SSQ-801 Barra

Outlook

- Last known contract production of Barra sonobuoys believed ended in 2007
- No future production foreseen at this time

Orientation

Description. Air-launched passive directional sonobuoy.

Sponsor

Royal Australian Navy
Navy Office
Department of Defence
Canberra ACT 260
Australia
(SSQ-801 Barra; Project Nangana and Project Barra)

United Kingdom Ministry of Defence Procurement Executive
Contracts Branch
St Georges Ct
14 New Oxford St
London WC1A 1EJ
United Kingdom
Tel: + 44 171 632 6014
(Joint Executive Project Nangana and Project Barra)

Status. In operational service.

Total Produced. Production of the latest version, the SSQ-801B, began in 1996. An estimated 56,000 Barra sonobuoys were made by 2001, when production ceased. An additional 10,000 SSQ-981E sonobuoys were programmed, with deliveries ending in 2007.

Application. The SSQ-801 Barra sonobuoy is designed to provide accurate and rapid range and bearing data for the localization of submarine targets. Using two Barras, it is possible to obtain sufficient data for carrying out an attack without having to use active sonar techniques.

Price Range. Based on the 1995 Royal Australian Air Force (RAAF) contract for 13,000 sonobuoys, the unit price was estimated (through contract cost averaging) to be $3,800.

Contractors

Prime

Thales Australia	http://www.thalesgroup.com/Countries/Australia/Home/, Level 2, Bldg 51, Garden Island, 2011 New South Wales, Australia, Tel: + 61 2 9562 333, Prime

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Ultra Electronics Sonar & Communication Systems	http://www.ultra-electronics.com, 419 Bridport Rd, Greenford, UB6 8UA Middlesex, United Kingdom, Tel: + 44 20 8813 4567, Fax: + 44 20 8813 4568, Email: information@ultra-scs.com, Prime
Thales Underwater Systems	http://www.thalesgroup.com/naval, 525 Route des Dolines, BP 157, Sophia Antipolis, 06903 France, Tel: + 33 4 92 96 30 00, Fax: + 33 4 92 96 41 24, Email: TUS@thales-underwater.com, Co-producer
Thales Underwater Systems Ltd	http://www.thalesgroup.com/naval, Ocean House - Troop Rd, Somerset, BA11 2TA Templcombe, United Kingdom, Tel: + 44 1963 370551, Fax: + 44 1963 372200, Co-producer

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

Characteristics

Operating depths	22 or 130 m (73 or 430 ft)
Operating frequencies	99 channels between 136 and 174.5 MHz
Acoustic bandwidth	10 to 2,500 Hz
Modulation	Narrowband FSK
Frequency stability	15 kHz
Sea state	Up to and including SS5
Datalink channels	136-173.5 MHz
Activation time	20 sec at 22 m 65 sec at 130 m
Operating life	0.5, 1, 2, 4 h
Operating temp (water)	0. +35°C
Shelf life	5 years in sealed container
Unpacked storage life	90 days (minimum)
Storage temperatures	-54C - +55°C
Buoy launch system	LAU-126/A

	Metric	**U.S.**
Dimensions		
Length	917.2 mm	36.11 in
Diameter	123.8 mm	4.88 in
Weight	8.8 kg	19.3 lb

Design Features. The SSQ-801B is an improved model over the previous SSQ-801A and SSQ-981, implementing a modular design. It is a passive directional sensor and may be deployed either singly or in a pattern, from either rotary- or fixed-wing aircraft. The usual platforms are the P-3C Orion maritime patrol aircraft and the Sikorsky Sea Hawk and Merlin HMA.1 helicopters. The A-sized Barra is deployed from a standard sonobuoy dispenser (LAU-126/A). After launch, a parachute is automatically deployed to retard the buoy's descent and stabilize the trajectory.

On impact, the parachute is discarded and the passive array and compass sink to a preset operating depth, while the radio frequency (RF) transmitter and antenna remain on the surface. The two subsystems are linked by cable. Barra has specially developed hydrophones, arrayed equidistantly on five tubular booms that deploy horizontally at a preset depth, in a star-shaped formation.

