

# ARCHIVED REPORT

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## ASW-600 - Archived 7/2007

### Outlook

- Sales have been confined to Swedish and Finnish FACs and corvettes
- No likely orders outstanding and any minor requirements will be satisfied from existing stocks
- Logic of classification weapon concept flawed
- This report will be archived next year unless there is an upswing in activity

### Orientation

**Description.** A lightweight multibarrel grenade launcher for use against underwater targets.

**Sponsor**

Defense Materiel Administration  
Försvarets Materielverk (FMV)  
Banérgatan 62  
S-115 88 Stockholm  
Sweden  
Tel: + 468 782 4000  
Telex: 19610

**Status.** In production and service.

**Total Produced.** Approximately 90 systems are in service worldwide.

**Application.** The ASW-600 family is designed to counter the threat of small/medium-sized submarines.

**Platform.** The system is installed on corvettes, mine warfare vessels, and fast attack craft. A helicopter-borne version is also available (designation ASW-604).

**Price Range.** The price of a complete ASW-600 system with four nine-barreled launchers is estimated to range from \$150,000 to \$200,000.

### Contractors

#### Prime

**Saab AB**

<http://www.saabgroup.com>, Box 703 63, Stockholm, 107 24 Sweden,  
Tel: + 46 8 463 00 00, Fax: + 46 8 463 01 52, 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](mailto:rich.pettibone@forecast1.com)

## ASW-600

## Technical Data

	<u>Metric</u>	<u>U.S.</u>
<b>Specifications</b>		
Launcher - Dimensions	460 x 920 x 650mm	18 x 36 x 25 in
Launcher - Weight	103 kg	227 lb
Platform - Dimensions	1,347 x 1,757 x 1,218mm	53 x 69 x 48 in
Platform - Weight	670 kg	1,477 lb
Fire Control Unit - Dimensions	540 x 580 x 675mm	21 x 23 x 26 in
Fire Controller Unit - Weight	43 kg	95 lb
Caliber, Tube	100mm	3.9 in
M-90E Grenade - Dimensions	100 x 478mm	4 x 18.5 in
M-90E Grenade - Weight	5.5 kg	12.1 lb
Display Units	345 x 510 x 160mm	13.5 x 20 x 6.5 in
<b>Specifications</b>		
Platform Performance		
Training	±110 deg	
Elevation	30-85 deg	
Accuracy (elevation, training)	± 1 deg	
Acceleration (elevation, training)	2 rad/s <sup>2</sup>	
Speed (elevation, training)	Max. 1 rad/s	
Recoil Load on Deck	~100 kN	
Firing Range (ASW-601)	150-450 m	165-500 yd

**Design Features.** The LLS-920 launcher system is a non-magnetic derivative of a mounting originally designed to fire Philax chaff grenades. It consists of four nine-barrel launchers, each firing shaped-charge contact fuze grenades, as well as control electronics and an operator's fire and launcher selection panel. The launchers were derived from the Karl Gustav anti-tank rocket launcher. The tubes are muzzle-loaded and the grenades are launched by charges fitted in the rear of the tube. Two safety switches are incorporated into the basic design, one on the bridge and the other in the control compartment next to the launchers.

A separate high-frequency sonar displays range, bearing, and depth information on an operator's console. To provide a complete tactical picture, information from other sources, including other ships, helicopters, or other own-ship sensors, can be integrated into this display. The spread of the grenade salvo in the original version was adjusted by hand from the launcher. After launching, the grenade sinks nose first into the water. The barrels are mounted in a fixed plan with a 30-degree incline. Up to 36 grenades can be fired in a single pattern in the 601 version; the 600 allows firing of 9, 18, 27, or 36 grenades per salvo. The

601 version has a rotating platform, which houses two launchers.

**Operational Characteristics.** The original theory behind the ELMA LLS-920 was that hits from the grenades penetrate the hull of the submarine without sinking it, thus exercising territorial water jurisdiction in the least lethal manner. The shaped-charge grenades are claimed to be capable of penetrating the inner hull of a double-hulled submarine.

The introduction of the M-90E round changed the scare concept to one of real threat, and offered users substantially more firepower to sink intruders. This new round is replacing the Swedish Navy's basic M-83 grenade.

In operation, the target is designated and the number of grenades for the salvo is selected. The sonar display in the command information center exhibits the target location and predicted impact area of the grenades, and the ship is subsequently steered toward an optimum firing point recommended by the computer. A carpet of up to 36 grenades can be fired on the impact area, whose size can be varied.

## Variants/Upgrades

Two alternative developments are being evaluated. One envisions the modification of the basic ASW-600 round to provide increased range. The launcher would be

mounted on the sides of a gun turret to provide training capability. This is being offered to Norway.

