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Front Cover
The aft fuselage and empennage of the F/A-18 Hornet fighter aircraft is undergoing a full scale fatigue test at DSTO's laboratory at Fishermens Bend in Melbourne.

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The Implications for Industry of the 1993 Strategic Review —

Future Directions for Australian Defence Suppliers

By the Minister for Defence, Senator, the Honourable Robert Ray.

Industry is one element of defence capability which contributes to the combat effectiveness of the Australian Defence Force. The Government is committed to building a relationship with industry that underpins the goal of defence self-reliance. The Strategic Review addresses the strategic planning aspects of that relationship which will be explored more widely in the White Paper later this year.

The trend over the past decade has shown that Australian industry can support a sophisticated and high technology oriented ADF. Although it is only one measure of the involvement of Australian industry, local content for major capital equipment projects over this period has risen from 30 per cent to 65 per cent today. The Government believes that there is further scope for involving industry in Defence programs. The 1993 Strategic Review (SR93) is an important part of this ongoing process.

SR93 reaffirms the importance of Australian industry in contributing to Defence self-reliance. It emphasises the need for clarifying further the Defence priorities for Australian industry and for increased Defence engagement with the region.

Since the release of Defence policy guidelines for industry in 1984, Defence has maintained its emphasis on the need for Defence industry policy to be consistent with broader Defence policy and corresponding strategic requirements. Areas of industry vital to the long term effectiveness of the ADF are repair, adaptation and maintenance of equipment, consumable where we can least rely on overseas sourcing and stockpiling, and technology.

The 1987 Defence White Paper and the 1992 Defence Policy and Industry Report restated these requirements and provided some broad priorities for Australian industry capabilities.

SR93 develops this theme further. It outlines more comprehensively those capability areas in which Defence will look to industry support. These areas are command, control, communications; intelligence, surveillance; weapons platforms; combat systems, munitions; and logistics support.

As Defence more clearly defines its key operational capabilities and the in-country industry capabilities required by the ADF, priorities will be communicated to industry. Areas of particular interest are those covering electronics/optics, communications and information technology, aerospace, shipbuilding and repair, munitions and land vehicles. Defence maintains regular contact with industry to keep its members informed of ADF needs.

Industry has a role to play in bringing new capabilities into service and in enhancing the effectiveness of equipment already in service. SR93 emphasises the need for close collaboration between defence science and industry in the development of new capabilities. Industry is also expected to play an increasing role in supporting existing capability through the Commercial Support Program.

Wherever possible, Defence will look to Australian
Defence will continue to rely on a mixture of overseas and domestic sourcing.

industry, teaming as necessary with overseas partners, to promote efficient and cost-effective solutions. As indicated in the 1992 Defence Policy and Industry Report, Defence will consider paying premiums over world market prices only for items of highest strategic priority. Defence will, therefore, continue to rely on a mixture of overseas and domestic sourcing.

SR93 signals our intention to build closer and more broadly-based defence relationships with countries in our region. Here too defence industry has an important role to play. Collaborative industrial ventures, supported by materiel cooperation agreements, could provide a defence industry support base for regional forces and for enhanced trade with the region. Importantly, it has the potential to create long-term business links with the region. For Defence this means a stronger, broadly-based defence industry and enhancing our security through increased regional engagement while offering the potential for increasing the degree of interoperability between Australian and regional forces.

Australia has important national strengths which it can offer to regional countries through defence industry cooperation. These include an advanced skill base, including project management and system innovation abilities. There is also considerable interest in Australia's leading-edge technologies such as telecommunications and materials. In addition, our defence investment program is of sufficient size to provide a base line of work to attract investors to the region.

The growing sophistication of defence-related industries within the region is allowing defence planners and managers to become less dependent on traditional, major suppliers in the northern hemisphere, and to consider the design, manufacture and through life support of defence systems which are specifically designed to suit the regional operational environment. Australia not only designs and builds its own state-of-the-art defence systems in important niche areas, it is long experienced in adapting overseas systems for use in this challenging environment.

The Australian Government is currently providing support to Australian industry to establish regional industry relationships. We are developing agreements on materiel, logistics and industry cooperation for our defence industries. We are also making appointments to specialised positions in our regional embassies in Bangkok, Jakarta and Kuala Lumpur to assist the development of defence industry links.

Underpinning the general direction of SR93, Defence is pursuing a range of policy initiatives. New guidelines have been developed for the Defence Australian Industry Involvement (AII) Program. These have two major impacts. First, the mandatory thresholds for the use of offsets for major capital equipment proposals have been removed and offsets will now be sought on a case-by-case basis. Second, two-tier tendering has been introduced to assist us to identify strategically important activities and provide greater cost
viability. These measures will facilitate the development of AID programs which are more focussed on strategic priorities and more cost-effective.

As an important follow-up to the 1992 review of Defence policy for industry a series of sector studies will be completed between now and 1995. The studies will seek to clarify capability priorities, the nature of the sector, and the means by which Defence might best ensure availability of those capabilities it needs. The Defence Industry Committee is currently overseeing studies on electronics/communications and shipbuilding and repair with studies of aerospace, vehicle manufacture and repair and ammunition/ordnance scheduled to occur within the next 18 months.

These studies will provide a valuable basis for longer-term relationships between Defence and its supplier. In principle, such approaches offer important advantages to Defence as a buyer, for example the potential to reduce acquisition costs, and to encourage investment in research and development, training and quality management. They would also address the difficulties presented by the discontinuity of Defence demand, the often highly specialised nature of the products we seek, and the barriers to entry and exit and consequent potential for loss of return on investment for the supply of specialised items. Defence is currently assessing how best to pursue such arrangements in a way which is consistent with the principles of fair and open competition that underpin our procurement policy.

As part of this process Defence has increased greatly the quality and quantity of information made available to industry on its formal procurement programs. This includes publications of the Defence New Major Capital Equipment Proposals and the Facilities and Property Procurement Plan; publication of strategic guidance, including SR93: procurement conferences and industry awareness courses; publication of draft requests for tender; and briefings on particular projects undertaken by individual Programs or sub-Programs of the Defence Organisation. These initiatives have rightly been welcomed by industry as a great improvement on previous practices and they will continue to be promoted strongly.

In conclusion, SR93 places the relationship between Defence and industry on a solid footing by enunciating clearly our industry goals in relation to our strategic goals. It is apparent that much work needs to be done to implement these measures but the government is convinced that the existing successful track record of Australian industry combined with its obvious potential for additional growth augurs well for the nation and its defence. Defence will continue its commitment to optimise local industry support capabilities critical to the defence of Australia, including regional engagement and cooperation.
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Australian Defence Industry Grows Up

By Alastair Hodgson, Managing Director, British Aerospace Australia.

Australian Defence companies have had to face increased "internationalisation" in recent years as the "peace dividend" — with its associated defence spending downturn — has forced major players to turn their attention to markets which in the past may not have warranted significant notice.

Australia, with its relatively stable defence budget and open-handed treatment of international competitors, has proved to be an attractive hunting ground. The large number of recent "big ticket" projects — such as the submarine and ANZAC ship programs — has also meant it is relatively simple for companies to establish themselves in this market on the back of a single contract and to go on to compete comfortably with local companies or to promote the products and services of parent entities.

The fact that the barriers to entry in the Australian market are so low and competition has become so intense, has had a significant effect on local organisations. Not only have we had to become more sophisticated — in our marketing, our teaming arrangements, our project management and our general operations, we have also had to look outside our traditional market to make up the order shortfalls as local opportunities are snapped up by new competitors.

While this has had the effect of focussing Industry's activities, it has also placed greater pressure on the Department of Defence — to whom Industry looks for strategic guidance and direction. Obviously it is in both our interests for local Industry to concentrate on areas in which Australia has a future requirement. Apart from the benefit of in-country employment; the application and development of technology; and the ability to provide long-term support — one can not under-estimate the advantages to be gained from addressing the export market. In this case, the greatest assistance the Department of Defence can give Industry is to ensure that Industry concentrates on areas in which Australia has a future requirement. Apart from the benefit of in-country employment; the application and development of technology; and the ability to provide long-term support — one can not under-estimate the advantages to be gained from addressing the export market.

This activity on the part of Industry will also mean changes to Defence which is itself going through a considerable learning process. The issue of probity, for example, has for many years been so rigidly adhered to that it has served to stifle the ability to develop long-term, trusted relationships with Industry. In saying this I am not condoning a hand-in-glove existence — in fact I'm in favour of fair and open competition. I do believe, however, that in the interest of Australia's security and long-term cost effective maintenance of major platforms, there are distinct advantages in having local companies undertake Defence work. By fostering the Buyer/Supplier relationship through open, on-going communication, Defence will be assured of a quality product, tailored to their needs, delivered in a timely, cost effective manner — and able to be maintained throughout its life.

In promising this — I am not proposing that Industry should be capable of meeting all Defence requirements. In fact the recent propensity for Defence to specify areas of "strategic importance" is, I believe, an excellent one. It is far better for Australia to secure a smaller portion of value-added work which is of strategic importance, than it is to do one-off build-to-print tasks to other company's design specifications. This neither develops our industry; offers export potential; nor ensures a long-term support capability of key assets.

Taking the “work-of-strategic-importance" route also secures Australia a place as an international player rather than simply a domestic supplier. With
specialist skills - and a national policy supporting strategic areas — Australian Industry becomes a sought-after teaming partner armed with the power to negotiate attractive work-packages — both for Australian and international markets.

While some members of Government — and Defence — still cringe at the “picking winners” concept, Defence Industry relies on this sort of direction if it is to survive in the face of increasing international competition. We have grown up enough to realise that the “Jack of all Trades” mentality which helped many Australian companies to reach their current status is simply not sophisticated enough to take us to the next stage and if we need to change our direction somewhat to meet the needs of the market — so be it.

In addition there are a number of processes which we will have to master to ensure the success — if not the survival — of the Australian Defence Industry. I have already mentioned communication with our customer — which will remain one of the highest priorities for the future. The relationship between Defence and Industry must continue to develop in a positive manner. One method of assisting this process must surely be the presence of a strong Industry Association — a single voice which represents the entire Industry and can effectively lobby Government, Defence, and international representatives. Presently there are a myriad of Associations — of varying degrees of relevance and competency — with none of them assisting Industry’s push to present a united front.

The fragmentation of our Industry Associations is a direct reflection of the fragmentation which has plagued the Australian Defence Industry for so long. The sooner we learn to pool our resources instead of constantly competing internally — the more successful we will be on the world stage. So often I have hosted delegations from European companies — led by Government officials and attended by half-a-dozen Defence companies — all looking for opportunities in which their country can play a part. But, despite this, Australian companies continue to cross each other’s paths in their independent travels. Fortunately, the move to encourage Australian Prime Contractors will, I believe, go a long way towards bringing Australian companies together in working relationships.

Much of what I have proposed in this article is not new and has probably been commented on — in one forum or another — by Industry and Defence representatives on several occasions. This is, in itself, a heartening example of the whole industry’s increasing maturity and openness. The changing environment in which we operate has accelerated our development and I, for one, look forward to the benefits which will flow from achieving success in a more sophisticated marketplace.

Mr Alastair Hodgson was educated at the South Australian Institute of Technology. He holds a Bachelor of Applied Science in Chemistry and a Graduate Diploma in Accounting (Flinders University). From 1970 to 1978 he worked for various companies, including BHP, as an industrial chemist. He moved into the accounting field in 1978 as Cost Accountant for Rheem Australia. A progressive career with British Aerospace Australia began in 1981 when he joined the company as Works Accountant at its facilities in South Australia. He was seconded to the UK for two years, to work as Assistant Company Secretary. He returned to Australia in 1983 and was made Company Secretary of BAE Australia in 1984. His duties were expanded to Company Secretary and Finance Manager in 1985, and became Finance Director in 1987. He has been Managing Director of British Aerospace since April 1990. He is Chairman of the Australian British Chamber of Commerce (South Australian Chapter), a member of the Australian Space Council and a member of the National Executive of the MFA Defence Manufacturers’ Council. He is also a Certified Practicing Accountant (CPA).
The New Focus on Industry Support in the DSTO

By Ian Hagan, First Assistant Secretary, Science Commercial Activities, DSTO.

The products of high-tech defence research and development are proving to be good business for Australian industry. A number of new initiatives are making sure that the skills and imagination of the DSTO are not only giving a vital advantage to the Defence Organisation, but are also contributing to the development of a technologically competent and economically viable Australian manufacturing sector.

The increased focus on industry support in the Defence Science and Technology Organisation (DSTO) is proving to be a mechanism both to strengthen industry's ability to support our national defence effort, and to generate national wealth. Jindalee Over-The-Horizon Radar and the Collins Class submarine are examples of large projects with DSTO input that are creating jobs in Australia, as well as furthering self-reliance and the concept of the clever country.

With the appointment of a First Assistant Secretary, Science Commercial Activities, the focus on DSTO's commercial interaction with industry and universities will be even sharper. This new position underlines the central importance, and the increasing momentum required, to ensure that Australia gains the full economic benefit of DSTO's research.

An in-house review revealed that industry currently has Defence contracts derived from DSTO's research and development which are worth $1.8 billion, with the Jindalee radar being the most notable example at over $1 billion.

DSTO's Mission

DSTO is Australia's second largest R&D organisation, with an annual budget of approximately $220m. Its mission and activities support the Defence Organisation's corporate objectives to promote the security of Australia and protect its people and its interests. Its R&D sustains a range of Defence activities that help to develop and maintain Australia's industrial capability, which in turn is a vital component of a self-reliant Defence strategy.

DSTO's research covers a wide range of disciplines — mostly in the physical and mathematical sciences, electronics, computing and engineering, but also includes such fields as man-machine interaction, systems engineering, organic chemistry, pharmacology and toxicology, food sciences and the degradation of materials by the environment.

For a number of years there has been the increasing recognition that Australia's investment in public sector research and development has not realised its full economic potential. Over the past decade, the Government has paid considerable attention to the ways in which science and technology can make a greater contribution to national prosperity. In support of that thrust, public sector R&D organisations have been encouraged to adopt a commercial orientation to better align their research focus to meet identified industry objectives.

DSTO's Defence work results in many scientific advances and technical innovations, and it possesses unique scientific and engineering capabilities. Government wants this research capability to be available to support the development of marketable products and services for Australian industry. It also wants DSTO's skills and facilities to contribute to Australian industry development through the transfer of enabling technologies, with the aim of improving Australian industry's export competitiveness.

For its part, DSTO is responding to this agenda by wider utilisation of its skills and facilities, and by commercial exploitation of the results of its research in both Defence and non-Defence areas. While DSTO has a clear focus on research for defence purposes, it is also a national resource with unique capabilities, facilities and technologies, that have economic and industrial potential beyond the defence context.

Defence Priority

Of course DSTO's capacity to support industry is not unlimited. Most of its effort goes, quite rightly, on supporting the Defence Organisation, which includes technology transfer for Defence procurement. In straight dollar terms, DSTO's commercial program is, and should be, secondary to its primary role of meeting defence customer objectives.

Nevertheless, the two are often complementary. Therefore an essential component of DSTO's overall
program is facilitating the timely transfer of defence research results to industry and providing industry with access to DSTO’s research facilities and expertise.

DSTO’s commercial activity is planned to have no adverse impact upon Defence priorities and DSTO does not profit from work which contributes to sales to Defence or the ADF. In other words, Defence does not pay twice for DSTO’s services. In addition, Defence gains a benefit from the investment of commercial profits back into improved and expanded capabilities in DSTO.

Closer Links

This movement towards industry from the public sector R&D side has been complemented by growing industry demand for earlier participation in development and more flexible procurement attitudes within the Department of Defence. The focus is now on developing partnerships with industry rather than “arms length supplier/buyer” relationships. These changes are significant to the DSTO and give policy support to developing better strategic linkages with industry at an earlier stage in the development of projects.

Ideally, industry should become involved in cooperative ventures early in the R&D phase, so that commercial opportunities, particularly non military applications, can be recognised and exploited as early as possible. The recent Defence Policy and Industry Report recommended strengthening links with industry so that DSTO’s research ability can benefit industry more widely. In particular, it envisages that greater access to industry to DSTO will permit earlier involvement in the capability development process. Closer links and earlier involvement will promote technology transfer and the commercial exploitation of DSTO technologies and capabilities through an improved market focus.

The implementation of the report’s recommendations is a major factor in developing relations between Defence and industry. DSTO’s part in developing Australia’s internationally competitive industrial base was recognised as including:

- providing support to the ADF and Defence through transfer of defence-relevant technology to industry;
- making technology, expertise and facilities developed by DSTO available on a commercial basis to all companies;
- contracting out research and development work under the Commercial Support Program and participating in Cooperative Research Centres; and
- communicating opportunities for industry to exploit Defence-related technologies through published media, conferences and exhibitions.

Earlier involvement with industry is being continually improved through alliances, which are formal long-term relationships with one or more companies or other external agencies to promote mutual objectives in technology transfer, exploitation of R&D and industry development. Alliances are helping DSTO change its focus away from what is basically a technology push model, toward market driven operations. In particular, DSTO is seeking to increase the degree to which it provides research and development services to industry under long term contractual arrangements, to achieve better integration between research and the market place, and provide industry with a resource to support it in addressing export markets.