Operational Characteristics. The arrays are sequentially switched to determine target bearing. Barra transmits on any one of 99 VHF frequencies, allowing the operator to select individual sonobuoys for discrete analysis before the launch. Digital techniques are used to convert combined sonar and compass returns into signals to modulate the buoys' VHF transmissions. A spectral analysis can be performed on the output for broadband emission classification. The FSK VHF transmitter provides a minimum of 1W output power.

The operating life in water can be selected before the launch, for one-half, one, two, or four hours. The

selections are made on the buoy and remain in its memory for the five-year life of the unit or until a new selection is made. At the end of its water life, the RF transmitter is turned off. Eight hours later, the unit automatically scuttles.

Variants/Upgrades

Barra-E. An enhanced development of the original Barra, the Barra-E contains an additional processor that permits beam-forming to be carried out within the sonobuoy itself rather than by the acoustic processing unit. This reduces the load placed on the acoustic processing system and eliminates the need for a Barra-specific side processor.

SSQ-801B. This third-generation Barra evolved from the SSQ-981A. The modular design is some 40 percent less expensive and 30 percent lighter than the original Barra SSQ-801. Other differences between this and the SSQ-981A, besides the modular structure, include reduced acoustic self-noise, rapid hydrophone array deployment, lower weight, and electronic preselect of the transmit channels, as well as the differences in the operating life and depth of the buoy. The sonobuoys entered service in Australia in August 1996.

SSQ-981A (Ultra Barra). A British second-generation development of the original SSQ-801, by Marconi Underwater Systems Ltd. It utilized state-of-the-art technology to lower unit costs while maintaining existing performance levels. This system also had 25 hydrophones arranged over a large acoustic planar array. The spectral and broadband energy was digitized and sent by telemetry to the overhead ASW aircraft. For all intents and purposes, this was the predecessor to the SSQ-801B, albeit in nonmodular configuration.

SSQ-981B (Ultra Barra). Re-engineered version of the SSQ-981A; apparently identical to SSQ-801B but produced by Ultra Electronics.

SSQ-981E (Ultra Barra). Further re-engineered version of the SSQ-981 family with fully digital electronics and an improved array suspension system. U.K. Royal Navy's aircraft planning is reported to include procurement of the SSQ-981E as equipment for the Merlin HMA.1 and the rebuilt BAE Systems Nimrod MRA.4.

RASSPUTIN. The Rapid Area Search Sonar Projector Used Tactically in Narrowband (RASSPUTIN) source buoy is a coherent, narrow-bandwidth, programmable acoustic source buoy capable of deployment from any NATO-standard sonobuoy launcher.

The system is fully programmable before and after deployment, and includes a GPS unit for optimal multistatic missions. RASSPUTIN exploits a vertical linear array using high-powered flextensional barrel stave Diabolo projectors. RASSPUTIN provides a coherent sound source for multistatics. A coherent source for multistatics is superior to explosive sources for tactical, logistic, and political reasons. Tactically, RASSPUTIN is fully programmable for transmission, which allows coordination of different sources, and allows the surface unit to clear the RASSPUTIN datum prior to transmission. Logistically, RASSPUTIN obviates the air safety issues involved in the deployment of explosive sources and simplifies the storage implications on board vessels and aircraft. RASSPUTIN also avoids wasted energy in unusable frequencies. Politically, the buoy can be used in peacetime or for low-contingency sovereignty assertion without risking escalation. The use of explosive sources is becoming increasingly unsuitable for peacetime operations due to pressure from environmental groups, and the fact that the use of explosives in lower contingency configurations may risk unwanted escalation of the situation.

Trials to date have confirmed that the RASSPUTIN buoys are achieving planned beam pattern and target source levels. The buoys have been successfully tested in both free-floating and air-launched trials. As of 2004, TMS Pty was producing preproduction RASSPUTINs to support ongoing Australian Defence Force trials. RASSPUTIN operates with the TMS-2000 sonobuoy processor. This makes Spain and Turkey early potential customers.

