

# ARCHIVED REPORT

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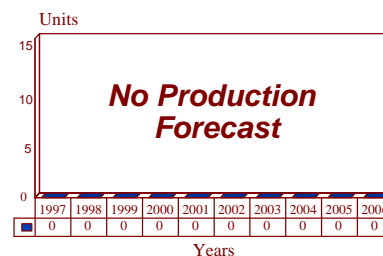
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## Type 911 - Archived 1/98

### Outlook

- Versions 1 and 2 in service, Version 3 cancelled
- Built for the Seawolf missile; 46 in use by UKRN
- Export prospects for the 911 nearly nil
- For other VL Seawolf applications, though, still available
- The ASEAN market for S-1805SW systems remaining active

10 Year Unit Production Forecast  
1997 - 2006



### Orientation

**Description.** Lightweight tracking radars for Seawolf point defense missiles.

#### Sponsor

UK Ministry of Defence  
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14 New Oxford Street  
London WC1A 1EJ  
United Kingdom  
Tel: +44 171 632 6014

Prime contractor for the Vertical Launch Seawolf program is British Aerospace.

#### Contractors

GEC-Marconi Radar Systems Ltd  
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Chelmsford CM1 3BN  
United Kingdom  
Tel: +44 1245 67111  
Telex: 99108

Ferranti Computer Systems  
Western Road  
Bracknell  
Berkshire RG12 1RA  
United Kingdom  
Tel: +44 1344 3232  
Telex: 848117

#### Marconi Radar & Control Systems

Chobham Road  
Frimley  
Camberley  
Surrey GU16 5PE  
United Kingdom  
Tel: +44 1276 63311  
Telex: 858289

**Licensee.** No production licenses have been granted.

#### Status

*Type 911(1)* In service

*Type 911(2)* In service

*Type 911(3)* Canceled

**Total Produced.** A total of 52 Type 911 radars of all types were produced by Marconi prior to the end of production in 1992. A total of 46 Type 911(1) and Type 911(2) radars have been identified with the balance being shore installations for training and spares. A total of 12 Type 911(3) radars were produced prior to contract cancellation; these were converted to Type 911(2) standard and are included in that total.

**Application.** As an element within the GWS.26 Seawolf system, the Type 911 is fitted to Type 22 and Type 23 frigates. In general terms, the system is intended for ships of 1,000 tons or more.

**Price Range.** The value of business generated by the Royal Navy's procurement of 28 such systems for the 14 Type 22 frigates was said to be about US\$140 million, which would indicate a unit price per overall system of about US\$5 million for the Type 911(1).

Analysis of contract values for the Type 911(2) and Type 911(3) indicates that these have unit costs of US\$10.0 million and US\$7.5 million, respectively.

## Technical Data

### Characteristics

*Operating frequency:* I-band + millimetric wave

### Dimensions

*Above-deck weight:* 1.725 kilograms

*Between-decks weight:* 2.155 kilograms

### US

3,795 pounds

4,741 pounds

**Design Features.** The Type 911 radar is the fire control system developed for Seawolf. A dual frequency (I-band and millimetric) differential tracking radar, Type 911 is designed specifically to match the engagement envelope of the Seawolf missile. The lightweight, two-axis director carries the dual antenna system, the associated electronics and command link transmitter. The radar "A" tracking and gather antennas together with the receivers, mixers and head amplifiers are on the left side of the director. The assembly also provides support for the command gather horn, boresight television camera and the rate integrating gyro package.

The I-band radar is derived from the ST-800 series. The radar "A" tracking antenna is a twisted cassegrain narrow beam reflector with monopulse feed. The radar "A" gather antenna is a wide angle four-horn monopulse cluster. Both antennas use a magnetron transmitter with a coherent, digital, COHO multipoint FFT signal processor.

The radar "B" assembly consists of the antenna, transmitter/receiver and the combined radar command link feeds. Fitted onto the starboard side of the tracker, mount radar "B" uses a millimetric radar derived from a system originally developed for the control of SAM Rapiere in a land-based environment. The millimetric antenna is in a concave elongated elliptical configuration nodding through a vertical axis. A system simultaneously and independently illuminating the upper and lower sections of the millimetric antenna ensures optimum guidance data for the in-flight missile at very low levels.

The radar "B" tracking antenna is an offset folded cassegrain reflector with steerable sub-reflector used in conjunction with a magnetron transmitter. The command link system is based upon that fitted to the Type 910 fitted to five Leander class frigates and, as a double-headed system, on six Type 22 class frigates.