Commercial Support Program

The closer interaction with industry, including that under the Commercial Support Program, is not only encouraging improvement in the effectiveness and efficiency of the DSTO, but also improving the interface between DSTO and industry to their mutual advantage. The aim of the Commercial Support Program is to ensure that non-core support services and products are provided to core defence activities in the most cost-effective manner, by allowing the private sector to compete for non-core business traditionally done by the public sector. In DSTO, most CSP activities have occurred in the non-research and development areas, such as administration and other support services.

As for DSTO’s research and development activities, the organisation will seek to retain a “critical mass” of expertise to ensure it can continue to provide professional and impartial advice to the Defence Organisation, while seeking to increase the level of contract R&D. Therefore, elements of DSTO’s R&D program will be contracted out only if they can be done more cost-effectively by industry or universities without compromising the quality of DSTO’s support for the Defence Organisation. Within this context, routine Commercial Support Program criteria have proven unsuitable for identifying which DSTO R&D activities should be tested. Accordingly, DSTO will use its own criteria for identifying which activities could be done under contract by industry or universities. These considerations include:

- availability of relevant and adequate capability in external organisations;
THE NEW FOCUS ON INDUSTRY SUPPORT IN THE DSTO

**DSTO’s new marine position dye marker, SeaMark, is expected to revolutionise aerial search and rescue techniques.**

- skills not available in DSTO;
- minimal impact on DSTO’s capability to provide R&D support to Defence;
- risk and cost-effectiveness;
- benefits according to Defence policy for industry; and
- supplementing in-house skill losses through staff separation.

On this basis, DSTO will meet the objectives of the Commercial Support Program of broadening the national base that supports Defence, increasing efficiency, and releasing DSTO funds for other R&D activities. However, it also will minimise the risk of losing a defence R&D capability.

In some technical areas, provision of contract research services by DSTO to industry on a commercial basis will help DSTO to maintain critical mass in particular skills needed to support Defence.

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**Partnership History**

DSTO’s long history of partnerships with industry has provided a firm foundation for these increased initiatives by the Government to support Defence self-reliance. DSTO has a strong and enduring relationship with Australian defence industry through Defence procurement. In the process of developing, modifying and acquiring systems for the ADF, DSTO develops the underlying technologies, and transfers them to industry for incorporation into Defence acquisitions.

A recent notable example is the role DSTO played in the decision to construct the new Collins Class submarines in Australia. DSTO scientists developed specifications for an Australian version of the high
performance steel used in the Collins Class, adapted welding procedures and developed a fracture control philosophy which the Navy has adopted to underpin the design, construction and through life support of the submarines. These innovations, especially the steel manufactured by BHP and Bisalloy Steels, are at the forefront of submarine technology worldwide and helped to make the Collins the best conventionally powered submarine in the world.

More recently, the adoption of a more self-reliant defence policy, and the restructuring of Australian industry, are providing the opportunity for a larger and more competitive defence industry sector, with increased potential for export earnings. DSTO contributes to this growth by seeking competitive industry involvement in exploratory development and concept demonstration work arising from its research, resulting in improved transfer of technical knowledge and skills in a competitive environment. Greater flow of information between DSTO and defence industry results, as does an increased commitment from industry.

As well as the benefits from interacting with Defence industry, there is potential for national economic benefit from exploiting DSTO's capabilities and intellectual capital in areas where defence technologies have civil applications. DSTO's charter was amended in 1987 to enable it to assist non-defence industry, and a vigorous program of commercial interaction with industry is in place, although support for the ADF remains DSTO's primary role.

Civil spin-offs include a by product from the development by DSTO of a submarine launched flare which is finding commercial applications as a civil marine safety device. Called SeaMark, the new marine position dye marker greatly improves aerial search and rescue at sea by releasing an intensely coloured fluorescent dye onto the surface of the water that retains its visibility for longer and is much cheaper than conventional dye markers. SeaMark is being marketed by Pains Wessex.

Another technology developed for Defence purposes that is set to revolutionise the way the world's computer systems are protected from white collar crime, hacking and unauthorised exchange of confi-
The Lockheed P3C Orion of the RAAF is equipped with the Australian designed Barra sonobuoy and other electronic sensors.

dental information, is being developed by AWA Defence Industries. DSTO has entered into a licensing agreement with AWADI to develop the technology, called STUBS, to a commercial stage and market it worldwide. The STUBS technology is years ahead of any known computer security system, is affordable and not unduly restrictive on existing computer systems. It has applications in almost every business, government and defence sector across the world where computer networks are used.

DSTO is therefore not constrained to work only with defence industry for Defence procurement purposes. It can work with any sector of Australian industry where it is in the national interest and where resources and Defence priorities permit.

**Commercial Objective**

DSTO’s main commercial objective is to assist the development of efficient, internationally competitive Australian industries through technological innovation. Technology transfer in pursuit of this objective is conducted on a strictly commercial basis.

This objective is directed towards Australian industry; however overseas industry will sometimes need to be involved, for example where there is a need for an established overseas marketing footprint beyond that available to Australian industry, or where Australian industry has no need for a technology or lacks the capability to exploit it. In such cases, DSTO has fostered beneficial linkages between Australian and overseas companies.

DSTO has a long history of successful technology transfer resulting in exports. Following on from the successful Barra sonobuoy, present DSTO contributions to defence exports include a radar target generator developed by DSTO for injecting synthetic targets into F/A-18 aircraft radar, which has been licensed to south Australian company MRad Pty Ltd. MRad recently announced it had been awarded a $4 million contract to supply equipment and support to Canada — two years ago it had one employee; today it has 35 and orders for $10 million of work.

Other examples are the announcement by Defence Technologies Australia Pty Ltd of a contract with the Netherlands Navy using DSTO’s technology for the modification of the Allison T56 gas turbine engine, used by the RAAF’s Orions and Hercules aircraft to remove smoke trails. Negotiations are being finalised with the United Kingdom, Belgium, Norway and Canada.
A boron patching system developed by DSTO to repair metal aircraft structures, which is being marketed by Helitech Industries Pty Ltd as “Bortex”, has won a contract worth $US8 million from the US Air Force. The technology has also been successfully trialed to extend the working lives of civil aircraft and has gained the approval of the Australian Civil Aviation Authority and the US Federal Aviation Agency.

Notwithstanding the steps being taken to promote exploitation of DSTO’s intellectual property, Australia’s capacity to adopt and exploit technologies has had limitations. Entrepreneurship, access to venture capital, strategic industry linkages, marketing networks and the ability to manage technology transfer and product development have been limiting factors in commercialising the results of R&D.

Long term national benefits are paramount in selecting the appropriate venture mechanisms to use. For new product development, DSTO looks for commercial partners prepared to contribute marketing, engineering and financial support and who have a commitment to generate wealth in and for Australia.

Successful technology transfer requires harnessing complementary capabilities from R&D, industry, and in some cases from Government. In the course of its Defence work, DSTO takes developments to concept demonstration, and industry undertakes product and engineering development to meet Defence procurement requirements. Likewise, in technology transfer and industry development activities, DSTO generates intellectual property which can be transferred to industry for exploitation in the market place.

The type of arrangement between DSTO and industry in any particular venture depends on the balance between R&D, engineering, design and product development, venture financing, market research and marketing, and management. Where successful development requires continuing research input some form of contract or collaborative arrangement may be used. Where a technology is sufficiently mature for industry to carry the development process through to market, then a “hands off” licence arrangement may be appropriate.

**Industry Access to DSTO**

There are a number of ways in which industry can gain access to DSTO’s capabilities. Commercial mechanisms employed by DSTO include:

- transfer of technology which industry needs to meet Defence procurement contracts;
- technical support contracts, where DSTO research, development or engineering requirements are contracted out. It is interesting to note that DSTO contracts out research to the value of over $8 million a year to industry and universities, and DSTO will continue to seek opportunities to increase its interaction with industry and external organisations; and
- licensing technology to industry;
- forming joint ventures with industry to exploit specific innovations;
- providing consulting services which make DSTO’s substantial technology base commercially available to industry;
- providing access to facilities unique to DSTO such as wind tunnels and advanced engineering techniques;
- using commercial agents to promote technologies and set up cooperative ventures; and
- collaborating in R&D with industry and with other Government agencies. These include the Cooperative Research Centre program, which also may have commercial aspects.

DSTO is involved in seven Cooperative Research Centres: aerospace structures; robust and adaptive systems; sensor signal and information processing; intelligent decision systems; distributed systems technology; polymer blends; and Australian maritime engineering.

Commercial access to DSTO is available through the Industry Support Office in Melbourne and the Business Development Unit in Salisbury. The Industry Support Office was set up as a trial to bring private sector expertise to manage and expand commercial operations and technology exploitation at the Aeronautical Research Laboratory in Melbourne last year. It has since been extended to provide the same services at the Materials Research Laboratory in Maribyrnong, and, it is intended to extend its operations to encompass the Business Development Unit that services Salisbury later this year, thus joining all commercial operations under one management structure.

Consulting and hire of facilities produce revenue immediately. In the case of other activities directed to industry development and technology transfer, it takes time to realise revenue. The objective of these activities is to generate a more competitive Australian industry through transfer of enabling technologies.

A large component of DSTO’s commercial program consists of consultancies and contract R&D, and long term R&D support contracts are being actively pursued. Some 40 DSTO technologies are licensed to industry. Three companies have been formed, and a number of other technologies are the subjects of joint venture proposals.
Defence Considerations

There are, however, some aspects of dealing with DSTO that need to be kept in mind. Business arrangements must preserve the Department’s freedom to seek competitive procurement tenders, and must avoid conflict of interest in Defence tender evaluation.

International defence research agreements, such as The Technical Cooperation Program (TTCP) involving the defence research organisations of Australia, Canada, New Zealand, United Kingdom and USA, result in a free two-way flow of scientific and technical information which is important to preserve. Hence, some types of exclusive international commercial arrangements may not be acceptable. The benefits to Defence from international exchanges can far outweigh commercial returns.

National security considerations can affect DSTO’s ability to exploit its technologies commercially, although in practice this is rarely a major constraint.

Benefits to Defence and Industry

Using accepted business practices, DSTO aims to generate savings for the Department in its development programs, equipment purchases and maintenance regimes and at the same time, enjoy a moderate revenue flow to support growth in commercial activities, while strengthening DSTO’s own breadth and depth.

In broadening the availability of its capabilities and facilities, DSTO’s commercial activities allow Australian companies to access the results of DSTO research programs and to develop them into products and services for local and international exploitation. Thus DSTO’s commercial activities assist in the development of efficient, internationally competitive Australian industries. The resultant linkages also improve both DSTO’s and Australian industry’s ability to support the ADF.
Over the last 5 years innovative technology, new plant and work practices have added considerably to Transfield Shipbuilding's abilities in design, project management, construction, refit and repair.

Transfield's proven modular shipbuilding technology enables it to excel in working to the highest quality, whilst operating to the tightest controls on deadline and budget.

An example is the success of the Australian Frigate Project. This technology is now being applied in full to building the ANZAC Frigates.

With its breadth and depth of skills and its competitiveness in world markets, Transfield offers the reassurance of commitment, quality and excellence.
When it was suggested to us that we might like to write an article for the Australian Defence Force Journal on this important topic we were delighted but conscious, also, that some readers might feel some scepticism about the views of a Company that appears, on the face of it, to have been in the business of building warships only since 1988; a scant half dozen years ago. Transfield, however, is a Company born and shaped in the highly competitive worlds of heavy and marine engineering. Furthermore, we have been able to draw on the experience of the Western Australian operation we purchased, which has built more than 200 commercial vessels and patrol vessels since it laid its first keel in 1966. We are also well aware of the lessons contained in the recent history of the shipbuilding industry in Australia.

Of course it is true, too, that shipbuilding in Australia is pretty much a reborn industry generally, and so most of its members are, like us, relatively young. Comparative newcomers though we may be, we take pride in some pretty significant achievements already in our shipbuilding history. The fourth and final of our 350 tonne (displacement) Survey Motor Launches was delivered to the Royal Australian Navy by our facility in Port Adelaide in 1990, and the sixteenth 165 tonne South Pacific Patrol Boat was handed over by our WA facility to Kiribati scarcely two months ago, with a further four vessels to follow. HMAS Newcastle, 4100 tonnes was delivered from our Williamstown yard in December last year, hot on the heels of HMAS Melbourne. Both FFG7s were completed ahead of schedule, on cost and to the highest quality standards. The last of six major hull modules for ANZAC 01 is being consolidated on the building way at Williamstown, as this article goes to press and this project is also on cost and schedule, giving us confidence that we should begin to exceed overseas best practice in terms of quality and efficiency, before the fourth ship of the Class is completed in 1998.

In a technology sense too, we believe we have moved quickly towards a position of leadership, particularly in the application of modular construction techniques and the networking of national and international infrastructure and skilled human resources. Hull modules for Newcastle were built and outfitted in Newcastle and Adelaide as well as at Williamstown. For ANZAC 02 onwards only one major hull module will be built in Victoria; the remainder, as well as all superstructure modules, being shared between Newcastle again, and New Zealand.

At a conference convened recently by the Institution of Engineers, Australia, it was acknowledged that a national industry policy must address:
- the development of large local companies;
- local design and development capability; and
- springboarding from strong local markets into export oriented value adding.

The problem for Australia is that our present chance to consolidate our reborn and undeniably capable warship building industry comes at a time when the volume of warship building world-wide, and the number of naval shipbuilders world-wide is declining, through amalgamation and through closure. This trend will continue until capacity matches demand, and even then further failures are likely, resulting from companies’ inability to fund the high cost of modernising facilities and methods.

In this declining market there are a number of factors which exacerbate the shipbuilders’ problems:
- Shipbuilders must have and must maintain the project management, design and engineering skills (so-called “intellectual capability”) to integrate the best technology to meet each customer’s requirements. It must do so in an age where technology advance, such as automation and modular construction, shortens build schedules and tends to create wide troughs between build programs. The high cost of maintaining this intellectual capability means that troughs are becoming increasingly difficult for the shipbuilders to fund.
- The relative value of shipyard work versus brought-in equipment costs in modern ships is declining. The shipbuilder’s scope of work in the past was of the order of 40-50 per cent of the value of the ship but today it has dropped to as little as 20 per cent, placing increasing pressure on profit margins. Flowing from reduced demand, increasing competition and a natural reduction in scope of work, shipbuilders are treading a very fine line between
difficult profitability and major losses. There are examples now of Weapons Systems houses becoming financially involved to support shipbuilding in order to ensure an avenue for sales of their own equipment:
- in a market growing more competitive, the improvement in productivity required of builders may involve major capital investment, a risk that some simply cannot take, in order to stay in the market; and
- diversification to fill the troughs in workload is difficult to achieve whilst retaining the particular intellectual and trade skills required for naval shipbuilding. The opportunities for diversification into work of comparable quality and scope are very limited. There are many examples of this approach, and few successes.

To survive and prosper in this tough world, the warship builder must firstly be internationally competitive. He must be able to weather the troughs (and the peaks) of his own Navy’s demand and he must find a way of retaining the expensive, skilled and expert team of people which takes such a long time to develop and such a short time to dissipate. Continuity of work for this engineering skill base is a key requirement if Australia’s reborn warship building industry is to survive into the 21st century.

That is not to say we must adopt the practices of the past, where shipbuilders relied on governments for their survival — this route failed before and it would again. Today shipbuilders must demonstrate world competitiveness and rely on their own excellence for survival. There is however a small critical mass, in terms of domestic orders, without which the Australian industry will surely fail.

### Situation

This article concentrates on those parts of the shipbuilding and repair industries best known to Transfield Shipbuilding, namely Defence related shipbuilding and repair, and the niche market, largely but not exclusively offshore, for smaller commercial vessels including new building and repair and refit of fishing vessels, rig tenders and the like, and rig components and modules. The comparative smallness of Australia’s shipbuilding and repair industry, in international if not in regional terms, makes it possible to extrapolate from this particular base to include the industry as a whole.

Australia is an island nation, separated from both its allies and its trading partners by long and potentially hazardous sea lanes upon which the country depends for over 95 per cent of its trade. This is a situation which is unlikely to change significantly if at all, in the foreseeable future. Australia’s geographic boundaries extend over some 12,250 nautical miles of coastline and it has island dependencies as far flung as Heard Island more than 2,500 miles to the south west, Cocos Island 1,400 miles to the north west, Norfolk Island 860 miles to the east and Macquarie Island 900 miles to the south. Australia’s claims in Antarctica are both extensive and important. Australia’s area of declared strategic interest extends over about 1/12th of the earth’s surface, largely covered by the sea.

That Australia is undeniably a maritime nation is not well understood by its people nor, arguably, by many in its several layers of government.

Australia does not have a large standing defence force. It seeks to rely instead on maintaining a technological and training edge over its regional neighbours: sufficient to achieve credibility as too powerful to threaten. This is published government policy, as is the stated aim of self sufficiency, and these two things alone constitute a comprehensive argument for a capable, efficient and modern warship building and repair industry. However, the resurgence of this sector of the industry since the late 1980s is very largely attributable to the vision and determination of three individuals: Mr Beazley, Senator Button and Senator Ray. The Hon Roger Price MP, in his “Defence Policy and Industry Report” of November 1992 also reveals a good understanding of the strategic issues confronting the industry.

