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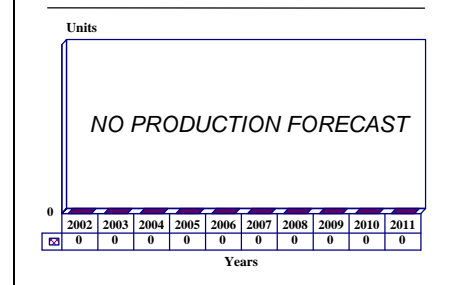
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SQR-19 TACTAS - Archived 11/2003

Outlook

- All production (other than support) believed completed
- No major sales, U.S. or international, seen at this time
- Barring any surge of activity, this report will be archived in the near future

10 Year Unit Production Forecast
2002 - 2011



Orientation

Description. The SQR-19 is a passive Tactical Towed Array Sonar (TACTAS) system or, more simply, a towed sonar system.

Sponsor

U.S. Navy
Naval Sea Systems Command
Washington, DC USA

Contractors

Lockheed Martin Corp.
Naval Electronics & Surveillance Systems – Syracuse
Ocean Systems
Electronics Park
EP7 MD31
Syracuse, New York 13221-4840
USA
Tel: +1 315 456 3505
Fax: +1 315 456 3515
Web site: <http://www.lockheedmartin.com/syracuse>
(Original manufacturer of towed array, components, system integration)

Northrop Grumman Corp.

(formerly Westinghouse Electronic Corp.)
Electronic Sensors and Systems Sensors (ES³)
C³I and Naval Sensors
PO Box 300 Sykesville Op
Sykesville, Maryland 21784
USA

Tel: +1 410 795 2800

Web site: <http://www.northgrum.com>

(Second source for towed array, SQQ-89 ASW system)

Status. In operational service. Last full unit production round believed to have been completed in 1999. Current activity appears to be focusing on operational support and spares replacement.

Total Produced. Approximately 149 systems are believed to have been produced through November 2002.

Platform. Surface warfare vessels: CG-47 Ticonderoga class guided missile cruisers, DDG-51 Arleigh Burke class destroyers, DD-963 Spruance class destroyers, FFG-7 Perry class frigates (USA, Spain), Halifax class frigates (Canada), Abukuma class frigates, and Kongo class destroyers (Japan).

Application. Detection and tracking of submarines.

Price Range. The per-unit cost for an SQR-19 was estimated at U.S.\$9 million or U.S.\$10 million, based on contract cost averaging using the most solid procurement contract awarded in 1987. Time and inflation alone have no doubt altered this price. Unfortunately, a more current price estimation has not been offered by the manufacturer.

Technical Data

Design Features. The sensor array of the SQR-19 is over 250 meters (800 ft) across and 82 millimeters (3.25 in) in diameter. The entire system includes 1,800 meters (5,600 ft) of armored towing cable weighing over 4,518 kilograms (9,960 lb). An additional 5,850 kilograms (12,900 lb) of processing equipment and 7,620 kilograms (16,800 lb) of winching equipment make up the ship-mounted dry end of the system. Tow depths to 335 meters (1,200 ft) are possible. The system is able to operate in sea states up to Stage 4 while at tactically significant own-ship speeds.

The towed sensor array has an enhanced ranging ability and reduced noise. Further improvements include a handling system that enhances system performance by maintaining array position and depth and a sophisticated signal processing system that supplies more sonar information with reduced operator workload.

Operational Characteristics. The SQR-19 is a Tactical Towed Array Sonar (TACTAS) system designed to allow surface ships to detect and classify submarines and surface vessels at long ranges. This is essentially a

passive sonar system that is being backfitted onto the Navy's DD-963, FFG-7, and CG-47 class ships, where it serves as the trigger for the LAMPS Mk III system. It is designed to support carrier battle groups and high-speed convoy operations, including over-the-horizon targeting.