The second concept involves developing a reduced-size, 57mm round that can be fired from the Bofors 57mm L70 Mk 2 gun.

The Swedish Navy has upgraded the original LLS-920 system to a hard-kill configuration, using a new shaped-charge munition capable of more catastrophic penetration of the pressure hull of a submarine. The new M-90E munitions increased the range of the system from 300 to about 450 meters. Along the way, the ELMA LLS-920 also was renamed the ELMA ASW-600. Today, the series is simply known as ASW-600.

The basic ASW-600 is available in two variants: the shipborne system described in this report, and a land-based variant intended to provide close-in defenses for harbors and other inshore choke points.

**ASW-601.** This is a further development of the original ASW-600 series system. It consists of two nine-round launchers, mounted side-by-side on a trainable platform usually installed in pairs. The mounting can be covered with a signature-reducing shroud if required. The weapons direction system uses sonar and other data to track the target and automatically train the ASW-601 launcher to the predicted angles.

Chaff and infrared electronic countermeasures (ECM) ammunition is also available for the 601. The 601 is especially designed for littoral and shallow water applications. Among its strengths are a shorter reaction time from target designation to impact, and a greater maneuverability that allows the ship to better position itself with respect to the target. The covered area is a circular band around the vessel's bow at a range of 150 to 450 meters.

**ASW-604.** This is a helicopter-borne derivative of the ASW-601. The round is modified by the addition of enlarged fold-out stabilizing fins. The weapon is

carried in two 20-round sidepacks mounted on either side of the helicopter and dropped in bundles over the projected position of the submarine. The system can be made interoperable with the Hawkeye, and uses a simple sighting system.

The grenades are fired in batches of two to four, or all together with a short timed delay between each grenade.

**EWS-900E.** The same ELMA launchers used for the ASW-600 can also be applied for launching chaff and infrared rounds as part of the ship's countermeasure operations. Four launchers have nine barrels each. Firing can be fully automatic, semi-automatic, or manual. Three operation modes can be selected: seduction radar, seduction IR, or distraction radar (optional).

**KAS-2000.** This active homing mortar is a further development of the same concept, carrying the original ELMA concept into the 21st century. The caliber is increased to 127mm and the system uses terminally guided grenades. The sophisticated target search and navigation system is locked in before the launch. The ballistic trajectory employs two different speeds, with the final descent taking place by assistance of a parachute. The multirole system is considered effective in both shallow and deep waters, for both above- and under-surface missions.

The launcher for the new system will be Alecto, a trainable and fully stabilized six-barreled mounting that will handle ASW, torpedo defense, and chaff/flare decoys. The ammunition-handling system for Alecto has provisions for both automatic and manual reloading.

The KAS-2000 was to have been the ASW weapon of choice on the Visby class corvettes of the Swedish Navy. Each ship was to have carried two Alecto launchers in concealed recesses below the foredeck. However, the Visby program has since been reduced and reoriented toward a mine warfare role.

## Program Review

**Background.** In the late 1970s, the Swedish Navy recognized the need for an ASW weapon to counter the new submarine threat. This weapon was not intended to destroy the submarine, but rather to force the submarine to surface. Development of the ELMA grenade-launcher system began in mid-1983 in response to this requirement. The design program appears to have been specifically intended to use existing components in order to reduce development time to a minimum.

### *Service Use*

The first production model of the system entered service in 1984. In January 1985, the system was modified to operate in water as shallow as 10 meters (33 ft). Subsequently, an additional series of modifications was instituted to permit engagements in even shallower water. Finally, the launcher system was modified to allow it to fire chaff cartridges and infrared decoys.

## ASW-600

In 1987, the Swedish Navy instituted a program to replace the ELMA LLS-920 with either a smart depth charge or a very low-cost, lightweight torpedo, one that would relay pictures to the launch platform by a fiber-optics link. Upon evaluation, the proposals were deemed unsatisfactory, and they were abandoned in favor of the improved ELMA derivatives described above.

In 1990, Finland became the first export country to order the system. It was installed on the Helsinki II class fast attack craft. During 1991, following Russia's confirmation that its naval units had been systematically violating Swedish territorial waters in order to determine the optimum position for laying mines around Swedish naval bases, Sweden decided to upgrade the basic LLS-920 system with the aim of providing a hard-kill capability.

The ELMA program required a new round, which utilized a shaped-charge warhead from Pains Wessex, capable of puncturing the pressure hull of a submarine, and a new booster, which increased the firing range from 300 to 450 meters. This new round was designated M-90, and, on its introduction to service in 1993, the LLS-920 system was redesignated the ASW-600.

