THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

Joint Committee on Foreign Affairs and Defence

AN AIRCRAFT CARRIER
FOR THE AUSTRALIAN DEFENCE FORCE

Australian Government Publishing Service Canberra 1982

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Introduction

1. On 25 March 1982, the Senate passed the following motion:

That

(a) the Senate refer to the Joint Parliamentary Committee on Foreign Affairs and Defence, as a matter of urgency, the following matters:

(i) the relevance of an aircraft carrier to Australia's current and perceived strategic environment;

(ii) the role of an aircraft carrier in the defence force structure of Australia; and

(iii) the effects of the purchase of an aircraft carrier on the future defence procurement program; and

(b) the Committee be requested to report not later than 1 September 1982.

2. On 20 April 1982, the Joint Committee on Foreign Affairs and Defence passed the following motion:

That

the resolution of the Senate dated 25 March 1982 concerning an aircraft carrier be referred to Sub-Committee C, and that the Sub-Committee be empowered to prepare a report for the Committee's consideration in time to meet the date set by the Senate.

3. The reference has attracted considerable public interest and a wide range of submissions has been received. We have been impressed by the interest which the reference has generated and wish to record our thanks to those people who, in many cases, took considerable trouble to assist us in our inquiry. There have been many conflicting claims included in written submissions and in evidence gathered at our hearings. We have sifted that evidence carefully and, in the chapters which follow, we discuss the major issues which need to be considered to reach conclusions relating to the reference.

4. The evidence which the Committee has received has been a mixture of fact, judgement, conjecture and inference, and polarised between pro-carrier and anti-carrier supporters. In view of the importance of the decision to purchase an aircraft carrier, and the public interest in such a decision, the Committee considers that it has a responsibility to present the conflicting evidence in a balanced way. By so doing, it believes that it will be making a valuable contribution to the public debate by providing informed opinion from which individuals may form their own judgements.

5. The public hearings coincided with the Falklands conflict, in which HMS INVINCIBLE was engaged. Undoubtedly there are many lessons which should be considered relative to the fighting which occurred there. At the same time, however, there were many features of that conflict which were atypical, and which could influence judgments unless allowance was made for this. At the time of writing this report, there are many matters - including the relative effectiveness of various weapon systems and equipments, tactics employed, deployment areas, damage inflicted and received etc, which could affect judgments. It is too early for this information to be available in sufficient detail for it to be analysed. If and when it is, it may be necessary to review some of the judgments made in this report. The Committee has before it a reference to assess the force structure of the Australian Armed Services, and when it reports on that matter, comment will be appropriate.

6. The Committee has developed the report in direct relationship to the three elements of the reference:

- Chapter 1 examines, in terms of the various levels of contingency, the relevance of an aircraft carrier to Australia's current and perceived strategic environment.

- Chapter 2 establishes the role of an aircraft carrier in the Defence Force structure of Australia, examines its effectiveness in that role, and looks at optional capabilities which could perform that role.

- Chapter 3 considers the effects of the purchase of an aircraft carrier on the future procurement program for the Australian Defence Force.

7. On 9 September 1980, the Minister for Defence announced a decision to acquire an aircraft carrier to replace HMAS MELBOURNE. In fulfilment of this decision, on 25 February 1982 the Government announced the purchase of HMS INVINCIBLE from the British Government. Following the Falklands conflict, and taking advantage of an offer by the Australian Prime Minister to forego the purchase, the British Government announced that it would retain HMS INVINCIBLE for the Royal Navy. The Australian Government is reconsidering the whole matter of acquiring an aircraft carrier. In view of this, and the reference that has been handed to the Committee, which requires it to consider the matter of an aircraft carrier, the Committee has not confined itself to ships of the INVINCIBLE type. It has, however, restricted itself to consideration of ships of the type which were on the short-list to meet the perceived requirement announced in 1980. As will be pointed out in Chapter 2, anything larger than those ships would be beyond Australia's capacity to acquire and operate.

R.C. Katter, M.P.
Chairman
Sub-Committee on Defence Matters

CHAPTER 1

Relevance of an Aircraft Carrier to *Australia's Current and Perceived Environment*

1.1 A nation's strategic environment is the determinant of its defence objectives, strategies and doctrines and of the defence forces it maintains. The nature and size of capabilities required in its armed forces at any given time to meet ongoing commitments, and as a basis for expansion to meet contingent situations of conflict, must be assessed against that environment.

1.2 There are both internal and external elements of Australia's strategic environment. Internal elements are relatively constant and relate to our geographical location, our strategic significance, our geo-physical features, our population, resource, economic, education and technological bases, our political and social systems, and our national will. The principal external elements, which must be subject to detailed and continuing study, are: the prospects for world, regional and neighbourhood stability and the implications of any perturbations for our security interests; the potential of any foreign country to initiate action which would be inimical to our security interests; the attitudes of third countries, including allies, friends and neighbours, to us and our adversary should we become involved in conflict; and the essential nature of our environs.

1.3 In a previous report to the Parliament, Threats to Australia's Security, this Committee considered in some detail the external elements which would have implications for Australia's strategic environment. That report provides the basis for our consideration of the relevance of an aircraft carrier to Australia's current and perceived environment. Where we have received additional evidence since we prepared the earlier report, we have taken account of that evidence; where it has been necessary to expand, interpret or modify our previous considerations we have done so.

1.4 In this chapter we classify our consideration under the same four headings that we used in our previous report: potential for global conflict and its implications for Australia; invasion of Australia; intermediate level threats to Australian interests; and low level contingencies. We discuss the circumstances which could lead to each level of contingency arising, together with its likelihood; the general nature of the conflict if it did arise and its implications for Australia; and the desirable nature of the response by Australia. From this discussion we are able to make a general assessment as to the relevance of an aircraft carrier to the particular levels of contingency; that is, to Australia's current and perceived environment. We address the question of whether an aircraft carrier would contribute an effective or appropriate response in a particular contingency in the following chapter.

Potential for Global Conflict

1.5 There is much in the present superpower strategic relationship to promote stability or at least to reduce the chance of major conflict. There is a common interest in avoiding mutually destructive war based on an understanding that each side possesses the capacity to destroy the other.

1.6 While there are factors which impel the super-powers towards maintaining and enhancing stability in their relations, opportunities will inevitably arise, in circumstances where the vital interests of the United States and the Soviet Union are not engaged, for either super-power to gain some political advantage from regional disturbance or conflict. Intervention in such disturbances or conflicts may affect the super-power relationship, even though the core of the relationship remains essentially stable. The greatest danger that could arise from 'peripheral' disturbances in the super-power relationship is that they might not remain peripheral. Major powers have frequently been drawn into wars which they had not sought.

1.7 Australia's geographical position is such that it is unlikely to become automatically or immediately involved in a conventional conflict associated with a general war. Because of the probability of rapid escalation to nuclear war, general war is likely to be of short duration. As a nuclear exchange and the engagement of super-power conventional forces would be concentrated in the northern hemisphere, it seems unlikely that Australia would be directly threatened with invasion. Any active overseas involvement would be by deliberate decision by the Australian Government after hostilities commenced. The damage that Australia would suffer in the first instance in a general war, aside from that associated with a possible attack upon the joint installations at Pine Gap, Narrungar and North West Cape, would be large scale disruption to our economy because of the massive destruction inflicted on some of our trading partners, and the dislocation of world trade.

1.8 Argument has been presented to the Committee that there are uncertainties involved in an analysis which suggests a rapid escalation to a nuclear war, in the event of super-power conventional forces becoming directly engaged. The most relevant of these uncertainties to the reference are the extent to which peripheral disturbances could lead to general engagement and, if they did, the nature of the subsequent engagement, and the way in which a conventional engagement would escalate to a nuclear engagement, or how nuclear conflict would be managed. Both super-powers would be anxious to ensure that a peripheral disturbance, where their vital interests or survival are not at risk, should not escalate to a nuclear exchange. In such a situation there could be a prolonged period of conventional war.

1.9 The USSR appreciates fully the vulnerability of the Western Alliance to the disruption of seaborne trade. It is conscious that the technological capacity of the West is infinitely greater than its own and that, in a war of attrition, the West's capacity would need to be starved of its overseas sources of supply of essential raw materials. In the Middle East, the Horn of Africa, East and West Southern Africa, the Caribbean approaches to the Panama Canal, and in South East Asia it has developed access to facilities which would assist it in disrupting vital Western Alliance sea-lines of communication carrying essential raw materials.

1.10 There are tactical constraints, however, on the USSR engaging in the disruption of seaborne trade, even to the extent of its unrestricted sinking of ships. The most powerful of these would lie in its perception of the extent to which the US - and the West - would accept losses before there was escalation. A degree of disruption could be achieved, of course, without resorting to the sinking of ships, but it would be difficult to sustain such a threat.

1.11 There are further limiting factors on the operational deployment of Soviet anti-shipping forces. Despite the formidable anti-shipping forces - submarines, surface ships and aircraft - it possesses, and the facilities to which it has access, it has problems in deploying freely from its bases, particularly from the Baltic and the Black Sea and, to a lesser extent, from the Arctic and Pacific bases.

1.12 Even if the USSR engaged in a campaign of disruption of seaborne trade, its priorities would be directed against those Western sea lines of communication which most directly supported or influenced Western military operations. They would be aimed primarily at isolating the US itself, Western Europe and Japan from their sources of raw materials and from mutual support. Large numbers of submarines would also be designated to the defence of Soviet ballistic missile submarines and to finding and destroying United States and Allied Polaris/Poseidon/Trident submarines. Australia has importance as a source of essential raw materials to Japan, and could assume importance as an alternative source of supply to the US for certain raw materials normally provided from Africa. The waters south of Australia would attain greater significance as part of diversionary routes between the Middle East and Japan, and possibly Japan and Europe, should the choke points in Indonesian and South-East Asian waters become untenable. This would most likely be the case were the war to be prolonged beyond an exchange of a substantial proportion of the strategic nuclear forces of both super-powers.

1.13 A great number of factors would influence the size and nature of the potential threat in Australia's environs. It would most likely be restricted, initially at least, and while existing international alignments and circumstances allowed, to a low level of submarine operations supported by satellite and - in the north, north west and west - aircraft reconnaissance. Submarines could be torpedo and missile fitted.

1.14 An aircraft carrier, capable of mounting and directing anti-submarine warfare (ASW) operations and conducting anti-shipping strikes, could contribute to protection of security of Western seaborne trade operating in Australia's environs. Contributions would also be made by the P3C Orions in both an anti-shipping and anti-submarine role, the frigates, and in an anti-shipping role, the F111s and FA18s. Australia would need to make a contribution, irrespective of the nationality of the shipping protected.

1.15 In the event of nuclear exchange, Soviet missile firing submarines would be most likely to operate from ocean areas close to their bases, where they would gain maximum protection and from which, with modern long-range missiles, they could strike their targets. There could arise circumstances, however, where it became necessary to deploy into the wide ocean areas of the world, including within the South Pacific or Indian Oceans. The government of the day could see it to be in Australia's interests to contribute to anti-submarine warfare (ASW) operations against such deployments. However, the Committee received evidence that the contingency of anti-submarine warfare during prolonged global war, which is seen as remote, has not been a factor in recent or current planning of Australian Defence Force structure.

1.16 In view of the assessment that the contingency of general nuclear war is highly unlikely on all rational calculations, priority is not accorded to developing the capability of the Australian Defence Force in relation to nuclear conflagration. Current Defence planning is based on the premise that, in circumstances of general conventional war, the objective would be to employ our forces in a complementary role with Allied forces, especially in our own region. The contingency of global conventional war is not, therefore, seen as a specific factor determining the characteristics of the forces.

1.17 It should also not be thought that the Committee believes a carrier to be the only contribution which Australia could make to the Western sea-control effort during a global war. In addition, given the magnitude of the task involved, it would be wrong to exaggerate the contribution which one or possibly two Australian carriers could make to such an effort.

Invasion of Australia

1.18 Australia has no neighbours across a land frontier and it does not threaten any other power. Surrounded by a large expanse of ocean, it is relatively remote from the main areas of super-power competition. Furthermore, Australia's remoteness, particularly its main population centres on the South-Eastern part of the continent, makes it difficult for a conventional enemy to gain strategic surprise, and may add the requirement for an aggressor to secure staging bases. This factor, plus Australia's size, means that any notional enemy has to overcome the problems of a long line of communications.

1.19 Leaving motives or intentions aside, there would be only two nations at present which have the military capabilities to mount a major conventional assault against Australia. These are the United States and the Soviet Union. The Soviet Union has a much lesser ability to project force over sea than the United States, and for a conventional military invasion of Australia, the Soviet Union would probably require an intermediate staging base in South-East Asia to provide an attacking force with effective air cover and to keep its shipping operational. Of the super-powers, only the United States has sufficient aircraft carriers to provide an adequate degree of air superiority for a successful invasion of Australia. It is difficult to conceive a situation in which either of the super-powers would develop the motivation to mount an invasion of Australia.

1.20 There are several countries which could develop the capability in the future to mount an invasion of Australia. The development of the required capability would, however, be evident and would take some time, and its acquisition should be discerned by Australia if it maintains an appropriate degree of intelligence capability.

1.21 So long as there is no imminent or foreseeable threat, the concept of deterrence should be central to Australia's defence planning. To increase the cost and risk of aggression requires the identification of possible aggressive acts, and the operations involved in responding to such acts, in an ascending order of cost and risk to the enemy. It requires identification of an enemy's vulnerabilities so as to develop capabilities which are directly relevant to those vulnerabilities, and the acquisition of which would raise the costs and risks of its aggression. It is necessary too, to identify particular Australian vulnerabilities and to provide the evident capability to protect these; by so doing a potential enemy would be obliged to raise the level of its capabilities to overcome the defence. A highly significant component in the deterrent Australia could offer to a notional invader would be the capability to strike against its home bases (in the case of a regional power) or its forward operational bases, with air and sea power.

1.22 Until and if a particular potential enemy, capable of mounting an invasion of Australia, and with the prospect of developing the motivation, is identified, it is necessary to develop the deterrent capability in general form only, related to the vulnerabilities inherent in the environment.

1.23 From a maritime aspect, a hostile power embarking on an invasion of Australia would aim to:

(a) develop, by sea and/or air-borne assault, a lodgement area or areas on Australian territory including, if possible, port and airfield facilities;

(b) establish sea and air control over the approaches to the lodgement area(s) and the sea and air lines of communication between the lodgement area(s) and its home bases or forward operational bases;

(c) expand its area of control over Australian territory by mounting further landing operations either from its initial lodgement areas or directly from its home or forward operational bases (the vast area of Australia could encourage an invader to make a series of sea and/or air-borne assaults against contiguous areas rather than risk a land advance across inhospitable country);

(d) provide logistic support from home or forward operating bases to lodgement areas;

(e) mount attacks against Australia's sea and air forces capable of interfering with any of the above;

(f) isolate Australia from its external sources of support, and deny it the capability to export to finance its war effort, by disrupting its sea lines of communication;

(g) deny Australian seaborne support of areas of operations by disrupting coastal sea lines of communication between base areas and operational areas.

1.24 A notional force would consist of sea and/or air troop transports, specialised assault craft and a vast array of logistic support vessels. The surface force would have to be supported by modern surface and submarine units armed with missiles, guns and torpedoes capable of anti-surface, anti-air and anti-submarine operations. Air cover would need to be provided by shore-based and/or carrier-borne aircraft; there would be a strong air strike capability against shipping and land targets.

