



SIGNAAL

A Fourth Generation Combat System for the Royal Australian Navy

- * FULLY INTEGRATED DESIGN
- * AUSTRALIAN MANAGEMENT
- * MAXIMISED AUSTRALIAN INVOLVEMENT

WHY SIGNAAL?

Hollandse Signaalapparaten b.v. (SIGNAAL) is bidding for the development and production of the Combat System for the Royal Australian Navy's New Submarine Programme. In selecting SIGNAAL to carry out the Project Definition Study, the Commonwealth chose a Company whose strengths and experience were second to none in the area of Submarine Combat Systems, especially with conventional or non-nuclear submarines.

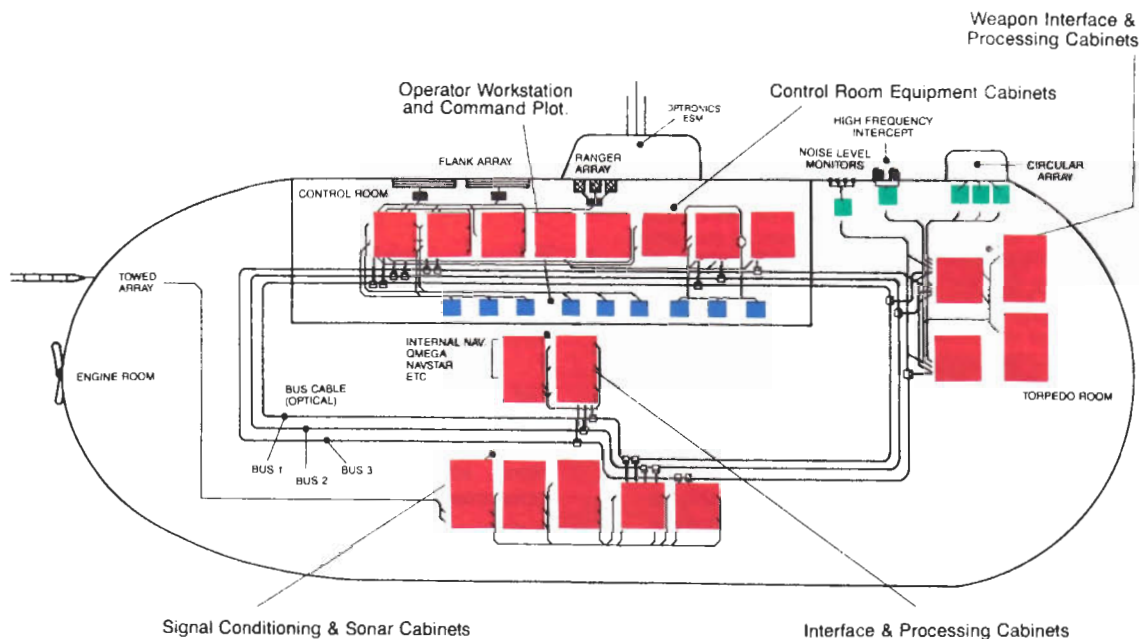
SIGNAAL's business and experience is in sophisticated military products and is prime contractor for hundreds of military systems.

SIGNAAL is a supplier to 37 Navies worldwide, and to the R.A.N. for 20 years. Submarine Combat Systems form a significant part of this international business.

Based on their operational requirements, the R.A.N. have specified an integrated, yet modular Combat System, which will meet exacting performance and maintainability criteria.

The challenge is to produce a Combat System on time and to strict cost and quality requirements.

SIGNAAL as Prime Contractor, Design Authority and itself a major supplier of Combat System components, has the determination, track-record and expertise to confidently meet this challenge with the surety of Corporate strength to guarantee the successful outcome.



Equipment for the Combat System is sited throughout the submarine. The weight and size of cabling required to interconnect disparate areas are substantially reduced by the use of optical fibre technology. A highly redundant and self healing data bus ensures maximum survivability of the Combat System and allows for future growth of the system.

MAJOR SUBCONTRACTORS

SIGNAAL's thorough knowledge and experience of Combat Systems for Conventional Submarines, has enabled it to evaluate major equipment suppliers throughout the world and select those companies best able to meet the specified requirement, not only in performance, but equally importantly integrated logistic support, Australian Industry Involvement, price and quality.

Major subcontractors proposed are:

Sperry Aerospace and Marine USA for development and supply of the complete navigation sub system.