Specifications

| | |
|--------------------|--|
| Space Requirements | Elec 244 ft ² /22.7 m ² H&SG 155 ft ² /14.4 m ² |
| RX Frequency Range | VLF/mf/hg apertures |
| Cable Length | 5,600 ft/1,700 m |
| Cable Diameter | 1 in/25 mm |
| Array Length | 800 ft/242 m |
| Array Diameter | 3.5 in/82 mm |
| System Weight | Elec 27,300 lb/12,410 kg H&SG 16,800 lb/7,635 kg Array 9,900 lb/4,500 kg |
| Tow Depths | Up to 1,200 ft/360 m |
| Reliability | 710 hours MTBCF |
| Maintainability | <20 minutes MTTR |



The Oliver Hazard Perry class guided missile frigate USS Rodney M. Davis (FFG 60) is one of the many warship platforms operating the SQR-19 TACTAS for ASW missions

Source: U.S. Navy

Variants/Upgrades

There are three known versions of this system. Each variant differs in the version of the console and signal processor it uses.

SQR-19(V)1. Uses two OJ-452(V)9 consoles and one OL-190(V)5 signal processor.

SQR-19(V)2. Uses two OJ-452(V)8 consoles and one OL-190(V)4 signal processor.

SQR-19(V)3. Uses two OJ-452(V)8 consoles and one OL-190(V)5 signal processor.

Program Review

Background. Surface towed array development began in FY68, and a specific requirement for development of tactical towed arrays for ASW capable surface ships was identified in FY73. The result was the Escort Towed Array Sensor (ETAS) program, which was pursued concurrently with the Surveillance Towed Array Sensor (SURTASS) program, under PE#0603794N, until June 1975. At that time, a separate program was established for tactical towed array development under PE#0603709N, and the system was designated the Tactical Towed Array Sonar (TACTAS) system.

Sea trials of prototype SQR-19 acoustic models were held in May 1976, and the SQR-19 TACTAS program moved into engineering development. Computer software development began, and critical item tests were conducted on towed array, telemetry, and handling of subsystem components. The SQR-19 engineering development contract was awarded in early FY78, and software validation testing with the UYS-1 acoustic display unit computer began. Gould manufactured the array and handling equipment for the SQR-19, while Hughes produced the UYQ-21 displays.

The first operational prototype of the SQR-19 was installed on board the destroyer USS *Moosbrugger* (DD-980) in mid-1982 for operational evaluation (OPEVAL) and technical evaluation (TECHEVAL). The *Moosbrugger* conducted tests throughout 1982 and into early 1983. These tests revealed some problems with the system. These deficiencies were analyzed and corrections instituted during a follow-on test and evaluation (FOT&E) period.

That same year, the Naval Sea Systems Command awarded U.S.\$23.3 million to Gould to manufacture the first 12 SQR-19 towed arrays and stowage groups with associated spare and repair parts, engineering services, and documentation. The contract also included an option for 20 additional units for FY84 production. General Electric received a U.S.\$16.9 million contract toward the 12-unit SQR-19 purchase, while IBM Federal Systems Division was awarded a U.S.\$14.9 million contract for 20 UYS-1(V) analyzer detector sets for the SQR-19 program. SQR-19 plans under PE#0604713N were classified during FY83. Preproduction tests were completed, and final reports and recommendations were submitted.

During FY84, technical problems were able to be identified through analysis of system performance data from the shipboard system. Ways to solve these problems could then be evaluated. Also, further efforts

were made to develop, test, and install those hardware and software modifications required to correct the system deficiencies noted in the analysis. In February and March, GE received separate contract increments to support SQR-19 systems, subsystems, and support items, bringing the total value of awards under that contract to U.S.\$24.6 million. In June 1984, Gould received a U.S.\$4.5 million contract increment for performance upgrade engineering changes for 14 SQR-19s used on FFG-7 class frigates.

