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A fleet of large square-rigged sailing ships similar to the U.S. Coastguard barque *Eagle* will lead a 'Parade of Sail' out of Sydney Harbour on Australia Day 1988. (Photo by 'Operation Sail '86').

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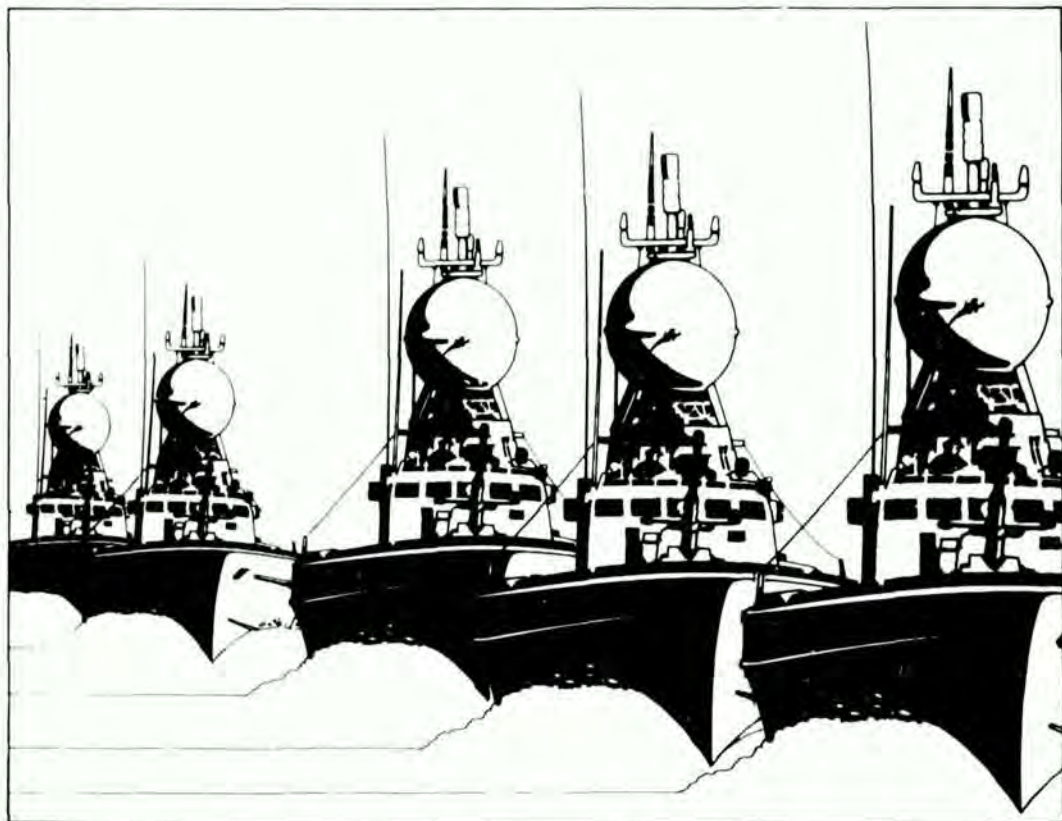
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FROM THE EDITOR

This issue celebrates the 10TH ANNIVERSARY of the ANI. To mark the occasion, I have concentrated on articles by junior officers and sailors — and by a member who is an airman. Unfortunately, I did not receive any unsolicited pieces from younger members, and so I have had to include a few contributions from members who insist that they are young at heart! My thanks to the new contributors — I hope we shall read more from them in the near future — and to those 'old' stalwarts, the few who continue to gladden the eye of the editor.

The leading article by David Francis should not mislead you into thinking that we are reopening old wounds: it is an essay on Defence decision-making which uses the aircraft carrier project merely as an example. I would welcome comments from any reader who was intimately involved on this basis only — and I do not have to say that I would like to hear from any other reader on the same basis!

I saw the article by John Pollaers in the papers which followed the Engineering Symposium in December 1984, courtesy Nick Newman, and asked John to shorten and simplify it for a more general audience. I am glad that he was able to do so, despite the shock he gave me when he rang up in the last week for copy to arrive to say that he might not be able to make the deadline, and I hope that more of our university students and junior officers will pluck up the courage to write for the *Journal*. Perhaps the more senior of us could keep an eye out for worthwhile articles and encourage the young turks to be a bit bolder?

Ian Lambden, Greg Watson and Martin Andrew give me great hope for the next 10 years of the ANI — if we can get articles of this calibre from our sailors and airmen, then we will be establishing a precedent, for I know of no other like journal which can attract such contributions from the 'other ranks'. Now is a good time for us to reflect that the Australian Naval Institute is not a retirement home for the brass hats, but is a collection of *individuals*, Service and civilian, senior and junior, who wish to show an interest in, and promote, matters relating to maritime affairs. Unfortunately, we have fewer than 5% of our members who are in the category of these three; perhaps the other 95%, and the revitalised Chapters in particular, can try to redress the balance? These three have demonstrated that the interest and ability is there — we have to tap it and make sure it is not frightened off.

Not frightened off by a long chalk, but swallowing the anchor is one of the most prolific of authors for the *Journal of the Australian Naval Institute*, Commander Robin Pennock. Look in the cumulative index for the sum of his contributions to the journal, and then add to that his years as editor and his years on the Council, plus his numerous donations to the ANI Library, and you will get some idea of his value. On behalf of all members, I wish him well out there, and hope that his pen never runs dry!

I cannot name all the other contributors, but they will understand my gratitude for the effort they have made. However, I must say that I was delighted to see that Master Ned is not yet retired, and assure readers that he fits the bill of junior officer for the purposes of the restriction on contributions to this edition.

There is no theme for the August edition — so there is no excuse for not writing on your favourite topic. The deadline for copy is the **22nd July**, but I would like to hear earlier from intending authors, or procurers! Aspects of maritime history will be the theme for the November issue, closing date the **21st October**. The editor's birthday wish for the next 10 years is that the journal might go from strength to strength — and that the editor might never be short of high class copy!

Geoff Cutts
(062-662245)

MESSAGE FROM THE PRESIDENT

The high standing of the Australian Naval Institute and its growing influence are worthy tributes to the foresight of our first President and his supporters during the months leading to formal incorporation on 10 June 1975.

The strength of the Institute has been and will continue to be in its membership — a membership dedicated to the advancement of knowledge and understanding of naval and maritime affairs. Our professional standards may be judged from the excellence of the Journal and from our chapter and other activities, including three successful national seminars.

The future is in our hands — with the full support of your Council, I encourage you all to actively seek out new members, to support your local Chapter, contribute to the Journal, and, where possible, to share in the administrative responsibilities of the Institute.

The record of the Australian Naval Institute during its first ten years has been impressive. I am confident that the Institute will continue to prosper and to make an important contribution to informed consideration of maritime affairs in Australia.

I.B. James



PETER MITCHELL TRUST ESSAY COMPETITION

3000 WORDS EQUALS \$1500

For as little as it takes to write 3000 words (maximum 7000 words), you could receive a cheque for up to \$1500. This can be achieved by entering the 1985 Peter Mitchell Essay Competition, the title of which is:

The Regional Defence Treaty — Its Contribution, Relevance and Future.

As the essay competition is open to members from any Commonwealth country, the essay topic does not contain the word 'Australia(n)'. However, you are free to discuss and/or compare any of the defence treaties throughout the world.

If you are interested in entering the 1985 competition, you should consider the following points:

- Essays must be between 3000 and 7000 words in length.
- An essay and not a Service paper is required.
- You are encouraged to provide original thought rather than repeating ideas from other sources.
- The closing date — the essays must be postmarked on or before 31 October 1985 (airmail from overseas entrants).
- Prizes will be awarded in four sections:
 - Open prize of \$1250 and \$250 worth of books or instruments.
 - Officer section. Prizes of \$1000, \$500 and \$250.
 - Sailor section. Prizes of \$1000, \$500 and \$250.
 - Officers undergoing staff course training. One prize of \$1000.

The conditions for entering the competition are detailed in

- DI(N) PERS 51-1
- DEFNAV CANBERRA message WAA 160033Z Jan 85.

For further information contact the Directorate of Naval Education — CMDR Angus Cameron on (062) 653359 or Room D-2-10, Russell Offices, CANBERRA ACT 2600.



Correspondence

A LETTER FROM BRITAIN

Sir,

When in future years, historians examine the record of British sea power in the twentieth century and attempt to distinguish the points at which the Royal Navy underwent some fundamental alteration in mission and structure, it is likely that they will declare that 1985 marked the beginning of the RN's true post-imperial phase.

The causes are many and apparent even to the contemporary observer. First, the strategic situation of the Falklands is beginning to settle. Whilst the present position is by no means satisfactory for either Britain or Argentina, the defences which the islands require are well on the way to completion and the resources which they will consume are clearly defined.

Second and more subtle, although equally important, the object lesson which it was in Britain's interests to provide over the Falklands may have had the desired effect. Whether those concerned like it or not, the future of Hong Kong has been provided for in as honourable a fashion as Britain could manage. Nearer to home, relations with Spain over Gibraltar have improved to the point where a workable solution to the question of the sovereignty of the Rock must appear at least a possibility, if not yet a practicality. There remains, of course, other irritations, such as the Guatemalan attitude to Belize, but it is fair to say that most situations in which Britain is involved outside the Falklands are capable of reasonable settlement.

The implication of a conclusion to such matters is that the activities of Britain's armed forces outside Europe and the North Atlantic will soon be determined wholly on the basis of the national rather than the imperial interest. The results may be profound, because the removal of what were and are fundamentally moral obligations — of a nature which could not be denied by a parliamentary democracy like Britain — will allow planners to allocate the requirement for an out of area capability a priority according to its national utility.

Every indication is that Britain's defence policy must soon be re-examined, for the simple reason that the money is running out. The fact is that there are too many projects in hand for the budget to cover, particularly a budget which will no longer be sustained by a formal commitment to a progressive increase in the real level of defence spending. For all that one may argue with the manner of execution of John Nott's 1981 economies, his accountant's analysis of the future was fundamentally correct.

What was dubious within the 1981 exercise was the denigration of the role of surface ships in the Eastern Atlantic. But it seems clear in retrospect that the hotly debated operational analysis study, proving the efficacy of Nimrods and SSNs in the ASW role, was only a pretext. The Royal Navy was clearly the most (politically) vulnerable service principally because the major concerns — and thus the expenditures — of the Army and Royal Air Force were with the defence of the Continent. The leaders of NATO, having as they do an understandably incomplete comprehension of the workings of sea power, have always regarded the presence of the British Army of the Rhine as a concrete indication of British commitment to the defence of Western Europe. More important, BAOR is a commitment irrevocable in an emergency. A British Government already at odds with other members of the Common Market could not afford to have its faith in continental defence challenged. There were, however, no comparable political risks attached to reductions in the Royal Navy.

There is little doubt that the major factor now affecting all three Services is the requirement to maintain an effective independent deterrent. The Ministry of Defence continues to present a relatively united front on the subject, but the *TRIDENT* project is coming under increasing external scrutiny and criticism. With or without the collapse of the pound in relation to the dollar, costs have risen considerably over the initial estimates and will rise further. Such increases

can only be at the expense of other projects for new equipment. The Ministry's insistence that *TRIDENT* will constitute only a small part of the entire defence budget has caused a great deal of irritation amongst those who are aware of how much of that budget is already committed to personnel and operating costs.

There are other financial problems, including the continuing fiasco of the *NIMROD* AEW, and aircraft which will, if and when it becomes operational, have cost at least three times as much as the *E3A* AWACS which was the alternative. There has been no more striking example of the fallacy of the all too frequent British insistence upon going it alone. *TORNADO*, while an undoubted technical success, is also running considerably over budget, a situation which is now the subject of some press interest.

The difficulties of the RAF hold little comfort for the Navy because both *NIMROD* AEW and *TORNADO* are projects the importance of which cannot be denied, both within the context of NATO and of the air and maritime defence of Britain itself. Although the suggestion has been made that the Navy should demand reductions in RAF spending, there is little benefit and a great deal of danger in such a policy. Indeed, the RAF has moved to pre-empt such an assault so far as the *NIMROD* AEW is concerned, by declaring that one of the major arguments against the *E3A* AWACS was that its radars could not provide the coverage of surface and low level contacts upon which the Navy was insisting.

Despite the Falklands, the Navy's position remains weak. No one denies that a powerful surface fleet is a useful thing to have; what is arguable is whether that fleet can be justified if it is maintained only at the expense of other elements of the armed forces which the Government might think more useful. In a sense, all the Navy's achievements in the Falklands served only to defer the final decision as to how Britain can afford to defend itself, and the longer it takes the Government to take the choice, the more extreme and apparent must be the immediate results. Many ships of the fleet are growing old. *LEANDER* celebrates her twenty second birthday this year and the youngest of the presently twenty four strong class has been in service for twelve years. It is often forgotten that the Royal Navy received no additional new frigates or destroyers as a result of the war, while one of the 'replacement' units, a Type 22, has only just been ordered as a result of ministerial agonising over the site of her construction. What did happen was that older ships, notably those earmarked for the inactive Standby Squadron, were run on. That this measure was purely a

stop-gap seems not to have been universally realised.

Excluding the Type 12s and *COUNTIES*, the figures for 1995 are of interest. All 24 *LEANDERS* and *BRISTOL* will be over 22 years old, while 14 other ships will be 15 years or older and all the remaining Type 42s and seven of the Type 22s will be at least ten years old. Excluding the Type 23, only the seven Type 22s now building or on order will be in the first decade of their life. This compares, one should note, with some 22 vessels at present in that state.

One can extrapolate such figures indefinitely, but it is clearly apparent that a large number of Type 23s must be put in hand in the near future to go any way towards replacing the Batch II and III *LEANDERS*. In bald terms, if we accept that all of the latter two groups and the *BRISTOL* will be overage by 1995, there will only be 32 escorts on the effective list other than the Type 23, and this will include six Type 21s, a class which shows no sign that it will enjoy a longer life than the original design intended. Matters in general have not been improved by the amount of time ships have to spend at sea or the conditions, particularly around the Falklands, under which they are forced to operate.

As far as the Type 23 project is concerned, the most alarming thing for the Navy is not just that orders have been delayed repeatedly — that for the first, *NORFOLK*, was only placed in late 1984 — but that the Government's procrastination has meant that the requirement for capital funds for their construction will now coincide with that for *TRIDENT* and RAF projects, not to mention the re-equipment programme which the Army plans.

Something has to give, and it will probably be the surface Navy. Although the war role of the fleet lies in the Eastern Atlantic and Norwegian Sea, many of the arguments used by the RN to justify its ships have been developed on the basis of the need to be able to protect British interests the world over. Hitherto, such arguments have been attractive to politicians, even to John Nott, who used their 'out of area' capability as his justification for retaining *ILLUSTRIOUS* and *ARK ROYAL*. However, at a time when Britain has begun to shed the last of her imperial commitments and when the increasing sophistication of world armaments throws doubts upon the ability of surface units to survive in any part of the world without extensive support, the foundations of this particular argument are much less firm.

Curiously, the greatest danger to the Navy would not be another attempt at swinging defence cuts along the lines of the 1981 measures, but a policy of deliberate neglect. Sudden reductions would have to be justified and this could well place the Government in an

awkward situation, particularly since the supporters of the naval case are rather more organised and better prepared than they were four years ago. If, on the other hand, orders are not placed soon and in sufficient numbers, the strength of the fleet must decline in the next decade. As a rule of thumb, five Type 23s must be ordered every two years from 1985 onwards, in order to sustain a force of fifty destroyers and frigates — which is the figure which the Government has accepted for the future. Reducing the rate of order to three or four every two years will have a direct impact on the Navy from the mid 1990s.

The best hope of the Service must lie in the enactment of some kind of 'Radical Review' in defence policy. Dissatisfaction with the concept of the BAOR certainly exists in influential circles; some doubt must hang over the future of the *TRIDENT* project. And, even if the Navy does not choose to offer itself as an alternative, it is nevertheless clear from the experience of the 1950s and 1960s that the Service which leads the way in changing the direction of policy, benefits most from such alteration. Fundamentally, a passive attitude to the creation of policy, is a loser's game.

Master Ned



SPAR TORPEDOES

Sir,

I read with interest the article on Spar Torpedoes by R M Jones in the March 1985 edition of the *Journal of the Australian Naval Institute*. Readers may be interested in the following notes made by Petty Officer George Fowler RNR (Australian Branch) before the turn of the century. Mr Fowler joined the South Australian Naval Force on 1 May 1885 and was promoted to the rank of Petty Officer in about 1895. I make no excuse for the English or layout of the notes, they were taken directly from his diary, kindly loaned to me by one of his relatives.

One wonders whether today's sailors (or officers for that matter) take notes in copperplate writing clear enough to be read some ninety years later?

Mark 2 Fiume;

- Length 14ft 6in
- Height of air in chamber 26lb
- Buoyancy to float 2lb
- Net weight 595lb
- Explosive 46.25lb of gun cotton
- Diameter of propellers 12.5in
- Pitch of forad propeller 34"
- Pitch after propeller 33"

- diameter of cylinder of engine 3in
- revolutions 1000 per minute

Mark 4 Fiume

- The torpedo on being discharged from the frame above water, or from a submerged tube will rapidly attain any depth between 5 and 15ft for which it may have been set and will retain that depth during the entire run.
- The torpedo will run straight when discharged from a stationary or moving vessel, but in the latter case it will be deflected if fired out of the line of kill, and its line will be abaft the line of projection when the vessel is proceeding ahead.
- It can be adjusted to go at any speed or to any distance within its limits.
- The torpedo cannot be exploded with a blow before it is discharged, the pistol being made safe by a different mechanism.
- In the event of the torpedo not striking the object it will stop at the distance for which it was previously adjusted, make itself safe, and will either sink or float as required.

Robin Pennock





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ASHES TO ASHES — THE RISE AND FALL OF THE RAN AIRCRAFT CARRIER PROJECT

by Lieutenant Commander D A Francis Dip App Sci, RAN

The Australian Defence Department has been likened to the elephant — a very large beast which expends an enormous amount of effort to produce a very small offering from a great height. At first glance, the RAN efforts to replace *HMAS MELBOURNE* support this uncomplimentary view, for it took some 13 years (1970–1982) and the expenditure of at least \$8m¹ to decide that we would not have a new carrier. The project was beset by reverses, went for long periods without public comment, and also stimulated one of the greatest defence-related public debates for many years.² The failure of the \$478m Aircraft Carrier Project is in contrast to the affirmative decision given to the \$4000m F18 Project.

This study aims to illuminate something of the Defence decision-making process on major capital equipment procurement with a focus on the RAN influence on that process. In approaching any case study, it is often convenient to measure the evidence found against a range of popular conceptions or models to gauge their accuracy and relevance.³ This study of the RAN attempts to replace *HMAS MELBOURNE*, will take such an approach. After an introduction which presents these models, a narrative of events will be given. The arguments for and against an aircraft-carrier will then be canvassed, before discussing the influence and motives of all the main actors. All the evidence will then be drawn together for a final analysis of the actual decision-making process over its 13 year life. Then, like all good stories, this one will be given a conclusion.

RELEVANT MODELS

The official, and therefore formal model for defence decision making is the *Rational Model* which argues that all Defence policies derive from rational argument as published in the Strategic Basis.⁴ This model is characterised as being completely objective and empirical; accordingly, it relies heavily on objective studies

and an extensive committee system to prevent individual biases from affecting decisions. All other models, since they are not officially endorsed, are *informal models*. Of course, elements of the informal models are present in the formal, approved processes; the problem is to identify them, for informal considerations are rarely committed to the public record. Indeed, this problem is worse when studying Defence, for most formal documents are classified, and the process as a whole is closed to the public.⁵

The second model is the *Emotional Model*. The antithesis of rationalism, this model suggests that major Defence hardware decisions are made by satisfying the personal preferences of the air marshal, admiral or general at the top.⁶ The Services, with their conservative, disciplined and hierarchical structures and methods, do facilitate strong direction from above and the potential therefore exists for this extreme model to exist. The Emotional Model is evidenced by five characteristics:

- the Gold-Plate Syndrome
- the Copycat Syndrome
- the Teeth-to-Tail Ratio
- Inter-Service Rivalry
- the Replacement Syndrome.

The Gold-Plate Syndrome is the result of arguing that 'nothing but the best is good enough for our boys'⁷ and produces hardware of a price and complexity beyond that called for by the task specified, even to the extent of writing staff requirements around preferred brand names.⁸ The Copycat Syndrome is exemplified by the thinking that 'every Army has tanks, — so must we'⁹ regardless of our strategic needs. The Teeth-to-Tail Ratio is exemplified by an

The Author

Entered RANC 1969. List—GLSU. Significant postings — *HMAS MELBOURNE*, NCS Harold E Holt, *HMAS CRESWELL* (as Supply Officer), currently Staff Officer Retail Policy, DNSPA. Academic qualifications — ESSC, Dip App Sci, BA (maybe soon).

emphasis on fighting equipment at the expense of support, logistics, war reserve and industrial resources. Examples are legion and include buying Mirages and F18s without Airborne Early Warning (AEW) aircraft to direct them, and failing to keep our shipbuilding industry modern and competitive. Inter-Service rivalry limits cool appraisal of Australian needs.¹⁰ It exists between the three Services and also between the Services and civilian members of Defence. Rivalry has its origins in competition for scarce resources, tradition and the competitive spirit and loyalty trained into Servicemen from the day they join. The Replacement Syndrome is self-explanatory, and is the least imaginative approach to equipment decisions.

The *Pragmatic Model* suggests that all decisions are made according to the practicalities of the situation. The unkind would rephrase this as being an approach predicated on expediency, ie the shortest way out of a problem, which is not necessarily the most efficient way out. This model shows itself most often when Defence planners are faced with a budget cut. For example, the best way to preserve the teeth-to-tail ratio is to buy the same number of platforms and cut the spares buy.

The *Political Model* is the belief that all decisions are made as the result of political activity which entails the use of all types of argument and leverage, legitimate and otherwise, to achieve the goal. The term politics is defined in this study as '... a conflict over whose preferences shall prevail'¹¹ and this definition implies that the strength of the respective arguments has less to do with decision-making than the relative power and influence of the parties.¹² The Political Model can perhaps be paraphrased as a blend of the Rational, Emotional and Pragmatic models.

There are many other models too numerous to mention; however, those other models are not usually listed as distinctive of Defence decision-making. Undoubtedly, all of the four listed models were exhibited at various times during the aircraft carrier project's 13 year life. The task of this study is to identify which were present when, and to what extent.

NARRATIVE EVENTS

Very briefly, the formal process of deciding to buy a Major Capital Equipment item is as follows.¹³ The equipment need derives initially from the strategic basis papers, from which are raised Defence and then single-Service capabilities papers. Once approved by the Defence Force Development Committee (DFDC), the expected cost of a needed Capability is added to the Five Year Defence Programme (FYDP). The description of the

needed equipment is then progressively refined from the general to the particular, by the successive issue of Staff Objectives (SO), Staff Targets (ST), Staff Requirements (SR), Invitations to Register Interest (ITR), and Requests for Proposals (RFP). These steps are not necessarily all taken, as some may be omitted or amalgamated, others will be repeated. This process of refinement is monitored by the Defence Operational Requirements Committee (DORC). Major programs are monitored principally by the Defence Force Structure Committee (DFSC) and the Defence Force Development Committee (DFDC), whilst the Defence Source Definition Committee (DSDC) is charged with making 'brand selection' recommendations to these higher committees.

The Aircraft Carrier Project (ACP) had its genesis in a body outside the formal process described above, the Central Studies Establishment (CSE). CSE was created in 1969 out of a stated 'increasing recognition of the value of Operations Research in the decision-making process...'.¹⁴ This is interpreted as a desire for a more scientific and rational approach to the process, probably under the sponsorship of the then Secretary of the Defence Department, Sir Henry Bland.¹⁵ The ACP story started with the Landing Platform Helicopter (LPH) study of 1970, which was more a desire to replace the ageing troop transport (and ex-aircraft carrier) *HMAS SYDNEY*, than any intention to replace *HMAS MELBOURNE*. In 1971, the LPH study gave way to the much larger Naval Air Power (NAP) study.¹⁶ This study went on for four years, was expanded to take in the Tactical Air Weapons System study (TAWS)¹⁷ and produced a report which found that an aircraft-carrier was not an effective solution in the scenarios considered.

