the same type as in our current inventory. But in many cases, appropriate equipment could be acquired within the warning time available for Australian contingencies. 

Significantly higher rates of effort needed for higher-level contingencies might be achievable in a fairly short period if the Government adopted extraordinary emergency measures. But some categories of manpower skills might still be difficult to expand. Technical manpower is likely to be a significant bottle-neck in some areas, and solutions to this problem should be planned.

Greater peacetime use of the Reserve Forces is one means of easing the lead time for the acquisition of military and technical skills in any future expansion. Apart from the formal Reserves there is a large pool of recently-retired personnel (some 7600 servicemen leave each year), many of whom could return to active duty in a defence emergency. Reserve Forces are discussed further in Part 8.

As with the wartime administration, the requirement is for general rather than detailed planning for force expansion that would mobilise the wider resources of the nation for defence purposes. We need a conceptual framework rather than detailed planning of the kind contained in the War Book. This is consistent with the judgement that contingencies requiring large-scale expansion of military forces will have substantial peacetime build-up.

Although some work is in hand, our present expansion planning is piecemeal, and machinery. This matter deserves more attention than it has received in recent years. In 1975 the Defence Force Development Committee established a senior-level standing group to supervise work in this area. It never met, and no alternative arrangements have been established, although planning deficiencies in this area have been criticised by both the Utz Committee in 1982 and the Report of the Joint Committee on Foreign Affairs and Defence in 1984.

War reserves and stocks

An important force structure consideration is the need to establish criteria for stockholding levels, covering war reserves and any need for stockpiling critical materials. Stocks of defence equipment, spares, ammunition and consumables provide the immediate means of replenishment in military operations and in peacetime activities. They are important to our surge capacity.

In principle, war reserves should cover likely usage requirements in the period before resupply—whether imported or from local sources—can be obtained. Strategic guidance observes that stockholding policy should be related carefully to those high-usage items likely to be needed in the more credible contingencies where the risk of restriction of supply for political reasons is greatest.

Holding war reserve stocks over and above peacetime needs is a costly process which, in our strategic circumstances, needs to be approached with considerable discrimination. (Current war reserve stocks of ammunition alone are valued at in excess of $500 million.)

The importance of stocks to the capability of the Defence Force, and the necessity for such requirements to compete for available defence resources, directs the need for years in specific areas such as fuels and lubricants and stocks for the Army's Operational Deployment Force (ODF). But efforts since as long ago as 1973 to develop an agreed stockholding policy have failed, in spite of the concern expressed in Defence Force Capabilities 1981 that this was an urgent need, and even when limited to the fairly straightforward area of ammunition. No policy recommendations on war reserves have been put to Ministers since 'interim' proposals were considered by the Government in 1963.

This institutional stalemate reflects the differences between the policies of the individual Services, and a lack of agreement over the appropriate contingencies against which stocks should be held. There is also no agreement on the formulae to be applied across the range of consumable items. Piecemeal policies reflecting differing single-Service philosophies seem to have been the result.

It is by no means obvious that our current stocks would be inadequate for the more credible kinds of contingencies. Current ammunition stocks, for example, include large quantities of the more basic kinds of ammunition. Stocks for the more advanced missile and torpedo systems acquired in recent years are more limited, but these would not be in high demand in low-level situations. They are also very expensive (Harpoon costs $1 million per missile) and require frequent maintenance.

A more precise and comprehensive approach to the planning of war reserves is required, based upon concepts of credible lower-level conflict and the unique characteristics of the Australian environment. It is unsatisfactory for a situation to arise where Departmental advice provided to this Review acknowledges that 'evidently due to deficiencies in our data base we are not well able to quantify the Defence Force's sustainability'.

An appropriate starting-point might be to determine the adequacy or otherwise of existing stocks to sustain military operations for periods of three months and six months in circumstances of intermittent low-level conflicts in the north of the continent. Given the nature of such conflict, rates of effort and demands for key supply items may be quite different than for higher-level contingencies. We might begin by determining the requirements for ammunition, spares and consumables of maritime-patrol aircraft, patrol boats, regional surveillance forces and the Special Air Service Regiment. The destroyer force, ODF, strategic transport, and utility helicopters might then be included and the increased readiness training of assigned as the fighter force and strike forces assessed. Remoteness and dispersion in the operating environments would be very demanding on fuels, lubricants and spare parts. Yet the general avoidance of military confrontation by the aggressor would probably limit the requirements for ammunition, particularly of the more advanced missiles.

One option should be to establish realistic rates of effort and stock usage, over and above current activity levels, as a basis for decisions about contingency stock requirements. We must be selective in our approach to providing complete weapon outfits for ships and aircraft. This is particularly true where we acquire advanced platforms from overseas with a design capacity for missiles based upon concepts of high-intensity northern-hemisphere conflict. The limited number of military targets in credible contingencies must be an important factor in calculating how many missiles we should hold.

Stockholding policy can be developed forward from this more modest basis and priorities established for remedying deficiencies. Once the methodology is established regular review of contingency stock requirements should be relatively straightforward, and there is scope for the concepts to be tested in exercises.

For higher levels of threat, realistic guidelines should be established having due regard to the effect of warning time on stockpiling preparations and the prospect of unanticipated support from overseas. There is a 1980 Memorandum of Understanding on logistic support in which the United States acknowledges the importance to Australia of uninterrupted supply. Other less extensive undertakings exist with some European countries. It is reasonable to expect the United States to provide military supplies in the event of threat to our security in regional contingencies. But our planning needs to acknowledge the possibility that this may not always be in the quantities and time-scales we would seek.

Creating large war reserves (as distinct from training and operational stocks) against remote and improbable contingencies is not a sound policy. Australia's strategic
situation does not justify large-scale stockpiling or a substantial diversion of resources to expensive spares and missiles that are needed only for higher levels of conflict. Precautionary stocks are in order, but not in numbers required to meet sustained high-level conflict.

CIVIL DEFENCE

As a consequence of discussions at a 1966 Ministerial meeting, civil defence is primarily a State government responsibility, with support and policy guidance provided by the Commonwealth. The latter is provided through the Natural Disasters Organisation, which is a part of the Defence Department.

Low-level conflict
The civil defence requirements of low-level contingencies are limited. In such circumstances an objective of government policy would be to maintain civilian day-to-day life as unaltered as possible. In so far as civilians were affected, the kinds of relief measures would be much the same as those needed for handling accidents and natural disasters.

The capacities of State emergency, hospital and ambulance services would provide the basis for this civil defence effort. However, some degree of more specialised training for key personnel is appropriate to ensure that they are aware of the special risks of military situations, and so that there is a basis for effective co-operation between civil and military authorities. Such training and planning is particularly important for personnel with responsibility for emergency and medical services in the north of the continent.

More substantial conflict
Higher levels of conflict would be more demanding of civil defence capacities. Nevertheless the overlap with the capacities required for natural disasters would be considerable, and the lead times associated with higher-level conflict would allow the further development of specialised civil defence skills. Planning for the evacuation of non-essential personnel in the north may be an important means of reducing the risk to the civilian population. Australia's capacity in this respect was amply demonstrated in the aftermath of the destruction of Darwin by Cyclone Tracy. Only in the event of serious deterioration in our strategic circumstances should consideration be given to involving the civil community in home-guard-type duties.

Nuclear war
Nuclear war is a very remote possibility, and Australia would not be a major theatre in the event of nuclear conflict. The level of risk is not sufficient to justify substantial investment in protective measures for the Australian population. However, an awareness of the requirements for protection against nuclear effects should continue to be maintained in State Emergency Service organisations through training courses conducted by the Natural Disasters Organisation.

Policy implications
The requirements outlined above are broadly in accordance with existing civil defence doctrine developed by the Commonwealth and promulgated to State governments. There is, however, one point regarding the risks of nuclear attack which needs consideration. In recent years Government has acknowledged—more explicitly than in the past—that in the event of superpower conflict there would be a specific risk of attack on the joint facilities at North West Cape, Nurrungar and Pine Gap. This raises the issue of whether protective measures for nearby population centres are necessary. While accepting the general unlikelihood of nuclear conflict, this Review judges that a comprehensive survey of the towns of Exmouth, Woomera and Alice Springs should be undertaken with a view to developing contingency civil defence plans for these centres.

