

ARCHIVED REPORT

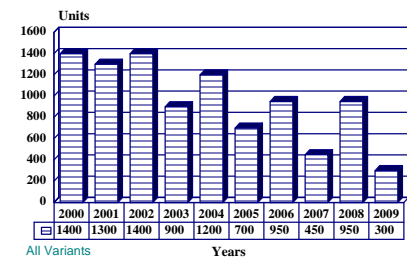
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Sea Gnat - Archived 1/2000

Outlook

- Family of NATO standard anti-ship missile launcher and decoy system
- Although popular, future market potential declining
- Common launch mechanism may help some sales
- May be replaced by higher tech systems within a few years

10 Year Unit Production Forecast
2000 - 2009



Orientation

Description. A family of standardized NATO anti-ship missile defense decoys using reflective radar and emissive infrared.

Sponsor

US Navy
US Naval Sea Systems Command (NAVSEA)
Washington, DC
USA

US Naval Surface Weapons Center
Dahlgren, Virginia (VA)
USA

US Naval Research Laboratory
Washington, DC
USA

US Naval Weapons Center
Crane, Indiana (IN)
USA

US Army
Communications - Electronics Command (CECOM)
Harry Diamond Laboratory
Adelphi, Maryland (MD)
USA

United Kingdom Ministry of Defence
Procurement Executive
London, England

United Kingdom

The US Naval Sea Systems Command is the NATO Sea Gnat Project Office, with the US Naval Research Laboratory acting as lead laboratorys The US Naval Ordnance Station and the US Naval Surface Weapons Center are jointly responsible for testing and the US Army Communications - Electronics Command is responsible for the remotely set fuse.

Contractors

Chemring Plc
Alchem Works
Fratten Trading Estate
Portsmouth
Hampshire PO4 8SX
United Kingdom
Tel: +44 1705 735457
(Munitions)

GEC-Marconi S3I
Combat Systems Division
The Grove
Warren Lane, Stanmore
Middlesex HA7 4LY
United Kingdom
Tel: +44 181 954 2311
(Chaff Rockets)

Hunting Engineering
Reddings Wood
Ampthill MK45 2HD
United Kingdom
(Launchers)

Racal-Thorn Defence/AB Precision Ltd
Manor Royal
Crawley
West Sussex RH 10 2PZ
United Kingdom
Tel: +44 1293 528787
(Control Unit)

Raytheon Co
(formerly Hughes Electronics Corp;
formerly Alliant Techsystems Inc Marine Systems)
600 2nd Street NE
Hopkins, Minnesota (MN) 55343
USA
Tel: +1 612 931 6000
(Munitions)

Loral Hycor Inc
10 Gill Street
Woburn, Massachusetts (MA) 01801-1788
USA
Tel: +1 617 936 5950
(Munitions for US Navy Mk 36)

Pains-Wesson Ltd
High Post
Salisbury
Wiltshire SP4 6AS
United Kingdom
Tel: +44 1722 411611
Telex: 47486
(Munitions)

Licensees. Sea Gnat is a multinational project produced by a number of companies in the United Kingdom, the United States, Denmark, Norway, Germany, and other NATO countries. However, none are licensees in the true sense of the phrase.

Status. In production and active service.

Total Produced. Based on various Sea Gnat-capable platforms, new product advances, and worldwide defense funding limitations, about 336,850 units of Sea Gnat (all variants) had been produced through 1999.

Application. The NATO Sea Gnat is a standardized, interpretable decoy system expected to provide savings in development costs, procurement, and logistical support.

Price Range. Analysis of the 1997 Royal Australian Navy contract suggests a unit cost of US\$2,500 for the Sea Gnat Mk 214 based on contract cost averaging.

Technical Data

Design Features. Sea Gnat is a NATO collaborative project involving the US, Britain, Germany, Norway and Denmark. It is managed by the US Naval Electronics Systems Command. The program is designed to provide radar reflective and infrared emission decoys to defend ships against guided anti-ship missiles. The decoys work in both the distraction and confusion modes and are intended for ships of frigate size and larger. Sea Gnat decoys are compatible with a modified SRBOC (Super Rapid Blooming Off-Board Chaff) launching system and should be thus usable by any ship equipped with the SRBOC launcher.

There are a number of variants of the decoy, all specifically designed for compatibility with the Mk 36 Decoy Launching System. The project also includes modifications to the AN/SLQ-32 EW system, to enhance decoy employment flexibility and minimize reaction time.