The House approved SQR-19 foreign sales in September 1984, despite the FY84 appropriations bill ruling against such sales. The U.S. Department of Defense (DoD) answered fears that new systems would be made available to foreign countries before the U.S. fleet had the system in sufficient quantities. This concern was in response to the orders from Spain and Australia for FFG-7 class frigates and from Canada for SQR-19 systems. But while Spain made it a major point to demand the SQR-19 with its FFG-7s, the Australians were not equipping their ships with the system. In late FY84, the U.S. Congress was told of a proposed Letter of Offer to Canada for the purchase of six SQR-19s with handling and stowage subsystems, support, and documentation at a cost of about U.S.\$55 million.

On December 5, 1984, the U.S. Naval Sea Systems Command announced that it was seeking potential second sources for the SQR-19, SQR-18(V)1, and SQR-18(V)2 towed arrays and handling equipment built by Gould in order to enhance competition and ensure cost-effectiveness. Several contractors submitted proposals and subsystems for testing. These subsystems underwent performance, interface, reliability, and maintainability tests in October 1985. In FY86, the U.S. Navy prepared performance specifications and solicited and evaluated competitive full-scale development contract proposals.

In early FY87, the U.S. Navy began full-scale installation of operational SQR-19 TACTAS systems on board two DD-963 Spruance class destroyers during their overhauls. When the U.S. Navy issued its FY88 budget request in January 1987, the SQR-19 procurement funding line had been zeroed. SQR-19 procurement funding had been incorporated into the SQQ-89 Surface ASW Combat System funding line. The U.S. Navy did not program any FY87 or FY88 funding for Project S0234, Tactical Towed Array Sonar (TAR) SQR-19, in PE#0604713N. The U.S. Navy received funding for eight SQQ-89 systems in FY88.

The first CG-47 class cruiser to receive the system, the USS *San Jacinto* (CG-56), was commissioned in January 1988. All new CG-47s are receiving the system, as are DD-963 class destroyers during their regular overhauls.

While problems in the early stages of the development program (centering on signal processing) almost caused its cancellation, the SQR-19 is being deployed ahead of schedule. Its long-range capability should substantially increase early warning for U.S. Navy surface elements.

In the early 1990s, AlliedSignal won the contract for the U.S. Navy's SQR-19 array away from then-Martin Marietta (now Lockheed Martin after the merger of the two companies) and became a part of the Westinghouse SQQ-89 team. The U.S. Navy considered all SQR-19 procurement as part of the SQQ-89 integrated ASW system.

As part of its goal to improve its surface ASW systems, the U.S. Navy began efforts to develop, test, and evaluate SQS-53C and SQR-19 bistatic prototype software in FY96. These efforts were completed by the end of FY97.

Towed Active Receive Subsystem (TARS) development with the mid-frequency bistatic towed array processor continued through FY98. In addition, TARS sea-testing was conducted. The development and testing of the TARS processor were completed in FY99.

SQQ-89(V). The SQQ-89(V) series of ASW combat systems links acoustic sensors and weapon control systems with advanced data processing and information displays. The SQQ-89(V)6, which is installed in Flight I and Flight II DDG 51 class ships and other combatants, is the baseline system for ships with a towed array. It integrates the AN/SQS-53 series hull mounted sonar, the AN/SQR-19(V) TACTAS, and the AN/SQQ-28(V) LAMPS MK III shipboard electronics with the ASW Control System MK 116 series. For Flight IIA DDG 51 class ships, the AN/SQQ-89(V)10 removes the AN/SQR-19 towed array, while (V)14 reorganizes the functional segments, and (V)15

introduces a COTS-based system. Eventually, A(V)15 will replace the AN/SQR-19 on Flight I and II ships with the new Multi-Function Towed Array.

Note: For related information, please see the report "SQQ-89 Surface ASW Combat System" in Forecast International's *Anti-Submarine Warfare* or *AN Equipment* forecast services.

International Market. Initial overseas activity in SQR-19 sales had been brisk at one point. However, no known orders for the sonar have been placed since 1992, and it seems rather unlikely that any more will come, although it is possible as the system is inexpensive enough for a second or third level navy looking for a bargain. It appears that the Japan Maritime Self-Defense Force (JMSDF) may end up as the largest user of the SQR-19 outside the U.S. Navy. The SQR-19 was selected for fitting to the Abukuma class frigates and the Kongo destroyers.