MEL UK for the microwave ESM system.

AEG Telefunken, West Germany, for the sub microwave ESM system.

Kollmorgan USA, for search and attack periscopes.

Honeywell Elec, West Germany, for acoustic arrays and underwater telephone.

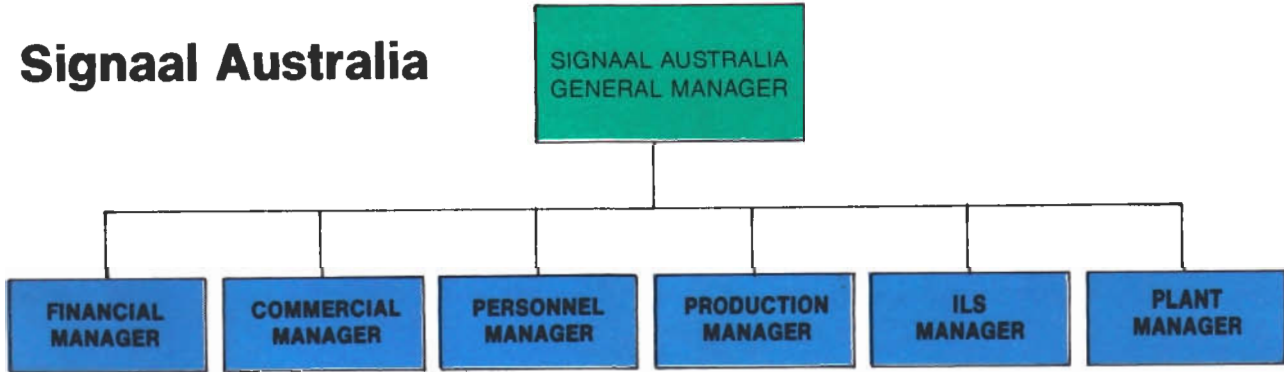
Krupp Atlas, West Germany, for mine avoidance sonar.

AWA Australia, for the optical fibre data network.

Thorn EMI Electronics Australia, for the command plot.

Ferranti, UK, for the land based simulator.

Each of these companies has worked closely with SIGNAAL throughout the past year to ensure the overall success of the proposal.



SIGNAAL AUSTRALIA

Hollandse Signaalapparaten b.v. (SIGNAAL) is the lead Company of Philips Defence and Control System Division, and an international group of Companies.

Recognising the importance of maximum Australian involvement, SIGNAAL has established Signaal Australia Limited in order to complement the skills and capabilities of her Australian consortium partners.

Signal Australia is headquartered in Canberra and acts primarily as a management company and as the focus for Combat System technology transfer to Australian industry.

During contract negotiations with the Commonwealth and the Shipyards, Signaal Australia provides the vital responsible interface which binds the Australian Combat System sub-contractors into an effective contractual relationship.

Signal Australia does not duplicate the existing capabilities of Australian industry and in recognition of this synergistic relationship, equity in the Company will be offered to its Australian Industrial Partners, once the Contractual negotiations have been completed.

This spread of equity will increase the Australian Corporate and technical strength for Signal Australia and provide a sound basis for tackling future civil and defence projects both in-country and export, which are currently beyond the reach of the individual Companies.

SIGNAAL COMBAT SYSTEM

While much of the detail of the SIGNAAL Combat System is classified, some of the general features may be discussed.

The technical strength of the SIGNAAL Combat System lies in its architecture. By use of a system-wide local area network, SIGNAAL has achieved all the flexibility and advantages of a modular structure with the performance of a totally integrated system.

Compared with other systems, the SIGNAAL system exhibits:

- Improved maintainability of hardware and software because of the well-defined, modular structure at the system level, and strict partitioning of application software.
- Better operational flexibility because of the use of general purpose processor units and display facilities, and hence the capability to re-allocate tasks amongst processors and displays.
- Better system availability by making all system functions accessible from more than one point, by minimising the amount of equipment dedicated to one function, and by improving redundancy.
- Better capability for system expansion by the use of small, well-defined modules dedicated to particular functions. This allows the incorporation of technological advances without the need to change the system philosophy or extensively replace non-related equipment, while simultaneously providing growth potential. The local area network permit Combat System re-configuration without recabing the submarine.