Operational Characteristics. The Sea Gnat ammunition is not interchangeable with existing SRBOC rounds, although the same Mk 36 launcher is used for both.

The following Sea Gnat rounds are available or have been developed.

Sea Gnat Mk 214. A short-range, high-volume chaff rocket designed to give a larger and more rapidly developing bloom cloud than existing SRBOC munitions. It is in widespread service with the US Navy, UK Royal Navy and other NATO partners.

Sea Gnat Mk 216. A long-range chaff round designed to operate in distraction mode. Sea Gnat Mk 216 is in service with the UK Royal Navy and US Navy.

M-BIRD. This round was originally intended to fulfill requirements for a floating infrared decoy. Its development was abandoned in 1986 following numerous technical problems.

Sea Gnat Mk 218. Following the cancellation of M-BIRD, the UK Royal Navy initiated the development of an infrared flare munitions for Sea Gnat. This development was abortive and replaced by an off-the-shelf procurement.

Variants/Upgrades

Outfit DLA. Interim Sea Gnat fit in which the Sea Gnat central processor controls a 102 mm launcher and munitions.

Outfit DLB. The Sea Gnat rounds are incompatible with existing UK Royal Navy decoy launchers, with the result that the launcher design had to be optimized for the new ammunition. In UK Royal Navy, the combined Sea Gnat/launcher system is known as Outfit DLB. A standard Outfit DLB fit consists of four Hunting Engineering six-barreled launchers interfacing with a Racal-Thorn central processing unit.

Outfit DLB(mod). A version of Outfit DLB in which the two rear barrels of the Hunting Engineering launcher are replaced by 102 mm CORVUS barrels. This is to permit the launching of infrared decoys while the Sea Gnat Mk 218 munitions are unavailable.

Outfit DLJ(1). A large-ship Sea Gnat defensive system which combines four Outfit DLB launchers with four

Mk 36 SRBOC launchers (UK Royal Navy designation, Outfit DLD) per ship.

Outfit DLJ(2). A large-ship Sea Gnat defensive system with eight Outfit DLB (mod) launchers per ship.

Outfit DLT. A variant of the NATO Sea Gnat decoy launcher system developed by Quitzau Industri A/S (a wholly owned subsidiary of Danish Aerotech) under contract to the Danish Naval Materiel command. Although based on the standard Mk 36 launcher, the DLT system features a lower radar cross section and angled barrel sets to provide wider coverage. The initial production version, DL-6T, entered service in mid-1989 on board the Willemoes class fast attack craft, and the Flyvefisken (Stanflex 300) multirole vessels. A variant for larger ships, DL-12T, is believed to have been retrofitted to the Royal Danish Navy's Niels Juel class corvettes and Thetis class frigates.

Program Review

Background. The Sea Gnat anti-ship missile defense system project began in 1973 when the NATO Naval Armaments Group identified anti-ship missile decoys as an area for cooperative development. A NATO-sponsored series of studies found that decoys provide a highly effective defense against anti-ship missiles and are one of the most promising electronic warfare defenses for naval forces. In 1975, several NATO nations proposed development plans for a decoy project, with a US Navy proposal winning acceptance from Norway, Denmark, Germany and the UK. Memorandum of Understanding negotiations were completed in October 1976 and the formal signing took place in January 1977.

The program started in April 1977. Initial contracts and military laboratory task assignments were awarded in May 1977. The major cost-plus-fixed-fee contract was awarded to Thiokol in September 1977. In 1978, the technical trade-off investigations were completed. Subsystem developments continued and were completed by October 1978. Subsystem integration analysis was continued and integrated system firing tests began in August 1978. At-sea development assist test rounds were procured in January 1979. Post-development assist test engineering development was conducted in the same time frame as was procurement of long-lead items for at-sea technical and operational tests. Environmental and at-sea technical and operational tests

were scheduled for 1980, with the production procurement data package scheduled for completion in the same year.

The US Navy planned to obtain service approval in 1981, requesting US\$2.1 million. In July 1982, Hycor received US\$1.6 million under contract N00039-81-C-0349 for Sea Gnat work. The 1985 plans included producing a level three technical data package suitable for production support and continuing system integration with the SLQ-32 system.