The Commonwealth should take the initiative in this planning, although relevant State authorities should be fully involved. While the principle that civil defence should be a State responsibility is generally sound, that principle was accepted before the joint facilities became operational. The Commonwealth is responsible for their establishment in Australia, and it has direct access to the intelligence expertise necessary for judgements about measures such as evacuation. A Commonwealth lead in this matter would be an appropriate response to the special nature of the risks associated with the presence of the joint facilities, and would provide a training model for State authorities should future circumstances require a greater civil defence effort.

CONCLUSION

No urgent or radical changes are required in ADF command and control arrangements, but a framework of functional commands should be developed so that peacetime arrangements more closely reflect the Joint Service requirements of credible contingencies. The Review recommends a detailed examination of the need for a regional joint force command in northern Australia, which might be established on an experimental basis in the first instance. The Review favours Army having control of an integral utility helicopter force.

In the longer term we should perhaps recognise that the trend is for the joint command structure under the CDF to gain authority at the expense of the single Services. This is not an argument for the eventual abolition of the single Services, but rather to recognise that over time the single Services are becoming less concerned with the conduct of combat operations. Their functions will be increasingly limited to the training and management of personnel, and the acquisition and maintenance of the equipment and stores to be provided as combat assets to functional commanders.

Planning for wartime administration and expansion of our defence effort has been neglected for many years and needs to be taken forward, but on a restrained basis related to credible levels of conflict. Similar considerations apply to our policy on war.
reserves and stockholding, where there has been no agreement since as long ago as 1973. We need to ensure that our forces could be properly sustained in credible contingencies arising in limited time-scales. Owing to a lack of data, however, the ADF’s sustainability in combat cannot be easily assessed. The Review recommends that a start might be made by determining the adequacy of existing stocks to sustain military operations for periods of three months and six months in circumstances of intermittent low-level conflict in the north of the continent. There is scope for these concepts to be assessed in exercises.

Appropriate civil defence skills and capabilities relevant to more credible contingencies are readily available within the civil community. The Defence role can be properly limited to training and planning. There is, however, a need to test our civil defence capacities in the north of Australia in exercises.

Except for the towns located near the joint facilities, civil defence measures against the remote prospect of global nuclear war do not require priority in our planning.

PART 6

LOGISTIC SUPPORT AND INDUSTRY FOR DEFENCE

It is perhaps inevitable that reviews of defence policy tend to concentrate on combat capabilities. Yet, the support requirements of our defence forces are of central importance. In the past we were able to ignore large areas of our logistic requirements because we expected to draw on the resources of allies in theatres distant from Australia. Now, however, an essential aspect of self-reliance is our capability to support independently protracted deployments in our own defence.

While considerable progress has been made in this regard, we are still in the process of identifying our logistic support and defence industry priorities. The difficulties of deriving force structure requirements from the generalised priorities in strategic guidance are compounded when support issues are considered. And yet decisions concerning the provision of infrastructure, logistic and industry support have direct and major significance for military operations, affecting the manner in which they could be conducted and even the strategy practicable at the time. The aim of this Part of the Review is to provide a clearer national focus for those organisations whose assistance the Australian Defence Force (ADF) needs in order to be an effective fighting force.

SUPPORT REQUIREMENTS

The support requirements of the ADF are very complex and demanding, both of manpower and financial resources. At the lowest level, they start with the individual in a combat area who requires clothing, rations, individual weapons and ammunition, and medical facilities. At higher levels, they include transport and the repair and maintenance of equipment. More remote from combat, but no less important, are technical and scientific support.

Excluding manpower costs, support activities account for over one-quarter of defence outlays in any given year. Defence manages inventories worth several billion dollars, and employs more than 30000 military and civilian personnel in support functions. There are over 1.6 million line items stocked in defence warehouses and stores, and about 15 million transactions occur annually in supply computer systems alone.

While this large and costly system supports the ADF in peacetime, its justification must rest in its potential to support military operations. There are less costly ways of providing peacetime support with lower inventories, more centralised services and minimal redundancies. Such characteristics would, however, severely limit sustained deployment and combat effectiveness in some circumstances.

Our primary objective then is to develop a logistic system to support the ADF which can respond to the needs of deployed forces in credible contingencies as well as in peacetime. To respond to contingent needs, it should be flexible, survivable and
sustainable. Present and future resource limitations also demand maximum efficiency, elimination of unnecessary duplication, and common use of logistic systems, facilities, inventories and services whenever this is practicable.

Facilities policy

Facilities are required to support the force-in-being in peacetime and in contingent situations that could arise at relatively short notice. The location and planning of operational and support facilities to meet these needs should, however, also have regard for strategic requirements which could arise in the longer term.

Strategic considerations suggest that some operational bases should be located in forward areas in the north and west of the continent. However, the abiding constraints of geography, population and industrial development patterns support the continuing need to locate major bases and support facilities in the south-east. This separation confers a defensive advantage, but it requires adequate transport and logistic supply lines in between. There is no justification for dispersing our major support bases or imperatives in the north-west which can provide assured access, fuel, and a limited repair capacity for patrol boats and other naval ships operating off the north-west of the continent.

In recent years there has been significant development of defence facilities relevant to operations in the north and west. These developments, together with proposals in this Review, have wide ramifications for the present disposition of military establishments in Australia. As social factors, such as urban growth and environmental considerations, also appear to be influencing the disposition of defence establishments to an increasing extent, a review of the present location of establishments in Australia and possible changes is recommended. The last comprehensive overview was in 1973.

No specific facilities that are required solely for expansion to meet higher-level contingencies need to be provided now. Construction resources in the civil community are extensive. We could assume that, in a period of deteriorating strategic circumstances, construction lead times would be relatively short compared with the times needed to train personnel or acquire equipment for installation. Expansion facilities could be more rudimentary than those usually available to the peacetime forces.

In peacetime, lead times for the provision of defence facilities are lengthy because of procedural steps required by Government. There is a need to consider whether more streamlined procedures should be planned for use in a national emergency.

Northern facilities

Developments in the north, including mining and gas exploration, have increased its potential vulnerability, but have also provided a more extensive civil infrastructure on which Defence might draw and build. The port facilities at Dampier, the heavy engineering repair and maintenance facilities at mining towns, such as Mount Newman, and the availability of services such as telephones and retail distribution, are examples of facilities that could be of use in emergencies.

There is scope for a greater ADF presence in the north. While there are modest naval facilities at Cairns and Darwin, there are none between Darwin and Cookburn Sound in Western Australia. This deficiency requires attention, particularly as the North-West Shelf area becomes more important economically. What is needed is a facility in the north-west which can provide assured access, fuel, and a limited repair capacity for patrol boats and other naval ships operating off the north-west of the continent.

The Army's only substantial forward base in the north is at Townsville, where elements of the Operational Deployment Force are based. This formation, which is air mobile and designed to be able to move to any part of Australia, is nevertheless conveniently located only with regard to the Cape York area. As indicated in Part 4, consideration needs to be given to the possibility of another Regular Army unit being permanently based in the north, probably in the Darwin/Tindal area. This would ensure an understanding of the peculiar conditions of the north and the long-term effects on personnel and equipment of climate and other factors. It could also be a central logistic point for ground force operations in the north-west.

Air operations in the north would be conducted from a number of locations varying from fully-serviced airfields (such as Tindal), and bare bases (such as Learmonth or Derby) to temporary strips for tactical transport operations. Cape York Peninsula is a gap in our chain of northern air bases, and a bare base there would be most useful to the support of air operations to the north-east of the continent.

The planning of operational facilities in the north should give attention to questions of vulnerability, given the sparseness of defence installations there and the tendency for newly constructed facilities to become the nucleus for further civilian development. Our planning should ensure that logistic resources would be available to allow increased rates of effort from these forward operating bases. Civil resources in the area of operations could be used, where available, for the supply of some commercial goods and services. But specialised maintenance facilities and demands beyond the civil capacity in remote areas will largely need to be provided from Service resources.

Fleet support

A need exists for logistic support for ships at sea. Such capabilities can increase time on station and avoid excessive transit times to northern operational areas, or in our maritime approaches. A minimum capability is an underway-replenishment ship to cover peacetime needs and provide a basic capability in time of threat. This would allow at-sea support of several ships by the provision of fuel, ammunition and other stores. This ship could be augmented in a developing situation through the use of appropriate civil tanker vessels. No requirement is seen at present to provide full afloat support operations simultaneously in both eastern and western ocean areas. But as our naval presence in the west of the continent builds up, the purchase of a low-cost tanker to support two-ocean deployments should be considered.