Spain equipped four out of six FFG-7-type Santa Maria class frigates with the SQR-19 for operation with SH-60B Seahawk helicopters.

The Canadians equipped their Halifax class frigate with part of the SQR-19. The SQR-19 operates with the Computing Devices SQR-501 receiver and signal processor in a system called the Canadian Towed Array Sonar System (CANTASS), which the Canadians are claiming is superior to comparable American and European systems because of the capability of the SQR-501. Apparently, the CANTASS system uses only the SQR-19 towing winch and hydrophone subsystem.

Hermes Electronics of Canada (which is under Ultra Electronics) supplies the Canadian Navy's submarine fleet with towed arrays and is currently developing that service's next-generation digital towed array, currently designated only as Advanced Development Model-2 (ADM-2). The ADM-2 is expected to replace the SQR-19 on Canadian Navy frigates and serve as the passive sensor on the Towed Integrated Active Passive System (TIAPS).

Funding

Funding for the SQR-19 has been completed. Various maintenance and support funding has been absorbed into other programs such as the Surface ASW Combat System Integration program and into work related to the SQQ-89, for which the SQR-19 serves as a subsystem.

Recent Contracts

| <u>Contractor</u> | <u>Award (\$ millions)</u> | <u>Date/Description</u> |
|-------------------------------------|--------------------------------|---|
| Diagnostic/Retrieval Systems Inc | 6.4 | Apr 1991 – Contract from Martin Marietta Corp. to manufacture shipboard receiver assemblies for SQR-19 interface. These will be installed on board the Canadian patrol frigates involved in ASW operations. |
| Martin Marietta | 19.8 | Jun 1991 – FFP for the procurement of OA-9056(V)2/SQR-19(V) Towed Array Groups (TAGs), related support supplies and services, spare parts, engineering services, training courses, and associated technical manuals and data to the governments of Canada and Spain. Spain will receive two TAGs and Canada six. (N00024-91-C-6336) |
| General Electric | 6.1 | Jan 1992 – Modification to a FFP contract for two SQR-19(A) and two SQQ-28 sonar systems. This contract is for purchases for Spain under the Foreign Military Sales program. (N00024-88-C-6219) |
| Analytical Systems Engineering | 5.9 | Sep 1996 – Indefinite delivery/indefinite quantity CPFF contract to provide configuration and technical data management in support of U.S. Navy surface ship sonar systems, including the SQQ-89(V), SQR-19, SQQ-28 LAMPS, and SQS-53 B/C. (N66604-96-D-0060) |
| Lockheed Martin | 11.3 | Mar 2000 – CPFF contract for operation of the U.S. Navy Array Technical Support Center (NATSC). This contract will provide technical and engineering support services for the operation of the NATSC and includes such services as production of the Surveillance Towed Array Sensor Systems (SURTASS A180R single line and twin line arrays, SURTASS towed array module repair, SQR-19 and TB-16 towed line array module repair and vibration isolation module production, SPALT 9080 module repair, tow cable manufacturing and termination, and SQR-19 and TB-16 hose manufacturing). The product supports the U.S. Navy undersea warfare program. This contract includes options which, if exercised, would bring the cumulative value of the contract to U.S.\$48.4 million. This contract combines purchases for the U.S. Navy (87.8 percent) and the government of Japan (12.2 percent) under the Foreign Military Sales program. Contract completed in March 2001. (N65236-00-D-3815F) |
| Lockheed Martin | 26.5 | Sep 2001 – A modification to a previously awarded indefinite-delivery/indefinite-quantity, CPFF contract (N65236-00-D-3815) for technical and engineering support services for the operation of the U.S. Navy Array Technical Support Center. This effort includes such services as the production of the SURTASS A180R single line and twin line array, SURTASS towed array module repair, SQR-19 and TB-16 towed line array module repair and vibration isolation module production, SPALT 9080 module repair, towed cable manufacturing and termination, and SQR-19 and TB-16 hose manufacturing. This contract includes options which, if exercised, would bring the cumulative value of this contract to U.S.\$74.9 million. This contract combines purchases for the U.S. Navy (87.8 percent) and the government of Japan (12.2 percent) under the Foreign Military Sales program. Contract is expected to be completed by November 2004. Contract funds will not expire at the end of current fiscal year. |

