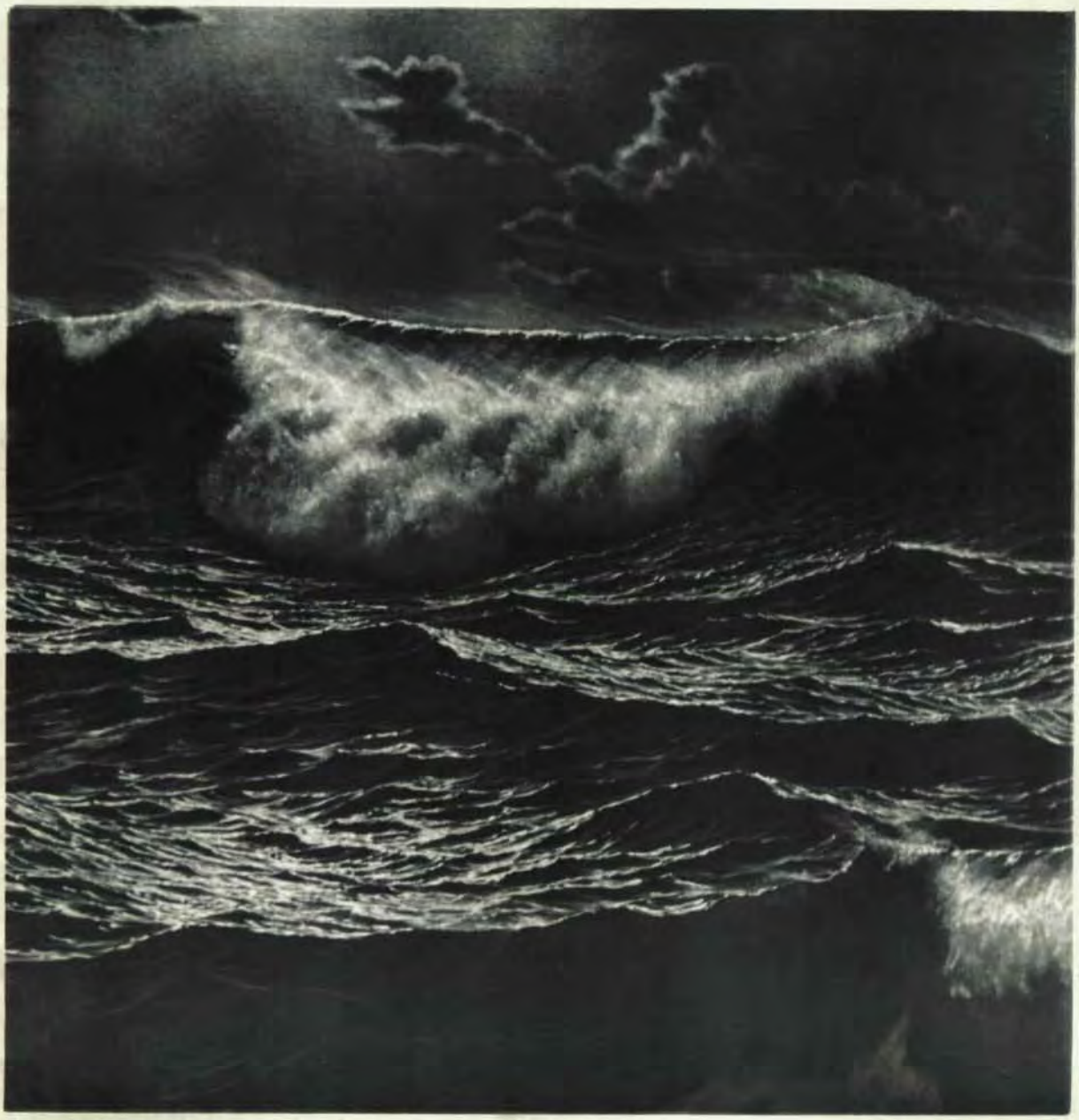
138

JOURNAL OF

THE AUSTRALIAN NAVAL INSTITUTE



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1974-75

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JOURNAL OF THE AUSTRALIAN INSTITUTE (INC.)

CONTENTS

CREST COMPETITION

The Council has authorised a competition for a crest suitable for adoption by the Australian Naval Institute. The competition is open to all members. The submission should be as simple as practical bearing in mind the costs associated with reproducing intricate designs. Once adopted the crest would be used on all official stationery and the Journal and if sufficient demand was forthcoming lapel badges, tie pins, cuff links could also be made available. The submission should be topical and linked with Australian Naval Institute aims. All contributions will be considered by the Council. A prize of 3 years subscription will be awarded to the originator of the winning design. If no design is considered to have sufficient merit then other avenues will be explored. Entries close on the 1 November 1975 and should be addressed to the Secretary, PO Box 18, Deakin, A.C.T. 2600.

NOTE

Members are also invited to send in comments and suggestions for improving this, your own professional journal. Letters and contributions are requested for future editions of the journal.

MEMBERSHIP

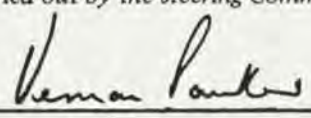
The A.N.I. needs members – details inside back cover.

OUR COVER

The front cover picture is a reproduction of a painting by Dennis Hardy, by courtesy of Mr. A. E. Stephen of Surfers Paradise.

From the President

It gives me great pleasure to write this first message to members of the Australian Naval Institute. In the years to come many people will write for the Journal and so it is with this certainty and also the belief that the Institute will grow and go from strength to strength, that prompts me to say that at last, we people devoted to the advancement of professional knowledge with respect to maritime affairs from an Australian stand point, have a forum dedicated to expressing such views. We should be proud to belong to the Institute and having got off to such an auspicious start we can be quite confident about the future. I would like to express my appreciation of the hard work carried out by the steering Committee and others associated with our beginning and also to thank you for the honour of electing me the first president.



THE AUSTRALIAN NAVAL INSTITUTE – HOW IT BEGAN

In October 1973, late one night, when usually the most eloquent arguments are propounded, the clearest statements made, and the Navy is put to rights V. Parker and J. Robertson came to the not original conclusion that what is needed is a Naval Society. During the following few months the idea was discussed with various people to gain some indication of support. Thus it was on 12 July 1974, 16 officers met in the Conference Room of Navy Building 2, Russell Offices, Canberra to more formally discuss the proposal. At this meeting the formation of a Naval Society, with the broad aims of encouraging and promoting the advancement of knowledge related to the Navy and the maritime profession and to provide a forum for an exchange of ideas related to the Naval profession, received encouraging support. A Steering Committee was formed consisting of V. Parker, J. Robertson, L.G. Fox, W.B. Loftus, A.M.F. Summers, N.E. McDonald and K.W. Grierson. Several Meetings of the Steering Committee then followed, under the Chairmanship of W.B. Loftus and drafted a constitution for consideration by the Registrar of Companies for Incorporation in the ACT. It was decided that the Society should be called the Australian Naval Institute and on 2 October 1974 a letter was forwarded to the Minister of Defence requesting approval to use the word "Naval" this being a specified word for the purposes of the Defence (Prohibited Words and Letters) Regulations. The proposal received out of session Naval Board support. Notwithstanding, it was not until 15 January 1975 that the Minister's approval dated 7 January 1975 was received. Meanwhile membership was slowly increasing and reached 30 by 21 January 1975.

With Ministerial approval to use the word Naval our Honorary Solicitors were instructed on 21 January 1975 to formally seek incorporation. A most extraordinary series of events then followed. At first the Registrar did not like our objectives. Then he thought the use of the word Naval should be referred to the Attorney-General. When it was pointed out that the Minister of Defence had approved this the Registrar then demanded to see the original of the approval and not to receive this through the Officers of the Institute but direct from the Department of Defence. You may draw your own conclusions from this stipulation. In any event the Registrar referred the whole question of incorporation to the Attorney-General in early March 1975. In early April the Attorney-General queried whether the Australian Naval Institute was associated with the Navy League or Naval Association, which at the time, you may recall, were issuing statements to the press on Naval policy. The Attorney-General was informed that we had no association with these two bodies and for that matter with any other organisation. Frustrated by these delays and in expectation of an earlier consent to our application a Special General Meeting had been set down for 4 April 1975. This was duly held and an interim Council elected, an Auditor appointed and a paper "Law of the Sea-Defence Implication" was delivered by Commodore K.D. Gray DFC ADC RAN, an historic first. On the books on that date were 57 foundation members.

The Attorney-General gave his consent in April 1975. The Registrar approved the publication of an advertisement in the Canberra Times on 24 April 1975 giving notice of the intention to form the Australian Naval Institute. The ANI was formally incorporated on 10 June 1975 at which time the membership stood at 68. In all, twenty months from conception to realisation.

Law of the Sea—Defence Implications

Address given by Commodore K.D. GRAY DFC, ADC, RAN at the inaugural meeting of the Australian Naval Institute on 4 April 1975.

Most of you will be aware that the second substantive session of the Third UN Law of the Sea Conference is being held at present in Geneva. This follows the first substantive – and inconclusive – session which was held in Caracas from June through August last year. That session was held after three years of preparatory meetings, with sessions held in New York in the period March/April and in Geneva in July/August of each year.

By your presence here this evening, as members of the Naval Institute, you lady and gentlemen are expressing your concern for naval matters. I wonder, however, how many of you realize the potential which the present conference has for the future employment of navies. In my talk I will try to identify these issues which have implications for sea power and to discuss those issues.

I do not intend to delve back into history except to invite your attention to the First and Second UN Conferences on Law of the Sea, held in 1958 and 1960. Those conferences were successful in codifying a number of customary and traditional aspects of international law as they applied to the usage of the sea. They failed, however, to find compromise solutions on two principal issues – the breadth of the territorial sea and the limits of exclusive fishing rights.

Thus in the late 1960s it was recognized that the 1958 Conventions were no longer suitable to the requirements of the last part of the 20th century and beyond.

- Less than one third of all independent states subscribed to those conventions
- A large number of independent states had no representation at the conference which had codified existing law
- A large number of smaller states were concerned that the oceans of the world were becoming the preserve of the great maritime powers who could exploit them to their advantage ignoring the aspirations of the developing states
- The security and the environment of the coastal states were seen to be in jeopardy.

With these things in mind, the General Assembly of the United Nations decided to convene a third Law of the Sea Conference. The Conference was charged with:

- The development of an equitable international regime for the area of the seabed beyond national jurisdiction which is declared to be "the Common Heritage of all Mankind".
- Establishing a precise definition of the area.
- Studying and making proposals covering a broad range of related issues including:
  - the regime of the high seas
  - the regime for the continental shelf
  - the regime for the territorial sea (including the question of its breadth and the matter of passage through international straits)
  - the Contiguous zone
  - fishing and conservation of the living resources of the high sea
  - the preservation of the marine environment and scientific research

The issues which are of particular defence significance are:

- the territorial sea
- the economic zone
- archipelagos
- straits
- regime of islands
- marine pollution
- scientific research

Territorial Sea

There is a little doubt that an overwhelming majority of countries favours a territorial sea not exceeding 12 nautical miles in breadth. However,

many hold important reservations and exceptions relating to this issue, namely:

- The maritime powers would accept an extension of the terrotirial sea to a maximum breadth of 12 miles only if there is an assured right of passage through and over straits (and archipelagos).
- The African Group is reserving its position on the breadth of the territorial sea pending acceptance or otherwise of the extensive economic zone concept, with a maximum breadth of 200 miles for that zone.
- Some of those countries which already claim a territorial sea in excess of 12 miles have constitutional problems in conceding a narrower limit.

Within the territorial sea there is general agreement that a right of innocent passage should be preserved. At the same time it is accepted that existing rules governing innocent passage through the territorial sea are capable of subjective interpretation and that objective rules, specifying what constitutes innocent passage or what constitutes passage which is not innocent, are needed. Within the territorial sea there is a general agreement that coastal states shall exercise sovereignty, including the right to impose their own pollution standards and to control scientific research.

The rules governing innocent passage likely to be developed will undoubtedly restrict the freedom of warship movement in the territorial sea. In areas outside archipelagos and straits this is acceptable, however, as, outside these areas, passage through the territorial sea of a foreign state by a warship is more in the nature of a navigational convenience than a necessity. I will discuss the issue in respect of straits and archipelagos later.

Economic Zone

The concept of an economic zone received wide support at Caracas, but there were divergent views on the extent of the zone and the conditions applicable within it. The most common breadth referred to is 200 miles and this receives the support of perhaps as many as 100 states. Some states, including Australia, wish to see the zone extended, in respect of the sea-bed and sub-soil thereof, to the outer edge of the continental margin where that lies beyond 200 miles.

There is divergence whether:

- a coastal state should enjoy sovereignty, sovereign rights or jurisdiction within the zone;
- the zone should relate to all living resources or only to living resources which are not highly migratory or which are not anadromous;
- a coastal state should impose its own standards of pollution control within the zone or only international standards;
- there should be freedom to conduct scientific research, except as it may affect the coastal state's right of exploration and exploitation, or whether all scientific research should be subject to the authorisation of the coastal state.

There is general agreement that there should be freedom of navigation and overflight within the zone although the status of the waters has not been defined. In this regard, however, there is concern that the right of coastal states to impose their own pollution standards within their economic zones could erode freedom of navigation. The concept of an economic zone of 200 miles would have the effect of denying access to the world's oceans, except through the economic zone of another state or states, to more than 60 coastal state countries. Thus, if each state imposed its own standards of pollution control, there would be a potential for those states to be "zone-locked" and each subject to the whims of its neighbours for access to its own territorial sea and internal waters. The burden of conforming to a whole series of separate regulations could become a significant barrier to world trade. The developing coastal states, on the other hand, are concerned that unless they have this right, together with the right to control scientific research within the zone, the concept will be meaningless.

In addition to the navigational problems there would be a danger that unduly restrictive standards imposed by a particular state could provide potential for the dispute between neighbouring states or between the coastal state and states the maritime traffic of which passed through a particular zone.

The USSR has made it clear that its support of the concept is part of a package which would include unimpeded transit rights through straits and archipelagos. The maritime powers insist that

a coastal state should have only those rights necessary for the exploration and exploitation of the resources of the zone.

In relation to the economic zone concept it will need to be noted from a Defence aspect that an extension of coastal state jurisdiction over a broad zone, probably 200 miles wide, could substantially increase the surveillance task where this remains a Services' responsibility. It will be necessary to ensure that a coastal state's jurisdiction and rights are not infringed and, if living resources are included in the concept or if broad coastal state jurisdiction over fisheries is included under separate provisions, there will be a responsibility placed on the coastal state to exercise management over fisheries resources. This is likely to entail surveillance to ensure that only authorised foreign fishing fleets operate in prescribed areas, that they fish only for authorised species to a specified level of catch, and that they fish only with approved gear etc. Not only will the extent of the area be greatly increased but offshore surveillance, to a range of 200 miles, will require surveillance platforms with different characteristics.