There is also a case for a tender to allow forward repairs and maintenance for deployed surface ships, and perhaps submarines. The long-term priority to be given to this capability depends in part on the further development of naval infrastructure in the north and north-west, which would provide alternative repair and maintenance capacities. But an afloat capacity can provide a useful element of flexibility and reduce transit time.

Ground force transport

Army needs to be highly mobile. This is achieved primarily by organic surface vehicles (light, medium and heavy trucks and armoured personnel carriers) and by air and sea transport support. From Air Force and Navy, the distances involved in our physical environment, and the likely dispersed nature of operations, indicate that Army will place substantial reliance on air transport support, with heavier items and replenishment stores being moved by road, rail or sea transport. Strategic air transport requirements would be met by aircraft capable of lifting troops and lighter vehicles into airfields in the area of operations, although civil aircraft could be used for transportation of personnel to forward bases (such as Tindal). Within the area of operations, fixed and rotary wing military aircraft needing limited ground support and landing site preparation would be required.

There are advantages in using coastal shipping for moving bulk tonnages. But the requirement for dedicated sea transport or amphibious lift is limited. Furthermore, at escalated levels of threat, when coastal shipping may be threatened, it would be safer
to rely on internal lines of communication, both air and surface. Improvements to the road system are gradually reducing reliance on coastal shipping for military movement and support, except in some particularly remote localities where there are in any case few attractive targets for an attacker. One amphibious heavy lift ship and perhaps a small number of landing craft are a sufficient force for training, responding to any low-level situation requiring amphibious operations, and providing an expansion base. Additional sea transport of a conventional kind (that is, requiring port facilities) would be by civil vessels on charter.

Support for air operations
Air operations in the north present a more predictable logistic support problem. Deployed aircraft will operate from the forward bases existing or being established across northern Australia. Such bases may need to maintain operations for protracted periods. The principal requirements will therefore be appropriate fuel storage capacities and facilities to undertake servicing and repair. Significant tonnages of fuel and stores would be required, calling for good access to surface transport routes.

Civil infrastructure
Much work remains before we have a comprehensive infrastructure capable of supporting a self-reliant defence posture. Although there has been commendable progress in the last decade in developing specific military facilities in the more remote areas of Australia, increased attention must be given to influencing developments in the civil infrastructure that may be relevant.

A more organised system is needed for bringing Defence interests to the notice of State and local authorities. The objective is to bring the location and capabilities of facilities such as roads, railways, ports, airfields, communications, water storage and power sources more clearly into line with the strategic requirements for the defence of Australia. This requirement was noted in the Defence White Paper of November 1976, but little seems to have been done where it matters—in the north and north-west of the continent and in transit areas such as the centre. Proposals need to be brought forward on additional means by which Defence may be represented in the planning processes for long-term civil infrastructure.

There should be no need for defence resources to subsidise these developments, other than in exceptional situations where it is clear that the potential benefits to Defence of limited additional works justifies some investment of defence funds. In most cases, what is required is for Defence to influence infrastructure planning being undertaken for commercial and other interests. In this context, a National Defence Infrastructure Directory has been begun which, on completion, should be readily available to planning and exercise staffs. Its data base should be updated regularly so that the existing or planned civil infrastructure is not duplicated unnecessarily.

Civil support
In the ADF support network there are opportunities for the use of private contractors or the civilian work-force. Some defence facilities, particularly dockyards, already employ large specialist civilian work-forces. The Air Force, however, provides most of its own base logistic support. The scope for introducing private contractors needs to be examined, thus releasing Service manpower for other activities. The ADF acknowledges that there is scope for employment of civilian manpower in aircraft depots and in maintenance squadrons, particularly in some specialised work areas such as micro-miniature electronics repair shops.

3 In the case of the Darwin to Alice Springs railway there is no urgent defence requirement, given the nature of credible contingencies and the warning time of more substantial conflict. The railway would be useful for defence purposes but it should not be subsidised from the Defence Budget.
for other purposes, including the movement of Air Force elements and base support units which would absorb additional aircraft.

Within an area of operations, other military transport aircraft are required to support deployed units, and to redeploy forces. These include fixed-wing aircraft of the Caribou type and rotary-wing aircraft such as Chinooks. Military ground transport assets are also needed ranging from lightweight high-mobility vehicles through to specialist bulk-haulage vehicles. While these forces can contribute in a limited way to the initial transport task, they should be reserved primarily for tasks in theatre. Recommendations concerning these air and ground transport assets are made in Part 7 of this Review.

Logistic support concepts have been developed within the individual Services, and organisational principles set out for logistic support in joint force operations. But these concepts and principles have not been subject to the same extent of testing in exercises as joint force combat operations and command and control. Too often in our exercises it appears that the logistic problem has been side-stepped because of resource constraints and the limitations of the tactical scenario. Current exercises are typically preceded by a considerable effort to accumulate extra support resources to ensure that logistic problems do not constrain operational activities. It would be most useful to conduct a program of sustained exercises in the north, supported from bases in the south, to test and identify weaknesses in the logistic train. This program might be preceded by some computer modelling of selected logistic problems.

The vast distances to be crossed between our main support bases in the south of the continent, and likely operational areas in the north, are a key logistic constraint that requires careful forward planning and practical evaluation in peacetime. In the process of testing further our logistic support requirements, the priority to be given to preparations for responding to various levels of threat requires particular attention. We do not need to create a logistic system that is more appropriate to higher levels of conflict, or give undue emphasis to supporting essentially expansion base elements. Planning to use civil-sector assets can help relieve the logistic burden, but the ADF may be required to operate from austere locations with a minimum of local support.

INDUSTRY FOR DEFENCE

Despite numerous reviews, studies and policy pronouncements, there is still considerable confusion about the issues involved in industry for defence—both inside and outside the Defence community. Part of the confusion stems from a continuing preoccupation with the historical experience of the Second World War when Australia found itself isolated from traditional sources of supply. At that time we followed a policy of all-out national mobilisation with some 40 percent of our national expenditure allocated to war production. By the 1970s, circumstances had changed to the point where the economic costs of conflict requirements would substantially reduce our logistic support needs. The large distances involved, the likely dispersal of forces across a number of areas, and the limited northern infrastructure, will place heavy demands on our logistic capacities. Planning to use civil-sector assets can help relieve the logistic burden, but the ADF may be required to operate from austere locations with a minimum of local support.

5 The term 'industry for defence' is preferred to the misleading concept of 'defence industry'.
capital equipment expenditure could be directed to Australian industry, this would represent a very small increment to our industrial sector.

The problem for defence policy is to identify those industrial capacities that are important for credible levels of defence effort, and to judge which could be expected to be available from normal commercial sources and which require special fostering.

Where Australian industry is broadly competitive with overseas procurement, there is no issue. Industrial capacities that are viable by commercial criteria are able to compete freely for defence orders in accordance with broader policies of preference for Australian industry in government purchasing.6 But in other cases, the issue is the level of premium that is acceptable to secure the involvement of Australian industry.

There is a need for discipline in the pursuit of Australian industry involvement. The ADF uses a wide range of weapons and equipment, much of it in limited numbers and often exploiting advanced technologies. Local production of such items can impose penalties of cost and time, which need to be weighed against the requirement for greater independence on the one hand and the alternatives of stockpiling or seeking greater assurances of overseas supply on the other.

In approaching this problem the key principle is selectivity. We need to be selective in those industrial capacities judged to require support on strategic grounds because the premiums paid require other defence capabilities to be forgone. In effect, this requires us to judge the level of premium against the costs of alternatives such as stockpiling and the risks inherent in dependence on overseas sources. In this process there is no alternative to careful case-by-case examination in reaching particular decisions. But clear guidelines can avoid unrealistic expectations and allow industry to undertake its own planning with a better understanding of government policy.

Current government policy

Defence Policy for Industry was considered by Cabinet in 1984 following extensive Defence Committee discussion. Principles on the Defence Policy for Australian Industry were announced on 3 June 1984. In accordance with my Terms of Reference, those principles form the basis of judgements made in this Review on the ways in which defence industry capacities should be enhanced. The June 1984 policy statement is a rather complex document, but it contains a number of important elements from which priorities can be developed for this Review.

