

ARCHIVED REPORT

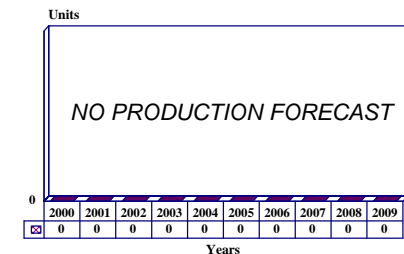
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Seaguard - Archived 8/2001

Outlook

- Saudi Arabia purchase now seems unlikely
- No additional procurement anticipated
- This report will be archived within the next two years if no new activity takes place

10 Year Unit Production Forecast
2000-2009



Orientation

Description. Modular naval fire control system including a close-in weapons system (CIWS) which has been optimized to provide protection against surface-to-surface and air-to-surface guided-missile systems.

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Licensees. The highly modified Seaguard systems (designated Shikari) on the Delhi class are believed to be produced locally under license by:

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Status. In production and operational service.

Total Produced. An estimated 21 systems have been produced.

Application. Seaguard is an integrated shipboard point defense system intended to provide, 24 hours a day, hemispheric, all-weather, and over-the-horizon defense against anti-ship missiles. Seaguard is equipped with capabilities verging on those of a full-scale CIWS. It can be combined with a number of different gun solutions, including: the Contraves 25 mm quadruple cannon Sea Zenith, the Russian 30 mm/65 guns and the Emerlec 30 mm gun.

Price Range. The modular design of Seaguard makes it difficult to assess an accurate unit cost. Analysis indicates that the various Seaguard configurations probably cost US\$6 million.

Technical Data

| | <u>Metric</u> | <u>US</u> |
|--|---------------|-----------|
| Dimensions - Tracker Mount (X-Band) | | |
| Width: | 2,240 mm | 88 in |
| Height: | 2,100 mm | 83 in |
| Depth: | 1,920 mm | 76 in |
| Weight: | 1,200 kg | 2640 lb |
| Operating frequency: | 8.6-9.5 GHz | |
| Peak power output: | 4 kW | |
| Pulse length: | 0.53-4 ms | |
| Antenna beam width: | 31 mrad | |
| Tracking range: | 0.3-70 km | 0.2-44 mi |

Design Features. Seaguard is a modular, digital naval fire control system that consists of components that can be configured to provide an integrated close-range anti-missile defense/close-in weapon system. Seaguard is specifically designed for maximum flexibility in optimizing the defense system arrangements to specific classes of warships. The system centers on one or more multisensor tracking modules, each with their Engagement Control Consoles.

The system has its own command console when operating as a stand-alone unit, consisting of a 24-inch CRT for threat evaluation and weapon assignment. The system is fed by a Plessey AWS-6 surveillance radar and/or the ship's command system. It can be configured to be controlled by the independent modules of the system.

Depending on customer preference, the system can be used for controlling a variety of different weapons. The default system offered is the Contraves quadruple 25

mm Sea Zenith gun, but on the Indian Delhi class it operates Russian guns, and on the Sandown class of Saudi Arabia, Emerlec 30 mm guns are used. Alternative trackers and designation radars can be also used, thanks to the system's highly modular composition.

Operational Characteristics. The system's operational center can be used for operating one or more Sea Zenith 25 mm point defense gun systems, and operates in concert with a sea-to-air missile as well as a medium-caliber gun, if so desired. All the components are linked through proprietary local-area network (LAN) databuses. Each module has its own 16-bit CORA computer that is proprietary to Contraves. The central processor of this bits-slice computer is characterized as being comparable to the Motorola 68000 series chip.

The modules include a Siemens-Plessey Dolphin/AWS-6 target acquisition radar, a tracker module operating in three axis (TM), weapon modules and a

common support module. Each weapon has its own weapons-control module and each tracker has its own control console. Each weapons-control module can produce its own ballistics data. On the Turkish Barbaros class frigates specifically, a separate surface

engagement console has been built for controlling the 5 inch gun and the Sea Sparrow missiles. The bus architecture can be expanded into a full-fledged weapons control system/centralized data system (WCS/CDS).

Variants/Upgrades

The Seaguard system can be configured in basically four different orientations.