Straits

The question of passage rights through international straits remains perhaps the dominant issue of the Conference. There are now three contending views on this issue.

The first, held by a dozen or so states which dominate strategically important straits such as Gibraltar, Bab el Mandeb, Hormuz, Tiran and Malacca, is that the concept of innocent passage should apply to the territorial sea wherever it occurs. There would be no right of submerged passage, except perhaps after seeking authorisation or providing notification; there would be no rights of overflight. The only concession in respect of straits would be that there would be no right to suspend innocent passage.

A second view, supported by most developing states, other than those in the first category, and perhaps commanding a simple majority of the Conference at present, accepts the need for a separate regime of passage through straits used for international navigation. Under such a regime it is envisaged that there should be assured rights of unimpeded passage for all merchant ships but warships would be required to seek authorisation or provide notification. Submarines would be required to travel on the surface; there would be no rights of overflight.

The third view is expounded by the maritime powers. This group is adamant that it will not agree to a Convention which does not provide a separate regime of passage through the territorial sea where it occurs in straits used for international navigation. They require transit rights through and over these areas for all categories of ships and aircraft, including submerged passage by submarines, without authorisation or notification. They would, however, be prepared to conform to sealanes and traffic separation schemes. This category of states argues persuasively that:

- the dozen or so states which dominate the strategically important straits should not determine the balance of maritime power;
- given the right to control military traffic through these straits the coastal states concerned would hold an instrument of considerable political and economic pressure;
- in exercising their right to allow passage by the ships of one state and refusing it to another, a coastal state would expose itself to the threat or use of force by the latter;
- warships transitting a strait do not pose a threat to the security of the coastal state.

A further determinant of the final position adopted by states in respect of passage through straits will be the definition adopted for "International straits". Most states would not have any problem with a definition which applied only to straits leading from one part of the high seas to another part of the high seas. Many would have problems with a definition which applied to straits leading from one part of the high seas to the territorial sea of a foreign power, but if justice is to be done to those countries – such as Israel – whose access to the high seas is through the territorial sea of another State or States, then provision needs to be made to cover this situation.

Archipelagic Concept

For over 50 years a number of learned societies and academics have produced studies and given varying degrees of support to the archipelagic concept, recognizing that these geographical features required a special status because of the importance of the waters within an archipelago to its social, economic and political unity. At the

Hague in 1930 and at the 1958 and 1960 Geneva conferences the matter was raised but failed to attract much support. Following the 1960 Conference the Philippines and Indonesia made unilateral claims that the waters enclosed within straight baselines connecting the outermost points of the outermost islands constituted internal waters. Indonesia conceded, as a facility and with the right to withdraw it at will, a right of innocent passage through the area; the Philippines maintained there was no such right. The international community did not accept these unilateral claims.

In the preparatory committee of the Conference Indonesia and the Philippines were joined by Fiji and Mauritius in seeking support for recognition of the concept. They developed criteria delimiting archipelagos, the status of archipelagic waters and a regime of passage applicable to those waters. Their initial proposals attracted a good deal of opposition, particularly from the maritime powers which feared that acceptance of the concept could lead to a situation where extensive areas of what the international community regarded as high seas would come under national jurisdiction and that commercial and military deployments could become severely restricted.

Observing that many of our neighbours are archipelagic states or potential archipelagic states Australia made a careful analysis of the concept. You will appreciate that it is important both to our trade and to our strategic deployments that it is important that passage through these areas should be as free of restriction as possible. At the same time we were anxious to satisfy the valid and reasonable aspirations of our neighbours. In particular we were sympathetic to the special relationship of archipelagic waters to an archipelagic state:

- that they are a medium which has a potential either for national unity or divisiveness;
- that their resources are of special significance to an archipelagic people so that the archipelagic state needs control over the resources and the authority to preserve and protect them against foreign exploitation and pollution;
- that an archipelagic environment is particularly susceptible to seaborne infiltration;
- that Indonesia especially, because of its strategic position, is an area of potential major power confrontation – and thus there could be prospect for such a country to be unwillingly involved in a conflict situation between those powers.

In the late states of the preparatory Committee's discussions Australia gave support to the archipelagic concept. That support was subject to the qualifications and suitable criteria, limiting archipelagic claims to those states which are genuinely archipelagic in character and limiting the extent of individual archipelagic claims, should be found. In addition we insisted that there should be assured rights of transit, at least on the surface, along sealanes through archipelagos for all categories of ships. Following our lead, a number of the maritime powers conceded that they could accept the concept subject to a suitable regime of passage being developed.

The archipelagic states further developed and revised their proposals in the light of this qualified support for the concept. At Caracas, Indonesia, on behalf of its archipelagic co-sponsors, gave an assurance that it was prepared to grant a right of innocent passage throughout archipelagic waters for naval and merchant ships, and that it would provide transit lanes, following navigational routes, in which warships and ships with special characteristics would have passage rights.

A further complication arose at Caracas when a number of continental states with off-lying archipelagos sought a similar status for those archipelagos as has been developed for archipelagic states. Many states, sympathetic to the special case of archipelagic states, see this as a resource grab by those continental states. If the two categories cannot be separated there is a real risk that the archipelagic concept could be rejected.

Warship Passage

In the debate related to passage – in the territorial sea, in the economic zone, in straits and archipelagos – there is a clear trend towards restricting the rights of warships. Most developing states recognize that freedom to trade is essential to their own development and that unnecessary restrictions on merchant ship movements would be to their disadvantage. They see, however, freedom of warship movement as a threat to their national security and to world peace. If there were no other pressures it is likely that there would be sufficient support in the Conference to severely

restrict warship movement. On the other hand many States are convinced that the major powers will not sign a Convention which unduly restricts this movement. In the end much will depend on the credibility of the major powers and the extent to which developing states consider that a Convention to which the major powers did not subscribe would have any value.

Regime of Islands

The question of the ocean space generated by islands has become a major issue as a consequence of the likely recognition of a broader territorial sea and the likely acceptance of the economic zone concept. Some states are seeking to establish criteria that would limit the ocean space (i.e., the territorial sea and economic zone) generated by islands according to their size, population, contiguity to the principal territory, location relative to the continental shelf of another country, and their geomorphological structure and configuration. Others are concerned to ensure that all islands retain full value. If some limitation is not imposed a number of minute islets or rocks – some of them of disputed sovereignty – could attract considerable economic importance. This importance could lead to sovereignty disputes.

Summary

In summary there is little doubt that the traditional freedom of the high seas, at least for warships, will be eroded. The extent of the high seas themselves will be reduced.

At best warship movements will not be restricted unduly. In the territorial sea, outside straits and archipelagos, they may be obliged to conform to certain restrictive rules or to remain outside the territorial sea. Through straits and archipelagos warship movement is likely to be restricted to sealanes; in the case of archipelagos, unless these sealanes are extremely broad, there could be a threat to the security of deployments from, particularly, submarines which took up offensive waiting positions. On the other hand, in times of tension, it is dubious whether transitting forces would conform to the sealanes. The economic zone concept should pose no barrier to warship movements.

In the worst case warships movements could be severely curtailed. They could be debarred from the territorial sea completely, wherever it occurs, except with the express approval of the coastal State concerned. They could be obliged to provide notification of passage and perhaps have to seek authorisation for passage of sealanes through archipelagos. They could be debarred from the economic zone of foreign states. The implications of the worst case situation would be to restrict, effectively, warship movement to their own areas of maritime space.

The Convention which I see as being acceptable to the necessary majority, including the major powers, would contain the following elements relevant to Defence interests:

- a territorial sea of 12 miles maximum width in which a coastal state would have sovereignty, but through which it would be required to provide a right of innocent passage and with what constitutes innocent passage being spelt out.
- an economic zone of 200 miles width in which a coastal state would have sovereign rights over the resources of the zone and the powers necessary to ensure that it could explore and exploit those resources. The international community would enjoy the right to navigate and overfly the zone provided its activities did not interfere with the exploration and exploitation by the coastal state. The resolution of competing rights will be the most difficult issue to be resolved before the Conference. The extent to which a coastal state may control pollution within the zone will be the most difficult right to resolve.
- acceptance of the archipelagic concept applicable only to archipelagic states, under which such states could draw straight baselines joining the outermost points of the outermost islands. Waters within would be archipelagic waters, the territorial sea and the economic zone would extend outwards from these baselines. There would be a right of innocent passage, applicable to all ships, throughout archipelagic waters. In addition there would be wide transit lanes, following main traditional navigation routes, through which warships and ships with special characteristics could take passage, including submerged passage, without notification or authorisation.
- a special regime of passage through straits used for international navigation and which lead from one part of the high seas – under which all categories of ships and aircraft

would have a right of passage without notification or authorisation. Passage may be restricted to sealanes and obliged to conform to traffic separation schemes, including vertical separation schemes for aircraft and submarines; restrictions are likely to be placed on the activities in which a warship or aircraft may engage while exercising transit passage.

In conclusion I wish to recount my two recurring nightmares.

In the first the Conference breaks down. A very large number of States, perhaps in excess of 100, takes unilateral action to declare vast areas of ocean space to be national territorial seas through which passage may be taken only with the consent of the coastal State. The terms of passage could include the imposition of tolls, impossible standards of ship construction, manning and equipment. Warship passage could be debarred. The potential for dispute is too horrific to contemplate.

In the second, not so violent, the Conference agrees to a Convention which is not acceptable to the super-powers and some other maritime and fishing states. This is a disturbing prospect as there are many countries which believe that it is not possible to accommodate this group of States within a Convention. The prospects for dispute potential would still be considerable.

The Author

Commodore Kenneth Douglas Gray DFC, ADC, RAN was born in 1921 in Melbourne and educated at Dandenong High School. He was a member of the RAAF between 1941-46 and saw service in Southern Rhodesia, Europe and Northern Australia. He was awarded the DFC in 1943. Commodore Gray joined the RAN in 1948 and was promoted Commander 1957, Captain June 1966 and Commodore in January 1975. He attended the RN Staff Course in 1960. Appointments held since then include Naval Member Joint Planning Staff 1963-64; Naval Officer Commanding North Australia 1965-66; Director of Plans, Navy Office 1967-68; Australian Naval Representative UK 1969-71 and Leader Joint Policy Staff 1972-74. He was the Defence representative on the Australian Law of the Sea Delegation at international Confetences in New York, Geneva and Caracas during 1973 and 1974. Commodore Gray is currently serving in the Department of Defence.

CLASSIC SIGNALS

Readers are invited to forward details of any classic signal with which they have been involved, or which has come to their notice:-

> the famous or infamous quote, the perfect squelch or the silly corruption and its consequences.

Please keep contributions brief (and anonymous if you wish), – but, hopefully, humourous, if not otherwise inspiring!

"The Admiral's Dinner Party"

"A decade or so ago the RAN Flagship was about to visit a S.E. Asian port after some weeks at sea and final details of the visit were arranged by signal.

One item on the Admiral's programme was a dinner for 12 local dignitaries in the "cuddy" on the first evening of the visit. However the text of the message on this matter suffered a corruption in transit and the authorities ashore set about inviting 120 guests, which did not seem unreasonable in such a populous country.

The flagship duly arrived in harbour and everything proceeded according to plan. However, as the day wore on the Admiral's secretary became increasingly puzzled and perplexed as he received scores of acceptances to the dinner party. The final count, shortly before the event was due to begin, amounted to over 100 guests.

While the Admiral was considered capable of producing a loaves and fishes miracle and the retinue and ships staff were ready and willing to cope with the crisis, the main problem was seating and hosting so many VIP's. The solution really was simple – the large overflow of additional guests was shown to the Wardroom and all available officers onboard participated as hosts. It turned out to be a very successful function – but the Flag Lieutenant and the communicators were not allowed to forget the incident for some time, even though the error in transmission was traced to a shore radio station which relayed the original message.

NOTE—In future it is hoped to introduce a column on Technical Topics for the "Plumbers" and "Weaponeers." Views and copy are required for this column. Please send in your contribution.

Naval Manpower Management in the Next 25 Years

This paper by Commander B. L. Spark won first prize in the Officer Section of the 1973 Peter Mitchell Trust Essay Competition and is reproduced here by permission of the Naval Board. The views expressed by the author are his own and not necessarily those of the Australian Government, the Department of Defence, the Naval Board or the Australian Naval Institute.

"Naval Manpower Management" is a cold label for a subject which is anything but cold. As a phrase it leads the mind straight to consideration of organisational matters such as pay, conditions of service, promotion prospects, living standards and technical qualifications. Whilst these are important factors which will be discussed, they form no more than the framework within which management is exercised. A sound framework is necessary in order to enable managers and managed to go about their business, but inspiration in leadership will continue to be vital for the maintenance of a complex society, the Navy, for the next quarter of a century. For this reason it is hoped that the following examination of the subject will be recognised always to be seeking a navy in which genuine affection, understanding and pride are fostered, and in which the authority and experience of managers are developed and supported for the benefit of those who are managed.

The Navy has just been referred to as a complex society. Resentment has been known to be aroused in sections of the community by any suggestion that the Navy is "different". There is a strong desire to equate the Navy to civilian life and to seek to apply civilian criteria to the serviceman's conditions. This is a mistake. Unless any grouping of men under particular circumstances is managed appropriately for those circumstances, they will be managed badly, and this applies as much to the Navy as it does to similarly identifiable groupings such as office workers, airline pilots, and clergymen. The services are different only in that they are uniquely self-contained societies with comprehensive levels of management, and in their respective environments, self supporting balanced mixtures of trades and professions working to a single common purpose.

Twenty-five years is a long time. Technical progress in the last quarter century has been immense, and the possibilities before the end of the century are infinite. But the nature of humanity changes much more slowly, and man is not very responsive to dramatic or drastic changes in the manner in which his affairs are conducted. Thus, although change in naval personnel management is consistently necessary and inevitable, it is essential to recognise that the search for such improvement has already been continuous and productive throughout naval history.

Future change should properly be a continuing development from the past, seeking to forecast and avoid change for the worse, and to ensure that evolutionary change is for the better. A navy is singularly defenceless against managerial experiments imposed by authority and can express itself only by reaction after the event. It is a most unsuitable, but attractive, playground for theoreticians. Sudden improvement has sometimes been apparently achieved, but examination always shows that this has been not so much a matter of improvement as dramatic rectification after a period when natural progress has been unfairly retarded.

Satisfactory achievement of a sound and fair framework will produce a placid, contented service in peace, without undue recruiting problems and without troublesome publicity. It may also be totally uninspired and unwilling to fight for fleet readiness at unpopular cost. But there is no purpose in any armed service unless it is prepared for war, and it is the fostering of the abstracts, and their achievement, which is the true business of leadership, in order to assure the spirit within the framework. The longer peace continues the more attention needs to be paid to the spirit by those within the Navy since the nation as a whole will care less and less whether it exists at all.