The statement emphasises, inter alia, that defence industry policy cannot be separated from defence policy generally. The role of defence industry is to contribute to national defence capacity. Any contributions from the Defence Vote over and above those principles form the basis of judgements made in this Review on the ways in which defence industry capacities should be enhanced. The June 1984 policy statement is a rather complex document, but it contains a number of important elements from which priorities can be developed for this Review.

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6 In assessing what can be supplied competitively from within Australia, it must be recognised that international production and trade in military materiel is characterised by very high non-tariff barriers, government-subsidised domestic sales and exports, dumping, international collaborative ventures, and counter-trade. Most arms sales have sensitive political and diplomatic overtones. Thus, the price at which we might buy a defence item will depend on a range of circumstances at the time and will have little if any relation to the price we would get in export markets should we establish a local capability of our own.

Defence industry and levels of conflict

Isolation from virtually all sources of overseas supply is credible only in circumstances of nuclear conflict or prolonged conventional war between the Superpowers. Neither possibility provides a realistic basis for the development of our defence capabilities. As a practical matter, the only credible contingency is a limited war involving the United States ally and its nuclear umbrella. This war could be quite high. This judgement has led to the emphasis on greater self-reliance in combat elements and their direct support. Resupply and logistic support from overseas is a different matter. In the range of low-level conflicts that are possible there is an considerable likelihood that overseas resupply will continue to be possible. Action to deny Australia overseas sources of important defence supplies is well beyond the capacity of regional states.

Resupply would be in doubt only in circumstances where overseas suppliers were attempting to put pressure on both combatants, or where other priorities in supplying countries meant that deliveries would not be available in either the time-scales or the quantities we required.

The continued viability of our defence relationship with the United States is an important element in these judgements. The United States is the major source of support from overseas. Action to deny Australia overseas sources of important defence supplies is well beyond the capacity of regional states.

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These broad policy approaches are endorsed by this Review. They are consistent with the strategic priorities established in the preceding Parts.

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stances, overseas acquisitions would be the main source for additional major platforms. In any substantial conflict involves rather speculative judgements. Contingencies requiring substantial expansion are improbable. Emphasis should therefore be on supporting and obtaining high utilisation from the equipment available at the time. The establishment and maintenance of large-scale production facilities appropriate only to a major expansion of the ADF takes a low priority because of the absence of an identified requirement, their high cost, and the lack of a continuing peacetime workload to maintain skills once a capability is established.

In general terms, the industrial capacity to support a defence effort in higher-level contingencies will be based on the general level of industrial capacity available in the Australian economy at the time. This is largely beyond influence by defence policy or investment. Moreover, the time-scales associated with the possible emergence of a more substantial threat would allow development of some additional industrial capacity and establishment of some new capacities specifically designed to support an increased defence effort.

Nevertheless, some specialist industrial capacities would be important to an expanded defence effort and may be lost without defence investment in maintaining a local capacity. Products with applications only in defence, such as military high explosives and ammunition and specialised areas of aerospace, communications and electronics, are areas where selective investment in technological capacity for the longer term may be justified. Also relevant are the technological and engineering skills which are maintained in the laboratories operated by the Defence Science and Technology Organisation.

Too much of the debate about industry for defence is concerned with the desirability of designing and producing platforms and weapons in Australia. From a consideration of strategic factors there is justification in paying a substantial premium for indigenous design and production only in the few cases where there is a unique Australian requirement, or where local participation contributes to an important overhaul and refurbishment capacity. Leaving aside financial considerations, the lead times for indigenous production of most major equipment would limit the expansion of our major defence assets from local sources in a deteriorating situation. In such circumstances, overseas acquisitions would be the main source for additional major platforms and weapons.

Industry priorities

In the public sector, the dockyards, the eight munitions factories, and the clothing and aircraft factories continue to do much the same kinds of defence work as during the Second World War, although the particular products and technologies have changed somewhat over the last 40 years. The June 1984 Government Statement acknowledged that ‘despite significant past expenditure the capabilities and capacities of the Government’s defence factories and dockyards . . . are ill-matched to our strategic needs and in need of reform’.

This situation does not reflect any lack of studies of the public-sector defence industries. The most recent and comprehensive review was produced in 1981 by Mr Eltringham, then Special Adviser Defence Production in the Department of Industry and Commerce. It is a thorough coverage of the subject with some substantial recommendations for the reorganisation and rationalisation of the defence factories.

Mr Eltringham recommended that some essential defence production in the munitions area needed to be retained in the public sector, but consolidated into a small number of factories with investment in new technologies and product processes. Other work would be attractive to private industry which would maintain the capabilities as an adjunct to their commercial capabilities at less cost. While some limited progress has been made in rationalising government production there is still much to be done.

Central to this exercise is the need to understand more accurately the costs of government production. The broad figures indicate a substantial subsidy of over 100 per cent on sales. This amounts to an annual subsidy of some $20 000 per person percent on sales. But these figures take no account of the effective subsidies involved in public-sector exemptions, that, from land rates, or the lack of provision for depreciation on buildings and equipment. Nor is it possible to ascertain from current accounting methods the effective premium involved in particular products or production processes. That consequence is that there is no real basis on which judgements can be made as to whether or not the subsidy paid for production capacity in the public sector is justified in relation to the same work in the private sector, let alone by the strategic or operational benefits in relation to overseas sourcing and stocks. What is needed is the introduction of commercial cost accounting in the public sector. A start has been made at the Williamstown Naval Dockyard and on some projects including aircraft, small arms, artillery and some ammunition. Extension across the range of factories and dockyards is being pilot tested. Full-scale implementation should proceed as quickly as possible. We would then have a firm basis on which to make case-by-case decisions on the acceptability of the premium that might be involved in maintaining particular elements of public-sector production, or options that might maintain production potential at lower cost.

Those areas of Australian industry offering the most scope for further development and a contribution to self-reliance are generally in the private sector. The more selective approach that has been developed in recent years has facilitated greater private sector involvement in major defence purchases. There are, however, some arrangements with the private sector which involve a high degree of Defence intervention and subsidy. The Government has directed that Defence’s method of doing business be revised as quickly as possible to eliminate these distortions to normal commercial decision-making. Considerable progress has been made in the aircraft industry. Shipbuilding and repair is the other major sector in which such arrangements apply and is the next priority for reform. Concurrently, it would be appropriate to review the methods of providing equipment and other support to industry (for example, the electronics sector) to reduce the unintended constraints on commercial activities.

Electronics is now an important area with considerable potential for local involvement. Advanced electronics, formerly confined to military applications, are now in widespread use in industry and in consumer products. There are at present significant, 7

7 Australia is favourably placed for such an effort by its general self-sufficiency in important raw materials. Studies by the Defence Industry Committee have shown that we either produce now, or could do so if required, the materials and basic products necessary for defence production. Those few areas of indigenous production such as small quantities of special chemicals and some special alloys could be readily stockpiled if strategic circumstances required this. We are less dependent on overseas sources than any comparable country, and have no need for large strategic stockpiles of raw materials.

8 As indicated earlier, this issue does not arise if Australian industry is broadly competitive with overseas procurement.

9 It is worth noting, for example, that electronic systems account for 60 percent of the fly-away cost of the P3 Orion aircraft, 40 percent of the cost of the F/A-18 and 25 percent of the submarine.
although not extensive, Australian capabilities in the design and manufacture of advanced electronic systems. The Australian electronics industry has also established a substantial capacity to maintain defence electronic equipment throughout its service life. This is not only within the communications area but in software support for some computer-based combat systems.

This Review has identified repair, overhaul and maintenance capacities as a priority area for industry participation, and we have earlier referred to the desirability of increasing private-industry involvement in Service repair and maintenance activities. This will require some adjustment of working practices in both industry and the Services. Contractor access to military bases and use of ADF equipment will be necessary, and civilian workers will in some cases find themselves working alongside military personnel. Additionally, management and unions will need to accept the premise of industry participation in industry so that military personnel can maintain the range of skills necessary for maintenance of equipment in forward operational areas.

Policy directions

The June 1984 Government Statement refers to a need to translate longer-term strategic defence planning into precise industry objectives... to produce an authoritative and detailed paper on longer term defence requirements and on measures to encourage the maximum participation by Australian industry. Interpretation of this requirement must recognise the changing nature of defence equipment, technology and relative costs, the cost of installing a reserve production capacity for contingencies, and the likelihood of obsolescence of unused industrial facilities should contingencies not arise. The paper has not yet been produced although relevant work is being done in the ongoing program of industry studies by the Defence Industry Committee and by a review of its capabilities by the Office of Defence Production.

