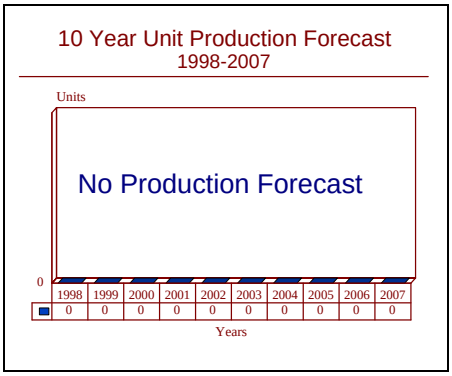
Bofors 375 mm ASW Rockets - Archived 6/99

Outlook

- Well suited to the current change in ASW for shallow water
- Could re-emerge for the littoral market place
- Low-cost, low-tech solution attractive to even smallest navies
- Russian products main competitors but unlikely to erode market
- However, most ASW now handled by smaller-caliber rockets and grenades; future of the program uncertain



Orientation

Description. Ahead-throwing (surface-to-surface) short- and medium-range ASW rocket system.

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Status. In service.

Total Produced. A total of 75 identified installations currently exist. Many more were installed on platforms now scrapped.

Application. The rockets are designed to attack and destroy submarines at relatively shallow depths (green- and brown-water environments).

Platform. This system can be installed onboard frigates, destroyers or corvettes. Some recently proposed applications have been for coastal patrol craft and offshore patrol vessels.

Price Range. Based on analysis of competitive products and their price information, these rockets are believed to cost about US$25,000 each.

Technical Data

Characteristics

Type	Weight	Min Range	Max Range	Final Sinking Speed
Erika	107 kg	655 m	1635 m	10.7 m/sec
Flora	230 kg	1400 m	2230 m	10.2 m/sec
Mimmi	100 kg	370 m	875 m	10.9 m/sec
Nelli	80 kg	1580 m	3625 m	9.2 m/sec

The total weight of the Flora rocket is 242 kg (533 lb).

The weight given above for the Nelli rocket is the burst weight. The total weight of the Nelli, with fuze, is 230 kg (507 lb).

Design Features. The 375 mm ASW Rocket Launcher system includes a shipboard sonar/fire-control system, a two-, four -or six-tube (French only) launcher and three different size rockets. When the ship's sonar gains contact on a submarine, the fire control system determines the proper bearing and elevation for the launcher. The launcher is moved by a remote control electro-hydraulic unit (a manual override is provided), and the rockets are loaded and fuzed.

The two-tube launcher has elevation limits of 0 to 60 degrees for firing and 0 to 90 degrees for loading, with an unlimited traverse, while the four- and six-tube launchers have a +130 degree traverse, 15-60 degree firing and 15-90 degree loading limit.

The rockets have two concentric (inner and outer) rocket motors, and velocity can be varied by firing one or both. Depth of burst can be set either by time (STIDR) or by acoustic proximity (ZAMBO). The time delay can be combined with an impact option if desired (STIDAR).

Operational Characteristics. The minimum interval between firings is one second, and the continuous rate of fire is two rockets every 45 seconds for the two-tube launcher. It takes two minutes to reload the launcher. Rockets can be fired either in single shots or in salvoes.

Variants/Upgrades

Launcher	Loading/Firing Elevations	Traverse
Two-tube	0-90/0-60 deg	unlimited
Four-tube	15-90/15-60 deg	130 degrees
Six-tube (French)	15-90/15-60 deg	130 degrees

The only variations are the number of tubes and the type of rocket.

Program Review

Background. Bofors AB began developing an anti-submarine rocket launcher in the early 1950s, as an independent venture. Many navies needed an ASW weapon system, but were unable to buy or use the large systems then being developed in the West. The first M/50 rocket and four-tube launcher was tested in 1954/55, and entered production in 1956. Bofors continued system development, designing a more capable rocket and launcher. The resulting Nelli rocket and the four-tube launcher were tested in 1972 and entered production in 1973.

The Japanese Maritime Self-Defense Force placed its first orders for the system during the early 1960s. Japan ordered systems from Bofors through the late 1960s, when Mitsubishi signed an agreement to produce the launcher and rockets under license. Creusot-Loire and the French navy became interested in the mid-1960s, seeing it as a short-range complement to the Malafon ASW rocket. In 1967, Creusot-Loire and Bofors reached an agreement for the French firm to produce six-tube launchers under license, while using the same rockets, warheads and fuzes.

Although the 375 mm rocket launcher system and its ammunition were regarded as obsolescent, two factors have lead to a resurgence of interest in the product. One is the need to combat diesel-electric submarines and

midget submarines in very shallow waters where homing torpedoes are ineffective. The other is the growing need for hard-kill anti-torpedo systems. Experiments conducted in the Belgian navy have indicated that the Bofors ASW rockets are quite effective against acoustic and wake homing torpedoes. The technique used is to fire a salvo of rockets down the bearing of the inbound torpedo in hope of deranging the homing system.

During 1992, SAAB released details of an active high-frequency sonar seeker and directional control system for depth bombs. The company started to receive official Swedish navy support for this program in June 1992 with the aim of applying the technology to the standard Swedish Model 33 depth charge and the Bofors 375 mm rocket launcher. For export purposes, the system is being made available for the ELMA ASW-600 rocket system and the British Mk. 11 depth charge.

During 1994, short-range rocket launchers of this type were featured in a number of bids made as responses to requirements for small combatants. These requirements included the Austral-Malaysian OPV and coastal patrol craft for a number of the Persian Gulf states. In each case, the rocket launcher fit was offered as an alternative solution to the use of lightweight torpedoes fired from single tubes or dropped over the side using poor-boys.