However, over a period of time, the RAN was able to discredit the NAPTAWS findings by questioning the assumptions and weightings made in the seven scenarios and by arguing that the scenarios were out of date by the time the report was finalised.¹⁸ Interestingly, no Defence document is yet on the public record as discrediting NAPTAWS, but the next major step in the process of justifying a carrier was the formation of the Seaborne Air Capabilities Special Group (SACSG) in 1976. This group carried out a number of specialised studies over several years. The results are classified, but since the SACSG was a naval group, the studies are not presumed to be as wide-ranging and fundamental as NAPTAWS.

In 1977, funding of \$1m was obtained to fund design investigation of a VSTOL and/or helicopter carrier, and an ITR was issued to a range of companies. By 1978, the various ITR

proposals had been narrowed to five, including an *HMS INVINCIBLE* class vessel. In 1979, the RAN requirement was refined into the 'RAN Agreed Ship Characteristics'. In May 1978, the DFDC postponed specific considerations of the carrier, but tasked the preparation of a further justification paper for consideration by the Chiefs of Staff Committee (COSC). This implies reservations within that body about the ACP. The resulting 'MELBOURNE Replacement — Strategic and Associated Factors' paper was considered in early 1979 and approval given for funded investigations of three ship designs, the *INVINCIBLE* class having been dropped on cost grounds.

In May 1979, the DFDC commissioned the RAN and Defence Central to carry out a further study entitled the 'Seaborne Air Capability Review' which included Naval Anti-Air Warfare (AAW) and Anti-Submarine Warfare (ASW) studies. This third major study implies continued uncertainty at Chief of Staff level on the need for the ACP. Finally, the Minister announced on 23 August 79 that funded studies on three designs would be carried out. In June 1980, the DFSC considered the evaluation report of these studies plus the 'Seaborne Air Capabilities Review', presumably yet another discussion of the basic need. On 9 September 80, the Minister announced that the Government would replace *HMAS MELBOURNE* with a purpose-built ship, and that a decision on fixed-wing aircraft for the ship would not be made till 1983.

In February 1981, a design contract was let with an American builder, and in March 1981 a project office established in the US. It is believed that a final construction contract was very close to finalisation (at a price of close to \$1000m) when in June 1981 the British Government announced the intention to sell one *INVINCIBLE* class ship. In September 1981, the Minister announced that *HMS INVINCIBLE* was to be included in the carrier evaluation in progress. On 25 February 1982, the Minister announced the acquisition of *HMS INVINCIBLE* for delivery in late 1983, but on 1 June 1982, the Prime Minister advised the British Government that in view of the Falklands conflict they would not be held to the sale should they wish to withdraw. The sale was effectively off from that point. On 30 June 1982, *HMAS MELBOURNE* decommissioned, as did the front line squadrons VF805 and VS816 on 2 July 1982. An announcement was made that the British would retain *HMS INVINCIBLE* on 13 July 1982. The Australian Government commenced a re-examination of available options, but before a decision was announced, the general election was called (on 3 February 1983) and the decision on a replacement carrier was deferred until

afterwards. The new Labor Government announced, on 14 March 1983, some 9 days after taking power, that *HMAS MELBOURNE* would not be replaced.

HISTORICAL PERSPECTIVE

To indicate the attachment of the RAN to its sole aircraft carrier, it is necessary to put the issue in its historical perspective. The RAN first flew single aircraft from ships in 1917, and in the same year the Australian Naval Board unsuccessfully tried to get a special-purpose aircraft carrier to counter two German raiders, one seaplane equipped, in the Pacific.¹⁹ Although the RAAF was formed in 1920, the formation of a Naval Fleet Air Arm was announced in 1925, but this decision was cancelled in 1928,²⁰ although the previous decision of 1924 to build a seaplane carrier proceeded.²¹ As a result, *HMAS ALBATROSS* commissioned in 1929 but decommissioned in 1933, a casualty of the Depression. The RAN reverted to flying single aircraft from ships until 1947 when the first of two cheap British carriers was acquired as the result of the clear lessons of the war in the Pacific. The RAN ambition for a two-carrier Navy was never realised, for the older carrier, *HMAS SYDNEY*, was paid-off as *HMAS MELBOURNE* entered service, the cost of modifying the *SYDNEY* for jets being too great. In 1982, the *MELBOURNE* was to be replaced by yet another cheap British aircraft carrier until the Falklands conflict (plus other factors) intervened. So now the RAN is once again committed to flying single aircraft from ships.

Several patterns emerge from this history. First, the great advances (except for the acquisition of *ALBATROSS*) were made under the influence of war, and secondly, the RAN has always used second-rate aircraft carriers. Thirdly, the RAN has never really realised all its ambitions for the Fleet Air Arm — the 1917 failure to get a carrier, the 1928 cancellation of its formation, the premature loss of the *ALBATROSS*, the failure to build a two-carrier Navy and the loss of *INVINCIBLE*. Finally, the RAN has now entered its third period of being obliged to operate single aircraft from ships. The picture presented is one of continual struggle for survival, experiencing some limited successes and numerous reverses, but the RAN desire for its own Air Arm in purpose-built ships is now some 67 years old and undiminished.

THE ARGUMENTS

Before discussing the arguments in any detail, it is useful to know who was doing the arguing. The pro-carrier group consisted of the RAN and a very small number of journalists and lobby groups, most of whom had some connection with

the Navy other than mutual interests. Arguing against the carrier were the RAAF (most of the time) and a very large proportion of journalists with an interest in defence matters, together with the Labor opposition, some academics, and CSE (in the sense that NAPTAWS did not support the Navy case). The Liberal government, industry and the general public were largely inactive, although, officially at least,²⁷ the Government supported the Navy.

In the absence of any clear, identifiable threat to Australia, or of any unequivocal strategic guidance from the Government, Defence created its own scenario-based arguments.²³ Briefly, the RAN argued²⁴ that a carrier was needed to:

- Provide ASW protection to convoys in the open ocean Sea Lines of Communication (SLOC).
- Provide ASW protection in focal areas of our SLOC, which are generally, but not necessarily, close to Australian ports.
- Provide AAW defence, ASW defence and air strike against any invasion fleet.
- Provide air defence against long range aircraft conducting reconnaissance for enemy submarines.
- Provide power projection, either by air strike alone or in support of an amphibious landing overseas in aid of regional allies.
- Provide a visible and flexible peacetime deterrent.
- Provide disaster relief.

The anti-carrier responses to these arguments are briefly put below.

Open Ocean ASW Escort

It was argued that satellite surveillance located a carrier for enemy submarines, thus making it vulnerable to torpedo or missile attack. The Navy responded that evasive routing would be employed to 'stretch' enemy submarines, the weakness of this argument being that if evasive routing is successful then who needs a carrier escort? It was also argued that the USN, acting under ANZUS, would do it for us anyway. The friends of the RAN responded that '... to abandon the carrier would be to place an unfair load on the US Navy.'²⁵ This is hardly a fair claim considering the relative sizes of the two navies (about 500 ships to 151). The argument was also put that since 93.6% of our seaborne trade was carried in foreign bottoms²⁶, then no enemy could interdict our trade without widening the conflict. The Iraq/Iran campaign against neutral shipping in the Arabian Gulf disproves this line of thought.

Focal Area ASW

In view of the weakness of the open-ocean arguments, the Navy shifted its case²⁷ to an

argument to use the carrier in SLOC focal points, which are by definition the areas where sea routes converge, usually, but not necessarily, near Australian ports. Focal areas, being generally closer to home, are amenable to probably cheaper ASW defence from RAAF aircraft and ocean bottom listening devices. An ancillary argument pedalled in tandem with the focal area argument was that of escorting a single vital cargo along the entire SLOC (as distinct from attempting to protect all our high seas SLOC trade). This argument was countered with a suggestion to prudently stockpile such vital commodities.²⁸

Anti-Invasion Fleet

The Navy anti-invasion fleet argument²⁹ suffered several deficiencies, not the least being the very low probability of such a threat, and the assumption that the US would come to our aid under ANZUS. Further, any invasion threat would take 6-10 years to develop, and the warning signs would allow Australia to build its defences appropriately, presumably converting container ships to take vertical take-off aircraft. Finally, an invasion fleet must approach the coast and so become vulnerable to our submarines, F111, Harpoon-armed Orions and the F18.

Anti-Reconnaissance Aircraft

The anti-reconnaissance argument is normally valid for *INVINCIBLE*, but in the Australian context there were certain difficulties. In its endeavours to ensure that it could buy the ship in a time of financial stress, the RAN deliberately emphasised that it wanted the ship only for helicopter ASW. This was repeated to Parliament on more than one occasion.³⁰

The Navy thus put itself in an unwinnable position between the need to play down the total cost (by sacrificing the Harrier) and the need to play up the ship's effectiveness wherever possible.³¹

Power Projection Overseas

Power projection overseas outside the range of F111 and F18 aircraft is reportedly the only NAPTAWS scenario where there was a clear advantage to the aircraft carrier.³² Sadly for the RAN, this scenario is at odds with our basically defensive stance and is tainted by the perception of being a remnant of the now outmoded Forward Defence strategy.³³ All in all, overseas power projection was perceived as an unlikely event.

Peacetime Deterrent

This argument is generally viewed as valid, although it was also argued that an increased



HMAS SYDNEY 1957

— RAN

fleet of RAN submarines would offer greater deterrence, in peace or war.³⁴ The Navy argued that the peacetime deterrent was enhanced by the relevance of the aircraft carrier to both high and low order threats. However, it is doubtful whether the RAN would risk its major unit in low-order threats; for example, they would not risk the ship in waters liable to mining (as occurred in the Red Sea recently) such as Torres Strait during an insurgency along our northern coast. Interestingly, the RAN found it necessary to play down the thought of *INVINCIBLE* being a peacetime sign of aggression against our northern neighbours. So did the Katter Committee.³⁵

Disaster Relief

This argument was based on the highly successful naval operation to clear up Darwin after Cyclone Tracy destroyed the city. Opponents argued that it took the Fleet about 8 days to arrive, and that air support, both civil and military, provides more timely relief. This argument ignores the value of the Fleet for reconstruction rather than first-aid relief. The Fleet provided the means of landing a skilled and disciplined workforce that could feed and house itself without drawing on local resources. But of course this support can come from any type of ship, and does not specifically depend on a carrier.

Further Arguments

The anti-carrier groups put several further arguments additional to those shown above. They were: the vulnerability of big ships, the smallness of the ship, lack of AEW, that the carrier requires its own escorts, and that Australia needs three carriers not one.

Vulnerability was argued most strongly after the *BELGRANO* was sunk by a British nuclear submarine. It was argued that this was conclusive proof that big ships were outclassed by submarines. There are several holes in this argument. Firstly, there were no further submarine successes on either side; indeed the failure of the Argentines to sink *any* British ship is remarkable, as is the fact that the British nuclear submarine believed to be tailing the Argentinian carrier lost its quarry. At best, the Falklands conflict gave inconclusive evidence about submarine effectiveness. Similarly, the Exocet argument ignores the fact that after the *SHEFFIELD* and *ATLANTIC CONVEYOR* incidents, other Exocets were 'dealt with'.

The lack of size arguments were based on quotes from US Navy admirals who argued that the *SHEFFIELD* loss demonstrated the inadequate size of *HERMES* and *INVINCIBLE* compared to American *NIMITZ* class conventional carriers.³⁶ It is certainly true that one *NIMITZ* is better than a small Harrier equipped carrier, but that is not a choice for

Australia. For Australia, the argument was 'Is one small carrier better or worse than none at all?'

The lack of AEW was certainly confirmed by the Falklands conflict as a serious omission from the air defence of any ships. At the time, this lack was cited against acquisition of *INVINCIBLE* and an argument for land-based air support for the Fleet. Interestingly, the *INVINCIBLE* is now equipped with (admittedly basic) AEW helicopters, whilst the RAAF as yet has no firm intentions (as distinct from desire) to acquire AEW aircraft.

The argument that the carrier needs its own escorts was one of sophistry. It was never suggested that we need to buy extra escorts because we wish to replace *MELBOURNE*. The issue was in fact whether the 12 RAN destroyers will go to sea with or without a carrier. This line is confirmed by the fact that the RAN destroyer fleet will not be reduced now that there is no carrier to defend!

It was quite correctly argued that Australia needs at least three carriers to maintain a two-ocean force. This was agreed by the Navy, but was obviously not a choice for Australia. The Navy failed to succeed in arguing that whilst three carriers are better than one, one is still better than none.

Argument Patterns

The carrier debate was characterised by a number of features. First, the RAN had poorly thought out its arguments.³⁷ Further, the Navy kept modifying its case to cope with criticisms it could not effectively refute.³⁸ Lack of sound naval doctrine also caused confusion and contradictions amongst Defence spokesmen.³⁹ The impossible intellectual position that the Navy put itself in over the Harrier has already been mentioned.

Secondly, the true basis of opposition to the carrier was rarely articulated. The root cause of opposition was the parlous state of Defence finances.⁴⁰ The argument was continually put that 'the money' would be better spent on 'more submarines' or 'more aircraft'. However, this was only once seriously put,⁴¹ and in reality the argument was about buying the ship or not spending the money at all. In other words — should the Navy be kept at its current size or reduced? Certainly, now that a carrier will not be bought, the orders for submarines, F18s, and Orions have *not* been increased over the pre-*INVINCIBLE* intentions. Indeed, the orders that were delayed when *INVINCIBLE* was bought have not been brought forward to their former positions.

The vulnerability argument of having 'all the eggs in one basket' that was persistently put,

was one of sophistry. A carrier, or any floating ship for that matter, is vulnerable to torpedoes and missiles. It was, therefore, argued that we should not have a carrier. This argument ignores the fact that any *convoy* is far less vulnerable when it has a carrier in company than without; ie the presence of a carrier increases vulnerability of a convoy in having *one* more expensive target in it, but *decreases* the vulnerability of the *entire* group of ships.

Finally, it seems that the anti-carrier groups put arguments characterised by much sophistry which has been pointed out in each of the headlined sections above. This the Navy was incapable of exposing and capitalising upon, almost certainly because it had not properly thought through the arguments over the preceding ten years. Additionally, nearly all the arguments put appealed to objective strategic and tactical discussion for authority, the underlying motive of the protagonists being rarely publicly disclosed. This last point will be expanded upon in the next section.

THE MAIN ACTORS

The Central Studies Establishment

The CSE is a largely civilian research unit within Defence Central and as such it is viewed as 'independent' and relying on a scientific and therefore objective approach to analysis. Rationality is its *raison d'être*. How then was the Navy able to discredit such a large and thorough study as NAPTAWs?

In the absence of clear, valid and binding strategic guidance from the Government, the CSE found a rational basis for analysis by creating its own scenario-based strategic guidance. There were several failings in this approach, the first being that the scenarios were produced after agreement had been reached with the Services.⁴² The effect of reaching agreed scenario positions with the Services, especially where the Services disagreed and CSE was obliged to choose between them, was to make the process somewhat political; that is, political in the sense of resolving the conflict as to whose preferences should prevail. This aspect of NAPTAWs was reported in the press as 'Everybody with the germ of an idea seems to have been able to push his pet project into the field'⁴³, thus indicating the vulnerability of allegedly objective studies to 'political' interests of the Services by drawing on their 'professional advice'.

The second unsatisfactory feature of NAPTAWs was the use of an economic based cost/benefit approach to problem solving. The cost/benefit method reached its zenith during the McNamara years at the Pentagon and treats

force structure design as an 'engineering exercise'⁴⁴ and treats all known factors as mathematical values which can be manipulated to produce a quantified result. It is based on the theory that there is a close relationship between strategic scenarios and force structure.⁴⁵ Essentially, the mathematics boil down to the cost of delivering destruction under stated conditions.⁴⁶ This is fine when assessing, say, the chance of an AAW missile of a given type hitting a given sized target at stated height, speed, wind velocity etc, but fails when characteristics requiring value judgement are in the equation. For example, what is the probability that Indonesia or anyone else will send such an aircraft with evil intent towards our defending missile? This political element simply cannot be quantified. Thus the seven NAPTAWs scenarios had a fundamental flaw which the Navy exploited.

The seven scenarios were:

- internal disturbances in PNG
- threatened secession in PNG
- surveillance of the USSR in the Indian Ocean
- limited operations in Indonesian waters
- low level Indonesian incursions into PNG
- Indonesian incursions into PNG leading to limited war
- defence of nearby islands of a major power.⁴⁷

The scenarios were a compromise, leaving some quarters of Defence dissatisfied.⁴⁸ All seven were based on Forward Defence, which by about 1975 had been replaced by Continental Defence, after the debacle in Vietnam.⁴⁹ The cost/benefit approach was unsuitable for factors requiring value judgements, the scenario development process was at least partly political, and the scenarios were quickly made obsolescent by changed strategic thinking after Vietnam fell. Thus, a concerted effort to find a rational substitute for inadequate strategic guidance came to nothing.

The Navy and Its Friends

There is no doubt that the ACP had its genesis in the RAN desire to replace the *MELBOURNE*. Myriad sources, plus the titles of some Service papers such as 'MELBOURNE Replacement — Strategic and Associated Factors' disclose the prevalence of the Replacement Syndrome in defence thinking in the early seventies. But the price of a new ship was perceived as awesome, and in the days before the *INVINCIBLE* was built and the Sea Harrier in service, there were doubts as to the future viability of a ship built around one peculiar aircraft whose future was not assured. This resulted in the CSE excursion into

Rationalism which failed to settle the issue as has already been discussed.

After NAPTAWs was complete, the Navy set about discrediting the study. Little is known of this process other than Roy Braybrook's comment that '... RAN protests that CSE had exceeded its terms of reference in making a direct cost-effectiveness comparison of sea-based and land-based air power ...'⁵⁰ which is very much a 'political' attempt at discredit. Whilst the Navy undoubtedly brought to bear all manner of influence within the bureaucracy to counter NAPTAWs, they were surely helped by the already mentioned strategic and methodological flaws in the scenario and cost/benefit analytical costing flaws in the study.⁵¹ The next known formal step was the formation of the SACSG which, being wholly Navy, could be relied upon to support the ACP case, although the documents are not available publicly to prove this presumption.

During the 1973–76 period, when the ACP was not doing well and the term aircraft carrier had become emotive, the colourless euphemism *Seaborne Aircraft Platform* was used to describe the ACP. This represents a lack of confidence by the Navy, which was overcome in 1976.

Vice Admiral Synnot became Chief of Naval Staff (CNS) in December 1976, and within a month, the earlier confidence shown in the formation of SACSG was advertised by renaming the Project to its more familiar and bold name ACP. Robertson suggests this is characteristic of the vigour and determination of Synnot who went on to become Chief of Defence Force Staff (CDFS). Synnot consistently maintained a confident pro-carrier stance throughout his time as both CNS and CDFS, and his advocacy undoubtedly helped the Navy's case. To illustrate his personal influence, it is relevant to consider his influence on the 1980 decision to buy a 'purpose built ship'. This was endorsed by the COSC whilst it was chaired by General MacDonald⁵² and thus not 'stacked' in the Navy's favour as it later was when Synnot ascended to the chair. If one accepts the theory that the COSC is like any Inter-Departmental Committee and tends to work on unanimity of vote rather than majority, then the soundness of his advocacy, at a time when the ACP and F18 were directly competing for funds, is all the more apparent. There have been suggestions that RAAF support was bought during a 'deal', which will be discussed later.

During the period 1976–1982, nearly all pro-carrier debate was carried on by the Navy itself or 'orchestrated Navy lobby groups'.⁵³ These groups were the Navy League of Australia, The Australia Defence Association, the Fleet Air Arm Officers Association and numerous retired

officers. These lobby groups generally confined themselves to the specialised press, but as the debate intensified in 1981–82 they wrote in the general press and eventually made strong representations to the Katter Committee.⁵⁴ Retired officers were involved in both writing as individuals, as leaders of those three organisations, and in coalition with each other.

There is ample evidence that the Navy is keen to encourage the continued support of retired officers, who are, of course, free to speak to the press. For example, CNS now has a regular newsletter for retired senior officers, and an annual symposium in Sydney for them. There is also an annual Navy Week formal dinner for retired senior officers in Sydney, given by the local area commander. Given these efforts to curry favour with these officers, and their concurrent lobbying activity, Stackhouse's comment on the lobby groups being orchestrated may well be true. This is an element of Defence decision making processes which has not been commented upon by scholars, the Navy being traditionally regarded as the 'Silent Service' in regard to publicity.

Despite the Navy's political awareness implicit in the foregoing, the pro-carrier arguments were never taken up by wider sections of the press. The Navy arguments were too faulty to attract wider support, especially in the age of Continental defence.

The RAAF

The RAAF Mirage replacement and the ACP have been directly competing for support and funds since about 1970. Both were affected by NAPTAWs, the Navy receiving a setback, and the RAAF being supported. Although NAPTAWs pro-RAAF findings were discredited in 1974–76, this seems to have been to no effect. In 1980, the Government decided in favour of the Mirage replacement and then in favour of the ACP. Bearing in mind the unanimity theory for the COSC, and the scarcity of funds, the Navy and RAAF may well have struck an alliance to protect their respective interests. It has been claimed by Brogden⁵⁵ that '... RAAF had agreed that the Navy should have a carrier so long as the Navy agreed the RAAF should not be forced to buy the cheaper F16.' Brogden goes on to claim that with *INVINCIBLE* approved, the RAAF withdrew its support arguing '... the Navy should have a "proper" carrier or nothing.'⁵⁶ which is a way of withdrawing support altogether, since a conventional carrier was never a choice for Australia.

Having entered the alliance with the Navy to protect the F18 funding, it presumably withdrew for the same reason. Apparently, it had become clear that there were fundamental problems with

the FYDP. The FYDP cash difficulties have been analysed in depth by Brown and Woolner⁵⁷ who make it plain that once the decision had been made to invest in the F18 (and an earlier than expected buy of 10 Orions) there was no room in the FYDP for the \$478M *INVINCIBLE*, let alone the intended \$1000M US built carrier, plus its aircraft. In short, the 'cut price special' *INVINCIBLE* offer was a threat to the entire FYDP, and particularly the RAAF F18 at some \$3000M (now, 1984, risen to \$4000M, about \$53M each). This financial problem provides a motive for the RAAF to oppose *INVINCIBLE*, but also suggests the Liberal Government may well have welcomed the Falklands conflict as a graceful way of withdrawing from a deal it now regretted.

Although RAAF support for the ACP was probably essential to get the project recommended to Government, the RAAF withdrawal of support was not particularly instrumental in causing the cancellation of the ACP. The fights for survival of each project were, despite the alliance, largely independent of each other. In the end, when the money ran out and it became a choice of one or the other, the basic strength of each argument counted most. The ACP suffered from the Continental Defence school of thought and operational doubts about the Sea Harrier, even if it was to be bought. In contrast, the F18 case was helped along by the initial NAPTAWs finding which was the foundation of a strong dose of Copycat Syndrome, for as Robertson points out: '... everyone knows air forces have fighters and armies have tanks. There was accordingly little or no debate about the need for these force elements ... the only issue publicly debated was "which aircraft, the F16 or the F18?"'⁵⁸ Despite the eight times greater cost of the aircraft, the F18 was thus bound to win any F18 versus ACP choice, regardless of RAAF or Navy political moves in 1982.

The Political Parties

The Liberal Government gave the impression that it was a compliant instrument of the Defence bureaucracy, for it approved all the aircraft carrier recommendations the Navy could push through without any evident debate. Indeed, Defence basically manoeuvred the Government into buying a ship it could not afford; a situation from which the Falklands conflict provided merciful and fortuitous relief. The Liberal inability to question Defence recommendations on the ACP is perhaps indicative of the malaise of a government in decline.

The Labor Opposition was largely dormant in the ACP debate until the press began to 'beat up' the story once the *INVINCIBLE* buy became a

probability. Strangely, the intended US buy at twice the price had elicited little Opposition argument. The Labor anti-carrier stance undoubtedly had roots in the stronger Continental Defence school within that Party, but was strengthened by a perceived opportunity to embarrass a government in decline. Labor probably sensed political advantage in condemning *INVINCIBLE* during the run-up to the 1983 election, which explains the vehemence of Labor arguments during 1982.⁵⁹ The alacrity with which the new Labor Government announced that *MELBOURNE* would not be replaced is a reflection of its original promise to sell *INVINCIBLE* if bought, the larger than expected budget deficit they inherited, and its Continental Defence sympathies. Overall, it seems that both parties were reactive to Defence proposals and press argument. The press and Defence generally set the political agenda on the ACP.

The Press

The greatest milestones in the ACP history were the presentation of the NAPTAWS findings, the discrediting of NAPTAWS, the 1980 decision to buy a carrier, the 1982 decision to buy the cheap *INVINCIBLE*, and the Falklands conflict of April-June 1983. Press reporting over this period was extremely variable. NAPTAWS was only occasionally reported⁶⁰ and the subsequent process of discredit was not reported at all. This is not surprising, for although fundamental to the shape of Australia's maritime defence, NAPTAWS and its aftermath were highly classified documents and the debate was closed

to the public. The next public step was Synnot's bold establishment of the ACP office. This led to a string of non-contentious articles in the specialised press (notably the *Pacific Defence Reporter* — their maritime writer is AW Grazebrook, a Reserve Naval Officer and Federal Vice-President of the Navy League). These articles were almost wholly concerned with guessing which brand of ship would be bought, and rarely questioned the basic need.⁶¹

In the build-up to the 1980 decision to replace *MELBOURNE*, the RAN became more aggressive in putting its case via any willing medium.⁶² Eventually, this aggression drew a hostile response, predictably (because the F18 was being put to the Government at about the same time) from a RAAF officer.⁶³ The first public counter blow had been struck. The general press did, however, continue to ignore the issue until the *INVINCIBLE* offer was made in June 1981. From this point on, the general press (meaning the big daily papers plus *The Bulletin*) opened a much wider public debate which was now also mirrored in the specialized press.

The sequence as related above, indicates that the specialized press is generally not controversial in its approach to strategic needs. The general press is largely uninterested unless the issue is short-term and controversial. They had, for example, ignored the Navy's steady progress towards a \$1000M US built ship until the half-price *INVINCIBLE* appeared. Why did the press question the basic need when a bargain was offered? The press seem to have become interested because the appearance of *INVINCIBLE* was more immediate compared to



HMS *INVINCIBLE* November 1983

— Chris Gee

building a new ship, and also because the *INVINCIBLE* class had been rejected previously as unsuitable. Overnight, the unsuitable ship had become irresistible to the Navy; hence, the press sensed good reading and took up the debate wholeheartedly. The strong press debate seems to have drawn parliamentary interest to the topic as well, for parliamentary debate now became intense. Essentially, the press initiated the debate that the Government should have started years previously.

Parliament and its Committees

It has already been suggested that parliamentary debate was stimulated by the general press publicity of the issue. The parties quickly established their opposing positions and the usual parliamentary stalemate ensued; however, after the *INVINCIBLE* acquisition had been announced in February 1982, the Government consented to a Senate motion of 25 March 1982 which referred the matter to the Joint Parliamentary Committee on Foreign Affairs and Defence.

No government likes to have its *firm* decisions questioned by parliament and strong reasons must have existed in this instance. Presumably, the Government was beginning to realize the extent of its financial problems and the Committee investigation may have been perceived as a way out. The Falklands conflict intervened to prevent this hypothesis being tested fully. However, the formal conclusions of the final report⁶⁴ indicate that budget pressure was the primary reason for rejection, and tactical (not strategic) ineffectiveness was the secondary reason for rejecting any carrier purchase. The circumstances surrounding the Katter Committee hearings suggest that the Committee was being used to rationalise a decision within the Government to extract itself from any carrier purchase.

Academics

The Katter Committee Hansard indicates that two of the ten witnesses heard were academics; neither was a stranger to the Committee. O'Connor credits the Strategic and Defence Studies Centre at ANU as influencing the adoption of the 'essentially continental'⁶⁵ view of Australia's defence taken by the Committee. Certainly, compared to other witnesses (including Naval witnesses) their evidence was clear and thought out in great depth. They appeared to be highly regarded, not only because of the quality of their thought, but also because they were non-partisan, and therefore uninfluenced by self-interest as were the Navy and RAAF witnesses.

TB Millar of ANU has argued that the role of academics is to aid governments to find truth and

not to advance party interests (a public servant could probably say the same thing about himself).⁶⁶ Whilst it is clear from Hansard transcripts that no academics blatantly advanced any protagonist's interests (such would ruin their credibility), their repeated appearance before Katter over the years does indicate that they are not just offering informed comment but are actively (perhaps not deliberately) taking part in the political process. As such, they are exposing themselves to pressures additional to those found in the usual academic environment which may place their academic integrity at risk. It is clearly the academics' task to identify and disregard such extra-curricular pressures. Nevertheless, the Katter committee clearly valued academic input for its depth of contemplation and perceived impartiality.

Structures

The 1973 reorganization of the Defence group of departments was expected to make the decision-making process '... more open, more complex, and possibly ... richer in terms of national participation'.⁶⁷ The ACP proved it is nothing of the sort. Prior to reorganisation, each Service decided its own shopping list which was then fought over by the Ministers at a political level. Post reorganisation, the Services now present the one Minister with a settled tri-Service shopping list; thus, the inter-Service debate has been pushed down into the Defence Central bureaucracy.

The focal point for discussion appears to be the DFDC, which is the lowest committee, comprised of the three Chiefs of Staff, CDFS (now known as CDF) and the Secretary. This is the area where Service alliances are most probably formed and where the justification of a case to the Minister is finalised. The fragmentary evidence available suggests this committee considered the carrier at least 8 times in 12 years, and the true total is almost certainly much greater. The Minister and Cabinet above the DFDC, and also the DFSC and DSDC below it, considered the ACP much less frequently, perhaps only twice or three times each, in twelve years.

The basic nature of Defence bureaucratic debate is unchanged; all but the most innocuous files are highly classified and available only on a strict need-to-know basis. Genuine debate is confined to the very highest levels of Defence Central, and it is up to the press and the public to learn what they can of the debate without official help.

Defence Industry

The interest shown by Defence industry appears to be one of the significant differences

between the ACP and F18 decision-making processes. With the Mirage replacement to be built, or at least assembled, in Australia, Defence industry stood to gain large contracts in high technology fields. The influence of Defence industry is evidenced by their strong involvement in RAAF overseas assessment missions for the Mirage replacement⁶⁸ and in the attempts to get Cabinet to agree to Mirage F1⁶⁹ and later the F15⁷⁰ production in Australia.

By contrast, the Australian shipbuilding industry was less than enthusiastic about building a carrier in Australia. The job was simply too big. It would strain resources in expanding to meet the task and the ensuing large-scale redundancy after the ship was complete would cause massive dislocation.⁷¹ The absence of a civilian interest group independent of the Navy and its 'friends' meant that it was much easier to cancel the ACP.⁷² Nobody but the Navy had anything to lose.

CONCLUSION

The life of the ACP was characterised by phases, and each phase was dominated by one of the process models. The ACP had its genesis in the Replacement Syndrome, but because of some pragmatic fears about cost, and rational

fears about effectiveness, the NAPTAWs study was started. This formal attempt at employing the Rational Model was affected by the Political Model and failed due to inherent failings in the analysis, and changed international political circumstances.

The Navy slowly rebuilt its ACP case by politically discrediting NAPTAWs and by confident political moves within the bureaucracy, culminating in an informal alliance with the RAAF. Whilst the alliance was essential to the Navy achieving approval for the ACP, the subsequent RAAF withdrawal had no real effect, for the Government had simply run out of money. The Pragmatic Model intervened and it, plus elements of Rationalism, caused the ACP to be cancelled in preference to the competing F18. The press and parliamentary debate were largely peripheral to the final decision to cancel, at best acting only to speed Government action.

The work of independent analysts and committees such as CSE and the Katter Committee were of marginal influence. CSE was discredited and Katter was very much a rationalization for decisions already in being. The ACP decision-making took place within a formal rational framework that was punctured, and very frequently dominated by informal political processes.



HMAS MELBOURNE 1977

— John Mortimer

The Emotional Model was somewhat muted during the process, although its elements were exhibited at various times. The Teeth-to-Tail Ratio and the Gold-plate Syndrome were constrained by cost considerations (eg a conventional carrier and the Sea Harrier were unlikely candidates for purchase). The Copycat Syndrome was not evident in the ACP story but strongly underlined the success of its competitor, the F18. Inter-Service rivalry was present not so much as a jealousy but as straightforward competition for funds. The Navy, although it seems to have done well at bureaucratic politics before 1982, failed at its attempts to secure wider support, and so easily succumbed to Pragmatism when the money ran out. The irony of it all is that the RAAF has bought a US Navy carrier aircraft at RAN expense.

Perhaps the most important finding of this study is the complete failure of Rationalism to find a durable and logical basis for major Defence decisions. Neither the Government itself, nor the Defence generated Strategic Basis paper, nor the massive CSE study (NAPTAWS) worked. All three were subject to political influence of one sort or another and so were not pure Rationalism. Further, a scientific approach is fundamentally unsuitable for predicting the future where human behaviour must be forecast, ie, where value-judgements must be made. The Defence Decision making process is basically a political process: it is a contest as to whose will shall prevail.

The basic weakness of the pro-carrier arguments underlies the entire carrier issue, and implies a question as to whether we should have acquired the *MELBOURNE* in 1955. Was the ship too small and second-rate for a major conflict, whilst being too big a clout in a minor regional one? The *MELBOURNE*, unlike our destroyers, was never used in anger during either Confrontation or Vietnam. But then neither were our submarines — so do we need either? It is abundantly clear that until there is a major unambiguous threat to Australia, then there will be no broadly agreed Fleet requirement for the RAN. Until such a threat occurs, force structure will be cause for uninformed debate.



Footnotes

1. AM O'Connor, 'The Great Australian Carrier Debate', *Aircraft*, November 1982, p 22.
2. S Brogden, 'The Invincible Decision', *Aircraft*, May 1982, p 22.
3. D Ball, 'The Role of the Military in Defence Hardware Procurement', F Mediansky (ed), *The Military and Australia's Defence*, Melbourne, 1979, p 41.
4. *Ibid*, pp 41, 42, 44.

5. D Ball, 'Australian Defence Decision-Making: Actors and Process', *Politics*, XIV, November 1979, p 183.
6. D Ball, 'The Role of the Military', *op cit*, p 42.
7. *Ibid*, p 60.
8. *Loc cit* and also *ibid* p 58; also, D Ball, *The Australian Tactical Fighter Force, Prologue and Prospects*, Canberra, 1979, p 17.
9. Lt TP Muggleton, *An Evaluation of the Analytical Infrastructure for Force Structure Decision-making in the Australian Defence Department*, Thesis, Royal Military College Duntroon.
10. J Stackhouse, 'Behind the Navy's Invincible Power Game', *Bulletin*, 16 March 1982, p 65.
11. D Ball, 'Actors and Process', *op cit*, p 193.
12. *Ibid*, p 186.
13. See D Ball, 'The Role of the Military', *op cit*, pp 43-50. An excellent description of the formal process, from which the information in this section is taken.
14. *CSE Annual Report*, 1969-70, p 6.
15. See H Armfield, 'Rolling Defence Plan Turns its First Circle', *The Age*, 15 May 1972.
16. *CSE Annual Report*, 1970, p 4.
17. *CSE Annual Report*, 1972-73, p 5, and also D Ball, *Methodology for Australian Defence Force Development*, Canberra, 1981, p 7.
18. D Ball, *Methodology*, p 8.
19. R Braybrook, 'The Carrier or the Submarine', *Australian Aviation*, March 1982, p 32.
20. *Loc cit*.
21. Brogden, *op cit*, p 22.
22. As indicated by the Hansard debates where the Government announced carrier acquisition decisions and defended them under Opposition attack.
23. By far the most comprehensive, thorough and thoughtful single summary of the carrier strategic and tactical arguments is contained in G Brown and D Woolner, *A New Aircraft Carrier for the Royal Australian Navy*, Canberra, 1982.
24. The pro-carrier arguments hereunder are drawn from A. Robertson, *The Need for an Australian Aircraft Carrier Capability*, Canberra, 1982.
25. Braybrook, *op cit*, p 36.
26. Brown & Woolner, *op cit*, p 11.
27. *Ibid*, p 32.
28. *Ibid*, p 36.
29. R Braybrook, 'The Carrier or the Submarine', *op cit*, p 34.
30. *Hansard* (Reps), 9 September 1980, p 996, and also *Hansard* (Reps) 19 April 1983, p 2069.
31. O'Connor, *op cit*, p 22.
32. R. Braybrook, 'The Great Carrier Debate', *Australian Aviation*, June 1980, p 23.
33. Brown & Woolner, *op cit*, p 15.
34. J Thorn, 'How Vulnerable is the STOVL Carrier?', *Australian Aviation*, March 1982, p 6.
35. Brown & Woolner, *op cit*, p 26.
36. Brown & Woolner, *op cit*, p 38. It should be recognised that the US Admiral quoted was biased because he was attempting to justify huge NIMITZ carriers as against small ones. The RN retention of INVINCIBLE is eloquent argument by that Navy as to a small carrier's value to a smaller navy.
37. A Robertson, *op cit*, p 12.
38. Brown & Woolner, *op cit*, p 31.
39. *Ibid*, p 34.
40. See J Thorn, *loc cit*, p 6, and Brown & Woolner, *op cit*, pp 35, 136.
41. J Thorn, *op cit*, p 6.
42. *CSE Annual Report*, 1971-72, p 4.
43. Defence source quoted by F Cranston, 'Military Equipment Studies No Use', in *Canberra Times*, 2 October 1973.
44. Robertson, *op cit*, p 2.
45. *loc cit*.
46. *loc cit*.
47. D Ball, *Methodology for Australian Defence Force Development*, Canberra, 1981, p 8.

48. *loc cit*.
49. *loc cit*.
50. Braybrook, 'The Great Carrier Debate', *op cit*, p 23.
51. *loc cit*.
52. *Transcript of Evidence*, Parliamentary Joint Committee on Foreign Affairs and Defence, Sub-Committee on Defence Matters (Katter Committee), May-June 1982, p 14.
53. Stackhouse, *op cit*, p 63.
54. Katter Committee, Minutes of Evidence.
55. S Brogden, 'The Invincible Decision' *Aircraft*, May 1982, p 22.
56. *Ibid*, p 24.
57. Brown & Woolner, *op cit*, pp 123-137.
58. Robertson, *op cit*, p 1.
59. See *Hansard* (Reps), 25 February 1982, pp 633-641.
60. See for example, Cranston, *op cit*, and J Stackhouse, 'Australian Scene: A Problem of Getting the Right Hardware at the Right Cost', in *Australian Financial Review*, 15 October 1972.
61. See for example, A Grazebrook, 'Sea Control and Maritime Air Power — an Australian View', *Pacific Defence Reporter*, September 1976, pp 15-20; and (authors not stated), 'Protean — a Way ahead for Naval Aviation', *PDR* July 1977, pp 21-27; and A Grazebrook, 'The Melbourne Carrier Replacement', *PDR*, February 1978, pp 13-21.
62. See 'The Carrier Issue', in *Stratagem*, May/June 1980; and Vice Admiral R Peek, Commander G Evans and Commander A Grazebrook, letter 'The Tactical Fighter Force and Maritime Airpower', 1 April 1980, a submission to the Katter Committee during hearings on Defence procurement.
63. Wing Commander R. Kellaway, 'The Carrier Debate — Another View' *Stratagem*, July-August, 1980, pp 39-42.
64. *An Aircraft Carrier for the Australian Defence Force*, Joint Committee on Foreign Affairs and Defence, Canberra 27 August 1982, p 51.
65. See Katter Committee, *Minutes of Evidence*, pp 363, 269, 372. Dr O'Neill supported the *INVINCIBLE* purchase but was equivocal about the cost of a new carrier.
66. T Millar, *The Role of Academics in Defence and Foreign Policy*, Canberra, 1981, p 5.
67. J Stackhouse, 'The Rules Have Been Rewritten', *Australian Financial Review*, 15 January 1973, p 2.
68. Ball, 'The Australian TFF', *op cit*, pp 13, 14, 23; and also Ball, 'Actors and Process', *op cit*, p 191.
69. *Ibid*, p 10.
70. *Ibid*, p 14.
71. See State Dockyard Newcastle evidence to Katter Committee, *Hansard*, pp 421-452.
72. See Braybrook, 'the Great Carrier Debate', *op cit*, p 30.

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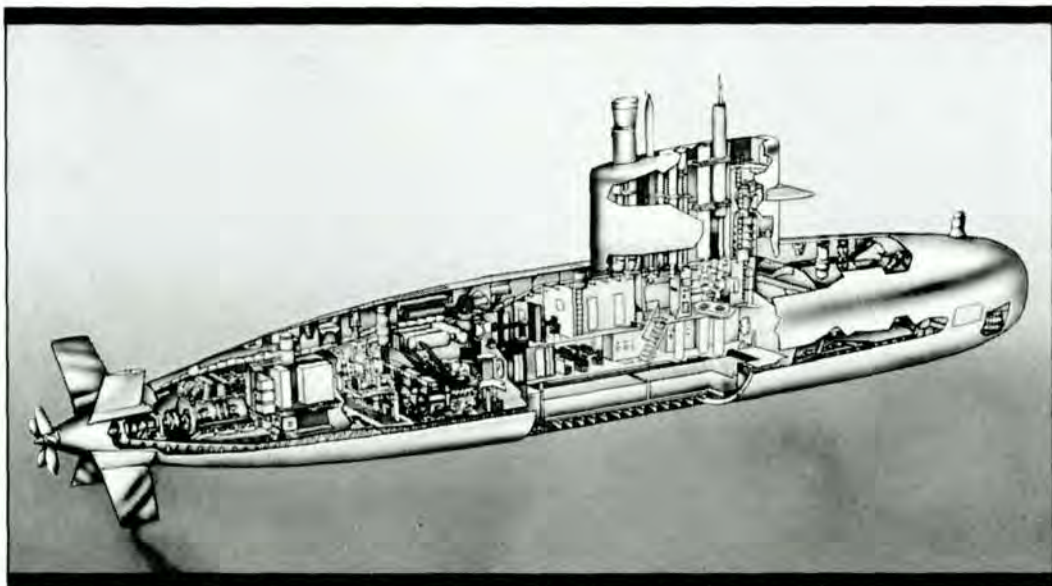
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THE WIDENING ROLE OF DESTROYERS AND FRIGATES IN TOMORROW'S NAVY

by ABROEW ID Lambden RAN

Ships are becoming increasingly vulnerable to a wide range of inexpensive, precision-guided weapons. The Navy must either develop an enhanced effective defence for the protection of a small number of high value units, or resort to a large number of low value units to fulfil the necessary roles. In essence, this is a correct assessment of the current military scene and will prove to be the major moulding force in determining the 'widening role of destroyers and frigates in tomorrow's Navy.' There are, however, a number of factors which have a bearing on the roles which naval units will be asked to perform in the future. Economic, geographical, political, and man-power related considerations and influences all contribute to the moulding process.

To evaluate a subject of this nature, one must clearly define the topic. In other words, what is the *current* role of destroyers and frigates? No more precise definition can be found than in the Oxford Dictionary: 'Destroyers — fast warships designed to protect other ships by attacking submarines etc with guns and torpedoes.' Frigates are defined as being 'smaller destroyers,' and I will be referring to them as such.

In the past, the roles of Australia's destroyers and frigates have been determined by what I term 'traditional military thinking.' The legacy of World War II is still evident in the determination of these roles. Allied with this, is what I believe to be a pre-occupation with anti-submarine warfare, the Soviet threat, and our role in alliances. In short, I see a failure to reflect changing trends in the international situation. Now we are beginning to appreciate the changing situation, and design, and modify, our ships to adopt newly-required roles.

In considering the evolutionary change occurring in the roles of destroyers and frigates, my primary consideration is the Australian situation. Many of the features I will discuss are

peculiar to the RAN. However, I will integrate international phenomena, when they are relevant. The term, *tomorrow's Navy*, can be viewed in two ways: there is the immediate future, as opposed to the longer term connotation. Short term considerations are brought about largely by changes which are in evidence today; longer term considerations can be seen as somewhat speculative, but no less important when discussing this topic.

To appreciate the changes which are occurring, I will begin by drawing a comparison between two warships which characterises the new roles which destroyers and frigates will be asked to perform. The comparison highlights the growing awareness of new threats and dynamic advances which have been made in technology, in order to outfit our ships for wider roles.

HMAS VAMPIRE reflects the role which destroyers were expected to fulfil in the 1950 era. The foremost weapons of the ship are 6 x 4.5" guns, followed by mortars, and 40mm guns, all in all a decidedly limited armament by modern standards. Sensor-wise, the ship is technologically deficient. A deficiency in electronic warfare, data link systems, and an advanced communications system are particularly significant. By comparison, the FFG *HMAS SYDNEY*, is equipped for, and capable of performing, a much wider variety of roles in tomorrow's Navy. The Harpoon missile system, Phalanx close-in-weapons-system, and a helo asset, are the features which do most to set it apart from its predecessor. The aim of providing maximum support for what is termed a 'high value unit,' is paramount. Surface to surface

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missile warfare, the projection of air assets, sophisticated electronic warfare equipment, and advanced communications and sensor technology, allow the ship to perform a multitude of new roles. Such ships personify the new 'multi-role' nature of destroyers and frigates, imperative to survival in tomorrow's military arena.

The major role of destroyers has always been in the area of convoy support, naval gunfire support, but predominantly in ASW. World War II saw the emergence of the submarine as a highly potent threat. The dedication to preserve our shipping from this invisible enemy has resulted in what I believe to be a pre-occupation with ASW, to the detriment of our capabilities in other facets of warfare. The threat of the imposing Soviet Submarine Fleet has been the basis for the major ASW role perpetrated for Australia's destroyers and frigates. Changing roles of submarines in the Soviet Fleet, new threats, and non-military related influences have resulted in a broadening of roles, and capabilities. I believe that destroyers and frigates are now capable of performing more 'aggressive' roles.

One of the most significant, recent military developments has been in the area of 'precision-guided munitions.' Perhaps the best example to cite is the Falklands War. British shipping proved highly vulnerable to a comparatively low-cost precision-guided missile. Surface ships, (especially larger ships) have become 'easy prey' for missiles, which can be guided accurately to their target, with devastating consequences. Exocet, Harpoon, and Gabriel are examples of the successful new phenomenon, which can be launched from the air, surface, and in some cases, sub-surface platforms. Earlier detection of the missile, and its platform, through radar, ESM, projected air assets, and other means is a role that destroyers and frigates must adopt if the protection of themselves, and their supported ships is to be ensured. Paradoxically, our destroyers must assume the role of aggressor, with our newly acquired surface capability, Harpoon; the advent of over-the-horizon-targeting for the RAN in the future will allow the full utilisation of this valuable asset. Australia is relatively up-to-date with AAW, and ASW. The standard AA missile, Ikara, and the Muloika ASW system can be considered state-of-the-art.

Our destroyers and frigates will have a hitherto unparalleled capability in surface warfare. The newly acquired 'gattling gun' style Phalanx, is capable of offering adequate defence against this type of weapon. Conversely, the role of our ageing River Class DEs in such surface conflicts, must appear quite minimal, owing to the deficiencies in necessary armament, and

inadequate defence relating to this new-style warfare. The role of these ships must continue to be primarily ASW.

Previously, destroyers escorting shipping enjoyed a fair degree of success in remaining undetected. This is no longer the case! Advances in satellite technology have permitted the accurate pin-pointing of ships, anywhere in the world. Destroyers in the future will play an ever increasing role in 'counter-reconnaissance warfare.' Satellite evasion, jamming, and other counter-measures will comprise future roles performed by our destroyers and frigates. The ability to utilise our own satellite technology must also be a vital role. Intelligence and targeting information will be readily available from this medium.

I have mentioned that changes have occurred in the Soviet Submarine Fleet. The emphasis has shifted from 'Attack,' or 'Killer' submarines to 'Ballistic,' and 'Cruise Missile' bearing submarines. The threat posed to destroyers by 'Attack' submarines is an obvious one. This threat was predominantly responsible for the Allied defensive ASW concern. However, the transition to 'long-range' missile carrying submarines introduces new challenges and roles for our destroyers and frigates. A changing role from the 'hunted' to the 'hunter' best sums up the situation. From an essentially anti-convoy role, submarines have now been transformed into major 'global theatre warfare' weapons. The ability of these submarines to dispatch ordnance to destinations hundreds of miles away, highlights the eminent danger they pose. With the increasing 'migration', and the global threat posed by these submarines, destroyers and frigates will play an increasing role in detecting and tracking them to give the West the tactical advantage in a future global conflict.

Perhaps one of the most deadly arrivals on the military scene has been the 'missile armed patrol boat.' These comparatively minute, but potentially lethal vessels are performing vital roles for an increasing number of navies throughout the world. For a portion of the cost of high-value units, ie destroyers, a nation can boast a fleet of highly manoeuvrable, high speed craft, highly proficient in surface warfare (although lacking the capability for other aspects of warfare.) Serious thought must be given to the roles of destroyers and frigates when dealing with this threat. Australia is surrounded by countries who have opted for this 'proficient low-value unit' concept. India, Indonesia, Thailand, Malaysia, and a host of other nations have recognised the acceptability of this concept.

The major role which our destroyers and frigates must assume, will be an enhanced

command, control, and co-ordination role. Ideally, our patrol craft will eventually be missile fitted. The role of our high-value units will be to co-ordinate a concentrated strike against the threat, by patrol craft, RAAF aircraft, submarines, and ship's own air assets, supplemented by the ship's surface warfare capability. Defence of the high-value units will be paramount. To this end, anti-missile counter measures such as Phalanx, will be more widely employed in tomorrow's Navy.

The command role of our destroyers and frigates is only possible if their advanced sensor technology, communication mediums, and intelligence facilities are fully capitalised. Our ships must take advantage of the deficiencies inherent in the smaller craft, ie, lack of armament, sea-keeping ability, and lack of sensors (due to size constraints.) Future roles that destroyers and frigates assume in a conflict with this threat must aim at the prevention of allowing our 'high-value' units from becoming 'large sitting ducks, in a shooting gallery!'

The requirement for destroyers and frigates to become more 'multi-roled' is easily recognisable. An innovative step in this direction is the 'modular concept.' The *USS SPRUANCE* class DD employs this concept. The modular design, and modification characteristics of this ship class are unique. Advantages are primarily in the relatively easy supersession of out-moded sensors, or technology. The feasibility of modular modification to outfit a ship for differing roles is quite significant. The concept also allows

for increased automation, production, and a reduction in the crew required. A proposal to develop a *SPRUANCE* with the ability to operate four LAMPS helos, is an example of the benefit derived from the concept. Such an enhanced air capability is proof of the variation in roles which may be achieved through the radical 'modular' concept.

The Falklands conflict offered an insight into the innovative technological achievements of the new military era. The Exocet missile achieved world-wide acclaim. Almost as outstanding was the success of the Harrier vertical take-off aircraft. This aircraft has revolutionised the area of air support, and opens the door for exciting new roles for destroyers and frigates in tomorrow's Navy. The aircraft itself is capable of performing a variety of roles, forward detection, defence and strike being the major ones. Whilst the aircraft is confined to carriers at this stage, one can envisage the aircraft becoming destroyer-borne in the not too distant future.

Australia has until recently been a 'Carrier Navy.' The area of air support has been a carrier concern, with the occasional RAAF support. Now, however, we must face the dilemma of providing air support, without a carrier. The installation of a Labor Government has had far-reaching effects on our naval forces. Foremost was the decision to scrap the ageing carrier *MELBOURNE*; the Liberal Government, if returned, would probably have vetoed the purchase of a new carrier, but would have continued to maintain the Fleet Air Arm. Naval



USS SPRUANCE March 1983

— James Goss

tactics in this country have always revolved around the provision of carrier borne air support. The unavailability of the carrier has meant that other units must adopt the roles that *MELBOURNE* fulfilled.

The RAAF are required to fill most of the void by providing land based air support but there will be times when reliance on land-based air support is unacceptable. Hence the introduction to the Navy of a destroyer-borne air capability. Our new FFGs are designed to operate two helos. Presently the Squirrel helo has been selected to fulfil the role. The limitations of this helo make it imperative for Australia to acquire a better equipped, and more capable helo for our ships. The importance of this is more so now, with the unavailability of carrier borne air support.

Providing projected air support is an entirely new role for our destroyers and frigates. This will enable the units to carry out wider roles in ASW, picket duties, and forward detection. Eventually, the utilisation of such an asset for over-the-horizon-targeting will be achieved. Positive control and co-ordination of the projected air assets will also be a vital role. In the longer term, Harriers will enable destroyers and frigates to offer a greater offensive capability, and also projected defence in dealing with an impending threat. Australia is a relative novice in the field of destroyer-borne air support but utilisation, and control of this asset, is vital to ensure the safety of our units.

So far, military influences which have initiated widening roles for destroyers and frigates in tomorrow's Navy have been mentioned. Political implications play a major part in determining the roles of naval units: the demise of *MELBOURNE* has already been discussed. Labor Party Defence Policy varies quite markedly from that of their Liberal counter-parts. The Hawke Administration was opposed to the concept of a carrier Navy, the major argument being that the carrier is too highly vulnerable. Whatever the case, destroyers and frigates will assume wider roles as a result of political changes.

The Government's emphasis on patrol boat, and submarine production carries great implications for the high value units of tomorrow. Since World War II, Australia has been politically aligned with the USA. Through a number of agreements, and treaties, foremost being ANZUS, we have committed ourselves to defence co-operation with the USA and to a large extent, the procurement of hardware, and Defence policy, have always reflected this close alignment. The USA has always viewed Australia as the West's Pacific Branch in the global struggle. Our Navy has tended to adopt roles which complement the US forces. A carrier

capability, and destroyers equipped with US weaponry, and technology including sophisticated data link mediums, allow the interaction with a larger combined force. Whilst the Government has not made the bold move of withdrawing from the ANZUS alliance, our destroyers and frigates may operate along different guidelines in the future. Australia has, in the past, endorsed a policy of 'forward defence.' This involves the deterrence of an enemy (expected to be Soviet) along a forward defence line, by our units integrated with a US force.

Forward defence requires a 'blue water navy.' Such a navy is composed of ships capable of transiting vast oceans, and operating in distant localities, eg the UK Fleet in the Falklands. Australian military thinking has mirrored US policy in recognising the USSR as the major threat to the Western World. In effect, the roles our ships are expected to fulfil, relate to the idea of a 'global conflict.' The Labor Party endorses a policy substantially differing, a concept of 'Regional Defence.' This would see our ships performing more independent roles. The defence of Australia from a regional point of view forms the basis for this policy. The requirement for a 'blue water navy' is consequently minimal; henceforth, the emphasis on patrol boats and submarines.

Geographical considerations deem it necessary for Australia to maintain its destroyer capability. The nation is surrounded by vast, and often hostile expanses of water. Larger ships with good sea-keeping ability are what is needed in such an environment. Patrol craft are limited in this aspect. Accepting that there is a requirement for destroyers and frigates, what then will be the roles they assume? Basically, they would assume more independent roles. More than ever, they will have to be prepared in all aspects of warfare, rather than specialising in one aspect, as may have been the case if part of a large Task Group. Roles involving coastal surveillance, and the protection of our coastal assets would be high priorities. Our ships would have to adopt a mine warfare capability, as the area of operations will be coastal areas, inlets etc. Once again, the tasks of command, control and co-ordination would take on greater significance. The severance of military ties with the US is not likely to occur overnight. However, it is possible that over a period of time the regional defence concept could be achieved. Our destroyers and frigates must be prepared to adopt a more autonomous role, should this eventuate.

An evaluation of this new concept of defence will show that there are vastly different threats to appreciate. Specifically, a greater awareness of our immediate sphere of interest will be needed



The last of the Fremantle class patrol boats to commission in the RAN, HMAS BUNBURY pictured heading for its new base, HMAS STIRLING on 20 February, 1985. (Note the bridge wings and different positioning of the aerals).

— LSPH Eric Pitman, RAN

as our potential threats will originate from India, Asia, and the Pacific area. Quite interesting is the fact that of Australia's neighbours, only India maintains a 'blue water navy.' Obviously, the acceptance of the 'regional defence' concept is widespread and Australia's destroyers and frigates must be prepared to fulfil wider roles, relative to the new threat posed by the forces of our neighbouring nations. Missile bearing patrol craft will be the priority threat. An alarming array of internationally acquired hardware comprises the remainder of the threat. American fighter planes, and German designed submarines will be a different proposition to the traditionally accepted Soviet threat. The new threat will primarily be AAW, and SSW oriented, with ASW taking on lesser significance.

A regional conflict, rather than a global conflict, is likely to occur along the lines of the Falklands War. Our destroyers and frigates would perform vital roles in the event of such a situation. The picketing of an island, and subsequent provision of air defence could not be performed by patrol craft yet Australian Territories such as Christmas Island, and Cocos Island could prove prone to this type of activity in the future. The roles of destroyers and frigates in dealing with a military crisis involving Papua and New Guinea is a primary concern. One must remember that our destroyers will bear the brunt of 'gunboat diplomacy'.

The past decade has seen the increasing evidence of terrorist activity. Politically motivated international terrorist groups are a great cause for concern among world wide security organisations. Destroyers and frigates will become more prepared for, and involved in counter terrorist activities as governments become more aware of the threats posed by these groups. In the future, destroyers and frigates will be more capable, equipment, sensor, and personnel wise, of dealing with such crises. The activities of a terrorist group in an area, not readily accessible from the mainland, would be a particular requirement for destroyers, in dealing with the situation. To this end, the future will see a closer relationship with SAS style organisations. Our offshore assets such as oil fields are particularly vulnerable to this type of activity.

Currently, we are witnessing something of a world wide technological revolution with application to the military sector. Electronic warfare is one area in particular, where great advances have been made. The battle for control of the electromagnetic spectrum will be waged by the destroyers and frigates of tomorrow's Navy. Sensitive receivers, communications and wide band jammers, and long range direction finding equipment will become part and parcel of

a destroyer's electro-magnetic arsenal. This is a relatively new area, and our destroyers and frigates will play major roles in the battle for dominance of this field. The increasing use of data links, and their susceptibility to jamming are features to consider. In the long term, the introduction of laser technology will accommodate new roles for destroyers and frigates.

Intelligence will become more of a major role in the future. The victor in any future conflict is likely to be the side which is more aware of the enemy's limitations, and capabilities. Through hi-tech developments, destroyers and frigates will become ideal platforms for the collection of all manner of intelligence be it ELINT, COMINT, PHOTINT, HUMINT etc. They will also be capable of collating, and analysing the various strands of intelligence in order to gain tactical advantages.

I have previously discussed the trend towards smaller low-value units. On the other hand, the US has initiated a trend towards larger ships. The re-introduction of battleships, and the increasing size of ships termed 'destroyers,' supports this statement. The benefits to be gained from this are the ability to carry more and varied ordnances and technology, and the ability to withstand more punishment. Australian destroyers and frigates of the future are more likely to reflect this trend. The possibility of destroyers and frigates becoming platforms for inter-continental missiles must be considered. The aim after all is enabling our ships to perform wider roles, and the subsequent survival of our high-value units.

The military scene is such that new, and growing threats, political influences, and military trends necessitate the destroyers and frigates of tomorrow's Navy being capable of performing a variety of wider roles. I have discussed the influential factors, and outlined the areas in which the new roles will be fulfilled. In summary, if destroyers and frigates are to remain viable and effective components of the future Navy, they will be required to adopt roles in a number of new areas. Perhaps the outcome will be an amendment to the Oxford Dictionary: 'Destroyers and Frigates — medium sized multi-purpose warships, capable of performing a wide variety of roles!'

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THE NAVY PSO — DO WE NEED IT?

by Lieutenant Commander S Coulson WRANS

The Defence Instruction on Personal Services, D1(N) PERS 90-2, describes the Personal Services Organisation (PSO) as an organisation which has been established *to facilitate the interchange of advice and assistance between the divisional system, (the personnel management chain in the Navy working environment) specialist services and personnel or their families* . . . A Personal Services Office is established in each region from which assistance is co-ordinated. More specifically, the PSO provides assistance, support and advice in the areas of housing, removals, resettlement, and the general welfare of Navy members and their families, in particular to the families of members who are absent at sea.

For the past 2 years, I have been the Navy Personal Services Officer in Canberra. As I am about to be posted, I thought that now would be an appropriate time to reflect on the role of the PSO and whether it contributes to the overall efficiency of the Navy by assisting members achieve satisfaction from their employment in the RAN. I will briefly discuss the major areas where assistance is provided by the PSO in order to assess whether or not the Navy really needs such an organisation. My discussion is, of course, largely based upon my own experiences as PSO Canberra.

Resettlement

Resettlement is always 'big business' in the Canberra PSO given the rank structure and age of the Naval community. When I first became Resettlement Officer, it was at the time that many Fleet Air Arm personnel were leaving the Navy following the decision not to replace the aircraft carrier. It was no easy matter as a junior officer to witness the obvious distress of many people whose whole lives were having to be rearranged and who genuinely believed that the Navy they had known and loved was disintegrating before their eyes.

Any persons's decision to leave the Navy also has a profound effect on other family members, particularly a forced decision based on medical recategorisation, non-promotion or changes in the Navy's direction, such as the phasing out of fixed wing flying, but the Resettlement Officer's terms of reference really only cover resettlement of the *member*. A spouse, and in most instances

this means a wife, is just as much affected by the decision to leave the Navy as is the member. Many men have had no other career apart from the Navy and it is no easy matter to have to write out the first job application in 30 years. For a family to decide to settle in a particular place without the consolation that if they don't like it they will be moved on in 2 years anyway is also an immense decision.

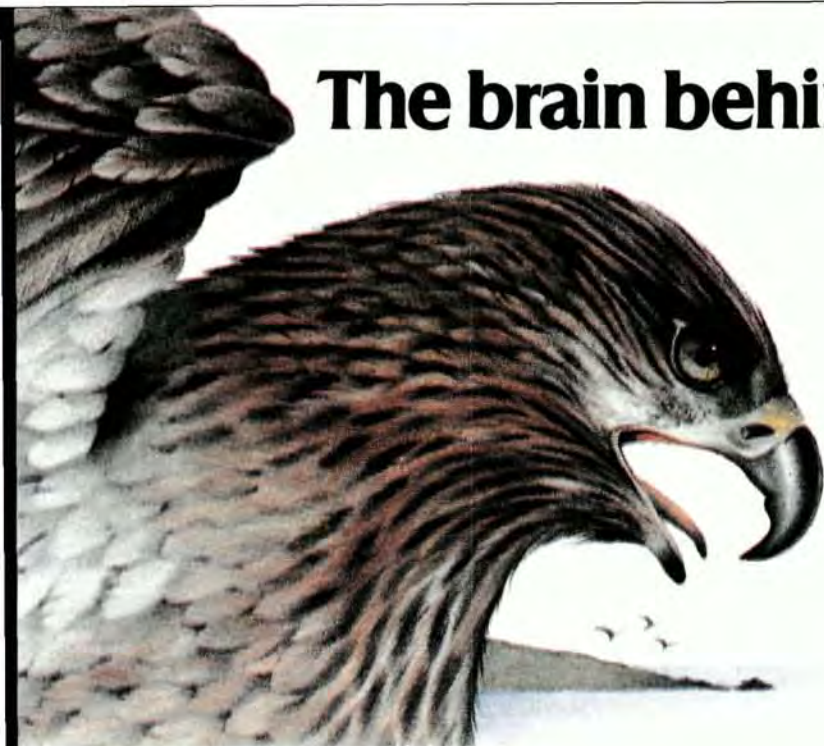
I did not become very involved with the wives of departing members — they were not entitled to attend resettlement seminars (which is now being looked at) — and very few came to their husband's resettlement or final removal interviews though they were always welcome to. Somehow, the wives just seem to cope with the trauma of their husbands' adjustments to new lives, and dutifully move to the south or north coast along with the boat, the caravan and the furniture.

My one other observation on resettlement is how thorough our Senior Sailors are when it comes to making arrangements to leave the Service, find a job and remove themselves to it. They invariably arrived in my office with beautifully tabulated folders detailing every step involved in leaving the Navy, knew all their entitlements and prompted me if I missed any out, and had a career précis prepared and several job applications already in the pipeline. They also never seemed to leave the Navy for a job that with their commutation paid less than what they were earning as Senior Sailors. Many officers on the other hand made sudden

The Author

Lieutenant Commander Sandy Coulson joined the Navy in 1974 after graduating from Flinders University with a Bachelor of Arts degree in European languages. She became an Administration Officer — as did all women officers at that time. Her early postings were to CERBERUS, Fleet Headquarters (where she actually went on board some ships), WATSON, and FOCEA, on the staff of CPSO Sydney. She then spent nearly 3 years as Secretary at the RAN Staff College, followed by 12 months with the Director of Naval Personal Services in Navy Office as Staff Officer (Quarters). While there, and making the most of her close proximity to the posters, she requested to be posted as PSO Canberra and has been there since June 1983. Lieutenant Commander Coulson joins the RAN Staff College in July 1985 — this time as a student. She has also been a member of the ANI Council for the past 2 years.

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decisions to depart, often as a result of the Navy, or more particularly the promotion board, not appreciating their true worth (their words); resettling them was often done hastily and unsatisfactorily, both for them and the PSO. Once having made the decision to go, some regarded the Navy as a terrible organisation and looked forward to the green, green grass outside. The PSO could only hope that it was that green!

Housing

The bane of the PSO's life in many places, not the least in Canberra, is how to house everybody with a housing entitlement. The problem in Canberra is compounded by the fact that personnel posted to Navy Office or Defence billets (ie the vast majority of Navy personnel in Canberra) are only entitled to Department of Territories housing on a priority basis: the Navy owns no married quarters for these people. Territories have their own problems providing enough housing for the general Canberra community and houses are therefore not always available when the Navy needs them. In any event, all Territories housing is classified as Group 1A under the Services Scales and Standards of Accommodation and therefore only Petty Officers and below are required to accept it. This means that the vast majority of Chief Petty Officers and above who do not own homes (and many do own homes in the Canberra/Queanbeyan area) are in receipt of Temporary Rental Allowance and have to find their own accommodation.

To find one's own rental premises in the tight Canberra rental market is no mean feat. To find such a house within one's TRA ceiling is difficult, to say the least. However, my experience as the Canberra Housing Officer is that the Navy's overall TRA budget is not made any easier to manage by the unscrupulous individuals who believe that because the Navy has moved them to Canberra, then so the Navy should pay for them to live in 4 or 5 bedrooomed, swimming pooled splendour in one of Canberra's more prestigious suburbs. Not for them the outer Canberra suburbs where many Navy and other families on similar incomes buy their own homes. These people believe, and the majority are officers, that they are entitled to a certain standard of subsidised housing well above Service scales and standards. Because housing is known to be in short supply in Canberra, people capitalise on the fact that they have found a house, albeit one well above the TRA ceiling, to apply (very often successfully) to the Navy for the full rent to be paid, minus the member's own Group Rent Scheme contribution.

I know it is simplistic to say that less money on TRA means more money for fuel and

consequently more steaming time for ships. But somebody, and I as a PSO have failed, needs to make Navy members understand that hefty amounts of money spent on satisfying some people's unreasonably high expectations is doing nothing to help our Navy. Housing remains a very contentious issue and a veritable nightmare for a PSO.

Removals

For the last 2 years, the words pre-removal inspection, pre-pack, uplift and delivery have become a major part of my working vocabulary. Navy removals are happening all the time, peaking over the November to February period of each year. Most seem to go remarkably smoothly — but one always seems to remember the 'problem' removals.

I'll never forget the truck, laden with the possessions of several Navy families, which headed off from Canberra to Nowra and never arrived. Exhaustive enquiries eventually located the truck parked, halfway there, outside a Bateman's Bay pub and the driver parked inside the local lock-up. Five days later, truck, furniture and driver drove through the gate at *HMAS ALBATROSS*, seemingly none the worse for their unusual trip. The load was duly delivered to its anxious owners, who were all by this time wearing borrowed clothes.

People having removals seem to be divided into two main groups (with infinite variations in each group): those who treat removals as an everyday occurrence and with a minimum of fuss, and those who approach a removal with absolute dread and who see (and generally encounter) difficulties at every corner. These are also usually the people who make life very hard for the removalists — they want their furniture arranged in three or four different positions before they are satisfied, they complain about the handling and packing of their crockery (including the vegemite jars) and they don't so much as offer the removalists, who may be working in 30° heat, a cool drink.

The standard of Government arranged removals has improved over the years and in Canberra, both Department of Administrative Services and Navy removal inspectors try and visit each removal to ensure that the correct standards are being adhered to. But any removal from one place to another has the inevitable side-effects of Navy families having to find new schools, new community facilities and new friends. The Personal Services Office can assist recently arrived families through its family services section.

Family Services

Family services encompasses a multitude of areas including reception and support for

families recently arrived in an area, the provision of loans and grants through the RAN Relief Trust Fund, the arrangement of reunion visits for the children of families servicing overseas, the provision of information on community facilities in the PSO's area, support for wives of members absent at sea and, of course, the specialist assistance given by professional Naval Social Workers.

My Office was without a Naval Social Worker for almost 12 months, resulting in my being in the unique position of having to provide a great deal of preliminary assistance to families until a Social Worker could be brought in to provide more specialised advice. My impression is that Navy families experience all the hazards of modern living including child-rearing problems, domestic violence and marital breakdown. These problems are very often exacerbated by the additional traumas of separation due to sea service.

The PSO's role in assisting the families of members at sea is a particularly crucial one. Very often, the PSO is called upon to provide support for the family of a sea-going member until he can be sent home. I found that most commanding officers reacted promptly and compassionately when a member's presence was required at home. However, the operational commitments of the ship and the needs of the family have to be carefully weighed before the decision to send the man home is made. I like to think that worries of both the commanding officer and the member were appeased to some extent by the knowledge that support was being given by the Navy until the family could be re-united. Support doesn't stop once the member is home but is provided as long as it is needed.

My one major concern about the role of PSO in supporting sea-going members and their families during 'tough' times is that some ships' officers regard a member sent home because of a family problem as no longer being any of their concern. I will always remember attempting to advise one Executive Officer (XO) about a sailor who had family problems in Canberra which were not grave enough to prevent him returning to his ship, but which were grave enough to make him a very worried man. The XO told me that it was my problem and he was thankful that I was the one in Canberra having to sort it out. The fact that in 24 hours he would have an unhappy leading seaman onboard, whose mind was preoccupied with his wife's anger towards his being at sea, simply did not enter the XO's head. He left me with the distinct impression that I had wasted his valuable time discussing a 'wife problem', and I could understand the wife's anger if this insensitivity was relayed to her by her husband.

It is imperative that ships and PSOs work together to ensure that men at sea aren't preoccupied with family problems which must affect their job performance and ultimately the ship's efficiency. The PSO is, after all, meant to supplement a ship's internal divisional system not replace it.

Use of the RAN Relief Trust Fund by Navy members in the form of furniture and housing loans has long been commonplace. Of more recent concern to me has been the dramatic increase in the number of people, particularly junior sailors, who need to borrow from the Fund simply to make ends meet. I don't propose to turn this article into a discussion on the Defence Force pay situation but increases in the cost of living without any significant pay rise are making life very difficult for many of the lower paid Navy members.

There are always people who simply can't manage their finances, but the majority of sailors who have borrowed through my Relief Trust Fund account are people who are finding it difficult to get by on what they are paid. These sailors, usually with a dependent wife and a couple of young children, don't have bank accounts they can draw on if the car needs new tyres or a family member gets sick. Without the Relief Trust Fund they would easily become the victims of lending institutions and their interest rates. However, it distresses me to write a cheque for \$150 for a young sailor so that he can buy his family's weekly groceries — his pay had gone on a new carburettor for his car which he needed as his wife was pregnant and needed transportation to her doctor. Mind you, he insisted on paying the loan back at \$20 a pay — not the minimum \$15 — he had his pride!

Is The PSO Needed?

Judging by the people who pass through my office I would say that the PSO is definitely needed. However, there are those who would say that by its very existence, the PSO generates problems and situations which would otherwise simply not occur. I lean towards the view that because of the very special lifestyle resulting from a Navy career, that an organisation such as the PSO is needed to make the arrangements that special lifestyle generates to assist families cope with the demands of that Navy lifestyle.