The entire system is fully automatic to provide fast reaction against small targets and is autonomous, requiring

only the allocation of the fire control channel to the selected target and information on the ship's motion. The Type 911 has Blindfire capability against small, fast targets with attack profiles varying from high-diving to sea-skimming. Electric drive motors give high acceleration and velocities in both axes, allowing rapid target acquisition.

Excellent clutter rejection is provided to give good system performance when operating in open or enclosed waters, and the use of fast fourier transform techniques enables the system to operate in the presence of severe clutter. Advanced ECCM characteristics are incorporated into the system. The system is broadly divided into two parts.

Above decks, the two-axis director carries the dual antenna system outlined above, the associated electronics and the command link transmitter. Below decks, the radar "A" transceiver and Fast Fourier Transform (FFT) signal processor are housed, together with the radar "B" processor. The servo amplifiers for director control are also located below decks, as is the monitoring console which would typically include a television monitor and an indication of system state. This console is usually collocated in the operations room. Between decks equipment weighs about 2,880 kilograms and can be supplied as a wired cradle assembly. The system is suitable for ships of 1,000 tons or more.

The FM-1600E computer manufactured by Ferranti is employed in the data processing role for Type 911. The Central Processing Unit is replaced by the more powerful F2420 processor for the Type 911(2) variant. This has been developed for the new Vertical Launch Seawolf (VLSW) system. The radar is identical to the conventional launch variant but includes a threat evaluation capability previously contained in the surveillance radar.

## Variants/Upgrades

Type 911(1) Royal Navy for six-barreled trainable launcher Seawolf

Type 911(2) Royal Navy for vertical-launch Seawolf

Type 911(3) Royal Navy for four-barreled lightweight Seawolf

A containerized version of the Type 911 Seawolf tracker has also been developed, in response to a company-perceived market for such systems in light of the

lessons learned during the Falklands war. The containerized version is a total above-deck package with the tracker head mounted on top of the cabin and all the associated below deck equipment housed within the container itself. It is about 6 x 2.4 x 2.4 meters in size and weighs about 10 tons. A 30 kVA power supply is required to operate the system.

## Program Review

**Background.** The Marconi Type 911 radar was designed as a component of the GWS.26 variant of the Seawolf missile system replacing the earlier GWS.25 variant on Royal Navy Type 22 and Leander class frigates. In Royal Navy service the radar is known as the Type 911(1) when used with the existing six-barreled trainable launcher. The first Type 911(1) radars were delivered on schedule in September 1984. At that time there were some aspects of the specifications which remained unfulfilled. The major problems identified were seriously underestimating the magnitude of the necessary software changes and a late definition of software overload in the tracker processing. These resulted in the further development of the Type 911(1) running late.

Development of the Vertical Launch version of Seawolf (VLSW) started in 1983. It was assumed that the modifications required to adapt the Type 911(1) to Type 911(2) configuration for use with this system would be straightforward. The financial and technical difficulties on the Type 911(1) had a knock-on effect with the development of Type 911(2) causing the offer price for the development of 911(2) to be doubled. These technical difficulties were still being encountered in 1986. According to the House of Commons Defence Committee report on VLSW and the Type 23 Command System, published in July 1989, "The development program still contains a real cost increase of £50 million (US\$80 million) as a legacy of poor management and financial control."

In June 1986, British Aerospace Naval Systems Division was awarded a study contract to examine in detail how the lightweight four-barreled launcher could be integrated onboard the Royal Navy's carriers and some of the Type 42 destroyers. Following completion of the study, BAe was awarded a contract to supply four-barreled launchers

for the Invincible class air-capable ships for the Batch 3 Type 42 destroyers. A modification of the existing Type 911(1) radar was produced for this system under the designation Type 911(3). This program was subsequently canceled.

During 1987 the Type 911(2) tracking radar was used in trials with the Seawolf VLS (Vertical Launch System). These were carried out onboard a purpose-built barge and included directed launches against targets. Type 911 radars were installed on the first of the Type 23 frigates, *HMS Norfolk*, and at the Royal Naval training school, HMS Collingwood.