Variant 1. This consists of a single Weapons Control Monitor (WCM) controlling, in the X-band mode, a vertical launch SAM battery, and in the Ku-band mode, a Seaguard 25 mm Gun Module (GM25). The GM25-based weapons system is driven by data from the search and target indication radar module (SRM), whereas the SAM-based system interfaces with the ship's combat system.

Variant 2. The X-band version has a single Seaguard tracker radar and associated control console (TMX-CW) interfacing with the ship's combat system on the one hand, with two WCM units on the other. One of the WCMs controls a medium-caliber gun, the other a VLS SAM unit. The medium-to-short distance, Ku-band version of the system usually employs two tracking module units (TMKs) connected to an SRM and/or the ship's command system. This configuration typically drives a mix of three gun modules (TM25) directly, without weapon control modules.

Variant 3. For long-distance defense applications, this version has two Seaguard TMX-CW tracker units, both of which interface with the ship's combat system independently. Both tracker units control either a vertical launch SAM system and/or a medium-caliber gun. The gun control is done through a WCM unit. The medium/short-distance Ku-band configuration can use one single channel of fire CIWS feed from the ship's command system and operate either a GM25 gun directly or a medium-caliber gun through a WCM.

Variant 4. This is the only one currently in production. It comprises a Siemens-Plessey AWS-6 Dolphin surveillance-lance radar in combination with the ship's combat system, and two Seaguard tracker radars, cross-fed by both. There are two WCM units, one

controlling a medium-caliber gun, the other a VLS SAM installation. One of these feeds into a weapons control system optimized for point defense (designated a TMK) which controls four Sea Zenith 25 mm AA guns. The other runs a WCM, which controls the medium-caliber gun and VLS SAM installation. This version is believed to be in license production by Bharat Electronics in India, under the name **Shikari**.

COSYS-200. Because of the facilities built into the Seaguard Variant 4, it verges on being a complete AIS. Recognizing this, STN-Atlas Elektronik has expanded the Variant 4 into a full-fledged command system designated COSYS-200. This is being promoted worldwide.

Sea Hawk/LSEOS. This is the purely optronic equivalent of the Seaguard system. The LSEOS Mk III, which was a successor to Sea Hawk Mk IIA, was introduced by Contraves Pittsburgh in 1993. It uses a 68030 microprocessor and an updated architecture. The system weight is only 450 kilograms (180 kg above decks).

Overall, the modular structure of the system allows for a very large number of combinations between its individual components. The modularity ranges from the choice of weapons and trackers to choice in the number of modules employed and their coordination as part of the overall system. The weapons director, today mostly the optronic type of either Sea Hawk or LSEOS, is used in combination with different weapons and trackers.

Sea Zenith. The quadruple-barrel 25 mm gun of Contraves is offered as the default gun in the Seaguard fire control system package.

TMEO/TMK/TMX. Designations for the different tracker units that are available as modules of the Seaguard system.

Program Review

Background. Seaguard can be essentially considered a successor to Contraves' Sea Hunter fire control system. Development of Seaguard began in late 1977 and the system was announced at the beginning of 1980. It was designed as a modular above-water warfare system, the idea being that users could pick and choose what elements they need depending on the platform and its intended mission. The Seaguard system can be fitted on ships ranging in size from fast attack craft to frigates. It can be configured to include one or several tracking radars, a surveillance radar, and a wide range of weapons including small- and medium-caliber guns and a surface-to-air missile battery, all of which operate in concert driven by the data provided by the radar.

The launch order for the system came from the Turkish Navy in 1985. After that, there were rumors that China had also bought the Seaguard, but instead it had selected the Italian DARDO system for its Jianghu class frigates.

Seaguard was, however, ordered for the Turkish Barbaros (MEKO-200) class frigates. These are near-sisters to the earlier in-service Yavuz class, but have the vertical-launch Sea Sparrow instead of the octuple launcher that was on the earlier ships. Original plans had even called for replacing the SEWACO command system on the earlier ships with COSYS-200. However, the finalized design kept the proven SEWACO command system with the existing Seaguard CIWS. This configuration was also retained for the second pair of ships that were ordered in 1992.