The custodians of the management of naval personnel are the professional heads of the service. In the past the majority of improvements to both the framework and the spirit of management has come from humane and intelligent application of the experience gained by those who have held concurrent responsibility for ships and men. In the last two decades, in almost all countries of the western alliance, it has been political policy to divest service commanders of autonomy and the free exercise of authority. Argument against this policy may not now be appropriate, but disciplined Services do not benefit from lack of authority in

their leaders, particularly since this spreads downwards. Whilst this factor may not yet be of dramatic importance, it is hard to avoid the conclusion that it will become so within the next quarter century if present trends continue. Again the naval society is not unique. In many other organisations too much weight is today placed on the dictates of outside academics or specialists who do not themselves carry any burden of continuing dedicated responsibility; but disciplined forces are particularly sensitive to the effects of partially understanding imposition against which they have little power of opposition. This matter is of sufficient significance to place it before any consideration of the present day state of either the framework or the spirit because although the Navy is directed by a government, it can be managed only by professional authority.

The framework of conditions as they stand at present is, in the main, sound. There can be little doubt that many of the inequities prevailing until the 1950's have been removed in recent years.

Pay, in particular, is no longer a source of discontent. This could be a dangerous statement if it were to lead to complacency and to erosion by neglect of benefits gained. But in addition to the accepted fairness of present pay rates there can be some confidence that equity will be maintained; not least, because the means has been provided for expression of dissatisfaction by voting with the feet. Until relatively recently, pay was amongst the most explosive of issues, primarily because the human components of the explosive were confined by long engagements and the Discipline Acts. But if pay is no longer a source of discontent it should not be relied upon as an incentive which removes the need for good management. It has become a neutral factor. Pay can be regarded as a sound part of the framework, but it does little for the spirit. Morale, which can in part be described as producing manpower amenable and amiably disposed to being managed, can be heightened by the expectation of increased pay, but once any increase has been achieved this effect on morale is very rapidly neutralised by its being taken for granted.

Conditions of service form the remainder of the framework, and these conditions must always be related to standards enjoyed by the population as a whole. If matters such as organisation, leave, discipline, habitability and length of engagement are viewed in historical terms there has been a startling improvement in the recent past. But if the equation is between the man in the Navy and an equivalent civilian, in differing historical periods, the improvement although positive is by no means as great. The sailor who was hanged for striking an officer must be compared with the countryman hanged for stealing a sheep a hunder or so years ago, and the amount the sailor is fined today for overstaying his leave must be compared with today's financial penalties on the man who is late at the factory. Management must be in an awareness of the relativity of the sailor with his counterpart, and the actual improvement in sailors' conditions with time is largely irrelevant. The purpose of improvement in conditions is to make it easier and more agreeable for the managed to do their jobs, and not with any expectation or hope that the improvement will be appreciated. Gratitude from one individual to another can sometimes affect morale and ease of management provided it is not taken for granted; abstract gratitude from the managed to the system is not a characteristic of people whether naval or civilian since general benefits are very rapidly assumed to have been no more than due.

An aspect of the framework of conditions of service which will occupy a dominant position into the foreseeable future is that of separation. This is generally thought of as applying to the married man but in its fullest sense it has increasing meaning to the single man separated from his girlfriend or even his friends and possessions. It is a problem which will become greater with time, not as a result of increased separation, but because society as a whole is becoming more self-indulgent and unwilling to accept any form of self-denial.

There is no true solution for separation except the ludicrous one of keeping warships within apron string range of home. But it is a problem which can be effectively minimised by imaginative and practical management and by recognising that it is sufficiently significant to justify a degree of enlightened expenditure.

In terms of man management one major fact is frequently not appreciated; this is that with a few noisy and intemperate exceptions the majority of naval people and their wives accept periods of separation as logical and inevitable. What they will not lightly forget or forgive is the apparently minor ancillary irritations which are caused by poor management and financial pettiness. Examples in illustration are not hard to find. The man who is duty watch the first night in his home port after prolonged absence, the technician who labours to rectify equipment prior to going to sea during a brief weekend between absences; the

separation caused by tailoring ships' movements to indulge the rights of the less disciplined groups by pandering to industrial conditions and disputes. These examples involve minor periods, a night here and there, but they produce cumulative dissatisfaction which is infinitely more unsettling than longer planned absences.

Any attempt to deal with separation as a problem to be treated by generalised concessions and conditions of service alone is doomed from the outset. The effect of separation is very personal and once general management has provided for fair, service-wide regulations, it must be recognised that officers directly responsible for men have not only a duty to assess the problems of the individual but also must be delegated the power to take unfettered action when they judge it necessary. Too many of us have lost highly trained and genuinely willing men because "I've been messed about too much", "my wife loathes the Navy although I don't", or "once is enough and it is unreasonable to expect me to accept another deployment already".

There could be no greater error of management than to consider that because all concessions which were judged expedient and practicable had been granted, it was unreasonable for morale related to separation to be anything other than high. This attitude would disregard one of the fundamentals of man management - that the ultimate effective judges of managers are the managed, not the managers.

Possibly one of the clearest and most intractable separation cases is that of a ship deployed for the express purpose of being alongside in a remote port for a considerable time. The example of a DDG sent for overhaul to the USA is worth detailed examination. Within its ship's company there will be married men who mind separation and those who do not, single men who look forward to going and those who would rather not be separated from home for such a long period without the changes of scene normal to a sea deployment. Once it is accepted that separation is something affecting the individual and not the mass it is clear that there is no single generalised concession which will meet the requirement of sound management.

The most obvious concession is an entitlement to family passages and allowances. But there will be many in the ship whose wives cannot take advantage of the concession, either because they are not the travelling kind or because the children are the wrong age. In these circumstances the effect of a beneficial general concession on a particular individual may be positively bad for two reasons; his separation will be aggravated by the knowledge that others have seized the chance, or family tension may be caused by his wife's reluctance to move. The alternatives might be to concede a mid-deployment leave at home or to allow a family visit for a leave period at mid-deployment.

Much depends on the importance which is placed upon maintenance of the spirit of naval manpower. From a minimum of no provision at all, limited improvement is achieved by making a single concession on a take it or leave it basis; but if man management is a primary consideration each man should be given the option of individually choosing one of the three alternatives in the preceding paragraph. Implementation of the latter would not be insuperably difficult, and the cost, although significant, would equate to the overhaul of a single major equipment.

Separation has been singled out for discussion because it is the aspect of management which will in future make the greatest demands in relation to the privileges of the population as a whole. It is also symptomatic of the stage of naval personnel management today. We have progressed from an earlier disregard of men's needs and now have considerate general conditions of service. We face the task of considering the individual and this will in the future demand enlightened general policy and greater trust and delegation to those placed in immediate responsibility, since the latter are the only people who can know the individual man.

The only other aspect of the framework selected for brief discussion is habitability, as here by seeking the impossible we are in danger of being counter-productive.

Living conditions at sea are likely to lag behind the material comforts to be found ashore no matter what resources are applied. The ratios of space available to space required for equipments do not significantly improve, and ships must inevitably continue to be starkly functional and move uncomfortably. The present attempts to overcome the disadvantages of living at sea by formica and fittings, with a few more inches of living space laboriously achieved per man, are scratching the surface of the problem. They are worthwhile in that they demonstrate that all that can be done is being done but in the end the managed are interested in achievement not attempt. It is perhaps significant that the DDG's have accommodation which is well below average, and drab, but they are manifestly effective and well

armed warships, and they attract above average pride.

It is therefore suggested that serious thought be given to calling a halt to the process of improving habitability at the expense of armament, particularly because we are no longer planning for wars and absences of years' duration. In these circumstances it would be as well to devote the resources thus freed to practical compensation for the difficulties of life in ships at times when men are not so employed, and to acknowledge that during service at sea all is subordinated to fighting effectiveness. Amongst intelligent men such a course can be expected to raise rather than lower morale provided that the objective of fighting effectiveness is genuinely pursued and the compensation during shore service is whole heartedly practical.

Although the matters so far discussed concern the framework rather than the spirit of management there is one subject which straddles them both. This is discipline, which is still too frequently considered only in terms of regulation, crime and punishment.

In the earliest days of ships, discipline consisted of the imposition of obedience by force, with any lack of personal strength and domination resulting in its breakdown. Progressively over the centuries, in tune with the establishment of orderly society ashore, the absolute authority of a ship's captain was first supplemented by abstract authority and then overshadowed by it. Captains ceased to be the ultimate authority, but represented and interpreted the authority which could be recognised as resting with the Crown or Government. As a result we have a present day uniformity of standards which is highly desirable, and those standards are derived by consensus rather than individual whim.

In recent years the separate military code has given place to civil law. Theoretically this is also desirable but it has practical drawbacks, and problems may well occur in the future if civil law reflects an increasing freedom from constraint in the community at large, which is not faced with the naval demands of interdependence, obedience and mutual trust in a confined environment.

Be that as it may, the application of the approved code of justice rests in the hands of naval officers except in the trial of the most serious offences, and even there the preparation of the case on which the trial is based rests in their hands. Over recent years there has been a progressive implementation of increased common safeguards under the law for sailors as for civilians, and these safeguards rely heavily on legal procedures and wording.

From a naval point of view it is to be hoped that this development will not be carried too far and that we will be allowed sufficient latitude as non-lawyers to concentrate on the intent rather than the form.

In many ways naval justice has, in the past, been more alive and progressive than that of civilian life because it has recognised that both the disciplined and those in authority are known to each other outside the "court" and are players in the same game. There is some danger that efforts to achieve common procedures will result in hesitancy and preoccupation with those procedures to the detriment of accurate justice from those in immediate authority. In a situation where captains are not lawyers it is probably better if they have a certain latitude to establish the truth.

Whilst this may be desirable there is little chance that the administration of naval justice will be simplified; if anything the equation with a court of law will become closer. This being the case it is suggested that better grounding in law is required than is currently given as a formal part of training, not in the interest of accurate justice alone but also to ensure confidence in those administering it. Only with such confidence can there be mental freedom to enquire, assess and decide. Since discipline is more than crime, judgement and punishment, it is vitally important that those in authority should in so far as that particular aspect is concerned be known to be fair, dispassionate, unhesitating and deeply concerned with the truth. The difference between a ship and a civilian community is that in the former not only the bad elements but also the good have a pretty fair idea of the rights and wrongs of a case before it comes to trial. As a result discipline as a whole is affected because the administration of justice in a small community is the subject of continuous assessment by a ship's company which is in itself both a highly sensitive jury and judge, which expresses its verdict in the form of morale.

In terms of crime and punishment we should, in looking ahead, ensure that at least as much attention is paid to morale as to the form of law; in doing so we would be reinforcing a most important thread from proven good management in the past. This involves instilling an early sense of the importance of humanity in justice and then ensuring oversight and guidance in practice until sufficient experience has been gained for authority

to be exercised in situations where expert assistance cannot be assured. Lastly, whilst safeguarding the individual by expert scrutiny of results by shore staff, those given the responsibility for administering justice must be supported, and where this ceases to be possible they must be replaced regardless of their other abilities. Above all, fear of criticism over procedures must not be allowed to dominate the efforts of Officers of the Day, First Lieutenants and Commanding Officers.

Although crime and punishment form no more than a part of discipline they have been allowed space because they are of major significance to the managed who have no say in determination of the code within which they live.

Concerning discipline as a whole, which is the vital ingredient of all man management: in its highest form, self-discipline, an individual understands his objectives and subordinates his own wishes, interests and well being to achievement by dedication of those objectives. It would seem a proper ultimate aim for any armed service to achieve self-disciplined personnel and success would remove the need for other forms of discipline. Although in the long term we should be able to achieve this, we can not afford to assume that we will necessarily do so. But with this as an aim a desirable trend, not only in disciplinary terms but also in human terms, becomes more likely.

Unfortunately it is not possible to instil self-discipline by telling a man he should have it; neither would it be wise to assume at present that all or even a majority of any group of sailors are willing to see the necessity for it. Even more unfortunately, there are signs that officers are becoming less inclined to subordinate their own private lives to the demands of their profession, and without dedication at the officer level it is unrealistic to expect it elsewhere.

Discipline can be imposed, but if so it is fragile. It is stronger if it is a natural cohesion in a grouping of people who are working to a sensible common purpose; in this event it will be enduring and indiscipline becomes offensive to the whole, not just the system. Provided leadership – or management – is dedicated the prospect for sound discipline is better than it has ever been. From a base of higher education and intelligence men increasingly wish to work sensibly and to effective purpose. But we can throw it all away if management does not apply a genuine affection and concern, or if the importance of a proper military purpose is not given pre-eminence amidst the welter of other considerations afflicting high level decision.

No matter how improvements to the framework are initiated they are given effect by those with the power of the purse and parliamentary authority, and not by those with responsibility for the management of naval manpower. The spirit within the framework is, however, with one major exception, directly the latter's responsibility. The exception is the pride inspired by the nation a navy serves.

As mentioned earlier, the longer a nation is at peace the less the esteem in which the services are held by the population as a whole. Furthermore, even a navy at war can be neglected unless the nation itself is threatened. Vietnam has been symptomatic of limited wars since the fifties which have provided vivid examples of nations first committing their servants and then displaying no consequential obligation to sustain them, choosing rather to discuss with ostentatious detachment whether they are wrong to be there in the first place. This is not irrelevant to management, which depends on the willingness of the managed, and a fighting service needs constantly to be sustained by the conviction that it has been committed for a proper purpose. The long term effect on the RN of national detachment during Suez has not been widely recognised, the effect of Vietnam on the USN is more evident, and the effect of Vietnam on the RAN, although not immediately evident, can be seen to be there on reflection. The average age of a navy is low and enthusiasm, although today regarded as ingenuous, is healthier than the uninvolved idealism which appears consistently to attempt to destroy it.

It is of course stated that "the Navy will never again be directed to take part in remote conflict of that sort." But just as the road to hell is reputed to be paved with good intentions, political history is littered with repetitions of events which were never going to happen again. Furthermore, the statement is irrelevant in manpower terms. A nation provides itself with a navy of a certain quality, and it is then entitled to receive service to the maximum of that navy's potential whenever and in whatever form it is demanded. Man management within the service has the purpose of preparing to respond to any demand and is only concerned with the adequacy of political forecasting to the extent that it hopes the eventual demand will not have been rendered impossible to achieve.

Naval personnel are under conflicting pressures. In the first place the people in the Navy are ordinary in their fears; there is less casual advocacy of a resort to force in the Navy during

times of international tension than there is in the press and the general population. In peace the sailor is in a demanding profession which is apparently destructive in purpose, which is costly, and which is therefore fair game for criticism. The complexity of ships and weapons demands at least average, and desirably above the average, intelligence. Thus, oversimplifying, skilled and able men are employed in a career which is clearly not productive, and which is as peace lengthens, increasingly unsympathetically viewed by the nation as a whole.

In these circumstances inspiration in, and constant attention to, personnel management is increasingly of importance to those who must exercise it within the Navy.