The Type 911(1) is being fitted to four of the six Type 22 Batch 2 and all Type 22 Batch 3 frigates. It is deployed in association with the Seawolf GWS.25 Mod 3 six-barreled steered launcher. The Type 911(2) Vertical Launch Seawolf fire control system is being fitted onboard the Type 23 frigates. Plans to install the system on the auxiliary oiler replenishment vessels of the Fort Victoria class have now been abandoned. The Type 911(3) radars ordered for installation on the four Batch 3 Type 42 destroyers and the three Invincible class light aircraft carriers have been canceled. A contract for the conversion of these Type 911(3) radars to Type 911(2) standard was awarded in 1994.

In 1992 the Malaysian Navy ordered two new frigates from Yarrow shipyards. These ships are to be armed with a vertical launch Seawolf system steered by a new fire control radar developed from the Marconi S-1805SW system, a new-technology successor to the older S-805SW. Since the Malaysian contract will be funding the final development of the new system, the Royal Navy will be adopting the S-1805SW for any Seawolf-armed new construction in place of the existing Type 911.

## Funding

The Marconi Type 911 was developed with UK MoD contract funding. The development and initial production order for VLSW covering the procurement of 500 missiles and 16 radars has been costed at US\$640 million. Funding of the Type 911(3) radar provided US\$177 million for approximately 16 sets.

## Recent Contracts

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
Marconi Radar Systems	177.0	July 1989 — UK MoD contract for the provision of Type 911(3) trackers for four Type 42 Batch 3 frigates and three Invincible class aircraft carriers. Exceeded 15 sets in total. Contract now canceled
Ferranti Computer System		August 1989 — Marconi Radar Systems contract for computers for Type 911(3) trackers
Marconi Radar System		February 1994 — UK MoD contract for the conversion of Type 911(3) radars to Type 911(2) standard

## Timetable

Aug	1983	Project definition begun on Vertical Launch Seawolf
Oct	1984	Second order for Type 911 from RN
		Delivery of Type 911(1) commenced for RN Type 22 frigates
Dec		VLSW FSD started
Sep	1987	First launch of VL Seawolf with Type 911(2) radar
Apr	1988	Delivery of Type 911(2) for Type 23 VL Seawolf commenced
Oct	1989	First Type 23 with Type 911 radar delivered
Dec		Third Batch Type 23 frigates ordered
	1990	Contractor trials for VLSW scheduled
	1991	<i>HMS Illustrious</i> refit with LWSW canceled
	1992	Type 911 production ended
Oct	1993	Plans to equip AORs with VL Seawolf abandoned

## Worldwide Distribution

UK: Royal Navy (16 on eight Type 22 frigates, 32 on 16 Type 23 frigates).

## Forecast Rationale

With confirmation that Type 911 production for Royal Navy requirements has come to an end, the future of this system seems particularly limited. The adoption of the S-1805 VL Seawolf tracker by the Malaysian navy has made this system available to the UK Royal Navy, sharply reducing the scope for Type 911(2). The UKRN derivative of the S-1805SW may be numbered in the Type 911 series for politico-financial reasons, but will be a fundamentally different - and much more capable - system.

Installations of the Type 911(1) were completed with the entry into service of *HMS Chatham* in 1990. The only future outlet for this particular variant lies in a retrofit replacement of GWS.25 with GWS.26 on the first six Type 22s. Four of these, the Type 22 Batch 1 ships, have been sold to the Brazilian navy and are not to be upgraded. This leaves just two potential applications for the original Type 911(1).

The combination of vertical launch technology with the Type 911(2) tracking system makes the VLSW system by

far the most effective of the Seawolf family. It must be considered the world's premier point defense missile system. Initial concept drawings of the Anglo- Italian-French Project Horizon common New Generation Frigate show the area defense missile system being based around the ASTER 30 missile backed up by an Inner Layer Missile System (ILMS). One candidate for this is the SR-2000, which uses the Short Starstreak or Starburst missile coupled with a Radamec 2000 optronic sight. Four such launchers will be provided with target acquisition using a centrally mounted radar. That radar may well be a member of the Marconi S-1800 family.

Production of the Type 911 radar ceased in 1992. Although a number of ships mounting the system remain to be commissioned, the radars for these have already been built and are being held in storage. We believe that the sale of the S-1805SW system to Malaysia will open the gates to other VL Seawolf sales within the ASEAN area and with other potential users. This will not, however, benefit the Type 911 program; any such export sales will be for the S-1805SW, and Type 911 will remain a UK-only system. As a result, our forecast accounts for no additional production of this system.

## Ten-Year Outlook

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### Drop This Report

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