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# Shipboard Infrared Search and Track (SIRST) - Archived 02/2008

## Outlook

- As a standalone system, the Shipboard Infrared Search and Track (SIRST) program has apparently been adapted to other systems or a suite of systems, as there is currently no listing for the program as such in U.S. defense budget documents
- Barring the re-emergence of detailed information on the system in the press or the defense budget, this report will likely be archived in November 2008

## Orientation

**Description.** A passive, second-generation, electro-optical shipborne surveillance system.

**Sponsor**

U.S. Navy
Naval Surface Warfare Center (NASURWARCEN)
Dahlgren, VA
USA

**Status.** In production and service.

**Total Produced.** At least 30 demonstration and evaluation and early production models are believed to have been produced through 2006.

**Application.** The system would complement the active radar surveillance capability of modern warships by providing a passive, long-range surveillance and targeting function.

**Price Range.** Indeterminate due to the developmental nature of this program.

## Contractors

### Prime

| | |
|---|---|
| **Lockheed Martin Corp** | http://www.lockheedmartin.com, 6801 Rockledge Dr, Bethesda, MD 20817 United States, Tel: + 1 (301) 897-6000, Fax: + 1 (301) 897-6704, Prime |

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Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

# Technical Data

**Design Features.** The Infrared Search and Track system consists of a mast-mounted scanner, a below-decks signal processor, and a system control and display facility fully integrated with the ship's combat systems.

The system rotates at 60 rpm, continuously scanning a full 360 degrees in azimuth for the variations in infrared energy that would indicate approaching missiles. Its field of view is limited – between 2 and 2.5 degrees. Once a missile is detected, SIRST rapidly and automatically cues the radar responsible for ship self-defense. As a second-generation IRST, the system is capable of longer-range detection and higher resolution than was possible with earlier variants.

The scanner operates in the 3- to 5-μm waveband range for optimal detection of supersonic sea-skimming missiles. Provisions for future growth to a dual-band capability, perhaps to include an 8- to 12-μm channel, could be included as U.S. Navy requirements evolve and the SIRST's level of effectiveness is revealed in the stages of testing.

**Operational Characteristics.** The current emphasis on littoral warfare mandates an effective passive surveillance system to improve a ship's survivability when radar systems cannot be used. The second-generation, long-range SIRST will fill this role, and will also be able to track incoming anti-ship, sea-skimming cruise missiles when the performance of radar is degraded by clutter or land-based jamming systems.

# Program Review

**Background.** The original U.S. Navy effort that would later become IRST was called SAR-8. The service's continued interest in a new IRST system was fueled by the objective of developing a truly integrated ship self-defense system (SSDS). This system would rely primarily on communication between existing weapon and sensor systems in order to permit system elements to operate in a coordinated and highly automated fashion. Although a number of different IRST systems designed for use on board aircraft and ground vehicles existed during the SAR-8 development, their relatively short range reduced their potential usefulness to the U.S. Navy's surface ships, which must respond in a few seconds to defend against an attack by anti-ship cruise missiles. This threat highlighted the need for a sensitive system with a much longer range capability.

In its FY93 objectives, the U.S. Navy transferred the SAR-8 development models to the Surface Warfare Research Center in Dahlgren, Virginia, to be used as a test system. The test system was to aid in the technical definition of the desired IRST replacement program. It has been reported that one of the SAR-8 engineering development models (EDMs) was used to support SSDS Mk 1 trials conducted on board the USS *Whidbey Island* in June 1993. The SSDS Mk 1 trials were successful in demonstrating integrated signal and data processing. Working with $5 million in funding from the IRST FY92 budget, the U.S. Navy's strategy was to stretch this funding through FY93 by concentrating on small, focused research activities until a new IRST program could be formulated and launched with FY94 funding.

The U.S. Navy completed a cost and operational effectiveness analysis (COEA) in FY94, which considered critical issues concerning the development of IR sensors under the Ship Self-Defense program. The studies considered the sophistication and diversity of threats facing naval surface combatants – specifically, the increasing development of low radar cross-section technology, the use of passive anti-radiation missiles, and the increased-speed/lower-altitude attack mission flight envelopes.

FY94 was a transitional year for the program, with funding coming from PE#0603755N, Project Z2138, in preparation for the FY94 program relaunch. The program emerged as Project J0665, IR Search and Track, under PE#0603755N. As one of several initiatives, it provided funding for the acquisition of two infrared sensors, the Infrared Search and Track (IRST) sensor and the Thermal Imaging Sensor System (TISS). The IRST was intended to provide passive augmentation to complement radar, electronic support measures, and visual surveillance systems for airborne targets. The TISS was to provide surface ships with a day/night high-resolution surveillance capability for small cross-section targets.

During FY94, however, the program suffered a general funding reduction; released funding was reprogrammed. The net result was a one-year postponement of IRST development caused by a delay in finalizing the

requirements, and a subsequent two-year slip in the EMD phase to accommodate a two-phase development approach.