It is also appropriate to acknowledge the influential role played by the ultimate customer, the Navy, in its demand for formal Quality accreditations to AS 3900/ISO 9000 series, from suppliers of all goods and services including prime contractors for ship building and ship repair.

There have been times in the nation’s past when it has boasted an extensive and capable shipbuilding industry. There are many reasons for its rise and fall: Australia as a supplier of high volume, high mass primary produce and raw materials, Australia as an importer of people and of bulky finished goods like machinery, the special trading relationship between Britain and the Commonwealth, Australia’s location at one end of long sea lanes, and war emergencies have all played their parts in the periodic rises. Peace, the EEC, lost competitiveness, lack of vision in both the industry itself and in Government amongst other things have contributed to the falls.

Except for their Defence sectors, the traditional shipbuilding nations of Britain, Scandinavia and Western Europe ceded the industry to north east Asia in the
1960s and 70s and North America suffered a similar fate in the 1980s.

Australia's once proud commercial shipbuilding industry had already succumbed along the way, taking the last vestiges of its warship building capability with it. However, some of the skills remained and a cell of specialist niche market suppliers began to emerge. There was little government recognition of this phenomenon initially and Defence contracts were few and certainly not sustaining. HMAS *Cook* (Williamstown), HMAS *Success* (CODOCK) and the *Attack* Class Patrol Boats (NQEA) illustrate the point. There were successes nevertheless, typified by the fishing vessel and luxury motor yacht industry in WA, the fast passenger and vehicle ferry industry in Tasmania and north Queensland, and the offshore platform and topside builders in Adelaide, Westport and Newcastle. Transfield Shipbuilding is proud of the achievements of ASI and EGLO during these crucial years.

Then came the order for the new submarines, the privatisation of Williamstown Naval Dockyard with its order for the Australian Frigate, and the ANZAC ships. The Federal Government talked encouragingly of a 3 per cent growth rate for the Defence budget, in real terms, opening the way for a sustaining workload in a lean and efficient shipbuilding industry. Most importantly of all, the same government began to show it meant business when it spoke of 70 per cent local industry participation in Defence contracting.

Unhappily, following a brief but encouraging period of slight expansion, the prospective and projected annual 3 per cent real growth in Defence outlay quickly fell back to little more than zero, and of course it has now become in practice a net real reduction. Fortunately for both the industry and the nation, however, the long term commitment to the two great Navy projects — the *Collins* Class submarines and the ANZAC Class frigates — amongst others, has cushioned the capital program from the worst effects of the reduction, and the reborn warship building industry is still active and outwards looking. For how much longer?

**Discussion**

At least in investment terms, but it is probably also fair to say in terms of capacity and capability for building and repairing large and complex ships, there are presently three major and a variety of minor players in the industry and there are others who have sought, or who are seeking, to enter the field.
The industry is pretty much self regulating amongst the minors — they diversify or go to the wall when times are tough — but the majors are in a different category, for several reasons: ADI NED is still a Government enterprise and the beneficiary of temporary protection from market forces; ASC was created as a result of a Government strategy for the new submarine program (and in the reasonable expectation at the time of a sustaining if not an expansionary new construction program, long term); and ASC and Transfield together represent Australia’s renaissance in terms of modern warship design and construction. ADI NED, in search of its own future, now seeks to enter the shipbuilding field too, through its competition for the Navy’s new Minehunter.

It is self evident that Australia must hang onto its reborn warship building capability but it is by no means evident, at all, that there is enough work in prospect for even two major players, even in the short to medium term. A consequence is an emerging struggle between the three.

- ASC, a capable builder of large submarines, is already seeking to diversify into GRP Minehunters and small patrol craft. ASC also seeks the Logistic Support Task Agency (LSTA) role for the COLLINS Class and for its through-life maintenance work.

- ADI NED was awarded the last two Oberon Class refits following CODOCK’s demise, and this has been a big help in keeping the Company in work despite the move west of an increasing proportion of the Fleet. ADI NED is bidding for the Minehunter too, and is said to be looking for the means of expanding the Company’s presence in WA, as a ship repairer. At the time of its corporatisation, ADI NED was given a lien on “traditional” east coast surface warship repair work, which expires in June 1995. Perhaps as a result of the lien as well, ADI NED is the Authorised Design Office (ADO) for all major warship classes and support force ships presently in service, except WESTRALIA.

- Transfield, too, has LSTA and ADO ambitions for the ANZAC Class and the Company’s experience with, and its data base development for its very successful Australian Frigate construction program makes it a strong contender for the FFG 7 LSTA role, too. Transfield is bidding for the Minehunter and, with Government support, for the RMN patrol vessel (PV). Transfield also expects to find itself in the competition for the new Oceanographic/Hydrographic Survey ships when the PDS is released. Finally, there is talk of the DDG replacements due at the turn of the century, being an
ANZAC variant: if so, Transfield should be well placed to win them competitively.

The progressive modernisation of the naval fleet, its distribution between the two oceans, the run-down of the submarine building program and the reduction below plan of the balance of Navy’s capital program have combined to give Defence as well as the industry itself, a knotty problem: how to ensure survival of an efficient core capability in the industry, in a free market economy. If the old inefficiencies from subsidy and protection are not to be re-introduced, a shake-out and probable further downsizing appears inevitable. Amongst other things, this article examines how this might best be achieved.

The Supply Side of the Equation

Notwithstanding that all three of the principal companies are presently reasonably busy: Transfield and ASC on their major building contracts and ADI’s Naval Engineering Division on a significant but declining submarine refit contract together with some surface ship work, the opportunity for orderly change is fast running out. Whilst the GRP Minehunter contract will be important in preserving the intellectual skills of the successful contender, it will provide little for the physical trades at ASC’s extensive facility at Port Adelaide, or Transfield’s facility at Williams-town, or even ADI NED’s facility at Garden Island (East). The same might be said for the PV of course but an order for the FREMANTLE Class replacements would certainly benefit the physical side of the “minors” shipbuilding industry, including Transfield’s WA operation.

It would be an unfortunate irony were a key benefit of closing down CODOCK — the removal of one participant in an over-populated industry — to be lost through a government initiative to create another, in the interests of competitive tendering.

The need to restructure the Defence shipbuilding and ship repair industries is urgent, and as the owner of one of the “big three” (ADI NED) and as both sponsor of and shareholder in a second (ASC), the Federal Government must take a lead in this rationalisation. Left to their own devices the three can be expected to hold on until all have been damaged, possibly beyond recovery. The strategic importance of the Defence ship building and ship repair industries makes such an outcome unthinkable.

A window of opportunity to take an important step towards this essential rationalisation is opening as
ADI’s lien on “traditional” Defence work runs out. Other important influences include the Minehunter design selection, the run down of the metal bashing end of the new submarine program, the intentions for the future of at least one of the shipyards with minor war vessel building experience, the future of Navy’s Fleet Base (East) and Garden Island (East) and the site selected for the NECAD. There are more, and few of them are matters for the judgement, alone, of the private sector.

To the extent that it is possible to plan in the absence of clear Government policy, Transfield Shipbuilding plans to stay for the long haul, both as a capable specialist warship designer and builder and as a supplier of quality ship repair and support services. The Company’s investment in the industry is heavy, however, and a clearer picture of Government intentions is needed before further investment could be justified.

It is for Government and the Department of Defence, in close consultation with industry, to develop a frame of reference for the Defence ship building and ship repair industries in Australia, and to establish in clear terms, long term goals and objectives.

Factors Facilitating Change

The recurring theme in this article is that the time for rationalisation is now and it is interesting to explore the factors that make it so.

- **Reduced ship repair workload.** Labour intensive steam has given way in the Navy to CODOG/CODAD/CODAD and there are many other technical advances with similar effect.
- **Maintenance methodology.** Navy, and the ship-builders in the case of the major new contracts, are moving away from maintenance based on elapsed time towards condition — based maintenance and repair by replacement. One effect is further to reduce work load and another is to replace lengthy dockyard level maintenance periods with a series of short assisted maintenance availabilities.
- **Reduced docking frequency.** Improved technology, including underwater paint technology, has extended typical docking intervals for naval vessels, from two to at least four years.
- **Industry efficiency.** Improved industrial relations and work practices have resulted from modern and realistic industrial contracts negotiated by the three companies.
- **Industry mobility.** An aspect of improved efficiency is Industry’s greater ability and willingness to travel to the ship rather than bring the ship to the dockyard or require the problems to accumulate until the next major depot level availability. Transfield’s national posture has been a significant factor in this development but it is an Industry-wide trend which is unlikely to be reversed.

- **Fleet Intermediate Level Maintenance Activity (FIMA).** The strong growth of the Navy’s FIMA has several roots; the now largely redundant concern to insulate the Navy from the worst of the industrial excesses of the past; the reduced manning levels in modern warships; and the need nonetheless, to provide relevant experience for the Navy’s technical personnel.
- **Two Ocean Basing.** The increased workload in WA is offset by a corresponding reduction on the east coast.
- **The Commercial Support Program.** There has been an increased Government focus on commercialisation generally.
- **The Strategic Focus.** The Defence Force is now focused much more sharply on the north and west.
- **Williamstown.** The re-emergence of a significant maritime defence industrial capability in Victoria.
- **Port Adelaide.** Additional industrial capacity represented by ASC and the desire to find continuation work for the new company and its local suppliers and sub-contractors.
- **Navy’s New East Coast Armament Depot (NECAD).** The sun has set on Newington and it may be only a matter of time before Kingswood comes under similar pressure. Local interest groups continue to resist the choice of Jervis Bay and they may yet succeed. Alternative locations within NSW (Newcastle and Twofold Bay) are problematical, as indeed are those outside the State but it is unlikely that the economically significant link between the locations of the armament depot and Navy’s Main Base will go unnoticed-notice.
- **Sydney’s Olympic 2000 Bid.** Sydney’s successful bid is already adding significantly to the pressure on the Federal Government to relocate the armament depot at Newington, to the point where it may soon become overwhelming and urgent.
- **East Coast Submarine Operating Base.** It is understood that HMAS PLATYPUS, Navy’s current submarine base, is to be vacated at or before the Oberon Class submarines’ end of life-of-type, perhaps as early as 1996? A decision on the future of Navy’s Fleet Base (East) (FBE) will be required before funds are likely to be invested in any new submarine operating base on the east coast.
Political Comment. Comment at the Federal Government level has from time to time reflected a wish for the Navy to vacate FBE, and for ADI NED to vacate Garden Island (East). The aim would apparently be to shut down the entire industrial complex and return it to the public domain. The cost is likely to be prohibitive in the medium term but some rationalisation and enhanced public access to the site seems both possible and desirable.

Expiration of ADI’s Lien. As already mentioned, this lien expires in June 1995 from which date, at the latest, the Company must compete in the market place for all work.

Privatisation of ADI. A possible outcome of Cabinet’s consideration of the Macquarie Report is the further rationalisation and privatisation of ADI.

The Winds of Change

It is evident that there are many straws in the wind and the foregoing list is neither exhaustive nor in every case, perhaps, unarguable. It is worth looking in more detail at what might be called the key change mechanisms.

The Nature of Maintenance and the New Industrial Climate

The clear distinction between “dockyard” (i.e., depot level) maintenance and “navy” (i.e., intermediate level) maintenance which once existed has gone forever, as has the notion that certain work is the sole preserve of civilians, or of particular industries or trades. The new commercial environment understands and accepts a competitive market.

Maintenance is now a continuum and it is a matter of convenience rather than capability how it is shared between the Navy and Industry. It is time to review the need for, and the nature and size of the FIMA. It can be argued that the Fleet needs only small, highly mobile specialists (“tiger teams”) with particular expertise in particular systems; an expansion of the present Mobile Technical Units (MOTUs). Beyond this, shore support should be a function of the Support Command, with the separation of depot level from intermediate level maintenance disappearing along with the expensive (in terms of manpower), purely uniformed FIMAs.

In short, most of the workshops in the Navy’s Fleet Bases and other operating bases should be contracted out.

The Demise of the Traditional Dockyard — The Ultimate One Stop Shop

The three former naval dockyards: WND, GID and for practical purposes, CODOCK, had outlived their relevance long before rationalisation saw the privatisation of WND and the closure of CODOCK. Corporatisation has wrought some major changes within ADI NED but, as discussed elsewhere, corporatisation is likely to be only a step along the developmental path.

It is no longer feasible nor necessary to retain in one company all of the skills, capacity and facilities
needed to maintain warships, and nor is it necessary
to return the ships themselves to their main base for
overhaul and repair. The overhead cost of retaining
this reserve capacity renders the supplier uncompeti­tive
and the customer, the Navy, appears no longer to be
willing, understandably, to pay the premium. The
solution is to adopt commercial principles: to project
manage and to spread the work across a broader
industry base by the optimum use of sub-contractors.

In this new environment it is more important than
ever that the prime contractor be qualified and able to
project manage and to this end a minimum require­ment
is that he be qualified to appropriate AS 3900/
ISO 9000 series Quality Assurance standards, both
technical and managerial. It is desirable too, that sub­contractors be qualified to similar standards and in
some regions, notably in WA, this is becoming
steadily more achievable.

There remain certain facilities needed for ship
repair which will only ever be used infrequently, e.g.,
docks, shiplifts, cranes etc. Others, retained for battle
damage repair for example, may never be used at all.
The GMLS 13 building at Garden Island (East) is in
this category. It would make no sense to require all
competing prime contractors to retain such capacity
and capability and therefore the customer (the
Government) must be prepared to deal with this part
of industry through other mechanisms than straight
competition. Once accepted, this principle should sen­sibly be extended to cover as much as necessary of
the ship repair — and for that matter the shipbuilding
— process.

Transparency of the Shipbuilding and Repair
Interface

A corollary of the changing face of warship main­tenance and repair, and of the way in which it is pro­vided on the one hand, and the development of the
"modular" approach to shipbuilding and outfitting on the
other, is that historic assumptions about a natural
separation between these two functions are no longer
valid — if indeed they ever were. Shipbuilders, like
ship repairers, are project managers. They manage a
team, comprised of both in-house and sub-contract
labour and expertise, to design, build, install, groom
and set-to-work the ship itself, its systems and equip­ments.

No shipbuilder could survive in this new environ­ment were he to restrict his activities to the traditional
shipbuilding function: too much of the value and
labour content of the contract is represented by the
systems and equipment; too little by the hull, mecha­nical and electrical (HM& E) element, and a prudent
shipbuilder must maximise his share of the contract if
he is to survive. He must 'win' the work however, in
competition with his suppliers and sub-contractors
and the consequence is that if he is to be successful he
must acquire both capability and efficiency across a
broad front. These are the in-house skills that he takes
to sea for Contractor's Sea Trials and which he de­ploys on board commissioned ships and in land —
based training and support facilities in the discharge
of his LSTA responsibilities. They are the same skills
which are needed for ship repair. The contrary view,
that shipbuilding must in some way be kept separate
from naval maintenance, refit and repair, is funda­mentally flawed. Were it to prevail, the shipbuilding
industry would be neither capable nor competitive.

National Ownership

The strategic importance of a modest but capable
warship building and repair industry has been dis­cussed, and the ability to extrapolate in time of
national need, from this capability to the design and
production of logistic support vessels, i.e., particular
merchant ship designs, has also been noted. This
latter need seems likely to become increasingly im­portant as regional tensions rise in response to the
perceived extra-national interests of some of the
stronger economies within the region. These percep­tions will strengthen as the United States' presence
and role as regional policeman declines as it presently
seems set to do.

Significant foreign ownership and management of
a strategic national asset like ship building need not
necessarily conflict with the national interest, but it
could do so where the foreign shareholder is also a
shipbuilder intent on sales in the region, for the sur­vival of its own national facility. There are signs of
such forces at work in the industry within Australia, at
the moment.

The implication is obvious: not only must the Gov­ernment's capital program be managed to ensure the
preservation of an essential core of the industry, but the
Government's acquisition strategy must ensure
that in any rationalisation and downsizing of the
industry it is the nationally owned portion which
survives.

Design Capability

An important spin-off from the acquisition strategy
adopted by the Government over the COLLINS and
ANZAC programs amongst others, has been the
development of a capable local design capacity. Pro­vided that sustaining work can be found for this new
capability, there is no reason why Australia's own
design requirements as well as those needed to sup­port its offshore marketing initiatives should not be
fully met in the future. It is this rationale which has driven Transfield Shipbuilding to propose the development of the PV design in Australia.

There is another important consideration for Defence here. In the past Navy, as the sole source of worthwhile relevant naval design expertise in the country, has found it necessary to retain a very large engineering staff in Canberra to generate the skills for its ‘informed customer’ role. This has been both expensive and difficult in management terms, because of the need for work experience for the individuals concerned.

The emergence of a private sector capability means that there are now more options available to Defence (Navy) for the acquisition of its in-house design expertise, including through traineeship opportunities, needed for its “informed customer” role.

**Realities of the Demand Side of the Equation**

Navy’s Capital Program

The current and prospective capital program is insufficient to sustain the current industry capacity and in these circumstances, giving free rein to open competition and free market forces is likely to have unintentional and undesirable consequences. It is essential that the Government use the program strategically, to support the national goal of a continuing efficient warship building capability for both domestic and export market reasons. To this end the Government must be more willing than hitherto, to counter other mechanisms than direct competition for the award of major Defence contracts.