1.25 Any threat to sea lines of communication would be provided by missile and torpedo firing submarines, supported by land and, perhaps, sea-based aircraft strikes and surface units in the north-west, north and north-east of the continent - dependent on the identity and forward basing of the enemy. Reconnaissance would be provided by shore-based aircraft with, in some circumstances, support from satellite reconnaissance.

1.26 The Committee remains confident that Australia would be able to internationalise the situation should an enemy attempt the sustained disruption of our external sea lines of communication. There would remain, however, the threat to sea lines of communication supporting Australian defensive operations. This requires that Australia should be seen to have the capability to protect these.

1.27 The roles ascribed to an aircraft carrier relevant to deterring the threat of invasion of Australia or countering it if it did occur are:

(a) mounting anti-shipping strikes against transports carrying the surface element of the invasion force together with its associated logistic support and screening naval forces, and subsequent reinforcements;

(b) co-ordinating the operations of other maritime forces engaged in the above;

(c) providing air and surface defence, including against missile attack, to other surface forces engaged in (a) above;

(d) mounting ASW operations against submarines operating in support of the invasion force;

(e) providing air strikes against land targets - home/forward operating bases or in the lodgement area - where the air environment is favourable. Any such activity would be more likely to be supplementary to operations involving Australian land based strike aircraft;

(f) protecting Australian (and allied) shipping supporting counter operations and, if required, shipping carrying high value or important cargoes to or from Australia.

1.28 It needs to be remembered that not all aircraft carriers in service and under consideration for possible purchase are equally capable of performing the tasks outlined above. In all cases, the ability to perform those roles outlined would be dependent on the capabilities, particularly the air control capabilities, of an opponent.

1.29 The Committee invites attention to its previous assessment that the contingency of invasion of Australia is remote in time, that it could occur only if there were substantial changes in world order, and that Australia would have significant warning before it could occur. The relevance of an aircraft carrier to this level of contingency should be weighed against these considerations. Unless it can be shown to be relevant to the more likely contingencies to be considered in subsequent sections, no great weight should be placed on its relevance to this contingency.

Intermediate Level Threats

1.30 In our previous report, Threats to Australia's Security, the Committee defined those threats which it considered should be included in this level of contingency. These were:

(a) lodgements on Australian territory;

(b) major raids;

(c) external aggression against a regional country;

(d) the blockade of an Australian port or ports; and

(e) disruptions to our sea lines of communication.

1.31 A notional enemy could mount one or more of the above threats with a significantly lower level of capability than would be required to mount an invasion of Australia. For this reason, the period of likely warning, based on Australia's perception of an expanding capability, could be less, as would be the time-frame in which the threat could emerge. By resorting to a lower level of activity than postulated by an invasion, a notional enemy might perceive that it would be less likely to create a situation in which effective international support for Australia was forthcoming. There would, therefore, be fewer political and operational constraints on mounting this level of threat.

1.32 The notional enemy would, however, still have to develop the necessary motivation and be prepared to accept possible escalation of the conflict. Given the appropriate capabilities, the response by Australia need not be related directly to the enemy's activities. For example, in response to disruptions to our sea lines of communication, Australia could retaliate with attacks against the enemy bases. The Committee considers that intermediate level threats against Australia are more likely where the existing world order was seriously disrupted, and where the attentions of Australia's main allies were totally preoccupied with serious military threats or large-scale economic disruption.

1.33 Taking into account that intermediate level threats might call for a greater need for Australian self-reliance, the maritime contribution to the military deterrents to lodgements or major raids are not greatly different to those for invasion. Australia's naval and air forces must be seen to be capable of destroying the attacking forces while moving to or from Australia or of destroying their lines of communication with their home bases, and should pose an unacceptable risk for any regional state contemplating hostile action. The deterrent effect is enhanced if our ready reaction forces demonstrate the ability to make rapid deployments to those parts of Australian territory that are more vulnerable to intermediate threats. Furthermore, the capability to strike at the notional enemy's home or forward operational bases constitutes a very significant deterrent.

1.34 A further consideration emerges in this classification of contingency in relation to external aggression against a regional country, particularly in the Indonesian/Melanesian archipelago, and to New Zealand. This vast area, extending out to beyond 7000 nautical miles from the Australian mainland, is of abiding and fundamental concern to Australia (and New Zealand) and of considerable strategic interest to the US; the USSR would be interested in improving its influence in and access to the area if this could be done without provoking too strong a reaction from Australia, New Zealand and the US. It must be said, however, that this consideration would not be of the same order of priority as that assigned to deterring an intermediate level of threat to Australian territory. The extent of concern, and Australia's ability to influence such events, would be determined by proximity (developments in New Guinea would be of more concern than those in Samoa or Tahiti), and prevailing political circumstances. There ought to be no assumptions of any direct Australian involvement in difficult domestic political circumstances in South-West Pacific islands.

1.35 In the discussion on disruption to our sea lanes, argument was presented to the Committee to the effect that the carrier could be useful in escorting important cargoes in prolonged global war, or in regional conflicts involving a notional enemy with a strong submarine capability. Scenarios for these threats were necessarily vague. The Committee noted the existence of other elements of our naval forces capable of performing an escort function. In a

situation involving global war, our allies would be performing this escort function through the most threatened waters. Further, some specialised cargoes related to spare parts for highly technical defence equipment where no local production capability existed, could be transported by air.

1.36 In a regional context, we are confident that Australia would be able to internationalise a situation in which an enemy disrupted our sea lines of communication. We accept that it could be done for a short period, but we do not accept that the enemy could sustain its action without attracting a sharp response by the owner states of affected ships. As mentioned earlier, moreover, the Australian response to such a situation need not be directly related to the enemy activity. At the same time, however, it would be necessary for Australia, in some intermediate level threats, to protect those ports and sea lines of communication which were directly supporting the Australian military response.

1.37 The nature of the operational threat environment in intermediate level threats would be similar to that experienced in invasion, para 1.24 above, although the intensity and scale of operations could be expected to be less. The area of threat would be localised in most cases. Operations in support of regional states against external aggression could be more wide-ranging. It could include the need: to land forces in areas where the aggressor had already gained a lodgement and had air and sea support; or resupply forces by sea and air against sea and air attack. In these circumstances, however, the enemy would also have vulnerable lines of communication. Any threat to sea lines of communication would be in the form discussed at para 1.25 above.

1.38 The role ascribed to an aircraft carrier could contribute to deterrence against intermediate level threats, or countering them if they did occur, are:

(a) in the case of lodgements or major raids, carrying out the types of task required in respect of invasion and listed at para 1.27 (a) to (e) above. It should be noted, however, that the level of operations and the level of opposition would be significantly lower than in the case of invasion of Australia, although the level of individual capability provided by particular enemy units could be as high;

(b) providing a power projection capability to deter or counter a foreign power embarking on an aggression against a regional state. Its most significant contribution would be in circumstances where the notional enemy had no significant air capability. Its effectiveness, therefore, would be governed by the identity and capability of the aggressor, and the capabilities provided in the particular carrier;

(c) contributing to the protection of Australian shipping supporting an Australian response against submarine, surface and air attack;

(d) contributing to the protection of Australian sea lines of communication should Australia be unable to internationalise the situation if these came under attack, and/or if an alternative Australian response, such as attacking the enemy's home or forward operating bases, were not effective.

1.39 Warning time for intermediate level threats would be less than for a major invasion, but these threats should be considered years away rather than months. As with the case of a major invasion, intermediate level threats to Australia's security are more likely to arise where the existing world order was seriously disrupted, and where the attentions of Australia's main allies were pre-occupied elsewhere.

Low Level Contingencies

1.40 In our previous report we identified, at paragraph 4.1, a wide range of low level contingencies with which Australia could be confronted. The level of capability required by an adversary state, group or organization to mount one or more of these threats would be low; a group or organization trained in the use of small arms and explosives would be capable of mounting most of them. To pose a serious threat to national security, such a group would be likely to require overt and covert support from an overseas organization or state. This assistance could be in the form of logistic and training support, as well as transport for insertion and extraction of activists (unless infiltrated on normal international transport). In most cases any support provided could be disavowable.

1.41 A motive to pose the sort of threats we classified as low level contingencies could be developed by any state, organization or minority group which strongly disagreed with any aspect of Australian national policy in any of a large number of areas - including Australian attitudes to minorities or certain organizations in Australia or overseas.

1.42 Low level situations of the type postulated could occur anywhere on the Australian mainland, in its offshore resources zone, or on our offshore dependent territories, including Cocos, Christmas, Lord Howe and Norfolk Islands. Low level situations also include: the harassment of our shipping, possibly in areas remote from the Australian mainland; the harassment of our nationals and/or the seizure of Australian property in overseas countries; support for dissident elements in, or military pressures against, a regional country; or harassment of off-shore installations.

1.43 To be categorised as low level threats, the level of force used by an aggressor would be low. This is not to say, however, that the platforms used by the aggressor would necessarily be of low capability. For example, sporadic intrusions into Australia's air space could be carried out by high performance aircraft, our shipping could be harassed by high performance ships and/or aircraft, our harbours could be mined by enemy submarines and aircraft pressures against a regional country could be applied by a powerful naval task force. As the threats classified as low level contingencies are those which could be dealt with by capabilities within the peacetime organization and structure of the Defence Force, that structure should contain elements capable of deterring or reacting to the situations postulated.

1.44 Because of the low level of force likely to be used in this classification of contingency, and the uncertainties relating to the source of any external support in most cases, the nature of Australian military responses to the threats would need to be measured. For example, it probably would not be considered appropriate to strike an adversary's bases in a foreign country or to interdict an adversary's lines of communication, except where these intruded into Australia's maritime and/or air space, and even then it would be circumscribed. Australian military responses would need to be defensive, in direct support of the interest under threat.

1.45 An aircraft carrier could be deployed as part of Australian maritime forces to deter low level threats and to provide military responses to any threats which emerged. Given that low level threats could develop at short notice, the value of the carrier would be in part determined by its proximity to the point of threat. The tasks of maritime forces would be to:

(a) provide surveillance over the approaches to threatened areas;

(b) provide patrols in threatened areas to deny seaborne intrusions by, or seaborne support of, unfriendly elements;

(c) provide protection to offshore facilities;

(d) extract Australian nationals under harassment from locations overseas and/or provide support for their extraction;

(e) contribute to a demonstration of a power projection capability to deter a foreign power from applying pressure to a regional country;

(f) provide protection to Australian shipping and fishing activities under harassment.

Summary

1.46 There are circumstances in all the possible threat contingencies outlined above in which an aircraft carrier might be useful. The Committee notes, however, that to a considerable extent, the roles that an aircraft carrier can perform will be circumscribed by the type of aircraft carrier that is utilised. The types of carrier under consideration for the RAN are less capable than the larger types in service with the United States Navy.

1.47 Not all the functions outlined in the preceding sections require an aircraft carrier capability for their effective performance. In all cases, use of an aircraft carrier is substantially dependent on a favourable air and maritime environment.

CHAPTER 2

The Role of an Aircraft Carrier in the Defence Force Structure of Australia

2.1 The role of an aircraft carrier in the Defence Force structure of Australia would be determined against its relevance to Australia's current and perceived strategic environment, which has been discussed in Chapter 1, and the capabilities it possesses. These capabilities need then to be examined in comparison with optional capabilities, to determine the effectiveness of an aircraft carrier to carry out a range of tasks, and thus its role in Australia's Defence Force structure.

2.2 The capabilities of aircraft carriers vary widely, generally in direct relationship to their size. They range in size from the huge United States Navy multi-purpose carriers, nuclear or conventionally powered, of 80 000 tons or more with aircraft complements in excess of 90 and carrying 5000 men, down to small helicopter carriers of about 13 000 tons with a complement of only eight or ten helicopters.

2.3 The large USN carriers are capable of carrying out a wide range of tasks including nuclear strike, air defence of the fleet in a hostile air environment, surface and shore strike, airborne early warning, area surveillance, anti-submarine warfare (ASW) operations, and major power projection. The smaller, specialised carriers provide ASW, amphibious landing and power projection capabilities. The only carriers still in service which provide the capability to operate modern high performance fixed-wing aircraft are the larger USN carriers, the smallest of them being the MIDWAY class of about 60 000 tons with an aircraft complement of about 75 and carrying about 4500 men. The capital cost of such a ship, even if provided under favourable terms, and its associated aircraft, and its huge maintenance and operational costs, would be beyond the capacity of the Australian defence budget. Several small old carriers in service in India, Argentina, Brazil and Spain can operate outdated fixed-wing aircraft. Several light carriers in service or coming into service in Britain, US, USSR,

Italy and Spain can carry an aircraft mix of helicopters and Short Take-Off and Vertical Landing (STOVL) fixed-wing aircraft.

2.4 In the past decade the matter of a replacement for HMAS MELBOURNE has been under consideration. By 1977 the RAN had defined its requirement as being for a ship of about 20 000 tons, capable of operating a mix of up to 22 helicopters and STOVL aircraft, and with a complement less than that required for MELBOURNE, 1300. It was stated that the ship, with its aircraft, would need to be capable of carrying out some or all of the following:

- Tactical reconnaissance and surveillance
- Maritime strike and interdiction
- Fleet air defence
- Anti submarine warfare
- Mining
- Command and control
- Strategic strike
- Close air support for ground forces
- Deployment and landing of combat troops
- Afloat support to destroyers
- Evacuation and disaster relief

2.5 In view of the stated requirement, the search for a suitable replacement for MELBOURNE was restricted to a purpose-designed ship to be equipped with helicopters for anti-submarine warfare, but with a potential for operating also STOVL aircraft. Following the Minister's announcement of 9 September 1980 to replace MELBOURNE, contracts were let for funded studies to allow a final evaluation to be made between two favoured options: the US designed Sea Control Ship (SCS) being built for the Spanish Navy, and a variant of the USN IWO JIMA class landing platform helicopter (LPH). According to the Department of Defence, the INVINCIBLE class ship had previously been dismissed from consideration on the grounds of its high cost and incompatibility with the rest of the fleet, which is largely US derived. Following the British Government decision to retain only two INVINCIBLE class ships in service with the Royal Navy, it offered to sell INVINCIBLE to Australia at a much reduced price. After a further evaluation, in which cost and availability were significant and

decisive advantages, the Government announced, on 25 February 1982, that the British offer had been accepted. On 14 July 1982, the British Government announced to the Australian Minister for Defence that it had decided to retain HMS INVINCIBLE for service with the Royal Navy. Since then the question of the purchase of an aircraft carrier has been under review by the Department of Defence.

2.6 In considering the role which an aircraft carrier could play in Australia's Defence Force structure and its effectiveness in that role, the Committee has rejected consideration of the larger types of carrier in service with the USN. Not only would their capital, maintenance and operating costs be prohibitively high and completely distort the force structure, but they would provide capabilities far in excess of the stated requirement. The Committee has confined itself to consideration of ships of the type which were on the short list to meet the perceived requirement announced in 1980, together with INVINCIBLE.