As a guide to that work the following principles are suggested on the basis of the strategic concepts developed in this Review:

- Every effort should be made to limit our dependence on overseas sources of repair and maintenance support. A critical area is electronics, particularly the software needed to support modern weapons systems. Australian private industry is increasingly developing high-grade and competitive expertise in this advanced-technology area.
- High-usage spares and ammunition items should be produced within Australia where the cost penalty is not excessively above alternatives such as stockpiling. For security reasons—and because of the need to subsidise margins of reserve capacity over current production—ammunition manufacture should continue to be concentrated in the government factories, but with private industry subcontracting to minimise costs and to exercise the relationships that would be essential for expansion. Funding of reserve capacities for contingencies should be done separately to ensure a proper basis for cost comparison. In some cases it will be sufficient to retain a production potential with reduced lead time rather than actual manufacturing capacity. This can be in the form of stored tooling or design information.
- Our requirements for design capacities are limited to those areas where we have unique Australian needs, but a skill base in the design area can be useful for the selection and adaptation of the most suitable overseas equipment. Much of our design skill base will, for this reason, need to be maintained within the Defence Science and Technology Organisation and Defence engineering staffs. But where unique Australian requirements exist, for example mine countermeasures forces, 10 there are overseas precedents for this, and at least one in Australia— at the Rapier facility in South Australia.
- Over the life cycle of an average military capability, some 70 percent of total cost will be attributable to operation and maintenance support.

CONCLUSION

To support our forces in operations, we need forward bases. While there has been significant base development in recent years, we need now to proceed with a bare-base airfield on Cape York Peninsula, a naval facility on the north-west coast of Western Australia, and the basing of a Regular Army unit in the Darwin/Tindal area. Because our forces would also draw on civil assets, it is important that defence interests have an influence, where appropriate, on civil infrastructure developments, and for Defence to have a comprehensive awareness of the potential for civil support through the maintenance of a National Defence Infrastructure Directory.

Logistic aspects must be addressed in our contingency planning and weapon-system procurement. 12 Our logistic planning should ensure that we could support deployed forces at increased rates of effort. There is a need to conduct a program of sustained exercises in the north, supported from bases in the south, to test and identify weaknesses in our logistic train. In credible contingencies, we can use both civil and military assets to carry materiel to forward northern bases from major support areas in the south-east, but we need integral ADF logistic capacities within operational areas in the north.

The industrial capacity to maintain, repair, modify and adapt defence equipment to the Australian environment is of fundamental importance for our combat effectiveness in credible contingencies. Every effort should be made to limit our dependence on overseas sources of repair and maintenance support. Civil industry should contribute to the maintenance, adaptation, and through-life support of defence equipment. This
is especially appropriate where a system is designed or manufactured in Australia, and where it has a priority use in credible contingencies.

If the ADF is to become more dependent on the civil sector in these crucial areas, it will need to be reassured about the co-operation of the trade union movement and the dependability of the work-force in the event of a national emergency. This is a matter for government policy and the development of better relations between the ADF and the union movement.

Our priorities for manufacturing should focus on those areas where Australian industry is broadly competitive, where Australian requirements are unique (this will apply mainly to sensors and other electronics), or where manufacturing and assembly provides equipment and skills for through-life support at acceptable cost.

Defence industry, including government owned and operated facilities, should be subject to the same restructuring policies and pressures that apply to Australian industry as a whole. The Government’s defence factories and dockyards are highly subsidised and in urgent need of further rationalisation and the introduction of rigorous commercial cost-accounting practices across the full range of their functions.

Australia’s ability to supply defence equipment at the requisite level of technology, with acceptable lead times, and at an acceptable cost is, and will remain, very limited. Pursuit of any substantial defence independence of overseas sources of supply is not feasible and would be counter to world-wide commercial trends. Nor does it have priority in our strategic circumstances. Australian industry should not plan on a repeat of its experience in the Second World War when a broad range of defence equipment was locally manufactured. Finally, and noting the limited effect that defence expenditure has on our overall economy, defence industry should be used to support defence, and not as a convenient prop for ailing industrial sectors.

PART 7
FORCE STRUCTURE RECOMMENDATIONS

This Part of the Review contains force structure recommendations in the light of priorities established in the preceding Parts. It is not a comprehensive survey of all force elements, nor is it concerned to recommend procurement of particular brands of equipment. These matters are beyond the scope of this Review, requiring detailed scrutiny and judgement by the Government’s Departmental and Service advisers.

The concern here is to identify central force elements, and to recommend changes where these seem required. In this process, we seek to establish not only where capabilities of higher priority should be developed but also where lower-priority activities should be reduced or acquisition deferred. In a few cases it has not proved possible to offer definitive advice because technical and cost considerations remained unresolved or are quite complex. In these cases the principal options are identified and advice provided to guide Government decisions.

Financial and other resource considerations are introduced in this Part of the Review. Our cost estimates are based on Department of Defence figures for the 1985-86 Financial Year (FY) and 1986-91 Five Year Defence Program (FYDP).

Cost estimates are expressed in constant 'Budget 1985-86' terms. The financial planning and programming implications of the recommendations made here are drawn together in Part 9 of the Review.

INTELLIGENCE AND SURVEILLANCE

Intelligence and surveillance capabilities have been given a generally high priority in defence planning over the past decade, and in the current FYDP. This is consistent with the judgements made in Part 3 of this Review. The recommendations made in this section relate primarily to the implications of technological trends and developments, and the possibilities they offer for enhancement of our intelligence and surveillance capacity.

This section is restricted to systems designed primarily for intelligence and surveillance purposes, but it is acknowledged that many platforms and systems can make an intelligence and surveillance contribution.

Defence intelligence capabilities
Defence intelligence assessment and analytical capabilities rest primarily in the Joint Intelligence Organisation (JIO). JIO was most recently reviewed by Mr Justice Hope in his 1984 Royal Commission Report. He found JIO to be ‘a competent and
professional agency", but expressed a few concerns related to organisational and managerial aspects. His recommendations in this regard have been accepted by the Government, and steps are being taken to rectify the problems he identified.1

This Review considers that the level of resources currently available to JIO, just over 300 staff and a budget of about $10 million per annum, for expenditures directly attributable to intelligence functions, provides the basis for effective defence analytical and assessment capabilities through the 1990s.2 Some modest enhancement will be necessary to benefit from and keep up with technological developments. The processes of collection and analysis are becoming increasingly dependent upon advanced technologies. Further investment will be necessary to process and utilise the raw data collected by national agencies and available through allied arrangements.

To exploit more fully available data and the potential of computerised data bases, to allow for periodic upgrading of computer facilities, and to accommodate the gradually increasing operating costs, additional funds in the order of $10 million will be required over the next five years. Provision has been made for this in the Defence Program and priority for this investment is endorsed by this Review.

JIO draws upon a number of sources of raw data, including Foreign Affairs and Defence Attaché reporting. A principal technical source is the Defence Signals Directorate (DSD). Mr Justice Hope found DSD to be 'impressive'. It is the judgement of this Review that DSD represents a most important national defence asset in both peace and war. In time of tension or conflict the capability that is represented by DSD could readily be of critical importance. Continuing investment in new technology will be required to maintain the effectiveness of DSD in its important national defence role.

**Intelligence for defence operations**

In Part 3 this Review drew attention to the need to meet the intelligence requirements of operational commanders. Mr Justice Hope has also drawn attention to the need for planning and policy decisions to give guidance and definition for the 'wartime roles' of the defence intelligence components.

This is primarily an organisational matter, but also a matter of recognising realistically the types and levels of threat facing Australia. There is no foreseeable requirement to plan on a total wartime footing. Incremental development is all that is required. Consistent with its conclusions on command and control arrangements, this Review judges that the co-ordination of intelligence for operations should be concentrated in the Headquarters Australian Defence Force (ADF) and in the Joint Intelligence Organisation (JIO). This Review judges that DSD represents a most important national defence asset in both peace and war. In time of tension or conflict the capability that is represented by DSD could readily be of critical importance. Continuing investment in new technology will be required to maintain the effectiveness of DSD in its important national defence role.

**Electronic warfare**

Australia has traditionally had substantial electronic-warfare (EW) capabilities by regional standards. We should aim to maintain effective capabilities in this important area. Significant Australian EW programs are in hand or programmed for early decision, for example, new electronic support measures (ESM) for guided missile destroyers at a cost of $13 million, and modern ESM equipment for the P3C Orion aircraft at a cost of $84 million.