Competitive Tendering — Ship Repair

Competitive tendering for ship repair contracts at the prime contractor level makes sense where there is sufficient demand to sustain more than one prime contractor with both the capacity and capability for the work. It makes no sense where, in order to achieve competition for a particular contract, Defence deliberately encourages the establishment of industry capacity which cannot be sustained in follow up work. The drive for competitive tendering continues to be an issue in WA and it is never far below the surface in Cairns, Darwin, Sydney and Adelaide.

There are other mechanisms available to Defence to ensure fair pricing: particularly through competition at the sub-contract level and full cost disclosure by the prime contractor to Defence representatives; and in the new ‘project management’ approach to DLM previously mentioned, this form of cost control is also in the best interests of the prime contractor.

Confined Tendering. An apparent unwillingness by Defence to consider mechanisms which will ensure probity despite confinement of tenders has, in WA at least, led to considerable tensions within the Industry. Lately there has been some indication of a change of heart, which is welcomed.

Competitive Tendering — Ship Building

ASC, a significantly foreign owned company, in a sense is amongst other things a product of Defence’s determination to compete acquisition contracts, and some of the difficulties that this has created for the Government and for Industry, downstream, have already been mentioned. There are benefits in this approach too, of course, including shifting the burden of project definition and design development to Industry, but they do not justify the penalties: the extent of sunk costs, unsustainable excess capacity, and the risk of Company strategy being decided offshore. There are better alternatives, including earlier design selection, and teaming with a selected (national) supplier. This is the approach being adopted by Defence for the Malaysian PV, and it should set the benchmark for future acquisitions.

Cost of Tendering

The cost of tendering for ship repair contracts is significant but small enough to be borne by losing tenderers. It is nonetheless important that the Government be willing to confine tenders to sole source suppliers, rather than artificially create competition where none previously existed and cannot be sustained by a continuing workload, as previously discussed.

Tendering for capital acquisition contracts is another matter. Here the costs can run into millions of dollars, and it is unreasonable to expect Industry, whether national or foreign, to carry them alone. It is commonly stated by foreign tenderers that the cost of tendering for Australian Defence contracts is very much higher than elsewhere, primarily because of the complexity and detail of Australia’s tender requirements. There is an urgent need to review them, and in this regard it would be sensible and expedient to explore international best practice. This is something that Defence and industry might beneficially do together.

“Home Port” Issues

It is presently a Defence requirement that warships undergo DLM in the vicinity of their home ports, which for practical purposes means Cairns, Darwin, the Fremantle Area, Melbourne and the Sydney area,
variously, for Patrol Boats and other minor war vessels and support craft, and the WAMSF and the Sydney Area for the major war vessels, support force ships and submarines. The reason for this is essentially domestic: depot level maintenance periods have been the only times in ships' operational cycles when their crews can count on spending a reasonable length of time with their families.

As discussed under “maintenance methodology” however, the requirement for lengthy DLM periods is disappearing, and it is time to review the ‘home port refit’ issue too, within the broad delineation set by the two ocean basing policy. Thus, notwithstanding that Sydney might continue to be Navy’s Main Base and east coast Operating Base for the foreseeable future, there should now be a willingness for Navy to allow the Melbourne based industry to bid in competition with ADI NED, at least for the FFG 7s. Insofar as Transfield would expect to be successful in bidding competitively for such work, this would go some way towards buffering the shipyard against the vagaries of the capital acquisition order book.

Logistic Support Task Agencies, Authorised Design Offices

Prior to the corporatisation of GID and closure of CODOCK, many LSTA functions were performed for the Navy by these organisations. A much more comprehensive task was contracted out to the private sector (Dawsons), in support of WESTRALIA and since then there has been a steady development of the LSTA and ADO concepts. Their further evolution is appropriate now, and should lead to considerable human resource savings for Defence.

Commercial support for the Navy’s LSTA and ADO requirements is a logical and sensible outcome from the development of a capable design capacity by Australia’s own warship building industry.

Melbourne Area

Transfield’s operation at Williamstown is the nation’s most modern and capable shipbuilding facility for hulls up to 150 metres in length and with a maximum beam of 16.5 metres. The Alfred graving dock limits the hull length to 142.3 metres (137.2 metres at the floor), and draft at the sill to 7.9 metres but tentative plans for a ships lift or floating dock with significantly greater capacity have received State Government endorsement.

A recent review has confirmed that the yard meets or exceeds world best practice. By way of illustration, Transfield expects to better Blohm & Voss man-hours for a Meko 200 before completion of the 4th ship in the current ANZAC build program of 10 ships — a significant achievement by any standards.

Transfield Shipbuilding’s Williamstown facility would welcome an opportunity to bid for Navy’s DLM but, as mentioned already, is prevented from doing so by ADI NED’s lien and by the presently literal interpretation of Navy’s “home port refit” policy. The Company’s Williamstown facility is capable of refitting most of Navy’s assets but since the departure of the Waglen floating dock from Melbourne, underwater work on DDG2 Class ships and above would have to go elsewhere. There is no other credible supplier of major warship repair services in the Melbourne area.

Sydney Area

ADI NED’s ship repair facility at Garden Island is well known. It has the capacity and capability for all ships and submarines of the RAN and most of its allies. There is no building way and it would be unrealistic to contemplate finding room for one. However the yard has undertaken quite extensive warship modernisations and it has recently engaged in merchant ship repair work, and diesel engine assembly for the COLLINS Class. The merchant ship work has been tolerated by the community to date but there would be opposition to any significant increase in it, and this would compromise the currently benign environment in which the Navy finds itself in Port Jackson.

There is talk of closing the dockyard at Garden Island and relocating the Navy’s Main Base elsewhere. Leaving aside some reported political preference for this course, there are strong but not overwhelming arguments for it and the cost alone makes it a difficult decision in the medium term. Sydney is home to a significant part of Australia’s Defence — related industry; moreover, whilst the NSW Government would not stand in the way of relocation elsewhere within Port Jackson, it could be expected strongly to resist a more
distant move, except to Newcastle or to Wollongong/Port Kembla.

ADI NED shares Garden Island with the Navy, and the Fleet Base (East) is adjacent. All things considered, it seems probable and sensible that an east coast COLLINS Class operating base would be established on or adjacent to Garden Island, within an expanded Fleet Base.

Despite recent extensive refurbishment and modernisation of the facility, building assets on Garden Island are scattered, probably excessive and their efficient utilisation must be something of a distraction for management. Privatisation would force a significant rationalisation of these assets and a downsizing of the total investment.

Whatever the outcome of the Federal Government's consideration of the Macquarie Report, it is certain that ADI NED will be faced with stiff competition for east coast surface warship and support force repair and refit from mid 1995 and the Company's continuing role thereafter, as Navy's principal Authorised Design Office (ADO), must also be uncertain at best.

Newcastle

The Sydney area includes Newcastle, where Forgacs is already permitted to compete for work beyond ADI NED capacity, or over which ADI NED's lien is inoperative — for example WESTRALIA. Newcastle seems certain to be the NSW Government's preferred alternative were the Federal Government to force the Navy to remove its Main Base from Port Jackson. The 15000 tonne floating dock and associated workshops are all that are still operative from the old State Dockyard. Reactivation of all or part of the dockyard site itself is possible but expensive.

Were Navy's Fleet Base or Main Base to be relocated to Newcastle, opening the way to increased warship repair work in the port area, the prospect of attracting merchant shipping for routine maintenance and voyage repairs seems likely to improve.

Transfield has built modules for HMAS Newcastle (FFG 7 #06) at its offshore construction site at Kooragang Island and is engaged on similar work there for the ANZAC program. However any expansion of Transfield Shipbuilding's activities in Newcastle would necessitate development of a green field site or the redevelopment of some existing infrastructure. Either approach would attract NSW State Government approval.

The Carrington shipbuilding site at Tomago is laid up; it could be reactivated but is unlikely ever to be competitive with, for example, Transfield Shipbuilding's operations at either Williamstown or WAMSF. Ramsay Fibreglass, the GRP facility previously operated by Carringtons is presently leased to ASC but seems likely to have a role in the Minehunter program whichever of the "big three" wins this contract.

Brisbane

The naval presence in Brisbane is already minimal and further reduction appears imminent. Reactivation of the Caimcross Dock is mooted but seems unlikely to affect Navy's location plans and reactivation would have to rely on merchant ship work for its economic justification.

The dock's physical dimensions are restrictive and associated infrastructure is in poor condition. In short, it is hard to believe that current reports of overseas interest in re-opening Caimcross are serious. Nevertheless, were it to happen, there would be marginal strategic benefit for Navy in line with Defence's stronger northerly focus, and no doubt the Navy would seek to exploit the opportunity for increased competition for DLM on the east coast.

Far North Queensland

Navy is firmly established in Cairns and earlier remarks about the FIMA are relevant here too. NQEA is quality accredited and together with a significant local light industry, has the capacity and capability to provide DLM and some other logistic services for all minor war vessels and marine science vessels operated by the Navy in far north Queensland. Voyage repairs for visiting major war vessels are also achievable.

There are other companies in the Cairns-Townsville area with the potential to qualify for naval work but the modest amount of work available makes the effort questionable. Nevertheless, given the apparent uncertainty about the long term intentions of some elements of Cairns' ship repair industry, it must be reassuring for Navy that there are other options available.

The next generation of patrol vessel seem certain to be significantly bigger than the FREMANTLEs, which will give Cairns ship repairers some infrastructure investment decisions to make, notably for docking. Defence will need to give some thought to assistance for the local industry.

Darwin

Navy's investment at the Darwin Naval Base is extensive, including warehousing and a FIMA large enough to handle minor war vessel refits. Further significant investment will be necessary if the shiplift and cyclone dry lay-up berths are to be adapted for the larger new generation patrol vessels when they come. The Darwin Naval Base is a ripe candidate for commercial support.

Francis Bay is a Quality accredited supplier of
DLM services to the Navy and there appears to be a
good working relationship between the local industry
and the Darwin FIMA, which can only be productive.
The commercial shiplift in Darwin is barely long
enough for the FREMANTLE Class and significant
investment will be needed to accommodate the new
PV when it comes. Other aspects of local industry
support will also need enhancement.

Commercial management of the Darwin Naval
Base would save manpower costs for the Navy and it
offers the prospect of a reduction in the capital cost of
introducing the new patrol vessels, to one site only, at
a saving of some millions of dollars.

Fremantle Area

The old Fremantle Port Authority slipway is leased
to the private sector and still operates, with a maxi-
mum lift of about 3000 tonnes. The slipway itself is
not currently in Class; nor apparently is the facility
certified under AS 3900/ISO 9000, a requirement for
Defence work. Its minimal infrastructure and (in
comparison with the WA Marine Support Facility) its
remoteness from Navy's Fleet Base (West) at HMAS
STIRLING make further investment at the Fremantle
slipway very questionable indeed.

There are other slipways in the vicinity of the
WAMSF, including a 3000 tonne facility owned by
Transfield Shipbuilding (WA), but none of these is
currently in Class either. Nonetheless they have some
potential for minor war vessel DLM, subject to their
operators achieving Quality accreditation.

It is the WA Marine Support Facility (WAMSF)
itself which has the potential to fulfill all of Navy's
DLM needs on the west coast, up to and including
FFG 7 Class frigates and COLLINS Class sub-
marines; and to provide a comprehensive ship repair
service to the commercial market as well. Transfield
has invested heavily in the facility already but more is
required: to seal sandy surfaces, to extend the transfer
system and to cover refit and new construction berths.

The projected Navy workload on the west coast, in
total, would barely support the additional outlay neces-
sary to achieve these improvements, and Defence's
continuing concern for direct competition between
potential prime contractors risks spreading the work
ever more thinly. Indeed duplication of this expensive
and under-utilised infrastructure, has been mooted, to
the advantage of no-one. Defence really must be
more willing to explore, with industry, other methods
of ensuring fair trading such as full cost disclosure
and open competition at the sub-contract level. Local
sub-contractors are very capable and many of them
seek full quality accreditation, with the active encour-
gagement of the WA Government.

The niche market shipbuilders in WA, based in
Jervoise Bay, have had considerable domestic and
offshore success, specialising in fishing vessels and rig
tenders and logistic support vessels, as well as the
luxury motor yacht and multi-hull ferry markets.
Transfield (WA), a leader in the local commercial
shipbuilding business, has also supplied patrol boats
to nations in the South Pacific, the Gulf States and to
Hong Kong. There is no doubt that the Company has
the capability and capacity to build the full range of
minor war vessels as well as commercial ships at its
WA facility though some rationalisation of property
assets is desirable first, centring on the WAMSF site
itself.

ASC's understandable interest in gaining all
COLLINS Class DLM has already been mentioned.
Transfield's own preference is for competition for all
naval work wherever competition is possible, regard-
less of ship type, and for an agreed methodology for
'confining' tenders to a sole source supplier of repair
and refit services where open competition between
qualified prime contractors is not possible. Whatever
Defence's decision might be in the case of the
COLLINS Class DLM, it is vital that the necessary
specialised infrastructure — particularly docking
facilities — should not be duplicated.

In the short to medium term this may present few
difficulties as the submarines seem destined to return
to Adelaide for post delivery dockings at least, and
both survey dockings and initial refits might also go
back to ASC while the Company is still building sub-
marines. Nevertheless it is important and urgent that
agreement be reached between interested parties over
the provision of docking services at the WAMSF, and
Defence could help achieve this, were it more willing
to work with its suppliers, and less committed to
direct competition as its preferred form of protection
against unfair trading.

Adelaide

Transfield can service the offshore oil and gas
industry from its Adelaide facility (ex-EGLO) and
Navy's four modern hydrographic survey catamarans
were built there, ANZAC modules are within the
facility's capability too, as are patrol vessels, but geo-
graphic considerations alone make it unlikely that
shipbuilding, and for that matter, ship repair, will ever
become core activities for this part of the Company.

ASC suffers similar isolation from Navy's main
and operating bases, and associated ranges and exer-
cises areas, and it is difficult to contemplate a long
term future for the company outside submarine build-
ing. COLLINS Class maintenance alone will not
provide a sustaining workload and there is unlikely
ever to be sufficient major surface warship building in Australia to justify a start-up in this field, in Adelaide. It is not the intention of this article to explore the future on an individual company basis but earlier remarks about the industry's need for a government frame of reference are most relevant here.

Reference has been made to Defence's capital acquisition strategy creating excess capacity in the industry — in the new submarine's case as both sponsor of the successful bidder and as participant (through AIDC) in the company formed to discharge the contract. The view was also expressed that the government must therefore take a lead in tackling the resulting issue of excess capacity and in doing so it must avoid the pitfalls inherent in a situation fraught with the risk of conflicting interests. Any federal government desire to support a company in which it has such an interest through its order book, in the search for continuing viability, must not be allowed to translate into the preferential feeding of domestic work to the Company. Support must obviously be confined to the Company's export activities, and it would have to be achieved at arm's length, as in the case of the Government's support for Transfield's Patrol Vessel marketing endeavours in South East Asia.

The Government's greatest responsibility is to ensure the continuing viability of a sustainable, efficient, capable and internationally competitive industry. It must share in planning that industry's future; it must not leave it for the survival of the fittest. To do so would risk further wasted outlays and irreparable damage to the shipbuilding industry as a whole.

Retention of Reserve Capacity

As observed earlier, the Defence ship building and repair industry requires expensive equipment and other infrastructure which is seldom used. Examples include the Captain Cook graving dock, the GMLS 13 building and the 250 ton hammerhead crane, all at ADI NED's Garden Island facility. Indeed all capability and capacity which is retained simply to meet an occasional Defence need — or in the case of equipment for battle damage repairs, a potential need — can be considered to be 'reserve capacity' and it is unreasonable in the commercial world to expect suppliers to retain it as a charge to the overhead, to be absorbed in the price bid for competitive work.

Options range from the Federal Government taking direct responsibility for its care and management, to
contracting out the management and operating task altogether. An option that the writer favours is a development of the German naval arsenals, but with management contracted out. This could be an attractive option for parts of Garden Island (East) were ADI NED to be sold off.

Merchant Ship Building and Repair

It was acknowledged at the beginning of this article that Transfield’s particular interests lie in major and minor warship building and repair on the one hand, and in specialised commercial vessels on the other. It was also suggested that it should be possible to extrapolate from this base with a degree of accuracy, to cover other aspects of merchant shipping as well.

Little more need be said about the very successful speciality markets: the luxury craft and the fast, largely but not exclusively multi-hulled passenger and vehicle ferries, and the same is probably true for the equally successful fishing vessel business.

There is no room for complacency but given the currently more realistic currency exchange rate and the runs already on the board, there should be no reason why this highly efficient sector of the industry should not continue to be successful. It is also already a highly competitive industry within Australia, with a fair number of players on the field. Infrastructure investment needs are modest, and product diversification is possible during market downturns. In short, the industry is largely self regulating.

Australia presently builds no “major” merchant ships, that is, above say 6000 tonnes displacement, and so the question is whether it is realistic, or indeed desirable that such a capability should emerge. Both answers are “probably not”, given investment and start-up costs and the learning curve, and observing too, that Australia would be unlikely to benefit on a broader national front from an exchange rate which made our waterfront labour rates competitive with those in countries where shipbuilding is a sunrise industry.