2.7 The principal characteristics of the three ships are at Appendix I. There are several characteristics which are broadly similar and which will largely determine the relevance, role, effectiveness and consequences of the acquisition of an aircraft carrier to Australia's defence posture. These are:

(a) by operating with a deck park, up to about 22 aircraft could be embarked;

(b) the aircraft complement could be all rotary wing, all fixed wing, or a mix of rotary wing and fixed wing aircraft. Complements would vary according to the particular tasks the ship was employed on in any given situation, and numbers would vary according to the mix embarked;

(c) the fixed wing complement would be restricted to variants of the Harrier aircraft;

(d) each has the appropriate command, control and communications facilities for the conduct of its own operations, and as required, for the tactical command and control of a naval task group;

(e) each has an air defence missile system. The LPH and SCS would carry close-in weapon systems, for close range defence against air, surface or under-water launched sea-skimming missiles;

(f) the total project costs of acquiring an aircraft carrier, including the acquisition of associated aircraft, would range from about $900m, in the case of the original INVINCIBLE offer, up to perhaps $1500m, in the case of the other classes of ship.

2.8 An aircraft carrier with the above characteristics would have the capabilities to:

(a) mount anti-submarine warfare (ASW) operations using ASW helicopters;

(b) co-ordinate ASW operations being carried out by co-operating land-based aircraft and other naval forces;

(c) provide air defence of ships in company, (but the limitations of STOVL aircraft against modern high performance aircraft must be noted);

(d) mount airborne anti-shipping strikes against enemy surface forces and strikes against land targets; but the distance to which these could be mounted would be restricted owing to the limited radius of action of its embarked helicopters and STOVL aircraft, and targets would need to be operating in areas of favourable air environment;

(e) co-ordinate anti-shipping strikes being carried out by co-operating land-based aircraft and other naval forces;

(f) provide command and control to a naval force of which it is part;

(g) project power into areas remote from the Australian mainland;

(h) mount surveillance and patrol operations to counter maritime intrusions into areas remote from established air and naval base facilities; and

(i) contribute to natural disaster relief and other peacetime tasks requiring maritime mobility.

2.9 In the following paragraphs the Committee considers the effectiveness of an aircraft carrier in each of the tasks in paragraph 2.8 above, and the optional capabilities which could be used to discharge them.

Anti-Submarine Warfare (ASW) Operations

2.10 Modern submarines are particularly potent weapon platforms. Depending on type, they can be used as part of a nation's nuclear strike capability, as anti-shipping forces, torpedo or missile firing, to lay mines in focal areas or choke points, to conduct a range of clandestine operations or to hunt and destroy other submarines. Nuclear powered submarines can sustain high underwater speeds; conventional diesel/electric submarines can maintain high underwater speeds for short periods only. Their underwater sensors, used in conjunction with satellite or aircraft surveillance, allow them to launch their long-range weapons at distances far beyond the detection range of ship-borne detection systems or to take evasive action from such systems. Because of the characteristics of the marine environment in which they operate, and the three dimensions in which they can manoeuvre, submarines have a range of tactical options they can employ to avoid or minimise detection.

2.11 Fixed wing aircraft of the P3C type, with their long range and high speed, can provide under-water surveillance over a vast area of ocean in a single sortie, and with their mainly passive aircraft sensors, used alone or in conjunction with a sonobuoy array system such as Barra, have a high probability of making a long range detection of a submerged submarine, particularly if the

submarine is unaware that it is under surveillance. Under these circumstances, the aircraft is capable of launching a successful attack against the submarine. Should the submarine be alerted that it is under surveillance, it would adopt tactical evasion procedures which would reduce the aircraft's chances of detection and destruction. In particular, it would reduce to 'silent' speed and seek concealment below a thermocline. (A thermocline is a temperature gradient; especially an abrupt temperature gradient occurring in a body of water). A P3C aircraft is effective out to about 2000 kilometres from a land base; beyond that distance the time taken to get on station and return reduces its effective time on station, and requires several aircraft to maintain one on station.

2.12 Active sensors mounted in ships and helicopters enable the detection of a submarine, even when it has adopted evasion procedures. Active sensors are relatively short-range, depending on water conditions, and they do alert the target that it has been detected. Ship-mounted sensors can, of course, move only at the speed of the ship, and a submarine can take suitable evasion action using its high underwater speed and/or, given suitable water conditions, seek concealment below a thermocline. A helicopter-borne active sonar system can be advanced at the speed of the helicopter, and may be submerged at varying depths; these advantages reduce a submarine's capacity to outrun its pursuer or to conceal itself below a thermocline.

2.13 The most effective means of countering the modern submarine is to employ P3C type aircraft, ships and helicopters in complementary roles, together with, in suitable areas, fixed or towed sonar arrays. The P3C effort would be used for distant support, area surveillance and for tasks in focal areas; ships and helicopters would be used in direct support of shipping requiring protection, and for ASW operations in areas outside the effective radius of action of P3C aircraft. Submarines would prefer to operate in focal areas and choke-points where there would be a concentration of targets. If the defence of these areas reached a high level of effectiveness, however, they would be forced into open ocean areas where they would have to rely on satellite or aircraft surveillance, or their own long range passive sonars to locate their targets. Submarine Launched Ballistic Missile (SLBM) forces would always operate in open ocean areas, except where they could deploy close to their own base areas.

2.14 P3C fixed wing aircraft and ASW helicopters should not be seen as optional capabilities: studies have shown that they are seen as essential elements in all ASW situations, except those beyond P3C range, when reliance would be on ships and ship-borne helicopters. The particular role for an aircraft carrier in ASW operations is its ability to provide concentrated ASW air assets at long range from base. It provides an efficient, centralised base for ASW helicopters which can respond quickly and in concentrated numbers to the needs of the situation; a large ship facilitates helicopter maintenance and concentration of force.

2.15 The aircraft carrier would, of course, be vulnerable itself to submarine (and other) attack. This vulnerability would be reduced by the protection which its own ASW helicopters would provide, and by escorting ships. It is envisaged that it would be in company with at least three other surface ships to improve the ASW effectiveness of the force, as well as providing protection to the aircraft carrier.

2.16 The conduct of ASW operations requires a high degree of co-ordination. Ships, shore-based aircraft and ASW helicopters are likely to be engaged. To maintain the total picture, to direct the most appropriate form of attack, to maintain pressure on the target, and to minimise the threat to friendly forces requires command, control and communications facilities which can best be provided in a large ship.

2.17 An aircraft carrier provides the means of transporting an element of the capabilities required to prosecute an ASW operation to the scene of action - the capabilities are provided by the ASW helicopters. In areas close to shore bases, say within 250 kilometres, land based ASW helicopters could perform the task. To provide a series of contiguous operating facilities, 400 kilometres apart, or to provide land-based mobile forms of support and the means of transporting these to contiguous operating areas, would be expensive. Even if it proved cost-effective, ASW helicopters could contribute to ASW operations only to a distance of about 200 kilometres from the coast. Finally, it would be necessary to provide considerably more aircraft to ensure their availability at a range of locations around the coast (an ASW helicopter flown under its own power between widely separated locations would dissipate its availability).

2.18 Land-based fixed wing aircraft, such as the P3C, could make a significant contribution to the prosecution of ASW operations in focal areas and choke points and in open ocean areas out to 2000 kilometres from bases. They can provide responses in widely separated areas. Their passive sensors can seriously impede a submarine's freedom of action and force it onto the defensive, and deny it the opportunity to launch an attack, even in circumstances where it cannot destroy it. To be sure of destroying a submarine, however, it is necessary to complement a P3C's operations with ASW ships and/or ASW helicopters.

2.19 The Committee acknowledges that an aircraft carrier could perform a significant role in ASW operations. It notes, however, that the most substantial requirement for ASW operations would be associated with the consequences of global war - which the Committee regards as remote.

2.20 The Committee is concerned that the means of providing mobility for a force of ASW helicopters - an aircraft carrier - which is itself vulnerable to submarine and other forms of attack, should be so costly. There will be further consideration of this aspect in Chapter 3. Meanwhile it flags the point, noting that it received no evidence which would allow it to make judgements relating to the option of cheaper platforms, including the modification of merchant ships.

Air Defence

2.21 Experience has shown that naval surface units are highly vulnerable to air attack. This vulnerability has been exacerbated by modern developments in precision guided munitions, and air to surface missiles. Reconnaissance aircraft operating in support of enemy surface, submarine and air forces enhance the potential of those forces to launch successful attacks, including by long-range missiles, against surface units. Modern surface to air missiles - long, medium and close range - provide a high degree of protection against a single or small number of attackers, but these can be swamped by a highly co-ordinated attack by a large number of aircraft; a shadowing aircraft can keep outside the range of long-range surface to air missiles and gain the information required by the

units it is supporting. Without effective air defence, naval surface units are restricted to operations in areas where there is only a low or negligible air threat environment.

2.22 An aircraft carrier of the type under consideration could embark only STOVL aircraft, variants of the Harrier, for the air defence role. There have been many claims, and counter-claims, made relative to the operational capabilities of these aircraft. Many of these stem from the Falkland Islands conflict over which eminent authorities disagree sharply on the effectiveness of the Harriers. There were a number of atypical features of that conflict, which should not influence judgements, certainly not before full details are available.

2.23 Characteristics of the Harrier which are not in dispute are that it is a sub-sonic aircraft, with a relatively short range/radius of action, a poor radar, capable only of day time or clear weather operations, poor 'look-down' capability, incompatible with modern weapon systems, and alleged to have lesser agility than contemporary aircraft. It has been claimed to be inferior to the F5E aircraft which is in service with several countries in Australia's region - Indonesia, Malaysia and Singapore. Because of the absence of any large-scale demand for the aircraft, although the US Marine Corps remains interested in a ground attack variant, it is unlikely that there will be any significant development of the aircraft in the short-term.

2.24 Land-based air defence of naval surface units is extremely limited. Except to very short distances from land bases, probably not more than 200 kilometres, they are unable to provide effective continuous air cover. It would require a vast number of aircraft to provide permanent cover over the surface force, after allowing for transit out and back, and the dispatch of a combat force in response to a call for assistance would be unlikely to be timely. Finally, most often, the fighter force would be otherwise employed when it was required in support of a naval force.

2.25 A means of ensuring naval surface units freedom from air threat would be to use land-based strike aircraft to destroy the enemy's air strike capability before naval forces entered the area. Meanwhile, the STOVL capability available in an aircraft carrier could provide some degree of air defence to surface units.

2.26 A major shortcoming of the ASW/STOVL carrier is its current inability to provide airborne early warning. Unless this can be provided, and this would only provide a minimal capability, in a helicopter or STOVL aircraft, a naval force would be restricted in the information and warning it had in respect of the approach of enemy aircraft or surface units. Even when this capability is provided by land-based aircraft, its availability for the support of naval operations will be limited - by availability from other tasks and by its inability to operate at long distances from land bases.

Anti-Shipping Strikes

2.27 A major capability to strike surface ships would be the most important element in Australia's ability to deter an invasion, major raids or lodgements, and to counter these if they did occur. Although the initial phases of these forms of aggression could be mounted by airborne forces, the follow up and maintenance phases would require massive seaborne support. The most acute vulnerability of an aggressor would be its sea lines of communication between home or forward operating bases and invasion or lodgement areas. The perceived ability by Australia to interdict these would increase the cost and risk to an enemy and require it to increase its own capabilities to a level it may not be able to achieve, or at a cost which it found unacceptable. It would be to Australia's advantage to ensure that its capability in this regard should be seen to be able to strike shipping as far from its own coast as possible, to minimise damage and casualties on the Australian mainland.

2.28 The capabilities relevant to anti-shipping strikes would be:

(a) the provision of strategic warning that an attack was imminent, and the location from which it would be launched;

(b) tactical surveillance of likely seaward approaches out to the island chain in the north-western, northern and north-eastern arc, and into the deep ocean areas of the Indian and Pacific Oceans;

(c) land-based air strike forces;

(d) submarine forces; and

(e) surface naval forces.

2.29 Strategic warning is largely outside the scope of this report, although a contribution could be made by our long range maritime patrol aircraft, by high performance, land-based reconnaissance and/or surveillance aircraft, and by patrolling submarines.

2.30 Tactical warning could be provided by: access to satellite reconnaissance if this were available from friendly sources; an over-the-horizon radar system such as Jindalee; surveillance/reconnaissance air patrols; and submarine patrols carried out in the approaches to enemy base areas or in choke points through which an enemy force would have to transit. Jindalee can detect the movement of air and surface targets out to ranges of about 2500 kilometres, but is unable to make positive identification or provide exact locations. Having provided an initial alert, an identification/location sortie can be flown by a surveillance/reconnaissance patrol. Because of their long-range, the large expanse of ocean which can be covered in a single sortie, and the high performance of the sensors they carry, these patrols would best be performed by specialised land-based aircraft, such as the LRMP force and airborne early warning (AEW) aircraft.

2.31 Given the necesary surveillance support to detect and locate these targets, modern precision guided munitions, and air to surface missiles, Australia's P3C aircraft, the F111 force and the projected FA18 force have a considerable potential for anti-shipping strikes. That potential would be enhanced very considerably by the acquisition of an appropriate AEW capability and of an in-flight refuelling capability. These would enable accurate detection and location of targets and ensure that the three elements of the air strike force could engage maritime targets throughout the seaward approaches to Australia. An enemy, intent on invasion of Australia could, of course, develop the capabilities to deny or minimise the interdiction of its sea lines of communication, but only at considerable cost.

2.32 Submarines provide a relatively low cost anti-shipping capability and, as noted in paragraph 2.10 above, they would greatly compound an enemy's problem. To acquire and maintain an ASW capability is costly. Submarines should be maintained as a most significant element of our deterrent capability against invasion, lodgement or major raids, and to counter these if deterrence failed. Their potential in other intermediate level threat or in low level threat situations is limited.

2.33 Surface maritime forces, equipped with surface to surface missiles, would provide the third element of deterrence and defence against invasion, lodgement and major raids. The costs and risks faced by an enemy confronted by all three elements would be compounded. Surface forces would be the most vulnerable of the three elements and should, in the context of deterring against invasion, lodgement or major raids, be regarded as the third level.

2.34 Anti-shipping capabilities need to be considered also in the context of the protection of shipping in global war, in intermediate level threat situations, and in lower level threat situations. In this role, the response time of land-based aircraft, either to make a positive identification/location or to mount a strike against surface units threatening Australian (or allied) shipping, could be too slow to be effective, particularly in offshore or remote locations. The capability would need to be organic to the force protecting the shipping.

2.35 In circumstances where surface units were conducting anti-shipping operations, an aircraft carrier would be effective. Embarked helicopters and/or STOVL aircraft would extend the area over which surveillance could be maintained, could provide the first level of defence against surface missile attack - by destroying the platform carrying the missile at ranges beyond that of the missile - and, by the use of air-to-surface missiles, could destroy surface targets. The distance to which this would be effective, however, would be restricted by the relatively short radius of action of helicopters and STOVL aircraft.

2.36 Because of its size, an aircraft carrier would also be relevant in providing command and control to other naval surface units engaged in

anti-shipping operations. The command and control function, however, could be carried out by other ships with suitable accommodation, equipment and facilities.

Command and Control

2.37 Like any military formation, a maritime force requires an operational headquarters element to control and co-ordinate its operations. The overall command of maritime operations, involving naval and air units, would be exercised by a shore headquarters in which naval and air staffs would be integrated. The primary function of this headquarters would be to allocate assets, naval and air as appropriate, for the conduct of particular operations. Tactical control and co-ordination would be exercised by a force commander at sea; the assets under his operational control could include naval surface ships and submarines, surveillance and reconnaissance aircraft, and maritime patrol and strike aircraft.