Experience has indicated that it would be prudent for future procurement planning to ensure that the EW systems we acquire can be adapted to our operational environment, and that we have access to the technology to enable us to do this for ourselves, especially where the capability is directly relevant to credible contingencies. Similarly, we need to give some priority to the development of an appropriate EW library. This Review supports the allocation of sufficient funds for this purpose and makes provision for 10 specialist positions—four for EW tracking, four for EW acquisition and three for EW planning and programming.

**Over-the-horizon radar**

The Australian-developed version of over-the-horizon radar (OTHR), Project Jindalee, gives strong indications that it may meet much of the requirement for broad-area real-time surveillance coverage of the northern approaches, particularly in respect of air incursions, by the 1990s. It holds promise that further development and the improvement in operator skills through experience will see reliable detection of surface vessels, and perhaps a contribution to the tactical control of fighters during intercept.

The measurement and performance definition program (Jindalee Stage B) will be completed by mid-1986, and conversion of the experimental radar to an operational system (Stage C) is planned to begin in July 1986 at an expected cost of $46 million. The conversion will be undertaken while maintaining a surveillance capability in OTHR. It should be completed by 1989.

Advice to this Review has suggested that technical and specialised manpower limitations would largely preclude any significant hastening of an operational OTHR entering service, irrespective of funding considerations. But there would seem to be a scope for some additional development work during the conversion process.

Two areas appear to warrant priority attention. The first is the further development of the surface detection mode which has not been advanced to the same level as the air detection capability. This is essentially a matter of applying additional defence science resources to this element of OTHR. The second matter is the parallel planning for additional radars. These are needed to provide comprehensive coverage, to help overcome some technical limitations and to explore the scope for utilising linked systems for enhanced tracking accuracy. This Review judges that three radars could be justified in locations across the continent. This will be a priority matter, and detailed attention should be given to this development with the objective of a decision in FY 1987-88 to allow two additional radars to enter service by the early 1990s. The design of these radars should allow for later modification to take advantage of technological development as it occurs, but these possibilities should not be used to delay their early introduction into service. A Departmental examination of OTHR capabilities, presently being conducted, will allow the Review's judgements on OTHR to be refined.

1 The generally satisfactory performance of JIO, and these minor deficiencies, were fully discussed in Mr Justice Hope's Royal Commission on Australia's Security and Intelligence Agencies: Report on the Office of National Assessments and the Joint Intelligence Organization (December 1984).

2 This Review notes that much important raw data is provided through allied arrangements. Some of these sources could not be duplicated from our own resources. Were they not available, we would need considerably to increase our intelligence investment, and yet still not match some of the capacities currently available to us.

3 Project Jindalee was developed in response to the air surveillance requirement. The technically more complex surface detection capacity has been a secondary priority.

4 A second radar could cover the north-east approaches to the continent while a third could overlap with the existing system to provide better detection and tracking capabilities.
The indicative project cost per radar would be $105 million with $2 million in annual direct operating costs. Present estimates are that the air surveillance mode would need about 40 Service personnel for routine 8-hour operation and 75 Service personnel for 24-hour operation. Civilian contractors would be extra, and additional Service personnel would be needed for surface mode operation.

Ultimately, perhaps some five radars could be justified to provide more comprehensive coverage of our maritime approaches, and to exploit fully the benefits of using more than one radar within a particular target area. Subject to the results of further Departmental studies, planning provision could therefore usefully be made for an additional two radars at similar cost for introduction by the mid-1990s.

In establishing command and control arrangements for operational radars, it must be recognised that there could be concurrent demands for operation in both the surface and air detection modes. Further, target acquisition and tracking information may be available from sources additional to OTHR. These considerations suggest that OTHR might best be managed on a Joint Service basis, and that there would be a need to integrate OTHR into the ADF command support system.

Long-range maritime-patrol aircraft
The Air Force will be operating a fleet of 20 P3C Orion aircraft from 1986 for at least the next 20 years. The Orion has long range and good endurance. It is equipped with sophisticated surface and sub-surface sensors for anti-submarine-warfare (ASW) and surveillance missions.

The initial detection of modern, quiet submarines is a difficult problem. The Orion aircraft, as a primary operating in conjunction with other assets such as helicopters, surface ships and towed arrays, is a cost-effective ASW platform. It is the preferred force element for ASW operations under most conditions.

The Orion is also equipped to attack surface targets with the Harpoon anti-ship missile, and it can lay mines. These capabilities are an important addition to the specialised maritime strike and interdiction capabilities provided by our submarines and F-111 aircraft, in areas remote from effective enemy air defences.

In Part 3 we identified a possible requirement for about 12 long-range maritime-patrol (LRMP) aircraft to operate from northern bases in credible contingencies. There would be an associated need for maintenance support aircraft, giving a total patrol (LRMP) aircraft to operate from northern bases in credible contingencies.

Towed acoustic arrays
Defence analysis has identified the important contribution that surface-towed acoustic arrays could make to the protection of shipping in focal areas from attack by submarine. They would be of particular value for the protection of our coastal shipping, a great proportion of which operates in southern waters from Fremantle to Sydney, and they could operate in other areas where water conditions and the tactical situation are favourable. They can detect modern submarines and surface ships at long ranges in suitable oceanographic conditions.

In Part 3 has identified the need for at least development and trials of towed array systems in Australian waters, because of their likely contribution to our ability to detect submarines in some nationally important sea areas. Australian defence scientists and developers are to be expected primarily for our new submarines, but which could also be suitable for the surface application, although alternatives are being investigated which could allow earlier trials and introduction into service.

This Review notes that the Defence Program has provision for a decision in FY 1986-87 to evaluate and develop an initial surface-towed array capability, at a cost of $56 million, and for a further decision on acquisition in 1989-90 at a cost of $23 million. The Review supports the priority of this program.

Mapping and charting
In Part 3 of the Review attention was drawn to the need to complete priority mapping and charting tasks in a shorter time-frame than at present seems feasible.

For an improved rate of topographical mapping AUTOMAP III equipment is programmed for decision in FY 1986-87 at a cost of $13 million, with introduction in FY 1987-88. A manpower increase of up to 50 personnel may be required, but there are possible alternatives such as greater use of civil resources under contract. The priority of the AUTOMAP project is endorsed by this Review.

A related issue is the provision of basic survey data. Up to 1982 this was done by Canberra aircraft modified for the photo-survey task. Air Force has for some years proposed the acquisition of specialist aircraft for the photo-survey tasks, and for aerial reconnaissance. The present Defence Program includes provision for a decision in 1986-87 on the acquisition of two commercial aircraft at a cost of $67 million.

For the mapping functions cost-effective ASW aircraft are therefore cost competitive, and should be provided. The acquisition of specialist aircraft can therefore be justified only by the strategic reconnaissance role that specialist aircraft could also have. This Review is inclined to the view that adequate reconnaissance resources are available through our access to allied systems, the F-111 aircraft and the package being developed for the F/A-18.

The Review believes that a more substantial case needs to be developed before the acquisition of specialist photo-survey reconnaissance aircraft could be justified. It considers that this project should be deleted from the Defence Program. The cost of contracting the primary photo-survey task to civil industry is expected to be in the order of $0.7 million per year.

Using the currently available hydrographic survey resources of HMAS Moresby and HMAS Flinders, defence priority surveys are expected to take about 45 years to complete. Additional survey assets—four survey motor launches (SML) (at a cost of $15 million) and a laser airborne depth sounder (LADS) aircraft (at a cost of $26 million) are expected to enter service beginning in FY 1987-88. The Defence Program also has provision for a decision in 1986-87 for an additional coastal survey vessel of the Flinders type (at a cost of $48 million) to enter service in 1990-91. These additional assets would allow defence priority hydrographic surveying to be completed in about 15 years.

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5 Even so, the costs are substantial with 900 personnel required to support 20 aircraft, and direct annual operating costs of $35 million.

6 A Review of Commonwealth Topographic Services is being undertaken by Professor J. E. Richardson. His recommendations on the division of responsibility between the Royal Australian Survey Corps and the Department of Resources and Energy should be available to the Government at the time this Review is being considered. While recognising the need for effective co-ordination with civil authorities, this Review believes that where a mapping effort is undertaken to meet a defence requirement (that is, large-scale maps of the north and north-west) it should be funded and managed by Defence. Australia has a defence need for maps and military mapping skills that is in many ways unique. Unlike countries such as the United States, Great Britain and Canada, we must contemplate seriously the conduct of ground force operations on our own territory.