There is no simple division between managers and managed. It is certainly not the "we" and "they" of officers and sailors. To attempt a definition, a manager is someone who has responsibility for the affairs of people, and the managed are those who must be responsive to the direction of others in order to achieve successfully an end result. In these terms a Leading Seaman can be a manager, and a senior Captain in another context amongst the managed. This is of course true in many large organisations, but needs stressing in relation to the Navy where the formal and visible distinguishing of rank requires heightened vigilance to avoid "we" and "they" identification. There is also a need to highlight the mutual interdependence of all the levels of naval management, which can be lost sight of in peacetime; unlike a commercial organisation which always operates under a degree of tension, the weakness of a link in the naval chain can become absolutely evident only when the chain is needed.

Men cannot work without consistent clear objectives; there is little point in superb management in a vacuum. Those with power and authority within the Navy have themselves a primary aim of ensuring that their subordinates are given a clear overall purpose, and they will have failed if they offer the excuse that a rapidly changing political scene or financial climate makes it impossible to do so since their subordinates must then inevitably become confused and apathetic.

The following is offered as an aim of naval manpower management which is achievable without reference to material considerations, and is therefore capable of being maintained continuously.

The objective for which the navy exists in peace is to become a cohesive, well prepared, and effective force which can be trusted absolutely to attempt any tasks set in peace or war, and to complete those tasks successfully if it is humanly possible.

If it is accorded more than lip service this is not a small or easy objective, and to be capable of fulfilment it must be consistently, honestly and unambiguously pursued. But it is not an unattractive objective for a professional service, and to be pursued successfully it must seek to ensure that men are kept content, confident and eager.

The two potential causes of failure could be that it is not consistently maintained as an objective within the Navy, or that it is not clearly recognised and supported by those we seek to serve. Sadly there is evidence that both these failings exist. It would, however, be wrong to lay the blame entirely on those who, in mortal terror of jingoism, denigrate or neglect the services. They may have the choice whether to retain or disband the Navy but for so long as they do not choose the latter those within the Navy must have no option but to maintain the objective, since failure to do so must reduce management to pointless organisational manipulation.

We are nowhere near a Utopia in which naval manpower is consistent and predictable so that for any particular numerical mix of officers and sailors a finite output can be guaranteed. Training ensures a minimum individual standard, but no more. A ship's company still needs to be knitted together to utilise individual strengths and weaknesses by a conscious and dedicated effort of organisation and coaxing, or driving if necessary, on an individual basis. But just as the more junior are individual so are those who lead. Again, we come back to objectives, and the need to avoid lack of freedom by dictating methods rather than specifying results. Ships have to be responsive to captains; it is pointless to expect the same route to success from an extrovert as from in introvert, or to expect a senior Captain to develop his ship's capability in the same fashion as a junior Commander. Yet each can achieve the desired result.

But considering man management as a matter of long term intention there is a fundamental demand when end results are being judged. This is that the men involved should be content to undertake the whole endeavour again. Failure to pay sufficient regard to this is a particularly modern evil, which arises from infrequent and too short an exercise of authority. A ship is not a vehicle to be stepped into and driven, then relin-

quished. It is an integrated mixture of people who should be improved not just used, and it is not possible for this to happen unless those in authority are there for sufficient time.

Ambition is one of the strongest personal motives and it is in the interest of the Navy that proper personal ambition should be satisfied. To satisfy ambition the structure must be flexible, and one harsh fact has to be faced. Neither sailors nor officers can achieve their personal goals without the assistance of those above them. The civilian can answer an advertisement for a better job; he can also exert pressure on his employer. Neither alternative is open to the serviceman, and it is not suggested that it should be. However, this places on those who do have the ability to satisfy ambition a responsibility to recognise personal ambition, to judge potential, to instruct, to guide and recommend. This will be as true in the next decade as in the last, all that will be changed is the apparent starting point of the man – not his individual needs. In this respect, as in many more, what is indicated is not a change in man management but a continuing reinforcement and restatement of known truths which will otherwise be lost because it is less demanding to devote effort to technical competence.

This is not intended to denigrate technical competence. Without it men today become incapable of performing their duties. It is a matter of emphasis. Men will not be content unless they know their trade, and for this reason we have devoted much effort to shore training. The balance should now be tilted back so that more effort is devoted to putting that trade into practice because only in this circumstance is specific technical work integrated with that of other sections of the naval community.

Ships' companies thrive on sensible work, and above all on operational work. A ship which is basically of sound morale is rarely more contented than when it is performing well in a complex exercise and its capabilities are fully extended. But it cannot exist in this condition indefinitely, and it is in the periods between exertion that cracks in morale open; it is not that we are work-lovers but rather that when pressures come off there is time and opportunity to explore the weaknesses in the structure.

Thus it is at low-key times when good management of people is most important, and it is unfortunately at these times that the manager is inhibited. Acknowledgement of the evident disadvantages of seagoing is not wholeheartedly practical. There are reasons why this is so; firstly, there is a tendency to imagine that if a ship is in harbour anywhere its manpower has reason to be content – although individually, or as a whole, the ship's company may be many miles from home or irritated by a place or event; secondly, there is the reluctance to give excuse for envious criticism by other sections of the community by any apparently elitist treatment of servicemen, and this produces unnecessarily unimaginative regulations; finally, whilst Commanding Officers have complete and unchallenged authority at sea where decisions are major, they become subject to trivial oversight in harbour where they are not.

It would be an enlightened development in the years ahead to 2000 if we could regain the thread of past management and restore the power and freedom of captains of ships, which have been eroded as communications have improved and as the focus of naval activity has shifted from the sea to concrete buildings. This would demand a shift by higher management to judging subordinates on whether they succeed in the tasks set for them rather than how they are performing as individuals in their present capacity. In many ways such a method is harsher since it contains less opportunity for excusing failure, but the objective of leadership at all levels is to stimulate rather than featherbed. It would also focus the attention of higher authority on manpower by heightening the importance of training and selection for command and, by extension, for all other tasks involving responsibility for men.

To adopt such a policy would require greater freedom for captains in the handling of their ships' companies. If the correct objectives are set for ships within the main objective, and these are fully achieved, the nation will have received full value for its investment. The rules which bind a captain should be those which prevent abuse of the rights of those who serve him, and these already largely exist. But irritant rules such as those designed to ensure that men do not exceed an arbitrary entitlement to leave or privilege should be removed where possible. There would be minor risks in such a course, not least because captains may be initially inexperienced.

It is not by chance that the preceeding paragraphs have focussed on captains of ships. They are the kernel of our profession. In a search for the means of improving captains' management the levels above and below are inevitably affected. The levels above must concern themselves with careful selection, and subsequently exercise constant vigilance in their judgement of the conduct of

ships for which they are responsible. The levels below must have assurance not only of their captain's personal capability but also of his authority. Leadership in war is intensely personal, and it is developed in peace. Where a captain is faced with a just request he should be able to grant it, and when faced with a need for decision he must be free to make it. If he is constantly bound to refer to higher authority for approval he loses authority, and furthermore the managed become frustrated since their affairs are decided by faceless men to whom they have no access. I do not suggest that the current situation is bad, but the trend is bad and needs reversal.

Men join the Navy because they wish to, and overall the human desire is to achieve tasks set, to be recognised and to be understood. Frustration can come from the last two aspects and remove incentive for the first, and anticipation and removal of potential causes of frustration in itself constitutes good management.

The ultimate responsibility for man management rests with the captain of a ship, but the only way he can meet that responsibility is through his officers. The officers are both managers and managed and provide the key to the future, whether for better or worse. They also provide one of the greatest areas of doubt. Here it is necessary to look at officers as a whole, and to leave the immediate context of ships.

It is a characteristic of modern navies that ships and weapons are so costly that their numbers diminish, although (since oceans have not reduced in size) the process must shortly be arrested if we are to avoid reduction to the point of absurdity.

As ships reduce in number so the planning of their activities to obtain maximum benefit becomes more critical and needs more officers. The additional argument is also sometimes advanced that more shore training is required, but this particular thesis lacks conviction. Nevertheless, everything combines to ensure that, as the years go by, the rank at which officers expect to spend the majority of their time at sea diminishes.

In considering the management of men the effect of this is bad. One of the strengths of the good officer has always been his perception of the morale and needs of his subordinates. This strength is not because of any magic in training or unusual quality of recruit, but because the circumstances of living in ships enforce a continuous contact with those both above and below. The officer at sea unless he is totally insensitive has a constant awareness of people as individuals. He cannot withdraw totally into a detached private life, divorced from the ship, at any time. This characteristic is virtually unique even within the services, and it is shared only with the soldier actually in the field. If an officer spends a sufficient proportion of working life in ships he can carry the confidence, humanity and understanding he has gained through his later shore years, but that proportion must be significant, and seagoing must not stop too soon.

There are two forms of confidence. One is a personal confidence in professional or technical ability. The second is a confidence in ability to lead, a confidence which would be foolish without sufficient of the experience on which sound judgement is based. The two are complementary, but both are necessary in ships, and an officer who relies exclusively on the former is unlikely to govern men well. But unless officers are employed at sea with sufficient frequency and continuity they are forced into this position – particularly since the same limitations on experience do not now and seem unlikely in the future to apply to senior and junior sailors within their shorter period of service.

The officer filling a post ashore is there because his practical and experienced knowledge is required for the post. Considering officers briefly as the managed rather than the managers, unless they possess sufficient experience for their posts (particularly those which are more senior) they lack conviction and absolute confidence. They themselves cannot be regarded as well managed.

But the greatest evil of shore appointments too soon or too often is that people get a taste for them. Officers as much as sailors have always longed for the blessings of the land and the fruits of their labours; but they find the fruits equally attractive whether or not they come after the abstinence of service at sea. And in a short job they are more continuously available. Leadership is demanding, and completely natural leaders of men are surprisingly few. An officer ashore, with the exception of some specific training posts, is rarely required to exercise naval man management, and without a full early grounding his subordinates are unlikely to receive the leadership to which they are entitled for some time after he joins a ship. It is not unusual now for a relatively junior officer to resent two consecutive sea postings, which does not augur well for his leadership of sailors who may themselves prefer not to have been at sea for a similar period.

Sailors at the more junior level are now fully privileged members of the general national community, a desirable situation which is comparatively recently achieved, although longer in the case of the USN and the RAN than most other navies. Although desirable in human terms, it is a situation which in itself will not guarantee easier or more productive management. A higher standard of education, more enlightened conditions of service, a higher standard of pay and better communication between all naval levels should ease the problems of management and to an extent they do. However, in any community there are criminal, disgruntled, and lazy elements, and there is an unchanged need for these elements to be fairly and firmly disciplined. A higher general standard of education and intelligence also means that there is a quicker appreciation of injustice and imposition, and a quicker if unexpressed judgement of an contempt for poor management, by both the good and bad elements.

This leads to a conclusion that there is a greater not lesser need for a high quality of management and leadership, particularly if the main objective is kept constantly in view. It is easier to be misled about the results of management oday. Men who are self-dependent can work to achieve successfully a material purpose within, and largely untouched by, a management organisation during times of little stress. This can and does lead to a laissez-faire attitude in managers who in any case have a full time load of technical responsibilities themselves. But the main objective demands that naval manpower is a mutually confident entity in adverse situations which may be both prolonged and intensive. The Navy has not been placed in such situations since the nineteen-forties, and complacency is possibly the greatest hurdle to be overcome in developing man management in the future. If we cease to regard manpower as the most demanding professional priority we are in some danger of rendering the main objective unachievable.

Some proposals for constructive improvement are developed in the following paragraphs. They are not particularly radical since they must build on a basically sound structure which has already been laboriously developed and practically proved. Any developing major organisation must in the process of development take some wrong paths; therefore, in many cases, development should take the form of retrieving ancient virtues, rather than inventing new ones. We are also, in thinking about the next twenty-five years, concerned with the establishment of trends which can be adapted successfully to contemporary conditions rather than the construction of a detailed plan which if it proved admirable for today, would most probably be unsuitable for tomorrow.

The first consideration is the means of ensuring that manpower at all levels is well disposed to being managed. Each man needs to be confident that his individual talents are appreciated and being fully used for a sensible purpose. In seeking to achieve this it must be accepted that until a crisis actually arises – by which time it will be too late – the Navy can no longer rely on emotional incentive from the country, its press or politicians. Therefore the generation in our manpower of a sensible and reasoned pride in fighting ability must again become a predominant rather than important factor in total naval management, particularly since there are many other important material factors which have a transitory urgency.

Pride is no longer engendered by rhetoric, particularly when stress, which heightens emotion, is absent. It can come only from self-confidence in ability and experience, and the knowledge that (in the opinion of an authority which is respected and trusted) the effort required is for good purpose. This means that man management must be devoted to professional preparation and the builing of personal confidence in an unbroken chain from the bottom to the top. To maintain and strengthen this the present trends must be reversed.

The beginning of pride must be instilled at the initial training establishment, and within our limitations we have tried with honesty and some success to achieve this. Of course there have been occasions of failure, usually well dramatised, but the principles have been consistent and in tune with the times.

But we have failed and are still failing in the first year or so after a sailor leaves his training establishment. He then knows very little, but believes he has some value. He is prepared to be a very small cog in a large machine, but he does wish to be involved. If training has succeeded he wishes, and expects, to go to sea as a minor component of a ship's company. His spirit will be killed if he is held ashore, or goes to a ship in prolonged refit, or is sent to sea as an unneeded supernumary.

This, therefore, is suggested as the first critical time of management. It requires organisational management ashore to give priority to sailors at this stage so that all, not merely a majority, have their aspirations satisfied. Not for

the last time, it also requires dedicated leadership at sea; it is no use sending a man to sea and neglecting him. In his early days in a ship a sailor needs to be asked to put to use his training, to be firmly directed, and to be fairly treated. He requires to remain an individual and to see that if he wishes to progress he will be helped to do so. If he is given this care in leadership and demonstrates that he cannot measure up he should be discharged from the Navy; his peers' pride cannot possibly be maintained if statements on the standards required are not matched by equivalent demands in practice.

All this and much more is the function of the Divisional Organisation, which needs strengthening and adapting rather than changing. There has been a trend towards separating the man management and functional tasks of officers and senior sailors. This is not universal and the strength of a divisional system varies between ships, but overall the trend exists, particularly because officers are under increasing pressures of work and are not encouraged or able to devote their principal efforts to man management.

We no longer manage our officers well. They themselves, in spite of braid and buttons, are merging into the faceless ranks of minor management. In a ship of three hundred men a wardroom of twenty officers possesses a complete power to cause the ship to run smoothly or badly. It will run smoothly if they devote their energies to providing the right conditions and climate for the mass of the complement to work purposefully. It will run badly if the officers are nagged and harried since they will pass this on. It will also run badly if the General List officers come to believe that they are paid primarily to solve the more difficult material problems.

If we were to adopt the policy of judging the success of units in reaching objectives instead of the performance of those involved, there would be hope that we might also break away from the current fallacy that it is natural for those with the greatest responsibility to work the longest hours. How long they work is irrelevant but how successful they are affects people.