Sometimes, we seem to do an awful lot for some members or families who simply can't cope without the regular support and assistance of personnel such as our Naval Social Workers, and who come back time and time again with problems that another member or family would handle as a matter of course. On the other hand, there are an increasing number of families who

THREATS AND RESPONSES: SINGAPORE AND THAILAND

by Corporal M. Andrew RAAF

Singapore and Thailand are two Asian nations of differing populations, land mass and wealth, yet they view their threats as being virtually the same. Both view Communism as their major threat, yet both trade with Communist countries, notably the PRC, quite openly and both consider Vietnam as the primary threat. The PRC is regarded as a long term threat only if there is a rapprochement between the PRC, Vietnam and the USSR.

Although Thailand has been informed that it cannot become a member of the Integrated Air Defence System (IADS), due to the possibility of the member countries' becoming involved with operations against Vietnamese incursions into Thai airspace, individual IADS nations exercise with Thai forces. Australian, Singaporean and Malaysian forces have exercises with Thai forces, and Malaysia has conducted operations against Communist terrorists on the Thai/Malaysian border. Singapore regularly stations A-4G Skyhawk strike aircraft in Thailand and has conducted maritime operations as well.

With regard to land based threats, Thailand's border areas have been areas of conflict over recent years, with 1984 seeing trouble on all borders: a small Vietnamese force crossed into Thailand but was easily repulsed; Laotian and Thai forces clashed over three disputed villages; Burmese forces crossed into Thailand in hot pursuit of guerillas; and there were operations against Muslim fundamentalists and Communist terrorists in Southern Thailand. Thailand views these troubles with differing priorities, having all its medium artillery and most of its armour facing Vietnamese forces in Kampuchea and lighter forces in the Laotian, Burmese and Malaysian border areas.

Singapore faces no direct land threat to its borders but due to its small population, size and land mass², that country's defence is based on the Israeli and Swiss models of having compulsory military training, utilizing the large scale use of reserves to augment a relatively

small regular army. A comparison of the Singaporean and Thai armies (fig. 1) shows that Singapore's forces are geared for rapid deployment by the Air Force's C-130 Hercules transports and the Navy's amphibious warfare vessels. Singapore's order of battle contains airmobile and commando forces designed for rapid deployment, while its armoured forces consisting of 15 ton AMX-13 light tanks and 10 ton M-113 armoured personnel carriers enable them to be transported easily.

Maritime forces show the difference in coastlines. Thailand has an expanding navy which is acquiring new corvettes, submarines and mine warfare vessels to add to its fleet, while Singapore relies on a small fleet of missile and gunboats for its seaborne forces (fig. 2). Singapore has no anti-submarine forces and its mine warfare fleet is next to useless. If Vietnam were to acquire submarines, Singapore would be expected to acquire the equipment to deal with them. Thailand's maritime airpower is provided by Tracker, Nomad and F-27 aircraft, the latter equipped with anti-shiping missiles. Singapore presently has no surveillance aircraft, but the arrival of the four E-2C Hawkeye AWACS aircraft with A-4S Skyhawk strike aircraft armed with the Maverick air to surface missile will be its main anti-shiping force.

Both countries view airpower as the major response to aggression, with Singapore having the most powerful airforce in South East Asia next to Vietnam, with Thailand third (fig. 3). Both countries utilize F-5E fighter bombers for the air defence, with Thailand utilizing them in the strike role as well. Singapore's Skyhawk and Hunter fleets provide an enormous punch. Singapore's air defences are augmented by the most modern

The Author

Cpl Martin Andrew has been a member of the RAAF since 1977. Tours of duty have included 2 years at the Australian Joint Warfare Establishment and 2 years in Butterworth, Malaysia. He is presently working at Air Force Office in the Technical Data Section.

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Surface to Air Defences in the region, incorporating Bloodhound, Improved Hawk and Rapier missiles for 24 hour coverage of Singapore's airspace. With the acquisition of two squadrons of MIG-23 to supplement the 40 Su-7/20 Strike aircraft by the Vietnamese Air Force, Thailand has ordered 16 F-16A multi purpose aircraft to improve its air defence and give it the ability to strike Hanoi if necessary from Thai airfields. Singapore has requested 8 F-16A aircraft with 12 on option, from the United States, to give its forces a longer ranged strike force and as escorts for its E-2C aircraft.

Both Singapore and Thailand view weapons' production as a major priority to support their armed forces with a strong industrial base. Through the Ordnance Development Engineering Inc. and its subsidiaries, Singapore builds, refurbishes or maintains nearly all of Singapore's weapons systems except for certain guided missile components. Singapore is the largest weapons producer in the region. Thailand is also increasing its weapons' production, being self sufficient in most small arms ammunition and it also produces rifles, mortars, rockets and light artillery. Thailand has also developed multiple rocket launchers and rockets to increase the army's fire support capability. Both countries are investing heavily in their aerospace industries, Thailand assembling its new light trainers under licence and Singapore assembling 17 of its new Super Puma helicopters, having rebuilt and updated over 100 Skyhawk strike aircraft. Singapore intends to produce or assemble under licence the strike aircraft and its armaments that will replace the Skyhawk in the 1990s.

Defence planning for the future will see Thailand building up its conventional forces to provide a balanced force capable of dealing with

threats short of a major invasion by Vietnam, and then still being able to respond in force till external forces, notably the US, come to Thailand's aid. Singaporean armed forces will be emphasising mobility and rapid deployment with sophisticated weaponry. This can be deduced by the force structures that are evolving from recent defence purchases.

Note the acquisition of Super Puma helicopters which are capable of moving 3 light infantry companies, and the acquisition of 160mm mortars which are not really necessary for the defence of Singapore, as Singapore is very urbanized with excellent roadways, but will be excellent in operations outside Singapore where the logistic network is poor. Similarly, Singapore's amphibious warfare vessels are a bit dubious for defensive purposes but perfectly sensible for deployment of its armoured forces to support its neighbours.

In conclusion, the differing geographical position, population and country sizes, coupled with their respective defence budgets, have shaped both countries' response to perceived threats. Thailand favours forward defence to blunt threats at its borders to allow time for reinforcements to arrive to its aid. Singapore remembering the old adage, "It is better to fight the enemy on someone else's soil", has evolved a force which can be used to assist neighbours under threat, while still having sufficient forces to protect itself.

Notes

1. Australia, New Zealand, United Kingdom, Singapore and Malaysia. These countries form the 5 Power Defence Agreement for the defence of Singapore and Malaysia which started in 1971.
2. Singapore 2.55 million, people, 603km²; Thailand 50.7 million people, 517,000km².

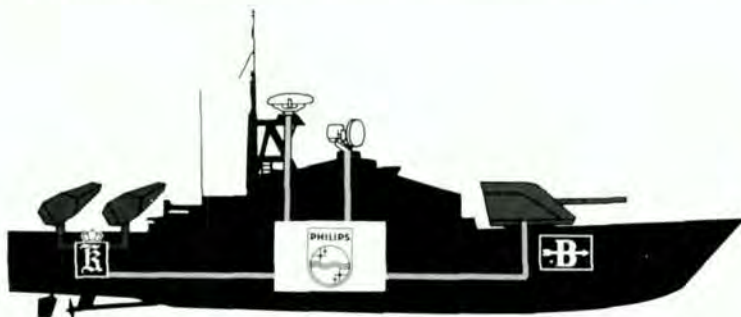
	Singapore	Thailand	Vietnam
Regular Army	45,000	160,000	1,000,000
Reserves	150,000	500,000	3,000,000
Medium Tanks	14	95	1500
Light Tanks	350	344	450
Tracked APCs	720	480	500
Wheeled APCs	280	340	1500
Light Artillery	Nil	300	300
Medium Artillery	60	162	400

Fig. 1. Selected Army's of South East Asia

(These figures are estimates, especially for Vietnam, and include equipment on order.)



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	<i>Singapore</i>	<i>Thailand</i>	<i>Vietnam</i>
Submarines	—	(2)	—
Frigates	—	2	—
Corvettes	—	3(+ 2)	4
Missile Boats	6	6(+ 3)	10
Gun Boats	6	3	39
Mine Warfare Vessels	—	9(+ 2)	—
Amphibious Warfare Ships	—	11	6

Fig. 2. Selected Navies of South East Asia.
(Figured in brackets are for ships on order.)

	<i>Singapore</i>	<i>Thailand</i>	<i>Vietnam</i>
Mutli-Purpose	—	16	40
Strike	>140	—	40
Fighter/Light Strike	27	60	70
Interceptors	—	—	180
Light Strike	—	15	—
AWACS	4	—	—
Utility Helicopters	39(+ 22)	102(+ 10)	80
Large Transports	8	4	—
Medium Transports	—	41	100

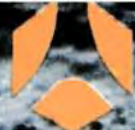
Fig. 3. Airpower of Selected South East Asian Countries

	<i>Singapore</i>	<i>Thailand</i>
Corvettes	—	2
Multi Purpose Aircraft	8 + on option ¹	16
AWACS	4	—
Utility Helicopters	22 + on option	10
Medium Artillery	—	56

Fig. 4. Major Equipment Purchases — Singapore and Thailand 1982–85

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EXPERT SYSTEMS

Artificial Intelligence based systems to supplement, or replace human expertise in the naval environment

by Sub-Lieutenant J Pollaers RAN

Summary

The variety of operational activities, and equipment, experienced in the Royal Australian Navy leads to situations where it is necessary to have access to people with specific expertise. This is not always possible, given the amount of time required to gain such expertise, and the constant lack of manpower. Artificial Intelligence based Expert Systems are achieving practical results in situations requiring expert assistance, and/or timely solution, especially where uncertainty, or ambiguity may exist. These computer systems have the ability to reason, and to learn. The article covers the structure of Expert Systems and the wide range of military applications; it also studies how these systems may be integrated by example, using a case study in ship classification.

INTRODUCTION

The Royal Australian Navy, from commanders to technicians, are beset by numerous problems stemming from the large amount of complex information that must be processed, and from the increasing complexity of the weapon systems being used. Decisions must be made faster than ever before, and operational readiness maintained, despite limitations in manpower and training. Artificial intelligence (AI) holds much promise in solving these problems, and is achieving practical results.

These results can be attributed to the design and use of 'Expert Systems', consisting of problem solving computer programs and hardware that can reach levels of performance comparable to that of a human expert in some specialized problem domain.

This article is intended to introduce the concept of AI, specifically expert systems, and in so doing indicate the variety of applications for this technology. It is the intention of the author to encourage personnel, both uniformed and civilian, to consider further applications. To illustrate the applicability more fully, a case study in ship classification has been presented.

Structure of an Expert System

Ordinary computer programs organise knowledge on two levels: data and program. Expert systems on the other hand, organise knowledge on three levels.

- Data
- Knowledge Base
- Control

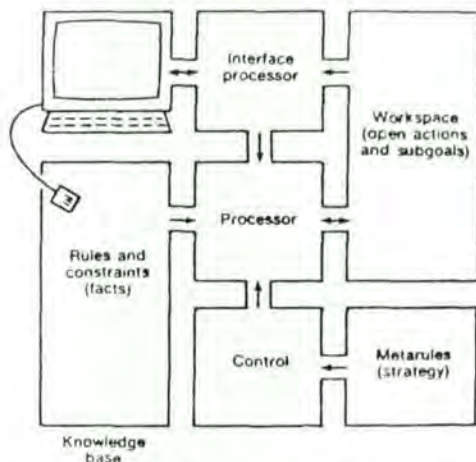


Figure 1: General Structure of an Expert System.

The Author

SBLT Pollaers, 22, joined the Royal Australian Navy College, HMAS CRESWELL in 1981 after completing the New South Wales HSC. In the same year, he commenced a Bachelor of Electrical Engineering (BE(L)) degree through CRESWELL with the University of New South Wales. In 1982 he moved to HMAS WATSON to attend the University directly, and commenced a second degree in Computer Science (BSc), to run in concurrence with his BE(L). Sblt Pollaers completed his BSc in December 1984, and completes his BE(L) in December 1985 to join the fleet for Stage II training. In December 1984, Sblt Pollaers presented a paper on the military application of Artificial Intelligence to the Royal Australian Naval Engineering Symposium.

Consider a system set up to provide operational advice in a naval battle configuration. The data level is declarative knowledge about the particular problem being solved, and the current state of the problem. This data may consist of sensor information, producing a collection of details or features relevant to the problem domain. For example,

- Sensor Information
 - weather conditions
 - sea conditions
 - visibility
- contextual information
 - ship sightings
 - intelligence reports

The knowledge base level consists of knowledge specific to the particular kind of problem that the system is set up to solve. This knowledge is used by the system in reasoning about the problem and may reason about such options as³:

- Attack
- Defend
- Withdrawal

where the 'attack' option may be broken into classes such as type, thrust, target, tactics, and deployment. It should be apparent at this point that the knowledge is represented in a hierarchical fashion enabling a gradient between detail and philosophy.

The control structure is a computer program that makes decisions about how to use specific problem solving knowledge. It makes use of high level rules (often referred to as Meta-rules) that represent the strategy of the system, where the data and knowledge base levels may be described as the tactics. At each step in the reasoning process, uncertainty and ambiguity may arise. Hence, hypothetical interpretations of the current problem are formulated and tested by the control structure at various levels of abstraction. Resources may be devoted to the hypotheses that show the greatest potential based on some measure of certainty. This measure of certainty may be represented as the probability value that the partial or final solution, as suggested by the system, is the right one.

For example,

- IF a fleet unit has been attacked by an enemy unit in the vicinity,
- AND there is a report that ships have been sighted in the vicinity in the last 24 hours,
- THEN we may conclude that there is a probability of 90% that the sighted ships were enemy ships. Thus 90% would be the certainty value.

Another important characteristic of such systems, is that while they offer alternatives to the human operator, they can also be held

accountable for their decisions¹³. This means that when required, they must be able to give a thorough account of the reasoning behind their suggestions. The operator is provided with an insight into the system's reasoning, such that whenever conflicts of opinion occur, the operator has the final say in the decision making process (when there is time to exercise it).

MILITARY APPLICATIONS OF EXPERT SYSTEMS

With the variety of operational activities and equipments experienced in the Defence Forces, particularly the navy, many situations arise in which it is necessary to have people available with specific expertise. This is, however, not always possible given the amount of time required to gain such experience, and the constant lack of manpower. The present policy can only be to produce members with general skills to cover as many situations as possible. Expert advice is not always available. The following represents areas where expert systems are being applied.

Equipment Maintenance and Scheduling

- A system dedicated to enabling a navy technician to trouble shoot and maintain complex navy equipment, using AI to emulate or surpass the heuristic search patterns and techniques that are used by expert technicians. This will result in reduced system downtime and increased fleet readiness. ^{2,13,14}
- Scheduling procedures in areas of ship maintenance to extend operational lifetimes. This splits the dockyard's role away from that of the ship's complement, releasing dockyard manpower to work for which it is better suited ^{4,14,20}

Decision Aids — includes tools such as:

- system designed to select a set of weapons for a given set of targets to produce the maximum expected destruction¹⁴.
- general purpose tools such as a system for target class identification for a radar system⁶. [These tools will help the operator to cope with complex decisions that require a large amount of input data, and to make these decisions in a timely manner.]

Multisensor Information Integration

- A system of automated knowledge-based specialist (ie, co-operating Expert Systems) to integrate information from multiple sensors such as radar, sonar, ESM, intelligence and overhead surveillance. This information organisation will support the commander and his staff in developing a sound tactical picture

to guide decision making. Operator overload will be reduced, helping the decision maker make accurate decisions with a better understanding of the surrounding environment^{5, 10, 14, 15, 16, 17, 20}

Operational Planning

- A system to act as an expert consultant system to aid in naval warfare mission planning³

Many expert systems are also under development. Their application areas include medical diagnosis and prescription, chemical and biological synthesis, mineral and oil exploration, planning and scheduling, signal interpretation, military threat assessment, tactical targeting, space defence, air-traffic control, circuit analysis, VLSI design, equipment fault diagnosis, computer configuration selection, speech understanding, computer-aided instruction, knowledge-base access and management, and expert-system construction.

CASE STUDY — SHIP CLASSIFICATION

It must be pointed out that facilitating the extraction of information for the knowledge base from the human expert or experts is at present a limiting factor in the design of expert systems. It is virtually impossible to create a system as described that will be 'all things to all people' since size limitations would result in the production of a system that resembles the skills of the average user, ie 'jack of all trades, master of none'. Obviously then, each system must aim at a problem of a generic class, providing expertise in a specific problem domain¹³.

To illustrate the types of considerations that arise in constructing an expert system, and their capabilities, we shall consider a system designed to classify ships⁶. The system to be

considered will make use of Synthetic Aperture Radar (SAR) data — a radar approach that makes use of the doppler shift of the object being tracked. The same considerations and system could be applied using data from passive infra red detection.

Difficulties Faced in Ship Classification

Advances in radar technology and techniques have led to the production of good, high resolution, two dimensional radar images. The desire to make use of such imagery requires automated or semi-automated techniques for analysing the images, and classifying the objects within. Assuming the use of SAR, we would be interested in determining whether the object on the ocean's surface is a cruiser or a noncombatant tanker, an aeroplane, or a missile.

In comparison with visual imagery, the image is of poor quality due to factors^{6, 19} such as,

- Noise containing false radar returns.
- Highly variable reflecting properties of the object with respect to such as viewing angle.
- The analysis is further complicated by the ship's aspect and orientation. That is, the image will be affected by the ship's roll, pitch, yaw, and may represent a top, side or even end view. The image may then appear stretched or contracted since the image's cross range scale is initially unknown.

There is a real need for a system that has the ability to classify a target when viewed from an arbitrary angle and subjected to the above mentioned interferences.

Approaches to Processing Sensor Devised Data

Sensor and/or radar data may be subjected to low level processing and analysis algorithms, image processing algorithms and pattern recognition algorithms. These algorithms



Figure 2: Typical SAR image. The streak is caused by the motion of the rotating radar antenna with respect to the overall motion of the ship⁶.

represent the mathematical formulation of well understood processes that base their correctness, completeness, and optimality on assumptions that are often inadequate, and are unable to deal with all real world variables. This includes the use of Fast Fourier Transforms, and combining picture elements in cleaning up the image.

The previously mentioned problems relating to most sensors and SAR, make pattern recognition algorithms too fragile and expensive to be successfully applied. Any statistical pattern recognition algorithm requires the storage of varied views in a library, available for matching with the image in question. The introduction of Artificial Intelligence would aim at achieving the same result, based on a single simple model. This will become clearer later.

Pattern recognition approaches do not work well in cases where areas of the ship do not return signals, are masked, or where the ship's superstructure has been modified. Artificial Intelligence approaches are unaffected by such problems, since, unlike pattern recognition where processing is done on individual pixels (picture elements), it reasons symbolically about larger schematic elements of the scene adaptively.

Clearly, pattern recognition and other signal processing functions represent defined, and well understood algorithms. AI as a tool enables the system to use input from the fore-mentioned processes, and further models, depending on the application in reasoning out problems exhibiting uncertainty, ambiguity and inaccuracy. The point is not that the more formal approaches to signal processing are useless, but rather, that when combined at higher levels with AI techniques, are useful in assisting, and even replacing the human decision maker, removing the reliance on human expertise being constantly available to interpret the results.

How levels of the Processing and Interpretation Process are Combined

Signal processing converts the raw sensor data into the two dimensional radar image. Image processing and pattern recognition algorithms are employed to perform the functions of smoothing, edge detection, region growing and boundary finding.

The AI techniques are then able to use the resultant feature vectors¹ at this level of the processing hierarchy, in forming and testing hypotheses. These are then accepted or rejected based on a certain level of significance, or certainty value. The current hypothesis may then be extended, or reformed, until a final solution is achieved.

AI Implementation to the Classification Problem

The following represents the approach selected and developed by the US-based Advanced Information and Decisions Systems. The contents of such an expert 'hypothesis formation' system include:

- Input data, a reasonable quality image.
- A reasoning process control structure that selects the next knowledge sources (component of the knowledge base) appropriate to further refine the current set of hypotheses. This may operate by allocating computational resources on a priority basis to the hypothesis most likely to be successful in its interpretation.
- A knowledge base.
- An output hypothesis consisting of a set of the most likely classifications.

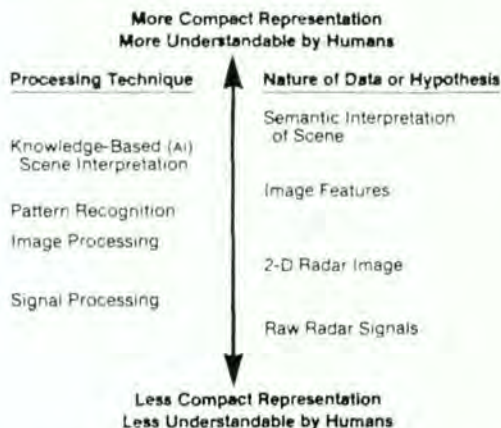


Figure 3: The levels of complexity in combining the processing and interpretation processes⁶.

By organising hypothesis formation hierarchically with the image input at the bottom, and sets of alternative hypotheses at the top, the task then simplifies to one of moving between levels of the hierarchy.

The Reasoning Process

This reasoning process or control structure (sometimes also referred to as the inference machine) combines both a bottom up and a top down knowledge control strategy, to achieve satisfactory results.

The bottom up approach can be referred to as being data driven. Data is processed from its raw state, leading to a final solution describing the current state of the problem. The top down or goal driven approach involves suggesting a possible solution first, (forming a hypothesis) and breaking the problem down to be validated against data at lower levels.¹

HYPOTHESES

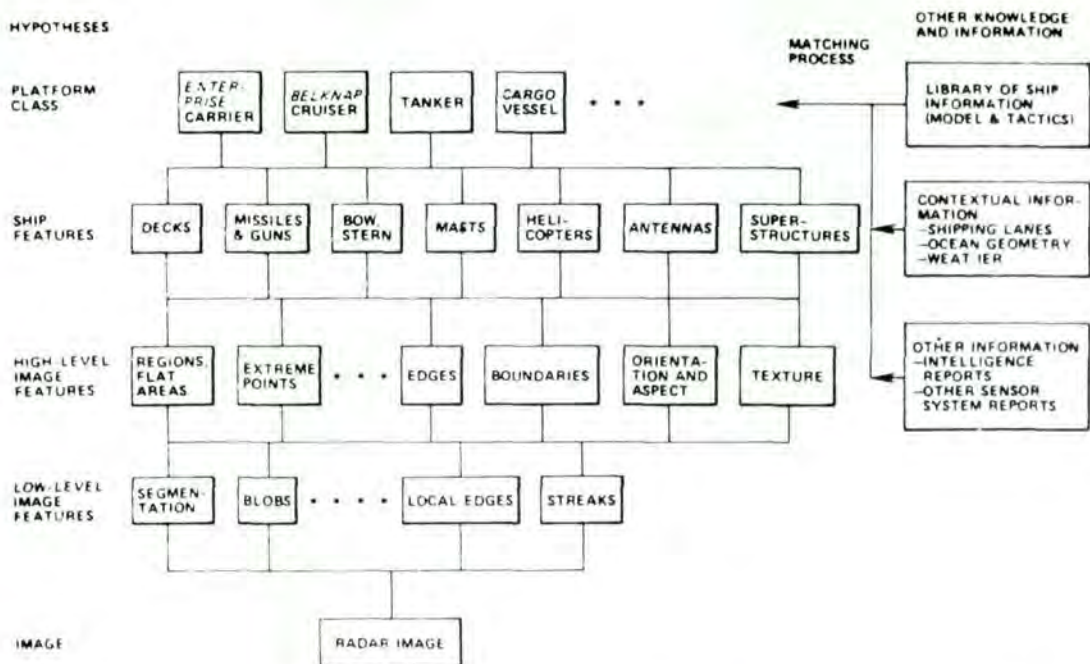


Figure 4: Hypothesis formation levels. Image input is at the bottom, the set of possible hypotheses are at the top, and the intermediate hypotheses are in between⁵.