Early 1995 saw the Russian Moscow Thermodynamics Institute release the Medvedka anti-submarine rocket onto the market. Medvedka represents a further development of the RBU rocket launcher concept also designed by the Institute. That weapon is basically a mini-ASROC delivering an APR-2E torpedo by rocket booster. It is specifically designed to be suitable for coastal patrol craft, and could represent competition to the Bofors weapons if it were marketed right and was able to overcome the preconceived notions of quality issues among potential users.

Funding

This program is company-funded.

Recent Contracts

No current contracts have been reported on the program.

Timetable

Month	Year	Major Development
early	1950s	Bofors started development
	1954	Testing began
	1956	Full-scale production commenced
	1973	Nelli rocket and launcher entered production
Mar	1992	SAAB guidance package announced
Jun	1992	SAAB receives official Swedish Navy support
Summer	1995	Advanced development of next-gen KAS-2000; studies into ASW-604
Sep	1995	Pre-production ASW-601 due for Swedish navy testings on FAC

Worldwide Distribution

Belgium. 3, on Wielingen FF

Brazil. 6, on Niteroi FF

Egypt . 2, on Descubierta FF

France. 17, on A-69 FS

India. 6, on Leander FF

Indonesia. 3, on Fatahillah FFL

Japan. 3, on Minegumo FF; 6, on Yamagumo FF; 4, on Takatsuki FF; 1, on Ishikari FF; 4, on Isuzu FF; 2, on Yubari FF

Malaysia. 2, on FS 1500 FFL

Morocco. 1, on Descubierta FF

Nigeria. 2, on Erinmori FFL

Peru. 8, on Friesland DD

Turkey. 4, on Koln FF

Germany. 2, on Hamburg DDG

Forecast Rationale

The Bofors ASW 375 mm rocket launcher system is typical of a generation of ahead-throwing launchers designed in the early 1950s. These include the British Mark 12 Limbo, the US Weapon Alpha, and the Russian RBU series. The concept went into eclipse with the introduction of nuclear-powered submarines, which had too high a maximum speed for engagements by such weapons. Limbo and Weapon Alpha are now virtually extinct; the Swedish navy and the Russians have pursued the concept.

More recently, however, it has become apparent that these weapons may once again become favored. The emphasis has now shifted from fighting nuclear-powered submarines in the ocean depths to engaging small, diesel-electric submarines in green and brown water. In this new environment, homing torpedoes are of limited use and, in any case, could not be afforded in sufficient numbers. Germany and Norway in particular require an inexpensive ASW weapon for use in brown water. In the case of Norway, this refers to the country's fjords; in that of Germany, it refers to the Baltic Sea theater of operations. Both areas are classic brown-water environments, and thus are very difficult for reliable sonar operation. This means contacts of targets are fleeting, ambiguous and very difficult to hit. Once lost, it is unlikely a contact would be easily re-acquired.

Since large numbers of weapons would have to be dropped on each contact, much like in the proven concept of depth charge attacks, the unit cost per drop would have to be very small. These conditions also apply to the Persian Gulf, the South China Sea, the Adriatic and numerous other areas where the political situation is fragile.

Such conditions would seem to create a favorable market for weapons such as the Bofors rocket launcher and its Russian rivals, the RBU-6000 and RBU-12000. Their individual rounds are inexpensive and thus can be afforded in quantities large enough to permit realistic training. The ship impact of the systems is low so they can even be retrofitted on existing platforms with ease. Modern sonars prove entirely adequate for their use, probably without significant modification. Finally, the advances in miniaturization that have dominated the rest of the military electronics field are of significant value. These permit the deployment of a guided round for weapons of this type. Although such rounds are more expensive than unguided weapons, Russian experience is that they are up to eight times more effective than unguided shots (the Russian navy already deploys such rounds for its RBU-6000 system). This suggests that the SAAB guidance package applied to the Bofors 375 mm may receive substantial acceptance.

Forecasting the rebirth of a system previously pronounced dead is usually not safe, but the Bofors 375 mm ASW rocket is likely well enough suited to the ASW environment of the 1990s to assume (with a fair amount of confidence) that the system has a promising future. The Bofors 375 mm ASW Rocket System is now reappearing on some bid proposals — albeit not as the only solution — which adds credence to this prediction.

By and large, the 375 ASW Rocket operates much like the depth charges, i.e., its main goal is to overwhelm the enemy with mass, while the shooting accuracy is less than that of a missile. Thanks to its low operating cost, the 375 is a good basic anti-submarine weapon that appears to be part of certain platforms and continues to remain in use by those navies. A new, lightweight launcher will probably be designed, but meanwhile, the proven, effective rockets will be retained. This new launcher may well be modified with the SAAB guidance package to provide an effective solution to the brown-water ASW problem.

Because of the said upgrade probability of the launcher, the following forecast refers to production of rockets themselves rather than the launching systems. It is likely that consumption will increase throughout the forecast period as the virtues of the system become more apparent and training with it becomes more intensive.

The use of smaller craft for inshore ASW adds to the attractions of this equipment.

A major brown-water ASW conflict, possibly involving the loss of Western warships, could very well boost the consumption substantially. The only counter-factor could be the availability of the Russian RBU-6000 and RBU-12000. In today's market conditions, however, that option is not threatening to the demand forecast of the Swedish product.

Barring any new activity, this report will be dropped next year.

Ten-Year Outlook

No production is forecast; the chart is therefore omitted.

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