In war men are asked at times to give more effort than they know they can; they are forced to assume major responsibility at an earlier stage than may be desirable; in general they respond well. These demands and the consequent sense of achievement are the source of the wartime serviceman's nostalgia to a far greater extent than any pleasure in war itself. As peace lengthens we become progressively more cautious; the ago of readiness for responsibility is assumed to creep up, and the extent of responsibility allowed becomes more limited. The fun goes out of the game.

If we are to manage men in readiness for war throughout a future period of peace, a conscious effort will be needed to drive responsibility down to the lowest level which is possible rather than that which is prudent. This can only be achieved by personal knowledge within a strong chain of command.

Captains of ships must be extended by the demands upon their ships. Officers must be extended by demands upon their ability to lead and to undertake responsibility. Senior sailors must be called upon to complement the officers, and junior sailors must be primarily employed in developing and using their professional skills. There is nothing new in these targets but in recent years they have lost their clarity.

In part this is because with fewer ships there is less competition. In a ship which operates alone for prolonged periods the responsibility for the standards set rests exclusively on the Commanding Officer, and it is difficult for him to avoid either easing or tightening them undesirably but unwittingly. In addition a ship's people become bored without the stimulation of competition; a football team which rarely played another team would soon find continuous practice unutterably boring. Man management is not just telling people to do things; it is placing them in the right situation and then telling them to do them. The need for ships to operate in company for a high proportion of their time for the well being of their complements should be a cardinal principle of Fleet Programming, and one which should rarely be subordinated to other factors.

The managers must be in sympathy with the managed. To achieve this a manager must experience the same general conditions of service as his subordinates. This is less and less the case, and there is one particular aspect which demonstrates a faulty sense of priority. Officers postings are increasingly tailored either to the requirements of their planned career, or to the requirement to prepare an individual for higher positions. Whilst this may be reasonable in the management of officers, it impacts badly on total personnel management.

Stability is much prized by ships' companies. Too many changes have an irritant effect on a ship as an entity. As has already been stated, officers at the more senior levels go to sea ever

more infrequently. We have now arrived at a position where ships' captains and heads of department may change at almost yearly intervals. Amongst the many disadvantages of this is the need for whole ships constantly to readjust to different personalities and methods, thus creating an inability to ensure that ships work towards con-sistent long term effectiveness. In addition insufficient time exists for those holding responsibility to gain the personal knowledge required for proper judgement and guidance of people. Furthermore, shortage of sea jobs must mean greater inexperience on assuming charge so that relief at the end of a year comes at the time when full effectiveness is just being reached. Ships can be properly governed only when those principally responsible have a mastery of them. In human terms a ship is sufficiently small for sailors to know whether their captain and officers are competent. They will pay regard to rank but will respect only experience, confidence, and professional skill; these cannot be developed by infrequent, short, sea postings.

Different methods have been tried to gain the best of all worlds by variations on the theme of "wet" and "dry" lists after promotion to Commander. These half measures have always failed. They are artificial and have proved impossible to sustain, and in any case deal only with the Executive branch.

Perhaps they fail because the main objective of fleet effectiveness is subordinated to the interest of only a section of the manpower. If the main objective is pursued wholeheartedly it is necessary to do all that is required to achieve it. In the process the personal interests of certain sections may suffer, but it is better to accept this as needed and to compensate those sections than to distort the whole to be fair to a few.

Personnel management in the future should therefore be guided by the following principles assuming peace continues (they will be followed by necessity in the event of conflict). The most important part of the Navy is always its ships. The ships' companies must be led by competent and appropriately experienced officers. Senior officers must be known to the fleet. Sailors and junior officers must be known for long enough to ensure proper individual guidance and to make it possible for them to be reported upon justly. The officers in a ship should serve in it for roughly the same period as the sailors, as they cannot otherwise be in sympathy with the effect of the programme on the ship's company – a captain who joins in mid-commission tends to think that everyone should be as fresh as he is. The chain of knowledge and trust should be maintained by personal knowledge at least two steps up and at least two down.

These principles are not achievable where the demands of promotion structures and shore jobs cause bulk at the senior levels. If it is agreed that "wet" and "dry" lists are not the solution, then something more needs to be done. The only apparent solution is to tailor the uniformed strength to the seagoing requirement. There should be sufficient officers to fill the sea billets on a generally similar sea-shore ratio to that of manpower as a whole. This would necessitate abbreviation of many uniformed careers, but the end of a career in uniform does not involve the end of usefulness to, or service required by, the Navy.

The experience gained at sea is a complement to other talent. An increasing number of tasks ashore which are carried out by uniformed personnel could equally well be carried out by civilians provided that they are qualified by past uniformed experience at the medium and lower levels, since it is normally the experience which is required for the job rather than a rank. It is therefore suggested that in the interest of manpower as a whole, individuals whose talents are best used ashore, or who are no longer required for sea service, should be given the option of civilian service or retirement. This would involve creation of a new and separately identifiable civilian element with a sensible promotion structure under the Naval Discipline Act. Substantial seagoing experience would be a prerequisite for entry. There would be some difficulties, but many advantages.

Above all those who continued in uniform would do so knowing that their experience would be consistently enlarged and fully exploited, and that uniformed shore postings would be limited to those relevant to subsequent and preceding sea posting. Furthermore, their capability and weight of experience would be known to the sailors in the Fleet. It is tempting to develop this theme, but to do so would detract from the reason for raising it as a possibility in the first place. Officers exist to lead and manage men, they cannot win wars by themselves; therefore it is essential to ensure that those with the greatest responsibility for the conduct of ships are continuously prepared for the discharge of that responsibility at a level appropriate to the rank they hold.

If we do not restore men to their proper and pre-eminent position how will management develop in the next twenty-five years? For a start we can expect little drama. Conditions are unlikely to give rise to major discontent, but a more insidious disease, ordinariness, is highly likely.

The trend which has relatively recently caused the preoccupation of the professional heads of the service with political and material management will be accentuated; in the process they themselves will become progressively more dispirited by reaching an ever more powerless pinacle.

Captains of ships will have fewer demands placed upon them and the simple and overriding objective of preparing their ships as effective weapons for war will cease to be placed clearly before them. The art can be lost in one generation. We fool ourselves is we believe that the contempt in which some other navies are held arises from an inborn national inferiority.

Officers generally will lose the touch of arrogance and pride which goes with spirit in leadership. They will increasingly believe that their value to the Navy lies in their intelligence rather than their readiness to serve and lead. They will become very ordinary. A man with a job rather than a vocation is not likely to give adequate attention to the well being of subordinates, and as a result some form of naval Trade Union will assume importance as visible evidence of the failure of the integrated naval society, which should otherwise not require a divisive internal pressure group.

The various matters discussed in relation to naval personnel management in the next quarter of a century have all assumed that changes must necessarily be developments from what has already been achieved, and that abrupt or radical changes would be destructive rather than beneficial. But it has not been argued that improvement is unnecessary, although much of the improvement has been foreseen to be retrieval of aspects of leadership which have been wrongly discarded.

The key issue is emphatically believed to be the provision and maintenance of an overriding objective for our manpower. The objective has been stated as the continuous fighting effectiveness and readiness of the Fleet; it is an objective which ceases to have meaning when qualified by external considerations.

The framework of conditions of service within which management operates is sound, and is likely to continue in tune with the progress of conditions in civilian life, because of the pressures for equality in an increasingly aware society.

But it is the matters of the spirit which have been questioned. Personnel management must achieve a pride in service, enthusiasm and an eagerness to succeed. Weakness which needs positive correction lies in the diminution of the importance of leadership in the lives and careers of officers. To restore and strengthen this there needs to be clear proof to officers that the development of their ability to lead and manage has an unquestioned pre-eminence. Such proof can be given only by positive action which places correct demands on them. Amongst the areas covered the restoration of greater authority to Commanding Officers has been emphasised, both as a key to management and as a catalyst for action by all the other levels in the naval society. In developing this theme it has been argued that the careers of officers, at present too much oriented to their own interests, must be patterned to achievement of the main objective.

Naval personnel management is a professional responsibility which can be exercised only by experienced, uniformed men. Pride, enthusiasm and effectiveness can be engendered only by those who themselves possess them in full measure. These qualities cannot be achieved unless the Navy holds a deep conviction that the service is needed in the interest of the nation; in general this is still so but is in danger of fading. But there is a further condition which is that a similar conviction exists in the nation itself, and here we have been given decreasing grounds for belief. If the stated necessity for a Navy ever becomes transparently no more than lip-service to a necessary evil, the next twenty-five years can result at best in a well organised but spiritless and badly managed service.

Author Commander Brian Lee Spark was born in 1927 at Corbridge, U.K. He graduated from RNC Dartmouth in mid 1944 and saw service in the English Channel and East Indies until the end of the war. After Sub-Lieutenants courses in 1946 Commander Spark had a variety of sea postings including command of HM Ships ML 3511, Loch *Alvie*, Loch *Lomond* and *Argonaut*. In 1952 he subspecialised in Action Information and Aircraft Direction. After subspecialisation Commander Spark had two years exchange service with the RAN, first at HMAS *Watson* and then in HMAS *Sydney*. He was then Direction Officer of 809 Squadron (Sea Venoms) embarked in HMS Albion during the Suez operation. Shore appointments with the RN included instructing at HMS Dryad, the RN Staff Course, Officer-in-charge Special Duties Officers Course at Greenwich, Officer-in-Charge ADA Rule Writing Group and a member of the Naval Staff involved in the development of a radical new command and control organisation on ships which has now been implemented.

Commander Spark retired from the RN at his own request in mid 1970 and then served 4 years on the Emergency List of the RAN. During most of this service he was Project Director for the introduction of computer assisted Command and Control systems in the RAN.

SHIPHANDLING CORNER

What Happened?

This incident occurred at Victoria Basin, Hong Kong. The ship was a Daring Class Destroyer and it had been given a berth on East Wall, bows south. The geometry of this problem is worth looking at on the chart. Having entered the basin, the ship had to turn through about 70°, from memory, in about 1½ ship's lengths. It was possible, but much would depend on conditions and the wind in particular. Once inside the basin, the flood which would be running strongly at the time would of course have no effect.

As the ship passed North Point a reasonably stiff easterly was blowing, and this was welcomed. It was considered it would allow the necessary steep approach and help blow the bows around.

At the basin, FEARLESS was outside on the North Arm, but inside appeared quite empty.

A normal approach was made with a good wide sweep through the Star ferries' tracks and, as the run to the entrance was made, it was seen that an R.N. Frigate was berthed inside on North Wall. This further reduced the room to turn and added to the problems. Worse still, the easterly had shifted to become a light westerly. As the Bull's Nose came nearer the Navigator remarked "We should now be out of the flood". No sooner had it been said than the tide moved the ship rapidly towards the all too solid sea wall in front of Tamar. A few quick corrections sorted that out, but it had altered the line of approach and had been, to say the least, unsettling. The turn to starboard was hampered by the R.N. Frigate reducing the area to port for the stern to swing and as the westerly breeze started to catch the ship, the starboard anchor was let go. By then the bows were getting too close to the wall to go any further ahead and there was very little room astern. So the two tugs standing by were secured, and the ship was berthed using them.

What Self Criticism is Offered?

It would have been much better handled with a more realistic plan. It had been decided that the worst possible position to get into was to be at an angle between East and North Wall with the bows near the former and the stern near the latter. Ironically it was just this worst case which developed. In hindsight, there were two, or maybe three, important mistakes. Firstly it was unwise to enter the basin with so much tide running. It would have been better to wait, anchoring in Junk Bay if necessary, until conditions were better. Secondly, it would have been simple enough to ask COM Hong Kong if there were any ships in the basin, and adjust the berthing plan accordingly. Finally and most importantly, two tugs were available, so why try to prove that it could be done without them?The best plan, I believe, would have been to get safely into the basin, stop, button on the tugs, and make a cold move of it. Very simple, no fuss and quite seamanlike; much more so than taking on a difficult task with engines, rudder and anchor. The tugs were available and had to be used anyway, as it turned out.

Lessons Learnt

Always make it easy for yourself. The hard ones develop all on their own; save your strength for them.

A Professional Wrecker's Comment

Berthing on the East Wall of Victoria Basin is not an easy evolution. The points mentioned under "Self Criticism" – State of Tide, Local information and Use of Tugs – need no further amplification.

Entering Hong Kong through Sulphur Channel and approaching from West may have been preferable in this case. The advantages are:-

1. slow steady approach to the basin
2. basin entrance and berth is visible to the command earlier
3. approach track cuts across Star ferries track at right angles which is preferable to making a wide sweep through the tracks.

CYCLOPS

SHIPHANDLING CORNER

Contributors are invited to relate their reactions when coping with difficult or awkward shiphandling problems and how the situation was retrieved (and if it wasn't – why not). Contributors may remain anonymous if they wish and also leave out ship names and places if desired. Articles should be between 300 and 500 words. Comments from members will be printed in succeeding editions.

The Place of the Seaborne Aircraft Platform in Future Naval Warfare

This paper by Lieutenant Commander R. M. Jones RAN won equal first prize in the Officer Section of the 1974 Peter Mitchell Trust Essay Competition and is reproduced here by permission of the Naval Board. The views expressed by the author are his own and not necessarily those of the Australian Government, the Department of Defence, the Naval Board or the Australian Naval Institute

'The assistance of aircraft in a modern Naval force has been proved to be essential. Especially is this so when the force is small and strength in ships must be compensated for by particularly good reconnaissance.'

Admiralty staff 1920-21

Very early in the story of the aircraft the potential of the flying machine as a war vehicle was realised. Various lighter-than-air-craft were used late in the nineteenth century but not until the First World War 1914-18 was the heavier-than-air machine available in a form suitable for warfare. In this war the aircraft was an outstanding success in a variety of roles, including maritime warfare, and the future of the aircraft as a war machine was assured.

In maritime warfare the aircraft proved itself essential and ships had been adapted to carry and operate aircraft. As the decades passed the ship borne aircraft underwent changes, some of them of a fundamental nature, nevertheless the aircraft became, and remained, an integral part of many navies.

The future role of the aircraft in maritime warfare is difficult to define in detail. It is, however, not difficult to see that the aircraft has an assured place in maritime warfare of the future. This place will be secure for as long as the aircraft possesses that desirable capability, best expressed as mobility, not possessed by ships. Whether it is the mobility to monitor a large sonobuoy field, mobility to reconnoitre over the horizon or mobility to rapidly close and attack a warship, the surface ship – even one employing the principles of the hovercraft or hydrofoil – will never be comparable in performance.

Far less certain is the nature of the base or ship which will operate these aircraft. In sixty years of existence the future of the aircraft carrier as a mobile airfield has seldom appeared so uncertain. This essay will trace the development of the seaborne aircraft platforms in use at present so that some of the associated problems will be understood and then consider the three existing types of air capable ships and their future; finally an entirely new type of seaborne aircraft platform or air capable ship with special applications will be described.