2.38 The functions of the tactical commander would vary according to the particular operation being undertaken but, in general terms, it would include: the deployment, disposition and manoeuvring of ships in company; the allocation of tasks to individual elements and units of the force; the organization and ordering of afloat support; and the co-ordination of operations by co-operating forces or forces temporarily attached, including air forces. The facilities required to exercise the functions of a tactical commander include: a well equipped operations centre to provide the total picture to the staff; a good data exchange system which ensures that all combat information available to individual elements and units is immediately available to the command; good communications, allowing the command to communicate with all units under its control, and with its national headquarters; and accommodation for the 20-25 people required to staff these facilities.

2.39 The required facilities cannot be provided in a ship of destroyer size. Ships larger than destroyers in service with the RAN or coming into service - the replenishment ship, destroyer tender etc., - could possibly be adapted to this role, but, in many operational situations, their primary role would require them to operate away from the combat force.

2.40 An aircraft carrier would provide the optimal platform for the command and control function. This function would be required in many situations in which naval surface units are deployed. If an aircraft carrier was not to be purchased, serious consideration would need to be given to installing in another ship all or part of the command and control functions it would have performed.

Power Projection

2.41 The unique features of Australia's environs have been noted in paragraph 1.34. Should it become necessary or desirable for Australia to contribute to the stability of those environs by the exercise of military activities, it could be faced with the requirement to mount a range of military tasks. The Committee received conflicting advice on the significance of this issue in determining the purchase of an aircraft carrier - for example the former Chief of the Defence Force Staff, Admiral Sir Anthony Synnot, argued strongly that Australia should be capable of performing this function. On the other hand, the Department of Defence, in evidence, chose to play down any such role, arguing instead the carrier's value in anti-submarine operations. The Committee has already drawn attention to the essentially nebulous nature of scenarios picturing Australian operations in the region, but believes it must address the matter in the context of the suggested aircraft carrier purchase. The most probable requirement would be to provide military capabilities in support of regional states, including particularly those capabilities in which regional states are deficient.

2.42 Particular requirements could arise for:

(a) surveillance and patrol over the seaward approaches to regional states;

(b) air defence of their air space;

(c) strategic and tactical mobility;

(d) strikes against maritime and land targets;

(e) the deployment, support, and extraction of ground forces.

2.43 The above tasks could be carried out by land-based aircraft operating from home bases in Australia, or by detachments deployed to the regional state affected, or to an intermediate co-operating third state. Many regional countries, however, have only a limited number of airfields which could support the operations of modern Australian land-based aircraft, and any potential aggressor could be expected to try to deny their use. Even if they were secured for Australian use before deployment it would require a significant effort - probably by Australian ground forces - to maintain their security.

2.44 The tasks outlined in the preceding paragraph above could be carried out, particularly in the South Pacific, by capabilities embarked in an aircraft carrier and other naval surface units. The level of capability, although relatively low, would probably be sufficient to meet the level of threat likely to be met in this environment. The risks - military and political - of putting forces ashore would be obviated. The ability of a naval task group, including a carrier, to maintain pressure for a prolonged period in a threatened area would have a salutary effect on a potential aggressor.

2.45 As discussed above (para 1.34), a capability for power projection into the South-West Pacific islands should not be regarded as having a higher priority than capabilities designed to deter or meet threats to Australian territory.

Surveillance and Patrol Operations

2.46 Surveillance and patrol operations could be required at all levels of threat. The major aspects involving invasion, lodgements or major raids - have already been covered in earlier sections of this chapter. In this section we address them in the context of low level contingencies.

2.47 Surveillance is best carried out by aircraft which can cover a large area of ocean in a single sortie - the actual size being determined by the aircraft's endurance and its sensors. In the lower levels of contingency, the response to a surveillance sighting is best made by surface craft - to identify the target positively, challenge it and, if need be, board and search it. In

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suitable waters a large number of small craft, dispersed over a wide area, would ensure the most effective means of ensuring timely responses to aircraft sightings. In remote areas, in areas where prevailing sea conditions preclude the use of small craft, and where intrusions are being made by more capable ships, it would be necessary to use larger surface ships.

2.48 Land-based aircraft would provide the most effective means of providing surveillance but, in areas remote from bases, much of their effective time would be taken up in transit to and from the threatened area. In these situations an aircraft carrier could be positioned in the threatened area, and its complement of helicopters and STOVL aircraft could provide effective surveillance, but the distance to which this could be mounted would be restricted owing to the limited radius of action of embarked aircraft.

Peacetime Tasks

2.49 The mobility required to meet peacetime tasks, such as in natural disaster relief, would be best met in most cases by strategic airlift. There will be situations, however, where strategic airlift cannot get close enough to the affected area to afford the necessary relief, or where the size of relief effort or individual parts of it would be too heavy for airlift. In these situations, an aircraft carrier - with its capacity for transporting people and stores, including by helicopter transfer, its organic stores and medical functions, and its command facilities - would provide a most effective option or supplement to air mobility. This could be most effective in the natural disaster prone South Pacific area.

Requirement for more than one Aircraft Carrier

2.50 In evidence presented before the Committee it was suggested that a single aircraft carrier would not be sufficient to carry out all of the roles ascribed to it, because the area that it would be expected to cover would be too vast, and because of the danger of a threat developing while it was undergoing maintenance in port. To remedy these difficulties, the following propositions have been put to the Committee:

i. While acknowledging the above shortcomings, one aircraft carrier would be sufficient to maintain the 'state of the art' so that if a threat arose, Australia could expand its maritime air capabilities at relatively short notice. This could be achieved through converting suitable merchant ships into carriers;

ii. That a minimum of two aircraft carriers is required to ensure that there would always be one on station;

iii. That a minimum of three is necessary: one for patrol in the Indian Ocean, one for patrol in the Pacific Ocean and one which could be in dry dock for refit.

2.51 Defence planning in recent years has assumed that the Defence budget would approach 3% of GDP per year. Such a level of spending can be expected to continue while the current relatively favourable strategic environment obtains. Given this financial ceiling, the purchase of more than one aircraft carrier would have serious repercussions on the Defence Force structure (see below paragraphs 3.44-3.51). If no aircraft carrier purchase is made, other measures to retain fixed wing flying skills of the Fleet Air Arm are available.

2.52 Whether or not a carrier is purchased, consideration could also be given to a study of the design requirements for the conversion of existing or future merchant ships on the Australian register to provide complementary aircraft platforms, should any of the situations for which an aircraft carrier appeared to be suited emerge.

Future of the Fleet Air Arm

2.53 At the time of Sub-Committee C's visit to HMAS Albatross at Naval Air Station, Nowra, on 4 August 1981, the future of naval fixed wing aviation, and thus the role of the Fleet Air Arm, was still in question. The front line Skyhawk and Tracker squadrons (VF 805 and VS 816) had been disbanded on 2 July 1982. Pending decisions on the future of the Fleet Air Arm, re-engagements for personnel were not being processed. The Committee is concerned that, if the


Irkutsk
Ulan Bator
Petropavlovsk
Sovietskaya Gavan
Khabarovsk
Vladivostok
Shenyang
Peking
Tientsin
Pyongyang
Seoul
Tokyo
Osaka
Nanking
Shanghai
Chengtu
Taipei
Okinawa
Canton
Hong Kong
New Delhi
Dacca
Calcutta
Hanoi
Vientiane
Rangoon
Manila
Tinian
Guam
Honolulu
Kwajalein
Bangkok
Phnom Penh
Ho Chi Minh
Bombay
Madras
Kuala Lumpur
Singapore
Colombo
Port Moresby
Honiara
Jakarta
Darwin
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Townsville
Vila
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Brisbane
Norfolk I.
Nukualofa
Diego Garcia
Perth
Adelaide
Melbourne
Sydney
Canberra
Rarotonga
Papeete
Auckland
Hobart
Wellington
I. Amsterdam
Kerguelen I.
Heard I.
Australian Antarctic Territory

decision is delayed, there will be deterioration of the skills and experience necessary for the future naval aviation structure. The Committee is also concerned that the capability represented by the existing Skyhawk and Tracker assets may be understated or ignored in the interests of short term economy.

2.54 The Fleet Air Arm has special capabilities in maritime operations, which it is important to maintain. If the Fleet Air Arm were to be limited to operating helicopters, its viability might be brought into question. The possibility of some or all of the long range maritime patrol aircraft (P3 Orions) being transferred to the Fleet Air Arm, as part of a maritime command structure, should be considered.

2.55 Following disbandment of Naval Air Squadron VS 816, its six operational Grumman S2G Tracker Aircraft were placed in storage. The Trackers, employed when embarked on HMAS MELBOURNE primarily in the ASW role, have a proven record of coastal and off-shore surveillance. During Operation Trochus from March to November 1975, three Trackers, based at Broome, maintained continuous surveillance over the fishing grounds off North-West Australia. The Trochus Operation was repeated in 1976, with similar success. From October 1977 to December 1980, the Trackers were deployed from Darwin to maintain surveillance over the North-West coast and the sea approaches to Darwin, searching in particular for Indochinese refugee boats. All approaching refugee boats were detected before they reached the coast. Thirteen of the RAN's 19 Trackers are now in storage. The Committee believes the Trackers should be employed to meet the continuing requirement for coastal surveillance, replacing the chartered civilian aircraft currently used.

2.56 The four Douglas A4G Skyhawks which were in service with Naval Air Squadron VF 805 before it was disbanded, are now in storage. These aircraft are invaluable for providing a maritime strike and ground attack capability, and the Committee believes they should be retained in operational service, flying from land bases.

CHAPTER 3

The effects of the purchase of an Aircraft Carrier on the future Defence Procurment Program

3.1 The proposal to acquire HMS INVINCIBLE provided the Committee with a useful yardstick or case study in assessing the effects of the purchase of an aircraft carrier on the future Defence procurement program. The effects which acquisition of HMS INVINCIBLE would have had on the procurement program are discussed in the following paragraphs (3.2 - 3.39). It should be borne in mind that the original HMS INVINCIBLE offer involved a purchase price of $285m and a total project cost, excluding missiles, helicopters and a fixed wing aircraft complement, of $478m, which probably represented the least expensive carrier option available.

3.2 On 29 April 1982, the Minister for Defence announced in a statement to Parliament significant changes to the Government's Defence Force development program. The announced changes were:

- the acquisition of an additional five FREMANTLE class patrol boats and the second underway replenishment ship would be deferred;
- the Canberra aircraft would be paid off;
- the initial installation of DISCON would proceed with reduced user access;
- the provision for expenditure over the next five years on follow-on destroyers would be reduced;
- planned expenditure for additional ASW helicopters has been deferred and program expenditure on other RAN and RAAF helicopters has been reduced;

- infrastructure developments, including a new airfield at Derby, had been slowed down or deferred;

- fuel and other stockholding levels would be reduced;

- operating, maintenance and administrative costs would be reduced;

- manpower savings, including the pegging of the Army strength at 32 850, would be achieved.

3.3 The above changes were not all the direct result of the decision to purchase HMS INVINCIBLE and to accelerate the acquisition of 10 new P3C aircraft, although these were the major factors leading to them.

3.4 Before the British offer was made to sell INVINCIBLE to Australia at a cost of 175m pounds sterling ($285m at August 1981 exchange rate, and producing a total project cost of $478m, excluding aircraft and missiles), Defence programming for a replacement for MELBOURNE related to the Sea Control Ship or a variant of the USN IWO JIMA class. Project costs of these ships were not precise, but were believed to be of the order of $900m to $1000m, excluding aircraft. The selected ship would have entered service about 1987-88, with project expenditure spread over a period starting in 1982-83 and extending over six or seven years. INVINCIBLE was scheduled to enter RAN service late in 1983, with purchase costs scheduled for 1981-82, 1982-83, 1983-84, and project costs extending beyond that period.

3.5 Thus, although a considerable saving was achieved in project cost, its spending was accelerated. There had, moreover, been no firm decision taken to acquire one of the options. Although a decision in principle had been taken to replace MELBOURNE, the Government would have been faced with a decision whether it commanded the necessary priority at its estimated project cost when the project came forward in accordance with normal Defence procedures. Now that Britain has announced its intention of keeping INVINCIBLE, the replacement for HMAS MELBOURNE should revert to its previous priority.

3.6 It was necessary to acquire 10 new P3C Orion aircraft, at a project cost of $280m, much earlier than planned, in order to fit in with an economic production rate in the US. Deliveries will take place between late 1984 and early 1986; this requires much greater expenditure in the early program years than was planned.

3.7 In the following sections we discuss:

(a) the effects of accelerating the purchase of an aircraft carrier (and the P3C aircraft) on specific projects which had previously commanded higher priority;

(b) some deficiencies in capability which the Committee has identified in its inquiry and which it considers should command high priority;

(c) consequences for the Australian shipbuilding industry; and

(d) the cost of an aircraft carrier.

Patrol Boats

3.8 Our inquiry has revealed that there are two sharply divided groups: those who support the acquisition of patrol boats to replace, in many roles, other surface ships, and those who, while accepting that they have a part to play in Australia's defence capabilities, accord them a lower priority.

3.9 The argument of the pro patrol boat lobby runs broadly along the lines that:

- many can be acquired for the cost of one major platform;

- they may be deployed at or near the many vulnerable locations around and off the Australian coast and so provide a rapid response to any threat which arose in their deployment areas;

- there can be no surety where a threat will arise so that dispersal of response capability is essential, particularly as an enemy would seek to by-pass a concentration of force deployed to relatively few localities;

- they can be armed with modern-technology weapon systems which provide them with a potent anti-shipping capability;

- their small size allows ease of concealment and reduces their vulnerability;

- if destroyed, only a single capability and a relatively low cost platform with a small crew is lost.

3.10 The counter argument advanced is that:

- they have limited range and seakeeping qualities, which limits the areas to which they may be deployed, the distance offshore they can be effective and the extent to which those deployed to one area can provide support to those deployed to a contiguous area;

- a large number of shore support facilities would need to be developed;

- without concentration of force they would be easily brushed aside by an enemy, destroyed in detail or otherwise be rendered ineffective;

- the short range of their organic sensors requires that they have the support of other platforms, particularly aircraft, to locate their targets;

- the aircraft providing that support could themselves be fitted with air to surface missiles capable of destroying the target and so obviating the need for the patrol boat;

- they are single capability platforms - usually anti-shipping - which are highly vulnerable to air attack, and lack flexibility;

- they are short lead-time platforms, relative to major ships, and could be acquired in a period of warning to supplement those ships.

3.11 There is no doubt that there is a role for patrol boats, particularly in the lower levels of contingency where a response, short of sinking, is required to aircraft sightings of surface targets. Providing provision is made at the design and selection stage, boats could be fitted with anti-shipping missiles to provide a supplementary capability should a higher level contingency emerge.

3.12 The deferral of five patrol boats will have little operational consequence for Australia's deterrent capability against the high levels of contingency; it will reduce Australia's capacity to respond to lower level threats with the appropriate degree of military response. It will have some industrial consequences which will be discussed later.