### *New Developments*

A further series of developments for the original ASW-600 line was announced in 1994. These included the new ASW-601 version, consisting of two nine-round launchers mounted side-by-side on a trainable platform. The mounting can be covered with a signature-reducing shield if required. The weapon's direction system uses sonar and other data to track the target and automatically train the ASW-601 launcher to the predicted angles. A second innovation announced at this time was the ASW-604 system, a variant intended for deployment on ASW helicopters.

The transformation of the LLS-920 into the ASW-600, a weapon designed to puncture the submarine's pressure hull and force it to surface, marked a sharp change in Swedish government policy. Originally, it was a weapon intended only to force a submarine to surface. Confirmation that Russian submarines had routinely violated Swedish territorial waters caused little surprise.

The revelation that they did so on reconnaissance missions to determine the optimum placement of nuclear mines off Swedish naval bases hit a sore spot with Swedish public sentiment. As a result, the Swedish Navy at last received political support for destroying submarines rather than just harassing them.

The principal advantages of the ASW-600 system include very low, host-ship impact, low cost, and ease of installation – all pointing to acquisition at short notice for suddenly emerging requirements. The system's shortcomings, on the other hand, are its inherently low lethality and short firing range, which restrict it to a limited market segment or to the status of an interim solution. This was to be addressed in the new development of the same concept, the KAS-2000 active homing ASW weapon system. The Swedish Defense Materiel Administration received a definition study on this in 1995, and the new Visby class corvette was designated as that system's first in-service application. However, the Visby class program had been cut back to six ships, only two of which will be equipped for ASW operations. Further into the future, the Swedish Navy will be constructing a significantly larger class of surface combatants.

In late 2001, the Visby class program was further cut back, with one of the two ASW/ASuW ships being eliminated and the other effectively becoming a systems trial testbed for the following generation of large surface combatants. However, in April 2003, Northrop Grumman announced that it was using the Visby design as the basis for its candidate in the U.S. Navy Littoral Combat Ship competition.

### *LCS Bid Unsuccessful*

The modified Visby design proposed for the LCS program was not one of the three designs selected for further development. Although weapons fits and equipment profiles for the LCS have yet to be fully defined, it appears unlikely that the ASW-600 will feature in these designs.

At present, the only activity in this program is the installations of ASW-601 systems on the Finnish Hamina class fast attack craft. It is believed that these use equipment removed from older ships and cross-decked.

## Funding

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This program is funded by the Royal Swedish Navy.

## Contracts / Orders & Options

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<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Saab Missile	N/A	1990 – 16 systems manufactured for installation on the Finnish Navy's Helsinki II class fast attack craft.
Pains-Wessex	N/A	1991 – Development of new shaped-charge hard-kill round.

N/A - Not available

## Timetable

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1983	Development begins
	1984	Initial production commenced
	1985	Product improvement program launched
	1987	Replacement program abandoned
	1990	Ordered by Finnish Navy
	1991	Development of hard-kill M-90 rounds initiated
Sep	1993	New rounds enter service
	1993	LLS-920 redesignated ASW-600
Mar	1994	New ASW-601 and ASW-604 systems introduced
Summer	1995	Advanced development of KAS-2000; studies into ASW-604
Sep	1995	Preproduction ASW-601 tested on Swedish FAC-M
Dec	1998	Feasibility study for KAS-2000 launched

## Worldwide Distribution / Inventories

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**Finland.** 4 on each of 4 Rauma FAC-Ms, 6 on three Hamina class FAC-Ms

**Sweden.** 4 on Göteborg FAC-M, 2 on Stockholm FAC-M, 8 on Kaparen FAC-M, 7 on Landsort MCMV

## Forecast Rationale

Sales of the ASW-600 family of systems are running to their end and, should any additional requirements arise, enough existing platforms have been decommissioned to ensure that a reasonable supply of surplus equipment exists. Even the new Hamina class FAC-Ms carry reconditioned LLS-920 systems. For a while, there was some possibility that the ASW-600 systems may have found their way onto the U.S. Littoral Combat ships, but that also has faded away.

The primary operational rationale for ASW-600 was as a "classification weapon." ASW operations in littoral waters are distinguished by low hit probabilities and high rates of false alarms. The argument was that firing a low-cost, low-lethality weapon at the suspect contact provided additional information based on how the

alleged target reacted to a weapons discharge. This permitted a better informed decision on the use of a more expensive and lethal weapon. The problem with that concept is that if the alleged target really is a hostile submarine, it will immediately respond to the use of a classification weapon with the most effective weapons at its disposal rather than wait for the situation to develop.

The question now is whether there will be enough prospects for ASW-600 and/or Alecto sales to maintain the hopes of returning the systems to production. At the present time, the situation appears to be that the ASW-600 is most unlikely to achieve substantial additional sales. This report will be archived next year unless there is a change in this prognosis.

ASW-600

## Ten-Year Outlook

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Due to the completion of existing programs and the doubtful status of their successors, only minimal future production is forecast.

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