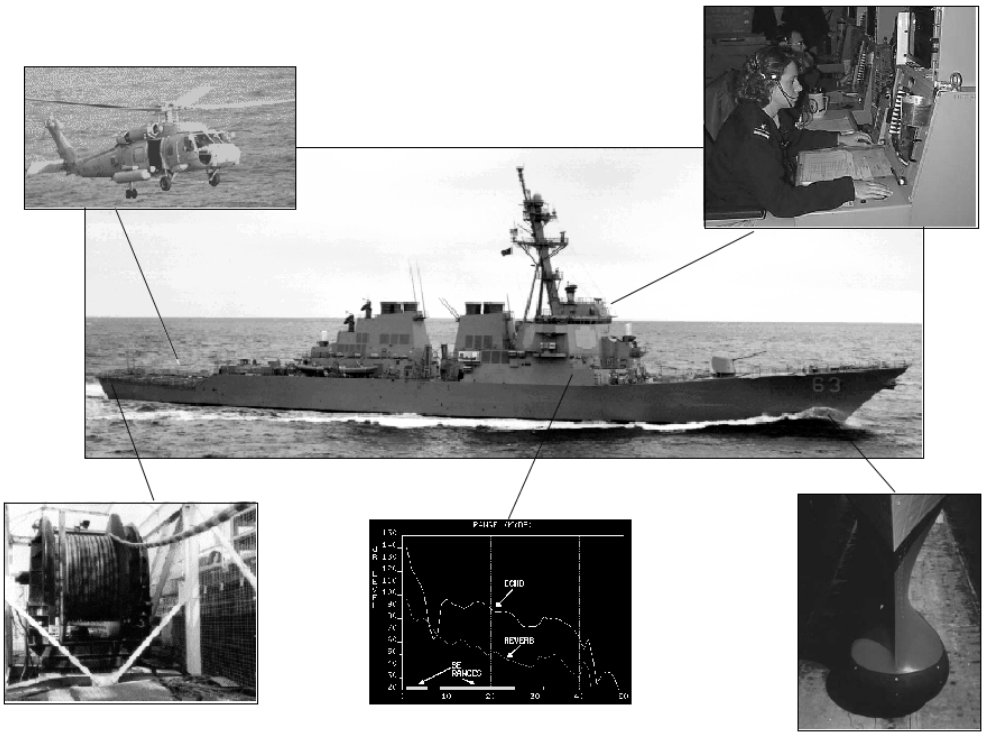
INTEGRATED SURFACE SHIP ASW COMBAT SYSTEM (AN/SQQ-89)



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 2010

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, and supports the ***Joint Vision 2010*** concepts of ***full-dimensional protection*** and ***precision engagement*** by providing long-range detection, tracking, localization and correlation of surface and subsurface contacts and engagement of subsurface contacts via the ship's Combat Direction System or Command and Decision subsystem. 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 that are installed in the CG 47, DDG 51, and DD 963 classes. Only combinations of the AN/SQR-19 (V) and AN/SQQ-28 (V) are included in the AN/SQQ-89 (V) variants that are 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 in the process of being improved. The program office has developed commercial-off-the shelf (COTS) engineering changes to be back-fit into in-service ships and forward-fit on future combatants.

There are three back-fit variants:

- AN/SQQ-89(V)6 Torpedo Alertment Upgrade includes installation of the Torpedo Recognition and Alertment Functional Segment (TRAFS), (formerly called Multi-Sensor Torpedo Recognition and Alertment Processor (MSTRAP)), and operability improvements such as the System Level Recorder and associated Signal LAN (S-LAN), the Tactical Decision Support Subsystem (TDSS), a COTS-based Sonar In-situ Mode Assessment system (SIMAS II) and a Common Integrated Tactical Picture (CITP) capability.

- AN/SQQ-89(V)12 replaces the AN/SQS-53B hull sonar system with the AN/SQS-53D(V)2 on TICONDEROGA-class Aegis cruisers (CG 47). The Torpedo Alertment Upgrade, including TRAFS, SIMAS II, SLR, and TDSS will also be added to the cruisers.

- AN/SQQ-89A(V)15 provides the Multi-Function Towed Array (MFTA) as a replacement for the AN/SQR-19 on the Flight I and II (DDG 51-78) ARLEIGH BURKE class destroyers.