Timetable

| <u>Year</u> | <u>Major Development</u> |
|-------------|--|
| 1978 | Initial research and development funding for SQR-18/19 |
| 1979 | Specific SQR-19 development funding |
| 1982 | Initial ship set installed for testing |
| 1983 | Gould Electronics to produce first 12 arrays ordered by U.S. Navy |
| FY83 | Enter production |
| FY84 | Correction of deficiencies noted during the operational evaluation. Initiation of minor improvements |
| FY86 | Performance specifications for SQR-19 PIP (Product Improvement Program) prepared. Competitive full-scale development contract proposals solicited and evaluated. U.S. Navy standard equipment such as UYK-44, UYQ-21 and UYH-3 procured to support computer program development. U.S. Naval Ships Research and Development Center design efforts begun. Formulation and evaluation of trade-offs commenced along with monitoring the multiple towed array concept designs and at-sea tests under the Surface Ship Advanced Tactical Sonar program (PE#0603553N, Project S1704) |
| 1988 | First (of two) SQR-19 for Spanish Navy installed |
| 1992 | Contract to Spain for two additional systems |
| 1999 | SQR-19 production believed complete. TARS at-sea test |

Worldwide Distribution

Canada. On board the Halifax class frigates as part of CANTASS system.

Japan. The SQR-19 is fitted on board Abukuma class frigates and Kongo class destroyers.

Spain. Standard fit on board the FFG-7 type Santa Maria class frigates.

USA. As part of the SQQ-89 ASW suite, the SQR-19 is a standard fit on board the CG-47 Ticonderoga (AEGIS) class cruisers (CG-54 and onward; earlier ones are being retrofitted); the DDG-51 Arleigh Burke (AEGIS) class destroyers Flight I/II; the DD-963 Spruance class destroyers; and the FFG-7 Perry class frigates.

Forecast Rationale

The market for the SQR-19(V) Tactical Towed Array Sonar (TACTAS) by Lockheed Martin appears to have reached the end run with no known orders for procurement being placed in several years. The system (basically a long cable of undersea microphones towed about a mile behind a ship, far enough that the ship's own noises do not interfere) now serves as a component sensor of the SQQ-89(V) ASW Combat System which augments the SQQ-89(V) with an increase in range for target identification and classification.

The U.S. Navy, in particular, has been addressing the increase in contact density (be it hostile, friendly, or neutral) by setting up the surface Navy's first automated contact handling and analysis system, the SQQ-89(V) combat system. Using the SQQ-89(V) (in its various permutations) increases sensor range and substantially improves classification, localization, tracking, and threat

engagement capabilities at the longer ranges now needed to counter the stand-off weapon. Working with LAMPS Mk III ASW helicopters, TACTAS enhances the U.S. Navy's ability to track the newer generation of hostile submarines (which are becoming quieter and faster with improved depth capability); the SQR-19's long range is of significant value.

The SQR-19 TACTAS was believed to have completed full unit production by the end of 1999. No additional systems are expected to be built. Most likely, any related work will focus on operational maintenance (such as module and line replacement) and possibly software upgrades. Additional international sales are not expected any time soon either; however, such sales should not be ruled out in the far term even though chances are rather remote. The system itself works quite well but unfortunately has become a victim of rapid technology advancements.

Note: For related information, please see the report International's *Anti-Submarine Warfare* or AN "SQQ-89 Surface ASW Combat System" in Forecast *Equipment* forecast services.

Ten-Year Outlook

The forecast chart has been omitted. Barring any sudden increase in possible sales activity (other than maintenance support work), this report will be archived in the near future.

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