Summary

Since its rebirth only a few years ago, the ship building industry in Australia has made impressive progress in both the Defence and commercial fields. On the commercial side the industry has focused on niche markets and in some of these it can claim membership, if not leadership, of the world market. The outlook for this sector as a whole is probably pretty secure, but in any case its numbers and level of investment permit flexibility and self-regulation to accommodate peaks and troughs.

Warship building on the other hand, is at the crossroads. Elements of the commercial sector have the skills and capacity to build minor war vessels, with varying degrees of design and engineering support from the purely Defence shipbuilders (Transfield WA is an excellent example here), but the “big three” are facing the prospect of a serious and prolonged mismatch between capacity and investment on the one hand, and production contracts on the other. The orders which are presently in prospect will help preserve hard-won engineering and management skills; but whilst the importance of the physical work that these orders represent for the industry as a whole cannot be discounted, it will do very little to support the large and expensive facilities at Garden Island (East), Williamstown and Port Adelaide.

Retention of a skilled and capable core capacity for the design and build of sophisticated submarines and surface combatants to destroyer size must surely be a national priority; the problem is how to achieve it from the approaching situation of significantly excessive capacity. To leave it to market forces to resolve would be to put the whole industry at risk of failure, or of a return to the subsidies of yesteryear. A far better approach is for the Government and the Industry to work closely together to find a mutual solution — and the time to do it is now.
The warship repair industry is also due for reappraisal, occasioned not only by the approaching end to ADF’s lien on east coast surface ship repair at its Garden Island Facility but also by the changing nature of maintenance, and by the Navy’s migration north and west. The linkages between warship building and warship repair are strengthening and though Defence work is inherently more costly, there is nonetheless a synergy between naval and commercial ship repair which should help win an expanding share of the latter, at least in the vicinity of international terminal points. Capturing a share of this market will become increasingly important to the industry, as the total quantum of naval work declines; the rate of decline being offset, perhaps, by a transfer of tasks under the commercial support program.

All in all, the outlook is assessed to be cautiously optimistic for the niche market commercial sector and “challenging” for the Defence sector. A degree of rationalisation and downsizing of the latter appears unavoidable and increasingly urgent. Close consultation and co-operation between Government and the Industry is likely to produce the best result for Australia.

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The Application of Stirling Engines to Air Independent Operations — Lessons for the Collins Class to be Drawn from the Swedish Experience

By Janis Cocking, Ship Structures & Materials Division, MRL, DSTO.

Introduction

The commanding officer and crew of any submarine on active duty desire unlimited amounts of energy to enable them to undertake their mission, be it an active or the more passive surveillance role. The only submariners who have access to energy of this type are those who serve in nuclear submarines. For the remainder of the submarine community, submerged operation is limited by the capacity of the batteries in the submarine. The batteries in conventional diesel-electric submarines have to be recharged periodically by running the diesel engines at, or close to, the surface, where they have access to the air that they require. To minimise such exposure, there has been and continues to be an ongoing need to improve the submerged endurance of conventional submarines.

To achieve the required underwater performance of submarines, the current state of development of non-nuclear systems is such that they provide power which supplements, rather than replaces, battery charging by existing main propulsion systems. The need for oxidant for these systems is met by taking a supply of oxygen with the submarine, rather than by approaching the surface to use air. This led to the term “air independent propulsion” (AIP) being used as a generic description of these systems. In Sweden the need for AIP is currently being met by Stirling engines. This article outlines the development of Stirling engine technology in Sweden and describes some of the similarities and differences which need to be considered if a similar system is to find application in Australia. A description of the operation of the Stirling engine is appended at the end of this report.

Swedish Involvement in Air Independent Propulsion

Many people are aware of the closed cycle diesel and turbine systems developed by the Germans in the 1930s and, in particular, the subsequent British, American and Russian developments during the 1940s and 1950s. In contrast, fewer people are aware of the development of air independent propulsion systems in Sweden. Sweden started working on AIP systems in the 1950s. Their first efforts were centred on closed cycle diesel engines. A closed cycle diesel demonstrator was produced in the mid-to-late 1950s. This operated well at partial loads, but did not perform at full load, partly due to materials which did not meet the requirements, and partly due to lack of stability and sophistication in the control units available at that time. At high loads it had a tendency to catch fire.

During the 1960s ASEA was contracted to provide a fuel cell demonstrator for use in the Sjoormen Class submarine. A demonstrator was produced. Once again this system worked well under partial loads, but there were problems with the materials and the control systems available at that time. Again there was a tendency for the system to catch fire at full load. Because of this the fuel cell project was abandoned.

In the late 1970s a third examination of AIP was begun. This time the Stirling engine was the candidate system. The first engine examined was a four cylinder U-configuration engine which was rejected as it had high vibration levels. Development of the four cylinder V-configuration Stirling engine began in 1982. The test rig unit was ready for trials in 1985. The project team included the Swedish Defence Materiel Administration organisation Forsvarets Materielverk (FMV), AGA-Cryo, Kockums and United Stirling. The latter firm was bought out by Kockums and now forms part of Kockums Submarine Systems AB (KSUB). The design of the add-on section for the submarine Näcken (project TIN-TIN) was undertaken at the same time as the engine and the engine control system were being developed.

Näcken was sectioned in December 1987. An 8.4 m long, 214 m², 220 t, self-contained plug was inserted aft of the fin and forward of the main engine room. This neutrally buoyant plug contained two Stirling engines and generators, accommodation for two engineers to operate the system, fuel and liquid oxygen (LOX) tanks, heat, fire and smoke detectors, a halon system, safety valves for the LOX system, weight compensation tanks, heat exchangers, the microprocessor control units, and small helium tanks. The
main helium storage tanks, and the nitrogen tanks used for purging the combustion chamber, were located external to the pressure hull, beneath the casing.

The Näcken was relaunched on 6 September 1988 and sea trials were conducted from November 1988 to February 1989. The first three-day completely submerged Stirling powered voyage was undertaken in December 1988. The submarine has been fully operational, rather than experimental, since 1989.

The Stirling engines installed in the Näcken have accumulated a combined total of more than 8000 engine operating hours. The Royal Swedish Navy and FMV have measured many aspects of the performance of the Stirling engine system and its effects on the performance of the submarine since the system was installed. These include:

- effects on signatures
- fuel and oxidant usage, storage and safety
- reliability and availability
- manoeuvrability
- air purification requirements
- physiological effects on the crew
- training requirements
- advantages gained with the use of Stirling engines

Effects on signatures

Noise levels generated by the Stirling engine which have been measured by FMV, the Royal Swedish Navy and by DSTO personnel are, naturally, not published in the open literature. However, information has been published that shows that engine vibration of the V4-275R Stirling engine, compared with an equivalent size direct injection diesel engine, is of the order of 15-25 dB less at the higher frequencies and not less than 8-10 dB at shaft frequencies. The noise signatures meet the requirements for silent operation under normal electric drive.

The exhaust products are water, carbon dioxide and a small amount of oxygen. These exhaust products are cooled prior to expulsion overboard, removing any thermal signature. They are also treated so that their effects on noise signatures are minimal.

Fuel and oxidant usage, storage and safety

On the Näcken oxygen is stored cryogenically in two tanks located below the engine deck. The tanks were designed for shock resistance and to minimise thermal losses. Analyses, performed to determine which tank shape would provide minimum losses, showed that two smaller tanks would be better than one large tank. Shock tests have been performed on the Näcken with the entire air independent propulsion system installed. The AIP system survived the tests without incident.

Oxygen is delivered by a road tanker and the time of filling is only dependent on the amount of oxygen loaded. Depending on the length of the mission, LOX can be loaded into either, or both tanks. The handling and storage of LOX is reported to be trouble-free. The submariners on Näcken say that they are more concerned about the normal build up of hydrogen from the batteries than they are about the safety of the LOX system.

The fuel used in the Stirling engines on Näcken is known as Citygas. This liquid diesel fuel, which contains around 10 ppm sulphur, is commonly available in Sweden. It is stored in the same section of the submarine as the LOX. The Stirling engines on Näcken originally used Lakhnita (EXXSOL D60), which contains around 1 ppm sulphur. The DSTO Stirling engine currently uses Lakhnita. The engineers on board Näcken reported that the use of Citygas had not presented any problems to the operation of the engine.

Reliability, availability and maintainability

The reliability and maintainability of the system has been shown to be acceptable. The Stirling system was reported to have a reliability figure of 82.4 per cent during 1989 (and 100 per cent during the last six months of that year) and 89.9 per cent during 1990. Figures for mean-time-between-failures and time-for-repair have also been calculated. The engine crew do all engine maintenance themselves, including larger overhauls required at 1000 h intervals. The Näcken carries a full set of the tools and spares required to repair the Stirling engines. If one engine has to be shut down for an onboard repair, the other engine remains in use, thus avoiding the need to draw power entirely from the batteries or to surface to recharge the batteries, as might happen if a single, larger engine was used.

Manoeuvrability

The section inserted into the Näcken increased its length to diameter ratio from around 8.7 to approximately 10. This resulted in an increase in the turning diameter of around 10 per cent. Adjustments had to be made to correct for overshoots on diving, but manoeuvrability in the vertical plane was said to improve.

Air purification requirements

Conventional diesel-electric submarines contain air purification units. Generally, these units operate by passing the air through chemicals, such as sodium hydroxide or monoethanolamine, to remove the carbon dioxide from the atmosphere. The atmosphere is
supplemented by taking in fresh air during times when the batteries are being recharged. When AIP is being used, the latter is no longer available, and the performance of the scrubbers becomes even more critical. On Näcken air is circulated in a split system. The air in the aft section of the submarine is scrubbed at a lower rate than that in the forward section as, generally, only a limited number of the crew work in the aft section. One of the limits on the submerged endurance of Näcken was the amount of soda lime required for purification of the atmosphere in the submarine. This has been addressed, although further studies continue to be made.

Physiological effects on the crew

As is common with many submarine operators worldwide, the concentration of oxygen onboard Näcken is slightly less than that in the atmosphere at sea level. A test program involving several institutions, including FMV and the Swedish Defence Research Establishment, was established to assess a range of factors including noise, light, extended confinement, air quality and hygiene. This program is ongoing. The crew report that, when the submarine is underway, they prefer to work when power is being supplied by the Stirling engines, rather than the main diesel engine, as there is an absence of diesel-fume smells, noise, vibration and sudden pressure drops when the Stirling engines are in use, and my own experience on Näcken supports this.

Training requirements

The engine crew onboard Näcken received their initial training at KSUB. It takes between six and nine months learning how to operate and repair the system. This length of time is partly determined by the amount of time it takes to feel familiar enough to make repairs. As a result of their training, the Royal Swedish Navy operates the engines independently of the engine manufacturers.

Advantages with the operation of Stirling engines

Several advantages have been gained from the installation of Stirling engines onboard Näcken. These include increased submerged endurance; lower indiscernibility; and ease and rapidity of use and shutdown. This enables flexibility of operation of the system when needed, with the capability to spend more time on station in areas which might reasonably be considered to be under greater surveillance. It also enables recharging of the batteries while submerged and has improved battery life. The total submerged endurance of the Näcken has been more than doubled.

Repercussions for Australia

The Royal Swedish Navy operates almost exclusively in the Baltic Sea. The Baltic is shallow (on average about 55 m, with a maximum of around 450 m), has levels of salinity which vary with depth, a rocky bottom, and a water temperature which ranges from close to freezing during the winter to around 20°C in summer. The distances that the submarines must transit to reach the patrol area are small and, essentially, patrols begin from the moment that the submarine leaves its home base.

The range of water in which the RAN operates is much more extensive. Australian submarines need to transit larger distances before a patrol commences. The waters around Australia extend below 200 m beyond the continental shelf, have temperatures which may be more than 32°C, and have bottoms ranging from sandy to rocky.

The Näcken is 220 t heavier and 8.4 m longer than the other submarines of its class. Näcken has a submerged displacement of around 1305 tonnes, in comparison with Collins, whose submerged displacement is of the order of 3300 t. Näcken has a crew of around 24 people, in contrast to the Collins 42. In the Näcken two Stirling engines provide propulsion power for 5-knots and the "hotel" load. With a full load of oxygen the Näcken could remain submerged for up to two weeks. The three new Swedish A-19 (Gotland Class) submarines, which will have a displacement of 1485 t, will also contain two Stirling engines.

If Australia was to fit Stirling engines to the Collins Class submarine, the experience gained by the Royal Swedish Navy would have several direct areas of application. In addition there are several areas where differences occur.

Direct Parallels

The areas where the Swedish experience which, in some instances is complemented by R&D undertaken by DSTO, is of direct applicability to Australia include:

- The design and integration of an AIP system into a submarine.
- The storage, filling times and safety requirements for handling LOX and fuel. The logistics of LOX and fuel supply are a separate issue.
- The effects on signatures. In addition to the information which may be provided from Sweden, DSTO has measured the airborne and structure borne noise levels of the Stirling engine over a wide range of conditions, and has investigated handling the exhaust products.
• The reliability, availability and maintainability. Information on these areas comes from KSUB, from operation on Nacken and from testing undertaken by DSTO.

• The physiological effects on the crew.

• The training requirements.

Extrapolations

Areas where the Swedish experience could be extrapolated to provide some indications of Australian needs are:

• The effects on manoeuvrability. The Näcken was increased in length by 8.4 m which, in turn, increased the length to diameter ratio of the submarine from around 8.7 to around 10. The length to diameter ratio of the Collins Class submarine is of the order of 9.6. If a plug was inserted the length to diameter ratio would probably lie in the range 11.1-11.5. Naval architects need to examine possible effects on factors such as drag, manoeuvrability and sonar target strength.

• The air purification requirements. The Näcken carries a total of around 24 people, while the Collins carries a crew of 42. The experience gained by the Royal Swedish Navy would provide an indication of the additional requirements for air supplies, air purification and air conditioning. DSTO has a program in which air purification techniques are being investigated.

• The fuel and oxygen usage. Information in this area is also available from results of investigations by DSTO.

• The energy storage requirements. The Näcken carries a total of around 24 people, while the Collins carries a crew of 42. The experience gained by the Royal Swedish Navy would provide an indication of the additional requirements for air supplies, air purification and air conditioning. DSTO has a program in which air purification techniques are being investigated.

• The logistics for the supply of LOX and fuel.

Differences

There are some areas where the differences in operational requirements, or other factors make an extrapolation either less possible or impossible. The differences in transit distances, missions and ocean depth and temperatures between Sweden and Australia create some problems which are unique to Australia. Some of these have already been addressed by DSTO. For example:

- The Stirling engine relies upon seawater to provide cooling. As the waters around Australia are much warmer than those in the Baltic, DSTO has investigated the effect of the temperature of cooling water from 17°C to 37°C on the efficiency of the engine.

- The Stirling engine operates at high combustion pressures. This means that the exhaust products can be expelled directly overboard, without the need to consider the introduction of a compressor, or an exhaust management system, as has been developed for use with closed cycle diesel engines. However, the limiting depth for the current system is less than the maximum diving depth of the Collins Class submarine. This is an area which DSTO has under consideration.

Alternative Air Independent Propulsion System

The Stirling engine is not the only system which has the potential to provide a submarine with air independent propulsion. There are several other non-nuclear options currently at various stages of development.
A 75kW, V4-275R Stirling engine undergoing assessment in the submarine propulsion facility at MRL. The engine is on the left of centre. The exhaust gas cooler is in the centre and dynamometer (which replaces the generator used in a submarine) is under the red cover. The engine-control microprocessor is mounted on the wall inside the test cell. Its command and display screen can be seen in the centre foreground.
The closed cycle diesel engine, at first examination, would appear to be a favoured option as the diesel engine is a mature technology, with which Navy personnel are familiar. However, the closed cycle diesel is somewhat more sophisticated as, like the Stirling engine, it relies on microprocessor control. In addition, as the closed cycle diesel engine operates at low pressure, the exhaust products require special treatment before being expelled overboard. The most mature system to deal with the exhaust has been developed in the UK, in separate collaborations with people in Germany and the Netherlands. This exhaust management system is about the same size as the engine itself, and results in a sizeable drain (of the order of 10 per cent) on the efficiency of the system. Since the 1970s, closed cycle diesel engines have been installed in three mini-submarines which have had displacements of the order of 25 t, 50 t and 120 t.

A closed cycle diesel engine trial was started in a German Type 205, 450 t, submarine in 1993. The initial reports from this trial are favourable. Germany is reported to be offering closed cycle diesel engine AIP for retrofit to the export market.

In summary, the Stirling engine is the most mature of the AIP systems currently available. It is the only system in use in a military submarine for which reliability figures have been provided. This means that, if it provides the necessary energy, and if the design figures show that the effects of extending the Collins submarine are not likely to be deleterious, the Stirling engine system provides the lowest risks, if a system was required today. Depending on the rate of development of the alternative systems, this may not be the situation in a few years time.

Description of Stirling Engine Operation

The V-4-275R Stirling engine is a closed cycle, continuous-external-combustion engine. This engine was specifically designed for air independent propulsion operation in submarines for the Royal Swedish Navy. It has four cylinders arranged in a V-configuration. Each cylinder has a swept volume of 275 cm². The cylinders are surrounded by annular coolers and regenerators. The engine has a maximum power output of 75 kW, and is rated at 65 kW for sustained operation.