AIRCRAFT CARRIER DEVELOPMENT

First World War

The history of the seaborne aircraft platform can be traced back, in various forms, to the First World War. At the beginning of the war, a radius of 100 miles from shore bases was considered a reasonable distance over which reconnaissance aircraft could be expected to operate. Experimental take-offs from ships at sea had been made in both the Royal Navy and the United States Navy and even a landing had been effected on the USS *Pennsylvania* in 1911, but routine embarkation of aircraft was generally thought to be in the remote future.

Circumstances of the war in the North Sea quickly forced the development of the ship launched aircraft. The struggle between the German High Seas Fleet and the Grand Fleet of the Royal Navy took place principally in this area, mainly between cruisers and battleships. Prior to the war, Germany had become involved with the airship and once hostilities began was able to make use of Zeppelin rigid airships for naval reconnaissance. These airships were unhindered in their task of observing, and bombing, the Royal Navy as they could operate at heights above the maximum attainable to guns then in service in the Royal Navy. Aircraft could sometimes shoot down Zeppelins but shore-based aircraft did not have adequate range to accompany the Fleet to sea. Thus the first ships to operate aircraft at sea joined the Royal Navy to provide aircraft at sea when shore-based aircraft could not meet the requirement.

These vessels were converted cross-Channel ferries carrying a few seaplanes which were hoisted onto the water for take-off. Seldom was the North Sea calm enough to allow these frail

seaplanes to take-off undamaged and if one did manage to clear the water the drag of the large floats reduced the performance to uselessness against Zeppelins. A few bombing raids were carried out with mixed success but these did not prevent airships shadowing at their will.

To ensure that aircraft would be available at all times, even with reduced performance, one seaplane carrier was fitted with a flying-off deck forward from which fighter seaplanes took off on trolleys. They could then attempt to land on the water for hoisting in after completion of the flight – if damaged, at least the task would have been tried. Such seaplanes suffered from the drag penalty imposed by floats and not many weeks elapsed before a wheeled fighter successfully took off from this platform. The wheeled fighter could not be recovered by the launching ship and must ditch if not within range of land, but it could shoot down Zeppelins. This trade of one fighter for one airship was very favourable to the Royal Navy.

Wholesale defence against Zeppelins was not yet possible as seaplane carriers were in short supply and those available were too slow to stay with the battle-fleet. Acceptance of the possible loss of the aircraft after the flight had already cleared the way for the next stage; fitting of flying-off platforms above turrets on cruisers, battle-cruisers and battleships. Fighters launched from these platforms could shoot down shadowing Zeppelins before they had seen much of importance or before they could return to Germany. The drawback was the limited number of these aircraft available as each could be launched only once before a return to harbour to embark another one. Still, a force with ten or twelve such ships included had available about twenty fighters, enough to deal with most forseeable threats during the average sortie into the North Sea.

The idea of a ship devoted principally to the operation of wheeled aircraft evolved quite slowly through several intermediate stages demonstrated by the cruiser, HMS *Furious*. She was first fitted with a flying-off deck forward; aircraft after launch being intended to fly ashore or ditch. In an attempt to recover and re-use these valuable items of equipment another deck was built aft of the main superstructure to allow aircraft to land on. Unfortunately the airflow over this landing-on deck was so badly disturbed by the superstructure that very few aircraft ever managed to land successfully. The next stage was elimination of the superstructure entirely and HMS *Argus* (the 'flat iron') was the first ship to try out this idea shortly after the war and too late to prove herself in action.

Between the Wars

HMS *Argus* pointed the way and between the wars the aircraft carrier slowly developed into a mobile airfield of about 20,000 tons with a few monsters of 33,000 tons or more which had been laid down as battleships and modified to comply with the terms of the Washington Treaty. Although the Royal Navy and the United States Navy used the carrier in slightly different roles both navies saw the value of the aircraft carrier as in providing aircraft whenever and where-ever required without worrying about the proximity to land and friendly airfields.

When carriers would not be available other means of providing aircraft at sea were developed. The value attached to aircraft reconnaissance was so great that the catapult aircraft evolved from the crude flying-off platforms of the 1914-18 period; instead of a 'one-shot' system, the aircraft was catapult launched and landed on the water alongside the parent ship for hoisting on board by crane ready for another flight.

Second World War 1939-45

The Second World War 1939-45 had a similar effect as the previous world war on naval flying; decades of peace-time development and discussion were compressed into a few years of rapid progress measurable against the cold figures of aircraft lost and ships sunk. In these years the cruiser-borne aircraft began to enter obsolescence; the range of shore-based aircraft and the increasing availability of aircraft carriers reduced the need for these individual aircraft and radar was taking over the reconnaissance role without the problems attendant on launching and recovery of the aircraft. The cruiser-borne aircraft had proved very susceptible to damage during enemy bombing attacks and tended to burn readily sending burning petrol over the remainder of the ship. In short, the aircraft no longer offered, at a reasonable cost, a capability not otherwise available to the warship.

Frequently the claim is made that this has established the aircraft carrier as the capital ship instead of the battleship. A more accurate assessment is that of Vice Admiral Sir Arthur Hezlet in his book 'Aircraft and Sea Power'; the aircraft, not the carrier, supplanted the battleship. The role of the ship became that of carrying the aircraft, co-operating with the aircraft and exploiting the command of the sea won by the aircraft.

Post-War Period

At the end of the war the typical fleet aircraft carrier being designed or under construction was about 50,000 tons full load displacement and approximately 900 feet long, an appreciable increase on the pre-war ship. The entire length was taken up by a single aircraft operating area used for both take-off and landing. In excess of 100 aircraft of various types and roles were embarked. Catapults were installed but free take-offs were more usual; the catapult was used only under special circumstances. Arrestor wires were an accepted means of ensuring the aircraft stopped in an acceptable distance (and in the right place), and the pilot had the assistance of a landing signal officer ('batsman') to signal landing information to him during the approach to the deck.

In the immediate post-war period several problems related to the introduction of the turbo-jet powered aircraft arose. The jet-powered aircraft had entered service towards the end of the war and had speeds far in excess of those possible with propellor driven fighters but major drawbacks arose when operations from ships was contemplated. The steam catapult, mirror landing aid and the angled deck solved these problems but increased the cost and complexity of the carrier.

The cost of the aircraft carrier was further increased when new ships had to be far larger to operate enough of the newer, larger and faster jets to be worthwhile. The growth in size of the carrier can be typified by comparing the Midway class, which was designed during the Second World War, and the Kitty Hawk (or improved Forrestal) class still in use. USS *Midway* displaced 55,000 tons at full load and was 968 feet long; depending on the types she could carry up to 137 aircraft. The Midway class is now considered marginal for some fighters in current use because it is too small. USS *Kitty Hawk*, name ship of her class, was laid down in 1956 and displaces 75,200 tons at full load, she is 1,047½ feet long and operates 90 aircraft; appreciably fewer than the Midway class but each aircraft is larger and more effective.

CARRIERS IN SERVICE

Large Attack Aircraft Carriers

Large aircraft carriers, such as USS *Kittyhawk*, are strategic units, with a proven ability to threaten the security of another nation. United States Navy carriers have performed this function since the advent of the atomic bomb; apparently with a good deal of success as a large proportion of the Soviet Navy was designed, built and trained with the primary role of destroying American attack carriers. Soviet efforts to have aircraft carriers included under the terms of the strategic arms limitations talks (SALT II) indicates that the Kremlin still regards the attack carrier as a strategic threat.

In the purely maritime environment, these same attack carriers can be tasked against enemy shipping, military or commercial; her own aircraft will provide an air superiority umbrella over friendly forces and allow ships and lower performance aircraft to carry out their equally important tasks. Under such circumstances these vessels change their role slightly to that of control of the sea.

Limited war applications have been as floating, mobile airfields from which naval air power has been projected inland. Seldom since 1945 has a year passed when movement of an aircraft carrier into an area of potential conflict has not served as a warning; or an aircraft carrier has not been actively engaged in support of political objectives. As was the case when aircraft first went to sea, the carrier is providing aircraft which are not available any other way. A cursory study of post-war history shows carriers in action in Korea, Suez, Kuwait, Vietnam, Aden and Beria to name a few of the better known occasions; in every case the shore-based aircraft either could not reach the scene at all or was severely limited when it did arrive.

The United States Navy is now the only operator of a useful number of attack aircraft carriers, other Western navies operate a rapidly dwindling handful and the Soviet Union has none yet. Fortunately the growth of naval aircraft in size and weight has stopped and carriers already in commission or under construction will allow the retention in service of the large aircraft carrier until about the year 2000 at least. Of the sixteen ships at present in commission twelve will still be in service in 1980; of these four will be nuclear powered. The remaining eight were commissioned between 1955 and 1968 and are given a thirty year life.

Small Aircraft Carriers

While the size of the large attack or 'fleet' aircraft carrier was growing during the war, a variety of smaller ships had been proving useful. The earliest of these was the escort carrier which was originally used to provide anti-submarine defence to Atlantic convoys when in the gap be-

tween shore-based aircraft operating from the western side of the Atlantic and those on the European side. Built principally on merchant ship lines and in many cases carrying cargo as well as aircraft, these ships were built quickly and cheaply and once in service made up in quantity for what they lacked in quality. In the post-war run down of the armed services all the escort carriers were either scrapped or returned to merchant service. Their legacy was acceptance of the principal that the aircraft carrier could be an escort unit rather than a ship always demanding escorting warships.

A closely related type of small ship, the light fleet carrier, was not scrapped entirely at the end of the war. Serving both the Royal Navy and the United States Navy these small carriers were built on mercantile principles but purely as aircraft carriers. Carrying between 45 and 30 aircraft depending on their size, they shared with the escort carriers the responsibility for controlling the sea and air around convoys; fighters drove off, or shot down, shadowing and attacking aircraft while anti-submarine aircraft such as the Avenger and Swordfish harassed submarines opposing the convoy. In the Pacific they supplemented the larger attack carriers in their support of the amphibious assaults which were characteristic of this theatre.

Several of these smaller carriers were purchased by various smaller navies as the backbone of their post-war naval air arms. For these smaller navies such vessels were ideal, economic in manpower and relatively cheap to maintain and run; another advantage was that a useful number of aircraft could be embarked. While operating in the Pacific theatre in 1945 one ship embarked 33 aircraft – 12 Barracuda torpedo bombers and 21 Corsair fighters. With these aircraft embarked a useful role in projecting naval air power ashore could be filled. Enough aircraft were available to defend the ship and mount an effective strike. Had the need arisen, these same small carriers could have been used effectively against other warships.

As the years passed the size and weight of carrier-borne aircraft increased to such an extent that adequate air groups for multi-threat defence and offence could not be embarked and the larger navies decided retention of the small carriers unwarranted. Smaller navies had the unpalatable choice of giving up aircraft carriers entirely or resigning themselves to obtaining only aircraft which would fit on their existing carriers after extensive and costly modification. Purchase of larger carriers was not economic either because of insufficient money or manpower, so several navies carried on with the small (20,000) ton ship. Replacements became increasingly difficult to obtain because the miniature attack carrier, which is what some small navies were attempting to operate, was basically unrealistic. Enough aircraft could not be fitted onboard to effectively defend the parent ship and still have a capability to strike a target, nor could enough fuel, ordnance and other consumables be carried by such a small ship to support other than 'hit and run' raids.

Some ships became specialist anti-submarine vessels and in that role enough aircraft could be embarked and operated to perform a worthwhile task.

All the hulls of these smaller carriers were built before 1945, by the 1970's they are all of advanced age but no replacement is planned. Since none of the smaller navies appear able to afford to build replacements and the larger navies are not interested, the small carrier – as we now know it – had no future. Nations requiring aircraft capabilities at sea must look to shore-based aircraft or other air capable ships.

SHORE BASED AIRCRAFT

The frequent, almost continuous, cry of opposition to the aircraft carrier in any shape is that shore based aircraft can do the job without needing an expensive and vulnerable ship. This was demonstrably not true in two world wars but what of the present and future when improving technology promises better maritime patrol aircraft?

Despite the potential for greater range and endurance, no attempt is presently being made to greatly extend the in-service range or endurance, any discernible trend is towards better sensors and on-board computers to handle information more efficiently. The most representative of such aircraft in the West is the Lockheed Orion which 'Jane's All the Worlds Aircraft' credits with a 'mission radius' of 2,070 nautical miles with no time on task, or three hours on task at 1,500 nautical miles. Such performance would require at least four expensive aircraft to keep one on station at a range of 1,500 miles for even a short time; for protracted operation at a range of 1000 miles the United States Navy considers a squadron on nine Orions necessary to allow for maintenance on aircraft. The same service regards a radius of 300 to 500 miles from base as the maximum for effective use.

Other maritime aircraft have similar performance; although unclassified figures such as those given for the Orion are not available, the Hawker Siddeley Nimrod has a ferry range of 4,500 - 5,000 miles quoted, indicating a radius of action comparable to the Orion. A maritime version of the well known Boeing 707 is under development and the performance must be a matter for conjecture, however the 707-320B model - the basis for the United States Air Force's Airborne Warning and Control System (AWACS) airborne radar station – could well be the basis for a maritime aircraft and is given a 6,493 nautical miles range with maximum fuel and no reserves on landing.

These figures assume high altitude flight, the most favourable environment for jet engine fuel consumption figures. Low-level operation is an essential capability for a maritime patrol or reconnaissance aircraft if the functions of identification and weapon delivery are to be performed. Magnetic anomoly detection equipment, possibly the most effective means of classifying and tracking a submerged submarine, requires the sensing head to be close to the water.

The present total lack of apparent interest in extending the range of the shore based aircraft indicates that present ranges are acceptable. Unless there is some quite unexpected development, shore-based anti-submarine and reconnaissance aircraft will be limited to a useful radius of action of no more than 1,000 miles; at the outer limit of this radius a number of aircraft will be required to maintain one on station. Such performance may provide support to coastal convoys and limited protection to ocean convoys if all geographically available airfields could be used. Shifting alliances and the emergence of touchily independent nations make the political availability of airfields highly suspect. The only reliable airfields are the ones built in the homeland; to operate only from them leaves no ability to provide support far at sea.

Fighter Aircraft

Provision of shore based fighter aircraft to defend a force at sea involves more complicated calculations and expense to supply in-flight refuelling facilities (and defend them); varying transit distances from bases to combat air patrol stations and changing weapon and fuel loads further complicate the problem. Only one country – Great Britain – has seriously attempted to adopt this method of defending warships against attack and no figures are available to assist in judging the effectiveness of the system. Undoubtedly the shortage of bases from which to operate the aircraft must restrict the idea on a world-wide basis.

Maritime strike is one role which could be carried out with limited effectiveness by shore-based aircraft as long as a nation was prepared to wait while the offensive was prepared out of range, and to waste time finding the target once it came within range.