Two important issues in the technical design requires special attention:

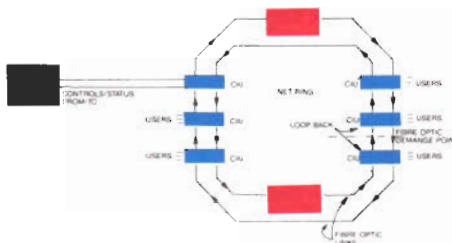
- MILNET, the high capacity local area network lying at the heart of the SIGNAAL solution, is a wholly Australian development from AWA. MILNET is a fibre-optic based network consisting of multiple path data busses with powerful self-healing, redundancy and fail-back capabilities to ensure reliable operation, even after battle damage.

Incorporation of MILNET into the SIGNAAL System Integration at both the design and production stages, ensures more effective "hands-on" technology transfer to Australian Industry.

- SIGNAAL is delivering both the sonar sub-system and the Tactical Data handling system and hence, there will be optimum integration of these two key sub-systems.

The resultant guaranteed interface compatibility ensure optimum system performance and enhances the essential surveillance capability of the submarine.

MILNET - a high speed optical fibre network



One of the three dual rings of the MILNET data communications network

MILNET is a high speed data communications network utilizing optical fibre as the transmission medium. It consists of 3 independent dual rings with data circulating in counter rotating directions to provide a powerful self heal capability. Should damage occur to the optical fibre at any point, the immediately adjacent network nodes or cluster interface units (CIU) link across to maintain a continuous data ring.

MILNET uses a time division multiplex structure providing 250 time slots for data words with an aggregate bus or dual ring capacity of 147.456 Mb/s.

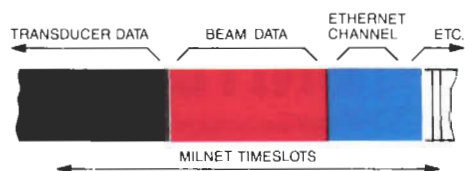
At the network nodes the data is handled as 24 bit parallel words in order to reduce the clock rate by 24 to 6.144 Mb/s, thereby reducing power consumption and allowing higher circuit integration. Data is then serialized for transmission over optical fibre. The three busses have a total working capacity of 442.368 Mb/s.

Should a CIU fail, the data automatically bypasses the faulty node by means of a fail-safe optical bypass.

This action effectively conserves the self-heal loop back capability for any possible future network damage.

Although MILNET is basically a synchronous data network, it can handle asynchronous data by allocating a portion of its capacity as a packet channel (see lower diagram). Specially designed bus interfaces make this channel appear logically as an Ethernet connection, allowing a wide range of equipment which uses this protocol to be integrated. In common with other local area networks, functions monitor and control addresses, bus allocation, packet status etc. and allow different priority configurations to be selected appropriate to the situation.

Typical bus allocations



A General Manager is in position in Canberra and the coming months will see the Signaal Australia staff increase to a working strength of approximately 200 engineers, managers and administrative staff.

In addition to overall management, the technical arm of Signaal Australia will concern itself specifically with transferring to Australian Industry, the technology associated with the System Engineering

aspects of the Combat System, including integration of the Combat System with the chosen platform.

In this task, Signaal Australia will have the international resources and research facilities of the giant Philips organisation which will ensure the success of the project.



Signaal's Australian Partners

THE TEAM IN AUSTRALIA

SIGNAAL has long recognised the need for a strong credible and viable team to carry out the development and production task and to meet the aim of the highest possible Australian Industry Involvement. It selected the following companies as its major teaming partners.

Amalgamated Wireless (Australasia) Ltd.
Thorn EMI Electronics Australia Pty. Ltd.
C3 Pty. Ltd.
Philips Communications Systems Ltd.

Each of these companies has a strong record in the military field and has the necessary corporation and financial backing and resources to meet this opportunity and contribute to the overall success of the programme.

These Australian companies have already been involved with SIGNAAL in the Project Definition Study and AWA and Thorn EMI

participated with SIGNAAL in the Project Advisory Committee to oversee the complete direction of the proposal and future plans.

In addition, another 170 Australian Companies will provide goods and services as Members of SIGNAAL's Australian team.

In summary, SIGNAAL and its Australian partners are ready to go, aware of the exacting task ahead and confident in their ability to fully satisfy the R.A.N.'s requirement.

SIGNAAL will harness the complementary skills of their Australian partners and subcontractors under a strong management team to bring the latest technology and techniques to bear on the New Submarine Programme.

UNITED FOR DEFENCE in the true meaning of the words.

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