In contrast to internal combustion engines, the Stirling engine has no cylinder inlet or exhaust valves. The Stirling engine operates by cyclic compression and expansion of helium, at low and high temperatures respectively. Helium is passed through tubes in the combustion chamber, where heat is supplied by the combustion of a refined diesel-type fuel in gaseous oxygen at high pressure. The double-acting pistons move the helium between the cylinder space below one piston, (the cold end), through the annular coolers, annular regenerators and heater tubes to the space above another piston. Heat is either given up to or extracted from the regenerator, depending on the direction of fluid flow. The difference between the work required to compress helium when it is cold and the work extracted when it expands as a result of being heated is transferred to the crankshaft by the pistons.

The engine is commonly operated at one engine speed and the power output is varied by changing the pressure of helium in the engine. The average helium pressure inside the cylinders controls the amount of...
Cross section of the V4-275R Stirling engine.
power that the engine produces for a fixed combustion temperature which, in turn, is controlled by the fuel and oxygen flow. Increasing the helium pressure increases the power output of the engine. A microprocessor sets the fuel and oxygen flow to meet the demanded power level, then controls the temperature in the combustion chamber by varying the helium pressure inside the engine. The power levels of the V4-275R engine are usually set at seven basic positions ranging from 25 to 75 kW. However, the engine can be operated at any output to within a few kW between these lower and upper limits if required.

Beneath the combustion chamber, shown in the diagram, is the cylinder block which contains the annular coolers, cylinder liners, the cold-end piston rod seals and check valves for controlling the helium. Below this is the crankcase. Due to the near-sinusoidal cylinder pressure variations, the crankshaft is almost perfectly balanced by two balance shafts and this results in an extremely low level of vibration. As the pistons in the V4-275R Stirling engine are double acting, with gas pressure acting on both sides of the pistons, the gas pressure forces transmitted to the crankshaft bearings are to some extent reduced. This, together with the short stroke, approximately half of the bore diameter, helps to minimise inertia loads on the bearings. Bearing loads are the main source of mechanical noise from piston engines. The noise level, compared with other piston engines, is therefore very low, but the engine is not silent.

On a submarine, the energy extracted by the crankshaft from the pistons, is fed to a generator connected to the main power grid.

NOTES


Janis Cocking is a principal research scientist with the Materials Research Laboratory of the Defence Science and Technology Organisation (DSTO). She currently manages the Australian program on the technical assessment of Stirling engines. As part of this program she spent several days on the RSN submarine Närhen in June 1993. She also manages a program on ceramics for use in diesel engines. She is the Australian National Leader of a panel which initiates and conducts collaborative international research in ceramic materials used in Defence applications in Australia, Canada, UK and the USA.

"WORKING TOGETHER FOR DEFENCE COOPERATION"

Ordnance

In order to ensure Australia's self-reliance, Australian industry has developed the capability of design, testing and production of a wide range of the Australian Defence Force's ordnance requirements.

The Defence Science & Technology Organisation (DSTO), in close collaboration with Australian industry, is at the forefront of technological developments in command and control, targets, acquisition and tracking, and decoys. Australian industry's commitment to the most modern technologies for the production of ammunition, rifles, guns, etc, has ensured that the ADF and Australia's regional neighbours can be self-supported.
Commercial Support for the ADF —
Lessons, Implications and Future Directions

By Commodore Paul Cashier, DGCSP, RAH.

Introduction

Defence's Commercial Support Program, or CSP as it is conveniently known, commenced in mid-1991, following Government acceptance of the report of the Inter-Departmental Committee into the Wrigley Report — "The Defence Force and the Community — Partners in Australia's Defence".

In seeking greater connection between Defence and the community and with a particular focus on Australian (meaning Australian and New Zealand) industry, the CSP permits Defence organisations performing "non-core" support activities to be subjected to direct competition with commercial companies. This competition will transfer such support activities to industry where Defence gains demonstrably greater value for money than could be obtained from continuing the tasks in-house.

Simultaneous competition between Defence organisations and industry makes the CSP more than a simple outsourcing process. The interaction between Defence managers, staff, unions, industry associations and individual companies is building a closer and more constructive relationship between the players which is fundamentally valuable to Australia's defence environment.

Where CSP is and where it is going

In the nearly three years of very significant effort across the whole Defence Organisation, the outcomes of 49 separate decisions have been:

- 31 decisions to industry (69 per cent);
- 14 to in-house (31 per cent);
- four activities have remained as they were before competition;
- Savings of $83 million (more than 30 per cent) have been identified so far; and
- more than $650 million in CSP business has been written.

By the end of March 1994, Defence's Program Managers will have completed the initial determination of core/non-core functions and associated constraints. Between March and the end of June, the total population of non-core activities available for CSP evaluation will be defined, together with the planned schedule for each evaluation over the period to 1998. This projection of the balance of the CSP will be made available to industry and unions at the end of June 1994, and will significantly assist industry and Defence in long term planning to bid for logistic service contracts.

In 1991, estimates put the population of people within Defence working in non-core activities at more than 20,000. While the effort to date has evaluated the work of more than 4600 people, we really do not have complete confidence in the 1991 figure, and therefore cannot be sure just how much of the non-core is yet to be examined. By mid-1994, this question will be answered, and we will appreciate clearly the dimensions of the CSP opportunities and effort to come.

The processes of determining core and non-core activities within Defence should best be seen as evolutionary in nature. As our attitudes mature and to meet changing circumstances, there will be a need to revisit original core/non-core determinations, and to treat prior decisions as a basis for future consideration rather than as set in stone.

Reactions of People Within Defence to the CSP

There is little doubt that the CSP has impacted on personnel at all levels across the whole Defence Organisation. The program has brought out the flexibility and desire to respond to challenge inherent in both our military and civilian personnel. CSP has also catalysed normal resistances to change. Overall, personnel at all levels have responded positively. The tremendous effort to reach 49 decisions cannot be understated, particularly as CSP is an overlay on what is already a well occupied but resource constrained organisation.

For senior managers within Defence, the Commercial Support Program has generally been seen as an opportunity to generate savings in the non-core that can be applied to the core. There has also been the hope that the discipline of the CSP would institutionalise some fundamental changes in management
approaches throughout the Organisation, not just in non-core elements subject to competition with industry. While very satisfactory long-run savings are now being identified and senior management support is strong, CSP is still generally seen by too many as a special process, separate from the mainstream of Defence activity, and there is not yet any general appreciation of the value of switching from a process mentality to one of concentration on outcomes and on innovative ways of achieving them. Cultural as well as procedural barriers also continue to constrain consideration of CSP opportunities across internal corporate boundaries and, while this an issue for Defence, the problem is not unknown in all large organisations.

In 1991, many middle-level managers saw the CSP as “just another review” and that, if they ignored it long enough, it would go away. Progressive building of awareness of the opportunities as opposed to the threat of competition with industry has achieved a view across Defence that CSP can do good things for individual managers as well as for Defence. There is still resistance to the program, but this is declining. What is needed now is for these all-important middle managers to be empowered to both take risks and to seek innovation in exploitation of the CSP.

For perhaps the first time in their working lives many Defence personnel (both military and civilian) have come to experience a general community issue — that jobs are no longer inherently secure. The Commercial Support Program is not the only influence in this context, but it is widely appreciated as having the greatest potential impact over time. It is to the great credit of the majority of our staff that they have acknowledged the impact of CSP and have worked hard to create competitive bids for their future work. The winners in the competition are to be congratulated. Those unsuccessful people deserve professional and caring management of their transition to other employment either within Defence or in another environment.

It is clear that, at all levels of the Defence Organisation, the CSP will continue to impact established cultural, policy and procedural foundations, and will challenge us all to evolve as individuals and as organisational members.

CSP as a Driver of “Best Practice”

Any decision to commercialise the delivery of a support function or activity should be based on the answer to one simple question, “What is the best way to deliver required support outcomes?” While the CSP is clearly not the only means of approaching this answer, the CSP does provide a disciplined methodology for evaluating between competing options, and allows managers to concentrate on the intrinsic value to Defence of each option, and in a way that is consistent across the entire Defence Organisation.

Only non-core support activities are reviewed using the CSP methodology. Determination of what is core and non-core has been based on allocating a category to a function or activity. At one end of the scale, combat and combat related activities are clearly core; at the other end activities considered to be Defence related infrastructure are clearly non-core. In the past, much of what sits in the middle has been considered core, in my opinion, often inappropriately. I agree with Wrigley (p.371) when he suggests:

“The dividing line separating activities that would on one side be best carried out by military personnel and on the other by civilians — either privately or publicly employed — can never be sharp and beyond debate.”

However, many within the Defence Organisation have taken a very conservative view of whether an activity needs to be performed by Defence personnel (military or civilian) or whether it really could be undertaken by a commercial provider. The fact that something has hitherto been performed by Defence personnel does not necessarily mean that it need continue to be so.

The concept of “Department of State”, with its seemingly inherent levels of responsibility to Government, has also been widely used as a reason for not passing work to the private sector. This is really a spurious argument. The issue of what is available for CSP evaluation, even in the so-called policy areas, merits further objective debate. It is clear that, as in many other areas covered by CSP, that the conventional wisdom cannot remain unchallenged.

While CSP is characterised as a methodology for the non-core, there is a small but growing population of managers throughout Defence who see CSP’s use of competition and a consistent evaluation methodology as just as applicable to the search for best value for constrained core resources.

In-House Bids — The Major Concern to Industry

When the CSP was introduced in mid-1991, Defence promoted the central objective of “transferring non-core support activities from Defence to
industry where operationally feasible, practicable and cost effective to do so”. Many within the defence industries interpreted this as guaranteeing a significant increase in new work. As competition between in-house and commercial bidders hotted up, and as some in-house bids became winners, the true nature of simultaneous competition for support activities became the major issue of Defence/industry CSP relations.

Industry sees in-house bids as unwelcome entrants to an already crowded market, and actively lobbies for their removal. Defence takes the view that, by offering in-house work to industry, the overall size of the market is increased. Defence also supports the Government’s policy principles of free and open competition, and is comfortable that this applies as much to in-house as to external bidders. While the two sides retain their own positions, in-house bids have clearly strengthened overall competition and median savings remain ahead of Defence’s original projections of 20 per cent.

The optimist would suggest that both sides are gaining from CSP — Defence gets improved outcomes for its money, the capability of bidders is improving on both sides, and industry is gaining new business in an expanding market.

**Future Impacts of the CSP on the Defence Organisation**

The Commercial Support Program initially addressed non-core activities such as base support, catering and aircraft maintenance, and all within the eight individual Defence Programs (of which Navy, Army and Air Force are the major three). From these beginnings, the CSP is widening its perspective into training, delivery of information services, material storage and distribution. While opportunities within individual Programs prevail, horizontal integration across Programs is now being given more senior management attention through pilot activities to evaluate the life cycles of administrative forms and non-combat clothing. Wherever there is a support function performed in more than one Program, integration opportunities may exist, and considerable management flexibility will be required to exploit them. The challenge here is not to acknowledge the technical issues but to confront cultural and business isolationism of individual Programs in the interests of achieving a better outcome for the whole Defence Organisation. Therefore, opportunities in functions such as information services, telecommunications, training, distribution, as well as in regional and national administrative support, will need to be addressed. Whether we have the right organisational and management structures to accommodate and exploit the future remains to be tested.

In seeking best value for money from support tasks both contracted and performed in-house, Defence managers will increasingly concentrate on demonstrating real outcomes against projections made at CSP decision. The present transition from cash to accrual accounting base is very timely for managers of CSP activities, for this provides the basis for a significant switch to resource management from initial activity level to successively higher aggregations and finally to the Defence budget level. The key to Defence’s ability to demonstrate outcomes against plan to itself and to external parties is the capture of resource allocations by both contractors and Defence — people, plant and equipment, facilities, materiel, utilities — at the activity level.

Progressively more non-core activities will be performed by industry and the in-house facilities that used to provide skill and experience development for core personnel will no longer exist in-house. In such cases, it is inevitable that more of our people, particularly technicians, will work at contractor sites when not employed in the field. Rather than being a problem to both parties, we might all see this as a significant opportunity to give our people more variety in their professional development, and for a closer relationship to evolve between Defence and industry. If this leads us more to greater reliance by Defence on the civilian infrastructure, then both sides stand to gain.

**Conclusion**

This article has looked at some of the ways Defence’s Commercial Support Program is affecting the Defence Organisation, its people and its present attitudes and future directions. There is no doubt that the CSP has already brought changes, benefits and challenges to people at all levels. The program has clear benefits but it also impacts organisations and individuals. CSP is, however, here to stay and, if treated as an opportunity by Defence and its industry and union partners, the program stands to bring better value for Defence’s support dollars, improved organisation for delivery of support outcomes and improved relationship with industry over the next four to five years.
Return to Greece

*Return to Greece* is an *Australian Defence Force Journal* production highlighting the 50th Anniversary of the Australian Defence Force's participation in the Allied struggle of the Greek Campaign of World War II.

In 1941, Greece fought for survival against the might of Germany. The Greeks, aided by Australian, New Zealand and British forces fought to ward off the invasion of their homeland. *Return to Greece* tells of these battles and of the Allied evacuation.

*Return to Greece* revisits the sites of the battlefields through a selection of 50 water colours and drawings. The book takes the reader on a journey with the veterans of the Greek Campaign through the country where they fought valiantly with their Greek comrades in defence of democracy. It illustrates the pride and professionalism of today's Australian Defence Force personnel as they pay tribute to the memory of those who fought with such bravery and self sacrifice in the cause of freedom in the dark days of 1941.

This book will rekindle memories for those who took part in the campaign of 1941 and also for those who participated in the return pilgrimage in 1991.

*Return to Greece* is illustrated by Defence artist, Jeff Isaacs with text by Michael Tracey.

*Return to Greece* is available from the *Australian Defence Force Journal* at a cost of $20.00.
Australia’s Defence and Related Export Controls and Exports into Southeast Asia

By Peter Quinn, Department of Defence.

E xport controls are not only an integral part of the long-term viability of defence industry in that they help assure continued access to important foreign technology, they also help ensure that the wider Australian national interests, ie. political, strategic and human rights issues, are given due weight. Against this positive framework, there seems to be a persistent negative view that the application of export controls is a mechanism which significantly reduces the potential for defence exports. In fact very few exports of either dual-use or defence and related goods are denied as a result of the controls. For example, in the 13 months to 30 January 1994, less than 0.4 per cent of potential defence exports were denied. This article will outline the background to Australia’s export controls and their adaptation to changing circumstances over the years. It will also look at the changing security environment in the region and show how the current policies will meet current and emerging regional challenges.

Background

Australia has had some form of control on the export of military goods since Federation. In 1910 the Customs Act included a provision that the Governor-General could, by proclamation, prohibit the export of military goods or goods considered to be harmful to the Commonwealth. It was not until after World War II that more considered controls were required to meet new circumstances. There was after the war, not only a significant supply of surplus war materiel and considerable defence manufacturing capability developed during the war, but also ready demands for such goods in Australia’s immediate region of interest as internal conflicts accompanied decolonisation in Indonesia, Malaysia, India and Pakistan, as well as in Indo-China.

In 1950, the Government decided that defence materiel in quantities and categories of military significance should be exported in time of peace only in circumstances where such arms and stores were not required by the Australian Defence Forces, or where the defence of Australia would be assisted by the proposed export; and where the request for supply had been made by a member government of the British Commonwealth or by the United States or a country whose defence would assist the defence of Australia, or in special cases authorised by Cabinet. In language familiar to current policy, exports were not to be made to a country engaged in, or likely to be engaged in, hostilities with a Commonwealth country or the United States; to a country against which the United Nations had instituted measures; or which was employing its forces in a manner contrary to a decision of the United Nations Security Council, or a recommendation of the United Nations General Assembly.

These controls were put in place through the Customs Act 1901 and the Customs (Prohibited Exports) Regulations. Regulation 4 included in its Second Schedule of controlled goods, Part III — “Arms, Explosives, Military and Naval Stores”; and Part IV — “Goods Capable of Being Used for the Purposes of War”. Goods on the Schedule could not be exported without the consent of the responsible Minister.

In the main, the controls when put in place affected only goods to be exported from existing military stores or from government factories producing military goods. It was not until the 1970s that a changing industrial base prompted a renewed look at the Regulations. An Interdepartmental Committee (IDC) Review, flagged in 1973, was completed in 1975 with a follow up review in 1978. The reports of these reviews were, for the first time, conscious of the role private industry would play not only in equipping the Australian Forces, but also in exporting military and related goods to Allies. This was no doubt influenced by the new offsets policy introduced in 1973 and the Australian industry participation policies which recognised the need for exports and joint ventures if Australian defence industries were to become commercially viable. The 1978 review in particular considered that export sales to ASEAN and the Pacific were possible and needed to be promoted through Embassies, Defence Attaches and Trade Commissioners.

An outcome of these reviews and policies was the recasting of the Export Regulations in 1979 with the introduction of Regulation 13B and the transfer of responsibility for approval of exports from the Minister for Productivity to the Minister for Defence where it has remained since. The new Schedule 13 listing the
controlled goods was also revised. A feature of the 1979 export controls was that the policies and operational guidelines, including the criteria for assessment of qualifications to export military and related goods, were not made public. There was a sense that the policies themselves would attract more contention than any exports which might become public.