### *Early Version of System Installed on Key U.S. Navy Vessels*

Under Phase 1 of a contract awarded in 1998, Lockheed Martin was responsible for integrating the below-deck signal processor control unit (SPCU) and Raytheon was in charge of the on-mast sensor. The initial SIRST EDM was completed by September 1998 for land-based tests at the AEGIS Combat Systems Center, Wallops Island, Virginia, and subsequent shipboard trials in the Persian Gulf. In the spring of 1999, following successful testing, the EMD was reportedly installed on either the USS *Anzio* (CG-68) or the USS *Cape St George* (CG-71) – both AEGIS cruisers – for at-sea testing.

The $30 million option package, for the second phase of engineering and manufacturing development, entailed the construction of three additional prototypes. These prototypes were to be installed with whatever modifications were deemed necessary from first-phase testing. This process was to be conducted over a 36-month period in order to allow for additional at-sea testing. Lockheed Martin was designated the supplier of both the SPCU and the on-mast sensor for Phase 2.

In FY99, Phase 1 of IRST was completed and IRST Phase 2 began. IRST Phase 1 activities included collecting at-sea data as part of USN/FGN joint fleet exercises, conducting integrated land-based systems tests at the AEGIS Combat Systems Center, and continuing combat systems integration via Cooperative Engagement Capability measures. IRST Phase 2 activities included the commencement of detector design and fabrication; completion of scanner design; and commencement of SPCU Phase 2 modifications, software development, and algorithm and simulation development.

In 1999, Lockheed Martin received a contract Phase 2 engineering development of SIRST. Also around this time, the company reported that the U.S. Navy had awarded the system "high marks" during recent tests.

In FY00, detector design and fabrication were completed, acceptance testing was initiated, and systems integration commenced. In other activities, SPCU Phase 2 modifications were incorporated, and work proceeded on software development and algorithm and simulation development.

Systems engineering for SIRST continued throughout 2001, along with systems integration and testing. In addition, stabilized platform subsystem design, fabrication, integration, and acceptance testing were completed.

### *Threat Environment Boosts Demand for New Technology*

In the program's 2002 RDT&E descriptive summary, the U.S. DoD stated, "The threat from sea-skimming anti-ship cruise missiles (ASCMs) is increasing at a substantial rate and is impacting the Navy's force protection and battle space dominance capability." Evidently, the time for SIRST had come. The previous year's evaluation efforts were continued throughout 2002 with the help of $2.6 million in funding.

With the eventual acquisition phase fast approaching, the FY04/FY05 defense budget released in early 2003 listed no additional funding for RDT&E beyond 2004. The work to be performed in the last year would entail further hardware fabrication and integration testing.

## Funding

RDT&E funding for this program has apparently been fully allocated. No firm procurement funding has been identified through open sources.

## Contracts/Orders & Options

| Contractor | Award ($ millions) | Date/Description |
|---|---|---|
| Lockheed Martin | 15.5 | Dec 2003 – Fixed-price incentive modification to previously awarded contract (N00024-01-C-5168) for inclusion of IRST in AEGIS weapon system production requirements for Korean Defense Authority KDX-III destroyer. Work is expected to be completed by November 2008. Naval Sea Systems Command, Washington Navy Yard, Washington, D.C. is the contracting agency. |

SIRST

## Timetable

| Month | Year | Major Development |
|---|---|---|
| Aug | 1984 | Full-scale engineering development of SAR-8 |
| | FY91 | Developmental testing phase of SAR-8 completed |
| | FY92 | SAR-8 program funding zeroed |
| Jun | 1994 | Second-generation IRST specifications developed |
| Aug | 1996 | Shipboard IRST contract awarded to Lockheed Martin |
| | 1998 | First SIRST prototype delivered for land-based tests |
| | 1999 | IRST Phase 1 completed |
| | 1999 | IRST Phase 2 begun |
| | 1999 | At-sea testing performed |
| | 2001 | Systems engineering continued, systems integration and testing begun |
| | 2002 | Software modifications completed |
| Jun | 2002 | Lockheed Martin/Northrop Grumman chosen as contractors for U.S. Coast Guard's Deepwater modernization program |
| | 2003 | At-sea demonstrations and evaluations conducted |

## Worldwide Distribution/Inventories

This system has been produced for the **U.S. Navy** and at least one known Foreign Military Sale: **South Korea**.

## Forecast Rationale

It has become difficult to track the status of the Shipboard Infrared Search and Track (SIRST) system as a standalone system. This is may be due to the possibility that it has successfully been adapted by the U.S. military as a component of another system or suite of systems. No new contracts have been publicized, and the latest U.S. defense budget shows no RDT&E or procurement funding for SIRST. For this reason, the **Ten-Year Outlook** has been removed. Barring the identification of new activity, this report will be archived next year.

SIRST was expected to be installed aboard U.S. Navy aircraft carriers, Wasp class and Tarawa class amphibious craft, and AEGIS cruisers and destroyers. In the last known contract, SIRST was included in an AEGIS weapon system for use by the Korean Defense Authority. Work on fulfilling this order should be completed by 2008.

## Ten-Year Outlook

The ten-year outlook has been removed.

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