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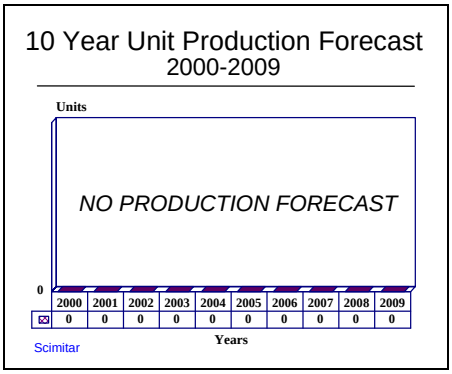
Scimitar Tactical Radio - Archived 07/01



Outlook

- Last known contract awarded in 1994
- Production of StarCom/TR 8000 ended in 1997
- Barring any future activity, this report will be archived next year, July 2001

Orientation

Description. A family of manportable and vehicle-mounted HF and VHF tactical radios, providing secure combat net communications, featuring a frequency-agile option for use in ECM intensive environments.

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Status. Believed to be out of production but still in operational service.

Total Produced. An estimated 12,910 systems of all variants had been procured through July 2000.

Application. The Scimitar family of radio communications equipment was designed to provide a secure combat net communications system and includes a frequency-agile option for use in ECM-intensive environments.

Platform. Variants of the basic system are generally suitable for vehicle installations or as manportable units. The Scimitar family consists of three different types: Scimitar H (HF radio), Scimitar M (VHF pocket-sized radio), and Scimitar V (VHF manpack or vehicle radio).

Price Range. Based on the price of comparable systems, the average Scimitar likely costs between US$10,000 and US$20,000 per set. The initial Turkish order and projected future requirements indicate an apparent unit cost of between US$30,000 and US$50,000. This high unit cost is misleading, however, since it includes substantial technology transfer and industrial infrastructure payment provisions.

Technical Data

	Scimitar H	Scimitar M	Scimitar V
Characteristics			
Frequency range:	1.6-30 MHz	68-88 MHz	30-88 MHz
Stability:	+/- 1 ppm	+/- 1 ppm	+/- 1 ppm
Channels:	284,000	800	2,320
Channel spacing:	100 Hz	25 kHz	25 kHz
Output power:	20 or 100 W	0.5 or 1.5 W	0.5,1 or 50 W
Temperature range:	-40 to 55 C	-10 to +55 C	-40 to +55 C
Dimensions (manpack):	304x80x338 mm	18x83x200 mm	240x80x296 mm
(vehicle):	240x170x340 mm		240x170x336 mm
Weight (manpack):	4.0 kg	>0.5 kg	4.8 kg
(vehicle):	6.7 kg		

Design Features. The Scimitar family is interoperable with existing radios and includes pocket, manpack, and vehicle configurations. Scimitar offers advanced and secure communications facilities designed to provide integral frequency-hopping and cryptography functions. Reliability under severe operational conditions is achieved by the use of large-scale integrated circuitry.

Scimitar H. This system, available in both manpack and vehicular configurations, is equipped to combine normal HF radio operating functions with several advanced features. Among these features is real-time channel evaluation, a function which is implemented entirely by the microprocessor-controlled system. The radio also incorporates a built-in frequency hopping capability to provide protection against current manual direction finding and intercept systems and fixed-frequency jammers.

The integral electronic counter-countermeasures (ECCM) facility uses a non-encrypted analogue waveform and utilizes the full extent of the HF band. Both manual and automatic hopping sets are available. In addition, digital encryption and burst data terminals can be used with both the manpack and vehicular sets, thus providing protection against broadband techniques such as sweep and barrage jammers. To counter more severe electronic warfare (EW) threats, the vehicle-mounted variants can be provided with an optional ECCM module. This unit provides digital voice encryption, a faster hop rate using a more extensive frequency hop set, storage of a larger number of hop sets, and a choice of hopping modes. Matching microprocessor-controlled antenna units have been developed for both manpack and vehicular modes. All operational modes are selected by keyboard input.

Scimitar M. This system is a lightweight, small tactical radio intended to be carried in the pockets of combat jackets or webbing pouches. It operates on 10 selectable frequencies within the 68 to 88 MHz zone. These frequencies are loaded via a fill gun and are thus easily interchangeable. Scimitar M can be fitted with any suitable crypto algorithm of the user's choice, including the standard Scimitar V algorithm. This feature ensures that interoperability is achieved in both encrypted and clear voice modes. With an output power of 0.5 to 1.5 W, Scimitar is compatible with squad or platoon deployment.

Scimitar V. This is the VHF version of the frequency hopping, secure combat net radio available as a manpack or, using a vehicle adapter unit, as a vehicular-installed radio. Crypto protection and frequency hopping circuitry are built into the basic radio; both facilities are selectable from the front panel. The frequency hopping mechanism permits full band hopping without restriction on the number of frequencies included in a hop set or excluded from a block. The hop rate has not been disclosed, but is thought to be between 150 and 400 hops per second.