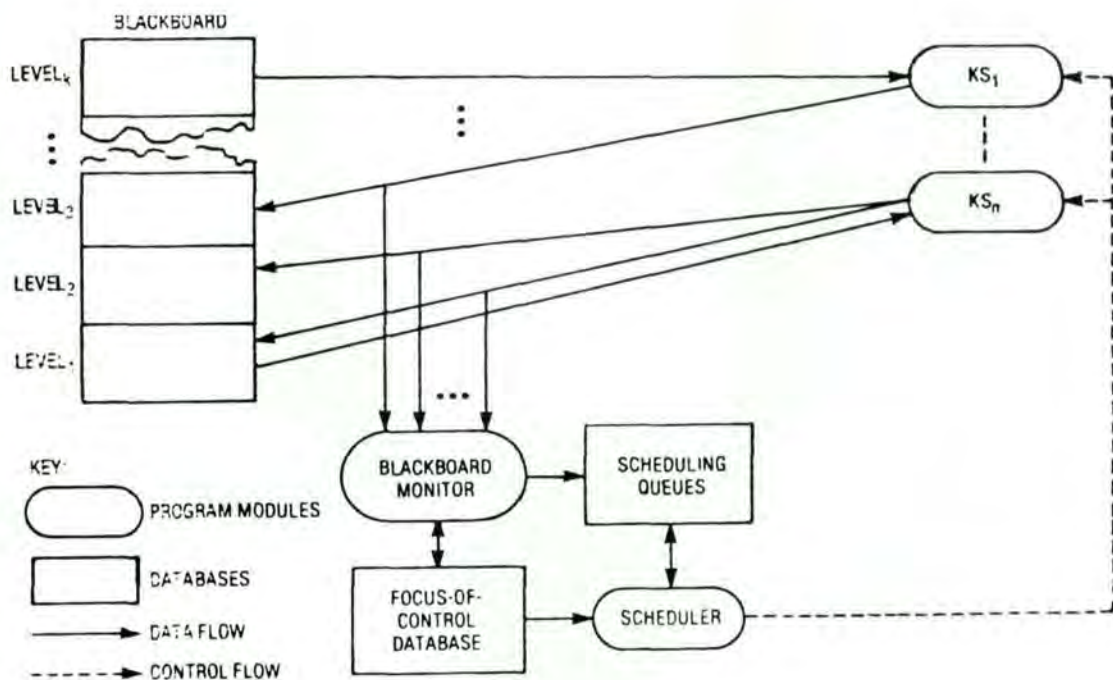


Figure 5: Schematic of the architecture for a system employing the use of goal driven pattern invoked programs (KS) within the Blackboard paradigm⁷.

Other control strategies found in expert systems include back tracking, where a solution path is explored as far as possible, before exploring other paths. Problem reduction is also a strategy employed, where the current problem is partitioned or decomposed into sub-problems, leading to primitive problems that are easily solved. Another approach and future direction in expert systems is the use of the blackboard paradigm as employed by the Hearsay Speech Understanding system⁷. Here Knowledge Sources (KS) communicate with each other by posting messages on a global data structure called the blackboard. KS are basically Meta-rules containing a condition program that evaluates where the KS is applicable, and an action program to accomplish its task in analysing and attempting to improve the current state of the solution. These entries are noted by a monitor, which then creates entries on the scheduling queues for any KS whose applicability might be satisfied. The highest priority activity is removed from the queues and is executed.

Each of these control or inference strategies is dependent on the specific problem domain. The following represents the breakdown of the strategies chosen for the study at hand.

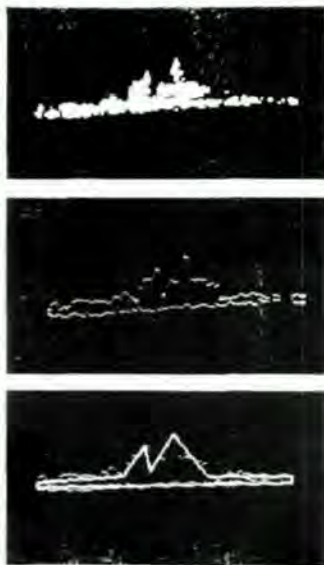


Figure 6: The Bottom up approach. (top) The Result of processing to determine low level image features. (centre) The processing result for obtaining higher level image features. (bottom) Now such features as estimated ship orientation, ship length streak location, deck locations, and superstructure locations and sizes are known⁸.

Bottom-up Strategy

The bottom up hypothesis formation:

1. extracts low level features (eg, isolated edges);
2. maps them to high level features (eg, boundaries and regions);
3. associates high-level features with ship components (eg, superstructures); and
4. combines ship components into an overall representation of the ship's platform.

Top-down Strategy

The top down hypothesis formation:

1. assumes the ship is in a particular class based on contextual information (eg, shipping lanes, weather, ocean geometry);
2. uses a library of ship information (containing three dimensional ship models and tactics), information covering intelligence reports, and further sensor reports;
3. predicts ship components;
4. describes shapes;
5. predicts features making up those shapes; and
6. suggests a specific pixel pattern.

Notably in the context of target classification, this two pronged approach will optimise the results when features cannot be clearly

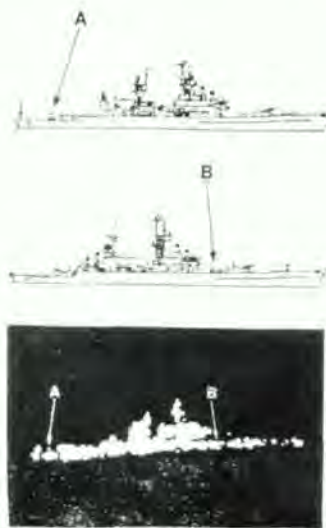


Figure 7: The top down approach. The system would predict the ship type. Look for any distinguishable point of the superstructure, such as the gun (A) near the stern, or the weapons launcher (B) approximately one third back from the bow. It would then proceed to find any indications of these structures on the radar image⁹.

extracted and interpreted, and where no image information is available in focusing on a plausible prediction.

Knowledge Base Representation

The representation of rules or expert knowledge also varies with the application. The most common form of representation is in the use of production rules^{1, 2, 8, 13, 18}. Here, based on a set of clauses being true, we can draw conclusions at certain levels of certainty. For example⁶:

- If: (1) The image is of a side view of a ship and —
(2) The highest superstructure of ship in the library, and the ship in the image, are in similar location.

Then: At a certainty of 0.5, the library image and the imaged ship are the same.

A System that Learns

It is possible that by making this certainty value a dynamic variable, as new information enters, (such as sightings of a certain class of ship in the area) the probability that it could be that ship increases, thereby introducing a learning quality into the system.

The final result will consist of a number of alternative classifications, each with a final certainty value. Such systems often follow an evolutionary design phase, whereby a prototype with a limited knowledge is used. This system is then used and the knowledge base extended, until the system achieves an acceptable level of accuracy, for example, until 85% of queries are answered correctly. In this way, the system evolves dynamically, adapting to the changing environment.

CONCLUSION

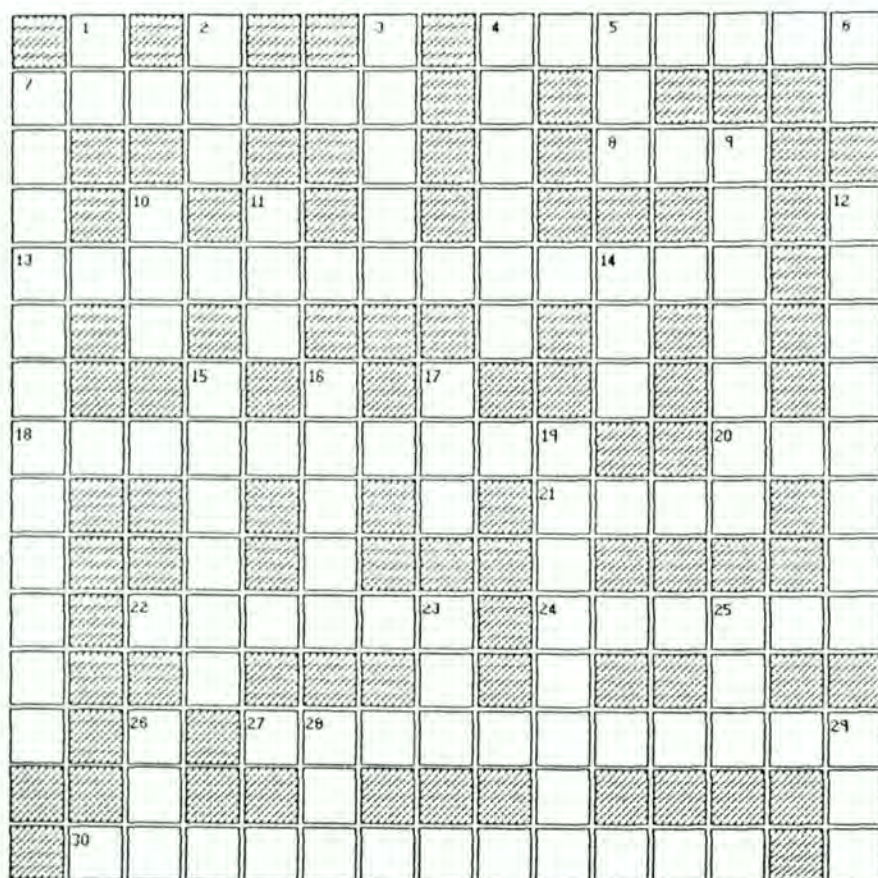
The examples and the case study cited illustrate the applicability of Expert Systems to domains requiring expert assistance and or timely solution. These are only indicative of the wide range of applications for AI as a tool of solution. The naval environment provides many areas where this technology could easily be implemented. It is recommended that serious attention be applied to the study of these concepts, and that the RAN be actively represented in this area.

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ANI ANNIVERSARY CROSSWORD



CLUES ACROSS:

4. A SHIP TYPE, NOT A LAZY SAILOR
7. ONE OF MELBOURNE'S TRAGEDIES
8. NAVAL AIRPOWER
13. A WELL KNOWN PATRON
18. RN'S ONLY RAM-SHIP
20. ABBREVIATION FOR OUR COUNTRY ?
21. NOT MANY OF THESE IN THE NAVY!
22. ATTACK IS ONE WAY TO DO THIS
24. NONE OF THESE IN OUR NAVY YET
27. A MIDSHIPMAN'S DIARY ?
30. MEDITERRANEAN STARSHIP ?

CLUES DOWN:

1. THE BOSS AROUND HERE!
2. PSEUDONYM 4 YEARS AGO
3. TOO MUCH IN THE ANI PERHAPS ?
4. GATACRE WROTE ABOUT HIS

5. A FELLOW INSTITUTE
6. BIBLE OF THE RAN
7. FOUNDING FATHER
9. MOST PROLIFIC AUTHOR
10. WHO WE ALL ARE!
11. TO WHICH SOME OF US BELONG
12. ANOTHER NAME FOR EXERCISES
14. ROYAL SAILOR OF SORTS
15. HOME OF THE FLEET
16. ISLAND DEAD GUNNERS GO TO ?
17. NUMBER ONE DOCTOR ?
19. FAMOUS US ADMIRAL
23. THE HEAD OFFICE IN CANBERRA
25. KEEPS THE SHIP MOVING
26. STATE OF THE ANI ?
28. ONE OF THOSE BOSSES!
29. A MEDIUM WE KNOW WELL

'OSPREY' — THE BELL-BOEING TILT ROTOR AIRCRAFT: ITS IMPACT ON NAVAL OPERATIONS IN THE 1990s

by Harry Julian DSC, C Eng, MIE Aust

The XV-15

For several years now, the Bell XV-15 Tilt Rotor aircraft has demonstrated the concept of vertical take off in a 'helicopter mode', with safe transition to wing-borne flight in an 'aeroplane mode'. Two XV-15 were built; the one operated by Bell has now flown well over 500 hours, exploring the whole design envelope, whilst the second has exceeded 350 hours in the hands of NASA, evaluating the potential of the tilt rotor idea. By the time this appears in print, it is expected that the CAS will have visited Bell at Fort Worth, Texas, to fly the XV-15 himself. He will be the first non US senior officer to do so.

The XV-15 has an empty weight of 4,550 kg; to this, 500 kg of research instrumentation, 185 kg of crew and 680 kg of fuel are added, to reach the Vertical Take Off (VTO) weight of 5,915 kg (about 13,000 lbs in the pre-Christian measure, for you old aviators). It can also operate in a Short Take Off & Land (STOL) manner, with STO at 6,850 kg. This experimental aircraft (which is a $\frac{2}{3}$ scale model, in effect, of the definitive 'Osprey' multi-role, all-Service aircraft) has given a clear demonstration of tilt-rotor potential. It can go *twice as far*, at least *twice as fast*, on the same amount of fuel as a similarly sized, modern helicopter! The XV-15 has reached 300 knots in level flight, 350 knots in descending flight and has sustained $-0.5g$ and $+2.7g$, apart from being able to land and take off vertically.

So, you see, the whole concept of tilt rotor operation has been demonstrated very adequately, including 55 deck landings on and at-sea operations from an LPH, where the

imagined problems of having one rotor over the deck and one over the water were shown not to exist. In trials as an ECM vehicle, it was found that chaff is beautifully dispersed by the rotor downwash, and that with the rotors suitably tilt-adjusted to assist the wing lift, the aircraft could be flown nap-of-the-earth to avoid detection. In the hover, the two 25 foot (7.6m for you modern minded youngsters) rotors produce a very even downflow, mainly below the knee level of a man attaching a slung load to the cargo hook. And the noise level is very modest — around 65–70% of an equivalent conventional helicopter and more like a twin turbo prop aircraft of similar mass.

The JVX 'Osprey'

As a result of all the experience amassed, the US Government has given the go-ahead to cut metal for the seven pre-production full scale aircraft, the Joint Services Vertical Lift Experiment, or JVX, as it has been known for some while. The new designators are as illustrated in Fig. 1:

Preliminary Design (PD) has now been completed and Full Scale Development (FSD) begun. First flight of the pre-production aircraft is scheduled from mid 1987 — just over two years away — with series production to start in mid 1989. The first batch of 18 aircraft (for the USMC) will be delivered between mid 91 and mid 92. This pilot batch will be followed, without break, by Lot 1 (42) and Lot 2 (72). The full scale rotor has been designed and the prototype is under construction, ready for testing from early 1986 at NASA's facilities.



XV 15 operating at sea.

Osprey is a *big* aircraft. The MV-22A will have a gross weight of 18,650 kg (41,000 lb), carry 24 fully armed troops and 2,820 kg of fuel. Its rotors are 11.6m diameter and spaced 14m apart; it has an overall length of 17.7m, overall width of 25.6m, and a wheel track of 4m. It is 6.1m high at the rotor hub.

The interesting thing about it is that there is hardly a skerrick of metal in the airframe — it is almost wholly constructed of composites, which from a salt-water corrosion, naval, viewpoint is a very good thing. It also means that you can swing a 6' long aerial inside the fuselage (if you ask the Marines to get out first) and there you have a super AEW ship. Also, Osprey is designed from scratch to fold. The rotor blades fold, then the wing swings fore and aft to align with the fuselage. Folded dimensions are 17.7m x 5.2m x 6.1m.

In an AEW role, Osprey can operate from a deck anywhere in the fleet — it doesn't have to be an aircraft carrier deck, provided it is strong enough to take 20,000 kg and is about 20m square. With a vertical take off, the Osprey can stay on station at 200 nautical miles for about 5 hours. If a run is available, it can STO at 25,000 kg and then stay out there for 8 hours.

SAR is another role for Osprey — the USN plan to purchase their first 50 for this duty. The required parameters are to search at 7,000' at 250 knots and to rescue 4 persons, in the hover, at a radius of 460 nautical miles. Later purchases are envisaged, to carry out ASW in the midfield zone, surface surveillance and over-horizon targeting, aerial refuelling and on-board delivery.

The USN can foresee the time when battle groups may have to be operated without a carrier. Surface Action Groups, Amphibious Task Groups, Underway Replenishment Groups and Convoy Protection Groups could all gladly use the services of a Vertical Take Off & Landing aircraft as capable, and of such high performance as Osprey. A typical SAG composition is 1 x BB-61, 1 x CG-47, 3 x DDG plus DD-963 and FFG classes. Both the CG-47 and DD-963 have adequate areas of deck; with suitable strengthening, they could operate an Osprey, to extend the Group's surveillance horizon, and target HARPOON missiles. Provision of deck and hangarage in the BB is entirely possible, within its space and weight capabilities. It might even give up a gun or two — or is that heresy?



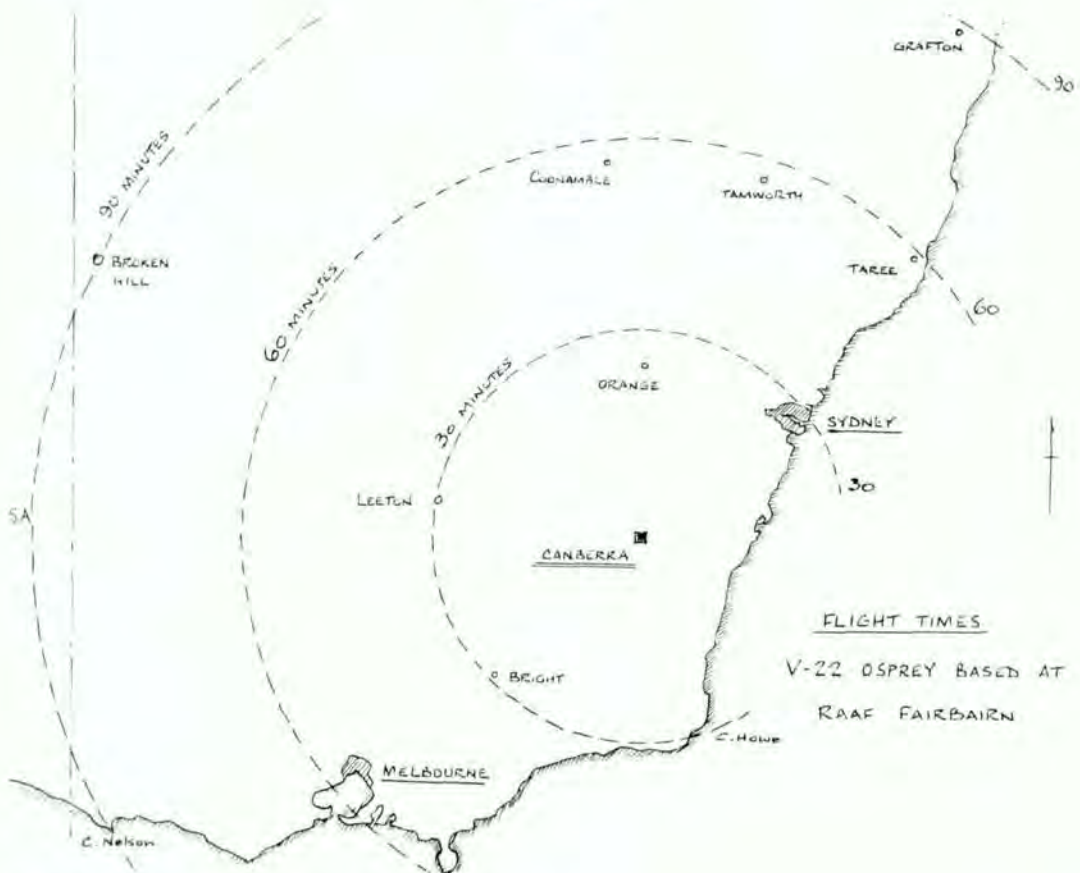
Artist's impression of OSPREY USMC Assault Version.

— Bell

Figure 1.

V-22 OSPREY			Projected numbers
US Marine Corps Variant	=	MV-22A	552
US Navy	"	= HV-22	50
US Air Force	"	= CV-22	80
US Army	"	= MV-22A (as for the USMC until new roles are defined)	231
			<hr/> 913

Figure 2.



Flight Times V-22 OSPREY based at RAAF Fairbairn.

— H. Julian

Impact on Naval Operations

From the mid 1990s, the Osprey will be routinely deployed at sea, initially with the USMC in the assault landing role. Later developed variants will exploit the other naval potentials of this unique and very fuel-efficient aircraft. Small operational groups, without conventional fixed wing carriers, will be able to carry out AEW and midfield ASW as effectively as groups with CVs in their composition. Long range on-board delivery, rescue and reconnaissance missions will be feasible. The self-deploy capability — over 2,000 nautical miles at 280–300 knots — will allow replacement of the air element, and the cycling of aircraft back to distant support bases, when heavy maintenance is required.

If the RAN's area of operational interest, where no likely adversary has an aircraft carrier, the possession of an Osprey force would provide a very clear advantage in any naval confrontation. Against modern conventional helicopters, the Osprey's performance — speed, rate of climb, range, turn radius and permissible g load — is so far ahead as to make it a 'no-contest'. The ability to out-range and out-fly the opposition helicopter would give the RAN

effective control of the air, and hence of the sea area, enabling attacks on the opposition to be made virtually at will, whilst the longer range, air-gathered intelligence of their movements would permit the RAN ships to avoid contact when desired.

Conclusion

The RAN should closely monitor progress of the Osprey programme, and start planning to incorporate this advanced concept in its Order of Battle. Ships now in construction should be modified to accept the weight and size of this VTOL innovation; existing units should be considered for modification, and any future design should incorporate the necessary facilities to operate Osprey. With Bell Helicopter and Boeing teamed together to produce the machine, there is clearly an adequacy of expertise being brought to bear. The concept has been well demonstrated by the XV-15 programme. The competence of the makers, combined with the enthusiasm shown by the USN, will inevitably result in a successful aircraft whose unusual characteristics will change the shape of maritime warfare.



V-22 OSPREY folding arrangements.

— Bell

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PLESSEY

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THE AUSTRALIAN WAR MEMORIAL AND NAVAL HISTORY

by Sub-Lieutenant T. Frame RAN

During the early part of this year, I had the distinct pleasure of working in the Australian War Memorial in Canberra as the inaugural Summer Vacation Scholar from an Australian university. What I recall most about the experience, however, was the disappointment I felt after thoroughly examining the Memorial's naval collection in its several forms in comparison with the Army and Air collections.

My understanding and work with the historical material contained in the Memorial will provide the basis for the comments and assessments I will make on this institution and its functions, its historiographical potential in terms of naval history, and its relationship with the Royal Australian Navy. The aim of this article is primarily historiographical: to locate and explain certain deficiencies in the War Memorial's portrayal of naval history and the scope and depth of its naval records collection, to consider the general difficulties encountered when creating a naval historical display, and finally to suggest ways the RAN could assist with the production of a more comprehensive and inspiring presentation of its history and the maintenance of supporting historical archives.

The Australian War Memorial was established after the First World War as a memorial for those Australians who died in the various campaigns of that war. The vision behind the institution came from CEW Bean, the official war historian and man of enormous humanitarian concern. Subsequent wars in which Australia played a major role — the Second World War, Korea and Vietnam — have led to successive changes in the layout of galleries and displays. These modifications have also led to the incorporation of higher quality graphic and design techniques, new acquisitions to the collection, and better ideas on how to portray the essence of Australia's military heritage. The excellent Gallipoli gallery is an example of the types of changes taking place. From the naval point of view, however, improvements with time have been minimal. Overall, the Memorial's

presentation of the RAN's wartime experience lacks continuity, is mostly disorganised and is far from compelling. But the curatorial staff of the Memorial should not be blamed for the relatively low quality of the naval displays. Firstly, it is basically quite difficult to create a good naval gallery. As the centre piece of naval warfare and naval life is the warship, it is not easy to convey an atmosphere which captures the feeling of being at war on the sea. Similarly, displays will mostly have a feeling of inadequacy unless they consist of a ship or parts of a ship opened up to reveal something of the life sailors endured. Rifles, tanks and field pieces are much more suitable for individual display. Relics from warships will always lack a perspective because they do not exist on their own, but in relation to their function on a warship. Though the galleries are the areas of the Memorial's work of which Australians are most familiar, the poor showing of the RAN in other aspects of the Memorial's responsibility is even more alarming.

Naval Disinterest

During the War Memorial's Fifth Annual Military History Conference, held while I was at the Memorial, none of the papers presented dealt with naval history! Surprisingly, the RAN

The Author

Sub-Lieutenant Tom Frame RAN joined the Royal Australian Naval College in January 1979 as a Junior Entry Cadet-Midshipman. After completing his Higher School Certificate in 1980, he began a Bachelor of Arts degree with a history major. In 1983 he was awarded the W.J. Liu Memorial Prize for Excellence in Chinese Studies at the University of NSW, achieving overall first place in undergraduate Chinese history, political science and economic history. After graduating from RAN as a General List Instructor Officer, Tom returned to the University of NSW to complete an Honours degree in history. At the end of 1984, he was given the Australian War Memorial's first Summer Vacation Scholarship as a senior history student from an Australian university. His current posting is to HMAS SUPPLY for Stage II Seaman Officer Training.

was not mentioned at all until the fourth day of the five day conference. The Memorial's Research Grants Scheme has served an overwhelming number of grantees who have based their research on Army and Air topics. In terms of published literature supported by the Memorial, the Publications List for 1985 contains only one book which is orientated towards naval history in its first six issues. It is tragic that Australia's premier military history institution is unable to present naval history with the same success it has achieved with the Army.