Replenishment Ship

3.13 Afloat support provides a multiplier effect in that it allows combat ships to be committed to operations away from base facilities for sustained periods; operations may be sustained by a given number of ships for as long as the support can be provided and crew efficiency maintained. A single replenishment ship allows operations to be sustained in only one area at a time and/or reduces the distance at which operations can be sustained; with two replenishment ships one ship can operate in support of the combat force while the second is on passage to and from base to replenish its stores. The original justification for the ship was to provide the Navy with a two-ocean operational capability. This meant a capability to support the operations of a number of war ships in two oceans simultaneously. This would have been difficult with two ships, impossible with one.

3.14 The deferment of the second ship will delay the time before the RAN mobility potential can be fully realized but, in view of the perceived absence of any urgency to achieve this, the delay, while undesirable, should be acceptable. There are, however, some industrial consequences which will be addressed later.

Canberra Phasing Out

3.15 The RAAF Canberra aircraft have been in service since 1953, and engaged on aerial photographic survey and other support duties in recent years. It is understood that the requirement for these capabilities will be met by other means, including by chartered aircraft, until new aircraft are acquired. There should be no short term consequences, but these capabilities do need to be revived in the long run to ensure that the essential photographic survey program is maintained.

DISCON

3.16 The reduction in user access to the Defence Integrated Secure Communications Network (DISCON) is understood to be acceptable, particularly as provision has been made for later expansion.

Follow-on Destroyers

3.17 The Committee is not clear on the extent to which this program will be delayed. It notes, however, that the deferment is related to planned reforms at the Williamstown Naval Dockyard. It is understood that the reforms planned are necessary if the Dockyard is to secure orders for the follow-on destroyers, and that deferment of the destroyers would have been necessary to allow those reforms to become effective.

3.18 The existing destroyer force comprises three guided missile destroyers due for modernisation late in the decade, six River Class destroyer escorts under progressive modernisation, and two, increasing to four, guided missile frigates. The Committee would prefer to see the follow-on program deferred to provide the opportunity for these ships to be built in Australia. Not only would this ease

the industrial effects on the ship building industry, but it would reduce balance of payments problems and provide employment in critical industrial areas. A viable ship construction capability, with the ability to build naval ships, has significant benefits relative to the repair and maintenance of naval ships.

Helicopters

3.19 The decision to defer the acquisition of ASW helicopters would appear to be wise, until the platform is determined. Had INVINCIBLE remained an option, with delivery in 1983, it would appear to be necessary for at least its ASW potential to be realized from the time it entered RAN service. Now that INVINCIBLE no longer is available, there remains the need to develop the full potential of the guided missile frigates by providing them with helicopters. We understand, however, that delays in proceeding with the acquisition of these aircraft have been caused by the failure to agree on the most suitable helicopter for RAN and RAAF use, rather than for budgetary reasons.

Infrastructure Development/Stockholdings

3.20 The delay in the provision of infrastructure, particularly the slowing down in construction of a new airfield at Derby, causes the Committee concern. There is consensus that the most vulnerable part of Australia, to all levels of threat, is the arc from North-West Cape around through northern Australia to the Cairns/Townsville area. Within that arc there are only four military-capable airfields - Learmonth, Darwin/Tindal and Townsville. These are about 2000 kilometres apart, leaving significant gaps which preclude the deployment of fighter/ground attack aircraft to some areas, and reduces the effectiveness of other aircraft by requiring them to waste availability in transit.

3.21 There is a natural but regrettable tendency to cut back or defer infrastructure and other forms of support, such as stockholdings, in favour of combat capabilities. Not only does this reduce the operational effectiveness and availability of combat forces, but a percipient enemy would recognize it and could be encouraged to exploit the situation. At a time of low threat the risk may be low, but care needs to be exercised that it does not become a feature of defence planning.

3.22 A period of large-scale unemployment could be used to develop military infrastructure. That development in remote and more vulnerable parts of Australia would provide evidence, to the Australian public and to any potential enemy, of our determination to secure our national interests.

Operations/Maintenance/Administrative Costs

3.23 The Australian soldier, sailor and airman has an enviable reputation for his skill, expertise and professionalism. This is a concomitant of his educational background, training, operational practice and experience. These have ensured that weapon systems in his control have been used to a high standard. Any restrictions on the operation and maintenance of weapon systems, or the adoption of administrative procedures which degraded the skills, expertise and professionalism of the Defence Force, would be deplored by the Committee.

3.24 We invite attention to one specific aspect which causes us particular concern. Evidence was provided to the Committee that pilots of the Tactical Fighter Force have been rationed to 17 hours flying monthly, the minimum required to preserve safety standards, and that members of the TFF are no longer trained in the two roles of air defence and ground attack. With the disbandment of Naval Air Squadrons VS 816 and VF 805, the amount of flying time available from the six Skyhawks, six Trackers and five Macchi trainers remaining in service is insufficient to maintain the flying skills of all of the 32 aircrew now attached to Naval Air Squadron VS 817, and the 45 aircrew now attached to Naval Air Squadron VC 851.

3.25 There have also been significant restrictions in Defence Force exercises. The Committee is concerned as to the effect that this will have on the efficiency and morale of the services. As a result of these restrictions, participation in 4 joint and combined exercises has been eliminated, 4 were reduced in scope and 3 deferred until the Financial Year 1982/83. Furthermore, 4 Army exercises have been cancelled, and other exercises have been restricted. The RAAF has been forced to cancel 7 of the 9 PNG training flights. Naval fleet activity has also been reduced to a minimum level allegedly necessary to maintain operational effectiveness.

Manpower

3.26 Some manpower savings are inherent in some of the previous decisions. We note further that Army manpower is to be held at a figure of 32 850 through the 1982-83 Financial Year. While not directly relevant to the Committee's present reference, we find this unexceptionable during this period of low threat.

Deficiencies in Capabilities

3.27 It is the contention of the Committee, as outlined in our previous report, that the primary function of the Australian Defence Force should be to deter all levels of threat from emerging. That contention has been reinforced by most of the witnesses who have appeared before us in respect of this reference.

3.28 We contend further that wherever possible, capabilities acquired by Australia should be relevant to deterrence and that they should have a multiplier effect; that is, their acquisition by Australia should have a compound effect on any potential aggressor, and cause it to raise the level of its capabilities by a disproportionate amount, or disproportionately raise the cost and risk of its aggression. Another form of multiplier is where the acquisition of a particular capability enhances the effectiveness of other capabilities in service in the Defence Force. It is in relation to this second form of multiplier that the Committee discerns some grave deficiencies in capabilities.

3.29 The existing F111 force and the projected FA18 force have a potent strike, including maritime strike, potential. That potential would be considerably enhanced if they could carry out strikes to greater ranges than can be achieved with their present fuel capacities. This could be attained by the acquisition of an in-flight refuelling capability.

3.30 A further capability which would considerably enhance the existing capability of elements of the Defence Force, would be an airborne early warning (AEW) system against aircraft and surface targets. In relation to aircraft, reliance is placed at present on widely separated land-based radar systems,

leaving large gaps, either because of geographical and range considerations, or because of the inability to detect low flying targets. In respect of surface targets, reliance is placed on LRMP aircraft flying random sorties or sorties in response to some form of intelligence.

3.31 Much is expected of the over-the-horizon radar system, Jindalee, when it comes into service. It is expected that it will gain detection out to about 2500 kilometres against aircraft and fast moving ships. But, in the case of aircraft, it will not provide height information, and in the case of ships and aircraft, it will provide information only that a ship or aircraft is in a wide area. Identification and precise location of a ship or aircraft will need to be provided by other means.

3.32 The most effective means of providing precise locations and height information would be by the use of an AEW system. An E-2C aircraft can, for example, accurately locate and track a large number of ships and/or aircraft out to distances of over 400 kilometres; the area it can hold under surveillance, with a high degree of certainty that all targets will be detected at any time, is about 360 000 square kilometres; it can detect low flying targets such as cruise missiles at ranges exceeding 200 kilometres; it can provide passive detection of radio-frequency emissions at considerably greater distances than by radar detection. Used in conjunction with Jindalee, such a capability would greatly enhance the effectiveness of other capabilities, land and sea based. These aircraft are expensive, and four to six of them would be required, but the multiplier effect they provide to other capabilities would far outweigh their costs.

3.33 We have already noted, at paragraph 20 above, the large gaps in military-capable airfields in the northern arc of Australia. The airfield under construction at Derby will improve the situation in the north-west, particularly if its development is advanced rather than retarded. A significant gap will remain in the north between Darwin/Tindal and Townsville. The Committee has received evidence that Gove and Weipa are under consideration as military-capable airfield sites, and supports the construction of an airfield at one of these sites from which land-based operations in the Arafura Sea and the Gulf of Carpentaria would be facilitated.

3.34 In association with Jindalee and an airborne early warning (AEW) capability, there is a further urgent need to provide land-based microwave radars. Jindalee and AEW provide, respectively, an alert that an air (or sea) threat could be imminent, and, the precise location of that threat. In respect of air defence, a microwave radar system is required to provide the necessary information relevant for the command and control of the air defence problem. It is the Committee's view that this capability should extend across the sensitive northern arc of Australia.

3.35 When authoritative accounts of the Falklands conflict are available, the Committee believes that it is likely that deficiencies in existing capabilities - particularly relating to the vulnerability of surface ships to sea-skimming missile attack - will be identified. It is important that urgent counter-measures, where available, should be provided to overcome these deficiencies.

Consequences for the Australian Shipbuilding Industry

3.36 Those capabilities which were relegated to lower order of priority to accommodate the immediate acquisition of INVINCIBLE have been portrayed as deferments, with the intention of reinstating them when the financial climate allowed this. In relation to the shipbuilding industry, these deferments are likely to become cancellations.

3.37 Unless given continuity of new construction and/or major refit, modernisation and repair work, capital equipment replacement and pursuit of modern shipbuilding techniques and advanced technology cannot command the necessary return on investment in commercial yards in order to foster a viable and modern industry. As the industry declines, so do the various training capacities, within the yards themselves and at training institutions which are marine oriented. The pool of tradesmen and technologists skilled in shipbuilding and marine engineering in Australia is shrinking rapidly. The capacity of the industry to attract additional people for specific short-term, non-continuing projects is severely eroded. It is a matter of record that of 1700 works and staff employees of the State Dockyard at Newcastle who were retrenched in 1977, only some 10% sought re-employment when further shipbuilding opportunities became available in 1979.

3.38 The deferment of the second replenishment ship and five patrol boats, which were to be built in Australia, exacerbates an already severely depressed situation. Modernisation and maintenance programs provide some opportunity for continuing work, and to hold together work forces and maintain skills; the deferment of these further exacerbates the situation.

3.39 If and when the time comes to reinstate building and maintenance programs, there is a very real probability that the capacity to undertake or contribute to the work in Australia would have been lost. Even if they do exist, it is likely that construction and maintenance times will be lengthened considerably and costs increased accordingly, to preserve job continuity.

Cost of an Aircraft Carrier

3.40 The Committee has identified a number of roles in which an aircraft carrier could be effective. The role in which it would be most effective is anti-submarine warfare. We do not accord a high priority to this requirement, although we acknowledge that should it arise, and here there is considerable uncertainty, it could have serious consequences for Australia. An aircraft carrier could also be effective in the lower level contingency situations. It is then, a matter of judgement what priority should be accorded to the various situations in which it would be effective, and the extent to which it would be effective in those situations. It is a matter of fact, however, that, except in its command and control function, an aircraft carrier is a platform rather than a weapon system. The weapon systems are its embarked aircraft.

3.41 The Committee has been presented with varying project costs for the aircraft complement of an aircraft carrier. It seems likely that these will cost in the range of $500m if a STOVL capability and additional ASW helicopters are provided. The project cost of a platform required to make these weapon systems effective would range from about $500m if a STOVL capability and additional ASW helicopters are provided. The project cost of a platform required to make these weapon systems effective would range from about $500m, had INVINCIBLE been available under favourable terms, to $1 000m or more for a modified IWO JIMA class ship.

3.42 It is this very high platform cost which causes the Committee considerable concern. We have not received evidence that satisfied us that optional solutions have received adequate consideration. We are concerned too, as outlined in our previous section, that it is most unlikely that ships previously under consideration as options for the replacement of MELBOURNE could be built in Australia; a less ambitious option could well be built in Australia.

3.43 If a STOVL capability is acquired then clearly the roles of the aircraft carrier would be expanded. While its primary role would still be ASW, subsidiary roles of tactical strike - anti-shipping and land targets - air-defence and power projection could be fulfilled. The greater flexibility afforded by a multi-role capability provides a greater rationale for the acquisition of an expensive platform.

Budgetary Considerations

3.44 On 25 March 1980, the Minister for Defence announced a program for defence which was estimated to cost, in August 1979 prices, some $17 600m over five years from 1980-81 until 1984-85. This was expected to allow Defence expenditure to grow by an average of about 7% a year in real terms, and to take total Defence expenditure in 1984-85 to about 3% of gross domestic product. In addition, it was planned that expenditure on new equipment should rise as a proportion of total Defence expenditure from 15% in 1979-80 to over 25% in 1984-85.

3.45 No sweeping changes in the force structure were planned, and the major, high-cost capital items to be brought into service included the following projects:

- The patrol frigates
- The tactical fighter force
- Additional patrol boats
- HMAS TOBRUK (then already launched)

- Follow-on destroyers to replace the present destroyer escorts from the end of the decade.

3.46 Additional projects to be brought to decision in the five year program were:

- MELBOURNE replacement
- A second underway replenishment ship
- An inflight refuelling capability
- Improved early warning radar systems (hinging particularly on Jindalee)
- An additional hydrographic ship
- A research vessel
- Medium trucks
- Additional equipment for the Army Reserve

3.47 The effects which the accelerated acquisition of INVINCIBLE had on specific projects has been discussed at paragraphs 3.8 to 3.35 above. In this section, we are concerned with the broader issues of the Government's ability to fund the programs, consistent with its objectives of increases in Defence expenditure of 7% a year in real terms, total Defence expenditure to represent about 3% of gross domestic product, and new equipment to represent about 25% of total Defence expenditure.

3.48 A number of projects in the 1980-85 program were carried over from the 1976-81 five year defence program. That program was based on a posited real annual growth rate of 5%, but real growth achieved was considerably less: the maximum amount spent on capital equipment reached a peak of 16.4% of total defence expenditure in 1979/80. In the first two years of the current

program, real increases of 5.6% and about 5.3% respectively have been achieved; expenditure on new equipment has actually declined to 16% and 12.6% respectively. Only if expenditure on capital equipment can be increased dramatically over the next three years can the program be achieved. The Defence outlay for 1981-82 was $3080m (at August 1979 prices). An increase of 7% in subsequent years of the program would mean total Defence outlays (at August 1979 prices) of $3506m in 1982-83, $3751m in 1983-84, and $4014m in 1984-85. This would mean an increase in expenditure on capital equipment from $398m in 1981-82 to an estimated $969m in 1984-85 (at August 1979 prices), if the objective of spending 25% of total Defence expenditure on capital equipment is to be achieved by that time. This appears to be an unrealistic figure, particularly when it is viewed against past experience. In a period of recession, moreover, with a declining growth in gross domestic product, there are likely to be strong pressures to restrict future Defence budgets to only marginal increases.