The 1980s were active years in the Department of Defence's attempts to formulate appropriate programs for industry covering preferences in procurement. The 1986 Review of Australia's Defence Capabilities and the Cooksey Review of Australia's Defence Exports and Defence Industry emphasised the need for the development of defence industry. Beazley's 1987 white paper gave additional impetus to the call for "self-reliance" in Australia's defence posture. Part of this translated into promoting Australian industry capabilities so that they could adequately support the Australian Defence Forces which in turn led to a focus on defence export control policy. During the 1980s Australia was also showing considerable interests in international export control policy and was looking to membership of the Coordinating Committee on Multilateral Export Controls (COCOM) and to play a role in other international dual-use control regimes such as the Missile Technology Control Regime (MTCR). Access to overseas military and related technologies was an important consideration in seeking participation in these regimes. While Australian membership of these regimes has led to Regulations controlling the export of dual-use goods specifically related to the production or delivery of weapons of mass destruction, they are not unrelated to the control of conventional arms and related defence goods, which complete the arms control measures but which are national in character and are not based on agreed international policies.

In 1988, the Government revised and decided to make public its policies on defence exports. This involved amendment to Schedule 13 but no change to the legislative basis for the controls. The public guidelines issued in 1989 made clear the Government's policy to encourage the export of defence and related goods and listed the criteria which would apply in considering applications for export. These criteria grew out of previous policies and emphasised international commitments and responsibilities (United Nations resolutions, Conventions, human rights) as well as Australia's strategic and foreign policy interests. More importantly the new policy was public and drew with it a demand for more effective administration than had been exercised in the past when industry had been subject to long delays in the consideration of approvals and had thereby lost export opportunities.

The "New" Controls

There were several principles underlying the export control policy which was formulated in 1988 and which remains the basis for current policy. In particular, the policy was tailored to fit in with the Government's general push to promote exports and therefore encouraged the export of defence and related goods where this would not conflict with foreign policy objectives and international obligations. It also reflected the belief that exports would have a favourable impact on the development of defence industries and reduce the cost of supply to Australia's Defence Forces. In broad terms, it was claimed that exports would contribute to Defence self-reliance. There was also a strong presumption that applications to export defence goods should be approved in situations where Australia's friends or allies would provide the goods if Australia were to deny the export.

The goods included in the controls were described as:

a. goods designed or adapted for military purposes that are inherently lethal, incapacitating or destructive (Part 1A goods);

b. goods which may be of major military significance, ie. goods which could be equipment, the export of which could reduce any Australian military advantage in our region and which could require major changes in Australian Defence Force equipment, operational doctrine or procedures; or which would be expected to have similar consequences for a country or countries in the region of the proposed export destination (Part 1B goods);

c. goods involving the release of classified or third country information or technology (included in Part 1B);

d. military cryptographic and related electronic equipment and software (Part 2);

e. non-military lethal goods (Part 3).

The export control policy aimed to keep to a minimum the number of goods which would be subject to the controls. It was decided that only goods which were inherently lethal, incapacitating or destructive, or which were of "major military significance" would be controlled. While a categorisation of goods which were "lethal, incapacitating or destructive" was made (Part 1A of Schedule 13), it proved impracticable to categorise goods which were of "major military significance". It was therefore agreed that Part 1B should categorise those goods which could be of major military significance, taking into account the destination and other relevant factors. This meant that for the
proposed export of a Part 1B goods, the first requirement was to determine whether the proposed export was of major military significance (this was to be determined by HQADF). If the goods were not of major military significance then an export permit was to be granted automatically. In other words, not all Part 1B goods were controlled — only those which were of major military significance.

This situation was subsequently changed in the wake of the Gulf War and concerns over exports to such destinations as Burma and Mirage sale to Pakistan. Under the revised procedures, all Part 1B applications to sensitive destinations would be referred to the Standing Interdepartmental Committee on Defence Exports (SIDCDE) for consideration. The SIDCDE had been introduced with the 1988 reforms and brought together the Departments of Defence (Chair), Foreign Affairs and Trade, Industry Technology and Regional Development, Customs, Attorney-General’s Department and Austrade to advise on export control policies and to assess sensitive applications and to make recommendations to the Minister for Defence. This tightening of the controls was announced by the Minister for Defence in his May Statement in 1991 and was perhaps a reflection of international hopes for a “New World Order” and the increasing emphasis being put by the West on democracy and human rights issues. In any case, the human rights issue was prominent in the decision to tighten the controls.

Criteria for Consideration of Applications

The policy on defence exports sets out clearly the grounds for denial of export permission, which are that Australia will not grant permits to export controlled military or related goods:

a. to countries against which the United Nations Security Council has imposed a mandatory arms embargo or which are employing armed forces in a manner contrary to a resolution of the United Nations Security Council or which are employing armed forces in a manner contrary to the provisions of international instruments to which Australia is a party;
b. to countries with policies or interests which are inimical to the strategic interests of Australia or its friends and allies;
c. to governments that seriously violate their citizen’s rights unless there is no reasonable risk that the goods might be used against those citizens;
d. where foreign policy interests outweigh export benefits;
e. if the export would be reasonably expected to result in a reduction in the Australian military advantage or would require major changes in Australian Defence Force equipment, operational doctrine or procedures; or which would be expected to have similar consequences for a country or countries in the region of the proposed export destination;
f. if the export would involve the unacceptable release of classified or third country information or technology;
g. to private organisations;¹

Review of Defence Export Policy

The export control policies are kept under continuous review with changing economic and political realities in the region. Since 1991 there have been a number of shortcomings in the policy identified and subsequently rectified. With Australia’s recent policy of strategic engagement being announced, with economic and commercial factors emerging as important issues in international and regional security, and the growing economy of the region, there has been renewed interest by our defence industry in exporting to the region. To accommodate these changes, and any changes to the non-proliferation control regimes, it is likely that the guidelines for defence exporters will need further revision in the future. One constant will be that consideration of export applications will always take into account and balance Australia’s economic, foreign policy and strategic interests and the benefits which would accrue from the proposed export.

Conventional and Non-Proliferation Controls

The post Cold War and post Gulf War environment has resulted in an international emphasis on export controls through mechanisms such as the UN Arms Register which is intended to make transparent the international flow of major conventional weapons and weapons platforms. At the same time, in the post-Gulf War environment, the US and its allies have placed great emphasis on non-proliferation measures to control the spread of weapons of mass destruction.

The non-proliferation Regimes such as the Missile Technology Control Regime (MTCR), the Australia
Group, dealing with chemical weapon precursors, and the Nuclear Suppliers Group, are based on strong internationally accepted non-proliferation norms and on close cooperation between members in the design of controls and exchange of information on suspect exports, exporters and consignees. It is debatable, however, whether the controls can, in the long run, prevent the proliferation of weapons of mass destruction. The general opinion seems to be that the regimes are effective mainly as delaying tactics and that technologies will in the end filter through to, or be developed by, "undesirables". It is argued that there must, therefore, be a parallel effort to expand membership of such regimes, thus to achieve wider acceptance of the non-proliferation and arms control norms the regimes espouse. A conference in Tokyo in October 1993 initiated this process by bringing together officials from the region to discuss export control measures.

There has been a recent emphasis on the sales of conventional arms by the developed countries into regions of rapid economic growth rather than, as in the past, transfers of military assistance programs to countries of strategic importance. The new pattern is evident in Asia where arms suppliers have been less constrained by political considerations in the transfer of weapons and more influenced by economic factors and the needs of their domestic defence industries. Increasingly, however, these transfers of modern conventional arms will involve sensitive technologies which have been the subject of COCOM controls. While COCOM will be phased out in March 1994, it is likely to be replaced with a new conventional arms regime with wider membership designed to prevent the proliferation of conventional arms and dual-use technologies. It will therefore be increasingly important to encourage wide acceptance of the non-proliferation regimes in the region and to encourage effective conventional arms control measures also.

Australia has been involved in rethinking its relationships with the region and has emphasised confidence and security building measures, transparency and closer military and defence relationships. Included in these considerations has been a view that a contribution to mutual economic and security benefit can be achieved through the co-operation of defence industries in the countries of the region, and in particular the involvement of Australian defence industry in joint ventures, collaborative arrangements and other export sales. There is therefore a twofold interest in the push into the region. One is the concern to develop a secure and stable strategic environment and to participate in this process through confidence building measures. The other is to engage more substantially in the region economically, especially through the export of goods and services.

The "Price Report" in particular argued the case for defence exports and defence industry involvement in the region and argued that the promotion of defence exports could meet both these objectives as well as providing domestic advantages in Australia's Defence self-reliance and reduced cost of goods and services to Defence (through economies of scale). At the same time, Australia's security interests in the region include the maintenance of a low level of threat of conflict between States, effective and modern defence forces, the absence of an arms race, and the absence of desire to develop weapons of mass destruction in the region. The latter objectives are particularly pertinent to the relationship between arms control and the policy of Australian exports to the region.

**Importance of Controls to the Region**

In applying export controls to potential exports to the region, Australia will in the first instance be bound by its international obligations in relation to the non-proliferation regimes. There is little doubt that there is general support in Australia, and in the region, for non-proliferation objectives and it is unlikely exports in this area would be affected by the controls, especially if countries in the region adhere to the various Regimes. It is also the clear intention of the non-proliferation regimes that the controls should not interfere in any way with legitimate trade. The MTCR has, however, had some difficulties with the close relationship between commercial and military uses of rocket technologies and in interpreting project objectives. Space programs could, it is sometimes claimed, cover military applications for missile technology.
There has, for example, been considerable negotiation with China and India on these issues and embargoes have been placed on several suppliers.

The export controls on military goods and non-military lethal goods may be more difficult. There has been a considerable impetus given to defence sales into the region following the end of the Cold War and by high levels of economic growth. Together these factors have brought many companies, including Russian, with the support of their governments, to promote their arms sales in the region. Fighter aircraft, helicopters, submarines, frigates and mine hunters are only part of what is becoming available and being sought by regional defence forces. Much of this new equipment and high technology is being offered on terms which would have been unlikely only five years ago. Whether we like it or not in Australia, sophisticated equipment will be sold to the countries in the region. But this is not to conclude that this will lead to an arms race or to instability. It does mean that Australia can be a participant in the process not only in terms of economic benefit but in the wider security context, through such activities as increased interaction in the form of joint exercises, collaboration in training and logistics, and in joint ventures involving Australian industries in the region. Other activities with wide security implications will include the work of non-government organisations such as the Institutes of Strategic Studies which promote interchanges of ideas between academics, government officials and the militaries of the regional countries — the so called "second track" process.

In this environment, the application of the export controls on military and lethal goods will have two streams. The first will consist of the general range of exports which make up the 3,000 or so applications processed each year. These exports are basically off the shelf goods which are exported (sometimes after repair) within a short time after approval or within the twelve month life of the permit to export. However, with the maturing defence industry in Australia now proposing the sale of complex equipment and systems, many of these potential exports may take years to materialise. They may also involve the export of goods and technologies or expert services all of which would be available and willingly supplied from other sources. The prospect of large scale projects and long-term collaborative or joint venture arrangements does mean that the defence export controls will need to be applied in a way which gives due consideration to the longer term environment in terms of economic political and strategic criteria. Conditions in a country which may at the time of application influence a negative response in the immediate term may well be seen in a more positive light in view of a country's progress on the issues of concern such as democratic reforms, human rights or relations with its neighbours. In assessing major projects, the government will need to consider whether to ensure the continuity of export approvals for spares and other support over a period of years, through the full life of equipment, despite possible short-term incidents in that country (unless of course there are changes in circumstances of such significance as to warrant denial of further exports). If Australia is to be a significant exporter to the region, it will need to be seen to be a reliable supplier.

The current criteria seem to provide a sound basis for the assessment of potential exports into the region. The fundamental concerns which the criteria express will not change, that is Australia needs to acquire a reputation as a reliable supplier. Australia will continue to be a principled exporter of defence and related goods, and defence export decisions will be made in a stable policy framework.

Conclusion

Australia has a comprehensive set of export controls and these can co-exist with a policy of increased export promotion in the region. For example, the value of defence exports in 1993 was around $37 million whilst approvals-in-principle (AIP) were granted for export proposals to a total value of around $2 billion, much of this targeted in the region. This difference reflects the increasing lead-time between enquiries and sales and the over-optimism of some exporters. Some $7m of defence export permit or AIP requests were denied during this period, representing less than 0.4 per cent of all such export requests.

Following a recent review, the Minister released improved defence export guidelines at the Defence Exports Outlook Conference in Sydney on 8 March 1994. The improved guidelines will then be explained to industry nationally through a series of presentations by the Department of Defence and other government agencies in each capital city during the period March to mid May and further "training" will be given if there is sufficient need. A brochure is also being produced, aimed at schools and universities, to raise the public awareness of the role and need for defence export controls. It is important for industry, all relevant government agencies and the public to understand the defence export controls and the reasons for them.

Australia, as a responsible exporter of defence goods, is not only contributing to the non-proliferation
of sensitive technology to "undesirables" in a worldwide effort, but the defence export controls also largely allow continued access to foreign technology by our defence industry, which is crucial for their long-term viability.

NOTES
5. Details of the dual-use controls covered by these regimes are contained in the publication Australian Controls on the Export of Technology with Civil and Military Applications: A Guide for Exporters and Importers, Canberra: Department of Defence, September 1992.

Peter Quinn was an Assistant Director in the Strategic Trade Policy and Operations Section of the Department of Defence at the time of writing this article. Other members of the Section contributed to the article.

Book Reviews


Reviewed by Michael Fogarty.

This book is volume one (of a seven volume set) in the Official History of Australia's Involvement in Southeast Asian Conflicts 1948-75. The project was commissioned by the Fraser Government in 1982 and the remaining volumes are to be completed by 1995. A later volume on regional politics and diplomacy will cover the period 1966-75. As such, final judgement may have to wait until the series is completed and the history can then be assessed in its entirety. However, if the first volume is any guide, the tone has been set and this early volume meets the expectations and suggests those which follow will also be well received. The book has the proper focus and conceptual approach one would expect from such a survey. The book also explains the determinants of our political psychology towards Asia.

If it is the role of military historians to describe and interpret the outcomes of the various campaigns, then equally, diplomatic historians also have a role to play in analysing the political events which resulted in those armed conflicts. Theirs is a lonely paper-chase through the respective archives to attenuate the policy lines which lead to the militarisation of diplomatic disputes. For this the highest levels of scholarship are required and here they are fulfilled. Whether the diplomatic initiatives were successes or failures is grist for an old mill as Time inexorably rolls up our past as we respond to the present. What is more relevant is the extent to which we continue to learn from that history as it shaped and determined our progress as a people and our development as a nation.

This is why volume one is so significant. The continuing military involvement by our armed forces in the region, throughout the period, was based on sound strategic imperatives — which the book examines so well. It was the role of the then Department of External Affairs to provide the appropriate political framework, in pursuing the necessary government-to-government relations, which legitimised Australia's formal military presence in the region. To be sure, Australia's strategic impetus in the region was not necessarily inimical to those countries which shared common security values and stood to benefit from co-operative defence arrangements with us.

As befits a democratic society, some Australians held differing views whether such political decisions were in our national interests. Others felt that they may have been against our neighbours. In this case, truism or otherwise, one sentiment is worth repeating.
“Writing many editions of ‘A Diplomatic History of the American People’, Thomas Bailey argued that it was not just the administration or State Department that formulated policy: ultimately in a democracy it was the people.” (See Terry H. Anderson, Diplomatic History, Volume 12, Number 4, Fall, 1988).

Extending this metaphor means that we should also reinforce the collective notion of policy-making as it relates to foreign relations. “By foreign policy as an issue-area, we mean all the controversies within a society that, at any moment in time, are being waged over the way in which the society is attempting to maintain or alter its external environment. The attempts to exercise control over the environment constitute ‘foreign policy’.” (See James N. Rosenau, “Domestic Sources of Foreign Policy”). The authors identify some components in Australian society which sought to influence policy articulation — be they church leaders, the unions, teachers, the RSL, editorial writers and political organisations.

And again, one should note the various defence policies in place which were structured to provide for Australia’s security. “Throughout the twentieth century successive governments have sought the same goal that (UK Defence Secretary) Tom King was looking for: ‘The security of our country against the unexpected. A Defence policy must provide that insurance’.” (See David French, ‘British Defence Policy in the Twentieth Century’, “Journal of Strategic Studies”, Volume 15, Number 1, March, 1992).

This book then has much to offer and no mere review could do complete justice to the many themes and analyses it so competently details. At best, some of the more important points which emerge can be described in brief. For example, the visit by the French High Commissioner to Indo-China (Le Tourneau) to Australia in 1953 is well covered. Evatt urged the French to report to Australia what they were doing and the major acquisitions to the military inventory which had consequences for our strategic planning in the region. Australian officials were strongly encouraged to enter into various political relationships which were in our interests. Those major powers may have been under similar compulsion to react to their own domestic imperatives. Their causes were not helped when they often differed with each other about the policies to be taken. Often the full motives were not made clear and the authors suggest the dialogue occasionally lacked the mutual frankness expected between partners. Separately, Australia had to foster sound bi-lateral relationships in the region. President Ngo Dinh Diem’s 1957 visit to Australia was successful and we are reminded that he was the first foreign head of state to visit. An assessment of Prime Minister Nguyen Cao Ky’s visit in 1967 will have to wait until another volume.