In 1991, Contraves introduced a new gun for Seaguard. The quadruple-mount of single-barreled 25 mm cannons was replaced with a twin 25 mm Gatling mount. Although the major promotional point was that this would increase the rate of fire from 3,400 to the very high 10,000 rounds/minute, the real reason is believed to have been to address the engineering shortcomings of the original quad set-up. It should be noted, however,

that none of these mechanical problems had anything to do with the radar system itself, which apparently works very well.

When the first Delhi class frigate was completed in India in late 1992, there were reports that it had a Seaguard point defense system controlling Russian AK-630M2 30 mm guns. This raised the possibility that the Delhi class had become the first customers for the COSYS-200 command system. However, a more likely configuration is the Delhis mounting the license-built IPN-10 command system which is used on other Indian ships, and the Seaguard is used as a stand-alone CIWS.

Seaguard was specified for the fire control system on India's Godavari class frigates which entered/will be entering service between 1983 and 2001.

As for the COSYS command system with Seaguard, it was first selected for the Korean KDX frigates in 1994, following a prolonged competition. Soon after the contract had been announced, however, the COSYS deal was suspended, and in May 1995, it was reversed in favor of the BAeSEMA SSCS Mk 7. This uses an entirely different close-in weapons system, thus eliminating Seaguard from the program. No other potential customers are known to have opted for the COSYS either, although this particular configuration would be the platform elevating Seaguard to a more competitive level in the sea-to-air defense systems market.

LSEOS. In 1997, Contraves was awarded a contract to supply the LSEOS Mk III (a successor to Seaguard) to direct the 40 mm guns of 11 offshore patrol vessels of a Far Eastern nation. LSEOS technology is also being validated for US use as the stabilized pedestal for the MK-15 CIWS PHALANX Surface Mode Upgrades in order to extend the capability of the PHALANX to address new threats in the littoral areas.

Funding

Development of the Seaguard systems was undertaken as a private venture by Contraves.

Recent Contracts

No recent contract information has been made publicly available.

Timetable

| <u>Month</u> | <u>Year</u> | <u>Major Development</u> |
|--------------|-------------|--|
| Oct | 1983 | Turkey orders Seaguard |
| Apr | 1988 | First Seaguard system delivered to Turkish Navy |
| May | 1988 | Second batch ordered by Turkey |
| Dec | 1991 | Delhi class reported to have entered service with Seaguard |
| Nov | 1992 | Seaguard ordered for remaining Turkish MEKO-200 |

Worldwide Distribution

India, Saudi Arabia, Turkey, and the US have variants of Seaguard on one or more of their sea craft.

Forecast Rationale

The past 15 to 20 years have been fairly successful ones for the Seaguard fully automatic, modular shipboard close-in weapons system (CIWS). However, the prosperity of the program appears to have come to an end.

Seaguard, a CIWS that primarily defends against surface-to-surface and air-to-surface guided missiles, has been installed on numerous types of seacraft such as Turkey's Yavus class frigates and India's Godavari class frigates. The last known nation to procure Seaguard was Saudi Arabia for its Sandown class minehunters. The Saudi Arabian original contract was for three ships with an option for three additional ships. This option, if exercised, was expected to be the last procurement of Seaguard. However, at this time it appears to be extremely unlikely that Saudi Arabia will exercise the option to purchase an additional three Sandown minehunters.

While the global need for CIWS has not dissipated, the market is saturated with a number of proficient CIWSs, so a system would have to provide some sort of above-and-beyond capability in order to be considered desirable and to generate new orders. Seaguard, however, does not boast of "extra" expertise. In fact, there have been various problems associated with the system, such as a lack of multirole capability for upper-end market users, that make Seaguard a less than likely option for future procurement.

Since the Saudi Arabian Sandown option appeared to be the final production order for the Seaguard system, and since manufacture of the three additional ships now appears less than likely, the manufacture of Seaguard has evidently come to a close. No future procurement of Seaguard is anticipated.

Barring any unexpected activity, this report will be archived within the next two years.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

| Designation | Application | Thru 99 | <u>High Confidence Level</u> | | | <u>Good Confidence Level</u> | | | <u>Speculative</u> | | | Total 00-09 | |
|-------------|---------------|---------|------------------------------|----|----|------------------------------|----|----|--------------------|----|----|-------------|----|
| | | | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | | 09 |
| SEAGUARD | Prior Prod'n: | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |