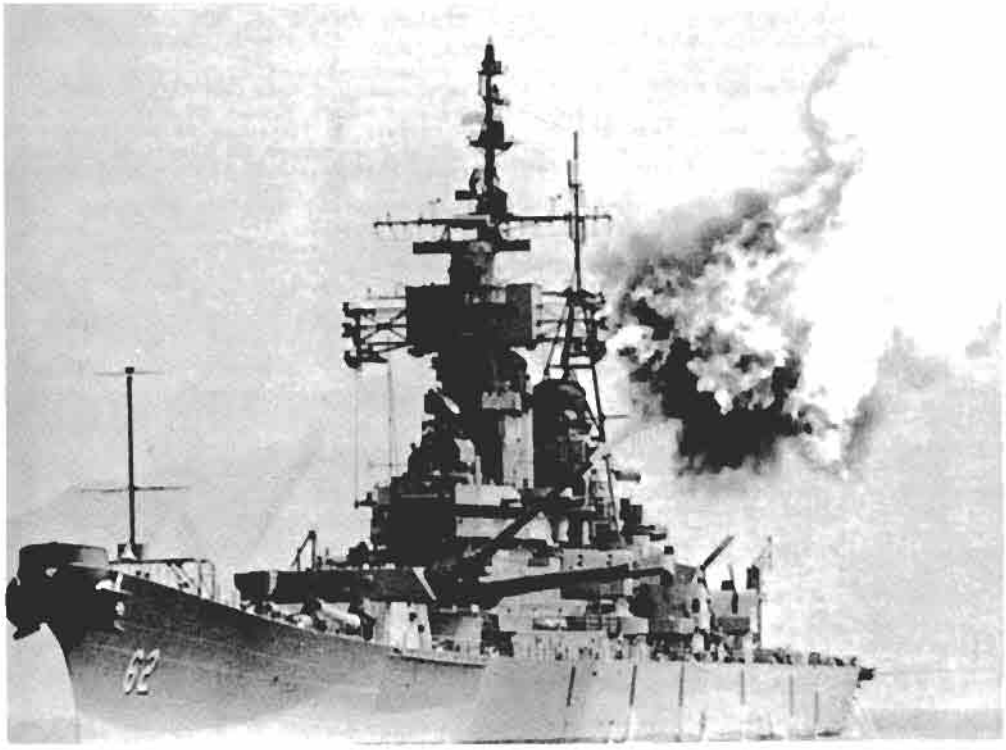

JOURNAL OF THE AUSTRALIAN NAVAL INSTITUTE

VOLUME 7 AUGUST 1981 NUMBER 3

AUSTRALIAN NAVAL INSTITUTE

1. The Australian Naval Institute has been formed and incorporated in the Australian Capital Territory. The main objects of the Institute are:—

a. to encourage and promote the advancement of knowledge related to the Navy and the Maritime profession.

b. to provide a forum for the exchange of ideas concerning subjects related to the Navy and the Maritime profession.

c. to publish a journal.

2. The Institute is self supporting and non-profit making. The aim is to encourage discussion, dissemination of information, comment and opinion and the advancement of professional knowledge concerning naval and maritime matters.

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(3) Ex-members of the Australian Defence Forces, both permanent and reserve components, provided that they have been honourably discharged from that force.
(4) Other persons having and professing a special interest in naval and maritime affairs.

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Registered for Posting as a Publication — Category B

ISSN 0312-5807

JOURNAL OF THE AUSTRALIAN NAVAL INSTITUTE (INC.)

CONTENTS

The cover photograph shows the battleship USS *NEW JERSEY* conducting a shore bombardment off the Vietnamese coast in 1968. The new regular feature in this journal, *Washington Notes*, discusses the possible re-commissioning of the four *IOWA* Class battleships which the US has in reserve.

— photograph by courtesy of Jane's Fighting Ships

Correspondence

NAVY RECORDS SOCIETY

Dear Sir,

I would be very grateful if you could draw the attention of members of the Naval Institute to the existence of the Navy Records Society.

The Society was founded in 1893 with the aim of publishing documents relating to the naval history of Britain. Over one hundred and twenty volumes have already been published, including the papers of Nelson, St Vincent, Collingwood, Fisher, Jellicoe and Keyes, as well as Admiralty and other official documents relating to a host of matters.

The third and last volume of the Keyes' papers is to be published this month and several other works are in the final stages of preparation. In addition, a large number of earlier volumes are being re-issued. The subscription to the Society is £5.50 a year, which entitles each member to a copy of each new issue of the NRS and the purchase of previous volumes in stock at a preferential rate of £4.00.

The books are all productions of the highest quality, editors having included Sir Julian Corbett, Admiral Sir Herbert Richmond, Professor Michael Lewis and Captain Stephen Roskill. I would be delighted to provide any further information to any who may be interested, but those wishing to join the NRS may do so by writing directly to:

H.U.A. Lambert Esq
Hon. Treasurer
The Navy Records Society
Barclays Bank Limited
54 Lombard Street
London EC3p 3AH UNITED KINGDOM

Yours faithfully

HMAS TARAKAN
Warships Section
Central Mail Exchange NSW 2890

J.V.P. GOLDRICK
Lieutenant, RAN

NAVAL SUCCESS

Dear Sir,

May I congratulate Sub Lieutenant J.V.P. Goldrick on his satire in the Journal of May 1981 but trust that he, as an A.Y.O., is not being commanded by or hopes to become engaged to the daughter of a GLEX MCD sub specialist.

Job 38.2, but note 1 Thessalonious 5.19.

Yours faithfully

HMAS JERVIS BAY
at Sydney

R.S. BLUE
Commander, RAN

LOSS OF VOYAGER (1)

Sir,

I have read with the keenest interest Sir Henry Burrell's reconstruction of the loss of the first *VOYAGER*. As one of the soldiers involved, I would like to comment on it, but lest I be accused of presumption in commenting on a naval ship-handling matter, I submit my qualifications. I had had a number of years' experience as a cruising yachtsman before the war; at a later period in the war I commanded an H.M.A. ship (albeit a small one); fourteen years post-war as professional fisherman; sometime member of the Australian Institute of Navigation, and am presently a member of the Australian Naval Institute (although the Hon. Treasurer doesn't seem to think so!).

Sir Henry's reconstruction is admirable as far as it goes. It can only be based on Lt. Cdr. Robison's report and *VOYAGER's* Report of Proceedings; however this is in error in one very important matter of fact. Whether this is due to Lt. Cdr. Robison's natural wish to present the facts in the most favourable light possible, or to the fact that he did not actually know what was happening down aft at an early stage in the incident, will never be known. However the crucial fact is that the ship had actually touched bottom before the troops were ordered into the barges, not, as stated in the Report, as a result of engine movements after the barges had been ordered away from the ship's side.

The *VOYAGER's* run into the anchorage was as plotted by Sir Henry, culminating in the, to us, mystifying naval practice of anchoring down-wind. The ship's head did not appear to be held up more than momentarily, and some possibility must exist that the fact of the cable 'growing out on the starboard quarter to seaward' was due to the fact that the ship was still turning to starboard as she was steaming her anchor in. Certainly she never at any time 'had her cable' and quickly assumed a position beam-on to the wind (light breeze, about S.E.) and swell.

At this time the bottom was clearly visible to those of us stationed aft, near the port depth-charge racks, and it was obvious that the ship was making way shoreward at an appreciable rate. The work of assembling the barges began, and some were swung out on the port side, to our considerable surprise, as we were fully expecting the ship to be brought up head-to-wind, and the shoreward drift checked.

The water was shoaling noticeably and, somewhat diffidently, I pointed this out to a naval rating, suggesting that the bridge should be informed. I was good-humouredly told that they knew what they were about, and no action was taken. Within seconds the ship touched bottom lightly, as she came down in a trough, the point of impact appearing to be directly beneath us, probably the port propeller. Nobody informed the bridge, and I think it is safe to say that from then on the ship never had a chance.

By the time we had loaded our own barge and boarded it, the ship had touched bottom several more times. I was not in one of the first barges to get away, yet we were some way away from the ship before the order came to clear the side. From then on we were fully occupied getting to shore, and avoiding capsize in the surf. Once ashore, it was clear the ship was in serious trouble, but we could not dwell on this, the object being to get everything off the beach and to head inland. On my last trip back to the beach, about 11 p.m. that night, the ship was only a few yards offshore, bumping heavily, and showing a wide expanse of bottom. It was a sickening sight. Next day, when we were well

into the mountains, we heard the noise of bombing, and feared the worst for the crew. Later we were vastly relieved to hear that they had been successfully evacuated, but it was not until 1945 that I learned of the tragic influence the incident had on Lt. Cdr. Robison's later life.

A number of comments come to mind. The word 'undisciplined' appears several times in the various accounts, as applied to the soldiers. These men had received no training whatever in amphibious operations, and were required to load stores, and themselves, into totally unsuitable craft, surging up and down alongside a rolling vessel. They waited until they were ordered into the barges by the Navy — not to have waited would have been 'undisciplined', and it is indicative of the state of affairs aboard the ship that the order, when it did come, came not from an officer but from a petty-officer. That these troops subsequently conducted a highly successful guerilla campaign against an enemy enjoying enormous numerical superiority is now a matter of record, and such results are not achieved by undisciplined troops.

Lt. Cdr. Robison refers to 'Army personnel who were cat-calling to friends on the beach, were keen to get ashore, and showed little regard to the plight the ship was in. Barges were upsetting in the surf'. The roar of a surf high enough to upset barges quite effectively precludes cat-calling over a distance of a few yards, let alone a few hundred, and in any case the shore-party were not known to us, being men of another unit. The soldiers were keen to get ashore — it was what they had come for, and their concern for the plight of the ship had been made clear very early in the proceedings.

Mention is made of a tidal stream setting to the Westward at 1¼-2 knots. There must be some doubt as to the existence of this stream. *VOYAGER's* drift was square to the wind, and although the paddle ashore took some time, we were able to take a more or less direct line to the fires set up as landing marks, without being set Westward along the beach.

I can only agree wholeheartedly with Sir Henry's conclusions, laying particular stress on the absence of at least one training exercise in Australia, and the total unsuitability of the craft used for landing. It was a time in the war when makeshifts had to be adopted in every area, and a lot of bricks had to be made without straw, but the only feature in favour of these craft was availability. They were folding plywood structures intended for Army engineer bridging operations in calm water, with swim ends, flat bottoms, no side decks, and no directional stability whatever. The petty-officer reports 'the soldiers appeared to be paddling around in circles and back to the ship's side.' How different the same operation can appear to two different observers! Even with a handy boat, it can be difficult to get away from the lee side of a vessel itself making leeway — with these brutes it was a nightmare. Any circular movements were entirely unintentional!

The same craft were used some four months later, when the 2/4th Australian Independent company was evacuated by HMAS *ARUNTA*. On this occasion, the operation took place in darkness, with a higher surf running, and came perilously close to failure. It was only after all weapons and equipment had been abandoned, and as the result of a particularly fine piece of organisation and inspiration by Lieutenant John Lane, AIF, that the operation was completed successfully. By contrast, I was one of a rearguard party evacuated a month later by a US submarine, using inflatable rubber boats. On this occasion, the operation was painless.

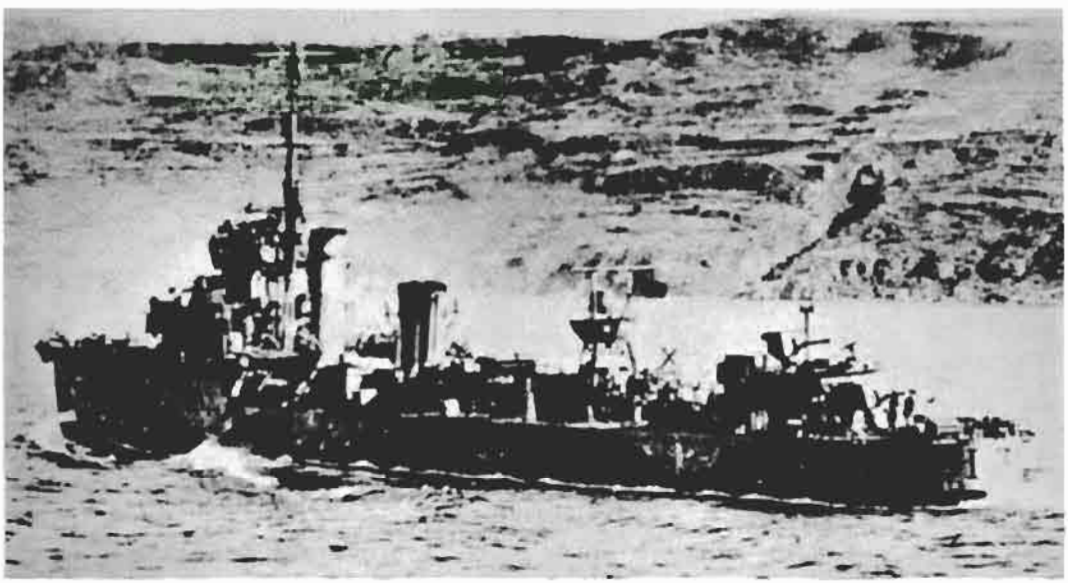
Some final thoughts:

- On the run from Darwin to Betano, in the course of the on-board briefing, we were advised that the possibility of the landing being opposed could not be ruled out. A short-sighted Japanese lance-corporal with five sick men could have repelled that invasion — shooting fish in a barrel would have been difficult by comparison!
- After the war one of the soldiers, a rose-grower by profession, bred a particularly beautiful rose which was exhibited very successfully at Rose Shows under the name *Betano Beach*. To the best of my knowledge, it is still being sold.

Yours etc.

P.O. Box 28
BALMAIN NSW 2041

JOHN R. KEY



The first HMAS *VOYAGER* off Suda Bay in Crete 1941. The story of the later stranding of *VOYAGER* on the South Coast of Timor in September 1942 was told by Vice Admiral Sir Henry Burrell in the last ANI Journal.

— Australian War Memorial

FROM THE EDITOR

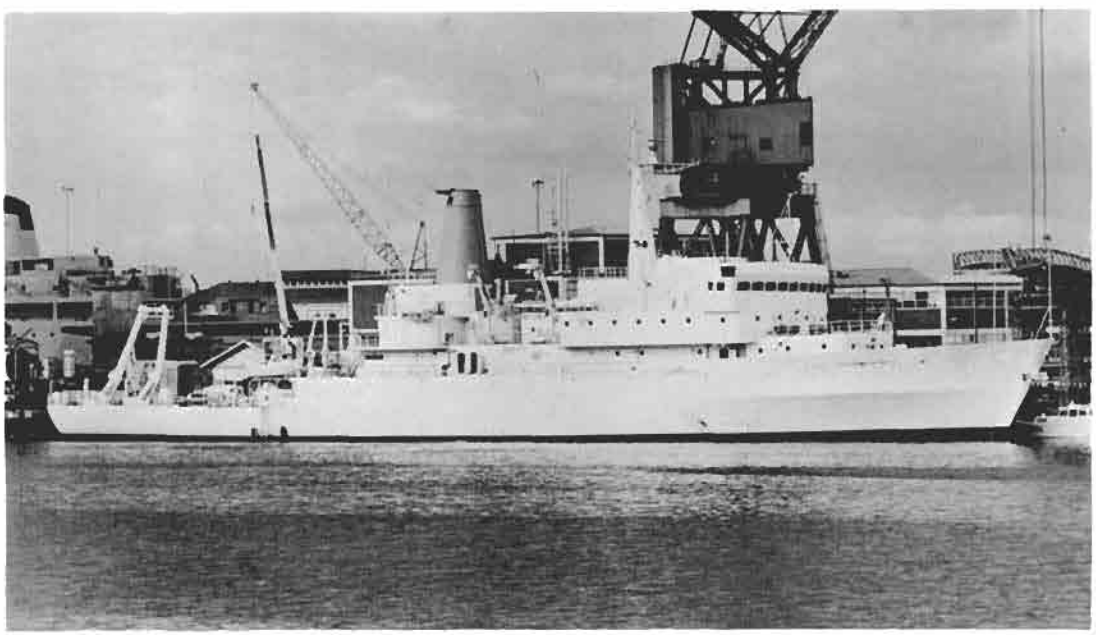
The article in the last Journal by Sir Henry Burrell, regarding the loss of the first HMAS *VOYAGER*, has attracted a considerable amount of interest. There is a follow-up in this Journal's correspondence column where there is a letter from Mr John Key of Sydney.

Mr Key was one of the soldiers on the quarter-deck of *VOYAGER* when she went aground. Understandably he is concerned about the statements made at the Board of Inquiry which suggest poor discipline among the troops being landed in Timor. With hindsight it could possibly be acknowledged that the *VOYAGER* Board of Inquiry was an all naval affair — the soldiers involved must have been all engaged in the bitter struggle on Timor when the inquiry convened in Darwin. Whatever the facts of the matter, it seems clear that *VOYAGER's* last ill-fated operation was a highly dangerous one for which she was inadequately prepared.

Admiral Burrell's appreciation of the loss of *VOYAGER,* and the additional comments from Mr Key, all highlight the maxim that when operations are required in uncharted waters, there can be no substitute for proper planning and sound navigational common-sense. Given the wide areas of poorly charted or dangerous waters which still exist in Northern Australia, the *VOYAGER* situation is not without its modern parallels. Primarily as a result of RAN involvement in sovereignty and coastal surveillance operations, fortunately experience in these waters is now quite widespread.

Leading the major articles in this journal is an account of the development of Soviet organic naval aviation by Dr Terry O'Rourke of the Department of Defence in Canberra. The other major articles include two recent prize-winning essays and a review of the impact of technology on the convoy system. Finally, Captain Henry Gamp from the U.S. port of Baltimore looks at how shiphandling has changed as a result of changes in the size and shape of merchant ships and the propulsion systems of tugs.

A new regular feature is included in the minor articles in this journal. This is 'Washington Notes' by Mr Tom Friedmann who was recently appointed the Washington correspondent for the ANI Journal. At a time when the defence debate is very active in the U.S., we will be fortunate to have Tom's informed views of developments in Washington which could affect the naval scene in Australia.



The oceanographic ship HMAS *COOK* which was commissioned earlier this year.

— by courtesy John Mortimer

'MASTS ON THE HORIZON'

A tribute to the first HMAS ADELAIDE, as the second of her name comes forward.

By Lieutenant-Commander W.N. Swan, OAM, RAN (Rtd)

In the Royal Australian Navy, there was a ship forever burdened with sorrow. She was not a large, nor modern ship nor particularly beautiful. Yet she was loved by all of us who had the honour to serve in her. She did nothing spectacular during the Second World War. Apart from assisting in the taking of Noumea from Vichy without firing a shot, and sinking the Nazi blockade runner *RAMSES*, she carried out mainly routine assignments. In the few incidents that brought her to notice, she was conspicuous for the quiet and efficient performance of duty. The public heard little of her. She was not widely publicised. A quiet ship, if you knew her you would know why. You would know that her heart was heavy with sorrow, something that even time cannot erase.

The reasons for this sorrow amongst her personnel involve three incidents in which she was to play a reluctant, though dramatic role. Still vivid in my mind, they are described here in chronological order.

It was a fine day early in November 1941, and our ship was steaming abeam of a troop convoy off the coast of Western Australia. Visibility was excellent, and only light airs broke the even surface of the sea. On the compass platform, the Officer of the Watch leaned down to speak into the voice pipe to the crows nest.

'Crows nest,' he called. 'We expect to see the *SYDNEY* any time now. keep a good lookout.'

'Aye, aye sir,' replied the rating at the other end.

About a half hour later a report came from aloft.

'Masts on the horizon dead ahead, Sir. Looks like a cruiser'.

'Very good,' the O.O.W. called back.

Very soon the glamour ship of the RAN, hero of Mediterranean exploits, was steaming around our ship while signals were exchanged. *SYDNEY* looked very clean, and made some quick turns like a hound impatient to be after its quarry. We duly handed over the convoy to her care, and parted company after the usual farewells. This was to be *SYDNEY's* last convoy. She never returned to Australia. We had, unknowingly, bade farewell to her and her brave men forever. Two weeks later she disappeared after sinking Germany's most modern raider *KORMORAN* (raider 'G') and being herself sunk with all hands.

We now pass to a dull February afternoon in 1942, only 2 days after the surrender of the heroic garrison at Singapore. Our ship was zig-zagging ahead of a convoy of tankers somewhere off the Australian coast. We expected to hand over this convoy to another cruiser later that day. The O.O.W. leaned down to the crows nest voice pipe.

'Crows nest,' he called. 'We expect to see *PERTH* any time now. Keep a sharp lookout.'

'Aye, aye Sir,' came the prompt reply from above.

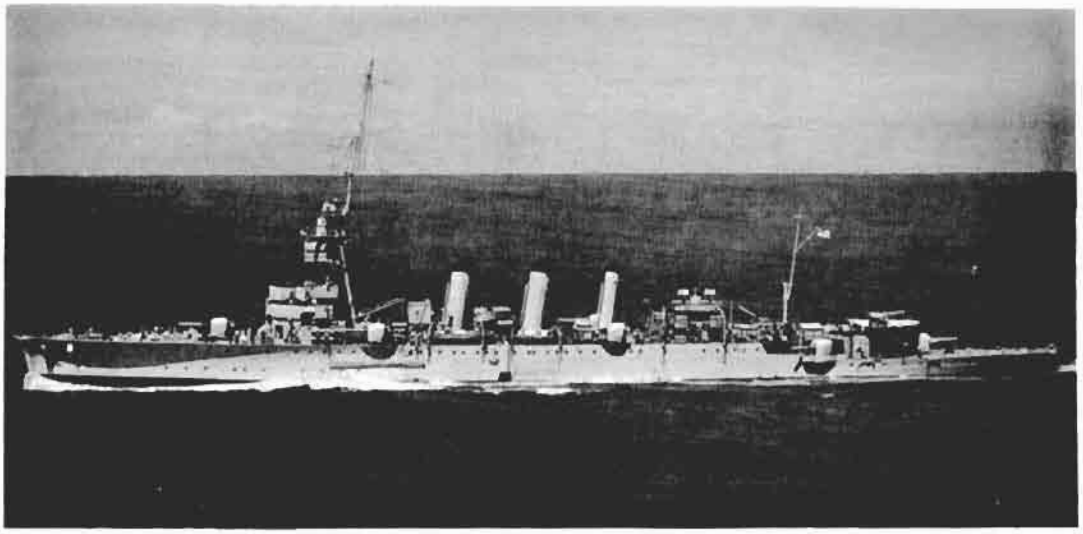
Over the top of the steel crows nest, a young Able Seaman leaned, his eyes glued to powerful binoculars as he searched the ocean. Suddenly he stiffened with anticipation, and pressed the buzzer to the compass platform.

'Masts on the horizon on the starboard bow, Sir,' he reported. 'Looks very much like a cruiser.'

'Very good,' The O.O.W's. reply was very clear considering the distance separating the two positions.

Our ship was now zigzagging half a mile ahead of the convoy and *PERTH*, being junior ship, took station on our port beam. Our Captain passed all information necessary for the safe escort of the convoy to Captain Waller, then altered course to clear the area. Soon *PERTH's* masts were dipping below the horizon. Our ship did not know, but we were not to see our *sister* cruiser again. *PERTH* was escorting her last convoy, and did not see again the shores of her native Australia. She was sunk by a superior Japanese Force in the Sunda Straits after a gallant fight against overwhelming odds.

After the sinking of *PERTH*, we hoped we had farewelled our last friends on their final voyage. We did not like handing over convoys to ships that were steaming to their doom. An unlucky ship, which put a 'jinx' on a rendezvous, was not a pleasant title. There was also a horrible feeling of inevitability about these two incidents. Two of our best warships, manned by some of the finest



The first HMAS *ADELAIDE* — *RAN official photograph*

officers and men in the country, lost without being able to make a proper report to the Naval Board. Two catastrophes, and we had to see them off the Station. There was only one thing to do — carry on cheerfully(?) with our duties and hope for no more such farewells.

Unfortunately, we cannot control ALL the machinations of Fate. 'Third time lucky' proved inappropriate here, as for our ship the third farewell proved equally distressing. Perhaps more so, as with the first two partings the ships had been well-equipped, modern cruisers. In the third instance, the ship was a mere sloop, less than a third their size.

The scene was a wild, desolate stretch of the Indean Ocean. It was one week after the fall of Singapore. The sun vainly endeavoured to break through the clouds and bring light and warmth to a troubled world. *ADELAIDE* was steering north north east, with an air of expectancy on board. On the compass platform officers and ratings were excited as they awaited sighting a convoy. The Captain turned to the O.O.W.. Captain Showers outward calm concealed his excitement.

'We should see the convoy very soon now,' he said. 'Let me know when you see anything on the horizon.'

'Aye, aye sir,' the O.O.W. replied, and bent down to the crows nest voice pipe. 'Crows nest. We expect to sight *YARRA* shortly, with a convoy. Keep a sharp lookout'.

Our ship pushed northwards at a steady 20 knots. The wind grew stronger and white caps appeared on the waves. The sky to the north looked dark and forbidding, as indeed it might, for only a few hundred miles from our ship a great battle was raging for possession of the Dutch East Indies. We all ached to be in the thick of it but it was not to be. A convoy had to be met and brought safely to Fremantle.

The crows nest buzzer rang, and the O.O.W. applied his ear to the voice pipe.

'Masts on the horizon bearing green 10, Sir,' came the report, a note of excitement in the AB's voice.

Reluctantly we took the convoy from *YARRA*. The sloop was operating under the orders of the C-in-C. Batavia so, after the usual information and farewells were passed visually, she hurried North watched by envious eyes from the cruiser. We watched her go with sinking hearts. She was so small and, like the others, had gone never to return. Her Captain, Lieut-Commander Rankin, and ship's company were gallant Australians of the bull-dog breed. *YARRA* had handed over her last convoy. *Only 10 days after parting company with us she was attacked and sunk by a large Japanese surface* force. Outnumbered and outgunned she fought back with colours flying, in a manner reminiscent of the destroyers at the Battle of Jutland which disappeared beneath the cold surface of the North Sea.

So now you know why our ship, when not weighted down with the business of war, bore this great sorrow. Why you might have seen a member of the ship's company on deck looking at the horizon. He would be looking for masts that will never break the eveness betwixt sea and sky again. Perhaps he saw a phantom ship flashing her last signals, then steaming North to glory. The silhouettes of these ships, their war camouflage, are indelibly imprinted on his mind. Many of those men lost were our friends, shipmates.

In regard to losses, the Army says 'Close the ranks'. In the Navy we say, 'The price of Admiralty is sunken ships and dead men'. Human feeling is, however, pardonable. Those called "great" by an admiring world are often the most human. So do not censure us if we pause to remember those three fine ships and their gallant men.

Their exploits may grow faint in history; but to their brothers-in-arms their memory in evergreen. While men still fire guns of ships, walk quarter-decks, climb the rigging, spin the wheels, or scrub the decks. While masts still appear on the horizon, the names *SYDNEY, PERTH* and *YARRA* shall represent everything that is best in the Service. In thinking of them, the lines of the late Lawrence Binyon's poem 'To the Fallen' are recalled:

'At the going down of the sun
And in the morning,
We shall remember them'.

FROM THE SECRETARY'S DESK

I would like to draw everyone's attention to the notices for the Special General Meeting and Annual General Meeting. The AGM will be held later than usual this year because many regular members will be involved with Exercise Kangaroo 81 in October.

The proposed amendments to the Rules, to be considered at the Special General Meeting, have been studied at length by the Council and two points should be noted. Firstly, by creating a new office-bearer i.e. the editor of the Journal, the numbers on the Council will increase by one to 16, since the Council is now comprised of the five office-bearers and ten ordinary councillors. The second proposed amendment in respect of the Patron stems from the Council's wish to recognize the honour paid to the Institute by our Patron, His Excellency, the Governor-General, by formalizing this position.

I would also like to advise members that elections to the Council will be held at the AGM and all members, are encouraged to stand for election either as an office-bearer or ordinary councillor.

The Secretary of the Canberra chapter, Lieutenant Richard McMillan, has asked me to advise members in the ACT to keep their addresses up-to-date so that they can be contacted regarding the Chapter's activities.

The Proceedings of the 'Seapower 81' review are now published and available from me for $12 per copy.

NOTICE OF SPECIAL GENERAL MEETING

The Council of the Australian Naval Institute, by the authority granted to it under article 13(1) of the Rules, has convened a special general meeting of the members in order to amend the constitution. The meeting will be held at 1930 on Friday 20 November 1981 at Legacy House, Allara St. Canberra ACT (prior to the AGM).

The Agenda for the meeting will be:

- Rules: consider the undermentioned proposed amendment to the Rules (Constitution) in accordance with article 34(2): Add a new subsection to article 23(1) office-bearers of the Institute, number (e) 23(1) (e) A Journal Editor.
- Add a new article, article 37, titled Patron to read as follows:
  'The Council may in its discretion from time to time appoint a patron and/or patrons of the Institute.'

Honorary Secretary

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THE IMPACT OF TECHNOLOGY ON MARITIME WARFARE IN THE 1980s

by Lieutenant Commander B.D. Robertson RAN

'I never saw a fleet altogether so well officered and manned. Would to God the ships were half as good, but they are what we call crazy' — Nelson, September, 1803

Introduction

Throughout the history of maritime warfare, man has always demanded superiority and greater efficiency from his arsenal of weaponry. In Nelson's day this arsenal consisted of ships and cannons, and war was confined to the seagoing areas of conflict. Technology has changed maritime warfare to encompass the depths of the ocean and the vast reaches of space. Command of the sea no longer implies the country exercising this command has been able to deny the enemy the use of its ships at sea. The presence of aircraft, submarines and satellites, and the ever increasing sophistication of technology which perpetrates them, will have a marked impact on maritime warfare in the 1980s.

With few exceptions, the technology which will most affect maritime warfare during the eighties is known today. A project from concept through research and development to trials, evaluation and eventually operational deployment, may take up to 15 years; *Barra*, the Australian designed sonobuoy, took 13 years. This lengthy process is exacerbated by the inevitable problem of money. The reallocation of funds, with resulting project priority changes, frequently causes technological breakthroughs to be postponed. The effects of money supply will be important when examining the impact technology will have on maritime warfare in the next ten years, and in assessing the likelihood of success of such technology should it be put to the test.

Victory, the ultimate goal in war, will belong to the side which is best able to employ the technology at its disposal when the battle begins. The man, whether he be airman, civilian or sailor, will be the user of this technology. His skill and ability will be of paramount importance to success. Technology is a science developed by man to further his aims. Only while it remains firmly in his control can it benefit him, therefore man must impress his purpose wherever technology is used to release his function.

This essay aims to examine how technology will affect maritime warfare in the 1980s and to show that although this will be vital in determining the victor in any conflict at sea, it will not eclipse the importance of the man, and the role he has to play in the 'electronic eighties'.

Technology and weapon performance

Lord Fisher, a man who shaped the Royal Navy for success in the First World War, and a man who greatly inspired Lord Louis Mountbatten, said at the Hague in 1899:

> 'The essence of war is violence. Moderation in war is imbecility. Hit first, hit hard, and hit anywhere.'

THE AUTHOR

Lieutenant Commander Brian Robertson was educated at Geelong Grammar School in Victoria before joining the Naval College in 1966. Whilst at the college, he was promoted to Cadet Captain and was the recipient of the Governor General's Cup for best all round sportsman. After his training cruise in HMAS *ANZAC* and training in the UK, he returned to HMAS *VAMPIRE* to gain his Bridge Watchkeeping Certificate before being posted as XO of HMAS *BOMBARD*.

After Operations training at HMAS *WATSON*, LCDR Robertson served in HMAShips *DERWENT* and *WATERHEN* before being posted to Darwin where he successively commanded HMAShips *ADVANCE* and *AWARE* during the period when Taiwanese boats were frequently arrested and the influx of Vietnamese refugee boats was of major concern. In 1978 he completed the Principal Warfare Officer's course in the UK before serving as the Communications Officer in HMAS *PERTH*. In 1980 he completed the Advanced Warfare Officer Course in the United Kingdom and after further studies in Electronic Warfare took up his present posting as the Staff Officer for Communications and Electronic Warfare at the RAN Tactical School at HMAS *WATSON*.

Lieutenant Commander Robertson is married with one son and lives in Wollstonecraft, Sydney.

Despite all the technology which has been utilised during the Twentieth Century, this axiom remains true, even with the necessary restraint imposed by the desirability for economy of effort.

However, to comply with Lord Fisher's wishes, a commander at sea must first detect and identify his enemy. Therefore to examine how technology will have an impact on weapon performance the methods of detection, identification, as well as destruction, must be examined.

Detection

To remain undetected at sea, and thus retain the all important element of surprise, is becoming increasingly difficult, and with further developments, this trend is unlikely to be reversed. Against some detection systems, would-be-eluders at sea may continue to hold the upper hand against the enemy, but when the entire range of surveillance methods is employed, anonymity at sea will become increasingly difficult. The first and most common method of detection is by electronic surveillance. Most maritime mobiles are equipped with 'electronic ears' to search the frequency spectrum for electronic emissions which may help locate enemy ships and aircraft. The success of these interceptions depends on the sensitivity of the listening device and the countermeasures to detection employed in the emitter. The detection range depends primarily on the frequency of the emitter but such technological advances as pulse compression in radars and spread spectrum techniques used in communications, will increase the problems of detection. Despite this, the advent of more efficient listening devices, incorporating logic circuitry, will allow search vehicles, employing electronic intelligence methods, to retain the advantage.

Radar and electro-optical devices, although of greater importance in tactical rather than strategic scenarios, will continue to be primary methods of detection at sea. Such developments as the surface acoustic wave and charge coupled devices will greatly increase radar performance and reduce its vulnerability to countermeasures. Equipment designed to detect ships and aircraft, by exploiting nature's radiation windows in the high radar and infra-red bands, will be deployed throughout the eighties. These surveillance systems will reduce the effects of atmospheric interference and absorption to provide a greater signal to noise ratio and a greater probability of detection.

Satellites will play a major surveillance role during the 1980s. The performance of a satellite is governed by its size and energy source. The size is governed by the circumference and thrust of the parent rocket, which is in turn governed by sheer physical limits, and the allocation of project finances. With advances in microelectronics and solar cell technology, and with the advent of the space shuttle for satellite launches and maintenance, the performance of satellites will be greatly enhanced. This will enable the owner to use the same satellite for many more tasks or use less satellites for the same number of tasks.

Satellites are used for electronic, photographic and radar surveillance as well as for communications. Technological advances in these areas will have a significant impact on maritime warfare. Unmanned satellites will not be the only vehicles to contend with in space. Recently, Soviet astronauts passed the world space endurance record in Salyut 6, a manned space station undertaking technological research, a subject to which the Soviets give great attention.

The need to detect the enemy is probably the greatest underwater, where ballistic missile firing submarines are the spearheads of the nuclear deterrent, and a continual threat to national security. The art of underwater warfare, using both acoustic and non acoustic methods of detection, is poised for rapid technological advancement. The ocean deeps have for ages been reluctant to surrender their secrets, but as the oceans and their resources become increasingly important to the survival of man, so they become important for him to defend. The next ten years will see quantum jumps in the exploitation of the ocean, the ocean floor and as a medium for warfare. Increasingly sensitive sonars in ships and submarines, aircraft dropped directional sonobuoys, orbiting space infra-red surveillance laboratories, sea water temperature gradient seekers, magnetic anomaly detectors and more sophisticated active sonars all add to tilt the balance against the underwater prowler who for so long has enjoyed virtual immunity. Technology in the 1980s will act to make the oceans transparent and, like a man in a dark room when the light is switched on, the submariner will begin to lose the initiative.

The detection of the enemy will remain a high warfare priority and will attract vast efforts in terms of man hours and money. It is an area where technology will provide important breakthroughs in the 1980s.

Identification

To maintain economy of effort whilst still achieving the concentration of forces necessary for a successful engagement, timely identification of the enemy's intent, type and number is vital. The methods of reliable identification available to maritime commanders are limited, especially during periods of tension where hostilities themselves are not an aid. Radars and sonars are at present unable to identify a target, satellite radar

is equally nondescript and the use of photographic satellites is impracticable. The best method for years has been the pilot in his plane who can give accurate and reliable identification information, but his usefulness in open hostilities would be shortlived.

The increasingly sophisticated world of electronics is assisting more each day with the problems of identification. Throughout the eighties equipment will be brought into service which will be capable of intercepting and measuring the electronic emissions of the enemy then instantaneously comparing this data with a computer library of parameters to provide the commander with a valuable electronic fingerprinting capability. Surveillance radars will become so accurate that they will be able to measure the length of a radar contact which will assist in determining the class of ship. Sonars will be able to analyse the frequencies of radiated noise from ships and submarines to provide information on the type and nationality of the contact. Satellites designed to scan the frequency spectrum will be able to recognise and report their findings to earth for further identification analysis. Aircraft will be fitted with sophisticated infra-red detection and viewing devices which will be able to identify surface ships from safe ranges. Not only will the enemy be more readily identified but advanced electronic gadgetry will confirm friendly identities by pulsed codes between units. These products of modern technology will greatly assist the maritime warfare commander in this difficult job of identification. However countermeasures are sure to be employed.

As new methods are found to identify so are methods found to deceive. The fight for superiority is a continuous game of technological leap frog. The will to remain unidentified is highlighted by the United States 'stealth' aircraft under development, whose surface uses radar absorption material and non reflecting contours to achieve immunity from radar detection. Similarly electronic fingerprinting can be deceived by changing the parameters of the emitter or just not switching it on and, as sonar becomes more capable of detecting submarines, methods are found to reduce the reflectivity of the hull and the radiated noise from the machinery.

These countermeasures frustrate the task of identification and put greater demands on the skills of the operator, whose job it is to squeeze optimum performance from his equipment. Technology will assist in the methods of identification but the operator will be the one to assess the results and determine validity.

Destruction

The arsenal of weaponry available to destroy the enemy at sea is becoming more complex and extensive. The development of weapons, which is carried out not only by governments but also on a competitive commercial basis, has become rapid and varied. Technology in the eighties will continue to produce 'bigger, better and more beautiful bombs' although in this sense 'bombs' will represent the entire range of conventional and nuclear weaponry.

Technology has already provided, in the form of a nuclear warhead, all the 'bang' that is needed for destruction of the enemy. Where technology will have an impact in the eighties is in the speed, guidance and survivability of a weapon and, conversely, the ability of the target to 'outwit' an incoming missile, torpedo or even a laser weapon.

Weapons of the eighties may be part of what is being called the 'Bullseye' war; a war in which technology will make it possible for a single accurate weapon to achieve better results than a salvo of less capable weapons. To this end the sensor of the weapon, whether it be radar, acoustic, infra-red, magnetic, pressure or laser will become increasingly more sensitive, reliable, compact, and accurate. The control and logic electronics, with the aid of very large scale integrated circuits, will become more capable and more compact. Autonomous missiles will be able to defeat electronic jammers by pulse jitter and frequency shifting techniques, they'll be able to dismiss radar decoys without IR signatures as false, and with increasing determination will be able to seek out their targets. Similarly torpedoes will become quieter and faster and thus harder to detect and evade. Mines will become more difficult to sweep as they will possess a greater depth capability and be programmed to detonate only when a ship with a certain pressure, magnetic and acoustic signature, passes overhead. Attack aircraft are likely to become smaller with less emphasis on speed and more on manoeuvrability and survivability. Even bullets will benefit from microelectronics: some will have radars with proximity fuses or be guided by lasers, whilst others will deploy broadband radar deceiving chaff and flares. Shipborne defences will become automated as the need for rapid response increases. Automatic chaff dispensers and active expendable decoys will become vital for survival. Lasers will play a greater role in the guidance of weapons as they give enhanced positional accuracy and are presently difficult to counter.

Technology and the resurgence of biological and chemical agents for use in warheads will have a considerable impact on the defence of personnel and units at sea. Greater emphasis will have to be directed towards citadel defence and protective clothing as well as methods for detecting such attacks.

To give the impression that the aggressors will hold all the cards would be unfair. Defence systems are becoming equally sophisticated with automated response and complicated sensor arrangements. However, as new technology becomes operational in a weapon there is usually a time lag before the same technology is turned into a countermeasure and installed in defences. This technological time lag may be crucial for the survivability of units.

Command and control

Technology in the eighties will have one of its greatest impacts on the function of command and control. Effective command and control relies on accurate information being presented clearly and concisely for quick evaluation and the existence of reliable communications for the relay of decisions to outstations. The main technological tool in this field is the computer. As well as its great capacity for work it also forces anyone who uses it to think clearly, formulate goals precisely and express them unambiguously. This alone may be the computer's greatest contribution to command and control in the eighties.

The performance capability of a computer is measured in speed and storage capacity. The speed of information flow within a computer is nearly the speed of light, but with technological advancement in hardware techniques such as the use of electron microscopic photography in silicon chip manufacture, components will be closer together enabling overall faster reaction times. The storage of information in packets of binary digits, called bytes, will increase more than a million fold in the next decade.

These advances will be seen at sea in improved combat data systems and data links which will enable the rapid exchange of picture compilation data and command orders between ships and aircraft, as well as providing a comprehensive realtime picture of the battle to the maritime commander in his headquarters ashore. This information will be encoded and flashed via geostationary communication satellites stationed some 23,000 miles above the equator. The speed of exchange of this information will increase, and hence the amount of information which can be passed between units, will increase many times over as technological hurdles are cleared. The impact of this technology will be enormous. Command and control will operate from the highest pinnacle of authority direct to the commander at sea instantaneously. The analytical component of top level decision making will expand to affect the lowest echelon of maritime warfare. This alone will be vitally important during periods of political tension before the use of weapons is authorised. Rapid command and control will also enable the timely authorisation of force which will enhance the survivability of units at sea.

Support technology

The technology required to support deployed maritime forces will become more important as such tasks become more involved. With the progress in silicon chip technology, computers will become available to all levels of administration and management. Desk top calculators with access to vast memory storage will enable managers to monitor the needs of their organisation in fine detail.

In the area of logistic support, ships and frontline aircraft squadrons will no longer be troubled by supply imbalances or bottlenecks resulting from inaccurately analysed and calculated needs. Development programmes will be able to be monitored for greater efficiency and new information will be able to be more quickly distributed and implemented.

Personnel training standards will be increased as greater software use is made of computers. Training programmes will be enhanced by computer controlled simulators which will accurately reproduce battle scenarios. Rapid printing processes will facilitate the quick dissemination of information, and training aids such as closed circuit television, visual display units and self teaching programmes will become more available as the cost of established commercial technology is reduced by cheaper manufacturing processes.

The impact of technology will be strong in the ship building and repair industry. Dockyards with computer assisted management will improve services whilst cutting costs. The advent of modular design will bring about the rapid interchange of equipment, replacing defective units or changing the entire role of a ship. Similarly dockyard facilities will be updated to cope with such new concepts in ships as the Surface Effect Vessel; a vessel capable of speeds in excess of 100 knots, and deep water ASW craft with automated sensors.

Medical support will be greatly enhanced by new techniques, equipment and drugs. The survivability of the individual in the event of injury, chemical or biological attack will continue to be increased with the advent of medical technology.

The balance of power at sea

Technology will have an important effect on the balance of power at sea in two ways. Firstly, the *rate* of technological advancement which produces more capable military systems before the enemy and, secondly, the *availability* of technology to poorer countries as the cost of such technology continues to reduce.

To examine the first criterion, the Soviet policy of making the USSR secure by making

other nations feel insecure has stimulated military growth, caused alliances and given rise to the need for rapid technological advancement. Such a policy is in itself the spark which ignites an arms race, a race supported by modern technology where the winner may be the alliance with the greatest rate of technological advancement.

Equality in power is impracticable for no other reason than the power of two nations is not comparable; nonetheless, the efforts of intelligence communities around the world are directed at checking the enemy's lead by observing his exercises and trials and turning the results to their own gain.

The second criterion gives rise to 'poor man's power'. Cheap weapons, sensors and combat systems are available for purchase by nations which do not have the technical expertise or resources to develop their own systems. Automated self contained weapons, such as the French surface to surface missile Exocet, which only requires the aggressor to point the weapon and pull the trigger, are becoming less expensive. This cheap technology will, in many cases, cause the balance of power in maritime warfare to be tilted, and may give countries which lack political responsibility the ability to invade another nation's area of interest.

Technological man

Technology is an immensely powerful instrument of cultural evolution which becomes a sword of idealism when war threatens. Technology was created by man for the advancement of his ambitions, and as such he is the catalyst and must retain his position of influence. This appears contradictory in suggesting that if man creates technology he may not be able to control it. Nevertheless, there will be many automated weapon systems in the arena of maritime warfare during the eighties, manned and controlled by men who are not engineers nor technicians, but who must be relied upon to exercise decisive judgement in periods of tension, where the wrong reaction could lead the world into nuclear war. To ensure that such moments of judgment are handled capably and correctly the men who man the systems of maritime war must be highly trained, efficient and disciplined.

The importance of the operator cannot be overstressed. Unlike the computer, he is in a position to think ahead, use his initiative and derive the maximum benefit from his equipment, even under adverse conditions. A prime example is the well trained radar operator who can detect contacts through heavy jamming when automated tracking systems have failed. Technology used wisely can help in the training of operators, system managers and military commanders, but for technology to remain as an instrument of national will, the human control element must be able to cope with the sophistication of technology in use.

Morale

Morale will continue to be the greatest single factor in war. As well as the essential qualities of leadership and determination, from which spring courage, ability and a fighting spirit, morale is dependent on good equipment, realistic training and timely rest and relaxation.

Equipment which is reliable and instills confidence is the product of good technology and maintenance. During the eighties such equipment will incorporate the latest in technology, such as very large scale integrated circuits and will be tested to withstand shock, blast and the effects of nuclear radiation. A high mean time between failures will be supported by logic circuitry which will quickly identify faults, thus enabling the maintainer to merely pull out the defective part and slide in the replacement.

Rest and relaxation will always be important to men and women who work long and irregular hours. As costs reduce and space is saved by the ongoing introduction of smaller components, entertainment amenities will improve and be more numerous in ships, submarines and shore recreation centres. These amenities will include computer video games, closed circuit film facilities as well as the endless list of inventive electronic amusements. Technology will have a great impact on the individual, it will assist in all facets of life and will assist in building morale.

Leadership

Good leadership is essential to good morale and a fighting spirit and must continue to be cultivated throughout the eighties. The advent of technology, and with it modern warfare, has brought about impersonal leadership. For example in the navy, maritime commanders now direct the battle from headquarters ashore; in the Air Force flying sorties are ordered by operational commands which may be a thousand miles away, and in the field of administration personnel records, pay, promotions and leave entitlements are all handled by computer. To avoid leadership being adversely affected by technology and thus jeopardizing the chances of success, leaders at all levels will have to extend their personal influence to the extremities of their commands and cultivate the respect and discipline so vital in military forces.

Leaders will become increasingly important in the eighties as men look to those who are knowledgeable and capable for guidance in times of stress. The requirement for a leader to exude confidence and well being whilst making fast and difficult decisions with little or no rest may, in many cases, require medical assistance. Ailing leaders

may rely heavily on medication and life support systems, and battle weary commanders may feel the need for energy restoring pep pills and the like. The possibility of leaders in time of great stress accepting the support of advanced medical and physiological technologies in the form of drugs is very real and may have disastrous results. In the technological world of the eighties, and especially in areas where lives are at stake, such as ships at sea, great care will have to be taken to ensure the demands on men brought about by advanced technology do not exceed the limits within which he is a rational and capable leader.

Conclusion

Throughout the eighties, technological advances will result in the introduction of world wide surveillance systems, more reliable methods of identification and weapons which are faster, smaller and more capable of destroying their targets.

Rapid communication systems associated with combat data systems and data links will provide concise and immediate command and control from the highest pinnacle of authority.

Technology in the support role will assist in the balanced and timely supply of stores and spare parts. Building and repair facilities will improve enabling a greater fighting effort to be available when needed.

The rate of advancement and the availability of technology will have a considerable impact on the balance of power between maritime forces during the 1980s.

These advances in military technology will have a marked impact on maritime warfare but the most important factor remains the man. His ability to react under adverse conditions depends on training, discipline, morale and leadership. The deciding factor in war will be the man's skill to use the technology at his disposal at the 'moment critique'. The ability of man to master the technology at his disposal and to make it work with optimum performance will be vital in determining the level of national security and the chances of success should war be necessary.

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THE DEVELOPMENT OF SOVIET ORGANIC NAVAL AIR POWER

by Dr T.J. O'Rourke

Naval aviation in Russia has had a long struggle to become an important arm of the country's armed forces. Russian naval aviation has been almost exclusively a land-based element of the armed forces and cannot be compared with the air power of the US Navy in style or capability. However, the continuing development of a substantial Soviet sea-going naval air arm is increasing the military options open to the Soviet leadership, both for defence and for offence.

Historical Background

Early this century, when the British Navy was experimenting with the idea of launching seaplanes from ships, Tsarist Russia had little awareness of the role that aircraft might play in naval warfare. Russia concentrated, as did other European powers of the time, on building up powerful squadrons of battleships, which were seen as attributes of big-power status, without regard to geography or the strategic mission of the ships.[1]

At the outbreak of World War I the Russian Navy had some fifty American Curtiss seaplanes and several airships. The role of the seaplanes was to serve to the maximum possible extent as forward observers at sea but during the war the naval planes were used mainly to back up the Russian Army's aircraft in the land battles. Some merchant ships were converted to act as seaplane carriers but none had a flight deck and the planes operated from the water beside the ship.[2]

The Bolshevik Revolution left the Russian Navy at a very low ebb. Russian ships were antiquated and the air arm was crippled. Gone were the seaplane carriers, the naval aviation organization, much of the aviation industry and most of the naval aircraft and flying personnel. Without these there could be no development of carrier aviation.[3]. While the inter-war years saw intensive aircraft carrier development in Britain, the United States, Japan and France there was no such activity in the Soviet Union. Economic constraints were influential but the Russian Revolution, which brought about a 'revaluation of all values' in so many fields, did not at first bring any change in the field of naval strategy. Lenin, and initially Stalin also, steadfastly adhered to traditional battleship thinking.[4]

The Young School of revolutionary naval theorists which developed in Soviet Russia, emphasized submarines, destroyers, fast patrol boats and land-based naval aircraft. It was argued that these conformed with Marxist-Leninist teachings and the principles of partisan warfare, that they were cheap to build and maintain, and that they were ideally suited for coastal defence which was all that was necessary since the Soviet Union was not an aggressor nation. Consequently, battleships, cruisers and aircraft carriers that could project aviation over open sea were not required.[5]

Stalin ostensibly supported the Young School and the Soviet Union proceeded to construct a large submarine fleet. A naval air arm was laboriously built up. In 1925 it had about 400 seaplanes and by 1937 some 700 land-based aircraft. However, Stalin saw other naval powers, including Germany and Italy, building large surface vessels and in 1938-39 the Russians sought US assistance to build aircraft carriers and battleships. The Russian entreaties proved fruitless, largely because of resistance by the US Navy.[6]

According to unverified reports, a Soviet carrier was actually laid down in Leningrad around 1940 but was abandoned when war came.[7] Thereafter the aircraft carrier project disappeared from view.

During World World War II, Soviet naval aircraft, still land-based, were integrated with the Soviet Air Force to support the Army. Naval fighters were used for the defence of ports and shore installations. Later they escorted Allied convoys as they neared Murmansk and Archangel.[8]

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A resident of Brisbane from 1950, Dr O'Rourke moved to Canberra in February 1980 to work in the Department of Defence.

Some Soviet naval officers saw how Allied maritime supremacy affected the conduct of the war on their own continent. However, Soviet doctrine continued to emphasize the overwhelming importance of the Army in war and pointed to the supreme contribution of the ground forces to the defeat of Hitler. The Army has traditionally been the senior Service in Russia and the lessons which most influential Soviet strategists drew from the war confirmed the Navy in a subordinate role as an auxiliary to the Red Army.

Completion of the unfinished German carrier, *Graf Zeppelin*, seized by the Soviets at the end of World War II, might have given some immediate impetus to the development of aircraft carriers, but the *Graf Zeppelin* sank, while under tow to Leningrad in 1947.[9]

Soviet long-range naval planning after 1945 aimed to give Russia a maritime capability which would eventually be equal to that of the West. This policy involved a naval program founded on a balanced surface fleet of cruisers, destroyers and submarines with aviation cover provided by a beefed-up land-based naval air arm. There has been some speculation that the largest surface vessels in this programme, 'Sverdlov' class cruisers and destroyer-leaders, were intended to provide the screen for Russian carriers and that four such carriers were envisaged. If this is the case such task forces would have been many years away. The level of destruction and disruption caused by the Second World War to the Russian economy was such that the Russians were no closer to possessing a capability for constructing carriers in the early years of the Cold War than they had been in the interwar years.[10]

In the period immediately after World War II the land-based naval air arm was rearmed and expanded. In 1950 it was placed under the direct control of the Naval Staff and in the mid-1950's could muster some 90 000 men and 4 000 aircraft. Almost half of the aircraft were fighters whose role was to provide close support for Soviet warships operating within range of land air bases.[11]

By the mid 1950's the Soviet Navy could be ranked third in the world behind the US Navy and the Royal Navy. But the Soviets were a long way behind since they had nothing to match the Western aircraft carriers. A single Western carrier with its air group of fighter and attack planes was capable of defeating virtually any combination of Soviet surface warships.[12]

Fleet Admiral Sergei Gorshkov, who became Commander-in-Chief of the Soviet Navy in 1956 was a disciple of the mastery of the sea theories of Alfred T. Mahan and Phillip Colomb and belived strongly in the creation of a well-balanced ocean-going fleet and in the value of naval aviation. Nikita Kruschev preferred to challenge US military superiority with a beefed-up strategic rocket force. Kruschev regarded aircraft carriers and other large surface vessels as metal eaters which would be sitting ducks for missiles. Without tackling Kruschev, the party and the military directly, Gorshkov manoeuvred to stall their plans to reduce drastically the Soviet Navy and he was able to preside over the transformation of the Soviet fleet into a global navy.[13]

Many Western observers have dated the expansion of the Soviet fleet from the Cuban missile crisis in 1962. However, the decision to upgrade the Soviety Navy was taken before 1962. Nevertheless, the virtual impotence of the Soviet Union because of its lack of maritime muscle in Cuba in 1962 and in previous crises such as Suez 1956 and the Lebanon 1958 confirmed Gorshkov's appreciation of the value the United States obtained from its global navy. Cuba in particular hammered the lesson home to many who had not shared Gorshkov's views and helped to create a 'never again' syndrome.[14]

Change of strategy

The major revision of Soviet naval strategy and naval tactics and the steady geographical and unit expansion through the 1960's stemmed initially from concern about defence of the Soviet homeland. The balance of power deteriorated sharply for the Russians during the latter 1950's when US carrier planes and then US submarines were armed with modern weapons which could hit the Soviet Union from areas well beyond the range of Russian shore-based aviation. Soviet territory became exposed to a threat far more serious than the possibility of invasion. The upgrading of the Soviet Navy and the new pattern of forward deployment was basically predicated on the need to track and mark US strike carriers and ballistic missile submarines. Thus the extension of the Soviet Union's maritime defence perimeter can be seen as a form of forward defence.[15]

The mobility of the US carriers and the comparatively small size and variable flight characteristics of their aircraft posed serious problems for Soviet planners. They saw a need to attack the carriers before they reached their starting points for aircraft launching. The counter-carrier mission was given an exceedingly high priority in an attempt to minimize nuclear destruction within the Soviet homeland by destroying at least some of the carriers or inducing them to turn away.[16]

The Russians created a counter-carrier force of submarines, small destroyers and naval aircraft most of which they fitted with long-range anti-ship cruise missiles. This type of force, development of which was overseen by Kruschev, can be seen as a return to the Young School of Strategy of the pre-war days with its emphasis on submarines

and light surface forces, the cruise missile substituting for the torpedo. The Young School emphasis on land-based naval aviation was also continued. The Soviets envisaged the encounter zone with the US carriers to be within a few hundred miles of the Soviet coastline.

Thus, while the Soviet naval forces were drawn outwards by the US carrier threat and obtained more small units and new weaponry, it was expected that the Soviet surface and undersea elements would be able to operate in range of shore-based aviation cover. Furthermore, it was expected that shore-based bombers armed with stand-off air to ship missiles could contribute to the anti-carrier effort by striking without coming within the danger zone of fire of the carrier formation's anti-aircraft defences. Therefore no immediate impetus was given to the development of sea-based aircraft and large seagoing platforms for them. [17]

By 1958 the basic premise that shore-based air support would be available over the encounter zone had been falsified by an increase in the range of US carrier aircraft. This allowed the US carriers to strike at Russia's heartland from the South Norwegian Sea and the Eastern Mediterranean. The Soviets decided to counter this by emphasizing production of a new class of nuclear submarines which could engage the carriers before they could launch their strikes.[18]

The carrier threat must have appeared to the Soviets as a potentially manageable problem but before their anti-carrier plans could be implemented fully, US carrier groups were being replaced by Polaris submarines as the main instrument of nuclear delivery at sea. The US attack carriers were shifted from a primary role of nuclear attack to one of 'general purpose' operations, but they retained a nuclear strike capability.[19]

The distance from which the West could launch seaborne nuclear attacks against the Soviet homeland was progressively increasing and the introduction of Polaris represented a quantum jump. Tracking and marking carriers is a relatively easy task but the problem of detecting and maintaining contact with nuclear submarines is of a different order. The Soviets did not abandon the anti-carrier mission but soon it became largely a matter of naval, not atomic, strategy and the counter-Polaris mission was accorded top priority.[20]

The long-range anti-ship missiles which the Soviets relied on to hit US carriers would have required mid-course guidance, generally from an aircraft. The development of a Soviet sea-based naval air capability could at least have reduced the hostility of the environment in which Soviet reconnaissance and target acqusition aircraft would have had to operate. However, the Soviets decided to develop shorter range anti-ship missiles with organic target-location systems.[21]

The real impetus for the development of Soviet sea-based naval air power came from the priority given to the development of ASW systems, an area in which the Soviets had been technologically behind. The Soviets concentrated on area search methods rather than trailing with their own submarines. *Kynda* class guided-missile cruisers and *Kashin* destroyers were rebuilt and a new generation of anti-submarine weapon systems, including *Kresta 1* cruisers (which are also capable of anti-carrier warfare) were introduced.[22]

The *Moskvas*

Helicopters are very effective units in ASW area search operations and so the Russians experimented with Hormone sub-hunter helicopters equipped with homing weapons but, given the speeds of the submarines, substantial areas of ocean would have to be covered. The task required a larger helicopter platform than could then be carried on the conventional destroyer or even cruiser. To meet the need a purpose-built helicopter cruiser, the *Moskva* (Soviet designation: anti-submarine cruiser) was laid down at Nikolayev in 1962 and joined the fleet via the Dardanelles in 1968. A second, the *Leningrad*, was completed in 1969. These were the first Soviet warships built specifically to operate aircraft.[23]

The *Moskva* appeared to be a hermaphrodite — a missile cruiser forward and a helicopter carrier aft. This hybrid design is reminiscent of the Japanese World War II battleships *Ise* and *Hyuga* which were fitted with flight decks aft. It can be argued that the *Moskva* is similar to such helicopter cruisers as the Italian *Andrea Doria* and *Vittorio Veneto* classes, the French *Jeanne d' Arc* and the British *Blake* and *Lion*. Nevertheless, none of these ships approach the *Moskva* in concept or capabilities.[24]

In the West it was thought initially that the *Moskva* was designed for amphibious warfare, that it was aimed at providing support for Soviet clients and for wars of national liberation, according to the Soviet definition or, from the Western point of view, for aggressive policies. The defensive strategic purpose of anti-submarine warfare was the *Moskva's* primary mission but it is capable of other roles. It could be used for the modern version of gunboat diplomacy and it did provide the Soviet Navy with a long-range intervention capability since it could be used by elite Soviet Naval Infantry — the equivalent of the US Marines — for sea-borne landings.[25]

Further Developments

The Russians had hardly reaped the first fruits of their investment in general anti-sub-

marine warfare, and more particularly in the operation of helicopters from sea-based platforms, when the Americans began to extricate their submarines from these dangers. The firing range of the Polaris missile was progressively increased. The US strategic strike submarines were then able to vacate their position in Soviet-controlled sea areas and to maintain their patrols in areas where the West enjoyed mastery of the seas.[26]

The Soviets had failed to completely counter the carriers or submarines which threatened to devastate their homeland with nuclear strikes. However, while the anti-nuclear missions had not been perfected, the anti-carrier concept served to liberate the Soviet Navy from a narrow view of coastal defence, endowed it with the beginnings of a high seas fleet and gave it mastery in seas adjoining the Soviet coastline. The anti-Polaris concept enabled the Soviet Navy to upgrade its ASW capability to a point where it commands respect.[27]

The increased range of the ballistic missiles (A2 and A3) employed by the Polaris submarines and the introduction of the MIRVed missiles employed by the Poseidon submarines indicated to the Soviets the need for an ASW platform with a greater range to sustain distant deployments, a greater aircraft capacity, and a greater ability to survive in a hostile environment.[28]

The helicopter-carriers had been developed after a lengthy and sceptical consideration of the modern role and utility of traditional aircraft carriers. Admiral Chabanenko had declared

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aircraft carriers to be extremely expensive giants of very doubtful efficiency. Gorshkov had noted that a carrier was eight times the cost of an atomic submarine. In 1960 Gorshkov contended that, like battleships, they had had their day and were, in reality, much over-rated sitting ducks.[29]

Yet the Soviets were aware of the need for air cover for distant naval operations in a hostile environment. This had been emphasized ever since the inception of the naval expansion efforts, but cost-effectiveness considerations appear to have prompted a reliance on land-based long-range naval aviation.[30]

With the successful development by 1967 of an all-jet Soviet VTOL fighter the need for the traditional type of aircraft carrier was obviated. The sought-after advantages of air-cover flexibility could be provided by mini-carriers — vessels of superior mobility and flexibility.[31]

During the 1950's and 1960's, the Soviets had consistently denigrated the Western carrier forces as primarily forces of aggression and maintenance of tension in various regions of the world. While viewing such carriers as smotherers of 'national liberation' movements, they were nevertheless particularly impressed by the effectiveness of US carrier operations in South-East Asia. They may, perhaps, have perceived that, if their forward deployed fleets could be provided with sufficient organic naval air power, they could be used at times to project power to the shore to support 'national liberation' movements.[32]

The *Kievs*

A building programme of Soviet aircraft carriers was approved, apparently early in 1969. Early in 1970 construction of the first of these carriers was observed at Nikolayev. In December 1972 the first ship, the *Kiev*, was launched. In 1974 a sister ship, the *Minsk*, followed.[33]

The *Kiev* can be seen as a second-generation *Moskva* — a larger class of ship built to the same basic design concept but able to operate and maintain twice as many aircraft and to bring fixed-wing, sea-based air power to contend with the Soviets' strategic defence problems. The primary mission of the *Kiev* class as stated by the Soviets is ASW but the ship does have a significant anti-ship capability in its cruise missile battery. The *Kiev* can act as a hunter-killer of enemy nuclear-powered strategic submarines and its ASW systems are a dramatic improvement on those of the *Moskva*.

The *Kiev* could be a manifestation of the Soviets' desire to counter long-range Poseidon and Trident missile systems in US strategic submarines with a surface ASW platform that can operate at great distances from the USSR and, if necessary, beyond the range of shore-based air cover. The fitting of the *Kievs* with SS-N-12s may indicate that the Soviets intended *Kiev* to serve as a launch platform for very long-range missile attack on US aircraft carriers. Both these roles are consistent with the development of Soviet naval strategy since the mid 1950's in terms of countering Western sea-based strategic delivery systems. The soviets may furthermore have perceived the *Kiev* class as capable of performing anti-ASW missions, that is protecting the capital ships of the Soviet Navy — the SSBNs — the Soviet sea-based strategic deterrent.[34]

Tactical V/STOL technology is in its infancy. Only the *Kievs*' Forger and the British designed Harrier are in service in significant numbers but it is clear that such aircraft will be widely deployed in the larger navies of the world. At present Forgers, like Harriers, have great limitations in performance but the Forgers do represent the beginning of a most significnat and growing trend in the Soviet Navy — the acqusition of a sea-based, fixed-wing air capability.[35]

Forger aircraft may well be primarily intended for air defence but they could be employed in other roles, including anti-ship, reconnaissance, close air support or ASW. The Hormone helicopters on the *Kievs* may be intended primarily for ASW operations but the *Kiev* could also operate troop-carrying helicopters or gunship helicopters for use in support of land operations. Thus the *Kiev* presents opponents with a new dimension of threats.[36]

Many Western observers viewed the development of the *Kievs* with concern as reflecting a Soviet decision to adopt an indisputably offensive naval posture. In an interview in August 1976 the US Secretary of the Navy, Mr J. William Middendorf, warned that Russia would probably field at least eight such carriers and with the *Kiev* the Soviets had moved from 'a navy without sea/air power to a formidable force with sea/air cover, and for the first time they have the ability to project air power from isolated areas'.[37]

Navy International, which featured the *Kiev* on the cover of its November 1976 issue, voiced a shrill warning:

> 'The Russian aircraft carrier *Kiev* has joined the Red Fleet, thus hammering the final nail into the coffin of Western Martime supremacy. From now on, it must be clear even to founder-members of the Ostrich Club, nothing will be quite the same in the business of deploying world-wide maritime power. Two sister ships are building and we can rest assured that the Russian delight in hefty numbers will ensure that others follow. At last Russia will be able to field balanced maritime forces. From her newly-acquired bases and with the

blessings of her new 'friends', she can now - or very soon — exert sea power wherever she sees the need — or the opportunity.[38]

The possibility that changing capabilities will produce new intentions is ever present. To some extent the Soviet Navy will feed on itself and develop expanded missions as its capabilities grow. While stragic defence was the most likely original motivation for the expansion of the Soviet Navy, the establishment of a pattern of forward operations and the eventual establishment of a base and replenishment infrastructure to support it will generate new options. The Soviets have increasingly acquired the means to shift from a defensive naval strategy to a partially offensive one. They have come to appreciate the leverage which a naval presence gives to foreign policy in areas distant from the homeland.[39]

Soviet Fleet Limitations

In the event of war the Soviet Navy would be a prisoner of its geography. Ships that were not already at sea might never get there. With the exception of the Northern Fleet's base at Severomorsk, near Murmansk, the principal bases of the Soviet fleets are located in tactically difficult positions. A few hundred well-placed mines in the Kattegat and the Dardanelles would bottle up both the Baltic and Black Sea fleets. In addition to having shallow and often ice-clogged approaches, the Pacific Fleet headquarters at Vladivostok is located on the Sea of Japan, which has only four narrow straits opening to the Pacific and is relatively easy to keep under surveillance.[40]

The Soviet Navy in forward deployment is at present nowhere powerful enough or large enough to survive against the Western Naval Powers in a wartime maritime environment. Western ASW techniques are purportedly more sophisticated than the Soviet Union's and Soviet surface ships are believed to lack the damage control facilities which make many Western ships virtually unsinkable.

The Soviet surface navy is designed for high intensity, perhaps preemptive, but not sustained war at sea whereas the Western navies can meet a much broader range of contingencies. Until attack aircraft carriers are demonstrably obsolete the navy which has its own substantial fleet-based air power has a great advantage in both mobility and firepower over a navy whose dependence is upon comparatively short-range ship-based missiles and mainly land-based planes.[41]

The *Moskva* and *Kiev* classes of ships can supply Soviet fleets with a modicum of organic naval air power but at present there are only four of them. The *Kiev* class, while the largest warships ever built by the Soviets and considerably superior as a weapons platform to the *Moskva* class, are essentially, like the *Moskva* class, ships for operating in confined areas of sea within reach of land-based air support. The *Kievs* are not large enough to combine major sea control systems — ASW and AAW — with significant capabilities to project power ashore — strike aircraft or amphibious helicopter lift. The *Kievs* have a very limited aircraft capacity compared with the US *Nimitz* class of carriers. The *Nimitz* can carry about three times as many aircraft.[42]

HORMONE — A helicopter

With no catapults or arresting gear that would allow them to operate orthodox aircraft, the *Kievs* are limited to V/STOL aircraft whose payload and performance limitations would severely limit their mission capabilities. The Forgers are not capable of undertaking strategic attack missions and have only a limited capacity to undertake tactical combat missions. The Forgers are not even capable of effectively defending *Kiev* against US carrier attack aircraft, let alone the sophisticated fighters embarked in the American attack carriers. A further consideration is that the range of the *Kievs'* surface-to-surface missile system is considerably less than that of the American carriers' aircraft. These aircraft armed with stand-off missiles such as harpoon frequently could release their precision guided weapons outside the missile engagement zone of their targets with virtually complete invulnerability to organic ship defences.[43]

It can be argued that the Soviet Navy is basically a political navy, that it was designed to win its battles in peacetime without fighting. The *Kiev* class of ships, in particular, combine beauty with menace and such warships have an undoubted value in times of peace. Their contribution to the political impact of the Soviet Navy is an asset which the Russians have exploited. The political value arises from the mere capacity to assert a presence and is not contingent on relative military strengths.[44]

Politically, even a relatively small naval force, with appropriate diplomatic and propaganda back-up, can symbolize changing political cir-

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cumstances, can offer alternative alignments, and can help to signify a particular commitment. The Russians need not be capable of defeating US carrier task forces to inhibit their action; they merely need to place themselves in the US line of fire. Far too much is at stake for the Americans to risk tangling directly with the Soviets unless their own interests are directly threatened.[45]

The deployment of embarked fixed-wing aircraft can demonstrate very effectively the power of the Soviet Union for the purposes of prestige and influence. The appearance of the *Kiev* off the coast of a Third World country would have rather more influence than a destroyer or a cruiser with little or no capacity to provide direct support to friendly land forces. The capacity, however limited, to project power towards the shore increases the Soviets' capacity to influence potential adversaries with Soviet power, intimidate them, lower their morale, and generally secure political objectives without actually initiating violent measures.[46]

The *Kiev* class of ships seem ideally suited for politico-military fishing in troubled waters off many third-world nations. Operating alone and with minimal logistics support, the *Kievs'* missions could range from showing-the-flag to landing Soviet Naval Infantry — the equivalent of the US Marines. Since the US Navy will be constrained to a carrier force of 12 by the mid-1980's, it will find it increasingly difficult to deal with simultaneous pinpricks of this nature while maintaining its carrier task groups at an adequate level in their normal patrol areas.[47]

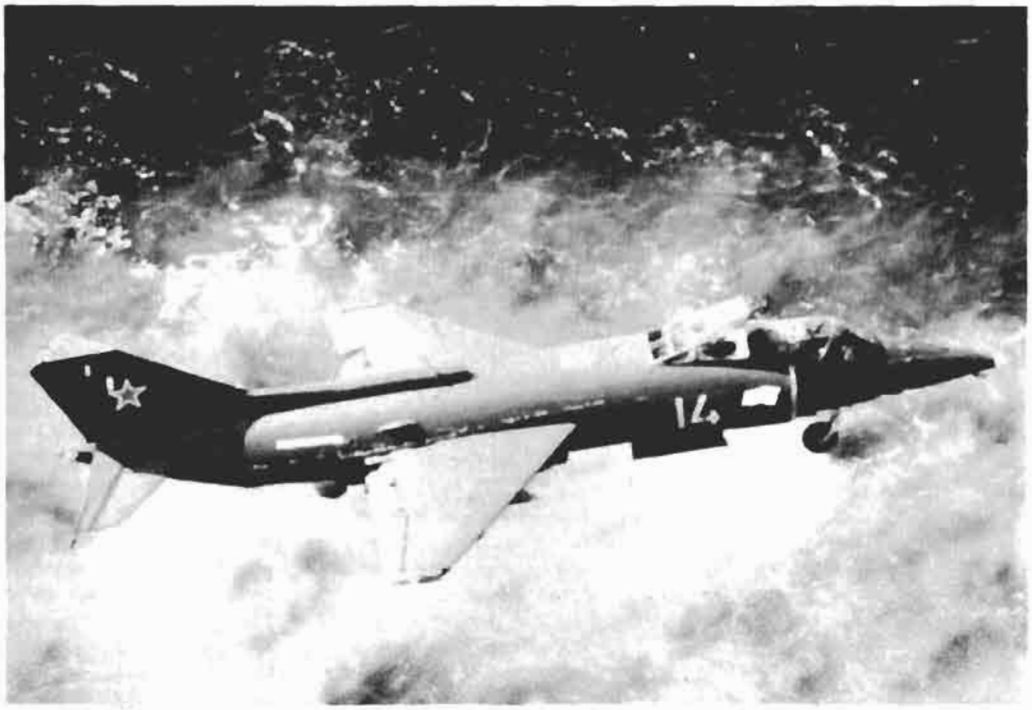
Operational Application

It is not likely that the Soviets see the *Kievs'* primary task as increasing the psychological effect of their maritime presence in peactime. Such a role would be seen as a bonus in Soviet strategic policy and would invariably take second place to national and bloc security. All previous Soviet warship designs have been aimed strictly at combat use and there seems to be little reason to doubt that the *Kievs* are designed for actual combat, too.[48]

Ship for ship in the open seas, the *Kievs* probably would be no match in wartime for the

American behemoths. The *Kievs'* aircraft at present are neither in quality nor quantity comparable to those of the US attack carriers. In a normal general engagement on the open seas the use of ship-to-ship missiles by the *Kievs* and other Soviet surface ships would not be effective against US carriers. Since the operational radii of carrier aircraft greatly exceed the firing range of Soviet cruise missiles, the carriers would be able at any time to attack the Soviet ships, while easily evading any approach that might present a serious threat. The Americans see the submarine threat as a bigger threat to their carriers and are confident that the Soviet surface fleet could eventally be neutralized in wartime.[49]

on launchers and tend to neglect reload capacity and staying power. The Americans, on the other hand, are confident that their carriers are highly survivable. But the carriers may not be invulnerable to a surprise multi-mission onslaught. Even if only two of the US carriers were destroyed at the outbreak of war, this would be a severe blow to Western maritime power in view of the small number of US carriers available to carry out various tasks. Another consideration is that, while carriers might survive, they might be damaged so much that they would be forced to suspend operations and undergo lengthy repairs, further depleting the available carrier force at critical times.[51]



Forger VTOL aircraft.

However, the Soviets appear to have a commitment to a first-strike concept in which brief, co-ordinated, massive saturation attacks are launched against the carriers which embody most of the offensive power of the US fleet and contribute most to Western mastery of the seas. Soviet air, submarine and surface forces could all contribute and the surface units might well be considered expendable. This first-salvo concept alows the Soviets to pose a permanent threat under the protection of peace. Soviet units can closely shadow the US carrier task groups in peacetime and, if they are within weapon range at the outbreak of war, they only have to survive long enough to discharge their weapons.[50]

The Soviets do not emphasize the survivability of their surface missile units. They concentrate

Still, the *Kievs* themselves should be viewed in the context of Soviet strategic defence. They should not really be seen as an effort to challenge US carrier forces on the open seas. American naval forces are built around the aircraft carrier as both a tactical and strategic system while Soviet naval forces are built around submarines and naval aircraft, supported by the surface forces including the aviation ships. The *Kievs* are primarily intended, like the *Moskvas,* for the ASW mission. Nevertheless, the *Kievs* could be of value in a manner reminiscent of battlecruisers in that they could successfully engage any type of Western surface units except for the largest capital ships. The *Kievs'* Forgers, while not a match for Western fighters or attack aircraft, are more than a match for maritime patrol, electronic

surveillance, communications relay or other poorly-defended aircraft. These capabilities are significant when placed in the correct perspective, that is of providing support for Soviet submarines.

The capabilities of the *Kievs* and their Forgers suggest that they could be of use in a limited sea-control role. They could provide control over specific sea areas beyond the reach of high-performance Allied aircraft from land bases or Western aircraft carriers which are now stretched very thinly. The Forgers could inflict considerable damage on surface ships or shore installations which lack protective air cover or sophisticated surface-to-air missiles. Built around the *Kievs* the Soviets could have a task force which could operate very successfully in a low-threat environment. They could even establish a mobile zone of supremacy. Neither the British *Invincible* class 'through-deck cruiser' or the projected US sea control ship would be effective counters to such a *Kiev* task group in view of the *Kievs'* greater aircraft complement and shipboard defence capability.[52]

The introduction of the *Kievs* into the fleet and their deployment at times to the Indian Ocean have been regarded by some Western observers as an indication that a Soviet offensive posture has been adopted. Edward Wegener argues that the Indian Ocean deployment is a manifestation of a Soviet desire to achieve mastery of the sea in at least one of the three great ocean areas. Wegener sees aircraft carriers as ideal instruments in conjunction with other surface forces for the sea control mission and the Soviets could plausibly gain control at least of the Northern section of the Indian Ocean.[53]

It does appear that the original Soviet move into the Indian Ocean was motivated by their perception of a threat from US Polaris missile submarines which either were stationed or could easily be stationed in the Indian Ocean to strike at the Soviet homeland.[54] Increasingly the Soviet Indian Ocean deployment has appeared to focus on peacetime political influence building rather than the prepositioning of forces for eventual war.[55] While the presence of Soviet forces in the Northern Quadrant of the Indian Ocean does not appear to be aimed at cutting off the West's oil supplies,[56] the *Kievs* do give the Soviets a formidable capability in such an area. This capability is reinforced by the Soviets' introduction of the *Berezina*, which appears to be an aircraft carriers' support ship, suitable for mothering one or more aircraft or helicopter carriers far from home ports so that they can stay on station continuously.[57]

The aviation ships do not at present allow the Soviets to control much sea space but it could be vital sea space. If the *Kiev*, the *Minsk* and the third ship of the class, the *Kharkov*, and the helicopter carriers the *Moskva* and the *Leningrad* were deployed in the Arabian sea and supported by the *Berezina* and sister ships in turn, they could put up a force of up to 165 aircraft. It is quite possible that such a force could control all naval, military and air movements over the entire Middle East and Persian Gulf areas and monitor or blockade all the tankers carrying the vital oil supplies to the rest of the world.[58]

New Carriers

The Soviets recognize a need to continue to develop their organic naval air power. They are not assured of the use of overseas bases in periods of tension or in time of war. The loss of their submarine base in Albania in 1961 and their base rights in Egypt in 1972 must have been painful lessons.[59]

The aviation ships have increased the military options open to the Soviet leadership and the *Kiev*, her three sister carriers and successors, could become key elements in a new Soviet concept of naval projection operations — a concept more offensive than defensive. The Soviet naval high command and the Communist Party appear to have developed an increased appreciation for the many capabilities possessed by the American-type strike carrier.

US intelligence has reported, and Admiral Gorshkov has since confirmed, that the Soviet Union currently is building a large nuclear-powered aircraft carrier. According to US Intelligence reports the new Soviet aviation ship will be a Forrestal size (78,000 tons displacement) carrier. Ships such as this would give the Soviet Union round-the-clock, continuous, year-to-year, world-ranging maritime air surveillance and intervention capabilities. These capabilities would be completely independent of replenishment-at-sea tankers and shore oil supplies. Their only limitation would be their aviation fuel capacity and the endurance of personnel.[60]

Conclusion

Until now, the Soviets have not challenged the West for overall command of the sea. But they are challenging the command of areas of the sea that Western navies used to exercise through default of any opposition. The Soviets concentrate on sea denial in a number of regions, especially those adjoining the Russian coastline. The primary mission remains the defensive one of countering the Western superiority in seaborne strategic delivery systems. But forces designed to discourage a preemptive attack will nevertheless also have a general purpose capability.

Naval vessels, particularly aircraft carriers, are flexible instruments and even those whose chief task is successful deterrence can be used in certain circumstances for acquisitive purposes.

These acquisitive capabilities may have exceeded the specific intentions and requirements of the Kremlin leaders but they have learned to exploit them.

Soviet leaders usually have been cautious and realistic but it should be borne in mind that the Soviets fervently believe that the best defence is a good offence. The development of the large ASW ships such as the *Moskvas* and the *Kievs* can permit the Soviets to exercise their own type of sea control and so obtain mastery of the sea in certain areas. Ongoing efforts can be expected to further reduce Soviet naval limitations.

Whether Soviet naval expansion is based on a blueprint or not, Soviet leaders traditionally have been opportunistic. The present ageing leadership will most likely be replaced within a few years. The new leaders could be more assertive — from the viewpoint of the West, more aggressive. The war no one wants could be harder to prevent. And at the Kremlin's disposal would be Gorshkov's navy — a balanced fleet with the foundations for its own organic naval air power — a force that might in a few years' time be powerful enough to tip the balance in Moscow's favour. The need for Western vigilance should be obvious.

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Annex A

MOSKVA

Displacement, tons:	14 500 standard 18 000 full load
Length:	190.5 m (624.8 ft)
Beam:	26 m (85.3 ft)
Draught:	7.6 m (24.9 ft)
Aircraft:	18 Hormone-A ASW helicopters
Missiles:	SAM; 2 twin SA-N-3
Guns:	4-57 mm (2 twin mountings)
A/S weapons:	1 twin SUWN-1 A/S missile launcher; 2-12 tube MBU 2500A on forecastle
Main engines:	Geared turbines; 2 shafts; 100 000 shp
Boilers:	4 watertube
Speed:	30 knots
Complement:	840
Air Facilities:	Hangar: 67 m x 25 m (219.8 ft x 82 ft) Deck: 81 m x 34 m (265.7 ft x 111.5 ft)
Electronics:	Eight Side Globe ECM
Radar:	Search: Top Sail 3-D and Head Net C3-D Fire Control: Two Head Light; Two Muff Cob Navigation: Three Don 2
Sonar:	Hull-mounted: One LF VDS: One MF In addition all helicopters have dunking sonar

Annex B

KIEV

Displacement, tons:	32 000 standard 38 000 full load
Length:	274 m (898.7 ft)
Beam:	41.2 m (135 ft) hull 48 m (157.4 ft) (oa, including flight deck and sponsoons)
Draught:	8.3 m (27.2 ft)
Aircraft:	Est. 35 Normal Mix — 12 Forger A, 1 Forger B, 19 Hormone A, 3 Hormone B
Missiles:	SSM; 4 twin SS-N-12 SAM; 2 twin SA-N-3; 2 twin Sa-N-4 A/S; 1 twin SUW-N-1
Guns:	4-76 mm (twin) 8 Gatling 30 mm mounts
A/S Weapons:	2-12 barrelled MBU 6000 launchers fwd
Torpedo Tubes:	10-533 mm (21 in) recessed below waterline
Main Engines:	4 steam turbine; 4 shafts (2 rudders) 180 000 shp
Speed:	32 knots
Range:	13 000 at 18 knots 4 000 at 30 knots
Complement:	2 500 (including air group)
Flight Deck:	189 m (620 ft) long, 4 degree angle; 20.7 m (68 ft) wide with two lifts
Radar:	3D Search: Top Sail Search (Air and Surface): Top Steer Fire Control: One Trap Door (SS-N-12); Two Head Light (SA-N-3); Two Pop Group (SA-N-4); Two Owl Screech (76 mm); *Four Bass Tilt (Gatlings)* Aircraft Control: Top Knot Navigation: Don Kay; Palm Front; two Don 2
Sonar:	LF hull mounted and MF VDS

Annex C

KAMOV Ka-25 HORMONE HELICOPTER

Type:	Ship-based ASW, search/rescue and missile guidance helicopter
Engines:	Two 900 hp Glushenkov GTD — 3 free-turbine turboshafts
Dimensions:	Main rotor diameter (both) 15.75 m (51 ft 8 in) Fuselage length 10.36 m (34 ft) Height 5.4 m (17 ft 8 in)
Weights:	Empty, about 5000 kg (11 023 lb) Maximum loaded, 7500 kg (16 535 lb)
Performance:	Maximum speed, 193 km/hr (120 mph) Service ceiling, 3350 m (11 000 ft) Range, about 650 km (400 miles)
Armament:	One or two 400 mm AS torpedoes, nuclear or conventional depth charges or internal stores, carried in internal weapons bay

Annex D

YAKOVLEV Yak-36 FORGER A

Type:	Single-seat VTOL naval attack and reconnaissance aircraft (Forger B) two-seat dual trainer
Engines:	One lift/cruise turbojet or turbofan with estimated maximum thrust of 7 720 kg (17 000 lb); two lift jets with estimated thrust of 2 540 kg (5 600 lb) each
Dimensions (estimated):	Span, 7.6 m (25 ft) Length, (A) 15 m (49 ft 3 in) (B) 17.7 m (58 ft) Height, 4 m (13 ft 3 in) Width with wings folded, 4.51 m (14 ft 10 in)
Weights (estimated):	Empty, 5 450 kg 912 000 lb) (B slightly heavier) Maximum loaded, 10 000 kg (22 050 lb)
Performance (estimated):	Maximum speed at sea level, 1 160 km/h (722 mph), Mach 0.95 Maximum level speed at optimum height, 1 380 km/h (860 mph), Mach 1.3 Service ceiling, about 15 250 m (50 000 ft) Radius on hi-lo-hi attack mission without external fuel, not greater than 320 km (200 miles)
Armament:	Four pylons under the non-folding wing centre carry gun pods, reconnaissance pods, ECM payloads, bombs, missiles and tanks Maximum external load, 1814 kg (4 000 lb)

A MARITIME STRATEGY FOR AUSTRALIA POST 1980

by Lieutenant P.C. Johnson RAN

'In the present day world strategy is the art of controlling and utilizing the resources of a nation — or a coalition of nations — including its armed forces, to the end that its vital interests shall be effectively promoted and secured against enemies, actual potential or merely presumed'.

Edward Mead Earle

Introduction

The history of western civilization is bound up in the sea and in the Naval forces which transported armies, fended off invasions and safeguarded lines of communication. That western civilization achieved greatness, through victory in war and through prosperity in peace, has been attributed to control of the seas. Mahan suggests that the determinants which enable use of the sea by a nation, form from a combination of military and non-military factors.[1]

In the broad definition of strategy,[2] the direction of the power which forms from the totality of these factors can be regarded as the strategy of the nation. National strategy is therefore a combination of strategies which fuses all the powers of the nation during peace as well as war, to attain national interests and objectives.

The major enduring feature which potential enemies must contemplate in any analysis of Australia's strategic circumstance is the vast maritime environment surrounding this island continent. An approach to Australia involves the transit of open oceans, by sea or by air. Logically, the military strategy element of national strategy must require, for the first line of defence, the denial to an enemy force of Australia's maritime approaches. Australia's military strategy should primarily be a maritime strategy. To paraphrase the quotation from Earle at the beginning of this essay, Australia should therefore acquire 'the art of controlling and utilizing the resources of a nation or nations such that by control of the maritime environment its vital interests shall be effectively promoted and secured against enemies, actual, potential or merely presumed'.

The aim of this paper is to propose a maritime strategy for the future which will meet the requirements of the definition. Accepting that the capability to implement the strategy must be attainable, the paper examines a number of areas which affect the achievement of that aim. The paper first discusses the extent of the national aims and interests which require defence or need promoting as a basis for understanding the problems of defining national and military strategies in peacetime. An analysis of Australia's strategic circumstance is then used to consider the relevance of current maritime strategic concepts before proposing a maritime strategy for Australia post 1980.

Australia's aims and interests

The first stage in the logical process of defining national and military strategies is to determine what it is the nation needs to defend. Simplistically, with the nature and distribution of vital interests identified, and with consideration of the strategic environment as a whole, the range of possible threats to be deterred can be defined. Having defined the threats, a military strategy, defence force structure and usage can be determined to allow protection of vital interests.

The national interests can be broadly defined as; population concentrations, located mainly in the south eastern coastal strip; land resources areas, located mainly in isolated northern pockets of the continent; offshore resources areas in-

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cluding fishing grounds and oil platforms; defence establishments; defence supply routes; and more abstractly, the Australian way of life.

In support of the defence of these interests, the defence force aim should not only be to provide 'security from armed attack and from constraints on independent national decisions imposed by the threat of such attack'[3] but it should support national strategy in promoting world and regional stability. The many uncertainties which are a feature of the Indo-Pacific area provide potential for local confrontation or conflict which could have implications for Australia's security. Where these implications have relevance to Australia's long term security interests, any Government should wish to be able to influence events and contribute to the stability of the region by showing the capability and inclination to support regional countries under threat or pressure. Taking a world view, the unstable nature of regions remote from Australia, Australia's commitment to alliances and friends and Australia's concern for world order, could cause Australia to wish to have the option of contributing to peace-keeping operations, to the extent its capabilities would allow.

With an understanding of the extent of the national aims and interests which need defending or promoting, the problems of defining national and military strategies to achieve the defence aim can be clearly appreciated. The difficulties are especially apparent during peacetime.

National strategy in peacetime

National strategy, being total in concept, has political, diplomatic, economic, commercial, cultural, geophysical and military facets. In times of conflict, political purpose is the prime element of national strategy and the use of military force is the means of implementing the strategy.[4] During war, clear political purpose is likely to be easy to define. In peacetime, despite the continuing need for a national strategy and despite the continuing need for policy to dominate that strategy, clear political purpose may not be as easy to establish because of other competing factors. The lack of an identifiable threat coupled with economic forces is an example.[5]

Before further discussion it is useful to represent by definition the extremes of the wartime and peacetime requirements of national strategy. In war national strategy can be expressed as 'the efficient application of national power to achieve the object of war'. A peacetime strategy however, might be better defined as 'the use of diplomatic and economic means to prevent potential enemies gaining positions from which they can threaten vital interests and the provision of sufficient military power to make the political pressure effective. Further sufficient military forces must be maintained or be capable of being created in the necessary time scale to enable attacks on vital interests to be defeated'.[6] The peacetime definition, although less succinct, identifies the importance of the other elements of national strategy as well as the need for capable forces in being and the importance of force expansion.

The attainment of a national strategy requires the relative importance of each of the elements to be established. This becomes increasingly difficult as the length of peacetime 'no threat' situation increases. The result can be a lack of a cohesive national strategy without clear political purpose and with an imbalance in the degree of importance placed on each of the elements of the strategy. For example, a nation such as Israel would have a different perspective of its national strategy than would Australia. Its history has been one of considerable self reliance, constant threat of war and a geographically poor location. Military strategy and national strategy are therefore clearly defined. In contrast, Australia has a history of dependence on major allies, a war effort which has always been distant from its own shores in support of those allies, a regional environment which has excellent geographic advantages and an enduring peace of 35 years with no immediate prospect of change. With such a present peacetime climate and Australia's background history,[7] the difficulties in establishing priorities for the ingredients of a national strategy are understandable.

A consequence of this situation can be a military strategy, required to protect Australia's interests in times of conflict which is compromised at the expense of other elements of national interest. This is the fundamental problem of deriving a military strategy for war, in peacetime. To preserve peace, the military strategy must be clear, precise and attainable, but peacetime undermines the capability to achieve the aim.

The purpose of this paper is to propose a future maritime strategy. With the philosophical background of the difficulties and realities which confront the formulation of a future strategy, a study of Australia's strategic environment can offer a further basis for approaching the task.

The strategic environment

Australia's strategic environment is made up of internal and external elements. Internal elements are relatively or totally static and relate to geographic location, strategic significance, geophysical features, population, resources, economic, education and technological bases, political and social systems and national will. The external elements, which are dynamic and must therefore be subject to continuous review include: the prospects for world and regional stability;

defence capabilities of foreign countries having strategic significance to Australia; and the value of our alliances.

As an island continent, isolated from major world centres of power and with no common land frontiers with any other country, Australia has a world geographic position which, it has been argued, serves to insulate it from strategic surprise.[8] Major attack or invasion would require any enemy to possess long range maritime and air strike capabilities and specialised sea and air transports. At present only the superpowers possess these capabilities. Conventional theory suggests that the acquisition of suitable capabilities by regional countries would be readily identifiable at an early stage thus allowing Australia to make appropriate defence preparations. There is some evidence however, that warning times are always much less than theoretically expected and are highly dependent on valid intelligence.[9] Both arguments acknowledge however, that any approach to the continent would involve a transit of the open oceans by sea or air. Whether Australia could deter such an approach or identify it in sufficient time to create a deterrent force is a fundamental element in the formulation of a military strategy.

Australia's geographic position also highlights the importance of the closest land masses. Papua New Guinea and the Indonesian Archipelago offer the closest staging point for attacks on Australia. Any nation, other than a superpower, contemplating mounting an invasion or major direct attack would require access to facilities close to Australia to reduce the length and vulnerability of lines of communication and to provide close support for offensive operations. The region is therefore of critical strategic importance to Australia.

Whilst distance from potential aggressors offers some security advantages, distance also creates problems for Australia's defence planners. A large proportion of Australia's developed natural resource wealth is located in isolated pockets spread throughout vast areas far removed from the major concentrations of population and defence assets. The national communications infrastructure of roads, railways, telecommunications networks, ports and airfields is not well developed except in the south east and south west. As a result, supply to the strategically vulnerable northern and north western areas is carried out mainly by sea. Defence of these remote areas and the sea routes which supply them is therefore a difficult and expensive task.

Allied to Australia's geographic situation is the extent of its trade and the amount of this trade which is carried by sea. The size of Australia's overseas trade is approaching 200 million tonnes annually and is worth over 27 billion dollars, accounting for about 32 percent of Gross Domestic Product. Most of Australia's foreigh trade is carried in approximately 6000 ships, of which 98 percent are foreign owned.

In the last ten years, trade with Europe has declined significantly. Japan now accounts for a quarter of Australia's trade whilst the US and other Pacific region countries account for a further 30 percent. Today, more of Australia's defence related equipment is being purchased and supported from the US; the UK position as our major supplier was usurped after World War II. The pattern of Australia's trade is therefore becoming concentrated into the Pacific region. Nevertheless, access to major trading partners still involves long ocean transits.

Another crucial element of Australia's strategic circumstance is the capability to provide defence manpower and the willingness of the people to defend the country.

From a population of only 14 million, Australia must provide a force-in-being which is capable of responding to immediate and more credible shorter term contingencies. Present difficulties in recruiting to fill certain specialized branches in the armed forces, especially in some skilled and professional categories, suggest that achievable peacetime manpower levels may be a determining factor in establishing a force structure. Thus, instead of military strategy dictating the force structure, the converse may be true for Australia in the future. In times of conflict, mobilisation may provide the required additional manpower, but recent studies[10] suggest that the delays in mobilising and training the additional numbers prejudice the capability to rapidly expand to deal with the likely threat.

The problems in achieving a credible deterrent force are also reflected in the national will of the people; first, the creation of the force and second, the demonstration of clear support for government to use that force to protect the nation's aims and interests.

The willingness of the population to support the government in the use of military force, is not easily established. The Vietnam conflict generated widespread discontent and condemnation of Australia's involvement, from within Australia. The after effects are likely to have implications for future Australian defence participation overseas in support of allies. Thus, whilst such participation may be considered by the government to be in the best interests of the country, unless a direct threat to Australia can be clearly identified, support by all sections of the population may not be guaranteed. As an example, the attitudes of defence support unions may be of considerable importance in allowing the defence services to function effectively. This has implications for any military strategy based on deterrence where it is essential

that a potential aggressor be convinced of the nation's will to use its deterrent force, if necessary.

Concerning the support of the public for defence equipment procurement, a recent ANOP survey found that, in general, the need to maintain adequate defence forces was supported by the public.[11] The percentage of GNP allocated to defence, which would be tolerated by the population, is less clear. However, the Government's commitment to raise defence allocation to three percent of GNP has had general public support. Nevertheless, the recent past would suggest that unless a threat situation can be shown to the public, the national will to support a future wartime defence effort is clouded by the realities of present peacetime economic circumstance. The government, to maintain electoral credibility, must therefore walk a political tightrope between, on the one hand, excessive defence spending that emasculates political, economic, social, scientific and environmental programs and on the other, deficient defence expenditure that actively endangers national security. In this respect, a strong and rapidly growing economy is important to allow the government to balance competing demands.[12]

An important consideration in the defence force capability to meet the requirements of a military strategy is the level of technology which may be adopted. For example, much of the new technology and weaponry is inherently well suited to the concept of deterrence. Small units can be equipped with excellent surveillance facilities and relatively heavy firepower to which large expensive platforms such as capital ships and aircraft are vulnerable. Thus at relatively modest cost a nation concerned only with defence may acquire a useful deterrent against offensive forces. Whilst the weapons could be used in offensive operations, they are essentially defensive in nature and require expensive countermeasures to overcome them. The great developments in surveillance equipment also have a deterrent effect by making it difficult for an enemy to achieve surprise or launch a pre-emptive attack.

A further advantage of technological sophistication is that generally the equipments are less manpower intensive. On the surface, this offers a solution to the manpower problems facing Australia's defence planners as discussed earlier. There are however, considerable disadvantages in the provision of in-country support for these equipments when self sufficiency is required.[13]

Defence self reliance, which encompasses equipment self-sufficiency, has become an increasing requirement of Australia's alliance with the US for low and medium level conflict situations. However, the ANZUS Treaty, remains as the major cornerstone of Australia's defence policy against the threat of nuclear war or major levels of conflict. With continuing US support of the treaty, a deterrent is provided to any potential aggressor against Australia. This element, the implications to an aggressor of possible US involvement in any conflict involving Australia, is probably the best argument for ensuring that support for the treaty remains. A danger of too much reliance on the treaty is that in peacetime, the umbrella provided by the treaty in a 'no threat' situation provides the impetus for not spending money on equipment to meet the lower levels of conflict. Practically, whether the US in wartime would have the capability to provide total assistance, with the priority and timing Australia might desire, is questionable. The implication therefore is that Australia should attempt to be as self reliant as possible for all levels of conflict.

Briefly summarising, military strategy must first consider the uniqueness of Australia's geographic circumstance. The extent of trade and the direction of that trade should demand an analysis of the implications for preserving its continuance. The number and character of the people should be considered when evaluating the availability of manpower for a force structure and the willingness of the population to support a credible defence force. A growing economy and the effects of technology have considerable implications for the attainment of the means of defence. Finally, dependence upon the US alliance, although demanding increased self reliance at lower levels of threat, continues to provide the basis within a military strategy to address high levels of threat. A discussion of the threats facing Australia in the short and long term is necessary to postulate whether the ANZUS treaty could be tested as well as to consider the chances of lower levels of conflict occurring.

Threats and levels of conflict

Any formulation of a military strategy in peacetime must consider the levels of conflict which are likely to be encountered in the future. The perspectives which must be appreciated relate to global and regional predictions of events both in the short and long terms.

The overriding strategic consideration must be the chance of nuclear war. Despite the frequently encountered supposition that nuclear war between the superpowers is extremely unlikely because its mutually annihilistic consequences are obvious to all, any slippage in nuclear parity raises the possibility of the nation succumbing to nuclear blackmail. The prospects for either a miscalculation or attempts at a pre-emptive strike to redress the unbalance resulting in a nuclear conflict, are very real.

A number of analysts have suggested that the USSR currently enjoys a nuclear weapons supremacy,[14] although this is being redressed by

the present US administration. A major danger period is therefore probably within the next ten years before the US regains parity. Australia can do little in that time to address the consequences of a nuclear war and must continue to rely on the US for nuclear protection. Similarly, any regional defence ramifications which would result from such a war would have to be met with the current forces-in-being. Taking an optimistic view, in the long term the chances of nuclear conflict between the USSR and the US will become increasingly remote. This will result from the implications to defence spending of a declining Russian economy and an expanding US economy.[15] However, the possibility of increased Russian covert influence in the region may occur as a result.

The types of threats which could emerge from the Russian policies are likely to be as much economic, political, social and psychological in character as military. In these circumstances, to promote stability of the SW Pacific, the Indian Ocean littoral and the region to Australia's north, a national security policy would be required to utilize to maximum advantage all the elements of national strategy and not be confined to the diplomatic and military elements alone. The difficulties of establishing such a national strategy in peacetime have been discussed. Nevertheless, the tying together of trade policies, foreign policy and defence policy would appear to be an essential first step.[16]

The present short term strategic outlook for Australia is reassuring and attempts are being made by regional countries to Australia's immediate north to preserve regional stability. Tentative moves towards increasing regional defence cooperation have been made in the past[17] but defence interdependence or common defence of the region appears very much a long term prospect. Furthermore, if the independent, rather than interdependent, arms acquisitions of a number of regional countries are taken as potential destabilizing influences[18], the prospects for long term stability are less assured. Threat situations develop from the capability and intent of countries to conduct offensive operations. Without interdependence in regional defence, countries may acquire the independent capability for aggression. There remains the possibility that radical political change by overt or covert means or the pressures of burgeoning population and resource problems, could preface the development of intent. Once again, there are no signs of such developments at present but the attractions of a resource rich, under-populated Australia coupled with regional potential for Russian inspired instability, provide sufficient justification to have in being a defence capability to meet regional conflict situations.

The contingency levels which Australia must consider first are those which could occur with little or no warning. Low contingency levels of conflict include:

- harassment of Australian nationals overseas;
- smuggling, introduction of exotic diseases or support of illegal migrants or drug runners;
- military support for exploitation of our offshore resources;
- external support for dissident elements in, or military pressures against, a regional country which has important security aspects for Australia;
- sporadic intrusions into our maritime and air space; and
- harassment of shipping, fishing activities and offshore operations.

Conflict at this level could occur during a period where resolution of a dispute is primarily sought by the use of non-military aspects of national strategy. The use of force would have to be restrained. However, such aggression could represent the initial testing by an aggressor of Australia's defence capabilities and national will.

The second or medium level of conflict would normally follow from an escalation of the low level situation, although the progression from low to medium level may be either protracted or almost immediate. Aggression at medium level may include:

- the threat of, or actual attack against lines of communication, either in isolation or as part of a general threat against Western lines of communications;
- the seizure of isolated island territories;
- raids against key military and/or civil installations in isolated areas;
- blockade of selected ports; and
- external aggression against a regional country, the security of which is highly important to Australia.

Diplomatic, political and military pressure would be used extensively at this level. The ability of the military to effectively counter overt action would be of particular importance to the aggressor who might contemplate further escalation.

In summary, Russian overt power projection in the area of Australia's strategic interest is likely to decline in the long term. The long term prospect of superpower nuclear war is equally likely to decline. In the short term, Australia can do little to counter the present build up of Russian presence in the Indian Ocean littoral nor can it expect to base its military strategy or force structure on countering the Russian 'threat'; for example, acquiring the capability to identify and challenge Russian nuclear submarines would be an exercise in futility. Australia must instead develop a military strategy as part of a national strategy which addresses, as its fundamental aim, the

likely threats which could emerge from Russian influenced regional destabilization. Conflict situations would most likely start from low level skirmishes and any escalation would be largely dependent on Australia's ability to deter or counter action at this level.

Applicability of maritime strategic concepts

The preceding discussion established that Australia's strategic circumstance, Australia's aims and interests and the threat environment have features which are unique to the country and to the region. Because of this uniqueness, the validity of current maritime strategic thought should be tested for relevance to Australia's situation. One of the major resources available to achieve the aim of a maritime strategy would be the use of seapower.

Captain John Moore writes 'In our modern world, seapower can be defined as that strength in naval ships, associated aircraft, weapons and support services which enable a country to promote the political and economic interests of itself and its allies in peacetime, and supremacy over the enemy in war'.[19] to fulfill this aim, modern strategic thought affords seapower four basic missions: deterrence; sea control by sea denial, sea assertion or power projection; naval presence; and the protection of sea power ashore.

In the military sense, deterrence implies the capability to inflict an unacceptably high penalty on a potential aggressor for all levels of threat and to ensure that the enemy is aware of the capability and the clear intent of the people to allow the deterrent force to be used. The acceptance of deterrence as the primary element of our maritime strategy has implications for our national strategy. For example: Is Australia able to provide the necessary surveillance capability over vast areas to meet even the low level threat situations? Can Australia provide the necessary intelligence network and force expansion capability to provide early identification and early deterrence of potential conflict situations? Can Australia provide the required scale of equipments, manpower, level of technology and support infrastructure for a credible deterrent force protecting widespread vital interests? Does Australia have an obvious unambiguous national will to exercise the use of military power if the enemy ignores the deterrent?

The facts which emerge from the discussion in previous sections suggest that Australia would have difficulty in offering the necessary scale of deterrent capability and credibility to meet all low to medium levels of threat.[20] The capability to deter medium to high levels of threat would be very much in doubt. In view of this, the 'major deterrence' approach to our maritime strategy, which requires large numbers of resources, should be tailored to provide limited deterrence to meet the most likely regional low to medium level conflict situations. That is, the offensive nature of the deterrent approach should be retained but in a limited form.

The second element of seapower, sea control, is regarded as being the primary role of maritime forces should deterrence fail. Control of the sea may be achieved defensively by denying the enemy the use of the sea (*sea denial*) or offensively, by using the sea for one's own purpose (*sea assertion, power projection*).

Sea assertion has been argued as being necessary to provide protection of Australia's trade routes, and to cooperate strategically with American policies aimed at frustrating Soviet military expansion. A sea assertion capability implies a 'blue water' fleet involving credible numbers of capital ships and an equally credible support infrastructure.

Previous discussion showed that Australia's seaborne trade is extensive and of great importance to the national economy. However, it does not necessarily follow that all the routes should be protected for all levels of conflict. A number of factors influence this reasoning.[21]

The effects of foreign owned shipping can have advantages because low levels of harassment may be deterred by an aggressor not wishing to involve third countries. Australia is geographically isolated from its main markets and suppliers. It can diversify trade routes in emergencies and there are some difficulties in identifying Australia bound cargo in foreign ships. Thus, any aggressor intent on cutting off supply and not just harassment would be required to mount an extensive operation aimed at either the supply or delivery ports.

The necessary selective processes which would be involved in isolating Australia bound traffic at third country ports would be difficult, and would increase the dangers of third party involvement to the aggressor. Attempts to cut off supply are therefore unlikely to be undertaken by any country other than Russia. If Russia were the aggressor, Australia would be required to seek assistance from the US.

Another factor which could make attacks on shipping less likely in the future is the shift in Australia's traditional trading patterns to ones which are more regionally based. Trade interdependence, if allowed to develop to mutual advantage could reduce the likelihood of attacks by regional countries on Australia's shipping.

Finally, Australia lacks dependence on food imports, has a lack of critical dependence on consumer and capital goods imports and has relative self-sufficiency in energy which could be augmented by stockpiling in peacetime and rationing in wartime. This suggests that critical routes requiring protection would only be those

supplying essential defence support goods unable to be manufactured in-country. The fact that the US is increasingly becoming the major supplier of these goods, offers significant advantages when protection of the supply route is considered.

The requirement to fulfill support obligations to the US may also be questioned. Although the provision of a token 'blue water' force in support of a US presence offers evidence of Australia's commitment to ANZUS, other contributions may be as meaningful. The provision of staging and home porting facilities and increased regional surveillance are examples. A more important long term contribution could be the promotion by Australia of regional stability. The stablility of the SW Pacific and SE Asian region is of vital importance to the US. If Australia were to increase its commitment to this region and work towards a long term goal of providing leadership in developing concepts for interdependence and for the collective defence of the region as a whole, US interests would be well served. In this case, an increased maritime defence commitment to the region may be required at the expense of a continued high commitment to US 'blue water' support.

If defence of overseas trade or the provision of dedicated support of US forces are not required, the need for a maritime force to carry out a sea assertion role is also not required. Additionally, the argument for a sea assertion capability for the protection of convoys of critical defence related goods, is valid only for the high level threat situation. The necessary commitment of assets to effectively meet this requirement may be considered as an unrealistic basis for force structuring.

At a lower level of threat, in support of an increased regional defence role, and to provide insurance against short term uncertainty, Australian maritime forces may need the capability to assert military influence rapidly and independently into the region, possibly in support of amphibious troops. In this case, a power projection capability would be required.

Sea denial in the broadest sense requires the capability to project sufficient maritime forces to deny the use of the sea to an enemy in any area of Australian interest. The sea denial concept therefore applies equally to ships fulfilling power projection or sea assertion roles and to ships carrying out fisheries protection duties. Recent strategic thought however, ties sea denial with the 'Continental Australia' defensive concept and requires operations based on causing such losses to the aggressor that he is unable to use his maritime forces to approach areas of vital interest. The defensive nature of the concept relies heavily on good intelligence, good surveillance and a rapid reaction capability in sufficient strength to intercept and challenge a potential aggressor. The vast areas of coastline and 200 mile EEZ and the isolation of many of the areas of vital interest make this concept difficult to implement in totality with limited resources. By degrading the concept, a limited sea denial maritime force, utilizing small platforms with sophisticated weapons system, may be achieved at a relatively small cost when compared with a sea assertion or large power projection force. This has considerable attractions for governments subject to economic pressures and for a public who perceive no threat. The problem is that sea denial is based on reaction to enemy initatives and the advantages to an aggressor increase disproportionately as the concept is degraded. Thus, unless the limited, affordable, sea denial force is backed by some form of offensive force capable of meeting medium level, low warning time conflict situations away from Australian shores, the benefits of the limited sea denial force are minimal.

To summarize, the total application of a sea denial concept in the Australian strategic environment is difficult to achieve, and a degraded version, as the primary element of a maritime strategy is an undesirable compromise.

Naval presence can be utilized in two ways — as a deterrent or as a diplomatic extension of foreign policy. Whilst the former may often require a considerable show of force to achieve the intention and may be of dubious value when the political will to use force is questionable, the latter, in a regional context, requires only small forces and is almost invariably successful. The need to increasingly show naval presence in the SW Pacific region, as a means of showing Australia's support may be especially important in the future.

The projection of force ashore in support of ground forces has for many years been a major contribution of sea power. The 'gun line' in Vietnam was the most recent example of its use. In the Australian strategic environment, the ability to transport and support amphibious forces by sea could be required although large amphibious operations are highly demanding on resources. Nevertheless, the provision of Australian support, in a limited manner, to neighbouring countries requesting assistance against insurgents could be in the best interests of Australia's long term security. In this case, naval gunfire in support of these operations has become less relevant in the counter insurgency types of operation where unopposed landings are likely to be achieved by tactics.

Maritime strategy for the future

An appropriate maritime strategy for Australia must, first of all, be realistic. Our military strategies and our force structures have, in the past, been developed either as an integral part of

a much larger allied force, or to enable expeditionary forces to be deployed to assist major allies. In the future Australia must recognize that long term maritime defence objectives must be achieved with diminishing dependence on traditional alliances and the strategies of those alliances. Australia's martime strategy must be achievable and must therefore recognize the unique qualities of the Australian environment and the advantages and limitations it confers. It must form a cohesive element of a national strategy which balances trade, foreign policy and defence policy. Maritime strategy must form the primary element of military strategy but the three strategies of the Services must be interdependent and supportive to achieve economic defence of vital interests.

In the preceding section, the simplistic tests of the applicability and achievability of seapower as the major element of a maritime strategy suggested that whilst major deterrence offers the most logical basis for a maritime strategy, the capability to meet all contingencies is questionable. The willingness of the people of Australia, through the government, to use force should deterrence fail is also unclear. The viability of any strategy based on deterrence is therefore equally unclear. Nevertheless, at least a limited capability for deterrence should be maintained as a basis for meeting regional low to medium level threat contingencies. Sea assertion is believed to have limited significance as protection of shipping in convoys is considered unnecessary for other than high level conflict situations requiring protection of defence equipment supplies. US assistance would be requested in these circumstances. The capability for regional power projection is desirable but can only be realistically achieved at modest levels. Sea denial if carried out on a sufficient scale can provide protection of vital interests, but when degraded by resource limitations sea denial, by itself, can not provide a viable defence strategy.

A future maritime strategy must be based on a gradual, balanced development of the present limited capabilities afforded by the sea denial and power projection concepts. Rather than allowing either of the concepts to dominate, the strategy should remain flexible. The force structure should allow the concepts to be complementary and provide for the retention of as many of the basic maritime skills as possible. The uncertainty of the future requires this of a defence force. The primary aims of the strategy should be to achieve the capability to meet the possible low and medium level threat situations and to place emphasis on the long term reduction of ANZUS alliance commitments and an increase in SE Asian, ASEAN and SW Pacific regional commitments. As a result of balanced development which hopefully should increase proportionate to the expansion of the economy, a more credible deterrent capability would follow.

The capabilities which must be developed should first of all, reflect the importance of regional surveillance. Coastal air surveillance of ocean approaches and maritime resource areas, enhanced by long range maritme patrol aircraft, should be supplemented by patrol craft and submarines.

Intelligence gathering and assessment should receive high priority to allow assessment of international events in sufficient time for some degree of force expansion. This will require the maintenance of a highly trained intelligence organisation in Australia and overseas.

A limited seaborne air capability, supplemented by long range land based aircraft should be retained for a regional power projection role and to provide a limited deterrence aimed at regional influence. A strategic strike capability should be available to support small scale amphibious operations and for anti-shipping tasks.

A limited airborne anti-submarine capability should be retained, essentially to maintain the necessary skills for the future and to assist in the development of innovative concepts in support of allies.

Of particular importance should be the continued development of mine hunting and mine clearing capabilities. Ships performing sea denial functions should be suitably equipped with anti-shipping missiles and self defence armament. The technology levels of these and other defence equipments should be as sophisticated as possible to achieve low manpower levels and regional supremacy, commensurate with the requirement for high in-country support. All equipments should reflect the need for flexibility, mobility, compatibility and economy.

Logistic support facilities should be sufficient to allow the fleet to operate for considerable periods at sea. Australian merchant ships should be capable of supporting the maritime strategy. The logistic support should be sufficiently flexible and economical in operation to minimize the limitations imposed by the Australian environment and deficiencies in the civil infrastructure.

Conclusion

Following acceptance of the fact that Australia's military strategy should primarily be a maritime strategy because of the maritime nature of our immediate environment, vital interests requiring defence should be defined. In wartime, political purpose and a military strategy can be achieved to provide a clear policy for defence of those interests. In peacetime, defining a clear policy is not such an easy task because of other competing factors of national interest. The result

can be a national strategy which is not cohesive. Thus the first requirement of a maritime strategy for the future must be its formulation as part of a balanced national strategy in which trade policies are aligned with foreign policy which are in turn aligned with defence policies.

Australia's strategic environment is multi-faceted and possesses unique characteristics which have implications for defence. Australia's geographic position away from the major areas of superpower influence serves to insulate it to a certain extent from strategic surprise. Its size makes invasion difficult. At present only the superpowers possess the capability. The capability to deter, or identify in sufficient time for force expansion, lower levels of threat aimed at widespread vital interests is a major factor in the maritime strategy formula. Comprehensive surveillance and sea denial forces-in-being are required.

Trade by sea is vital to Australia's well being, but a number of factors suggest that only protection of essential defence equipment supply routes would be necessary and then only in high level conflict situations. A sea assertion capability for convoy duties would therefore not be an essential determinant of a force structure.

The location of the archipelagic chain to Australia's immediate north is of vital interest to Australia. The stability of this and the SW Pacific regions should receive considerable emphasis for the force structure development. The provision of diplomatic support by naval presence is essential. A capability to provide a limited amphibious counter insurgent force in support of friendly governments is also required.

An increase, in the long term, in Australia's commitment to regional defence plans should be fostered at the expense of support for US 'blue water' forces. Increased commitment to regional defence to promote regional stability would be in the best long term interests of the US and should not therefore prejudice the high level conflict 'umbrella' provided under ANZUS.

Whilst fostering regional interdependence, Australia should provide for regional uncertainty by retaining a limited maritime power projection capability optimized for regional conflict scenarios and for low to medium levels of conflict. Although the present strategic outlook is favourable, long term covert Russian influence in the region may increase as a result of Russia's probable decline as a nuclear superpower. The capabilities to meet this influence should be a critical determinant in a maritime strategy. But, having defined the capabilities required, they must be able to be achieved realistically.

All the capabilities must be achieved with low levels of manpower. This may be the ultimate limitation on the strategy. Forces-in-being will most likely fight the next low to medium level conflicts. Force expansion may not be achievable within the required time frame. Technology may help manpower problems and may assist in providing a limited credible deterrent capability. Technology may however, impose restrictions on self sufficiency and self reliance which will be a major factor in defence development in the future.

Finally, although an expanding economy can benefit the defence forces, their continued development is dependent upon the will of the people of Australia to continue to commit even the present mediocre percentage of Gross National Product to defence. Even more importantly, having provided the means for defence, would the people be prepared to allow its use?

NOTES

1. Mahan contends that the ability of a state or nation to advance its interests significantly through use or mastery of the seas depends on the geographical location of that nation, its physical conformation, extent of territory, number of population, character of people and character of government.
2. Admiral Eccles defines strategy as 'the comprehensive direction of power to control situations and areas to attain broad objectives'.
   Eccles H.E., 'Strategy — The Theory and Application', *Naval War College Review*, May/June 1979.
3. *Defence White Paper 1976*, p.2. In peacetime, a defence aim similar to the Swedish example may be more appropriate. This states: 'The aim of this (security) policy is to secure a national freedom of action in all aspects in a form decided by the people in order to maintain and develop the country politically, socially, culturally etc. according to Swedish value'.
4. Admiral Eccles lists political purpose as the first principle of strategy.
   Eccles H.E., 'Strategy — The Theory and Application', *Naval War College Review*, May/June 1979.
5. Sir Anthony Synnot stated that 'At a time of low or intermediate threat, strategic guidance cannot be expected to be sufficiently specific to enable us to determine the force structure; if there was a threat this problem would of course be much easier'.
   Quoted in Babbage R., *Rethinking Australia's Defence*, University of Queensland Press, 1980.
6. Both definitions are used by H.E. Gelber, *Problems of Australia Defence*, University of Oxford Press, 1970, p.107.
7. Dr Primrose suggests that the way national priorities and resources are allocated in Australia are affected by Australia's lack of a maritime tradition and the lack of informed public debate on defence. Primrose, B.N., 'Insurance, Deterrence, Faith; The Search for an Integrated Concept of Defence', *The Australian Journal of Defence Studies*, Vol. No.1, March, 1977, p.36.
8. This assertion was part of the defence platform of the *Labor Government 1972-75. See* L.H. Barnard, *House of Representatives Debates 28th Parliament*, 22 August 1973, p.239.
9. Although theoretically the amassing of an invasion force or major strike capability should be identifiable at an early stage, Ross Babbage, pp.85-88, critically analyses Australia's capability to act on early warning signs and suggests that although capability can often be detected, intent can often be disguised. Thus a threat may not be recognized until it is too late to expand the defence force to meet the threat. Looking at past history Babbage concludes that in only one instance has defence preparation

time exceeded 17 months. Often warning time is less than 12 months.

10. See Babbage, R., *op. cit.*, pp.85-86.
11. ANOP — Community Attitudes towards Australia's Defence Force. Published in *Pacific Defence Reporter*, May 1981.
12. '...in the absence of any immediate threat to our security it may be more important for our defence, to increase Australia's growth rate by two percent than to concern ourselves about increasing the proportion of GNP going to defence by two percent'. Withers, G., 'Technology, Defence and Regional Arms Limitations: An Economic Perspective', *The Australian Journal of Defence Studies*, Vol.3, No.1, May, 1979, p.47.
13. The Katter Committee found 'this increase in scientific and technological sophistication has played no small part in reducing Australia's self sufficiency in defence equipment. While the super powers spend huge sums on advanced research, development, test and evaluation programs, second and middle ranking nations are obliged to work in particular specialist fields and in other cases to rely on technology transfers from the super powers to maintain essential capabilities in their Defence Forces'. *Parliamentary Paper No. 260/1979 — Joint Committee on Foreign Affairs and Defence*, p.32.
14. *Newsweek*, 9 March 81, states that 'The Soviet Union already has enough missile warheads to knock out the US land based ICBM force; adding more warheads would only make the rubble bounce higher'.
15. *Economist*, November 15 1980, pp.19-22, gives an overview and projections for the Russian economy particularly in regard to the agricultural problems. Economic growth has steadily declined since 1970 and is now the worst since the early 1930's. Industrial output in 1979 was the lowest since the second world war and despite huge capital investment, agricultural growth is in a declining spiral. As a result there is a growing dependence on Western World markets for food. In contrast the US economy, despite considerable external pressures, mainly attributable to high energy costs, continues to expand in both industrial and agricultural output. The effect on Gross National Product, if the economic trends in the two superpowers continues can be related to future defence capabilities. Whilst Russia at present spends 15 percent of her GNP on defence and the US spends six percent, Russia does so from a GNP base heavily dependent on agriculture and half that of the US (See *The Military Balance 1979/80* by the Institute for Strategic Studies, p.11). If the percentage GNP spent on defence remains the same, and if the respective economic trends continue, the US will gradually be spending more on defence than the USSR. In the long term the US will achieve and be capable of maintaining military superiority with a much smaller slice of GNP. If the USSR chooses to increase defence spending to maintain parity or superiority it will be to the detriment of the economy. This will ultimately lead to military decline. The ensuing tilt in the balance of power towards the US would probably reduce the threat of nuclear wars. It might also force Soviet reassessment of its current overt regional expansionist policies.
16. Professor West discusses the lack of cohesion of the three policies. West, F., 'Australia — A Changing Role in a Changing World', *Journal of the Australian Naval Institute*, Vol.4, No.1, February 1979, pp.35-36.
17. The 1971 Five Power Agreement involving Australia, NZ, Malaysia, UK, Singapore was agreed to promote cooperation in defence of Malaysia and Singapore.
18. See O'Neill R. *Insecurity — The Spread of Weapons in the Indian and Pacific Oceans*, p.153.
19. See Moore J. *Seapower and Politics*, p.2.
20. See also Group Captain I.B. Gration, 'The Way Ahead — An Air Force Officers View' *USI of ACT Proceedings*, 1979, pp.67-99.
21. In addition to the factors to be discussed, Colonel P.M. Jeffrey and LTCOL I.G. Darlington postulate the most likely threat scenario as being a series of minimal warning attacks on vital interests with the intention of presenting a 'fait accompli' to the nation. This scenario suggests that 'the security of our trade routes may not be of vital importance'.

    Jeffrey P.M., Darlington I.G., 'Australian Defence Force Structure Options for the Remainder of the Century', *USI of ACT Proceedings*, 1979, pp.56-57.

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MODERN SHIPHANDLING

by Henry W. Gamp

As a shipdocking Master in the Port of Baltimore, I have noticed an evolution in ship designs, tug designs and the way in which ships are handled. This port has no current and a mean tidal range of only 1.2 feet. October through June, the prevailing winds are northwesterly with highest wind speeds occurring February through April. June through September, the prevailing winds are southwesterly and generally calm. To some extent my observations on shiphandling are based on local custom and I freely admit ships are handled differently in other localities. Nevertheless, many of my observations are universal and hold true.

Since the time sailing ships were replaced by steamships, no generation of ships has undergone as many innovations and changes as now. Today a ship's form follows her function. In years past, the designs for cargo ships were more standardized. The cargo was stowed to conform to the ship's hull configuration, whereas now, ships are designed around their specific trade requirements. This rather drastic shift in thinking has allowed for a wide multitude of new and unusual looking ships. All have characteristics that differ and to the extent of their individual peculiarities, Shipdocking Pilots have had to alter their handling techniques.

The modern shipdocking tug has also undergone many fundamental design changes. From a visual standpoint they are not nearly as pronounced as the design innovations in ships. Nevertheless, these changes give tugboats manoeuvrability and capabilities their predecessors did not possess.

A discussion of shipdocking techniques without discussing new tugboat designs and methods of using tugs would be incomplete. Aside from the ship herself, the tug is the prime tool at the pilot's disposal. Accident free shipdocking is the result of utilizing ships and tugs together as a team.

IMPLICATIONS OF NEW SHIP DESIGNS

The older ship designs such as the 'Victory Ship' had a short bow with little outward flare. The straight midbody ran for roughly three quarters her length and the short quarter quickly rounded into an elliptical stern.

Whereas, cargo ships now have sharper, longer tapered bows and most of these have considerable flare. Numerous vessels have protruding bulbous bows that take many shapes and vary greatly in size. Some high sided vessels have blisters built out from and running longitudently along the midbody at the waterline. Ships' quarters are usually longer and cutaway from the main deck. However, a few are straight sided to near the waterline then abruptly cutaway. Also, you find some ships with knuckles protruding from the sides near the bow and stern. The elliptical stern has, in large part, given way to squared off flat sided sterns. Roll-on/Roll-off ships have ramps built into their sterns. Lash ships have two cantilever arms extending beyond their sterns. Design changes for the most part have caused a significant reduction in the length of the midbody in proportion to the bow and stern. The midbody is now perhaps no more than one-quarter of the overall length on some ships.

The deck layout has changed as well as the hull's shape. The old freighter most often had her bridge located amidship. Modern ships usually have their bridge located near the stern or on the bow. There are Roll-on/Roll-off ships with their main deck extending past the ship's hull. Today specialized ships do not have their decks cluttered with masts, booms, rigging, etc. Even the general cargo ship has simpler more streamlined cargo handling gear.

The size of ships has grown, the 'Victory Ship' for example, was 440 feet long. A cargo ship today is likely to be 600 feet to 850 feet long. Likewise, their beam, draft, freeboard and tonnage have increased proportionately.

Ships are propelled by a variety of power plants; diesel and steam turbine are the primary

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ones. There are gas turbine and combination plants utilizing electric motors in existence. In addition, some ships are reversed by changing propeller pitch instead of changing propeller rotation. The reaction time of the different systems is not uniform nor is the effect they have on the ship's handling characteristics. Horsepower is greater as well as the speeds that ships can make.

IMPROVEMENTS IN TUG DESIGN

The World War II vintage tugboat was by and large steam powered with diesel power beginning to come of age. A large degree of dependence was placed on the engineer hearing and

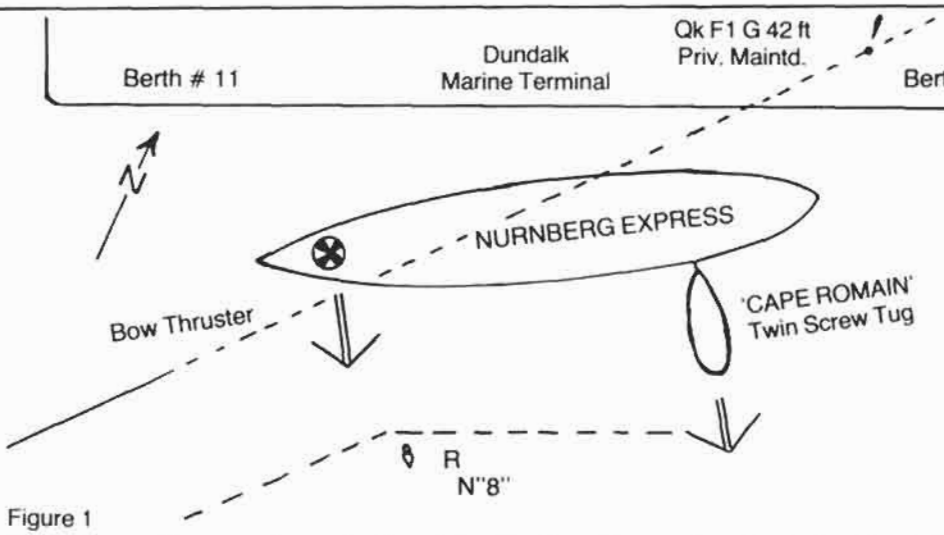


Figure 1

This diagram illustrates the undocking of the *Nurnberg Express* from Berth #11 Dundalk Marine Terminal. The ship is equipped with a bow thruster and the twin screw tug *Cape Romain* is backed using a bow line to pull the ship's stern off the pier. By opposing the tug's engines and varying her speed she can be held end on to the ship until the ship gathers considerable headway. When stopped she is already in position to assist the ship turn into Fort McHenry Channel without any further manouvering or shifting her line.

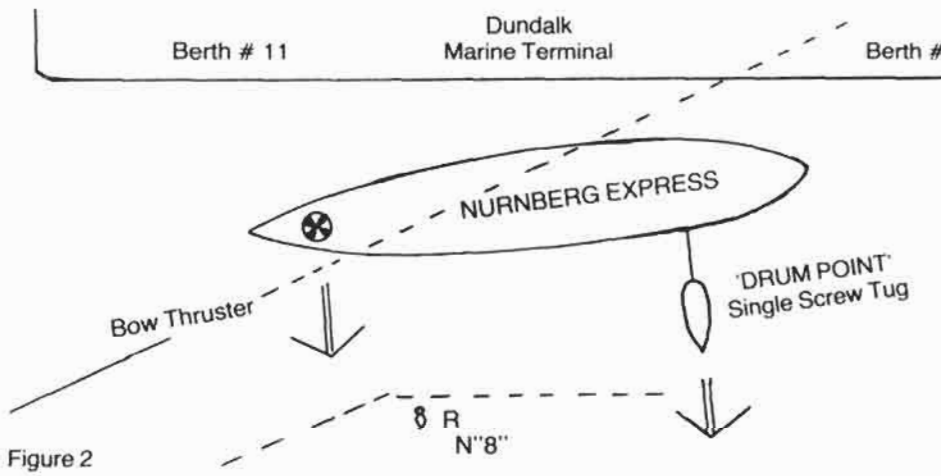


Figure 2

This diagram illustrates the same ship being undocked as Figure 1. However, the single screw tug *Drum Point* is assisting instead of the twin screw *Cape Romain*. The astern steering capability of a conventional single screw tug is poor. It is therefore necessary for the tug to pull the ship off with a hawser. Before the ship gathers headway the tug must let go her hawser. When her line is aboard she will have to come alongside on the port quarter to assist the ship make the turn into Fort McHenry Channel.

answering telegraph bells correctly; tugboats were single screw and low powered. Over the last several decades great strides in handling ability and power have been made.

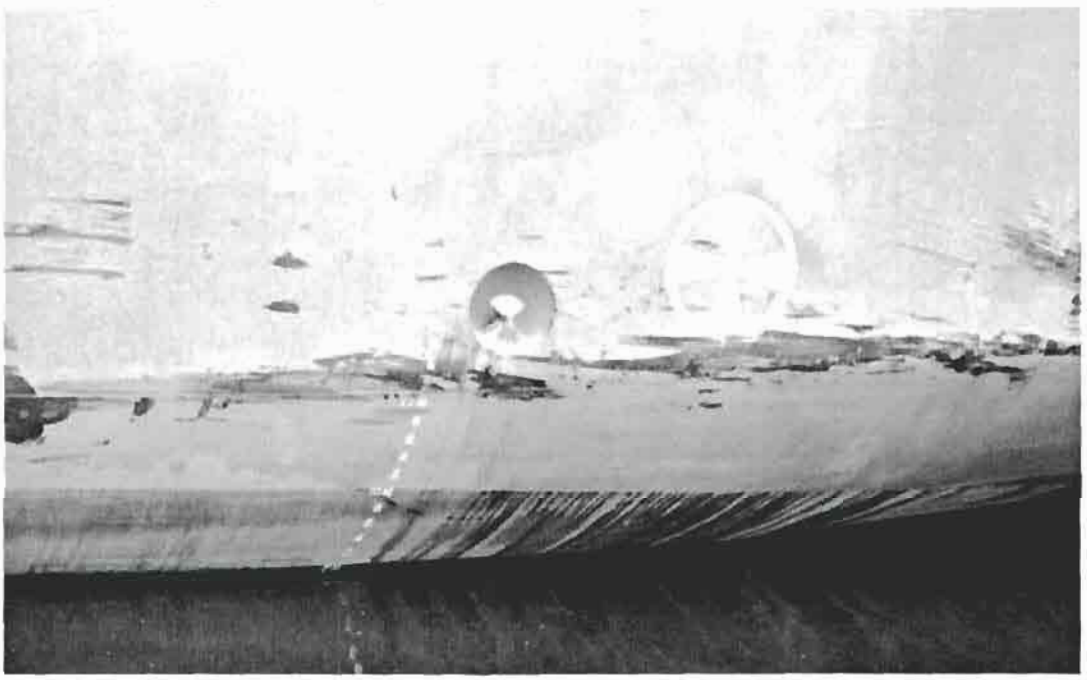
In the realm of tugboat design, the twin screw tug is a far more agile and manoeuvrable piece of equipment than the conventional single screw tug. By working the engines in opposite directions, the tug can be kept in position to back straight and not fall to port, as a conventional single screw tug. Therefore, under normal conditions it is not necessary for the twin screw tug to use a hawser when pulling a ship off a pier, a backing line from the tug's bow will do the job. This is advantageous if the tug will be used in this same location to push the ship around once clear of the pier.

When a 'BACK' is not required of the tug, a twin screw tug can be worked without putting a line on the ship. The normal tendency of tugs is to fall alongside the ship when stopped and to slide along the hull when ordered ahead. However, by opposing her engines the twin screw tug can prevent this sliding.

My personal experience with single screw kort nozzle tugs equipped with flanking rudders forward of the kort nozzle is limited to conversations with Pilots so acquainted. To a man, they claim them to be nearly as manoeuvrable as twin screw tugs. By shifting the flanking rudders to pull water either way, and turning the steering rudder either way, the tug can be rapidly twisted or walked sideways. The thrust developed by the kort nozzle is greater than similar tugs not so equipped. The tubular kort nozzle prevents centrifugal dispersal of the thrust column.

Horsepower is continually increasing in tugboats, a 3000 h.p. tugboat 25 years ago was gigantic. Now, many new docking tugs are built with 3000 h.p. to 4000 h.p. and either twin screw or single screw with flanking rudders. Horsepower is only one quality of a good shipdocking tugboat. The manoeuvrability of the tug can be just as essential. A Docking Pilot forced to use a tug with inadequate rudder power is severely limited in what the tugboat will accomplish for him; a fact sometimes overlooked by designers and naval architects.

An unobstructed view of the horizon is essential from the wheelhouse. Unlike barge work, the hawser is often picked up while the tugboat Captain or Mate operates the tug from the wheelhouse and not the stern steering station. There are various reasons for this. First, the tug's radio and whistle are there to hear and answer the Pilot's commands. Second, the tug may have to tow the ship along a channel and it would not be possible to see ahead from the stern. Third, in many instances the Pilot requires tug assistance after the hawser is down and the man handling the tug is already at the wheelhouse controls. Fourth, at night it may be necessary for the tug to light up an unlighted buoy and the searchlight is operated from the wheelhouse.



This is an example of a recessed bitt built into a ship's hull in her port quarter. Notice also this vessel has a stern thruster.

The bull nose is a half round ring of heavy pipe approximately six inches inside radius welded athwartship to the bow as an alternative to the conventional stemhead. When the tug's line is run through the bull nose and secured on the tug's bitts, the line is free to move without chaffing as often happens on a stemhead.

The forward capstan is another essential piece of equipment for the more powerful tugs using 8 inch to 9 inch dacron lines. The sheer weight of these lines makes it impossible for them to be retrieved by hand when dropped in the water from a ship underway. The capstan is also required on a tug equipped with a bull nose to pull the lines back through it. The tugboat can be made much tighter when making fast with three lines to the ship by heaving up the headline with the forward capstan before bringing the stern in tight with the after capstan for a good hold.

Rope fenders have been replaced by ones fashioned from strips of rubber tires bolted together or of the moulded rubber type. They wear longer but do not absorb shock to the extent that rope did. In place of steel guard rails a continuous rubber bumper can be wrapped around the hull at the deck line. There are gaps between conventional fenders and this system offers better protection against metal striking metal. Tugboats need a bow fendering system that would permit them to safely work against a bulbous bow.

A short stubby tug is advantageous for ship-docking work. Additional length adds to drag when trying to come end on to the ship with headway. A wide tug with a narrow house is more useful than a narrow tug with a wide house as the tug can lay further ahead under the bow or aft under the quarter without striking the tug's superstructure. Radar scanners and other overhead obstructions should be low down and far back as possible. The mast should not be fixed but capable of being lowered.

These are some of the changes tugs have undergone. There is wide latitude for more change, in propulsion-steering systems, house and hull shape, and methods to handle heavy lines. Tugs often are designed for both ship work and long distance towing. Compromises are made and to some extent both functions suffer. Taking everthing into account the new tugs are very able and give the Docking Pilot more flexibility as to their use.

NEW PROBLEMS

Changes brought about by ship design alterations have created some problems for the Docking Pilot. In some cases solutions have been forthcoming and in others it has been necessary to work around the handicap without a completely satisfactory alternative.

Locating the ship's bridge on the bow puts the Docking Pilot at the disadvantage of having to look back to see how fast the swing when turning, the amount of lateral set across a channel and

The *Tohbe Maru* being docked portside to Dundalk Marine Terminal. Notice the after tug can be worked perpendicular across the stern in either direction in lieu of the ship's rudder. The forward tug is only 60 feet forward of amidship making her leverage much less than the lesser powered tug on the stern.

how fast the ship is falling when docking. Looking forward over the bow, it is possible to be deceived into thinking there is little swing or set when this is far from the case. On most ships the Pilot must stand off the centerline and usually outside to see aft. This can be very inconvenient if it is necessary to execute a change of speed or rudder command at the same time.

Flared bows on ships or lack of chocks sometimes make it impossible to make a tug fast on the ship's bow to steer her stern first; at such times the bulbous bow becomes a hindrance. In the past when unable to make the tug fast on the ship's bow, the tug put a line in the eye chocks on the bow. By coming ahead and giving right or left rudder, she could steer the ship astern. When the ship is equipped with a large and protruding bulbous bow, the tug can not usually do this without contacting it metal to metal. The Docking Pilot must also use care to keep the angle to the pier fine when docking or sailing such a ship, as it is easy to strike the pier with this type bow.

Docking masters are often forced to compromise their needs when positioning tugs on today's ships. The more flared bows, shorter midbodies, cutaway quarters, protruding stern ramps, lack of chocks or recessed bitts, tug's superstructure, etc. usually means a tug must be placed closer to the Plimsoll mark than is desired. The tug's mechanical advantage is largely diminished but to do otherwise could mean damaging the tug's wheelhouse, mast or radar scanner against the hull. Design changes have caused these problems. The increasing size of ships should make it apparent Docking masters need more, not less, leverage on the ships they handle. (See figure 3).

The height of most ships' freeboard is greater today. Car carriers and high sided container ships are particularly challenging to the Docking Pilot in the wind; they present the wind with much surface area to act upon. Such ships have a tremendous desire to sail to leeward which accelerates with shallower drafts. The Pilot handling these ships in wind also finds them difficult to turn because they want to lay broadside to it; this is compounded when tugs can not be placed to exert good leverage.

High sided ships create other problems by increasing the vertical lead and length of the tug's lines. When the Pilot orders a tug ahead there is no loss of power as the springline merely holds the tug's bow from sliding. The point where the bow fender contracts the ship is where the force is applied. However, when the tug is 'BACKED' it is quite another story, unless the ship's chock is approximately the height of the tug's bow. The higher the lines when backed the less horizontal thrust is delivered and the vertical component increases which is lost power. When working two lines on a ship's bow, as during a docking operation, longer leads will stretch more. The tug will fall alongside when backed thereby diminishing her lifting effect.

It is my feeling that ship designers do not understand shiphandling techniques or the needs

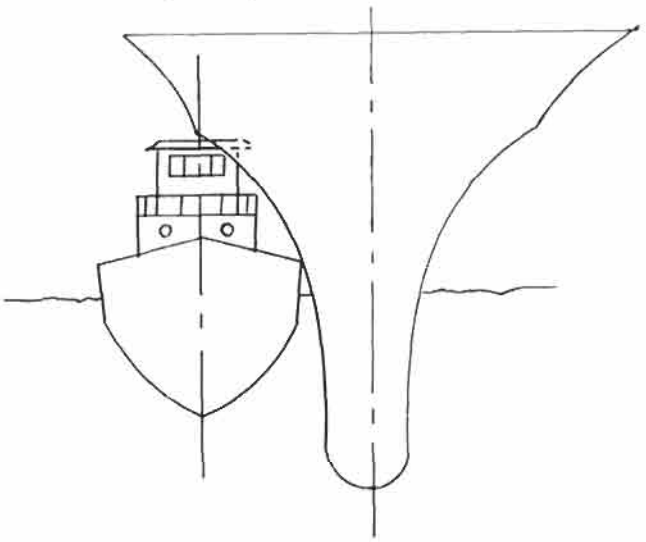


Figure 3

To position a tug near the bow of a modern streamlined ship where her mechanical advantage is greatest is to invite damage to the tug. Therefore, tugboats must be positioned closer to the Plimsoll than desired diminishing their value to the Docking Pilot. Strategic placing of recessed hull bitts and modification in tugboat design could greatly assist the Shipdocking Pilot.

Barbar Tonsberg underway in Baltimore Harbor. This vessel is equipped with bow and stern thrusters. Notice the large stern ramp, the straight lines of her quarter to near the waterline and the bow beginning to cutaway and flare outwardly from amidships.

of the Shipdocking Pilot. Therefore, when determining where to place chocks they approach the subject solely from the stand point of safely mooring the vessel alongside a pier. There seems to be a tendency to build ships with fewer chocks today, at times substituting them with crucifix bitts, padeyes, or nothing in their place. It is essential that a tug has a good hold on the ship to do the job well. It appears to be false economy to save money on chocks and bitts only to spend it on damage repairs.

Propulsion systems cause much anxiety for the Docking Pilot. The variable pitch propeller is probably the most troublesome. Most ships will either slip ahead or astern when placed in neutral and the water around the stern becomes confused with the propeller always turning over. The ship has a tendency to back to starboard not to port. Special care must be exercised when handling sternlines to keep them away from the screw. Gas turbines are challenging as well. Their reaction time is slow and if the ship is carrying much headway needs time to take it off. It must be anticipated when to stop ahead of time as they continue to spin over awhile after being stopped.

The very fact that ships are large today is a problem. The practical effect is to make channels, bends, turning basins, anchorages, berths, underwater clearances, tugs, etc. all seem smaller. Vessel size is quickly reaching the limit that US Ports can accommodate. Without dredging to increase channel width and depths, handling large ships in relatively tight confines will continue to be a challenging job. Very often the Docking Pilot must make do with tugs built to handle the older and smaller classes of ships. During these times he is relying on his skills and knowledge to pull him through, not on tugboat power.

SOLUTIONS AND DESIRABLE CHANGES

Thus far, I have endeavoured to explain the innovations in designs and the problems which have been created. In fairness, some changes and alterations have been as useful as others have been detrimental.

It is my preference, and I think most shiphandlers would agree, to dock or sail a ship with the bridge located near the stern as opposed to conning the ship from the bow. This is because the major part of the vessel sets out in front acting as a range to gauge movement. This enables the Pilot to better judge how fast the swing is when executing a turn or when being set across a channel. The one drawback to this layout is created when containers are stacked as high as the ship's bridge. This forces the Pilot to stand on one of the bridge wings to see ahead, giving a distorted view of what is happening. Logic and the law could easily solve this by dictating that the first row of containers ahead of the bridge be below eye level and progressively decrease as they proceed forward or build the bridges higher to insure a clear view under the bow.

The bow thruster is a useful tool for the Docking Pilot because we have a built-in tug to

The 948 foot long *Sealand Market* underway with a tug alongside her port bow. The tug's bow is 150 feet forward the Plimsoll mark or 324 feet after the ship's bow. The ship has recessed bitts but they are below the tug's bow and her head line would jump off the bitts should she use them.

control the ship's bow. There are situations such as the ship's bow can not be played with one line due to a bulbous bow, flare too great to make a tug fast, or holding a line from the tug's side bitts to the ship's shoulder will not lift the bow that makes the use of a tug impractical. In cases of light wind, a single tug can be placed on the outboard stern quarter to control the stern. The bow thruster simultaneously holds the bow in check. If the ship is also equipped with a stern thruster the tugboat can be dispensed with altogether. Several words of caution, as with any piece of machinery, they are subject to breakdowns. Many ships are equipped with less than adequate thrusters which all but the lightest breezes cancel out. The efficiency of the thruster diminishes as headway increases and with several knots headway they become nearly useless. Under conditions of light draft, they may be out of the water and totally useless.

The answer to long leads on the tug's lines due to the vessel's high sides and distant chocks can be solved by recessing and building bitts into the hull of the ship. This allows the tugboat crew to make fast and let go of the ship without assistance from the ship's crew, the inconvenience caused by lines being thrown overboard, instead of gently lowered to the tug. The above is beneficial when the tug must quickly be shifted. By the tug working ahead and coming end on to the ship, slack can be removed from the line. When secured, the tug will be held at the same angle it took two lines to do. Also, there is the advantage that all pushing and backing is in a horizontal plane and no loss in power. At times the chock is lower than the tug's bow and there is danger of the line flipping off the bitt. The chances of this happening are reduced by putting several turns around the bitt but certainly not guaranteed.

The best solution is to build the ship with several recessed bitts, one above the other several feet apart to accommodate normal changes in draft. The tug can avail herself of whichever one aligns best with her bow. By placing these hull bitts on the forward shoulders, after quarters and stern centerline, the tug's hold on numerous ships would be immensely improved, thereby, facilitating shiphandling operations. The American Bureau of Shipping and other classification socieities need to insure standardization in positioning bitts, chocks, recessed bitts, etc. The guidelines should take the following into account: safe tug placement, maximum leverage obtainable, changes in draft, number of chocks in proportion to length and space between chocks.

Often there is the decision of where to place the after tug if one is required. The need is under the ship's tuck for leverage but it is a precarious position and damage might be sustained by the tug. The next chock forward is almost midships and the tug is just about totally useless there for

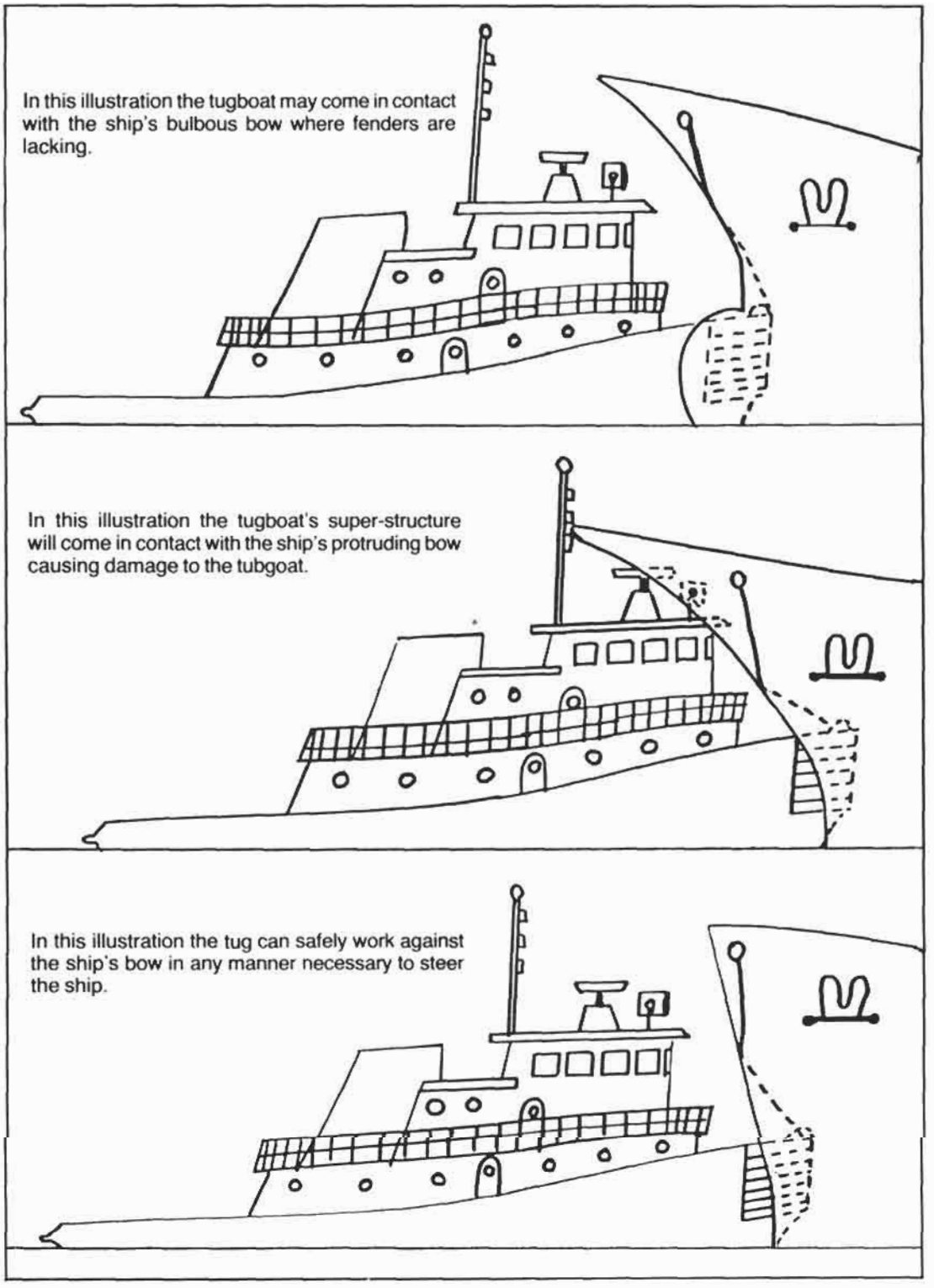


Figure 4

Positioning a tugboat on 3 different style bows for the purpose of steering the ship astern.

pushing the stern up. If the after chock is used, the line can be held to the side bitts instead of the stemhead. This permits the tug to lay forward a few feet on the line without having the line bending the visor or superstructure rubbing the ship as would occur if the line were held on the stemhead. Keep the tug working slow ahead with enough rudder towards the ship to keep the house from rubbing the ship's side when there is scant clearance. Beware, the ship's stern will continually be pushed down. This dilemma is common, often the wind and weather are deciding factors in what course of action is followed.

Some ships have stern quarters that are straight sided almost till they reach the water then cut away abruptly. Many of which a tug can lay alongside with safety. On ships that have ramps obstructing the stern, this style quarter is the ideal place to use the after tug. By placing the tug's line practically on the stern she exerts considerable leverage. Care must be exercised not to back the ship until the tug is in position and her line fast. In this position ½ to ⅔ of the tug is behind the ship's screw. The ship's screw will suck the tug towards it not away from it as when a tug is working a conventional quarter further forward.

The traditional elliptical stern has been replaced in large measure by squared off sterns.

Starboard side profile of *American Legend* showing her protruding forward knuckle. The ideal position for tug placement would be where this knuckle is located. Tugs must be positioned aft of it losing about 75 feet of leverage. The ship has a similarly designed knuckle aft.

This is a plus for the Docking Pilot. In lieu of using a cutaway quarter it is sometimes possible to work that tug on the flat stern. The tug can substitute for the ship's engine and rudder. This helps keep headway off the ship while still maintaining perfect control. The tug can exert maximum leverage against the ship. Judgment must, however, be exercised while working the ship's engine with the tug perpendicular across the stern. By working the ship strongly, the wash can carry the tug's lines away and jeopardise her safety.

Diesel power coupled to reverse gears as a prime propulsion system has been helpful to the shiphandler. The engine response time is fast and the shaft revolutions through the full range of speeds are most uniform. On many steam vessels 'dead slow' and 'slow' are not enough power and 'half' is too much.

Tension winches using steel cable makes shifting the vessel ahead or back alongside the pier several feet easier today. It is not necessary to use ship's engine or tugboats once the cables are on the pier's bollards. Another good idea is to wind the ships' lines on separate automatic winch drums. This speeds securing and singling up the vessel by eliminating the need to stop lines off and transfer them to or from the bitts.

SUMMARY

Ships and tugs are changing and will continue to do so. Docking Pilots must be acquainted with the various hull designs, deck layouts and propulsion systems that are encountered in the course of their work. The recent trend has been towards more diversification. The future is unpredictable; spiralling fuel costs, other operating expenses, shifts in markets and new technology will play a very large role. The new concepts in moving cargo are likely to come under review. Older concepts may prove feasible once again. Some trades may see the reintroduction of coal and sail in some modern form. The implications for shiphandling are great should these things occur.

The era of tug assistance in docking ships is very likely near its pinnacle. Economic pressures are going to give greater impetus to equip ships with large and reliable bow and stern thrusters. In fact the tug may relinquish her predominant role in shiphandling to that of a back up system for these thrusters in cases of breakdowns or high winds.

No matter what design and innovative changes the future holds, competent shiphandlers will still be required. Shiphandling is interesting and sometimes challenging work and will remain so.

CONVOYS AND TECHNOLOGY — AN HISTORICAL PERSPECTIVE

By Lieutenant Commander R.M. Jones RAN

In these times of rapid technological change, we are often told that introduction of new equipment casts doubt on firmly-held operational beliefs. A good example is the principle of convoying which is now attacked on several grounds based on new technology.

A study of trade defence begins with consideration of basic principles and whether they are current in the light of technological progress. Some basic principles were established long ago in the age of sail and, until the late decades of the 19th century, were rarely doubted.

The major feature of trade defence was the use of convoy. As long ago as the 16th century, Spain used convoys to protect treasure ships returning from the New World. Thereafter they became routine features of naval operations regarded unenthusiastically by both convoyed and convoyers. In 1761 England was at war with France and one of the three major causes of merchant ship losses was given by Mahan as '...the inattention of merchantships to the orders of the convoying vessel.'[1]

Convoying alone was considered adequate to protect merchant shipping on oceanic trade routes where the possibility of attack was relatively low. A major factor of this relative safety far at sea was the difficulty of a raider's search for a convoy. Raiders tended to gather at focal points through which merchant shipping was known to pass. These points were typically narrow straits or entrances to busy ports; anywhere geography confined shipping. In turn, convoy escorts were strengthened in these focal areas.

In the latter part of the 19th century, maritime technology underwent fundamental changes. Two of these changes are of special relevance to trade defence. Steam propulsion made ships more independent of the weather but introduced reliance upon coaling stations and actually resulted in reduced freedom of action for ships. The second change was the introduction of radio, allowing rapid communication over long distances.

New technology led to new strategy. In the early 20th century Corbett suggested that the traditional approach to trade protection should be altered.[2]

Principles for the defence of trade using convoys far at sea, with reinforced escort when passing through focal areas, did not imply any attempt at permanently holding geographic areas; local control of the convoy vicinity was the aim. Corbett felt that the time had come for a new approach based on the limited freedom of action of coal-burning ships and the advent of radio communication. He proposed that focal areas and trade routes between them should be patrolled intensively while shipping sailed independently along the protected routes.

In theory, the first victim of a raider which had evaded patrols would raise the alarm by radio. Warships hastening to the scene would quickly despatch the enemy. In any case, raiders would be unable to cause much damage because of a variety of limitations imposed by steam propulsion.

Protected trade routes were adopted by the Admiralty on the outbreak of war in 1914. Had the threat been only surface raiders, the patrolled routes may have offered some protection to trade, although even this is not certain. Unfortunately, on 1 February, 1917, Germany removed restrictions which had been placed on her submarines and unrestricted submarine warfare began against merchant shipping sailing to and from Allied ports.

Allied merchant shipping losses had been severe in 1916 while German submarines operated restricted trade warfare, unrestricted attacks quickly produced very high Allied merchant ship losses. Neutral shipping became increasingly reluctant to enter the submarine operating zone around the British Isles leading to further reductions in tonnage carried.

THE AUTHOR

Lieutenant Commander Ray Jones joined the RAN in 1963 as a Supplementary List (Air) Midshipman. He completed Observer training with the RN in Malta and later served in various Fleet Air Arm Squadron postings, including service in Vietnam (1967-68) and RN exchange service (1969-71). He was Basic Aircrew Training Officer at HMAS *CERBERUS* between 1971 and 1973 before joining HMAS *BRISBANE* for watchkeeping training. Postings since 1974 have included Air Operations Officer at NAS *NOWRA*, the Directorate of Naval Aviation Policy in Navy Office, Canberra, and SNO at the RAAF Base, East Sale.

The rate of sinking by April 1917 was 835,000 tons in 354 ships. The ability of Britain to continue the war was in doubt.

Many measures to defeat the U-boat were considered. The broad options were to attack the bases, protect the merchant ships (by convoy), or hunt the submarines. The main effort was directed to the third choice and many more vessels were built for intensifed anti-submarine patrols. In the English Channel these patrols were so organised that a protected lane was provided for traffic while farther out in the Atlantic vessels were tasked with general patrolling of the trade routes. Other measures were the arming of merchant ships, the introduction of aircraft patrols, laying minefields, use of improved hydrophones and commissioning more decoy ships.

Convoying had been suggested but rejected by the Admiralty on the grounds that this would be gathering the targets for a submarine, would slow down trade and congest ports. It was also regarded as a defensive measure not in keeping with the offensive spirit required of the Royal Navy.

The Jellicoe Papers, recall a meeting with the masters of 10 merchant ships in February 1917 which confirmed the naval opinion that convoys were not feasible. The 10 masters were unanimous that eight merchant ships could not keep station two and a half cables apart in two columns at five cables spacing. They believed that neither engine room nor bridge could handle convoy steaming. If pressed, they would agree to travel in pairs but felt that three ships together was too many. Independent sailing was their clear preference.

Despite various anti-submarine measures, merchant shipping losses to U-boats continued. During April and May 1917, opinion within the Admiralty changed under the pressure of the shipping losses and convoying was reconsidered.

A minute by Admiral A.L. Duff, quoted by Temple Patterson in the Jellicoe Papers records at the end of April the Director of the Anti-Submarine Division pointed out that rather than providing targets for submarines, convoys limited the attack opportunities.[4] Outline proposals for a convoy system were approved and detailed planning began.

On 25 June 1917 the Admiralty directed that convoying of most merchant shipping to and from the United Kingdom was to be instituted as soon as escorts were available. The exceptions were the very few vessels over 14 knots which would sail independently. A trial convoy from Gibraltar to Plymouth during May had proven the station-keeping problems to be greatly exaggerated.

Merchant ship losses declined after April 1917 but for the rest of the year monthly losses still exceeded new construction. Not until 1918 did the U-boat problem appear to be solved. In hindsight the Admiralty did not realize the effect convoying was having on the U-boats and persevered with other, less effective, measures. Prominent among these was the continuation of patrols which reduced the number of vessels available as convoy escorts.

By the end of the war the United States Navy and the Royal Navy had been wholly reconverted to the principle of convoy.

Such was this conversion that in 1919 when Admiral Jellicoe, on behalf of the Admiralty, prepared a report on the future form of the Royal Australian Navy, he forecast, inter alia, an Imperial requirement for 14 light cruisers and 37 armed merchant ships solely for escorting merchant convoys on the Australia Station.[5]

Events between 1914 and 1918 had a major influence upon the principles of trade protection. The modern concept of protecting the trade routes instead of the trade had been proved wrong and policy reverted to the older escort of convoy principle — even against the new threat of unrestricted submarine warfare.

Before the Second World War began the Admiralty had already drawn up plans for the introduction of convoys on the outbreak of war. Confidence in ASDIC as an absolutely effective counter to submarines was complete and the convoys were organised to defeat the surface raider. A lack of cruisers meant that escorts would only be provided through focal areas. In the Atlantic these were close to the United Kingdom and in the vicinity of Halifax. Early in the war convoying was accepted as effective although, as in the previous war, neutrals did not like being convoyed.

By August 1940, unrestricted submarine warfare against Allied shipping was in progress again. Losses in 1941 and 1942 were worrying enough but by 1943 ships were being sunk faster than the shipyards could build replacements. Even these heavy losses, when studied, showed that the convoy system reduced shipping losses.

Although allied navies were convinced that convoy escort was the most effective means of feating the u-boat, unfortunately, the Royal Air Force was reluctant to divert aircraft from bombing Germany to augment Coastal Command and Coastal Command itself had decided that "offensive' sweeps were more effective than operating aircraft as convoy escorts.

In February 1943 this priority was reversed and shortly afterwards very long range aircraft began escorting convoys in mid-Atlantic where there had previously been no air support. Once aircraft operators accepted that the vicinity of a convoy was the most profitable place to prosecute

submarines, their aircraft also became most effective escorts. Very few ships were sunk in convoys when an aircraft, from ship or shore, was present.

Since 1945 major developments in merchant ship design have taken place. The United Kingdom Register in 1975 had 39 tankers in excess of 250,000 dwt; in 1970 there were only six and nine in 1965. Tanker speed has also increased, but not to the same extent. It has stablised in a narrow range between 14.5 and 17 knots. No British tankers exceed 20 knots.

Bulk carriers and combined oil-bulk-ore carriers are nearly as big and also prefer speeds in the range of 14.5 to 17 knots, although a few exceed 20 knots.

Increase in size of the third major group, the cargo liners, including container ships, has not been as spectacular. The 1965 average was 8123 dwt. 10 years later this had increased to 10,811 dwt. On the other hand, speed of these vessels has increased beyond the tankers' modest range. By 1975, 36% of cargo liners travelled at speeds between 14.5 and 17 knots, a further 27% are in the next speed bracket of 17 to 20 knots and a further 20% exceed 20 knots.

Clearly, shipping can be divided into two major size/speed categories. Firstly, tankers and bulk carriers are large but designed for modest speeds in the region of 16 knots. Secondly, there are the fast cargo liners, including container ships, which are not as big as the tankers but are much faster, many of them having service speeds over 20 knots. Most of these ships are part of an integrated freight system which derives profitability as much from a rapid turnaround of the ship as from its size and speed. As part of this integration a trend to specialised ships and equally specialised port facilities is apparent.

Future trends are uncertain. The effect of increased oil prices is not yet clear although present evidence indicates a probable reduction in design speed of only a few knots for new ships[6]. The gas turbine which promised even higher speeds is now unlikely to be used much because of its higher fuel consumption. Examination of ships now ordered shows that the size of tankers and bulk carriers has stopped increasing and is actually decreasing slightly.

Protection of trade in future will involve defence of these individually more valuable and faster ships. As in the past, the threat will be from ships, aircraft and submarines. Weapons will be torpedoes from submarines or anti-shipping missiles from all three.

The principle question concerning future trade protection is the extent of use of the convoy system. Several objections have been raised on the not unfamiliar grounds that technology has rendered the convoy undesirable or impracticable. Some of these objections are serious and should be studied.

The most important reservation is related to speed. It is undeniable that at 24 knots, a speed within the capabilities of many container ships, an escort's sonar effectiveness will be reduced due to self-induced noise. This may not be entirely bad as there is some evidence that ship-borne active sonar serves more as a warning to the submarine than the escort but it does mean that alternative anti-submarine sensors are badly needed.

A more serious implication of this order of speed is the reduced range available to escorts. Perusal of *Jane's Fighting Ships* over the years shows marked reduction in ships' range as speed and associated fuel consumption increases. A tanker pre-positioned to provide fuel in mid-ocean would drain already scarce resources for its own protection.

Naval tankers are not fast enough to join a convoy of container ships.

Another problem will be relative sea-keeping qualities. Many of the larger merchant ships (particularly tankers) are so large that they are little affected by weather. Escorts being smaller, need to slow down in heavy weather to avoid structural damage.

These arguments suggest that ships should sail independently lest maritime trade be reduced. Allowance is not made for increased probability of independent shipping being sunk once hostilities begin: total loss of a large ship will reduce trade capacity far more than will a few ship-days wasted while a convoy assembles. Nor has increased ship speed altered the fact that the probability of detection of a number of scattered individuals is higher than that of a single group.

Another reason increasingly advanced against the use of convoy is the much better reconnaissance systems now available. Large area reconnaissance techniques may facilitate detection and subsequent attack of shipping whether independent or convoyed. A convoy is far easier to defend because of the possibility of concentrating defensive forces in the very place the attack must come: the exercise of sea control for a short time over a specified moving area is familiar to maritime forces.

An alternative to convoying is the patrolled trade route which was so unsuccessful in 1915 and 1916. There is little more prospect of success now than then as the same limitations still exist. Numbers of escorts required for patrols over thousands of square miles is unrealistic even allowing for the use of aircraft within range of shore bases. Assuming escorts could be found, a patrolled route would only be safe if a barrier of extremely high integrity could be maintained.

While it may be possible to search quite large volumes of airspace with radar and be reasonably

confident that all possible targets have been detected, the same cannot be said underwater. Both active and passive sonars are capricious sensors subject to random, severe degradation or enhancement by the ocean environment. Recent concentration of development effort on passive sonars may eventually alleviate the situation but the present detection of submerged submarines remains a major problem.

Since submarines, ships or aircraft intent on commerce raiding will still seek to operate in the higher traffic density of focal areas, additional escort forces will still be needed there. Ranges of torpedoes and missiles have not increased so much that a raider will not try to improve his chances of target detection and attack as much as possible.

The desirability in principle of convoying trade subject to attack must not obscure the fact that any measure which reduced the carrying capacity of the maritime trade system is counter-productive and undesirable. Some time spent forming convoys can be justified but, although large convoys are statistically preferable, quite small convoys may have to be accepted because of limited handling facilities. The trade-off between convoy size and lost ship days is a subject for operational research.

The speed difference between merchant ship and warship is very important. Undoubtedly the limiting factor in a 1980's convoy using accepted procedures and current equipment will be the speed of the escorts. That warship performance should limit the volume of maritime trade is anomolous, yet this appears to be the attitude adopted by some maritime authorities despite the penalties of system capacity loss and tactical disadvantage incurred.

Loss of effective ship days should not be under-estimated. A reduction in speed of a container ship from 24 knots to an escorts' relatively comfortable 17 knots (in good weather) will entail the loss of five days (120 hours) over a 7,000-mile route (Sydney-Panama) or nearly eight days (189 hours) over 11,000 miles (Fremantle Southampton).

Expressed another way, over a 7,000-mile route (allowing for 48 hours turnaround) three single trips at 17 knots will take longer than four single (one way) trips at 24 knots. When multiplied by the number of ships involved the number of ship-days lost is serious.

High service speed is a tactical advantage which should not be lightly discarded. Interception of a fast-moving ship presents problems to submarines. Conventional submarines will have difficulty in intercepting at all unless they receive intelligence well in advance of the merchant ship. Even nuclear submarines which could catch up from astern of a fast convoy will be very wary; the speed they need involves high radiated noise levels which expose a submarine to detection and attack while he is deafened by his own passage.

The restrictions imposed on convoys by warship performance are severe and may contribute to opposition from commercial and political source to the introduction of convoy. Such opposition does not alter the fact that the principle of convoying at sea and reinforcing escorts in focal areas still applies despite advancing technology.

It does however, point to a certain tardiness on the part of the planners and designers of maritime forces in applying this same technology to the problem of escorting the fast convoy.

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WASHINGTON NOTES

Few subjects regarding naval policy have been discussed with the frequency and intensity as has the possible recommissioning of the four *IOWA*-class battleships the United States Navy has in reserve. The current resurrection of the battleship controversy has taken on new proportions as the vessels have become enmeshed in the rapidly developing "big ship" controversy.

Secretary of the Navy John Lehman has proposed a program focused on the carrier battle group, beginning construction of another *NIMITZ*-class carrier and pulling the carrier *ORISKANY* out of mothballs. It would also form battleship battle groups, using battleships modified to carry a large number of long-range cruise missiles. The battleships are becoming a symbol to those who oppose most expenditures on a limited number of large ships, either new or refurbished.

No common purpose for recommissioning the battleships has been evident over the years. Proposals to convert them into missile carriers (From Regulus to Polaris to Tomahawk), hybrid aircraft carriers, amphibious support ships to stripped down gunfire support platforms (the only successful metamorphasis since the late 1950's) have all been considered by the Navy. The same

USS *NEWPORT NEWS* Tonkin Gulf January 1968. The *NEWPORT NEWS* was a *SALEM* Class Cruiser.

reasons, cost and manning problems, have prevented any serious program for using the vessels. The deployment of the *NEW JERSEY* during the Vietnam War, while highly successful in the support role she was given, was limited to one tour of duty for these very reasons. The twin problems of money and men haven't changed.

In discussing the feasibility of bringing the *IOWAS* back, Norman Polmar, perhaps the leading authority on the United States Navy, told me last year that the major drawback to the ships were their huge crew requirements. Undersecretary of the Navy Robert J. Murray's recent statement that, since we manned 5,000 ships in the 1940's and 1,000 in the 1960's, providing crews for the battleships along with the current fleet and current shipbuilding programs should pose no problem, totally ignores the effect of the draft on the Navy both directly and indirectly. Improved retention of volunteers won't be enough.

Cost estimates of recommissioning the *IOWA's* and the carrier *ORISKANY* have run from $300 to $500 million *per ship* and, in the case of the *ORISKANY*, the preliminary figures were rejected by the Senate Armed Services Committee for not being firm enough.

Senator Gary Hart, one of the country's leading proponents of increased seapower, has noted in a recent Senate speech that, even with substantial increases in the Navy's shipbuilding budget, we can never have enough ships if each ship built is extremely expensive.

'However much money we spend on shipbuilding, however much we improve readiness and the personnel situation, if we build the wrong kinds of ships, reflecting the wrong concepts, we will end up with a weaker Navy in the future, not a stronger one,' Hart said.

Hart presented viable alternatives to the 'big ship' approach:

- We could purchase three light carriers, of about 40,000 tons each, for the cost of a single *NIMITZ*-class carrier.
- We could purchase approximately two conventional AEGIS cruisers for the cost of a single nuclear cruiser.
- We may be able to meet the Marine Corps' legitimate need for additional landing fire support in ways which are both less expensive and more effective than re-commissioning battleships. We currently have in reserve two *SALEM*-class cruisers, each of which carries nine automatic eight-inch guns. These unique guns permit each ship to fire a broadside of approximately 80 rounds per minute. This could provide the fire support needed by an amphibious landing more effectively than could battleships, whose guns are larger but have a much slower rate of fire. Yet the cost of recommissioning these cruisers, and of supporting them once they were returned to service, might be substantially less than that of the battleships, freeing funds for other needs ship construction.
- In submarines, we clearly need numbers greater than the current force level goal of 90 attack boats. Yet, with a single SSN-688 class attack submarine costing over $500 million, we will be fortunate if we can afford just to sustain 90. Modern diesel-electric submarines are highly effective, and while they cannot perform all the missions of which a nuclear submarine is capable, they can do many of them. In some missions they are actually somewhat superior because of their smaller size and greater quietness on patrol. And they can be acquired for as little as $100 million each, only one-fifth as much as the SSN-688 class. We could make good use of such conventional submarines as additions to a force of 90 nuclear boats.

USS *NEW JERSEY*

— Jane's Fighting Ships

The case for bringing back the battleships, and for building large ships in general, is as much an emotional as a practical one. Even cocooned in protective covers, I was impressed with how the old battleships exude strength and power as they rest in the Philadelphia Navy yard. The aircraft carrier *EISENHOWER* is so huge that it appears invulnerable, a magnificant symbol of America's military might. But the practical considerations of the need for greater numbers of ships, with limited manpower and financial resources, stands a good change of slowing or halting large ship programs. The debate over battleships and big ships, money and manpower, has only just begun.

TOM FRIEDMANN

(Authors Note: Since the completion of this article, the Congress has approved funds for the reactivation of the *NEW JERSEY* and has provided a small amount of lead money for the reactivation of the *IOWA*.)

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GRACE HARWAR

GRACE HARWAR, broken up in 1935, was the last full rigged ship engaged in overseas trade as a pure cargo carrier. There have been, and are, other full rigged ships in commission but all are either training ships or the more popular combinations of training vessel and cargo carrier.

A steel three masted ship of 1816 tons gross, *GRACE HARWAR* was built in 1889 by Wm Hamilton, Port Glasgow for the shipowner W. Montgomery of Mark Lane, London. Originally rigged with double topsails and single topgallants on all masts this rig was revised after she was dismasted on her maiden voyage. The revision consisted of fitting double topgallants on the fore and main masts. With royals above the topgallants, this gave *GRACE HARWAR* six square sails on the fore and main masts and five square sails on the mizzen. Essential other details were length 266' 8", beam 39' 1" and a draft of 23' 6".

In her 46 years, *GRACE HARWAR* saw much hard work, several fatalities, near disasters and most ports of the world as a true tramp ship. Originally designed for the Bristol Channel/Peru trade, *GRACE HARWAR* saw much more than those areas. Designed to carry some 3000 tons of cargo, she was run with a minimum of crew and little in the way of labour saving devices. No brace or halyard winches were fitted and the only mechanical aids were the six manual capstans and a patent winch for the anchor cables.

Captain Alan Villiers has described a voyage in *GRACE HARWAR* quite graphically. In the 1929 grain race they sailed from Wallaroo to Queenstown with a crew totalling 20; Master, two Mates, Carpenter, Sailmaker, Cook, Steward and 13 Able Seamen — by the owners reckoning she was overborne by one AB! During that voyage one fatality occurred plus a nervous breakdown by the 2nd Mate.

The following will give the reader some idea of the variety of experiences encountered by *GRACE HARWAR* in her long career:

1889-1913 Dismasted on her maiden voyage and limped into Cape Town. In one voyage July 1910/Feb 1912, she was in collison with the French Steamer *MAGELLAN* in Iquique Bay losing one anchor and the bowsprit. Sailed to Falmouth (for orders) and whilst there collided with the italian steamer *ORIANA*, subsequently she discharged the cargo in Hamburg.

Three masted ship *GRACE HARWAR* 1889-1935

1913-1916 Sold to A/B Delfin of Helsingfons in 1913. Damaged in a cyclone in Iquiqui Bay, suffered 3 collisions and finally dismasted. Pushed ashore at Mobile (USA) by the 4 masted barque *FRIEDA* and capsized by a hurricane.

1916-1935 Refitted and sold to Captain Gustaf Erikson of Mariehamn. Frozen-in in Kristiana Fjord. Raced in the grain races from Australia. Eventually when due for an extensive survey and refit *GRACE HARWAR* was found to be uneconomical and sold to the shipbreakers. Broken up at Charlestown, Fifeshire during the summer of 1935. Masters during this latter period were:

Julius Eriksson	1916/1917
Anders Donner	1917/1920
K.V. Lindquist	1920/1922
M.A. Gustafsson	1922/1928
K.G. Svenson	1928/1930
G. Bowman	1930/1934
G. Holm	1934/1935

As a finale, there is the unconfirmed story of

one Master of *GRACE HARWAR* prior to 1916 who, to prove that his wife's death (at sea) was not murder, pickled her body in a salt beef cask so that it could be examined at the next port of call.

PAMIR

21 September 1957 spelt the deathknell of pure sail training. Not the stylised sail training of today with *CHRISTIAN RADICH, WINSTON CHURCHILL* and such, but the tradition of training *and trading* under sail.

On that day the steel four masted barque *PAMIR* was overwhelmed by cyclone CARRIE some 600 miles south-west of the Azores with the loss of 80 lives, of which 54 were cadets under training.

A well known visitor to Australia, *PAMIR* had a long and varied career including a period of de-facto ownership by the New Zealand Government.

Designed and built by Blohm and Voss of Hamburg, *PAMIR* was launched in 1905 for Ferdinand Laeisz and joined his famous 'Flying P Line'. At that time, Lactively engaged in the South American nitrate trade. Thus *PAMIR* joined a stable of well-known vessels — *PADUA, PEKING, PRIWALL, PARMA* and later *PASSAT*.

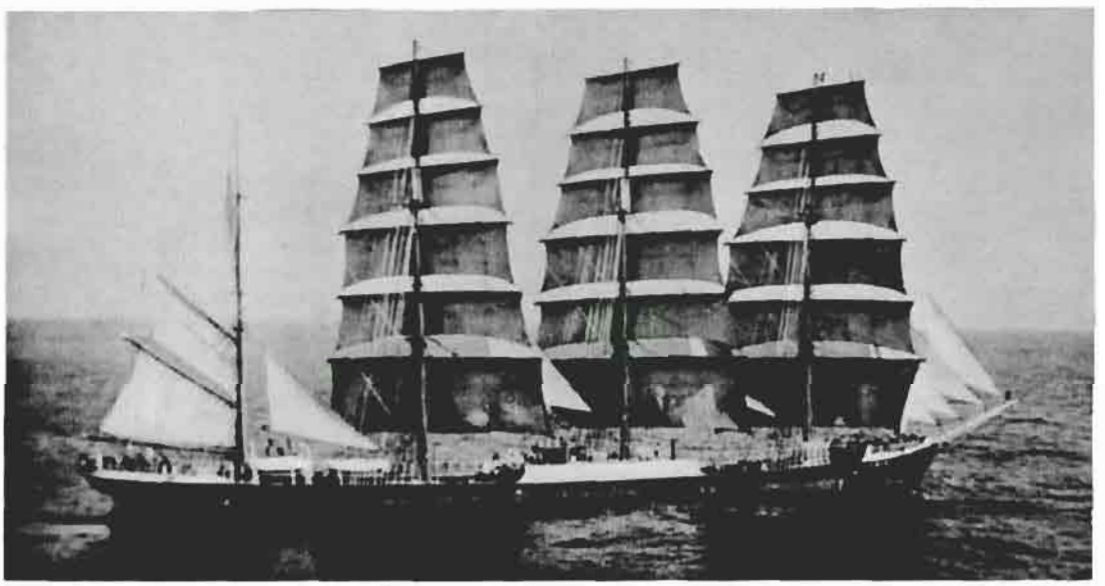
The early years of *PAMIR's* life were reasonably uneventful and the first major setback came immediately after the outbreak of World War I. Homeward bound from South America, PAMIR put into the Canary Islands to seek refuge from the war and was interned for the duration. At the war's end, she was headed to Italy as reparation and sailed to the Mediterranean and subsequently laid up at Geneo. Put up for sale in 1925, *PAMIR* was purchased (once again) by Laeisz and re-joined the Flying P Line to be employed on the grain and nitrate trade.