7 In addition, two landing craft heavy (LCH) are currently being used as interim survey vessels.
The introduction of the LADS aircraft and the four SMLs will need 50 uniformed personnel. The coastal survey vessel would require another 30 uniformed personnel, with perhaps 20 civilian personnel required for the Hydrographer’s office. While recognising that the availability of trained hydrographic staff could be a limiting factor, this Review considers that the charting requirement is of sufficient priority to justify retaining the present timings for these proposals.

STRIKE AND INTERDICTION

Part 3 of the Review established a continuing requirement for strike and interdiction capabilities within our force structure, while acknowledging limitations on their utility in low-level conflict. It was noted that in escalated conflict it would be important for Australia to have a demonstrably superior strike and interdiction capability, particularly for maritime strike. Two force elements have a primary strike function—the F-111 force and the submarine force. Current force elements with secondary strike roles—Orion and F/A-18 aircraft and destroyers—are considered elsewhere.

Strike aircraft

Our 23 F-111 aircraft represent a unique capability in regional terms. They have an unsurpassed capacity for long-range strike at land targets with substantial immunity.

Nevertheless, there are issues concerning the long-term future of the F-111 in our force structure. The F-111 is demanding of fuel, spares and specialised maintenance personnel. Some 1800 personnel are required to support 23 F-111s, and the direct annual operating cost (including manpower costs) of these aircraft is approximately $72 million. Over the last decade operation of this aircraft was justified by its unique capabilities in a period in which the Mirage interceptor offered virtually no strike capability. But the introduction of the multi-role F/A-18 raises the issue of whether the strike potential of the F/A-18 could meet our needs more economically, and provide a better expansion base for the future.

The decision to acquire the F-111 aircraft was made in the 1960s when Australia had rather different strategic priorities and aspirations. If the aircraft were not in our inventory, this Review considers that in current circumstances we would decide that a specialised strike aircraft of the F-111 type was not justified by the extra capability margin it provides. Rather we would seek to maximise the strike potential of multi-role aircraft such as the F/A-18.

The issue of the future of the F-111 force has prominence now because of the need to update the aircraft with modern avionics, weapons and support systems. The combined costs of these proposals in the Defence Program is in the order of $72 million. Over the last decade operation of this aircraft was justified by its unique and high costs in continuing to operate a small number of highly specialised F-111 aircraft. Also, an internally fitted reconnaissance system is being developed for the F-111, and to a comparable standard.

Accordingly, and on the basis of more recent cost estimates, the Review recommends an update package costing up to about $225 million. This would comprise reduced spending on: the Avionics Test Equipment ($60 million); the Simulator update ($14 million); and the Avionics update ($150 million). These figures would be subject to more detailed examination in the course of the review of options for our strike force structure. The proposals presently being undertaken for the Force Structure Committee.

The option of replacing the F-111 by additional F/A-18s has some attractions. Given its expected fitting with the Harpoon anti-ship missile, and if supported by in-flight refuelling, the F/A-18 will have substantial capabilities in the priority maritime-strike role. It has a lesser but still significant capability against land targets, especially if modern stand-off weapons are used. This marginal deficiency needs to be set against the limited requirement seen for particularly land strike, and the inherent disadvantage of the F-111 in terms of lead times for their acquisition, and noting also the reduced priority that the Review sees for strike against land targets.

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additional F/A-18s or similar aircraft would be available should our future strategic circumstances require enhancement of the strike force. But against this are some doubts about the service life of the F/A-18, arising from current structural problems. However, there is an expectation that these will be resolved eventually, as they were for the F-111.

The number of F/A-18 aircraft required in a replacement strike force for the F-111 is the subject of some debate within Defence. Air Force has argued that some 30 to 45 aircraft might be required. Part 3 of this Review identified a requirement for up to two squadrons of strike aircraft oriented towards maritime strike, but also capable of strike against land targets. The Review judges that this requirement could be met by the acquisition of about 25 additional F/A-18 aircraft with some adjustment of the squadron and training arrangements for the currently planned 75 Tactical Fighter Force aircraft. While the individual F/A-18 would be less capable than the F-111 it replaced, at least two squadrons of F/A-18s specialising in the strike role, together with the strike potential of the other 75 F/A-18 aircraft and our 20 Orion maritime aircraft, would prove a substantial margin of strike capability by regional standards.

Financial comparisons would need to set the cost of the F-111 update against the cost of the F/A-18 options. These latter costs would include the cost to acquire the additional F/A-18 aircraft and in-flight refuelling, and perhaps a specialist aerial reconnaissance aircraft for the longer-range reconnaissance now provided by RF-111. But offsets in costs would include the possible resale of the F-111 to the USAF and the longer-term savings in operating and personnel costs by settling on a single multi-role aircraft type.

A detailed examination of the cost implications of F-111 and F/A-18 options is at present being undertaken for the Force Structure Committee. While the unique capabilities of the F-111 over the F/A-18 are not of sufficient strategic priority to justify a substantial financial premium, over 10 years of operating experience with these aircraft has given us a potent strike force which has been adapted for reconnaissance and maritime strike roles. And we have a substantial investment in training and support facilities specifically for the F-111 force.

On the basis of available information, this Review is inclined to support retention of the F-111 fleet with a minimum update program designed to sustain rather than enhance the aircraft in service until around the mid-1990s. Decisions could be made towards the end of this decade on the long-term future of the strike force in the light of experience with the F/A-18, the availability of a specialised strike version, and more informed projections on fatigue and attrition rates for the F-111 which will then be almost 20 years old.

Submarines

Australia operates six Oberon class submarines, which were commissioned into the RAN from 1967 onwards. With updating of their sensors and weapons they have developed into the most formidable sub-surface strike force in our region. The potential of submarines derives from their ability to conduct covert operations at low risk in areas where an adversary may have a degree of sea and air control. They can contribute to covert intelligence collection and surveillance, the transport of special forces, blockade, mining, ASW and strike missions.

The Oberon submarines are expected to be paid off during the 1990s, and the Government is planning to build new submarines in Australia. The first stage of this procurement involves funding two European shipbuilders to develop detailed proposals within guidelines endorsed by the Government. Improvements in new submarine performance, together with improvements expected in boat availability, mean that six of the new type of submarine will be broadly equivalent in overall capability to nine or ten submarines of the Oberon type. The estimated project cost for six new submarines is currently about $2.6 billion, or six percent of the anticipated capital procurement program over the next 15 years.

This Review considers that at this level of sub-surface warfare capability can be justified by the long-term strategic value of a capable submarine force. Nevertheless our minimum submarine requirement is generally met by the current Oberon fleet, and the increased capability of a fleet of six new submarines represents a desirable rather than an essential increment. Should cost pressures require re-examination of the project, this extra margin of capability could be subject to scrutiny on the basis of comparison with higher-priority capability requirements, particularly those relevant to more credible contingencies, for example mine countermeasures forces and ground force mobility.

In May 1985 the Defence Force Development Committee (DFDC) proposed the establishment of a financial ceiling for the submarine project. This Review considers that a ceiling should be established as a matter of some priority. Should there be predictions of a substantial cost escalation in the submarine project due to local construction problems, then options involving some lesser capabilities could be considered.

These could include a reduction in submarine numbers, the fitting of less capable and less costly equipment, the fitting for but not with certain equipments or sensors or a reduction in the extent of Australian industry involvement, particularly in areas involving high cost premiums. With regard to possible reductions in numbers, even in low-level contingencies, Australia might wish to have the option of maintaining submarines on station in more than one operational area—if only to ensure that an opponent, having detected the presence of one of our submarines in one area, could not count on the absence of a submarine threat in another area. Six new submarines of the capability proposed should be able to provide a sustained presence in three separate areas simultaneously, a major improvement over that available from the existing Oberons.

A related issue is the desirable basing arrangements for our submarine fleet. The need for proximity to priority operational areas suggests that the effectiveness of our submarine fleet would be enhanced by basing the fleet at Cockburn Sound in Western Australia, with secondary basing on the east coast to provide a Pacific Ocean presence and for ASW training purposes. Cockburn Sound already has well established submarine base facilities, which, following a Ministerial statement in 1985, will be used for the home porting of some of the Oberons. The introduction of new submarines, together with the move of RAN facilities out of Sydney Harbour, provides a suitable opportunity to make the change to west-coast basing of our submarine fleet. The estimated cost of this move is $112 million.