Scimitar V provides an intelligible signal even when up to 50 percent of the hops are lost through electronic countermeasures (ECM). This is achieved by the use of a special last hop recovery (substitution) algorithm. After the hopping and crypto fill data are generated using a fill management unit, both are injected into the radio together via a fill gun. Late entry into an already hopping net is possible by cueing on the frequency to which the net would revert upon selection of fixed-frequency operations. A further mechanism is provided to permit late entry even if jamming is experienced on that particular frequency.

Operational Characteristics. Scimitar has an orthogonal hopping capability. In a fixed-frequency combat net radio system, only when individual nets are separated out of each other's range can a given frequency be used by the two nets at the same time without causing mutual interference. When using a frequency hopping system (where frequencies can change 100 times per second or more), mutual interference or spectral splatter can also be technically encountered. In practice, however, this effect only becomes noticeable when particular frequencies are in concurrent use by many different nets. Even then, the effect is minimal since hopping systems only stay on a particular frequency for a few milliseconds.

The use of orthogonal hopping methods helps to alleviate interference problems. In fact, the Marconi-developed system prevents parallel usage of a particular frequency at any time. All the sets in a network can be simultaneously operated without causing mutual interference. In order to be effective, however, time synchronization of all operating radio nets must be provided. This requirement can present problems on the battlefield.

Scimitar V can hop over the entire band from 30 to 88 MHz. Scimitar H correspondingly locates its choice of frequencies anywhere within the 1.6 to 30 MHz band. However, because of the different transmission characteristics encountered in various regions of the HF band, it is more suitable to restrict the choice of frequencies in HF hop-sets to those with similar propagation characteristics. Unlike other frequency agile radios, Scimitar V and H can take advantage of both orthogonal and non-orthogonal hopping. A single fill gun has the capability of both entering the appropriate hop-sets and cryptographic protection programming. The hopping rate is thought to be between 150 and 400 hops per second.

Continuous transmission of synchronization signals keeps radios in the same net from drifting out of step and also allows radios to leave and enter the net at different times. To avoid detection and jamming, the synchronizing signals are hidden in a 16 kbits/s digital data stream which also carries speech and data.

Variants/Upgrades

StarCom/TR 8000. This communications radio is a derivative of the Scimitar system, modified by Ericsson to meet Swedish requirements. It is produced in manpack and two vehicle configurations. The baseline Marconi system was modified considerably, with most changes affecting mechanical components in order to comply with Swedish requirements. These changes include dimensional alterations and improved water-proofing standards.

Scimitar R. A receive-only capable VHF radio operating in the 20-88 MHz band.

Program Review

Background. Prototypes of the Scimitar radios were first shown in mid-1981. At that time, a batch of 10 sets was ordered by the UK Ministry of Defence (MoD) for evaluation. This was followed by a second order, also

for evaluation. In July 1982, Scimitar was selected by the Swedish Ministry of Defense to form the basis of the StarCom TR 8000 system.

A contract for the modification of the radios to meet Swedish requirements was awarded to Ericsson Radio in 1982. The resulting equipment was extensively field-tested in 1985-1986, resulting in a US$134 million production order. Marconi (now BAE Systems) is the primary subcontractor for the StarCom project.

Following successful field trials in Jordan in July 1988, Marconi was awarded a US$12.5 million contract to supply several hundred Scimitar H HF tactical radios to the Jordanian Armed Forces. A key factor in winning the contract was Scimitar's excellent performance under difficult trial conditions in environments ranging from desert to rough mountainous country. Twenty-six Swordfish receiver/transmitters were also part of the contract. The award of this contract followed soon after a US$17 million contract award to Marconi Defense Systems to supply Scimitar V VHF combat radios to the Jordanian Armed Forces.

In February 1989, Marconi confirmed that the Turkish government had selected Scimitar H for use by all branches of the Turkish Armed Forces in applications ranging from man-to-man to shore-to-ship to ground-to-air communications. Negotiations for this order were finally completed in early 1990. While the resulting contracts cover the initial supply of 3,000 Scimitar H radios, the requirement ultimately may extend to approximately 7,000 radios at a value of some US$360 million (£200 million) over a span of 15 years. Marconi won the competition against five other companies.

An estimated 1,200 of the contracted 2,936 radios had been produced by the spring of 1994. The Turkish Armed Forces initially refused to accept several scheduled Scimitar deliveries, requesting that they be outfitted with additional filters. The request was based on reported interference experienced at the command and control level. After prolonged negotiations, the company agreed to install the filters at no cost, although no liability stipulation was included in the contract.

Other Scimitar customers include the Portuguese Armed Forces, which have chosen Scimitar H as the basis for their communications network. At least 100 vehicle-borne versions were ordered there. Approximately 50 Scimitar systems were ordered by Nepal in January 1991.