3.49 In Budget Statement No. 1, distributed with the 1981-82 Budget, it was estimated that outstanding obligations on orders placed, mainly for capital items, to be carried over to 1982-83 and later years would be $2578m (in 1981 prices). Four new commitments - the Tactical Fighter Force, 10 P3C aircraft, the 105mm light gun, and trainer aircraft - entered into during 1981-82 increased forward commitments by $2797m (at 1981 prices). This will result in some $5375m, being carried into 1982-83 and subsequent years. Should an option to INVINCIBLE as a replacement for HMAS MELBOURNE be approved, this figure will need to be increased by the cost of that project. As indicated earlier in this chapter, unless a much less ambitious option is adopted, the cost for the ship alone will be $1000m or more.

3.50 There are known to be several other projects - the follow-on destroyers, mine clearance vessels and two Army communication systems - which the Government favours, but to which it is not yet committed. These, together with a carrier, would project a total capital equipment commitment over the next seven years of about $7500m (at 1981 prices), plus the cost of any STOVL and other aircraft for the carrier. These costs at end of 1981-82 levels are likely to be increased .

3.51 Because of the long lead times involved, it is necessary to enter into commitments for projected major capital equipments well in advance. By entering into a commitment for the acquisition of an aircraft carrier, however, particularly at a total project cost, including aircraft, which may be in excess of $1500m, there will be severe pressures placed on the Defence budget and little flexibility will be available in that budget for the rest of the decade. This position will be exacerbated if the effects of the current recession produce pressures to restrict the growth of total Defence expenditure, noting particularly that manpower costs normally account for around 50% of total Defence expenditure, and it would be unrealistic to expect this percentage to decrease.

CONCLUSIONS

1. The Australian Government's offer to permit the British Government to withdraw from the sale of the HMS INVINCIBLE, which has been accepted, provides a fresh opportunity to review the value of an aircraft carrier to Australia's Defence Force structure, and the priority such a purchase should be accorded. The Committee considers that the discussion on the purchase of the Invincible has increased public awareness of the issues involved. The Committee notes statements by the Minister for Defence that all options, including a decision not to purchase a carrier, will be considered.

2. The Committee acknowledges that an aircraft carrier can provide many functions which would be valuable in the Australian Defence Force.

3. At the price at which HMS INVINCIBLE was to be made available, a credible case could be made for its purchase.

4. However, at the full project cost which would be involved in the acquisition of a purpose-designed ship, in the context of present Defence spending levels, it is harder to justify such a purchase. Other desirable acquisitions would have to be curtailed or delayed unacceptably for the Australian Government to purchase such an aircraft carrier.

5. If INVINCIBLE had been acquired, her aircraft complement would have been limited, largely because of budgetary pressures, to six or eight Sea King Helicopters. This would have been barely adequate as an ASW capability. The prospect of enhancing ASW capability by acquiring additional helicopters for the INVINCIBLE and the destroyers was also limited by projected Defence expenditure levels. Acquisition of STOVL aircraft would have required large expenditure, which would have competed with other procurement proposals.

6. If future Defence expenditure of a much higher order were to be contemplated, a carrier could be included in the capital expenditure program without necessarily distorting the shape and balance of the Defence Force. The

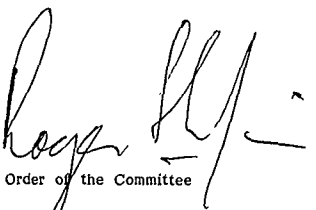
Committee does not anticipate that Defence expenditure will rise to such a level in the foreseeable future.

7. The Committee is of the view that many of the functions performed by an aircraft carrier can be performed as effectively, or at least acceptably, by other elements of our air and maritime forces. Though it could be argued that alternative naval vessels and aircraft could perform their individual functions, an aircraft carrier would combine many of them. For example, the aircraft carrier does offer a platform which combines an ASW and command and control function. In the absence of a carrier the Committee recommends to the Government that it proceed forthwith with the purchase of helicopters for Australian frigates to enhance their ASW capacity. The Committee also urges that the command and control capability of other Australian ships in service be enhanced to perform some of the tasks that would have been performed by INVINCIBLE.

8. The Committee is also of the view that other elements of our air and maritime forces perform functions more closely related to the immediate priorities of Australia's Defence planning. The analysis of proposed budgeting for Defence procurement contained in paragraphs 3.48 to 3.51 indicates that development of these other elements may have to be delayed or reduced over the period 1982-1985.

9. The Committee remains concerned about the viability of the Fleet Air Arm if it only operates ASW helicopters. It believes that the Fleet Air Arm has special capabilities in maritime operations which would be important to maintain. The Government should consider the possibility of some or all of the Orion P3Cs being transferred to the Fleet Air Arm, as part of a maritime command structure. It should also consider utilising the Trackers for their remaining life in coastal surveillance tasks as they have a special capability in this regard and would be operated by dedicated, highly skilled professionals. At present this valuable capability is not being used because 13 of the existing 19 Tracker aircraft are in storage. In addition the A4 Skyhawks will remain for the rest of their operational life invaluable in providing a ground attack and maritime strike capability. In these roles they have useful training and combat functions. They should therefore be retained in service as land based strike

aircraft. In the process, experience in operating in a surveillance and combat role with the fleet will not be lost. Finally, arrangements should be made to ensure that some Fleet Air Arm pilots are familiarised with other aircraft in service with the Australian armed forces so that broad experience in all aspects of maritime strike tasks is maintained.



By Order of the Committee

R.F. Shipton, M.P.
Chairman

APPENDIX I

Comparison of characteristics of three of the RAN Aircraft Carrier contenders

	RAN BASELINE LPH	RAN BASELINE SCS	HMS INVINCIBLE
DIMENSIONS			
Length OA (feet/ metres	648.6 (198)	640 (195)	675.6 (206)
Length-Flight Deck	636 (194)	576 (175.6)	598.9 (182.6)
Beam-Waterline	94 (28.7)	80 (24)	90.2 (27.5)
Beam Flight Deck	126 (38.4)	95 (28.9)	104.6 (31.9)
Displacement- Full load	21407 tonnes	15380 tonnes	19860 tonnes
Draft- navigational	28.4 (8.7)	29.7 (9.04)	28.8 (8)
SPEED AND ENDURANCE			
Speed (approximate)	24 kts	24 kts	28 kts
Range (indicative)	7000 nm	4800 nm	4000 nm
MAIN MACHINERY			
Propulsion	2 x LM2500GT	2 x LM2500GT	4 x OLYMPUS GT
Installed SHP	40000 2 CRP prop	45000 1 CRP prop	112000 2 fixed prop
AVIATION			
Aircraft Complement	22 +	16	22
Ski Ramp	Yes 12°	Yes 12°	Yes 7°
Lifts	2 (both deck edge)	2 (1 deck edge)	2

COMMAND AND CONTROL			
Data System	NCDS (Modified)	NCDS (Modified)	ADAWS 6
Link 11	Yes	Yes	Yes
RADARS			
Air Search	AN/SPS-49 (2D)	AN/SPS-49 (2D)	Type 1022 (2D)
Surface Search	AN/SPS-67	AN/SPS-67	Type 992
Navigation	(AN/SPS-67)	(AN/SPS-67)	Type 1006
Carrier Approach	AN/SPN-35A Type 1006		AN/SPN-35A
IFF	Yes	Yes	Yes
TACAN	ASN/URN-25 TACAN	AN/URN-25 TACAN	No
ARMAMENT			
ADMS/Fire Cont System	SM1	SM1 (if fitted)	Sea Dart/2 x Type 909
CIWS	2 x CIWS	2 x CIWS	None
ACCOMMODATION			
Officers	120	102	131
Senior Sailors	172	156	265
Junior Sailors	884	592	609
Total Accommodation (Requirement 996)	1184	850	1005

Aircraft Carriers in the Royal Australian Navy

The following paper is submitted in accordance with a minute from the Secretary, Defence Committee, dated 7th January, 1944 -

> '3. The Minister wishes the Defence Committee as the advisory body on Defence Policy, to keep constantly in mind the question of Post-War Defence Policy from the following angles:-
>
> (i) The experience of this war in relation to the principles of Australian and Empire Defence, and to the nature, strength, and organization of the Australian Forces ...
>
> 4. The Minister desires this minute to be viewed as a standing instruction to the Defence Committee so that, when a firm basis for the expression of its views has been established under either 3(i) or (ii), the Committee will submit them for his consideration.'

The Naval Board considers that a firm basis for the expression of its views in relation to the value of Carriers to the Royal Australian Navy has been established, and therefore submit the following memorandum on the subject for consideration.

The Aircraft Carrier has proved itself a necessary part of any Task Force not only to provide fighter protection for the remainder of the force and itself, but also to provide a powerful striking force for offensive purposes. Such striking forces have been used in this war with great effect against land targets, Naval targets in harbour, and Naval targets at sea.

The importance of the Carrier striking force has proved so great that now in meetings between Task Forces, each of which contains Carriers, the result of the battle may well be decided by the Carrier striking forces before the surface forces can get into gun range.

Nevertheless Carriers cannot afford to take the sea unaccompanied by Cruisers and/or Capital Ships and Destroyers, which are necessary to provide protection against attack from other surface vessels or submarines, and to provide additional anti-aircraft gun support.

It is not too much to say that the future Fleet will be moulded round the Carrier.

The most notable examples in this war of the offensive and defensive use of Carrier-borne aircraft have been as follows:-

(a) AGAINST NAVAL TARGETS AT SEA:

(i) The sinking of the 'BISMARCK' - This ship was attacked and torpedoed by aircraft from the 'VICTORIOUS', later aircraft from 'ARK ROYAL' torpedoed her and slowed her down so that the surface ships were able to close and finally destroy her.

(ii) The Coral Sea and Midway Island Battles - These were fought almost entirely between opposing Carrier forces. The Japanese losses were heavy and included - 5 Carriers, 3 Cruisers and 5 Destroyers sunk; 1 Carrier, 3 Battleships and 6 Cruisers damaged: whilst the United States Navy lost 2 Carriers and 2 Destroyers.

(b) AGAINST NAVAL TARGETS IN HARBOUR:

(i) Taranto - A striking force from one Carrier ('ILLUSTRIOUS') carried out a night attack on the Italian Fleet and was able to sink one Italian Battleship and severely cripple two others for the loss of one Swordfish aircraft.

(ii) Pearl Harbour - A Japanese force of carrier-borne aircraft inflicted heavy damage on the United States Fleet for the loss of 48 aircraft. The American losses included 6 Battleships sunk or very severely damaged, 3 Cruisers damaged, 3 Destroyers sunk, 1 Floating Dock destroyed, etc., etc.

(iii) Kaa Fjord - 'TIRPITZ' was attacked on April 3, 1944, by Barracudas from Carriers, escorted by fighters - 3 hits by 1600 lb. and 5 hits by 500 lb. bombs and 5 probable hits. Damage caused will take at least five months to repair. Only 2 Barracudas lost by enemy action plus 1 crashed taking off.

(c) AGAINST LAND TARGETS:

(i) Tokyo - An attack on the Japanese mainland was carried out by Carrier-borne aircraft in April, 1942.

(ii) The Carolines and Marshalls - In two months, i.e., from 1st February to 1st April, 1944, a force of Battleships and Carriers was able to neutralise the whole of the Mandated Islands causing considerable damage and loss to Japanese aircraft and shipping, with practically no loss to themselves.

(iii) The Marianas - Powerful Carrier Task Forces completely neutralised Japanese air resistance in this area and successfully covered the landings of troops.

(d) ANTI-SUBMARINE OPERATIONS:

Since the introduction of the Escort Carrier for anti-submarine protection of convoys early in 1943 until the end of 1943, aircraft from these escorts sank 14 and porbably sank 9 German U-boats in the Atlantic alone. In the famous '500 mile gap' where air cover could not be provided by shore-based aircraft, the Escort Carrier has solved the problem by providing convoys with A/S Air protection.

(e) ANTI-LONG RANGE BOMBER AIRCRAFT:

(i) Russian Convoys - The only fighter cover against shore-based air attack on the Russian convoy route was provided by Aircraft Carrier escorts. No Aircraft Carrier escort has been lost on this route.

(ii) Malta Convoys - In the days when Malta was of vital importance, the only air escort that could be provided for the desperately needed convoys was given by Aircraft Carriers. Reinforcing Spitfires were flown in from the decks of Carriers - the only method (except as cargo) that could be used to bring them within flying range.

(f) COVERING LANDINGS:

(i) North Africa - In these landings complete fighter cover was provided over the landing areas by the 12 Aircraft Carriers employed; the beachheads were beyond fighter range from the airfields under Allied control. The Aircraft Carriers also supplied attack aircraft during the operations.

(ii) Salerno - When the Allied air situation was critical in this area (September, 1943) 4 Aircraft Carriers were used as mobile airfields to provide fighter cover until shore bases were available.

(iii) Hollandia - The fighter cover for this operation was provided entirely by the Carrier-borne aircraft of the Task Forces. The 'attack force' aircraft during daylight hours was also provided by the Aircraft Carriers, 750 aircraft in all being provided. No losses were suffered by our forces.

The above examples are sufficient to show the important and varied uses to which Carriers can be put. They show that they can be used with equal success against both land and sea targets. They show their value in the covering of troop landings and in the protection of trade from submarine and aircraft attack. It can be shown that they are equally useful for attack on enemy trade although the opportunities for this have been scarce as our command of the sea has virtually closed the oceans to the enemy.

The strategical ubiquity of the Carrier is one of its most important assets. It corresponds to a completely mobile Air station of three to five squadrons of Aircraft complete with fuel, maintenance facilities, bombs and torpedoes which can shift its position 600 miles a day, and thus in one month it may strike without warning in the Atlantic and in the next off the coast of Australia. A few Torpedo Bomber Squadrons in a Carrier thus constitute a greater threat than a similar number of Squadrons in a shore base where their activities are circumscribed by a definite operational radius.

Great Britain and America have realised the value of sea-based air power and each is building up a great fleet of Carriers. Great Britain will have at the end of 1944, a total of 53, U.S.A. will have a total of 108, whilst Canada recently have taken over 2 from the Royal Navy.

The Naval Board therefore recommends that favourable consideration be given by the Government to the provision of Aircraft Carriers for the Royal Australian Navy. In this connection it is observed that the Naval Board have been asked in War Cabinet Agendum No. 342/1944 of 5th July, to report on the number of personnel required to man a Light Fleet Carrier in December 1944 or as soon thereafter as possible.

Secretary, Naval Board.

Navy Office,
Melbourne,
17th July, 1944.

Australian Archives Accession
MP 1049/5 File 2026/2/925

(Note: The argument set out in this memorandum was accepted by the Defence Committee, and was the basis for the Chifley Government's decision to establish an RAN Fleet Air Arm taken in May 1947).

APPENDIX III

Witnesses

The Committee is grateful to all those who appeared in person before the Sub-Committee on Defence Matters. The following persons appeared before the Sub-Committee, in most instances after having presented a written submission (dates of hearings and relevant page numbers in official transcript of public evidence are shown):

Admiral Sir Anthony Synnot, AO, CBE, RAN (Rtd), 10.5.82, pp. 4-81.

Commander F.G. Evans, OBE, VRD, RAN (Rtd) Federal President, Navy league of Australia, 10.5.82, pp. 82-122.

Mr M.J. O'Connor, Executive Director, Australia Defence Association, Victoria, 10.5.82.pp. 123-161.

Air Chief Marshal Sir Neville McNamara, KBE, AO, AFC, AE, Chief of Defence Force Staff, Department of Defence, Canberra, 24.5.82, pp. 164-194.