There are also three primary forward-fit variants:

- AN/SQQ-89(V)10 removes the AN/SQR-19 towed array on six destroyer hulls (DDG 79-84).

- AN/SQQ-89(V)14, for DDG 85-90, divides the system into 10 discrete functional segments. It bridges the gap between the (V)10 mil-spec hardware and the (V)15 COTS-based system. The only significant additional capability is TRAFS.

- AN/SQQ-89(V)15 is the variant for DDG 91-107, and extends some of the (V)14 architecture. It features the Echo Tracer Classifier (ETC) for improved shallow water active SONAR classification 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.

The most recent testing of the AN/SQQ-89 system was OT-IIIF completed in June 1994 in conjunction with platform level FOT&E of the DDG-51 class guided missile destroyer. The purpose of the evaluation was to determine the operational effectiveness and suitability of the AN/SQQ-89 (V) 6 and verify the correction of the deficiencies discovered during the 1992 test (OT-IIIE) on USS ARLEIGH BURKE (DDG-51). Testing was conducted at the Pacific Missile Range Facility, Barking Sands, HI. The test platform was USS CURTIS WILBUR (DDG-54), with services provided by surface and sub-surface craft, as well as ASW and tactical aircraft. Seven Mk 46 exercise torpedoes were launched. This test was in full compliance with the OSD-approved TEMP.

Overall, DOT&E determined that the AN/SQQ-89 (V) 6 ASW combat system installed in the DDG-51 class ship to be operationally effective and operationally suitable. Major deficiencies discovered in the 1992 test were corrected and all COIs were resolved. System software reliability exceeded revised thresholds approved by the Navy after determining that previous thresholds were unrealistic. However, when faced with an attacking submarine in a one-on-one encounter, current systems do not afford a survivability advantage to the surface combatant.

A standalone introductory version of MSTRAP underwent an OPEVAL (under TEIN 0779) at the Pacific Missile Range Facility on July 9-10, 1997. The introductory MSTRAP system was determined to be operationally effective for DD 963 class ships with the AN/SQQ-89 (V) 6 stand-alone system while employing the AN/SQR-19 towed array, but not operationally effective otherwise. The system was found to be not operationally suitable. OPTEVFOR did not recommend fleet introduction of the standalone MSTRAP. A verification of corrected deficiencies on MSTRAP was mandated by OPNAV.

TEST & EVALUATION ACTIVITY

The Navy is revising the 1990 Operational Requirements Document (ORD), which focused on the Cold War scenario, and updating it to reflect the subsequent shift to littoral and regional threats. This ORD will also reflect the evolving series of upgrades to the SQQ-89 system. The current TEMP from June 1994 is being updated to incorporate the anticipated ORD changes. A limited DT was performed in June 1999 and Prospective Commanding Officer operations have been used to provide supplementary data. FOT&E is now planned for February 2000, to support a more realistic operational evaluation of the SQQ-89 (V) 6 Torpedo Alertment Upgrade.

TEST & EVALUATION ASSESSMENT

While the baseline SQQ-89 system has been determined to be operationally effective and suitable, testing of the various upgrades is required. A significant challenge remains in the identification and allocation of resources/funds to support adequate testing of these upgrades. DOT&E is working with the resource sponsor, the Program Manager, and OPTEVFOR to identify cost effective options for system upgrade operational testing. Based on the poor performance of standalone MSTRAP, there is concern about the effectiveness of the planned torpedo alertment segment, (TRAFS), that will be embedded in the SQQ-89 system. DOT&E will ensure that adequate testing of this segment/functionality is conducted during the FOT&E.

Of considerable importance is the selection and settings of the appropriate surrogate for the threat weapons and the design of test scenarios that will provide operationally realistic alertment opportunities. Since actual threat weapons are not being used, a mix of inventory weapons is being employed to separately represent threat torpedo acoustics and tactics during operational testing. Unaccredited simulation models are available to assist with these investigations and to merge threat acoustics and tactics. A fully accredited model would allow more complete resolution of operational issues while offsetting the significant cost of in-water testing.

Additionally, the larger "ship survivability/torpedo evasion" MOE 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.