As part of GEC-Marconi's response to the Bowman program, Marconi formed the Arrowhead Consortium with Thomson-CSF. The proposal offered by the Arrowhead Consortium combined Scimitar HF frequency hopping HF technology with the Thomson-CSF VHF PR-4G radio. In a most unexpected move, the Arrowhead Consortium was informed in December 1992 that its Bowman proposals would not be considered and that the group was not to proceed with its bids. Since Arrowhead was formed specifically to support the Bowman program, this rejection effected the termination of the consortium.

GEC-Marconi (now BAE Systems) subsequently initiated the process of joining the Crossbow Consortium in order to participate in the Bowman program as the supplier (in place of Cossor) of the User Data Terminal. In March 1994, the Crossbow Consortium sought MoD approval for this change. Later, however, Marconi was out of the bidding for the Longbow project, and subsequently for producing the Scimitar mainly for export markets as well.

The Malaysian Army placed a substantial order in January 1994 for Scimitar H and Scimitar V radios to equip Land Rovers used by Malaysian forces serving with the UN in Bosnia. According to reports, the Scimitar H radios for this contract were being produced by Marconi Istanbul Makine Sanayi AS in Turkey, while the Scimitar V sets were manufactured in the Portsmouth (UK) plant.

Production of StarCom/TR 8000 stopped in 1997. With the delivery of all orders for Scimitar since that time, and with the lack of any new contracts, it appears the production life for the whole program has ended.

Funding

The Scimitar family was developed and marketed as a company private venture using corporate funding.

Recent Contracts

No known contracts have been awarded since 1994.

Timetable

Month	Year	Major Development
	1981	UK MoD orders 10 Scimitar sets
Sep	1982	Sweden adopts Scimitar V as StarCom
	1983	Portugal selects Scimitar H
	1985	Scimitar enters production
	1985	UK orders Scimitar V for field trials
	1986	UK field trials of Scimitar completed
	1986	China evaluates Scimitar V
	1986	Turkish Army evaluates Scimitar H
	1987	Swedish TR 8000 enters production
	1987	Irish Army evaluates Scimitar V
Apr	1988	Jordanian Army orders Scimitar V
Jun	1988	Jordanian Army orders Scimitar H
	1989	First deliveries of TR 8000
Feb	1989	Turkish Army selects Scimitar H
Feb	1990	Turkish production contract signed
Jan	1991	Nepal orders Scimitar H
Dec	1992	Arrowhead proposals for Bowman rejected
Jan	1994	Malaysia orders Scimitar H and V
	1997	StarCom/TR 8000 known to have ceased production

Worldwide Distribution

Jordan. The Royal Jordanian Army.
Malaysia. Peacekeeping forces in Bosnia.
Nepal. Royal Nepalese Army, about 50 systems.
Portugal. At least 100 systems.
Sweden. The Royal Swedish Army and Navy.
Turkey. Major customer, with local production; also for regional exports.
UK. Very few units; the system of choice there is Bowman.
US. Very few units; SINGCARS main communications system of the US forces.

Forecast Rationale

First produced in 1981 by Ericsson, Scimitar is the group name for a series of secure tactical radios which are interoperable with existing radios. The group consists of manpack and vehicle configurations. The two main members of the Scimitar are the VHF-band Scimitar-V and the HF equivalent, the Scimitar-H. The radios were selected by the Swedish Ministry of Defense in 1982 to form the basis of the StarCom TR 8000 system.

Scimitar had obtained respectable orders by the mid-1990s, however, by that time, the pace of technology had already outstripped the radio's ability. In the early 1990s, primary contractor GEC (now BAE Systems) had put forth the Arrowhead proposal for the Bowman project based on an upgraded Scimitar system. This proposal was one of the first ones rejected due to the fact that the core of the system would be over fifteen years old by the time Bowman was expected to begin its initial operational capability.

The last known contract award for additional Scimitar systems came from Malaysia in 1994. This order was not extremely large, arising as it did as an emergency purchase by Malaysian forces pressed into service with the UN in Bosnia.

The Malaysians were looking for a relatively inexpensive system that could be deployed quickly. The rapidity with which this order was filled has led to speculation that GEC had a number of surplus Scimitar radios sitting on the shelf, and jumped at the chance to sell.

With the cessation of new contract awards after 1994, the end of production for Scimitar had apparently arrived. Further evidence was seen in Ericsson Micro-

wave's decision to discontinue production of the TR 8000/StarCom variants of Scimitar in 1997.

As all previously known orders for Scimitar systems have been delivered and with the lack of any recent contracts, it is believed no additional orders will be placed. The ten-year forecast has therefore been omitted.

Ten-Year Outlook

The forecast chart has been omitted, as no production is expected over the forecast period. Barring any future activity, this report will be archived next year, July 2001.

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