Loral took over Hycor, Sea Gnat's prime contractor, in March 1985 for US\$24.5 million. In June 1985, the Naval Research Laboratory released RFPs (N00014-85-M-MC19) for support of the DECM/Decoy integration effort. This effort involved developing software algorithms that will be used to integrate the SLQ-32(V)1, 2, and 3 systems with off-board and with supporting field tests and data analysis associated with this task. A level of effort of approximately 2,000 man-hours per year was contemplated, with two one-year options. Sea Gnat engineering development was completed and limited production began in 1986.

The UK Royal Navy-specific Sea Gnat Mk 218 infrared distraction round experienced considerable development problems. Since earlier UK Royal Navy infrared distraction rounds were not compatible with the Outfit DLB Sea Gnat launchers, the projected delay in the

service entry of the system would have left British warships without protection from infrared-guided missiles. An interim modification program refitted the Outfit DLB launcher systems with two barrels from old CORVUS launchers specifically to fire infrared rounds, while other ships retained Outfit DLD (the US Mk 36 SRBOC) or Outfit DLE (Marconi Shield) launchers to fire infrared rounds.

In March 1993, the UK Royal Navy and US Navy published solicitations for the development of a Sea Gnat-compatible expendable acoustic decoy round to be fired from either the Mk 36 SRBOC or Outfit DLB/Outfit DLJ. This is linked to the Surface Ship Torpedo Defense (SSTD) program. Initial projections were for the delivery of 12 trials, 100 preproduction and 500 limited production rounds.

While the above developments were under way, a series of trials were started in June 1992 and continued through the middle of 1994 under the direction of the UK Royal Navy in an effort to study the performance of existing infrared detection rounds. These evaluations reportedly used a P-3 Orion from the US Naval Research Laboratory Flight Support Detachment carrying an infrared sensor in an underwing pod. The trials were said to have revealed a number of performance shortfalls with the types of infrared decoys evaluated. These included inadequate payload persistence, too small an effective infrared area and an unrealistic signature spectrum due to inadequate output in the 8 to 14 micron band and excessive output in the 1 to 2.5 micron band.

These trials are believed to have led to the formulation of Staff Requirement (Sea) 7338 for an infrared decoy

round in 130 mm caliber and compatible with the existing Outfit DLB and Outfit DLJ. The round was expected to enter service in 1995. This favored the German DM-19 Giant round made by Buck Werke GmbH, a round also evaluated by the NATO Sea Gnat Steering Committee and by the US Foreign Weapons Evaluation program. A UK Royal Navy evaluation of the DM-19 round began in September 1994.

By 1995, the UK Royal Navy commitment to the program seemed confirmed by an additional contract for 1,360 Mk 214 rounds, covering the next two years – somewhat affirming the impression that UK Royal Navy requirements were for about 700 rounds annually. However, during this period there were no indications of additional US Navy contracts. The previous order pattern suggested that additional US orders may be placed in later years.

There was some minor procurement activity throughout 1996, with Australia ordering the Giant variant round and with Denmark completing a fleet upgrade to the DLT variant. Procurement activity for the Sea Gnat family picked up a bit in 1997, with orders coming from Australia and Portugal.

The UK Ministry of Defence announced in early 1998 that it was requesting expressions of interest from potential suppliers of test sets for the Sea Gnat decoy system. (The 15 kilogram man-portable infrared test set fits into the Sea Gnat launch barrels to test incoming firing pulses.) A design concept was under development at the time of the announcement. The UK MoD said it expected to procure up to 100 such test sets.

Funding

The last year of funding for the R&D portion of Sea Gnat was 1986. Engineering development was completed and limited production began in that year, with full-scale production commencing to meet UK Royal Navy requirements in 1987.

Recent Contracts

<u>Contractor</u>	<u>Award</u> <u>(\$ millions)</u>	<u>Date/Description</u>
Pains Wesson	2.1	May 1995 – UK MoD contract for 1,360 NATO Sea Gnat RF Mk 214 seduction rounds for 1996 delivery.