Yet none of the blame for this unfortunate imbalance should rest with the Memorial staff. Of the staff I had dealings with in the various sections, no one expressed a deliberate preference for the Army or Air Force and their histories to the detriment of the Navy. Neither did the ex-Service personnel on the staff exude a parochialism of the type one might expect from people with strong Service ties. In my opinion, the source of the problem I have described has many dimensions, none of which amount to an indictment of the Memorial. The responsibility lies with a number of groups and the corporate sentiment that has resulted from a poor understanding of the contemporary use of history in the Navy which has remained unchecked over a long period of time.

The RAN has displayed an on-going disinterest in preserving and reconstructing its past. Affiliated ex-Service groups, historical societies, naval foundations and small naval museums/libraries have often acted in opposition to each other or even in a vacuum. Other groups of individuals who might have been expected to contribute, such as local historical interest groups or 'more aware' directorates or departments within the Navy, have shown a poorly developed sense of history and historical worth. In more academic institutions, there has been a persistent failure to offer undergraduate courses orientated towards analysing naval affairs or perceiving the maritime component and its particular historical importance to Australia's military effectiveness. In other professional academic bodies, there has been a reluctance to enter into serious discussion on the role of the RAN, both past and present, the Navy seeming to be the domain of historians and analysts who have had a direct experience with the RAN itself. All of this has a bearing on the level of awareness shown by naval personnel towards the benefits of studying history. Very few within the officer corps are aware of the basic and central events in Australian naval history, fewer are motivated to add to the extent body of knowledge, fewer still have taken the trouble to initiate the instruction of naval history, and a small minority adequately perceive the

contemporary value of military history. Though the aim of this article is not to counsel the use of military history in the RAN to achieve specific objectives, I believe the apparent lack of interest has been responsible to a large degree for the deficient naval heritage this country possesses. A Navy which displays little interest in naval history produces officers and sailors who have little interest in naval history. Obviously, the problem compounds itself very rapidly.

With Anzac Day a national feast day celebrating the qualities of those who died in the charges from the trenches, and the cult of the digger as strong now as ever before, the Navy needs to affirm the historical identity of its wartime experience and demonstrate the sailor's parity with the celebrated digger. It is the Australian War Memorial which can give to the RAN the recognition and historical appraisal it needs, through the utilisation of its lesser known but equally important functions.

Contents of the AWM

Below the galleries currently open to the public, are located the various sections of the War Memorial which manage the more diverse functions of the institution which go beyond the construction and maintenance of galleries and displays. These sections include: Printed and Special Collections, Written Records, Historical Research, and Audio-Visual. The first two are particularly significant for the writing of naval history. Printed and Special Records include books, serials, pamphlets, newspaper cuttings, maps, aerial photographs, forms, books, souvenirs, etc. Written Records consists of official written records and private records, personal papers, non-government organisations' records, manuscripts, etc. While at the Memorial, I was employed in both sections and could gain an appreciation of the contents of both collections.

When working in the Printed and Special section, I found very quickly that there were many more Army and Air orientated books than naval publications. Not because fewer had been acquired, but for the simple reason that many more have been written. The deficiency in naval history literature begins with the standard series of texts on Australia's involvement in World Wars I and II. Though the Official Histories contain an unfortunate over-emphasis on the role of the Australian Military Forces in the context of our national war effort, it is not the product of bias on the part of Bean, or Gavin Long — the official historian of the Second World War. Why we lack as complete an account of RAN wartime operations is the result of a number of factors which can be identified.

Briefly, land operations were the subject of more detailed and continuous reporting than the war at sea. Reporters had greater access to the sites of action and could more rapidly move from one battlefield to another, though it should also be remembered that the RAN operated throughout the major theatres of war, possessed a comparable amount of capital equipment and support services and industry. Yet after both world wars, the RAN failed to see the Australian War Memorial, or a similar institution, fulfilling an archival function which the Navy could draw upon for thoughtful and careful collation, indexing and storage of important historical records, and later the presentation of hits history to the public and ex-serving members. The deposition of documents is the most crucial factor. Without the necessary primary documentation, the written account of the service of the RAN since its inception cannot be completed. The only other necessary component now absent is personal recollection, the record of which needs to be compiled immediately before it is lost forever. The matter of the unavailability of documents, official records etc, leading to a lack of published works on naval history, brings us into the realm of the Written Records section, for it is from here that the whole deficiency originates.

Within the Written Records collection, there remains a large body of records, some dating from World War I, which have not been made available to the public because they are not yet 'accessioned' — indexed and referenced to enable a reader to locate more precisely the records he is seeking. To give an example from my own experience: I located records relating to the RAN Bridging Team of World War I which remain unavailable to the public because they have not been sufficiently collated, to ensure that all records relating to the Bridging Team are listed in the reference and cross-referencing system the Memorial operates. One series of records which I accessioned — AWM 133, the Naval Historical Records Collection — was donated to the War Memorial by the Department of Defence when Navy Office was relocated to Canberra in the 1960s. The most startling feature of this collection is the enormous variety of historical material it contains all lumped together in random order: confidential papers relating to the visit to Australia of Admiral Henderson in 1908, files dealing with the establishment of the RAN College and reports of the College's first few years, the post-war destruction of the first RAN ships, instructions to RAN ships for the Coronation ceremonies for Elizabeth II, and files relating to the return of the RAN College to Jervis Bay in 1957–58. And only recently, the Navy handed over to the Memorial a great many

Reports-of-Proceedings, several of which referred to ships' activities before the outbreak of World War II. One may reasonably ask, why the delay? These reports could have formed the basis for articles and books over the last twenty years instead of lying in state, unused, uncared for and unorganised within the precincts of Navy but out of reach of those seeking the information they contained. The interest of those who were actually involved is needed to get many of these historical projects underway. With the unavailability of supporting evidence to those who were involved, much of the Navy's history will be lost.

None of this, of course, is the fault of the War Memorial. Records are literally 'dumped' on the Memorial from a number of sources, most often in a state of great confusion. The Memorial then has to impose upon the files its own system of control, while taking into account the signs of arrangement inherent in the files when they arrive. With a continual staff shortage, many large collections remain untouched. To reiterate a previous point, it makes it much more difficult for a researcher to obtain all the relevant information on a specific topic. What then, can be done to reverse this unfortunate trend in naval history?

Action Required

Though recent years have witnessed the publication of some very good popular but general books on Australian naval history, and the creation of various bodies designed to promote the study of naval affairs, more action is required if a concern for our naval heritage is to be transmitted to those who will need to bear the responsibility for its upkeep in the future, both civilians and serving personnel. This leads me to my conclusion on what can and should be done *to begin* to reverse this predominant trend, in the hope that Australia, as a maritime nation, will come to understand the content and significance of naval history and particularly the role of the RAN in this country's foreign relations.

To avoid any future problems associated with the disposal of all naval documents, the RAN should initiate the necessary steps to formulate a policy which firstly nominates a suitable institution as the recipient for its records once they are no longer of immediate relevance. That institution should be the Australian War Memorial rather than a branch of Australian Archives, as the Memorial is specifically organised as a depository for military records. The staff are dedicated enthusiasts in their various fields and specialise in collating military records. They are also most suited to provide these records to the very broad researching public which frequents the Memorial's Research

Centre. Presently, the Army forwards most of its records to the Memorial where they are collated and made available to the Army on short notice for a variable loan period. The Memorial also has the facilities to handle and store documents which still hold a security classification. The Navy should follow the Army's lead to further promote the idea that military history is a specialist field and that the War Memorial, for a number of reasons, should be regarded as the centre for the study of military history in Australia and the chief-keeper of military memorabilia.

While these measures might be able to secure a future safe home for documents still held by the Navy, attention is still required to improve the state of naval records *already held* at the Memorial, in addition to locating and recording the whereabouts of other important documents scattered about Australia which would be of use to historians.

Appropriate action might consist of seconding an individual to the War Memorial who had an understanding of the organisation of the institution, the basic orientation of archives and the needs and requirements of naval historical researchers. To support this effort, funds could be allocated to a central archival institution, again the Memorial would be an appropriate choice, to prepare a master listing of the holdings of archives, libraries, museums etc, around

Australia of useful historical material. Once compiled, the Navy could officially publicise the availability of these source materials and their location. A provision for offering research grants could also be made for researchers of approved projects to complete manuscripts which would then belong to the Navy for whatever use they might serve.

Using such methods as I have outlined, it seems to me almost certain that enormous gains could be made in the field of Australian naval history. The RAN of the 1980s needs to understand its roots, traditions, the particular strengths of its predecessors and those events and influences which have shaped its contemporary form. Further still, the Navy of the mid-1980s can earn itself the reputation of far-sightedness and wisdom as a consequence of any action it might take to preserve our nation's naval heritage.

The imperative is quite apparent in what I have described. The opportunity is now available and the means within reach to initiate appropriate restoration of the condition of naval history. With firm resolve and commitment, the RAN can correct the apparent deficiencies and imbalances that have been described in this paper, and thereby assure itself of a fitting memorial to its service covering nearly three-quarters of a century.



The destroyer escort HMAS STUART off the WA coast. February, 1985.

— LSPH Eric Pitman, RAN

NOBODY ASKED ME BUT . . .

THE SPIRIT OF THE NAVY

The Spirit of the Navy is too old, too varied and too subtle to be adequately interpreted by any outsider, no matter how keen his interest, how deep his affection . . .

Isn't it possible that the very thoroughness with which the Navy has protected the nation in the past may constitute a source of weakness both for the Navy and the nation? We have been safe for so long and during all these generations have been free to follow our own devices, that we tax-payers as a body today are utterly ignorant of the facts and the forces on which England depends for her existence . . . Some of us think that the Navy does not much matter one way or the other; some honestly regard it as a brutish and bloodthirsty anachronism which if it can't be openly abolished, ought to be secretly crippled as soon as possible. Such views are not shocking or surprising. After four generations of peace and party politics they are inevitable . . .

In peace the Navy exists under conditions which it takes years of training to understand; in war it will be subjected to mental and physical strain three days of which would make the mere sea-fight of Trafalgar a pleasant change. We have no data to guide us for the future, but judging by our thousand-year-old-past we can believe and thank God for it, that whatever man may do, or neglect to do, the spirit of the Navy, which is man-made, but which no body of men can kill, will rise to meet and overcome every burden and every disability that may be imposed upon it — from without or within.

From 'A Book of Words' by Rudyard Kipling. Written six years before the outbreak of World War I.

A brilliant piece of work, isn't it? Kipling knew what the Spirit of the Navy was all about. His gift was his ability to put it into words that outsiders could understand. Monsarrat was equally knowledgeable and gifted. Apart from *The Cruel Sea*, his penultimate achievement must have been *The Master Mariner*. Tragically, only one book was finished before his death. Even so, Monsarrat demonstrated superb insights into what Kipling labelled 'The Spirit of the Navy'. With this type of prologue, I also have picked up a pen to write about the 'Spirit of the Navy', although I am painfully aware that if I were to

write for the next thousand years, I could never match the excellence of the two authors already mentioned. So I'll endeavour not to write for so long!

The Navy today is under attack from all quarters. There could be no argument about this from even the most optimistic naval commentator: *HMAS AUSTRALIA* has been cancelled; the fleet air arm is all but dismantled; a second underway replenishment ship cancelled; a decision on the new submarines delayed again; a decision on DE/DDG replacements ominously deferred; 1900 trained and valuable people to be discharged without replacement before 1987; DFRDB and Service housing entitlements under threat from an envious public service. Aggravating these setbacks, we now find we have the first rumblings of trade unionism. I'm not suggesting for one minute that the Navy has become impotent overnight. What I would like to point out is that if these relentless attacks on our beloved Navy continue at this rate, our capability to conduct ANY operation (including search and rescue) will become nil.

If none of this seems comforting just at the moment, rest assured we're not alone in our weakened state. ANZUS has been very severely mauled lately and the only Australian city that freely accepts large US warships is Perth. To complete this 'triple-threat', the Australian press is now firmly engaged on a 'kick Marcos out of the Philippines' campaign.

The thinking military man can quickly spot the object of this particular 'trilogy': the removal of the US bases from the Philippines, the dismantling of ANZUS and the US bases in Australia, and the reduction of Australia's own defence forces to practical non-existence.

What has all of this got to do with the Spirit of the Navy you ask? Stay tuned.

I would now like to draw your attention to the words of Vice Admiral Leach at Seapower '84. . . the development of any Service is affected by the importance it is accorded by its nation. It must enjoy the understanding and confidence of the Government and the support and encouragement of the community — and so it is with the RAN. Acceptance of its role in defence is a predominant factor in the Navy's development.

This acceptance is only possible if the political leadership, the Department, the press, industry, trade and the community are well informed of its role and functions.'

There it is, the bottom line. The community needs to be WELL informed of the Navy's role and functions. It is my contention that the public is not informed at all on these matters. Further, I submit that greater public awareness is the only way we can prevent being 'secretly crippled as soon as possible'.

The need is established.

The question is, of course, should we, a group of professional Navy men, proceed to inform all and sundry that a continuing policy of neglect of the Navy will lead to disaster? That our cherished Australian lifestyle could well pass into the history books in much the same way as the great depression? Remembered not so much for what happened, but what didn't happen?

Do we want to travel this dangerous path?

Before more senior members of the corporation take up pens to put this young upstart in his place by telling me that the ANI has never been a pressure group and will not become one — I'm aware of that.

I'm not advocating 'pressure group' type of activities, ie lobbying ministers etc. What I think should happen is that the ANI should become more like other organisations of professional people, like the Institute of Accountants, for example. This well respected institute is currently running a public education campaign to further its own cause and through it the

professionalism of accountants is enhanced. I envisage a time when the press would actively seek out the ANI for informed comment on maritime affairs.

In the same way that 'we have no data to guide us for the future', neither do we have the Kiplings and Monsarrats to write on our behalf.

What we do have is 'The Spirit of the Navy'. It may sound trite for me to appeal to such an old fashioned concept, but who among us can deny that he feels moved by Kipling's work?

And whilst I'm in a rhetorical frame of mind, let us ask ourselves what level of frustration has been reached to germinate the seeds of trade unionism in the ranks? What level of frustration has caused some currently serving members of the Royal Navy to go to the minister personally with the facts regarding the sinking of the *GENERAL BELGRANO* Obviously neither the press nor anyone else was interested enough to present their story and subsequently clear the reputation of the RN.

I would like to leave you with one last thought. We in the Navy today face problems that have not had to be faced by Navy men before. We in the Australian Naval Institute are probably the impersonation of Kipling's Spirit of the Navy. Consider then, our future. Should we rise to meet these disabilities being imposed upon us, by becoming the Navy's information pipeline to the community?

G.J. Watson
LSWTR



VISIT TO AUSTRALIA BY ADMIRAL HAYWARD USN (Ret'd)

Admiral Thomas B Hayward USN (Retired), former Chief of Naval Operations and currently a consultant on National Security Affairs, Pacific Basin — East Asia, will be visiting Australia in June–July this year. The purpose of his visit is promotion of 'a more effective maritime strategy in Southeast Asia and the Indian Ocean'. The visit is being sponsored by the Navy League of Australia in consultation with the Australian Naval Institute.

ADM Hayward's schedule is planned as:

24–26 June — Canberra
26–28 June — Melbourne
28 June–1 July — Perth
1–4 July — Sydney

ANI is co-ordinating arrangements for the Canberra leg with the Navy League taking the lead elsewhere, backed up by Chapters.

This visit will provide an excellent opportunity for members to hear the views of, and engage in discussion with, a distinguished and knowledgeable practitioner and commentator concerning our strategic environment.



WASHINGTON NOTES

by Tom Friedmann

The fast missile attack craft (FMAC) of today is a direct descendant of the revolution in naval architecture and marine engineering of the late 19th Century which combined to put the newly developed self-propelled and self-guided torpedo on small, fast, and highly maneuverable vessels. From the commissioning of the world's first torpedo boat, *HMS Lightning*, in 1879, until the late 1950s, the story of fast attack craft was one of modification and improvement of the torpedo boat concept. The advent of the surface-to-surface missile, however, changed the nature of naval warfare forever and opened new vistas for fast attack craft.

The United States Navy (USN) has traditionally eschewed the use of small combatants, except in wartime. Lacking the range, endurance and versatility of larger warships, such vessels are in direct contravention to American naval procurement doctrine, which aims at long range, high endurance and the greatest possible versatility per vessel. Further, there has been the belief among our naval planners that fast attack craft could be designed and built rapidly in wartime.

But this thinking does not reflect the tremendous strides of modern technology. Whereas the torpedo boats of World War II carried armament that was distinctly inferior to virtually every larger ship in the fleet, the 'miniaturization' of armaments and electronic systems now permits the use of the same main systems on 250 ton vessels that are used on ships 40 times as large.

The FMAC concept is represented in the USN by the *Pegasus* class patrol combatant-missile (hydrofoil) (PHM). The brainchild of Chief of Naval Operations Elmo Zumwalt as part of the 'low' end of his 'high-low' mix, the *Pegasus* class are the most potent warships, on the basis of firepower to displacement ton, in the USN. Developed by Boeing Marine Systems as part of a NATO project, the ships weighed in at 240 tons

full load, and move on their foils well in excess of 40 knots. This small displacement includes eight Harpoon SSMs and a 76mm OTOMAT gun. Provisions have been made for the mounting of single 20mm guns abaft the mast.

The PHM had a troubled birth. Originally scheduled to be a class of 30 units, only one was completed before Zumwalt left office, and the rest were cancelled. With great foresight — and extreme pressure — Congress forced the Carter Administration to build five more vessels so that the fleet could experiment with an entire squadron of FMAC. PHMs were originally scheduled to deploy to the Mediterranean but were instead homeported in Key West. Many teething problems, particularly in regard to engine upkeep, have been resolved. From all reports, the ships are remarkably stable weapons platforms that are meeting the expectations of their builders, crews, and supporters in and out of the Navy.

The official mission of the PHM is to operate offensively against major surface combatants and other surface craft, and to conduct surveillance, screening, and special operations. Primary tasking is to engage hostile forces with surface-to-surface missiles and secondary armament. Operating without seaborne support, PHMs are in their natural element in the Caribbean, Mediterranean and Baltic where the distances to choke points are not great. But firepower such as that represented by the PHM should be exploited to its fullest potential and not restricted because of the size and endurance of the boat.

Lieutenant Commander Kendell King, USN, writing in the US Naval Institute *Proceedings*, proposes linking a PHM squadron of six vessels with two FFG-7s to create fast attack, surface action groups (FASAGs), an idea which could be utilized by Australia and Spain since they both have FFG-7s. King argues that the frigates can be used as valuable back-up to the combat capability of the PHMs in several areas:

- *Anti-surface Warfare:* The FFG-7s can support the PHMs' Harpoon attack with their own missiles. Over the horizon targeting can be provided by the frigates' LAMPS helicopter.
- *Anti-air Warfare:* The PHM is only armed with the 76mm gun, so the Standard missiles and Phalanx CIWS of the frigates would provide much needed anti-air support. The FFG-7s' superior electronic suite could also provide early warning to the PHMs, to enable them to make the best use of their speed and maneuverability to counter air attacks.
- *Command, Control and Communications:* The larger communication suite as well as the larger size of the frigate (to accommodate the FASAG commander) gives more C³ flexibility

than if the PHMs had to rely on their own equipment.

- *Fuel and Endurance:* Perhaps the greatest benefit the FFG-7s can render the PHMs is by serving as support ships to keep the PHMs at sea, thereby negating a primary argument against small vessels — lack of endurance. It is estimated that if both frigates of the FASAG each dedicate 20% of their fuel supply to the six PHMs, the endurance of the hydrofoils will double, allowing the group to operate more than 3,500 miles over a two-week period. Additionally, the commonality of armament and gun and fire control systems would simplify maintenance and logistic support.

Along with controlling choke points, King suggests that the FASAG could be used for sea



PHM-3 TAURUS.

— Boeing Marine Systems

lane protection. Other uses could be to shield surface strike groups against FMACs; guerilla-type warfare where the group can strike and withdraw quickly; operate as a surveillance group to conduct a 'reconnaissance in force'; provide cover for landing craft and support ships; and provide long range sanitation sweeps to identify and counter surface threats before they can move into missile firing range against the main battle group.

PHMs have great potential in coast guard-type roles. With their speed and armament, they are virtually immune to law breakers. PHMs have already engaged in some drug interdiction work in the waters off Florida. Drugs are the scourge and disgrace of the United States and by all accounts we are losing our war against the drug dealers. The PHMs provide the speed and firepower that is requisite to combat the increasingly aggressive 'dopers'. An additional benefit would be that Coast Guard manning of PHMs would provide a powerful back-up for the Navy for use in times of national emergency.

Another proposed use for the PHM concept is to build a hydrofoil larger than the *Pegasus* to be armed with Tomahawk cruise missiles to provide a partial substitute for the absence of Allied naval air power on the Central European Front. Harpoons and RAM missiles as well as Phalanx CIWS would be carried for self defense. Operating as American vessels or as components of NATO navies, in the Baltic, Adriatic and Black Sea, craft armed with Tomahawks, whose range is 600 nautical miles, could attack most of the European part of the Soviet Union as well as *all* of the other Warsaw Pact countries. The small size and high speed of the hydrofoils would make them virtually immune from detection and destruction.

Technology has allowed the naval architect to construct small, fast and heavily armed FMAC. Properly used in sufficient numbers, the PHM can supplement the USN's surface forces and serve the Coast Guard in those areas of its operations that are most likely to place that service in the way of desperate men.



PHM-3 TAURUS.

— Boeing Marine Systems

ADDITIONS TO THE ANI LIBRARY

OCTOBER 84—APRIL 85

- Clarke Wayne, Penner Judith and Rogers George.
Cruising Nova Scotia, From Yarmouth to Canso.
- Jenkins Nancy.
The Boat Beneath the Pyramid — King Cheop's Royal Ship.
- Ricciardi Lorenzo.
The Voyage of the MIR-EL-LAH.
- Rosignoli Guido.
Badges and Insignia of World War II — Airforce - Naval - Marine.
- Sulzberger C.I. et al.
The American Heritage Picture History of World War II.
- Waterfield Gordon.
Professional Diplomat — Sir Percy Loraine.
- Wyden Peter.
Bay of Pigs — The Untold Story.
(Last seven presented by Mr W T Guidice).
- Kennedy Gol William V. et al.
The Intelligence War.
- Koenig William and Scofield Peter.
Soviet Military Power.
- Stanley Peter and McKernan Michael.
Australians at War 1885-1972. Photographs from the collection of the Australian War Memorial.
(Last three presented by Commander R J R Pennock, RAN).
- Compton-Hall, Richard.
The Underwater War 1939-1945.
- Gatacre, RADM G.G.O.
Reports of Proceedings — A Naval Career 1921-1964.
- Winter Barbara
HMAS SYDNEY — Fact, Fantasy and Fraud.



(Continued from page 32)

simply don't want Navy involvement or interference (as they term it) in their lifestyles. I've noticed this particularly in families when a decision has been made for the family to remain in Canberra regardless of the Navy member's posting, in order for the spouse to pursue his or her own career and lifestyle.

The PSO properly used, ensures that members arriving in a new area are settled into homes and can get on with their jobs either at sea or ashore with minimum disruption to their ship or establishment. Family services can provide assistance when required during the course of a posting. If all else fails, or an engagement expires, adjustment back into civilian life can be made easier by calling on the Resettlement Officer.

In conclusion, I believe that the Personal Services Organisation is fulfilling its roles and is effectively responding to the many and varied needs of Navy members and their families.

NAVIGATORS AND CHARTMAKERS

by Captain J A Noble

Claudius Ptolemy (AD 90–168) was the first mapmaker to use latitude and longitude to project the curvature of the earth on a flat surface. Contemporary chartmaker, Marinus of Tyre (AD 70–130), used the equator and the Tropic of Cancer as parallels of latitude, with meridians of longitude 15 degrees apart (one hour) from the prime meridian of Rhodes, the maritime centre of his world. Ptolemy and Marinus believed the earth's circumference to be 180'000 stadia, but an earlier Egyptian astronomer, Eratosthenes (BC 276–195), had more accurately calculated this as 252,000 stadia. On a midsummer day, Eratosthenes observed the sun directly overhead at Aswan at the same time as it cast a shadow 7 degrees 12 minutes from the vertical 5040 stadia further north at Alexandria: 7 degrees 12 minutes is a fiftieth of a circle, 50 times 5040 is 252,000.