The text is leavened with a sprinkling of political cartoons confirming the role of satire in editorial opinion, a tradition also used by Gordon Greenwood and T.B. Millar in separate political histories. Those photographs chosen are thoughtfully selected for their originality. The authors show scholarly courtesy in the “Note on Terminology” as they take particular effort to explain the style and format of Asian surnames and place names in a consistent manner despite changes over the period. Also, the book is many histories giving keen insights into Australian social history over the period in examining the values which conditioned voting behaviour.

A useful feature of the book is how the authors make the link between the various defence reviews and the major acquisitions to the military inventory over the years. Here diplomatic words are matched by military deeds. It was one thing to declare major
foreign policy shifts but, if one missed the fine print, the increased expenditure on new military technology added the required emphasis.

Several political figures receive attention as the authors run them through a literary gauntlet of sorts in which they emerge mainly intact. Here their characters and personalities are studied to the extent of their overall contribution to policy — making in the period — or more aptly, their political survival or otherwise under Menzies. It may have been for this reason that (Sir) Keith Waller was chosen as the first career Ambassador to the United States in 1964 — for his suitability and availability over any other young thrusters within the Cabinet.

Whether discussing the politics of the home front, or the protracted and sensitive diplomatic negotiations abroad, the authors show their grasp of issues as they continually place regional events in their wider international context. For once the book is successful in analysing the Australian political spectrum in the fifties and sixties without retreating into excessive demonology or, at worst, zoology. "Historians... are entitled to retrospective wisdom, but they should not lose touch with reality." In this instance, the authors manfully resist the temptations. (See Michael Robinson, RUSI Journal, April 1992).

Whatever the rights and wrongs of the period, of which there were many, and despite the great events this work covers, one should remember those immediately concerned and the nobility of idealism held by all those caught up directly in those days or were affected nonetheless. Australians responded with different degrees of commitment and their individual role collectively becomes an embodiment of that era. Many Australians will approach this book seeking explanations why the official response to those crises required such a personal commitment from them, to their country, in another country, with all its personal rewards and, in some cases, costs. More so if that service was involuntary but no less important. Australians of Vietnamese heritage will identify with this history as they come to terms with their new country and realise how, for ten years, the destinies of both countries were linked and remain so for them.

The authors also attempt to make sense of the wider politico-military relationships in their historical perspective. The work concludes with an interesting observation. The authors suggest that the policy formulation and military deliverance was successful for Malaya and Borneo whereas Vietnam constituted a failure. This theme will receive detailed study in successive volumes as the authors marshal the evidence and give their reasons why.

In summary, both in the fifties and sixties, technical military aid requests aside, two major powers sought Australia’s moral and political support for their cause in the international community. In the latter case, the government of the day recognised the crisis and became increasingly committed — demonstrating that it was in our national strategic interests to do so. For this reason, Crises and Commitments is a worthy attempt to explain why Australia became involved to the extent it did — in pursuing wider alliance obligations. This is a masterly work which both confirms and consolidates the reputation of not just the authors but all members of the Official History Unit, the Australian War Memorial and those sources who very much contributed to the book’s success.

AUSTRALIANS IN ASIA, Various Authors, Centre for the Study of Australia-Asia Relations, Griffith University, Brisbane, 1988-92, 9 issues, price: $6.16, postage extra.

Reviewed by Michael Fogarty.

Academic publishing has its own political economy and this series is primarily concerned with promoting the study of Australia’s contemporary relations with Asia. To this end, the Centre produces publications on that relationship and the many dimensions therein as expressed throughout the region. As well, the series draws from a wide occupational strata from journalists to academics although there is an emphasis on diplomatic memoirs in the current range. For this reason, one would hope that future manuscripts are attached from a wider field — perhaps including service attaches, QANTAS station managers, missionaries, business managers, medical staff, relief workers or from any Australian with sufficient insight into that relationship seen from their individual vocational perspective.

While the subject and content is pitched towards business, government, researchers and other educational institutions, there is much here of value for anyone seeking a greater understanding of the region and its people from the personal experiences of those Australians fortunate to have lived in Asia and who were socialised by that living and learning experience in cultures not like our own. Moreover, the books read well offering immediate appeal to the general interest, despite their specialist nature.

This review then briefly surveys some of the titles published in the last five years and notes that more works are currently in progress by two of the authors, that is, on Burma and Indonesia. This review is more concerned with accounts by several retired diplomats
Francis Stuart opened the batting order with “Towards coming-of-age” which is perhaps the most interesting not so much for its length or the elegance of his writing but for a fascinating career which had its origins in the pre-war British consular service in then Siam. He thus had a leg-up on many of his contemporaries who came to serve with him in Asia after the war. In many ways, Stuart’s career is a microcosm of the service itself as he grew with it from its turbulent days re-established in post-war Singapore through to Manila and Phnom Penh. His book has been well received in many journals which include *Australian Outlook* (December 1989) and *Pacific Defence Reporter* (February 1990).

Sir Keith Waller was first posted to China (Chungking) in 1941 and later served in Manila and Bangkok. He was appointed Secretary of the then External Affairs Department in 1970 and retired in 1974. He provides some very incisive comments on the nature of Australian diplomacy and is not shy in assessing some of the political figures he knew in a distinguished career. His book, *A Diplomatic Life*, was also favourably reviewed in the *Asia Studies Review* of April 1992.

John Rowland was Australia’s first charge d’affaires in Saigon during his posting from 1952-53 (before the appointment of a Minister to the Legation) and he later returned for a second assignment between 1954-55. He witnessed the loss of French power to the Viet Minh and was in Hanoi several days before their entry. Mr Rowland writes extremely well as one would expect of any official tasked with writing numerous despatches for more than half their life. As well, he is more widely known for his poetry, Soviet expertise, and an interest in conservation long before it became socially conscionable and politically sound.

His book, *Two Transitions*, also covers his time as High Commissioner to Malaysia from 1969-72. His views have no official imprimatur (indeed the Centre offers its own caveat) which is why the book should be read in its own right. He offers a detailed understanding and appreciation of the many cultures he came to respect. Overall, he retained considerable affection for the country and its people, finding both dignity and enterprise within them — and much to appreciate and learn from. Several UMNO political figures receive his attention as he describes his social and working relations with them — on and off the golf course.

If he found fault in foreign societies he also recognised some of the imperfections in his own country.

For this balanced assessment his work assumes a certain authority. Anyone involved in the planning or conduct of the major military exercise “Bersatu Padu” in 1970 will note his comments on the wider political features of that event.

As well, John Rowland was alive to the intramural sensitivities shared by senior defence commanders in his parish. He became the good vicar in recognising that Australia’s service leaders in Malaysia and Singapore had their own concept of protocol and responsibility in their formal relationships within regional command structures. That issue required careful management by him as much as the existing bi-lateral relationship. His comments are both thoughtful and well-intentioned as he provides a frank appraisal of how he saw the development of those ties during his term. Moreover he concludes that, having made our bed in Asia, verily, we should lie in it.

Of special interest is Professor Hugh Dunn’s book “The shaping of a sinologue of sorts” in which the author describes how he drifted into things Chinese. A brief visit to China in 1945 satisfied a long-held curiosity. That connection led to formal studies in the mandarin language at Oxford and to a long career as a China specialist — culminating in appointments as Ambassador to Taipei and later Beijing.

In all, this series is probably not widely known outside its immediate target readership but the notes are of considerable value. As explained above, the criteria might be expanded to include those many others with stories to tell. One hopes the series continues in its present form yet still finds time and space to widen its approach. That is, to include other Australians still to have a voice to make the series truly representative. In short, this is a remarkable series which would benefit from a wider audience — not just to Asianists but to all who seek more background on Australia’s participation in the region.

It is a measure of our society that these former officials have now chosen to record their periods of Asian service using their knowledge and wisdom to note the values we share and the differences which can often lead to misunderstanding. The series has become a cottage industry of sorts as other tyro writers come out of the woodwork. The sentiment that they “indulge in some sort of ego trip” is misplaced as they may have recognised a private duty to account for a public life of particular interest to many Australians. Furthermore, their accounts are written with the characteristic discretion which such attempts demand, yet remaining informative and entertaining. Their first-hand knowledge of various political events provides the personal cachet that some of the more scholarly historical works fail to capture — despite their equal importance.
All Australians with an interest in Asia are better served by these writers who have surrendered to their instincts to provide us with a “thoroughly good read” which we may enjoy and learn from. In their absence, much knowledge and understanding would be denied to us.


Reviewed by Major W.J. Graco.

Back in the early 1980s, the reviewer conducted a study of a sample of competent commanders. One of the most controversial commanders studied was Field Marshal Douglas Haig, C-in-C of the British Expeditionary Force (BEF) Western Front in Europe 1915-1918. Haig aroused strong passions in people and he had his supporters as well as his critics.

Denis Winter’s Haig’s Command falls in the latter category of being critical of Haig as a commander. Winter’s publication follows closely those of De Groot and Travers who provide revealing portraits of the Field Marshal. Winter was able to uncover evidence previously not cited by other historians and biographers to correct a number of misconceptions about Haig. Most of the new evidence was obtained from Australian, USA and Canadian archives.

Winter makes a number of startling claims in his biography. Two of these are that Haig falsified the record of his military career to cover up his mistakes and blunders in the war and that documents vetted to remove embarrassing material which could reflect badly on the reputations of senior officers who served on the Western Front during the war. These revelations are not entirely new as General Sir James Edmonds, the official war historian of British military operations on the Western Front 1914–1918, admitted that while he wrote the histories to convey the lessons of the war, the histories were couched in such a way to protect the reputations of his fellow officers. Edmonds was a contemporary of Haig at Staff College.

In private comments to British military journalist and writer Sir Basil Liddell Hart, Edmonds stated that Haig was above averagely stupid, knew nothing of infantry or artillery (Haig was a cavalry officer), and was technically illiterate. He was dominated by ambition and was too ready to promote favourites, but reluctant to dismiss senior commanders who had failed if their dismissal reflected badly on him because he had originally appointed them. He also used his authority to punish those who had crossed swords with him in the past. Edmonds stated to Liddell Hart that he could not write the truth about Haig.

Edmonds too came across attempts to doctor war diaries and to suppress evidence on what happened in particular events. The irony is that Winter accuses Edmonds of either destroying or suppressing incriminating material. The alleged cover-ups and destruction of documents reinforce the view of General Essame who said that generals who wish to avoid the exposure of their doubts after their deaths and who wish to cut a respectable figure in the eyes of posterity should not keep diaries.

Another revelation in Winter’s biography is that Haig had a controlled personality. Hitherto to now it was believed that Haig was inarticulate and had difficulties relating to all but intimates. Winter presents a different interpretation of these traits and conveys the view that Haig’s combination of constraint and inarticulacy was possibly a defensive disguise he used to maintain distance from his subordinates in order to protect himself and to allow him to control others. He was distant, brusque and at times abrasive in his treatment of colleagues and subordinates. He stayed close to his defences always on the lookout for threats real or imagined. Haig also searched for rivals who threatened his position. Competitors were given cold steely treatment by Haig.

This aloofness and silence contrasted to his boyish, whimsical behaviour where he was given to moments of light-hearted fun and to his geniality where he took a fatherly interest in those he liked.

A third aspect to Haig’s personality was his tendency to bottle up his frustrations and hatreds and his nervous mannerisms such as his tugging of his moustache. He was also xenophobic, especially towards the French, and he disliked intensely politicians.

Winter attributes Haig’s rise to the top to his unrelenting pursuit of his own ambition, his astute diplomacy and his manipulation of the system of patronage. Haig outperformed his rivals in the number and social standing of the patrons he enjoyed. These included Sir Evelyn Wood the Adjutant General in the 1890’s, Field Marshal Kitchener and Lord Esher one of the architects of the Committee of Imperial Defence which secretly organised Britain’s part in the war with Germany the decade before it began. Later, when he served in the War Office from 1906 to 1909, he became known to Haldane, the Minister of War, and Asquith, the Prime Minister, who appointed him C-in-C during the war.

Winter also criticised the British Army and its failings. Winter indicated that the British Army was ill-trained and ill-equipped to fight the war in France and
Flanders and that the quality of generalship at the top was substandard. Promotion to Corps command and above and allocation of key staff appointments were reserved for Regular Army officers and it was a closed trade union shop. According to Winter the British Army suffered from over-bloated staffs and from too many men being misemployed in the administrative tail rather than the fighting teeth.

Travers made similar observations where he pointed out that Haig surrounded himself with sycophantic staff, some of whom were not fit for war, and how Haig’s GHQ suffered from what is called “group-think” by psychologist Irving Janis. This refers to a state where a group of decision makers are sheltered from unpleasant news, where there are strong pressures to conform to a particular view or policy, and where there is an absence of critical thinking and debate. Haig contributed to groupthink in his GHQ. He picked acquiescent staff officers for his HQ. He also believed that the authority of the C-in-C is impaired by permitting subordinates to advance their ideas and that there must be unanimity at the HQ. This led to the isolation of GHQ from the rest of the BEF and to a lack of discussion of alternative strategy and tactics. Travers stated most senior officers were afraid of Haig and were not prepared to question him. Furthermore, officers further down the chain of command were afraid to tell Haig’s liaison officers the truth. This situation improved in 1918 with a cleaning out of the augean stable after the disaster of the Flanders Campaign in 1917. Key staff officers on Haig’s GHQ were replaced by order of the War Cabinet.

Winter makes other serious and damning claims in his book and some of the more important ones include:

- A third myth is that British forces were caught unawares by the first German offensive aimed at splitting British and French forces near Amiens in March 1918. Haig had correctly anticipated the offensive and later the second offensive in Flanders in April. Where Haig blundered was in underestimating the size and ferocity of the German attack. British and French forces had planned a trap for the Germans but were themselves caught out by the overwhelming German response.

Overall Winter’s biography tarnishes further Haig’s dwindling reputation as a commander. He is revealed as a flawed individual who was not suited to high command and who, as an Edwardian general, achieved high rank because of his burning ambition and because of the system of class and privilege in the British Army at the time. It is a provocative book full of controversial claims and it will be interesting to see how other historians respond to what Winter has said about Haig and the British Army of the First World War.

**NOTES**

The strength of Steve Eather's book on Australian air forces in the Vietnam War is the way it captures the flavour of operational flying. Detail from archival records has been complemented by many interviews with the men who flew the missions, resulting in a sense of action not always present in such a carefully researched book.

There are separate chapters on each of the main Australian air units: the RAAF's Caribou, Iroquois and Canberra squadrons, and its Forward Air Controllers and Phantom pilots; the Army's Reconnaissance Flight; and the RAM's Helicopter Flight. Each chapter combines a brief but useful history of the unit concerned with numerous anecdotal incidents, some tense, others humorous. Many excellent photographs illustrate the narrative.

Australia's involvement in Vietnam was in many respects characterised by political ineptitude. By contrast, as this book shows, at the operational level the professionalism of the RAAF, Army and RAN airmen rarely, if ever, faltered.

Thoughtful and informative annexes round out a book that should appeal to anyone with an interest in military aviation generally and the Australian air experience in Vietnam specifically.


Reviewed by Dr Allan Stephens.

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Reviewed by Major M.J. Pollock.

Inside the SAS is a well researched and illustrated account of the British SAS. It presents a glamourised version of service life in general, and SAS activities in particular. In spite of this, the book is well presented and will interest many students of military history and weapons.

Inside the SAS includes a glossary of military abbreviations and jargon which enable the armchair enthusiast to understand the language of the military. This glossary then enables the reader to readily comprehend the many accounts and anecdotes of SAS activities throughout the world.

A particular strength of the book is the number of detailed illustrations of weapons and equipment, accompanied by appropriate tabulated data and specifications. These illustrations allow the enthusiast to examine in detail specialist military weapons not normally available for inspection.

The book begins by introducing the reader to the development of the SAS during the Second World War. This section examines SAS operations in North Africa and in Europe and the employment of raiding techniques. In the post-war period, SAS operations in Malaya and Oman are examined, supported by photos, maps and illustrations. More recent campaigns are also examined, Borneo, Aden, Northern Ireland, the Falklands and the Gulf War. This potted history of the British army at war provides an insight into the adaptability of the British SAS over many years and in many countries.

Inside the SAS takes the reader through the process of making the SAS soldier by examining the selection and training procedure which has been followed since 1941. This account is followed by sections covering tactics, weapons and equipment. The book has many anecdotes tales of selection courses, training and operations for which there are no acknowledged sources. The authors do not acknowledge the support and assistance of the British SAS in the compilation of the book; it must be assumed therefore, that this is an unauthorised account of the unit. This aspect of the writing of the book does tend to introduce an air of urban myth to many of the recent stories.

The sections of the book which address counter-terrorist training and equipment will interest many readers of this journal, as will the reports of operations in Northern Ireland. Finally, the book profiles SAS leaders over the years from the founder of the SAS, Stirling, to de la Billiere, commander of British forces in the Gulf War.

Inside the SAS is a well researched and illustrated account of the British SAS. It presents a glamourised version of service life in general, and SAS activities in particular. In spite of this, the book is well presented and will interest many students of military history and weapons. Inside the SAS provides a good update of Tony Gerghaty's This Is the SAS, now some ten years old.