In June 2006, the Australian government described the RASSPUTIN sonobuoy program as being a Capability and Technology Demonstrator aimed at investigating the extent to which a directional receiver could increase the detection range of submarines relative to sonobuoys currently used by the RAN and RAAF. By November 2008, the Australian Defence Science and Technology Organization was stating that the RASSPUTIN monostatic sonobuoy CTD had demonstrated an enhanced capability over comparable Australian Defense Force sonobuoy systems to detect and localize modern quiet submarines.

During this period, the Australian Department of Defence announced it had developed the Sonix sonobuoy processor which, as one of its attributes, was compatible with RASSPUTIN. Variants of Sonix have been installed and deployed on AP3C maritime patrol aircraft, S-70B-2 ASW helicopters, ANZAC and FFG-7 class surface combatants, and other craft such as

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Fremantle and Armidale class patrol boats. Sonix technology is also being used by the sonar data recorders on the Collins class submarines.

Despite these developments, the latest available information suggests that the RASSPUTIN CTD Contract 2006-6 commenced in October 2006 and was completed in May 2008 with the Final Design Review (FDR) by Thales, DSTO, and other Commonwealth representatives. The CTD scope and its target performance were successfully achieved within the proposed schedule. Thales Australia has gone beyond the CTD work scope by building and successfully sea testing a full mechanical prototype of the new sonobuoy that physically demonstrates that both the arrays and the electronics can be deployed from a single standard A-size sonobuoy canister. All of this provides key risk reduction for any subsequent product industrialization phase. However, there remains no indication of development beyond this point.

Program Review

Background. Project Barra grew out of Project Nangana, a research and development program undertaken to develop improved means of submarine detection. Australia has responsibility for the SSQ-801 Barra, while the U.K. has responsibility for the acoustic processor and telemetry/datalink.

In 1976-77, Amalgamated Wireless Australasia (AWA) was appointed prime contractor for Project Barra and received an initial production contract. AWA completed work under the first SSQ-801 Barra sonobuoy contract in late 1981 and received a contract for further Barra production in early 1982. Additional contracts were received in 1985 and 1987.

In early 1987, AWA and Plessey-Pacific in Australia formed a partnership, Sonobuoys Australia, to market the Barra sonobuoy. The new consortium also began developing an upgraded version of the SSQ-801. Sonobuoys Australia concentrated its marketing efforts on the U.S. and Japan, both of which evaluated the system. The U.S. Navy placed an order for Barra sonobuoys and side processors for the Foreign Weapons Evaluations program. These trials were completed in mid-1988.

First Orders

The U.K. Ministry of Defence originally ordered SSQ-801 Barra sonobuoys direct from AWA Australia. In 1987, Plessey Naval Systems received a $38 million contract to produce under license 7,000 Barra sonobuoys for the Royal Air Force, with production starting late in that year. When production was at its peak, approximately 5,000 Barra units were coming off the lines every year. Although impressive, this output was small compared to the vast quantities of sonobuoys bought by the U.S. Navy.

Production of the original SSQ-801 Barra sonobuoy to meet British and Australian requirements ended in mid-1994. The 1994 Statement on the Defence Estimates (SDE94) included the Barra sonobuoy as an ongoing joint U.K./Australian program, although no details of orders, production rates, or total quantities ordered were included. This was redesigned in the U.K. in 1990 to become the SSQ-981A; in 1996, it became the SSQ-981B.

A New Generation

Development of the new modular design took about two years. The new version, the SSQ-801B, entered production in 1995, and deliveries began in August 1996. The existing production contracts for Australia were scheduled to keep the lines open until 2001. Since then, there has been no sign that any additional orders have been placed, and it is therefore probable that the Australian production line is now closed.