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Buck System GmbH	0.89	Jun 1996 – Contract to supply the Royal Australian Navy with the 130 mm Mark 245 MoD 0 Giant infrared decoy round. The fire infrared submunitions of the Giant decoy, released in a programmed sequence during its trajectory, progressively lure away an infrared-homing anti-ship missile from its target.
Pains Wesson	1.37	Apr 1997 – Contract award from the Australian Department of Defence for the supply of more than 500 Sea Gnat ship-launched anti-missile decoys (Cartridge RF seduction Mk 214) to the Royal Australian Navy. Deliveries completed in 1997.
Pains Wesson	0.32	Apr 1997 – Contract placed by the Portuguese Navy for the supply of sea Gnat ship-launched anti-missile decoys. Deliveries were made in the second quarter of 1997. (Approximately 128 units based on the Australian contract, with an average per unit cost of US\$2,500.)

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1973	Project begun
	1975	Development plans proposed
Oct	1976	Memorandum of Understanding negotiated
Jan	1977	MoU signed
Apr		Program initiation
May		Initial contract awarded
Sep		Cost plus fixed fee contract awarded
Aug	1978	Integrated system firing tests
Apr	1979	At-sea development test
	1985	Sea Gnat selected for UK Royal Navy Type 23 frigates
Dec	1985	Approval for production
	1986	Limited production started
Mar	1987	HMS <i>Argus</i> enters service with Sea Gnat
Dec	1987	Bids submitted for supply of Sea Gnat to UK Royal Navy
Oct	1988	HMS <i>Invincible</i> enters service with Sea Gnat
	1989	UK Royal Navy Sea Gnat infrared decoy under development
Jan	1989	UK Royal Navy Sea Gnat 214 production contract awarded
Sep	1989	UK Royal Navy Sea Gnat 216 production contract awarded
Dec	1989	HMS <i>Norfolk</i> enters service with Sea Gnat
	1991	Australia orders Sea Gnat munitions to equip SRBOC launchers
Nov		Greece orders Sea Gnat munitions
	1992-94	Trials of infrared munitions lead to formulation of new Sea Gnat infrared decoy round specification
	1995	Procurement orders from the United Kingdom
	1996	Procurement orders from Australia and Denmark
	1997	Procurement orders from Australia and Portugal
Feb	1998	UK MoD announces requirements for 100 Sea Gnat test sets

Worldwide Distribution

Known Sea Gnat users include **Australia, Denmark, Norway, Germany, Greece, the Netherlands, Portugal, Spain, the United Kingdom, and the United States.**

Forecast Rationale

With low-intensity-conflicts and so-called “international peacekeeping missions” becoming the norm, many navies are now faced with out-of-area operations. Such missions increase the probability that ships will more than likely face highly sophisticated Western anti-ship missile systems, which adds to the argument for deploying Sea Gnat aboard more ships. Sea Gnat ammunition has the potential to become the standard equipment on almost any ship with a compatible (SRBOC or Outfit DLB) launcher by the end of the forecast period, based on examination of world geopolitical trends and world navy structures. However, given the rapid rate of new technology development, it is more likely that Sea Gnat will be replaced by a next-generation system.

The decision by the UK Royal Navy to develop a Sea Gnat infrared decoy has had some bearing on the future

of the system. These heavyweight infrared decoys may be of growing importance now that infrared target acquisition and missile guidance technology has become more widespread. The decoy round chosen may very likely be adopted by other Sea Gnat versions.

Analysis of existing orders and established practice with previous chaff launchers implies that shipboard magazine capacity is six rounds per barrel per launcher, with another six being held at depot level on shore. Sufficient annual munitions production to sustain this is built into the forecast but will be spread over a number of producer countries within NATO. It should be noted that previous forecast numbers have been drastically reduced due to the emergence of newer and more sophisticated technology-based decoys such as the SLQ-49, Siren, and NULKA.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

Designation	Application	Thru 99	High Confidence Level				Good Confidence Level			Speculative			Total 00-09
			00	01	02	03	04	05	06	07	08	09	
SEA GNAT	SURFACE SHIP MISSILE DEFENSE (AUSTRALIA)	3600	100	500	100	100	100	100	100	100	100	0	1300
SEA GNAT	SURFACE SHIP MISSILE DEFENSE (UK ROYAL NAVY)	55900	700	700	700	700	500	500	250	250	250	200	4750
SEA GNAT	SURFACE SHIP MISSILE DEFENSE (UNSPECIFIED)	76850	100	100	100	100	100	100	100	100	100	100	1000
SEA GNAT	SURFACE SHIP MISSILE DEFENSE (US NAVY)	200500	500	0	500	0	500	0	500	0	500	0	2500
Total Production		336850	1400	1300	1400	900	1200	700	950	450	950	300	9550