Mr W.B. Pritchett, Secretary, Department of Defence, Canberra, 24.5.82, pp. 164-194.

Commodore I.W. Knox, RAN, Director-General, Naval Plans and Policy, Department of Defence, Canberra, 24.5.82.

Mr J.M. Moten, First Assistant Secretary, Force Development and Analysis Division, Department of Defence, Canberra, 24.5.82.

Air-Vice-Marshal F.W. Barnes, R.A.A.F. (Rtd), 29.6.82, pp. 196-262.

Mr A.C.C. Farran, Senior Lecturer in Law, Monash University, 29.6.82, pp. 263-300.

Captain W.S.G. Bateman, RAN (appearing in a private capacity), 29.6.82, pp. 301-369.

Dr R.J. O'Neill, Head, Strategic and Defence Studies Centre, Research School of Pacific Studies, Australian National University, Canberra, 30.6.82, pp. 372-417.

Mr J.C. Price, Assistant General Manager, Engineering and Marketing, State Dockyard, Carrington, N.S.W., 30.6.82, pp. 418-452.

Written Submissions (without testimony)

The Committee is grateful to the following individuals and organisations who provided submissions and/or documents to the Committee, but who did not give oral evidence:

Mr C.R. Cummings, Heatley, North Queensland.

Mr M. Eiseman, Cairns, Queensland.

Mr R.S. Wallace, East Ringwood, Victoria.

Admiral Sir Victor A.C. Smith, KBE, CB, DSC, RAN (Rtd), Red Hill, Australian Capital Territory.

Commodore K.W. Shands, RAN (Rtd), Watson, Australian Capital Territory.

Rear Admiral G.G.O. Gatacre, CBE, DSO, DSC, Rose Bay, New South Wales.

Vice-Admiral Sir Henry Burrell, RAN (Rtd), Forest, Australian Capital Terrtiory.

Commodore J.A. Robertson, RANEM, Cremorne, New South Wales.

Admiral Sir Alan McNicholl, RAN (Rtd), Yarraluma, Australian Capital Territory.

Visit to HMAS Albatross-NAS Nowra

Sub-Committee C visited HMAS Albatross-NAS Nowra, the home of the RAN Fleet Air Arm, on 4 August 1982. The Committee expresses appreciation to Commodore T.A. Dadswell, AM, RAN, Officer Commanding, and to his ship's company, for their hospitality and assistance.

APPENDIX IV

Bibliography

A.A.P. (AUSTRALIAN ASSOCIATED PRESS). 'Carrier options to be discussed'. Canberra Times, 5 July 1982.

THE ADVERTISER, 9 March 1982. 'Invincible best for defence - Synnot'.

THE AGE, Editorial Opinion. 1 December 1981. 'Sinking the Invincible'.

THE AGE, 18 February 1982. 'MPs to get briefing on Invincible'.

THE AGE, Editorial Opinion, 19 January 1982. 'Invincible not the answer'.

THE AGE, Editorial Opinion. 26 February 1982. 'Gift horse or white elephant?'

ANDERSON, L.R., Wing Commander (Rtd), 'Victory at Sea', The Australian, 3 April 1982.

ATHERTON, Graeme. 'Time to reflect on future defence'. The West Australian, Wednesday March 10, 1982.

AUSTRALIA. Department of Defence. 'Navy Aviators ... a breed apart'. Sydney Morning Herald, 17 March 1982.

AUSTRALIA. Department of Defence. Press release No. 200/81, Thursday, September 24, 1982. 'UK Aircraft Carrier Design to be Considered'.

AUSTRALIA. Department of the Parliamentary Library. Transcript. 'Australia's Naval Capability Critised: One New Aircraft Carrier Insufficient'. A.M. 16 January 1981.

AUSTRALIA. Department of the Parliamentary Library. Transcript. 'Is the Used Aircraft Carrier HMS Invincible, offered to the Australian Navy by Great Britain, suited to Australian Needs?'. Nationwide. 30 November 1981.

AUSTRALIA. Department of Defence. 'The Combat Capabilities of the Royal Australian Navy'. Evidence before the Joint Committee on Foreign Affairs and Defence, Sub-Committee on Defence Matters, 2 May 1980 (Loosli, Hudson, Dadswell, Youll); 'The Force Structure of the Royal Australian Navy', idem., 19 April 1982 (Knox).

AUSTRALIA. Department of Defence. Defence News Release No. 50/82, 'Royal Australian Navy to have another HMAS Australia', Tuesday April 20, 1982.

AUSTRALIA. Department of Defence. Defence News Release No.44/82 'Fleet Air Arm Working Party'. Thursday April 8, 1982.

AUSTRALIA. Department of Defence. Defence News Release. June 8, 1982, No. 85/82. 'New Australian Defence Shipping Council Meets'.

AUSTRALIA. Department of Defence. Defence News Release, No. 97/82, Sunday, 4 July 1982, 'London Talks on HMS Invincible'.

AUSTRALIA. Department of Defence. Defence News Release. No. 93/82, Thursday, July 1, 1982. 'Two Navy Squadrons to be Disbanded'.

AUSTRALIA. Department of Navy, Navy Office, Melbourne - Memorandum - 'Aircraft Carriers in the Royal Australian Navy'. 17 July 1944.

AUSTRALIA. Directorate of Public Relations, Department of Defence, Canberra, ACT. 25 February 1982. 3611b/663B. 'Background Information to the Decision to Purchase a New Aircraft Carrier for the Royal Australian Navy'.

AUSTRALIA. Government Information Unit. 24517/82. 'A New Carrier for the Royal Australian Navy'.

AUSTRALIA. Parliament. House of Representatives. Hansard, 25 March 1982: 1491. (Morrison, Baume.)

AUSTRALIA. Parliament. House of Representatives. Hansard., 17 March 1982: 1190-1111.

AUSTRALIA. Parliament. House of Representatives. Hansard, 20 April 1982:162 (Kerin/Killen).

AUSTRALIA. Parliament. House of Representatives. Hansard, 27 April 1982: 1923 (Scholes/Killen).

AUSTRALIA. Parliament. House of Representatives. Hansard. 26 November, 1959. 'Defence Review' (Townley).

AUSTRALIA. Parliament. House of Representatives. Hansard, 11 March 1982: 942-949. Ministerial Statement.

AUSTRALIA. Parliament. House of Representatives. Hansard, 25 February 1982: 629-639. Ministerial Statement.

AUSTRALIA. Parliament. House of Representatives. Hansard, 11 March 1982: 942-949 (Morrison, Beazley, Katter).

AUSTRALIA. Parliament. Senate. Hansard, 20 August 1981: 230 (Durack).

AUSTRALIA. Parliament. Senate. Hansard, 25 November 1981: 2580-2584 (McGibbon).

AUSTRALIA. Parliament. Senate. Hansard, 23 February 1982: 268-272. (McGibbon).

AUSTRALIA. Parliament. Senate. Hansard, 11 March 1982: 710-714; 749-750 (Evans, Sibraa, Mason, McGibbon).

AUSTRALIA. Parliament. Senate. Hansard, 25 March 1982: 1229-1236 (Hamer, Durack).

AUSTRALIA. Parliament. Senate. Hansard, 21 April 1982:1437 (Durack).

AUSTRALIA. Parliament. Senate. Hansard, 22 April 1982:1442 (Mason/Durack).

AUSTRALIA. Parliament. Senate. Hansard, 20 May 1982:222-3 (Sibraa/Carrick).

AUSTRALIA. Parliament. Senate. Hansard, 27 April 1982: 1510. (Kilgariff/Durack)

AUSTRALIA. Parliament. Senate. Hansard, 18 May 1982: 2081 (Siddons/Durack).

AUSTRALIA. Senate Estimates Committee D. Written Replies ... asked ... during examination of Proposed Additional Expenditure for 1981-1982. May 1982, pp. 2-3.

AUSTRALIAN AVIATION AND DEFENCE REVIEW. 'The Great Carrier Debate', June, 1980.

THE AUSTRALIAN FINANCIAL REVIEW. 8 December 1981. 'Beware of this Christmas gift'.

THE AUSTRALIAN FINANCIAL REVIEW. 16 February 1982. 'The carrier litmus test'.

THE AUSTRALIAN. 17 July 1981. 'Why we're getting a new aircraft carrier'.

THE AUSTRALIAN. 18 June 1982. 'Ark Royal: it's cheap, it's suitable, its' there'.

THE AUSTRALIAN. 25 June 1982. 'Navy likely to buy modified US carrier'.

THE AUSTRALIAN. 30 July 1980. 'Navy chief calls for new carriers'.

THE AUSTRALIAN. 5 may 1980. 'We need a carrier - but not for $1000 mil' and 'The sky's not the limit'.

THE AUSTRALIAN. 6 March 1982. 'The military's powers'.

'HMAS ALBATROSS AND THE INVINCIBLE DECISION'. The Navy. July 1982.

BALDERSTONE, Simon. 'Budget reality may sink the Invincible'. The Age, 16 February 1982.

BALDERSTONE, Simon. 'Purchase absurd, says Morrison'. The Age, 1 March 1982.

BALDERSTONE, Simon. 'Rhetoric at odds with reality'. The Age, 8 May 1982.

BALL, D.J. *Evidence before Joint Committee on Foreign Affairs* and Defence Sub-Committee on the Pacific Basin, 24 May 1982, pp. 95-107.

BARNES, F.W. Air Vice-Marshal, RAAF (Ret'd). 'Fact and fiction on the Invincible. STOVL planes'. *The Australian*, 29 May 1982.

BARNES, F.W. 'Debate about the *Invincible: a matter of priorities*'. The Canberra Times, Wednesday, 14 July 1982.

BATEMAN, W.S.G. 'In defence of the Invincible', The National Times, April 11 to 17, 1982.

THE CANBERRA TIMES. '*Australia offered a carrier*'. 25 July 1982.

THE CANBERRA TIMES. '*Budget aircraft carriers* "ideal" for Australia'. 24 July 1982.

THE CANBERRA TIMES. 'Carrier alteration cost defended'. 9 December 1981.

THE CANBERRA TIMES. 'Defence and Invincible'. 3 March 1982.

THE CANBERRA TIMES. 'Invincible deal waits'. 6 April 1982.

CARMAN, Gerry. 'Navy's fixed-wing role under threat'. The Age, 14 April 1982.

CARMAN, Gerry. 'RAN searches world for second-hand jets'. The Age, 25 June 1980.

CRAIG, A.H. 'A carrier force for Australia'. The Canberra Times, 26 July 1982.

CRAIG, A.H. 'RAN Need for naval air power'. Canberra Times, 6 July 1882.

CRANSTON, Frank 'Experts visit US for carrier talks'. The Canberra Times. 16 July 1982.

CRANSTON, Frank. '$98M saving if deal is off'. The Canberra Times, 5 June 1982.

CRANSTON, Frank. 'Advantage in seeing "the other side of the hill" for Australia'. The Canberra Times. 27 June 1982.

CRANSTON, Frank. 'Aircraft-carrier Invincible visits Australia next year'. The Canberra Times, 3 December 1981.

CRANSTON, Frank. 'Argument about the Invincible: the costs and the benefits'. The Canberra Times, 15 December 1981.

CRANSTON, Frank. 'Australia wants the Invincible, not the Hermes'. The Canberra Times. 7 JULY 1982.

CRANSTON, Frank. 'Australian built ship an option'. The Canberra Times, 21 July 1982.

CRANSTON, Frank. '*Government to reassess policies*'. *The Canberra Times*, 15 July 1982.

CRANSTON, Frank. 'Invincible proposal attacked'. The Canberra Times, 10 December 1981.

CRANSTON, Frank. '*Invincible talks to be held in Canberra*'. *The Canberra Times*, Saturday, 3 July 1982.

CRANSTON, Frank. 'Invincible "loss" no gain to the RAAF'. The Canberra Times, 15 july 1982.

CRANSTON, Frank. '*Melbourne to Lose Fighters - Refit to lengthen carrier's life*'. The Canberra Times, 19 March 1981.

CRANSTON, Frank. 'Navy body wants changes in Defence'. Canberra Times, 24 March 1982.

CRANSTON, Frank. '*Navy fights to retain Skyhawk*'. *The Canberra Times*, 23 March 1982.

CRANSTON, Frank. 'Navy moving to acquire jump-jets'. The Canberra Times. 8 July 1982.

CRANSTON, Frank. '*Navy rejects Harrier criticism*'. *The Canberra Times*. 1 July 1982.

CRANSTON, Frank. 'New Italian offer in wake of Invincible'. The Canberra Times. 20 July 1982.

CRANSTON, Frank. 'RAN may lease US aircraft carrier'. The Canberra Times, 15 February 1980.

CRANSTON, Frank. 'RAN now without aircraft carrier'. The Canberra Times, 30 June 1982.

CRANSTON, Frank. 'UK industry wants carrier move'. The Canberra Times, 28 July 1982.

CRANSTON, Frank. 'Wider options on carrier replacement'. The Canberra Times, 30 July 1982.

DADSWELL, T.A. Captain (RAN). 'The Carrier Debate - Another view'. Strategem, July/August, 1980: 39-42.

DADSWELL, T.A. Captain (RAN). 'The Carrier Issue'. Strategem, May/June 1980: 28-31.

DALY, John H.D. 'Purchase of HMS Invincible'. The Canberra Times, 6 April 1982.

DALY, RAN, Commander Barrie. 'A New Aircraft Carrier for the Royal Australian Navy'. Journal of the Royal United Services Institute of Australia, Vol 5(1) April 1982: 13-16.

DAVIDSON, Kenneth. 'Falklands lesson for Australia'. The Age, 13 May 1982.

DAVIDSON, Kenneth. 'Invincible is just indefensible'. The Age, 4 March 1982.

DONOHUE, Cdr. H.J. 'Naval Air Power and the RAN', Journal of the Australian Naval Institute, November 1975, pp. 10-22.

THE ECONOMIST. 'The Royal Navy stays the air'. May 7, 1977: 63; 'By any other name', May 24, 1975: 48.

EVANS, Geoffrey. 'Invincible at War'. The Navy, July 1982.

FARRAN, A. 'Australia itself makes an unsinkable carrier'. The Age, 24 July 1982.

THE FINANCIAL REVIEW. 13 April 1982. 'Hopes decline of new planes for Navy'.

FINANCIAL REVIEW. 'The mysterious submarine threat'. 30 April 1982.

FITZGERALD, Alan. 'Just the thing for sailing round in circles'. The Canberra Times, 11 May 1981.

FLEET AIR ARM OFFICERS' ASSOCIATION, JOUNRAL 'FLY NAVY'. Special Issue - Shipborne Air Power - May 1973.

'FLIGHT'. 'Australia's Fleet Air Arm'. 4 November 1960.

FLYNN, Julie, 'Electoral cost may torpedo plans to buy the Invincible', The National Times, February 14 to 20, 1982.

GLEDHILL, J.A. Captain, DSC RAN (Rtd). 'Fleet air arm's struggle to survive'. Pacific Defence Reporter February 1982: 2-6.

GLEDHILL, J.A. Captain, DSC RAN (Rtd). 'Why Australia needs an aircraft carrier'. Sydney Morning Herald, 8 February 1982.

GLEDHILL, J.A. Captain, DSC RAN (Rtd); ROBERTSON Alan, Commodore RAN (Rtd); CUNNINGHAM R.; ROBERTS, W.O.C. 'Important role of carriers', Sydney Morning Herald, 13 March 1982.