SMALLER FLIGHT DECKS

Helicopters

The helicopter first became a useful naval vehicle during the Second World War when the German Navy used a twin-rotor design in convoy escort operations in the Aegean and the Mediterranean. Across the Atlantic the United States Coast Guard became interested in Ivor Sikorsky's VS-300, the first practical helicopter to be built in America. In those days of the 'mid-Atlantic gap' any way of obtaining the services of aircraft far at sea was eagerly grasped; however, the potential of the helicopter was far greater than the reality and much work was seen as necessary before the helicopter would be an effective aid to convoy escort. Several other applications of the available resources promised quicker results and development of the helicipter was given low priority.

In the immediate post-war years the helicopter was employed and developed mainly as an aircraft to embark in an aircraft carrier, not for some years did the need for the helicopters capabilities in the smaller warships become apparent and then as an anti-submarine weapon carrier. Beginning as a simple torpedo dropping embarked singly in small ships, the helicopter was quickly accepted; the mobility of the aircraft meant that it was used for a variety of other tasks, especially reconnaissance. In many respects the lessons learned during the years of the catapult aircraft were re-learned; particularly that there is a way to find out what is over the horizon before it becomes an immediate threat.

Present and future roles for the helicopter have expanded from the simple one first planned. The United States Navy sees the helicopter primarily as an anti-submarine unit which can extent the sensor and weapon range of a small ship, anti-surface ship capability is severely limited. The Royal Navy takes a different view and has developed the Lynx, a helicopter designed with anti-submarine warfare as a secondary role – the primary role is that of surface search and attack using surface skimming missiles.

Ships

Many navies now have in service, or are planning to have in service shortly, destroyers with their own helicopters; a few navies have decided that two aircraft per ship is a more flexible number. Some have decided on the cruiser size ship with an even larger number of helicopters embarked; the most publicised of these is the Soviet Navy's Moskva class, closely comparable to the Italian Andrea Doria or the Japanese Haruna. All of these ships are designed, equipped and armed as cruisers but also have a larger than usual helicopter deck aft and embark a number of helicopters to enhance the ships' capabilities.

The Royal Navy is constructing another type of ship, the through-deck cruiser; HMS *Invincible* will be the first and is planned to complete in 1978-79. Sometimes referred to as an aircraft carrier by another name, *Invincible* will be armed as a cruiser (at least by Western standards) with two twin area defence surface-to-air missiles (Sea Dart). These two launchers will absorb twenty per cent of the total cost of the ship, reported as £60 million. The quadruple surface-to-surface missile launchers (Exocet) originally planned have been deleted. She will have comprehensive radar equipment and will be able to operate up to nine medium size helicopters – the Sea King is presently planned. The best way to provide a reasonable number of helicopter operating spots was found to be by adoption of the straight deck with a hangar below rather than the more usual layout of a superstructure forward of a large platform on the stern.

Such a configuration enables an alternative vertical or short take-off and landing (VSTOL) aircraft to operate from *Invincible*. Earlier trials with the Harrier from HMS *Blake* and the light fleet carrier INS *Vikrant* demonstrated convincingly that such aircraft have far better performance if they can take-off with a short run. *Invincible* has her deck arranged so that such a run is possible and she is capable of embarking six Harriers.

Despite her appearance as a small aircraft carrier, the British through-deck cruiser can fairly be described as a cruiser which carries aircraft to assist in performing her duties. Her area defence missiles, her sensor fit and extensive command facilities enable her to perform a useful role without aircraft embarked. As with the smaller helicopter fitted warships, she can still perform the task, but to a lower level of effectiveness, without the aircraft. Helicopters or VSTOL aircraft will allow *Invincible* to be far more aware of her surroundings and in a better position to influence them, but she cannot carry enough aircraft of any type to consider aircraft as her primary weapon.

A closely related ship, at least in general appearance, is the latest addition to the Soviet Navy. Until comparatively recently the Soviet Navy has been content to rely upon shore-based aircraft entirely – even the notoriously short range anti-submarine helicopters were shore based. In the last two decades this thinking has altered, first with the introduction of ship-based helicopters to provide target information for cruise missiles, then the Moskva class of anti-submarine cruisers. Now a most unusual ship has been reported which appears to be an attempt to combine the desirable featrues of both the cruiser and the aircraft carrier.

This 45,000 ton ship, anmed *Kiev*, is 900 feet long with an angled deck running for the aft two thirds. Presumably catapults or arrestor gear are not installed, although catapults could well be considered worthwhile by the Russians. An island superstructure is to starboard amidships and several missile launchers are forward. Such a configuration could derive from the same philosophy as led to the flight deck on the HMS *Invincible* but is more likely the result of awareness that the stern mounted deck of the Moskva class will not allow optimum use of VSTOL aircraft. *Kiev* will certainly be able to operate STOL aircraft in appreciable numbers and therein lies the basic difference between the Royal Navy ship and her Soviet counterpart; *Kiev* is over twice as large, she has far heavier armament and could operate many more aircraft than *Invincible's* handful; she could do this in a high threat area. Whether she should be described as a cruiser with extensive aviation arrangements or a heavily armed aircraft carrier will depend on what air group the Russians finally embark and the emphasis given to her aircraft capability.

VERTICAL TAKE-OFF AIRCRAFT

The fixed wing aircraft which can take-off vertically has been advanced as the ideal ship-borne aircraft. Unfortunately wholesale replacement of present helicopters by VTOL aircraft is not nearly as simple as is generally believed; the Harrier, for example, is just not compatible with the average small ship deck. For instance, a minimum freeboard of 25 feet during take-off and landing is essential to remain clear of the cloud of spray generated by the jet exhaust striking the water. If the aircraft enters this cloud the pilot cannot see at a critical stage in the flight and spray will be ingested into the engine resulting in loss of power. Additionally, because of the manner in which the nozzles are rotated to achieve vertical flight the amount of deck movement acceptable to the Harrier is very small, not nearly as much as the 4 or 5 degree acceptable to the helicopter; far better stabilisation than presently available is necessary for small ships.

Any VSTOL aircraft has poor load lifting capability when taking off vertically because no lift is derived from the wings. In the short take-off mode, when lift from the wings is available, the lift (payload) of the Harrier increases by approximately 100 pounds with each one knot increase of airflow over the wings. A short take-off run to augment any natural wind to 50 knots would increase the payload by 5000 pounds. To plan for VTOL operation from platforms built on the stern of ships where such take-off runs are not possible would be to disregard most of the potential of the VSTOL aircraft.

The Harrier is referred to whenever VSTOL aircraft practical performance figures are needed because it is the only VSTOL aircraft in production in the Western world. The type equips the Royal Air Force,and the United States Marine Corps has purchased 110 for evaluation; a maritime version has been designed for use from the through-deck cruiser and has been offered for sale around the world but production has not yet commenced. The United States Navy is working on alternative types of VSTOL aircraft as successors to the Harrier but none are yet near flight trials; these successors will, hopefully, not suffer from some of the limitations in speed and range from which the Harrier suffers because of engine design.

FUTURE FLIGHT DECKS

The future of the very large flight decks on attack carriers and the very small flight decks on destroyers is relatively secure. Hulls now in existence will last for some decades and further construction is likely in one case and assured in the other. While the need for both types of deck and associated aircraft is recognised and no unforseen technological changes take place the attack carrier and destroyer deck will continue.

For the small or middle size ship the future is far less clear. As has been described, all the hulls presently in service are old and near, or beyond, the end of their economic life. The only exception to this general rule are the amphibious assault ships which operate troop carrying and cargo helicopters only; these are already fully committed to the amphibious role. As with the attack carriers and the destroyer decks the specialised amphibious ship will exist as long as the need is recognised.

Only one ship which could possibly be described as an aircraft carrier and able to take over the tasks of the remaining small carriers is even in the planning stage, this is the United States Navy's sea control ship – a ship which in its planned method of operation is very similar to escort carrier or light fleet carrier when first designed. This comparison should not be taken too strictly as the sea control ship is severely limited when considered as a carrier.

Sea Control Ship

The sea control ship is designed exclusively to carry and operate aircraft. Adopting the operating concept of the escort carrier, these sea control ships will be as simple and inexpensive as possible – single screw with a minimum of installed sensors. Fixed armament is planned to consist of 20 millimetre Vulcan-Phalanx rapid fire guns for close-in defence. Main sensors and armament will be installed in aircraft.

Ultimately, enough aircraft will be embarked to provide one radar early warning helicopter and two anti-submarine helicopters airborne at all times, with another anti-submarine helicopter at immediate radiness. Such a flying programme will provide warning of all air, surface and sub-surface threats and the weapon to meet the sub-surface one. At least one VSTOL aircraft will be at immediate notice to meet the surface and air threat which the USN feels the fixed wing aircraft is better suited to meet. An air group of this size will not be large enough to be effective in high threat areas nor is it intended to be; neither could the ship provide the storage for the large quantities of jet-fuel and ordnance needed for high-threat area operation. For escort of military and commercial convoys in low threat areas the ship promises to be very effective.

Trials have begun of this idea using USS *Guam*, an LPH which is approximately the size of the planned sea control ship. The usual assault helicopters have been replaced with an air group of Sea Kings and Harriers which are demonstrating the practicality of the ship as an escort unit. The helicopters provide effective anti-submarine defence and the Harriers are proving an ability to destroy the shadower, that bane of the convoy commander. Beginning from a realistic deck launch the Harrier is consistently achieving Sidewinder launch positions against genuinely shadowing Societ aircraft at ranges of 100 miles from the ship. In the anti-submarine role the Harrier is proving useful as a rapid-reaction sonobuoy laying vehicle and could no doubt carry and drop homing torpedoes.

Variations

The future of the sea control ship idea seems assured, regardless of United States Navy perse-

verence with the planned eight ships. Any navy intending to work outside the effective range of shore based aircraft must have shipborne aircraft. The aircraft requirements for effective defence, even at a very low threat level, is such that only a specialised seaborne aircraft platform can provide the numbers at reasonable cost. Through-deck cruisers could operate the necessary number of aircraft but at a unit cost far in excess of the outlay to built the far simplest sea control ship.

Existing hull and machinery designs for fleet support ships but with a flight deck and hangar instead of the usual superstructure would be one inexpensive method available to smaller navies to ensure that sufficient numbers of aircraft will be available at sea. Sensors will be the minimum for control of aircraft and weapons will be restricted to a single type of point-defence missile or rapid fire gun. An air-group of helicopters and fixed-wing aircraft will be embarked, the exact composition depending on the role envisaged and the amount of progress in VTOL aircraft technology.

An interim stage before this specialised ship would be an oiler or supply ship with accommodation for a squadron of helicopters for anti-submarine defence. The Netherlands Navy has already built the first of two Poolster class fast replenishment ships with space for five helicopters aft and the Royal Fleet Auxiliary *Tidespring* can operate three anti-submarine Sea Kings. Navies seeing the future aviation needs only in terms of helicopters may be content to remain at that level of naval air power – embarking in such hybrid vessels a mixture of medium size anti-submarine helicopters (e.g. Sea Kings) with a smaller helicopter for surface search and strike (e.g. Lynx).

Replenishment ship requirements conflict with some of the needs of aircraft operating ships and navies which recognise the need, and can afford to fill it, will move on to the next stage and build the specialised ship with the hangar and flight deck greatly extended. Such a seaborne aircraft platform could operate aircraft already available in the sea control role; classed as an escort she would provide the aircraft to control the maritime environment around herself. The most beneficial improvement over the less specialised ship would be the ability to despatch the shadowing aircraft which so easily remains just outside the missile envelope of conventional surface ships.

Exact details of the VSTOL fixed-wing aircraft to equip these ships are still obscure. The road to the present level of VTOL expertise is studded with numerous expensive experimental and developmental vehicles, none of which justified production. Even the Harrier's range and speed abilities are not particularly good when taken in isolation; VTOL ability justifies the aircraft and only those services which have a clear requirement to operate away from prepared bases have so far bought Harriers in any quantity. Aircraft being planned to have higher performance all incorporate technical features which are unproven and therefore include a degree of uncertainty. For shipborne operation an aircraft designed for catapult launching when heavy with fuel and weapons but capable of a vertical landing after the flight may prove the most effective compromise between user requirements and technical abilities. After all, a catapult launch is a short take-off without attracting an airframe size or weight penalty and vertical landings at the end of a sortie, lighter by thousands of pounds of fuel and ordnance is a technically less difficult problem.

THE MODERN CONVOY

One capability which has atrophied in the prevailing low-threat setting has been that of convoy defence. Present equipment capabilities, mental attitudes and training are biased towards a convoy speed in the vicinity of 12 to 15 knots. Such speeds may be above those commonly available during the Second World War, when last there was a serious world-wide threat to shipping, but they are far less than the speeds now used by the average merchant ship. Large tankers which ply the trade routes of the world have speeds in the vicinity of 17 to 20 knots; container ships are already faster and increasing in size and speed.

Not only are these container ships much faster than older ships, they are individually more important. Large, fast container ships are not replacing conventional 'break-bulk' ships on a one-for-one basis; rather one container ship is replacing seven or more of the older variety. As a specific example – about 150 ships were used to carry ammunition to Vietnam during the busiest years of the fighting; in any future such operation 25 or 30 container ships would be adequate to carry the same amount of ammunition.

Loss of a single Victory ship to a submarine in the Battle of the Atlantic was undesirable but could seldom be described as a serious blow to the war effort. The loss of a single container ship, performing the same amount of load carrying as five Victory ships, is more undesirable; the loss of two or three to enemy action would be the equivalent of a whole convoy lost – a catastrophe. Accord-

ingly a high degree of protection is appropriate; but how?

High speed is a mixed blessing when convoy defence is planned. Service speeds of 23 knots are common and up to 30 knots is not unusual; this high speed in transit, with the rapid turnaround permitted by the use of containers and special handling equipment, is the key to the efficiency of the container ship and cannot be reduced without severe degradation in cargo-carrying capacity of the system as a whole. On the credit side, speed reduces the time spent in focal areas and presents the torpedo firing conventional submarine with a major time and distance problem. To balance these advantages, grave limitations are apparent when escorts are being earmarked for convoys of container ships.

At speeds of 20 knots and above, the flow of water around the sonar dome generates noise which interferes with the sonar, the higher the speed the greater the noise until well below 30 knots the ship is deaf, with no anti-submarine sensor. Ships with the speed necessary to escort a 25 knot convoy effectively are rare, as the escort needs a margin of speed superiority to investigate contacts and move around relative to the screened body. Even rarer, nowadays, are ships which could maintain a speed of over 20 knots for over two thousand miles – fuel stowages are not sufficient.

Helicopters

Adequate defence against the air and surface threat could be provided by building ships with the speed, range, sensors and armament appropriate to the role and consideration of this ship in detail will make up the latter part of this essay. Sensors appropriate to anti-submarine defence at speed are more difficult to provide. Whether passive or active modes are used, sonar is the only underwater long or medium range sensor available in the forseeable future and sonar devices must be moving slowly, ideally stationary. Immediately one of the prime advantages of the sonar fitted anti-submarine helicopter comes to mind; a stationary transducer when in the water, but with a high speed of advance – the ideal vehicle for escorting fast merchant convoys. Aircraft such as the Sea King, already in service in several versions in many navies, have transit speeds of 100 knots and an endurance of three to four hours. Two or four homing torpedoes or depth bombs can be carried and although medium range variable depth sonar is presently installed there is no reason why passive arrays or sonobuoys should not be carried.