Seafarers used the league of four Roman miles as a unit of distance: a Roman mile was 1488 metres, a metre a ten-millionth of the distance between the pole and the equator — so the earth's circumference was important to navigators. During the 14th century, the magnetic compass became the mariner's direction finder. Previously, the Pole Star and prevailing Mediterranean winds provided direction by wind-roses. Magnetic compasses also pointed to the Pole Star, and compass roses replaced wind-roses. The 32 points were projected on primitive sea charts, drawn up on sheepskins and known as portulans, on which the coastal configuration and known dangers were shown. Compass roses were centred on the ports from which lines projected from 32 points, and criss-crossed the chart with courses to steer along which distance could be plotted. Co-ordinates of latitude and longitude were not needed.

Days began when the sun crossed the meridian. Time, kept by gnomons and sundials on shore, was measured by an half-hour sandglass at sea. Maximum altitude of the sun was determined by a cross-staff — a rod with a sliding cross-piece to measure the altitude against the horizon until its maximum was reached, when the bell was struck as the

sand-glass was upended. Half-an-hour later, when the glass was empty and turned, the bell was struck once; twice at the second emptying; three times at the third; and so on until eight bells. This process was repeated six times until noon was again proclaimed, and the correct time ascertained.

Distance run was found by streaming the log every hour, the 'knots' were recorded on a traverse board — a wooden compass rose with pegging holes along each of the 32 points — along the course steered. These were entered in the log book every four hours and plotted on the portulan charts.

Craftsmen at Genoa and Venice made the first portulans, but the art moved west with centres of trade — to Majorca and on to Spain and Portugal at the time Henry the Navigator was inspiring navigators to explore the Western Ocean and the west coast of Africa. These voyages complicated the plane navigation by portulans with the spherical geometry of the globe.

When the equator was reached, and the Pole Star dipped below the northern horizon, meridian altitudes of the sun had to be used to find latitude. The astronomer Regiomontanus calculated the sun's declination for this purpose in 1475. Martin Behaim, a contemporary instrument maker, modified the cross-staff into a back-staff to enable the observer to keep his back to the sun and measure its altitude by the shadow. Behaim also invented the 'mariner's ring', or astrolabe, and quadrants were a later combination of the cross-staff, back-staff and astrolabe.

The Author

Captain John Noble served his apprenticeship with the Bank Line before moving to New Zealand in 1936 to join the Union Steamship Company. He sailed with this Company in the south west Pacific, Australian and Asian waters until 1958, spending the last seven years in command. In 1958, he moved to Melbourne and became a Port Philip Sea Pilot from which he retired in 1979. He has written a number of books on maritime matters and now works part time as a nautical consultant.

In 1490, Behaim engraved the known world on a copper globe covering 234 degrees of longitude between the Canary Islands and China. Columbus learned about charts, declination, astrolabes, and compasses from Behaim, and was intrigued by the 126 degrees of longitude shown as unknown on the globe. When Portugal rejected his proposal to sail west to China, he sought support in Spain. After waiting for five years, he sailed with Juan de la Cosa in *Santa Maria*, accompanied by two caravels.

Ptolemy's under-estimation of the earth's circumference was probably responsible for his belief that the land he discovered was part of Asia. De La Cosa, owner of *Santa Maria*, was also a cartographer. In 1500, he made a chart of Columbus' discoveries that extends from 60 degrees north to 30 degrees south latitude — a portulan-type projection with compass roses and radiating position lines, the only parallels being the equator and the Tropic of Cancer, with only the base meridian of the Azores. Distances are in leagues, and no allowance is made for convergence of meridians.

Magellan also miscalculated his distance when crossing the Pacific in 1520–21, his longitude being about 52 degrees in error to the east. After discovering the strait south of the American continent, Magellan followed the west coast to 35 degrees south latitude, then steered WNW into the unknown to 12 degrees north latitude, and west to the Philippines, discovering the Ladrões en route.

In those days, navigators followed coastlines whenever possible. Portugal sent an expedition to intercept Magellan, leaving the Spice Islands to explore the unknown coast of Terra Australis Incognita that was thought to extend from New Guinea to South America. Like all Portuguese voyages of this era, it was shrouded in secrecy, but there is speculation that it was this expedition that discovered the east coast of the Australian continent, and probably resulted in the wreck of the Mahogany Ship near Warrnambool.

Portugal had established a regular trade with the East Indies. Navigation was by a system of parallel sailing — south to the latitudes of known landfalls on the African coast, east along that latitude to the coast and round the Cape of Good Hope, following the east coast of Africa to the known latitude of their destination, then east across the Indian Ocean. Their hydrographer, Pedro Nunes, overcame some of the problems of meridians converging in higher latitudes by covering a globe with paper and cutting it into segments through the poles, stripping off the segments and arranging them on a flat surface, touching at the equator but increasingly separated as latitude increased. Straightened

meridians absorbed the dislocation and were the same distance apart as parallels of latitude. The distortion, that increased in proportion to latitude, became known as departure (from the meridian). Nunes introduced loxodromes — lines that intersected each meridian on the globe at the same angle — that also indicated true direction on plane charts on north, south, east and west bearings, but in all other directions spiralled towards the poles. His formula for compensating this error trigonometrically became known as Meridional Parts.

Flemish cartographer Gerhard Mercator (1512–1594) applied the formula to chartmaking by increasing the distance apart of parallels of latitude on plane charts, and explained: 'With difference of latitude, difference of longitude, direction, and distance, waxing latitudes can be kept in context by plan trigonometry'. Equatorial distance could be converted into difference of longitude in latitudes up to 60 degrees, and courses and distances plotted on plane charts.

Navigators of the day would not accept this reasoning until an English mathematician, Edward Wright, explained the principle in *Certain Errors in Navigation Detected and Corrected*, and included the table of Meridional Parts. Nevertheless, the exact circumference of the earth was still in doubt, and also the consequent length of a degree of latitude. Mercator defined this as 15 German, 60 Roman, or 20 French miles. (Four leagues, or German miles, to a degree.) In 1637, Richard Norwood measured the distance from the Tower of London to York Minster, and, by comparing this with the difference in their latitudes, found a minute of latitude was 6120 feet. Jean Picard, a French astronomer, came to a similar conclusion. Obviously, the metre based on Ptolemy's theory had to be re-assessed. France adopted a ten-millionth of the distance from the pole to the equator on Picard's calculation (about 39.37 inches). England introduced a statute mile of 5280 feet.

There are no references to nautical miles as minutes of latitude before 1730. In 1875, the metre was standardised at 39.37 inches; the nautical mile at 1852 metres in 1929 (6076.10333 feet).

During the 16th century, the Dutch took over from Portugal in the East Indies. Two other Flemish cartographers — Hondius and Ortelius, and Dutchmen Van Linschoten, Plancius and Goos — prepared charts and sailing directions for the East India Company. In 1595, the first expedition followed the Portuguese route, followed the African coast to the latitude of the destination, and the voyage was slow and tedious. In 1611, Hendrik Brouwer's three ships sailed east in the latitude of the Cape of Good

Hope, taking advantage of favourable westerlies, and turned north in the estimated longitude of Sunda Strait to get the south-east trade winds. This established a new Dutch route, and it was recurring problems of longitude and distance estimation that led to the discovery of Australia.

Another Dutch expedition under Le Maire and Schouten was inspired by Drake's report that 'the Atlantic and the Great South Sea met in large free scope south of Tierra del Fuego'. Le Maire's Strait and Cape Horn were discovered, and the Pacific crossed westwards to Java.

Abel Tasman, in 1642, left Batavia to sail west and south of New Holland to determine if this was part of Terra Australis Incognita. After discovering and naming Van Diemen's Land, he disproved this by crossing the Tasman Sea, discovering New Zealand, and returning to Batavia via the north of New Guinea.

In 1681, the English buccaneer Bartholemew Sharpe captured a Spanish ship in the Pacific with its derro-terro — Spanish charts and sailing directions for that part of the world. Sharpe was acquitted of piracy and rewarded with a naval commission when the derro-terro was translated by William Hack — the first English charts and sailing direction for the Pacific. Sharpe's log, preserved in the Naval Library of the Ministry of Defence, also contains several pages of calculations for converting difference of longitude into departure. Land was not sighted during his voyage from the Pacific to the West Indies via Cape Horn.

Throughout the 17th century, there were no means of finding longitude at sea. Greenwich Observatory was built with this aim in 1765, and established the prime meridian. Inability to determine longitude was the cause of four ships of Sir Cloudesley Shovell's squadron being wrecked off the Scilly Isles in 1707. The resulting Royal Commission led to the Board of Longitude being established, and there was an urgent need for more accurate instruments for measuring the altitudes of heavenly bodies.

John Hadley invented the reflecting quadrant in 1731. Then Tobias Mayer, a German professor, submitted a table of lunar distances and a 'reflecting circle' — with an arc of 90 degrees to measure angles up to 180 degrees. Captain Campbell tested this for the Board of Longitude, considered it to be too clumsy, and designed a similar instrument with an arc of 60 degrees to measure angles up to 120 degrees, the sextant.

Dr Nevile Maskelyne fitted a telescope and vernier for greater accuracy, and devised a method of calculating longitude from Professor Mayer's lunar distance tables, which were published as the *British Mariner's Guide* in 1763, and as the *Nautical Almanac* when Maskelyne

became Astronomer-Royal in 1767. Longitude by lunar distances needed three observers: a timekeeper, an observer of the sun's altitude to find its hour angle, and another to observe the angle between the moon and a star or planet. Greenwich time was found from the lunar distance tables, ship's time from the sun's hour angle, and the difference was longitude.

Cook, in *Endeavour*, thoroughly tested the method and reported: 'By these tables the calculations are rendered short beyond conception and can never be enough recommended to the attention of all sea officers'.

There was a reward of £20,000 for a method of finding longitude that proved accurate to within 30 miles after a six-week voyage. An accurate timekeeper was the most sought after solution. John Harrison submitted his first, in 1728, that resembled a grandfather clock. His second was never tested at sea but his third, completed in 1749, was awarded the Royal Society's Copley Medal. Its size presented problems of transport and stowage, and Harrison designed a small instrument — intended to be a hand-held watch for comparison of time. Tested on the requisite six-week voyage it proved correct within five seconds and qualified for the reward.

Harrison was paid £10,000 for the four instruments, and would be given £10,000 for two replicas of No. 4, one of which was tested at Kew Observatory shortly before Cook returned in *Endeavour*. Maybe the success of the lunar distance method discouraged the Board from paying Harrison the outstanding £10,000. Professor Mayer's widow was given £5000 for the lunar predictions, but a petition to Parliament was needed for Harrison to be paid.

Cook in *Resolution*, had a replica of Harrison's No. 4 made by Larcum Kendall, and other chronometers. Kendall's proved to be the best. Bligh, in *Bounty*, also had a Kendall chronometer. When the American whaleship *Topas*, Captain Folger, found the *Bounty* mutineers on Pitcairn Island in 1808, he was presented with the *Bounty* chronometer but it was taken by Spaniards at Juan Fernandez Island. In 1840, it turned up in Chile and was bought for fifty guineas to be returned to England.

Lunar distance calculations were used to find longitude at sea, and to check chronometer time, until well into the 20th century. By then visual time signals, and later radio signals, had taken over and the longitude by chronometer method was in general use.





The US Los Angeles class submarine USS INDIANAPOLIS arriving at HMAS STIRLING in Western Australia for a seven day rest-and-recreation visit on 31/01/1985.

— ABPH Mark Russell, RAN

BOOK REVIEWS



The International Law of the Sea, Vol II. D.P. O'Connell. Edited by I.A. Shearer. Oxford University Press, 1984. \$100.

International Law in Australia. Editor K.W. Ryan. Law Book Company, 2nd edition, 1984. Hard cover \$59.50, soft, \$42.50.

As with the first volume of O'Connell's *International Law of the Sea* (1982), the author adopts an historical approach to analyse the traditional concepts of the law of the sea. This approach has the advantage of showing how concepts of more recent origin have been derived. On the other hand, it does mean that more recent developments in ocean law that have come out of the Third UN Conference on the Law of the Sea do not receive the same degree of analysis as the more traditional concepts. Nevertheless, the author does not entirely ignore the 1982 Law of the Sea Convention (which in this volume is called the Montego Bay Convention — after the location of the signing ceremony) and there are useful guides to new rules in the area of maritime boundary delimitation, marine pollution and marine science research. Readers of this journal will find the chapters on enforcement of the law, the law of belligerency at sea and economic warfare at sea particularly interesting. The volume exhibits the same high standards of scholarship as were evident in volume 1, although one suspects that the detailed treatment of the traditional areas of the law of the sea will deter many potential readers who may be looking for a more 'nutshell' guide to the 1982 LOS treaty.

For those in the latter category, particularly those with an interest in Australian ocean policy issues, the volume of essays edited by Professor Ryan will be of some help. There are four essays (out of nineteen) that deal with international legal developments and Australian law of the sea practice. They deal with Australian coastal jurisdiction, offshore jurisdiction, the international sea-bed, and the protection and preservation of the marine environment. These essays give a very interesting summary of recent developments in ocean law and Australia's response to such developments. Also of specific interest to ANI readers are chapters on Australia's defence arrangements, regional non-military arrangements and resources policies. In the light of the Tasmanian Dams Case, this reviewer also found great interest in an extremely stimulating discussion of the relationship

between international law and the domestic legal order by James Crawford and W.R. Edeson. Professor Starke notes, in a chapter on 'Australia and the International Protection of Human Rights', Australia's 'substantial' contribution to the Geneva Conference of 1974-77 on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts (p 149). Unfortunately, we are only told what this contribution was in one line. (It included 'the provisions for an International Fact-Finding Commission to inquire into grave breaches of international humanitarian law, the provisions as to Protecting Powers, and the provisions concerning minimum or fundamental guarantees'.) One would like to know more. There is no index, which is surely unforgivable in a book of this price.

Anthony Bergin

FRASER OF NORTH CAPE. Richard Humble. London, Routledge and Kegan Paul, 1983. 386pp, 32 illustrations, \$29.95.

Richard Humble has written a useful biography of the life of the Admiral of the British Fleet, Lord Fraser of North Cape — Commander in Chief of the British Home Fleet and later the British Pacific Fleet during the Second World War. The difficulty in reviewing this book is that at a number of points it diverges into sub-themes, so that at times it is strictly a military biography, while at others it is an account of the development of the Royal Navy, the fluctuations in the military preparedness of Great Britain and a narrative concerned with a series of events, some central and some less so, during the two world wars. Though broad in his approach, I feel Humble is on several occasions unsuccessful in relating his subject to the environment he discusses. In this respect, the book departs from the purer form of military biography.

Drawing from diverse primary and secondary source material (though possibly relying excessively on oral sources) Humble does not offer any startling new interpretations on significant events. However, the book is able to hold the interest of both the general reader, for it is written in a very readable style, and the specialist, who will benefit from Humble's presentation of Fraser's view of certain crucial events and decisions, especially in the period 1936 to 1942.

The sinking of the *Scharnhorst* receives the greatest attention, and rightfully so since it was Fraser's greatest hour. However, the author does himself a disservice in his minimal treatment of Fraser's role in the creation of NATO, his contribution to British decisionmaking on Korea and his efforts in giving hope and encouragement to the post-war Navy as one who had the experience of a similar decline after the First World War. The last thirty five years of Fraser's life are dealt with in only forty pages. This is unfortunate.

The most outstanding feature of the book is the aura which exudes from the author's portrayal of Fraser. It is evident that Humble has an enormous admiration for Fraser and this permeates almost every page of the book. Though I believe Fraser is worthy of every adulation that he receives from Humble, we are prevented from beholding Fraser at his peak. In the author's portrait of Fraser, the great man never seems beset by personal failure, error or frustration, nor do we find him gaining the upper hand over his various inner weaknesses (assuming he had them). The full stature of humanity is visible when men overcome those things which constrain the realisation of human potential. Unhappily, we fail to see Fraser struggling to emerge triumphant over personal hardship. This robs us of the opportunity to gain a full appreciation of the eminence of Lord Fraser.

Again on a personal note, since it is the essence of good military biography, we are left uninformed of Fraser's evaluation of his developing capabilities and the progress of his career, whether he entertained doubts as the career he had chosen, why he did not marry, the nature of judgements he made on the validity and morality of various operations during and after World War Two and the relationship he believed should exist between the military and government. An examination of these areas of Fraser's personality and mentality opens the road to 'getting inside' the character of Lord Fraser, facilitating an understanding of his thinking and motivation, permitting in the final instance an assessment of his leadership. Though the author did conduct numerous interviews with Fraser and his contemporaries, he is often unable to separate the reminiscent and the romantic from the objective. Hence in places, the book is somewhat sentimental and subjective in analysis.

Notwithstanding these comments, this book is extremely readable, embodies a flowing and well-developed literary style, maintains the reader's attention and contains a number of anecdotal snippets which add to the interest the book easily elicits. The text is accompanied by a series of photographs and maps, though additional maps would have been useful in aiding the reader's perception of several key incidents in the war at sea. References in the text are contained in endnotes which precede a good bibliography and index. The overall production quality is of a very high standard, with a thoughtful arrangement of the author's material.

All in all, this book will be valued by general and specialist readers of naval history and military biography. Its appeal will be less as a specialist resource than as a 'good read' and as a creative and informative account of the central events. But this should not deter academics of this area of research because the book still offers some new insights on

familiar events. Moderately priced, this book is worthy of the purchase price and the time needed to read it.

Tom Frame

SEEK AND STRIKE. Andrew Hendrie. William Kimber, London. 320 pages. 11.95

Following patient research by the author over a period of nearly three years, we now have a good record in a single volume of the contribution made by the Lockheed Hudson aircraft to the Allied cause in the Second World War.

When war broke out in September 1939, the RAAF had, or was to receive over the next three years, a total of 247 Hudson aircraft out of a grand total of 2,941 of this type of aircraft produced. It was operated by a number of Allied air forces, of course, and used in most of the theatres of war.

Designed for use in a maritime strike/surveillance/reconnaissance role, it is well known that circumstances required the Hudson to be used in a number of other roles with consequent sad losses. However, while no match for the front line German or Japanese fighter aircraft of the time, it was able to give a good account of itself given reasonable circumstances.

In *Seek and Strike* the author has endeavoured to give a balanced account of the use of the Hudson in all the areas in which it was used. Two of the thirteen chapters of the book are allocated to the RAAF operations in Malaya, through the islands to the northern portion of Australia, and in Papua New Guinea from December 1941 to the latter part of 1943 when losses and attrition required the general replacement of the Hudson by other aircraft. The experiences of some RAAF personnel in RAF squadrons in other overseas areas are also recorded in other chapters of the book.

But few who served in or worked on the Hudson in the, for example, RAAF Squadrons Nos. 1, 2, 6, 8, 13, 24 and 32 will be unable to relate to one or more of the accounts given. An interesting annex lists all the RAAF aircraft by their serial number and their eventual fate.

From the Australian side, the author has drawn on the volumes of the RAAF Official History and then given some wider coverage of particular incidents where he has been able to undertake more research and inquiries.

RAN Kelly

IMAGES OF AIR WAR — 1939–1945. Chaz Bowyer. Batsford Books, 1983. pp.120, ill 200. \$24.

'Nostalgia for the small coffee table' might be a way to describe this publication: an interesting compilation of photographs, well captioned, and laid out in twelve groups, each covering a particular aspect of the Air War. The author served in the RAF for 26 years and obviously understands his subject and material; his more routine work of writing for aviation journals is a background on which he draws in preparing the opening page for each group of photos. These openers are economic of words, yet give the reader/looker a feel for the period and stage of development of the conflict.

The balance of the material is fair, with appropriate space devoted to the air war at sea and in differing theatres ashore. Many of the photos will be recognised as having appeared elsewhere, but this does not detract from their suitability, either from an historical or aesthetic viewpoint. By contrast, there are some fine pictures which I, for one, have not previously seen and which are admirably suited to a work of this nature. Of the latter, the most outstanding is from South African Air Force sources, printed on page 44; it depicts a SAAF Beaufighter strafing a German barracks in the Yugoslav winter.

The author has taken pains to ensure that all the photographs are correctly credited, where this is possible. He has included in the collection, shots from enemy sources, which help in preserving the balanced nature of the book. The feature which makes this

collection of images particularly interesting is the inclusion of personal photos — odd snapshots of the not-so-famous going about their daily wartime business, and pictures of lesser known allied Air Force people, including Russians, Poles and Free French. These provide the book with a very human feeling.

It is good to see that one whole group is dedicated to the ground crews, both male and female, whose hard work was so necessary to support the more glamorous aircrew; although the latter faced the immediate danger and excitement of aerial combat, they were always aware of the long work hours and discomfort which their ground crews endured. Overall, a somewhat different and certainly interesting collection, which evokes the atmosphere of World War Two in the air.

H.G. Julian



HMAS CANBERRA 1935. Another celebration — recognise any faces?

— Captain I. Calloway RAN

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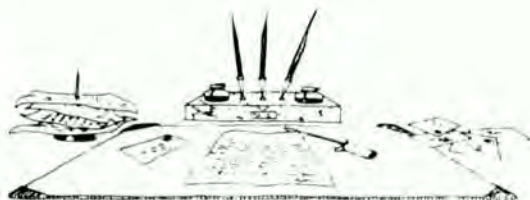
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CHAPTER NEWS

Current Chapters

Currently there are functioning Chapters in Sydney, Melbourne, Perth, and Canberra. A major objective for this year is to achieve functioning Chapters in all states and arrangements are currently underway to raise Chapters in Brisbane and Hobart.

Reports from Chapters

Canberra. Although activity has been at a low level in the first part of 1985, a vigorous programme is scheduled for the remainder of the year. Planned meeting dates and speakers (to July) are:

8 May 1985 — Captain C Skinner RAN and Commander T Cox RAN will speak on the topic 'Australia's Need for Destroyers — Their Roles and Capabilities.'

25 June 1985 — The Chapter will be co-ordinating the visit to Canberra by Admiral Thomas B Hayward USN (Retired). (See article elsewhere.)

23 July 1985 — Commander C Harrington will speak on the topic 'A Maritime Strategy for Australia'.

The Secretary of the Canberra Chapter is LCDR Brian Clarke — contact telephone number (062) 65 4426.

Melbourne. Quarterly meetings were held in November 1984 and February 1985. Speakers were:

26 November 1984 — Captain J A Noble (Master Mariner and ex-Port Phillip Sea Pilot) on the subject 'Navigators and Chartmakers' which is the subject of a book he is writing. (Extracts are printed elsewhere in the journal.)

25 February 1985 — LCDR R L Warne RN (*HMAS CERBERUS*) on the subject '*HMS NEWCASTLE* — Rapid Refit and Falkland Islands Peace Patrol'. (It is hoped to have extracts published in a future Journal.)

The next Chapter meeting is Monday 27 May 1985 at 1800, at the Royal Melbourne Yacht Squadron Clubhouse, St Kilda. The speaker will be Commander N G R Daniel RANR on the subject 'Operations of the Port Phillip Sea Pilots'. Additionally, to bring members together socially and strengthen member participation within the Chapter, luncheons are organised from time to time. The Secretary of the Melbourne Chapter is Commander Neville Daniel RANR — contact telephone number (03) 84 84935.



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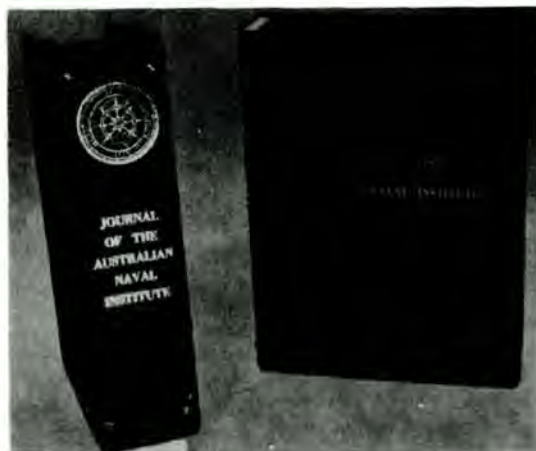


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