GOULD, A.J. (Director, British Aerospace Australia). 'Fleet air cover by Sea Harriers'. Canberra Times 1 July 1982.

GRATTAN, Michelle. 'Senator claims "blind panic" over carrier'. The Age, Tuesday 8 December 1981.

GRAZEBROOK, A.W. 'Carrier experts challenged'. The Australian 3 March 1982.

GRAZEBROOK, A.W. 'Invincible - Britain's new TDC'. Pacific Defence Reporter, May 1977, pp. 12-14.

GRAZEBROOK, A.W. 'Putting a Price on Invincible - No.1: To buy or not to buy is the RAN's dilemma'. Pacific Defence Reporter, November 1981: 21-26.

GRAZEBROOK, A.W. 'Sea control and Maritime Airpower - an Australian view'. Pacific Defence Reporter - September 1976: 15-20.

GRAZEBROOK, A.W. 'The Melbourne Carrier Replacement'. Pacific Defence Reporter, February 1978: 13-21.

GRAZEBROOK, A.W. 'The Role of the Navy's New Aircraft Carrier'. The Navy. July 1982.

GREAT BRITIAN. HOUSE OF COMMONS. Hansard. Oral Answers: 734-735. (Brotherton, Duffy, Churchill, Silkin, Miller, Brown/Nott).

GREVILLE, P.J. Brigadier. 'Muddled gunboat thinking'. The Advertiser, 1 October 1980.

GREVILLE, P.J. Brigadier. 'Defence the democratic way'. The Advertiser, 10 February 1982.

GREVILLE, P.J. Brigadier. 'The hunt for a new RAN aircraft carrier'. The Advertiser, 20 January 1982.

GREVILLE, P.J., Brigadier. 'Covering Australia'. The Australian, 29 April 1981.

HALE, Allan. 'Shift from 1945 Offensive to 1980 Defensive'. The West Australian, 12 May 1980.

HALL, H.D., Air Vice-Marshal. 'In defence of the carrier Invincible'. The Age, 4 December 1981.

HAYDEN, Bill, Leader of the Opposition. Radio broadcast transcript, Sunday December 6.

HEWITT, J.E., Air Vice-Marshal (Rtd). 'Three small frigate type carriers would suit us better than Invincible'. The Age, 2 March 1982.

HUGHES, Gary. 'But who will defend the Invincible?'. Brisbane Courier Mail, 3 March 1982.

HYWOOD, Greg. 'Aust's chances of securing the Invincible become more remote'. Financial Review. 12.7.82.

JAMES, Francis. 'Aircraft carriers and deadly sin'. The Review, 11 December 1981.

JANES'S Fighting Ships 1981-82. p. 562.

KELLY, Paul. 'Carrier purchase splits the big-spending consensus'. Sydney Morning Herald, 26 February 1982.

KILLEN, D.J. The Hon. M.P. 'HMS Invincible to be Acquired RAN'. Ministerial statement 25 February 1982.

KORPORAAL, Glenda, 'Navy takes a fresh look at US carriers'. Financial Review, 19 July 1982.

KNOX, Commodore. Press briefing, 1981, 'The Requirement for a New Carrier'.

LINFORD, R.J. 'A claim for Cocos "unlikely to succeed"'. *Canberra Times*, 13 May 1982.

LONGWORTH, B., 'The Decline of the Surface Fleet'. Defence V.13 (1/2) Jan/Feb. 1982: 69-71

MILLER, R., 'The High and the Mighty'. The Age, 8 May 1982.

MILLS, Stephen. 'Navy still planning to buy Invincible' The Age, 22 June 1982.

MILNE, Chris. 'Loss of the Invincible: "it's no bad thing"'. The Sydney Morning Herald, 16 July 1982.

MILSON, Scott. 'Battle looms over new aircraft carrier'. Sydney Morning Herald 24 November 1981.

MacGIBBON, David. 'Invincible can't give seaborne air power'. Financial Review 24 February 1982.

MacGIBBON, David. 'Is the Used Aircraft Carrier HMS Invincible, offered to Australian Navy by Great Britain, suited to Australian needs?' 'Nationwide', 30 November 1981.

MacGIBBON, David. 'UK carrier is not what we need'. The Australian, 17 February 1982.

MacGIBBON, David. 'Why we shouldn't buy the Invincible (or the Harriers)'. The Courier Mail, Friday, 9 July 1982.

McNAMARA N.P., Air Marshal, 'Inhibiting the work of defence'. The Australian, 10/11 April 1982.

THE NATIONAL TIMES. April 11 to 17, 1982. 'In defence of the Invincible'.

NAVY LEAGUE. 'Senators Query Carrier Need'. The Navy, July 1982.

NED, Master. 'A Letter from Australia - V'. The Naval Review, April 1980: 137-138.

NEWHAM, J.W. 'Air Vice-Marshal. Evidence 2 May 1980: 283 and 287.

O'CONNOR M.J. 'Navy should buy carrier', The Age, 10 April 1982, p. 10.

O'CONNOR, M.J. 'Ark Royal: the price is right'. The Age 7 July 1981.

O'CONNOR, M.J. 'Invincible will be better than nothing'. The Age 15 March 1982.

O'CONNOR, M.J. 'Navy should buy carrier'. The Age, 10 December 1982.

O'CONNOR, M.J. 'Defence after the Invincible'. The Age, 22 July 1982.

O'NEILL. Robert. 'Australia's future defence requirements, Working Paper No. 24, Strategic and Defence Studies Centre, ANU, June 1980: 10-11.

OWEN, Trevor. 'Strategic guidelines and the Invincible'. The Australian 27-28 March 1982.

PACIFIC DEFENCE REPORTER, March 1982. 'AV-8As in close support program with US Marines'.

PACIFIC DEFENCE REPORTER. November 1976. 'PROTEAN - A way Ahead for Naval Aviation'.

PACIFIC DEFENCE REPORTER, August 1981. pp. 73-74. 'The case against the carrier'.

PACIFIC DEFENCE REPORTER, Dec/Jan, 1977/78. pp. 72-73. 'Melbourne Replacement'.

PACIFIC DEFENCE REPORTER, July 1977. V/STOL - 'the state of the art'.

PEEK, Sir Richard; EVANS, Geoffrey, Commander; GRAZEBROOK, A.W., Commander. 'The Tactical Fighter Force and Maritime Airpower'. The Navy, May June, July, 1980: 5-9.

'PEGASUS'. 'The Aircraft Carrier Replacement : the Real Requirement'. Journal of the Australian Naval Institute: 60-66.

PINWELL, William. 'The controversial "cathedral"'. The Australian, 2 March 1982.

PINWELL, William and KNEZ, Ted. 'Variety of uses for Invincible: Fraser'. The Australian, 1 March 1982.

PINWELL, William. 'Air protection "deficient" - RAAF's plan to stiffen nation's defence system'. The Australian 29 March 1982.

PINWELL, William. 'Cabinet decides: We buy HMS Invincible'. The Australian, 26 February 1982.

PINWELL, William. 'Invincible sets cat among service hawks'. The Australian, 16 Febraury 1982.

PINWELL, William. 'Invincible divides backbench'. The Australian, 17 Febrary 1982.

PINWELL, William. 'Invincible: Secret document gives low priority to $480m carrier'. The Australian, 6 March 1982.

PINWELL, William. 'Invincible rates low in strategic priority'. The Australian, 27-28 March 1982.

PINWELL, William. 'Navy's rare birds face extinction'. The Australian, 9 February 1982.

PINWELL, William. 'Red herrings in the Invincible debate'. The Australian, 12 January 1982.

PINWELL, William. 'The case against the Invincible'. The Australian, 5 January 1982.

PINWILL, William. 'A rematch over the Invincible'. The Australian 8 June 1982.

PINWILL, William. 'Back to square one in search for a flagship'. The Australian. 15 July 1982.

PINWILL, William. 'Decision on a carrier within six months'. The Australian, 16 July 1982.

PINWILL, William. 'Invincible press reveals shortcomings'. The Australian, 3 May 1982.

PINWILL, William, 'Confusion reigns over Invincible'. The Australian, 29 July 1982.

PRICE, John. 'Naval budget plans "add to Dockyard problems"'. The Newcastle Herald, 1.7.82.

PRIME MINISTER. Electorate Talk. Sunday Febraury 28, 1982.

RICHARDS, I.H. Captain, RAN. 'An Aircraft Carrier for the Royal Australian Navy', Defence Force Journal: 46-52.

ROBERTSON, Rosanne. 'Garden Island to get a new look as well as a new carrier'. Sydney Morning Herald, 24 March 1982.

ROBERTSON Peter. 'Defence chief's parting salvo at cuts in budget'. Financial Review, 21 April 1982.

ROBERTSON, Alan. Commodore (Rtd). 'Exposing the holes in our sea defences'. The Weekend Australian, 15/16 May 1982.

ROBERTSON, Alan. Commodore, (Rtd). 'Navy v RAAF in defence strategy'. The Australian, 7 June 1982.

ROBERTSON, Alan Commodore, RAN (Rtd.). 'We shouldn't discard naval aviation'. The Australian 11 January 1982.

ROBERTSON, Alan, Commodore, RAN (Rtd). 'Naval air power'. The Australian Financial Review, April 1982.

ROBERTSON, Alan, Commodore, RAN (Rtd). 'Naval Aviation and its Opponents'. Pacific Defence Reporter, July 1982, pp. 2-3.

ROBINSON, Peter. 'At a cost of $600 million Why The Navy Wants a Carrier'. The Australian Financial Review, 1 July 1981.

ROBINSON, Peter. 'Candid comment'. The Sun Herald, 28 February 1982.

ROBINSON, Peter. 'Carrier decision wallows in obfuscation, shallow thinking'. The Australian Financial Review, 22 February 1982.

ROBINSON, Peter. 'Decision on Carrier in Balance. Time running out on Invincible offer'. The Autralian Financial Review, 4 January 1982.

ROBINSON, Peter. 'Invincible an inevitable choice as new Australian carrier'. The Australian Financial Review, 27 November 1981.

ROBINSON, Peter. 'Navy carrier choice crucial. A painstaking examination must precede Invincible'. The Australian Financial Review, 30 November 1981.

ROBINSON, Peter. 'RAN considers British carrier purchase'. The Australian Financial Review, 21 September 1981.

ROBINSON, Peter. 'The hidden costs of buying Invincible'. The Australian Financial Review, 1 March 1982.

SANTAMARIA, B.A. 'Continental defence an abdication'. The Australian 11 December 1981.

SANTAMARIA, B.A. 'Spare some thought for strategy'. The Australian 5 March 1982.

SCHNEIDER, Russell. 'Navy says new carrier needed to guard trade'. The Australian 3 May 1980.

SIRIUS, 'Stamping noisily and clutching at twigs'. Pacific Defence Reporter, February 1982.

SKELTON, Russell. 'British carrier favoured by Navy'. The Age 6 November 1981.

SKELTON, Russell. 'Defence backs British carrier'. Age, 30 November 1981.

SKELTON, Russell. 'Fraser supports a navy on carrier'. The Age. 14 December 1981.

SKELTON, Russell. 'The Invincible is all too vulnerable'. The Age, 14 December 1981.

SKELTON, Russell. 'Top Liberal defends plan to buy carrier'. The Age, 14 December 1981.

SKINNER, C.J. 'Exploding some bubbles'. Pacific Defence Reporter, December 1981/January 1982.

SMARK, Peter. 'Carrier offer may be withdrawn'. The Age, 10 December 1981.

SMARK, Peter. 'HMS Invincible'. Sydney Morning Herald, 1 March 1982.

SNOW Deborah, 'The Battle over the Multi-billion Carrier'. National Times, 5 April 1981.

SNOW, Deborah. 'Defence group juggles options. Carrier - Orions decision emerges'. Financial Review, 15 February 1982.

SNOW, Deborah. 'Fraser offers to cancel the Invincible purchase'. Financial Review, 3 June 1982.

SNOW, Deborah. 'Govt faces Senate probe on Invincible'. Financial Review, 30 March 1982.

SNOW, Deborah. 'Invincible's southern voyage becalmed by down-payment'. Financial Review, 19 January 1982.

SNOW, Deborah. 'Italy's late bid to sell Aust aircraft carrier'. Financial Review. 21 July 1982.

SNOW, Deborah. 'UK-US contest looming over carrier for RAN'. Financial Review. 15 July 1982.

SPIERS, John. 'Harrier outflies early hopes'. The Australian, 26 May 1982.

STACKHOUSE John. 'Behind the Navy's Invincible Power Game'. The Bulletin, March 16, 1982: 27-28: 63-72.

STACKHOUSE John. 'Pro-carrier forces face rough seas'. The Bulletin, December 15, 1981.

STACKHOUSE, John, 'Navy sticks to safety in numbers'. The Bulletin, 14 July 1981.

STACKHOUSE, John. 'Why Australia should not buy the Invincible'. The Bulletin, 6 July 1982.

STRASSER, Steven. 'Are Big Warships Doomed'. Newsweek, 17 May 1982.

SUMMERS, Anne 'Govt intensified push for Invincible' Financial Review, 24 June 1982.

SUMMERS, Anne. 'Carrier decision deferred'. The Australian Financial Review, December 1981.

SUN-PICTORIAL, Melbourne. 'Carrier defence"better"', 29 July 1980.

SWAIN, Bruce LCDR. 'Right Idea, Wrong Ship, Wrong Time'. The Navy, July 1982.

SYDNEY MORNING HERALD. 'The Navy's victory'. 12 May 1980.

SYNNOT, A.M., Admiral (Chief of Defence Forces Staff, Canberra). 'Invincible: a substantial deterrent'. The Australian, 5 March 1982.

TERRY, Peter. 'Carrier critics "ill-informed"'. The Australia, 10 March 1982.

TURNER, Stansfield, Admiral, US Navy, retired. 'The Sheffield Shock' Newsweek, 17 May 1982.

WALTERS, Patrick (From Margaret Jones in London) 'Dilemma of having a carrier' The Sydney Morning Herald, 24 June 1982.

WALTERS, Patrick. 'Navy's new carrier not so inevitable'. The Sydney Morning Herald, 10 February, 1982.

WALTERS, Patrick. 'PM swings purchase of carrier'. The Sydney Morning Herald, 26 February 1982.

WALTERS, Patrick. 'Sinclair urges reappraisal of carrier plans'. Sydney Morning Herald, 16 July 1982.

WARWICK, Graham. 'V/Stol shapes tomorrow's ships'. Flight International, 12 January 1980: 84.

WEMYSS, Rear Admiral M. LaT. CB. 'Submarines and Anti-submarine Operations for the Uninitiated'. RUSI Journal (Royal United Services Institute for Defence Studies), V. 126(3) Sept 1981:22-27.

THE WEST AUSTRALIAN. 25 January, 1982. 'Navy's needs'.

THE WEST AUSTRALIAN. 9 March 1982. 'Navy denies it'.

WETTERN, Desmond. 'A portrait of the ship'. Pacific Defence Reporter, November 1981: 25-26.

WILLIS, Vice-Admiral Sir James. 'Why we bought Invincible', Pacific Defence Reporter, April 1982:61, 62, 64, 73.

WILSON, Bruce. 'Carrier could cost $1 bil.' The Herald, 18 June 1981.