In the early 1930s, Ferdinand Laeisz started to reduce his fleet and in 1931 *PAMIR* joined the great fleet of Captain Gustaf Erikson. *PAMIR* was not alone as other Flying P's (*PENANG* and *PASSAT*) joined his fleet too. She had now entered another phrase of a long career.

Under the command of Captain K.G. Sjogren (1931-33) and subsequent masters, the barque made consistent passages. Although she shared 1st place in the 1932 grain race with *PARMA*, the 103 days Spencers Gulf to Queenstown was not her best passage. With masters such as J.M. Mattsson (1933-36) U. Morn (1936), V. Bjorkfeldt (1937) and L. Lindvall, *PAMIR* continued to give stirling service. However, history was about to repeat itself.

On 8 August 1941, *PAMIR* arrived in Wellington NZ with a cargo of grain from the Seychelles. Although a regular visitor to New Zealand, this vist was to be different. Finland had now entered the war on the side of Germany and *PAMIR* was siezed as a war prize. Laid up for almost a year, she was then handed to the Union Steamship Company of New Zealand, and made five round trips to the US and Canada under New Zealand registry.

On completion of hostilities, *PAMIR* was refitted, and in 1947 handed back to her pre-war owner Gustaf Erikson. In company with *PASSAT*, she sailed for Europe with a cargo of grain. Ever



4 masted barque *PAMIR*

watchful for world wide cargoes, Captain Erikson kept *PAMIR* on the grain trade, but in vain. Again with *PASSAT, PAMIR* left Australia for the last time in 1949. Under the command of Captain Verner Bjorkfeldt, *PAMIR* sailed from Port Victoria on 28 May 1949. *PASSAT* (Captain Ivar Hagerstrand) left the same port on 2 June but being the faster sailer passed her sister on the run to the Horn. Thus fate decreed *PAMIR* to be the last merchant sailing vessel carrying cargo on an ordinary commercial voyage to round Cape Horn. The date was 11 July 1949.

In 1951, *PAMIR* was sold to an Antwerp ship-breaker but was rescued by Heinz Schiewen of Lukeck and converted for sail training (and trading). Refitted and with a U-boat main engine as an auxilliary, another phase of her career was about to start. Schiewen's ownership didn't last too long and 1954 saw another change of owners. In that year, in company with her sister *PASSAT, PAMIR* was purchased by the Landesbank Schleswig Holstein consortium to continue as a sail trading and training vessel.

Falling cargo rates and competition from bulk carriers were causing concern for her owners and the plan was to sell off or lay-up both *PAMIR* and *PASSAT* in late 1957/early '58. This was not to be, at least as far as *PAMIR* was concerned, and whilst on passage from Rio to Europe with a full cargo of grain, *PAMIR* met with cyclone CARRIE and lost her last battle.

Details of the *PAMIR* were:
Designed by Blohm and Voss, Hamburg
Built by Blohm and Voss, Hamburg 1905
Steel 4 masted barque
Length 316 feet
Beam 46 feet
Draft 26'2"
Deadweight tonnage 4,500
Gross tonnage 2,798

ROBIN PENNOCK

Nobody asked me, but...

"NO UNIONS?..."

Commander A.W. Grazebrook's article 'Fleet Admiral King and Other — Pacific Admirals' (Journal Vol. 7, No.1 Feb 81) was a pleasure to read — even an old fanatical follower of recent naval history could find some new thoughts in it. And yet...

Towards the end of his paper the author talks of professional *unions* which came into existence in the US Navy and is justifiably happy with their absence in the RAN. And yet...

He compares three of the US Navy's key admirals during the Pacific War, he contrasts their personalities and briefly compares their careers — *at Flag rank.* However, admirals do not just happen, they get to those dizzy heights by continuous promotion and that means continuously outstanding service, right from the start.

Commander Grazebrook does mention Admiral King's early career, he refers to it as 'unique', as Admiral King succeeded in qualifying as a submariner and as an aviator as well as being a 'surface' sailor.

But what about the other two admirals? Admiral Nimitz was very much a submariner. An interesting aspect of his career was that in 1913 he was sent to Germany to study design and construction of diesel engines. It appears however, that he only held one shore posting and one seagoing as an engineering specialist. In the meantime he also turned down an offer from a commercial firm for a technical job with a salary which was about nine times his navy pay (1) (3).

One cannot help wondering as to what exactly motivated Lieutenant Commander Nimitz to turn down such an offer.

Nimitz, as a marine engineer re-emerged briefly in late May 1942 when he became personally involved in patching up the battle scarred carrier USS *YORKTOWN* and getting her back to sea in time for her appointment with destiny at Midway.

Midway...That brings us to the victor in that battle — Raymond A. Spruance (2) (3). This early career is worth following through in some detail.

He was not a distinguished student at the Naval Academy. On promotion to Ensign, he requested post graduate studies at the Westinghouse Electric Company. He became a qualified electrical engineer, qualifying in wireless.

This was followed by service in battleships as a 'junior engineer officer' and then came the command of USS *BAINBRIDGE* (DD1), an old destroyer of 440 tons, stationed in the Phillipines.

Subsequently he was posted to a shipyard in Newport News as 'Assistant Inspector of Machinery'. In fact, he was supervising the installation of electrical equipment in the new Battleship USS *PENNSYLVANIA.*

On commissioning of USS *PENNSYLVANIA*, Lt. Cdr. Spruance was posted to her as an 'Assistant Engineer Officer'. By this time, World War I was in progress.

As an electrical engineering specialist, Spruance was once again posted ashore — to the New York yard as 'Electrical Superintendant'. From there, Commander Spruance was sent to England to supervise the installation of electric fire control systems in the Sixth Battle Squadron — the US Navy Component of the Grand Fleet. This was his main contribution to the World War I effort.

After the War, he was given the command of the destroyer USS *AARON WARD*.

After this, he was moved back ashore to Bureau of Engineering, where he spent the next three years becoming 'Head of Electrical Division'. It was only in 1926 that Commander Spruance was selected for a course in the Naval War College and left the field of electrical engineering for good.

One may wonder how Spruance fared as a destroyer captain after a career which was mostly composed of technical duties. Well, his division commander lavished praise on him and assessed him as 'An able, bright destroyer captain'. That assessment was signed 'William F. Halsey'.

Fleet Admiral Halsey, a true 'salt horse' and a hard task master (who qualified for his aviator's wings only as a senior Captain) was another great Pacific War admiral. It escapes me why Commander Grazebrook did not mention him in his article.

All this brings us back to the question of 'unions'. If Admiral Nimitz was at least a part-time marine engineer, then Admiral Spruance's early career was a prototype of a young Weapons and Electrical Engineering Officer's career in the RAN today. (If you don't believe me, Hoyt (3) gives a good precis of Spruance's early career in Chapter 7 of his book).

Today in the RAN, we talk a great deal about the General List concept, but our posting and promotion policy would ensure that neither a potential Nimitz or Spruance would be allowed to do their best for the Navy or the defence of the country.

Is this a case of undiagnosed 'unionism'? Do we really need rigid 'executive' or 'engineering' categorisations?

In this day and age when the galloping technology keeps pressing for new doctrines at sea, can we afford the luxury of drawing lines between *them* and *us*, between the *users* and the *maintainers*? My guess is: certainly not at the officer level. We are all in it together. We must make the best use of the bright young brains we have in the officer ranks today regardless of their categorisation.

Of course, there will be officers who will *prefer* to be constrained to engineering duties only, there will will be officers who should be *limited* to those duties... and there will be others as well.

As it is today, an engineering degree or diploma effectively prevents an officer from venturing outside that field. As far as command at sea is concerned, a technical qualification becomes a major career impediment.

Why did Nimitz reject a most lucrative offer from a commercial firm? Could it have been a confident expectation of sea command and those 'bigger and better things' that follow it? Could it be that some of the would be Nimitzes and Spruances in the RAN today resign because they can see no satisfying future for themselves?

Could it be that quite a few of them do *not* regard some mundane desk job in the Navy Office (or Defence Central) as a satisfactory future?

If the answers to above questions are in the affirmative, then should we not start thinking in the terms of a true 'General List'?

G. NEKRASOV

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(1) Potter E.B. *Nimitz*, Naval Institute Press, Annapolis, Md.
(2) Buell Thomas B. *The Quiet Warrior — A Biography of Admiral Raymond A. Spruance*, Little, Brown & Co.
(3) Hoyt, Edwin P. *How They Won the War in the Pacific — Nimitz and his Admirals*, Weybright & Talley, N.Y.

SIMPLE LOGIC?

In Lewis Carroll's immortal classic, *Through the Looking Glass*, the White Queen asks Alice to believe that she is over a hundred years old. The conversation went as follows:

'I can't believe that!' said Alice.

'Can't you?' the Queen said in a pitying tone.

'Try again: draw a long breath, and shut your eyes.' Alice laughed. 'There's no use trying, she said: 'one can't believe impossible things.'

'I daresay you haven't had much practice, said the Queen. 'When I was your age, I always did it for half-an-hour a day. Why sometimes I've believed as many as six impossible things before breakfast.'

It is with this splendid example in mind that we can approach the problem of believing in the impossible proposition that all Chinese are Negroes. When I've finished with you, you will not only believe it, but you'll wonder why we are even debating it. It's obviously true.

Before establishing the fact, let us recall George Orwell's frightening novel *1984*, in which the concept of 'Double think' was introduced. Due to Double think we learnt that War is Peace, and

Freedom is Slavery. We found out that the Ministry of Love ran the Secret Police; the Ministry of Truth handled Propaganda; The Ministry of Peace ran the War; and the Ministry of Plenty controlled food rationing. What splendid stuff Double think is. It liberates the mind from the shackling constraints of reason, and permits us to explore the world of the insane without any danger of being tapped there.

It is of course much better if you can actually prove the impossible, rather than just have it asserted. For example, it is a well known fact that, with the exception of Manx cats, all cats have one tail. However it is a simple matter to prove that they actually have three. The proof follows at once from the absolutely true premises that no cat has two tails, whereas any cat has one more tail than no cat. Therefore all cats must have three tails.

Before venturing into the field of formal logic, I must remind you of the grave consequences of arguing from a false premise. Indeed it is possible to prove any absurdity if you start off incorrectly. When I was studying post-doctoral mathematics my old Professor warned me of this, and I was brash enough not to believe him.

'What rubbish Sir' I said. 'Do you mean to tell me that if we believed two equals one, that you could prove that I am the Pope?'

'Trivial my boy' he replied. 'You and the Pope are two; therefore you and the Pope are one.'

He could outdrink me too.

This brings us to our fundamental premise which must be clearly understood if we are to proceed. The premise is rigorously true and can be stated as follows:

'A implies B if and only if No B imples No A'

We can illustrate this by the mathematical example $2 + 2 = 4$. This is true if and only if all numbers which are not equal to 4 are not equal to $2 + 2$ either.

Another example occurs in meteorology. We all know that the presence of rain implies the presence of cloud, noting that the converse is not true. However the premise that rain implies cloud is true if and only if no cloud implies no rain, and this is of course equally valid.

This important logical premise can be exploited in scientific research. For example a meteorologist who wished to establish the hypothesis that rain always implied cloud, but disliked getting wet, could just as easily conduct his investigations on cloudless days. He would soon discover that no cloud implies no rain, and thus prove his theory.

I am reminded of the armchair ornitholigist who wanted to prove that all crows are black. He hated going outdoors, so he decided to stay in his study and prove the contra-hypothesis, that is, that all non-black objects are not crows. He first of all examined his blotting paper and correctly observed that it was a non-black object. Closer inspection revealed that it was not a crow either. He went around his study doing the same thing with his pen, slippers, spittoon, siamese cat, and many other non-black objects. At the end of the day he was exhausted but triumphant. All crows are black, beyond reasonable doubt.

We are now equipped to use this method of attack in the problem of proving that all Chinese are Negroes. I was unable to find any Chinese who were prepared to assist me, and the one Negro I approached intimidated me with a switch blade knife. I was in dispair until I remembered my old friend, the armchair ornithologist. Here was the answer. The proposition that all Chinese are Negroes is true if and only if all non-Negroes are non-Chinese. And any fool can see that's true. I've never met a non-Negro yet who wasn't non-Chinese. My dear readers, the case *for* is therefore established to virtual certainty. I thank you.

I.F. McKIGGAN

JOURNAL BACK ISSUES

Stocks of the following back issues of the Journal are available:

Vol 1 No 1 August, 1975
Vol 1 No 2 November, 1975
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Vol 2 No 2 May, 1976
Vol 2 No 3 August, 1976
Vol 3 No 2 May, 1977
Vol 3 No 3 August, 1977
Vol 3 No 4 November, 1977
Vol 4 No 1 February, 1978
Vol 4 No 2 May, 1978
Vol 4 No 3 August, 1978
Vol 5 No 1 February, 1979
Vol 5 No 2 May, 1979
Vol 5 No 3 August, 1979
Vol 5 No 4 November, 1979
Vol 6 No 2 May, 1980
Vol 6 No 3 August, 1980
Vol 6 No 4 November, 1980
Vol 7 No 1 February, 1981
Vol 7 No 2 May, 1981

Back copies may be purchased from the Institute at $2.50 each ($7.00 for Vol 1 No 1), which price includes postage. Write to the Treasurer, Australian Naval Institute, PO Box 18, Deakin, ACT, 2600.

NOTICE OF
ANNUAL GENERAL MEETING

The Annual General Meeting will be held at 2015 on Friday, 20 November 1981 at Legacy House, Allara St., Canberra ACT.

AGENDA

1. Confirmation of minutes of the Annual General meeting held on 24 October 1980.
2. Business arising from the minutes.
3. President's Report.
4. Auditor's Report.
5. Annual Subscription.
6. Election of the officers of the Institute and the Ordinary Councillors.
7. Appoint an Auditor and fix his remuneration.
8. Other Business.

ELECTIONS

Office Bearers:

The Office Bearers of the Institute are:

a. President
b. Senior Vice President
c. Junior Vice President
d. Treasurer
e. Secretary
f. Editor

Council

The Council of the Institute consists of:

a. The Office Bearers
b. Ten regular members known as Ordinary Councillors

Qualifications

Only regular members may hold office.

Nominations

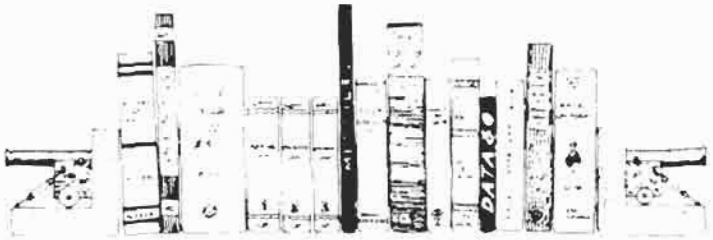
Nominations of candidates for election are to be signed by two members (regular or associate) of the Institute and forwarded to reach the Secretary no later than 6 November. A nomination form is enclosed.

Voting

Only regular members may vote and voting must be in person at the Annual General Meeting.

HONORARY SECRETARY

BOOK REVIEWS



WAR IN 2080, By D. Langford. Sphere Books Ltd. 1979. 242 pp with plates. $5.50.

War in 2080 presents as a classic trap for the reader who judges a book by its cover. The thoughts conjured up by the futuristic double delta winged supersonic fighter which assaults the browser from the cover of the book are quite at odds with its purpose.

David Langford is a physicist and has applied his expertise to matters military. Beginning with 1980 technology, couched in terms that a reader whose schooldays have dimmed can understand, Langford has extrapolated well into the twenty-first century. His chatty style admirably serves to make his presentation enjoyable for the reader.

The scene is set by a brief coverage of the initial impact upon warfare of the technological age. Then he produces THE BOMB. The technical explanations are pleasingly simple and should enable the least scientifically minded reader to grasp all of the essential points.

Lasers are fully covered and for the first time, the reviewer actually understood what they are and roughly how they work. Could a high-power laser system be used as an ICBM defense?

If these revelations are not enough to convince the reader that modern technology is not beyond the grasp of all but those with PhDs in the Sciences, Langford's explanation of Einstein's theories and their application are a must to read.

Having considered the simple use of the nuclear and the laser families of weapons, the reader is invited to consider the use of such techniques to harness natural forces against an enemy. Regrettably, Langford is unable to recommend that one should try to generate an earthquake aimed at the unattributable destruction of an enemy's ICBM arsenal.

The reader will also be pleased to note that Langford does not overlook the fraternity of science-fiction writers, ancient and modern, who have often, it seems, taken handsome liberties with science, to produce fantastic war machines. Nevertheless, he willingly concedes to the possibility that new discoveries may yet save the reputations of some.

Naturally, Langford has not kept his feet on the ground in his search for what lies ahead. Neither the sun and the moon, nor the stars and the planets escape his probing mind. Not only does he consider the possibilities of war between Earth and man-built colonies in near space, but also the unknown — the threat from outer space. What should be the reaction of Earth's leaders when confronted by emissaries from other galaxies — 'aliens yet to come ... whose craft can be photographed without either fogging the film or bearing an uncanny resemblance to portions of old vacuum cleaners'.

The common belief, that the speed of light is an absolute limit, is not blithely accepted. The mysteries of black holes and the complex opportunities available to wreak destruction throughout space almost condemn our simple, present day thermonuclear weapons to the ranks of damp squibs.

For those who seek to study the art of war in the future and need a technological scenario, Langford has provided a most useful reference with concise chaptering and a handy index. Additionally, he has not allowed the realms of technological possibility to override the fundamental fact that war is evil —

> "You need proof that war is irrational?
> The German General Staff lost more World Wars than any major power.....and everybody adopted the general staff concept from (them)."

G. MACKINNELL

HMAS MELBOURNE — 25 YEARS. By Ross Gillett. Nautical Press, Sydney, 1980.

HMAS *MELBOURNE*, the backbone of RAN strength for the last naval generation, has richly deserved her reputation as a 'Grand Old Lady' and it was fitting that her unique history be recorded to mark her 25th anniversary in 1980.

Ross Gillett has drawn on his own experience and the talents of a small but enthusiastic band of assistants to produce, in short time, a publication appropriate to the occasion. It is a combination of informal photographic history and line book which will be a worthy souvenir in the truest sense.

While the book may not be as durable as the souvenir silver plate also issued to mark the anniversary, it will provide for its buyer a complete record of the ship's movements, an exhaustive photographic record of the ship and her changing aircraft types and a smattering of line book humour and press clippings which marked the significant milestones in her life. It is a little unfortunate that the series of photos of Commanding Officers is not complete but this will only worry the purist and not the majority of buyers who will probably be found in the anniversary crew list at the back of the book.

This reader was provided with a pleasant trip down memory lane in a book which, unlike some of its kind, is well edited and free of annoying misprints. Nevertheless, although having served in *MELBOURNE* on two occasions, I am not moved to buy it as I am not by nature a souvenir collector. It will be of most value to those who served in her in 1980, to those with fond memories and, as it represents the sole consolidated record of her life so far, I recommend it to reference libraries and naval historians.

The book is available from the Nautical Press, Suite 16, 280 Pitt Street, Sydney, N.S.W. by mail order at a cost of $4.50 (postage 50¢).

R.S. BLUE

CONVICTS AND EMPIRE: A NAVAL QUESTION By Alan Frost, Oxford University Press, Melbourne, 1980. Price $25.00

In this well researched study, Alan Frost seeks to show that more urgent and important factors than just the requirement to rid Britain of its convicts lead to the settlement of New South Wales.

Convicts and Empire is a complex study. It deals with British, French and Dutch policy, intrigue and actions. Events are not discussed chronologically mainly because of the delays in communications between Government and far flung outposts of the Empire. How 18th century on-line encrypted HF circuits would have changed history!

To make his arguments easier to follow, Frost has divided each chapter into titled sections. Not only does this make reading easier it enables the reader to go back to refresh his memory on a point missed.

Alan Frost's main thrust is that the struggle for control of India and the East between Britain and France was based on maritime might. Often naval actions were broken off as smashed spars, torn sails and lack of cordage made warships unserviceable. The fleet which replaced these items quickly won the next battle or was able to blockade the enemy in harbour. In the years to 1790 the British Fleet was stored and repaired from Europe.

The book is dedicated to Matra, Young, Call and Banks — loyalist, naval captain, merchant and scientist — these men convinced Prime Minister Pitt that suitable timber and flax could be harvested in New South Wales. Frost's views on Pitt and his Home Secretary, Lord Sydney, are most illuminating. The results of Pitt's policies were that the new colony at Sydney was able to contribute logistically during the 1803-15 war against France. In turn Britain was able to dominate the Indian and Pacific Oceans for one hundred years.

Just in case he has not convinced the reader, Frost has added an appendix entitled 'The case against the Pitt Administration's having had commercial motives for colonizing New South Wales' — 11 pages to spell out then squash those views contrary to his own.

A book for those interested in either our British beginnings, colonisation, European politics or naval logistics. He did succeed in convincing me.

G.P. KABLE

JOURNAL BINDERS

Journal binders are available (as illustrated) from the Treasurer, price $6.00 each including postage. Coloured blue, with gold lettering and ANI crest, each binder will hold 12 copies of the journal (3 years' supply) by means of a metal rod which is inserted simply through the middle page of the journal and held firmly at top and bottom of the binder. Plastic envelopes on the bottom of the spine enable volume numbers or years to be inserted.

NAVAL INSTITUTE INSIGNIA

The Council of The Australian Naval Institute advises that cuff-links and mounted crests featuring the badge of the Institute are now available for purchase by Members.

The cuff-links are robustly made and are attractively finished in gold and black. They are epoxy-capped to ensure long life and are packaged in presentation boxes. The price is $7.00 a pair, which includes postage.

The crests are meticulously hand-painted in full colour and are handsomely mounted on polished New Zealand timber. They measure 175mm x 130mm (5"x7"). The price is $13.00 each, which includes postage.

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NOTICE OF
ANNUAL GENERAL MEETING

The Annual General Meeting will be held at 2015 on Friday, 20 November 1981 at Legacy House, Allara St., Canberra ACT.

AGENDA

1. Confirmation of minutes of the Annual General meeting held on 24 October 1980.
2. Business arising from the minutes.
3. President's Report.
4. Auditor's Report.
5. Annual Subscription.
6. Election of the officers of the Institute and the Ordinary Councillors.
7. Appoint an Auditor and fix his remuneration.
8. Other Business.

ELECTIONS

Office Bearers:

The Office Bearers of the Institute are:

a. President
b. Senior Vice President
c. Junior Vice President
d. Treasurer
e. Secretary
f. Editor

Council

The Council of the Institute consists of:

a. The Office Bearers
b. Ten regular members known as Ordinary Councillors

Qualifications

Only regular members may hold office.

Nominations

Nominations of candidates for election are to be signed by two members (regular or associate) of the Institute and forwarded to reach the Secretary no later than 6 November. A nomination form is enclosed.

Voting

Only regular members may vote and voting must be in person at the Annual General Meeting.

HONORARY SECRETARY

SUBSCRIPTION FOR YEAR

1 OCTOBER 1981 TO 30 SEPTEMBER 1982

The Secretary
Australian Naval Institute
P.O. Box 18,
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SUBSCRIPTION NOW DUE

I, ...
(initials) (Surname)

Membership number . . . . . .
enclose the sum of $15/$7 (see note 4) as my subscription to the Institute for the 1981/82 financial year.

NOTES

1. Payment is due on or before 1 October 1981.
2. Cheque should be payable to the Australian Naval Institute.
3. Payment should be made in Australian currency.
4. Subscription is $15.00 but members who joined between 1 July 1981 and 30 September 1981 pay only $7.00 (unless lower rate paid on joining).
5. Use reverse side to notify change of address, if appropriate.

FOR OFFICE USE ONLY

Membership Register . . . . . .

Address change . . . . . .

Fees received . . . . . .

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I, ...
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Membership number ..... nominate:

	NOMINEE	FOR POSITION	SECONDER	SECONDER'S SIGNATURE
a.	.....	.....	.....	.....
b.	.....	.....	.....	.....
c.	.....	.....	.....	.....
d.	.....	.....	.....	.....
e.	.....	.....	.....	.....
f.	.....	.....	.....	.....
g.	.....	.....	.....	.....
h.	.....	.....	.....	.....
i.	.....	.....	.....	.....
j.	.....	.....	.....	.....
k.	.....	.....	.....	.....
l.	.....	.....	.....	.....
m.	.....	.....	.....	.....
n.	.....	.....	.....	.....
o.	.....	.....	.....	.....
p.	.....	.....	.....	.....

Signed .....(proposer) Date .....

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Australian Naval Institute
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NB: To reach the Secretary by 6 November, 1981

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His Excellency the Right Honourable Sir Zelman Cowen,
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Governor-General of Australia

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