The break in British production turned out to be much longer than expected. Both likely platforms for the Barra sonobuoy, the new Merlin HMA.1 helicopter and the rebuilt Nimrod MRA.4 maritime patrol aircraft, suffered serious delays that stalled their entry into service. Indeed, it is now reported that the Nimrod will not enter service until 2009. In the interim, existing stocks of sonobuoys have been adequate to maintain operational readiness.

With the reduced demand for ASW surveillance and increasing financial pressure on defense budgets, the number of sonobuoys later dropped from its peak years. Barra, for instance, was not listed in the British 1994 Defence White Paper as a separate procurement item, indicating that annual expenditure was relatively low.

In August 2001, Thales acquired complete ownership of Thomson Marconi Sonar (TMS), a joint venture of Thales and BAE Systems. BAE Systems owned 49.9 percent of Thomson Marconi Sonar. TMS was set up in 1996 and had operating units in the United Kingdom, France, and Australia. The new group has been renamed Thales Underwater Systems Pty. This group continues to list the SSQ-801B Barra sonobuoy as an available product. Ultra Electronics continues to list the SSQ-981B as being available.

Final Production Order?

In August 2002, the U.K. MoD awarded Ultra Electronics a $12 million contract for the development and production of the SSQ-981E Barra sonobuoy. This new system entered service in February 2004 on the Merlin HMA.1, with an estimated production run of four years. This was the last known activity in this program.

Funding

Announced contracts for the Barra sonobuoy include a $38 million award to Plessey Naval Systems from the U.K. MoD and a $20 million award to Plessey and Amalgamated Wireless Australasia from the RAN. These two awards bring the total business generated by the program to more than $170 million. The Barra program continued to be listed as a development and procurement item in the 1994 Defence White Paper. In May 1995, the Royal Australian Air Force placed a $50 million contract for 13,000 sonobuoys of the upgraded SSQ-801B model.

Contracts/Orders & Options

No recent contract orders have been identified.

Timetable

Year	Major Development
1962	Australian Defence Ministry begins Project Nangana
1969	Australian Navy begins project Barra, branching out from Nangana
1972	Barra engineering study completed
1973	Barra project definition completed
1976	Amalgamated Wireless appointed prime contractor
1977	Australian government issues first production contract
1987-88	U.S. Navy Foreign Weapons Evaluation of Barra
1990	Barra-E introduced
1990	SSQ-981 introduced
1994	SSQ-801B Barra specified for Merlin HAS.1
1996	B version enters service with Royal Australian Air Force and Navy
2001	Production in Australia probably ended
2002	SSQ-981E development and production contract awarded by U.K. MoD
2004	SSQ-981E enters service

Worldwide Distribution/Inventories

Australia. The SSQ-801A has been in service with the RAAF Lockheed P-3C Orion ASW fixed-wing aircraft and the Sikorsky Sea Hawk SH-70B since 1982.

U.K. In service with BAE Nimrod MR.2 and MRA.4 maritime patrol aircraft and Westland Sea King HAS.6 and Merlin HMA.1 ASW helicopters.

Forecast Rationale

The last Barra-series sonobuoys for the U.K. Royal Air Force (RAF) were believed delivered in 2007, marking the end of the contracted production run. The U.K. RAF and the Royal Australian Air Force (RAAF) stock of Barra sonobuoys will be adequate to keep the two services equipped with these systems for many years. Thus, there is no outstanding requirement for additional Barra production.

In a longer perspective, the Australians plan to replace the AP-3C with the Boeing P-8A Poseidon. This aircraft will be equipped with Sonix sonobuoy processors that give the aircraft the ability to handle both Barra and the new RASSPUTIN sonobuoys. Reports on the technical development of RASSPUTIN all suggest that the program was suspended following the completion of the CTD phase and the construction

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of a hydrodynamic prototype. There is no great urgency apparent with this program; the existing stock of Barra sonobuoys is more than adequate for the short term. RASSPUTIN is, however, at the point where transition from development to production could be made promptly.

Unless there is a sudden and unexpected emergence of an immediate and tangible submarine threat, it is likely that the very successful Barra program has come to a conclusion.

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