Providing a base for such helicopters need not cause problems. A United States Navy programme designated project ARAPAHO has already described how all the support facilities needed by a squadron can be embarked in standard 8 x 8 x 20 feet shipping containers. These containers are already air conditioned and insulated, fitted with standard naval fire-fighting and safety equipment as well as power and telephone. In a trial of this concept, an entire Sea King squadron (HS-5) embarked in USS *Wasp* with all required workshops, offices, spare parts and stores in 21 such containers averaging 7000 pounds in weight. Embarkation in a merchant ship would need additional containers for personnel accommodation and facilities as well as the storage of fuel for the aircraft.

The principle advantage of such a scheme is that squadrons earmarked to embark in such ships – ideally Reserve squadrons – could normally operate from the containers ashore. When activated and aboard ship they would be using the same facilities as used ashore with, hopefully, higher serviceability. The type and number of helicopters to embark could be determined by the threat assessment and the space available; air groups could be assembled ashore and embarked while the host ship was being turned around at the end of a journey. No prior preparation or alteration to the host ship is envisaged, she would still be manned and operated as a commercial cargo carrier with a self-contained naval component embarked to provide defence, exactly as has been done by merchantmen for hundreds of years.

Such a plan does have drawbacks; storage of consumables – fuel, water, food, spare parts, would be a major limitation and a reduction in the commercial capacity of a ship would be another. The ARAPAHO plan envisages between 50 and 100 containers to support six Sea Kings in a merchantman; other authorities give a figure of up to 500 containers being replaced although this latter figure presupposes a certain amount of permanency in the arrangement and a good deal of prior preparation. Using the working figure of 2000 containers per ship this is a reduction of between 5 and 25 per cent in cargo capacity.

The carriage of helicopters does not entirely provide all-round defence to convoys or individual ships. Some air defence is still needed and the helicopter is not yet an effective air-defence vehicle; either surface-to-air missiles or fighter aircraft are still lacking. Installation of missile systems in containers has been suggested; these would have to be built at a great cost, then stored awaiting

the call for use. Storage would demand some degree of preservation and consequent setting to work after installation in the host ship, thus defeating the whole aim of the module concept which is quick installation of an already functioning system. Embarkation of fighter aircraft is more feasible, especially when the reduced numbers required for deck alert operations are calculated and the ineffectiveness of missiles against shadowing aircraft is included.

Still lacking are the necessary radar and command and control facilities in the host ship. These may be placed in modules but for the radar at least the disadvantages of 'mothballing' for long periods are evident, as would be the difficulty of obtaining trained operators. The large number of containers is reducing the cargo carrying capacity of the host ship to an alarming degree, a detailed calculation would produce a figure approaching half of the ship's normal cargo replaced by defensive containers by the time helicopters, VSTOL fighters, radar, missile systems and associated operations rooms with necessary fuel supplies, weapon storage and personnel facilities are included. Removal of the air defence and command capability into a special purpose ship would restore a more reasonable balance between defended and defender.

THE MICRO-AIRCRAFT CARRIER

Such a special purpose air defence ship would need an area air defence missile system (Standard?), a suitable long range air warning/air direction radar and be able to operate about six fighter aircraft. An operations room designed to accept information from, and take control of, anti-submarine and surface strike helicopters, as well as the air defence weapons, would be installed. She must be capable of up to forty knots and be able to sustain this speed for over three or four thousand miles, in a sea state in which a tanker or container ship can operate.

Hydrofoil

Obviously this will not be a conventional ship with a displacement hull. Either a hydrofoil or surface-effect ship is possible and plans for both have been prepared. Hydrofoils so far built have been intended for developmental patrol boat roles but results of tests indicate that a 1,000 ton hydrofoil is feasible. A micro-carrier of 1,000 tons has been designed which would be capable of 50 knots with a range of over 2,000 nautical miles when operating on foils. Such a carrier could operate two VTOL fighters and could be equipped with the necessary direction equipment.

Surface Effect Ship

Surface effect ships of 2000 tons are also being planned as the next step from the two 100 ton developmental vehicles (SES-100A and -100B) now being assessed by the United States Navy. Operating at a height of twenty feet to provide a stable platform in any but the most extreme weather and travelling at up to 60 knots, such a micro-carrier would fill the requirements for convoy escort. The configuration of such a ship is subject to detailed calculation and experiment but in broad detail a 200 feet by 100 feet micro-carrier would have one half, traditionally the port half, reserved for aircraft operating areas. Two 75 by 50 feet grids would be installed from which VSTOL fighters would operate. Experience has proved grids of this size essential to allow exhaust gases to escape instead of recirculating into the engine intakes when operating Harriers; the Harrier successor is unlikely to be much larger. The wind over the deck generated by either the hydrofoil or surface effect micro-carrier ensures that aircraft operating in the VTOL mode will have adequate payload. Should VTOL technology not make good its promise one or two catapults could be installed in this deck, the aircraft making a short landing on completion of the flight. The starboard half of the ship would be occupied by a conventional but streamlined superstructure which would incorporate radar antennae and missile launchers. A separate helicopter deck may be found to be advantageous on the starboard quarter so that immediate -notice fighters need not be disturbed for helicopter movements.

Intended specifically as an air defence escort, the surface effect ship has the same anti-submarine advantages as a helicopter. Remaining motionless on the water, variable depth sonar can be operated to detect submarines and high speed can be used to regain station. Provided space and weight capacity can be found without detracting from the primary role, the secondary role of anti-submarine defence could be filled relieving the helicopters of some of the load.

New Escort in Use

A hypothetical setting for using these facilities would be an increase in international tension leading to a requirement to provide multi-capable escorts for merchant shipping. The scheduling of tankers and container ships is based on the loading and unloading facilities available and forcing loaded ships to wait before sailing would reduce the effectiveness of the whole system, even more than slowing ships down in

transit. Convoys may, therefore, consist of only two or three ships. Each ship would have a helicopter squadron embarked simultaneously with the loading of the cargo; the aircraft, providing a mix of anti-submarine and anti-surface capabilities, would fly on as the ship sailed. Also joining at departure would be a fast micro-carrier escort to provide full anti air defence with missiles and fighters.

The convoy would proceed to its destination under the control of the micro-carrier acting as the command and control authority for all purposes. The convoy commander, embarked in the escort, would have available the necessary communications and information display equipment to assist him in decision making; equipment which because of its complexity could not readily be provided in the merchant ship, even using the module principle. All air-defence would be carried out by the escort, aided by airborne early warning helicopters operated from the merchantmen for detection and her own missiles and fighters for defence. Surface defence would be co-ordinated by the escort using her own radar with helicopters for surface search and strike aided by fighters for strikes against tougher targets; submarine defence would be left principally to the anti-submarine helicopters operating from the merchantmen but co-ordinated by the escort.

Fast micro-carriers would have many other uses, even to escorting military convoys including attack carriers. A VTOL fighter at immediate readiness on deck could be regarded as a low altitude combat air patrol ready to be scrambled by an airborne early warning aircraft. The near impossibility of a successful torpedo attack, and the difficulty of a successful missile attack against the fast moving vehicles make them attractive for a variety of roles where the conventional displacement hull would be at too great a risk.

As with all weapon systems there are disadvantages – cost being the greatest. The expense of providing full air direction and workshop facilities for each embarked detachment will be high, this very high cost will probably slow down the introduction of the micro-carrier but it is inevitable that eventually there will be some such vessel providing the aircraft necessary for defence of commercial convoys.

CONCLUSION

The driving force behind the development of the seaborne aircraft platform has been the need for the capabilities of the aircraft far at sea. To meet this need several types of air capable ship have been developed; of these, the large attack carrier, the small carrier and the helicopter fitted escort are the most prominent; three other ships are notable for some features – the sea control ship, the through deck cruiser and the latest Soviet air capable ship.

Shore based aircraft have often been suggested as a better proposition than the sea based counterpart. Within useful range of bases this may be true but beyond 500 miles from fixed shore bases present or projected maritime reconnaissance aircraft are not economic. Beyond 500 miles the extended transit times reduces the useful time on task to a useless level, beyond about 2000 miles the shore based aircraft cannot reach the scene of action at all. On a global scale, and allowing for the unreliability of overseas bases, this is unacceptable.

Destroyer-based helicopters are gaining world-wide acceptance as a normal part of the naval scene. The proliferation of deck fitted ships and the increasing capabilities of the embarked aircraft ensures a long and profitable association between the warship and the helicopter which will last as long as the aircraft can perform tasks which the ship cannot perform unaided. These destroyer decks could not easily be adapted for carriage of VTOL fighter aircraft and for the high performance aircraft some form of specialised air capable ship is essential.

The large attack carriers, operated principally by the United States Navy, are political as much as naval weapons with the role of projecting naval air power ashore or over large areas of ocean. As long as the political need for this capability to project air power remains, and is recognised, the large attack carrier will remain in service; probably in a form very like that we now know.

The future for the small aircraft carrier is not so rosy. During the post-war proliferation of the small carrier, naval aircraft were small enough for a useful number to be carried in a single ship. Increasing size of carrier-borne aircraft forced a reduction in the numbers embarked to the point where the small ship could not retain a multi-role capability. The large navies gave up the small carrier entirely when this occurred, smaller navies could not afford to do so and persevered with the small carrier. All of these remaining examples are old and at the end of their lives; several possible replacements are possible.

Alternatives

The Royal Navy approach is the through-deck cruiser, a ship which will operate a handful of helicopters and VSTOL fighters. This ship will also be equipped with area defence surface to air missiles and comprehensive sensor and command facilities. Such a ship will be very expensive, too expensive to build in any numbers, but will be a versatile ship. Rather than a serious contender as the latest variation in aircraft carriers the high cost of the ship and the low number of aircraft carried places this ship in the class of a cruiser with extensive aviation arrangements.

The American answer to the problem is quite different. The sea control ship has been designed from the outset solely to operate aircraft which will control the sea environment in the vicinity of the parent ship. Essentially this is a defensive or escort role and such is freely admitted by the United States Navy which considers the ship too small to support enough aircraft for long enough to even be called an aircraft carrier. Unlike the through-deck cruiser, the sea control ship will exist solely to operate aircraft for the defence of accompanying ships – without her aircraft she will be a liability.

The Russian ship appears to be an attempt to provide a cruiser with enough aircraft to confidently face a high level of threat for a reasonable time. Exactly how it will be employed remains a matter for conjecture, it appears to fall in the same category as the attack carrier – if the need for air power of that scale is admitted, the ship will remain in service.

Sea Control Ship Variations

Smaller navies with a desire to operate beyond the range of shore based aircraft must look to the sea control ship idea as the only source of aircraft they can afford. Navies prepared to limit their naval air arms to helicopters could settle on the hybrid supply ship/helicopter carrier able to carry a small squadron of defensive helicopters but unable to combat the shadowing aircraft. More ambitious services could use the basic hull and machinery of a support ship as the basis of an inexpensive locally built sea control ship able to operate enough fighters and helicopters to provide adequate defence against all forms of threat.

Such a ship must be defensive. The nation wishing to operate an offensive naval air arm posing a credible threat has no choice but to look for large aircraft carriers. Only the large ship can operate enough aircraft or carry enough aviation consumables to operate aircraft for a reasonable length of time.

Convoy Escort

The main disadvantage of a sea control ship is low speed – it would be unable to stay with a modern 25 to 30 knot container ship. Defence of commercial convoys in the decades to come will need the capabilities only aircraft can provide. Helicopters operating from shipping containers included in the commercial cargo of merchant ships would provide emergency defence against submarines and some surface threats. Provision of air defence by these modules is not feasible as too high a proportion of commercial cargo must be displaced. Rather, a special purpose air defence and command escort is needed.

Speed, range and seakeeping requirements for this escort are such that only a hydrofoil or surface effect ship could be considered. For air defence fixed wing aircraft are essential so the escort must be able to operate fighter aircraft and incorporate the necessary radar and command facilities. Communications and information display facilities are best provided in this single unit to provide the escort commander with a convenient and efficient unit from which to exercise control of the convoy.

This micro-aircraft carrier will take some years to develop but must eventually enter service as it is the only forseeable way in which the capabilities of aircraft, so essential for convoy defence, can be obtained at sea.

THE AUTHOR

Lieutenant Commander Raymond Marshall Jones RAN was born in 1943 at Oakleigh in Victoria. He matriculated from Christian Brothers College, East St. Kilda in 1959 and joined the Victorian State Public Service as a Draftsman. Lieutenant Commander Jones joined the RAN in 1963 as a Supplementary List (Air) Midshipman. He carried out Observer training with the Royal Navy at Malta and then served in various squadrons seeing service in Vietnam 1967-68. Promotion to Lieutenant took place in 1966 and to Lieutenant Commander 8 years later. In 1974 he transferred to the General List. Other appointments held have been RN exchange service 1969-71, Basic Aircrew Training Officer HMAS *Cerberus* 1971-73, Watchkeeping training HMAS *Hobart* 1973-74 and as Air Operations Officer NAS Nowra 1974-75. Lieutenant Commander Jones is currently at RAAF East Sale on the Advanced Navigation Course and will assume the duties of Senior Naval Officer RAAF East Sale on completion of the course.

THE NAME OF THE GAME

An extract from a speech made to 101st Annual Meeting of the U.S. Naval Institute by Admiral J.L. Holloway III, U.S. Navy.

Admiral Holloway referred to a question posed to him by a Congressional Committee which went like this "Why is it that the United States Navy is receiving the lion's share of the defence budget? At 31 billion dollars you are getting more than the Air Force and considerably more than the United States Army".

My reply was very simple. I said "Mr Chairman, there has been no time since World War II when the role of the United States Navy has been more important. If the Navy does its job in carrying out its roles and missions in our national strategy, there will be no job for the Army and the Air Force to do in defending our country".

THE SIZE OF THE GAME

Addressing the Navy League Convention in New Orleans, on 23 April 1975, President Ford emphasized the threat posed by expanding Soviet naval strength and asserted that the U.S. must maintain "sea, land and air forces that are second to none." He declared: " . . . Soviet Naval units now freely roam the world's seas.

"Let me give you a graphic example – something that has happened within the past few days. Elements from all four fleets of the Soviet Navy have just completed global maneuvers. More than 220 Soviet ships, deployed in all the oceans of the world, participated in the exercise. More than 50 Soviet ships were deployed in the Atlantic, extending their maneuvers to the Norwegian Sea and southwest of the British Isles. Soviet reconnaissance aircraft operating from Cuba and Guinea conducted ocean surveillance over wide areas of the Atlantic. The Soviet Navy was also active in the Mediterranean, the Pacific and the Indian Ocean."

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   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.

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CONTRIBUTIONS

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