MARITIME DEFENCE

In Part 3 we observed that in a wide range of credible contingencies there would be an important requirement for maritime defence forces. It was also noted that surface naval forces have particular value because of their flexibility, endurance and sustained military presence, but that the requirement for high-capability destroyers is limited.
The focus of our concern here is the need for surface naval forces and naval helicopters. Requirements for submarines, maritime air defence and strike aircraft, maritime surveillance and reconnaissance aircraft, and afloat support are addressed elsewhere in this Part of the Review.

**Size of the force**

At present our surface naval fleet consists of 12 destroyers (three guided missile destroyers (DDG), four guided missile frigates (FFG) and five destroyer escorts (DE)) and 20 patrol boats (15 Fremantle class and five Attack class). 12 Two more frigates are being built at Williamstown Naval Dockyard to replace two of the destroyer beginning in the mid-1990s. These proposals are being reassessed.

In recent years, there has been no overall strategic review of the desirable size of Australia's naval forces, and specifically no review of destroyer numbers. The number of destroyer-type ships has been sustained more because no clear argument has emerged for variation in the size of the fleet than because of any positive force structure judgements based on strategic guidance or enduring geographic factors. The Government's decision in 1983 not to replace the aircraft carrier HMAS Melbourne, which marked a fundamental change in the composition of the fleet, has not yet led to any reconsideration of destroyer numbers, although Departmental studies are now in hand to address this matter. Thus the number of destroyers and frigates in the fleet is much the same as it was 15 years ago. Similarly, Navy now has about the same number of patrol boats as it had in 1970, although the requirement for patrol activities has greatly increased.

In the same period, there has been a marked fall in mine countermeasures forces (from three vessels in 1970 to one ship today), despite the high strategic priority consistently accorded to this capability. By contrast there has been a growth in the Navy's amphibious transport capability. In 1970 we had no ship capable of operational beaching, whereas now we have a heavy amphibious transport ship and six LCHs. These trends in mine countermeasures and amphibious capabilities are contrary to priorities for the defence of Australia.

Navy aviation forces in recent years have been determined by perceived needs for air defence of task groups at sea, organic maritime strike and ASW. These forces centred on the Navy's aircraft carrier capability. With the disposal of Skyhawk and Tracker aircraft, Navy's aviation activities now largely rely on ASW helicopters and the helicopter support of offshore counter-terrorist operations. The latter is a task imposed on the Defence Force by government decision. The requirement for ASW helicopters has been extensively analysed, including possible uses for the Sea King ASW helicopters, 16 Wessex utility helicopters of which 10 are kept operational for counter-terrorist tasks, and 13 smaller helicopters. The latter are used for interim FFG support flights, training, survey and utility tasks. Eight helicopters are normally in extended maintenance or storage.

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**Mine countermeasures**

The most important deficiency in the naval force structure is the absence of an operational mine countermeasures capability. Navy acknowledges that at present Australia has only a token mine countermeasures vessel. This is an unacceptable deficiency in our force structure. There are risks of potential and focal points being mined, especially in northern waters, even in low-level contingencies. Modern mine technology is such that the specialised craft are required to operate in mine countermeasures ships and aircraft used in mine warfare, and even in the north-west of Australia, mine countermeasures is required to complement the hunter.

Minehunting is based on determining the positions of individual mines and concentrating countermeasures on those positions. Sweeping techniques are directed at the more extensive area suspected of containing mines. Minehunting is based on determining the positions of individual mines and concentrating countermeasures on those positions. Sweeping techniques are directed at the more extensive area suspected of containing mines. Mineweeding is based on determining the positions of individual mines and concentrating countermeasures on those positions. Sweeping techniques are directed at the more extensive area suspected of containing mines. Minehunting is generally preferred, because it cannot be undertaken in areas where the nature of the bottom can obscure the mine.

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Laboratory (RANRL) are claimed to have achieved a radically different concept in minelaying. These involve Australian-developed towed magnetic and acoustic sweeps, which do not require electrical power down the towing cable. A new degaussing system has also been developed which it is hoped will solve the magnetic influence problem for the towing vessel. The significance of not having to construct purpose-built magnetically and acoustically clean minelaying hulls is that it may be possible to adapt suitable commercial craft (such as fishing trawlers) for minelaying with great cost savings and the potential for rapid force expansion. Navy envisages 10 craft of opportunity for this task (five on each coast). Precursor sweeping would be required, however, to counter mines designed to sink mine countermeasures vessels. For this important task, Navy proposes the use of 'helicopters of opportunity'.

The force planned by Navy is small and will enable only the highest-priority ports (two ports simultaneously, one on the east coast and one on the west coast) to be cleared and kept open. Other mined or suspected mined ports would remain closed for a period, although the force expansion facilitated by the craft-of-opportunity approach, if properly developed, could be expected to contribute significantly. This is acceptable as a shorter-term objective, but in the longer term we should increase this capability to allow simultaneous operations in three dispersed areas.

There are, however, substantial technical risks and other uncertainties in Navy's proposed program. The acceptability of the Minehunters is subject to the success of the two prototypes, which are built of glass reinforced plastic that introduces new concepts and technology into the RAN. They can be used only for inshore work because of their limited sea-keeping abilities. The minelaying program is a long-term project and depends on the success of RANRL technological and scientific breakthroughs. This program is also heavily dependent on gaining access to suitable craft of opportunity and helicopters of opportunity. Although the problem of the magnetic signature of the towing vessel seems likely to be solved, there remains risk as regards its acoustic signature. Furthermore, the construction of production minehunters is expected to absorb skilled project and technical manpower in Navy until the early 1990s. This may disadvantage the minelaying program until that time.

This is not a satisfactory situation and the Review recommends that additional resources should be allocated to Australia's mine countermeasures requirements, until this capability gap is redressed. No avoidable factor should be allowed to delay still further the completion, and testing and evaluation, of the two prototype MHIs. As soon as it seems reasonably prudent, approval should be given for the construction of the four additional craft. The Defence Program has provision for these four additional MHIs in FY 1987-88 at a cost of $211 million. The need for further MHIs should then be reviewed.

The proposed Mine Warfare Systems Centre, which will provide a training and support facility for the mine-warfare force, should receive high priority. The Defence Program has provision for a decision in FY 1987-88, at an estimated cost of $46 million.

The minelaying program also needs greater attention. Mine countermeasures cannot be effective without minelaying. The development and trial of the Australian-designed influence and mechanical sweeps requires early resolution. If the project proves successful, provision should be made for the acquisition of at least four suitable commercially-based vessels using this technology at a cost of $37 million. They would be manned mainly by the Permanent Naval Force, and two vessels would be based on the east coast and two on the west coast. They would be in addition to the lease of four larger vessels and four smaller vessels as minesweepers of opportunity, and two vessels with side-scan sonar to complement the MHIs in mine surveillance.

14 These would comprise four larger vessels and four smaller vessels as minesweepers of opportunity, and two vessels with side-scan sonar to complement the MHIs in mine surveillance.

15 This includes the proposed move of Navy facilities from Sydney Harbour. There are strong reasons for retaining the base for mine-warfare assets in one of our most important ports.

16 The direct operating and manpower costs of the 12-destroyer force are $170 m per year. (This excludes indirect costs of support and allowances.)
where RAAF land-based aircraft and/or allied carrier aircraft are unable to contribute to air defence. It also observes, and this Review agrees, that in the absence of fixed-wing air support the preferred force elements for strategic maritime surveillance and strike are submarines and land-based aircraft.

Navy advice provided earlier to this Review envisaged up to a maximum of 20 destroyers being required for low-level contingencies, as well as up to 36 other surface units. This was based on assumptions about concurrent maritime operations all around Australia's coast, including southern ports, that are clearly not relevant to credible contingencies. Navy's calculations that 6 to 10 destroyers (and 12 to 20 other ships—including patrol boats) might be required for operations in northern focal areas are more in accordance with the views of this Review.

During the early 1990s, Navy's destroyer force is planned to comprise three DDGs, six FFGs and three DEs. Of these 12 ships the first to be retired will be the DEs, by the mid-1990s, and the DDGs by the late 1990s. The essential needs for ASW, area air defence and maritime strike, so much as destroyers will contribute, seem likely to be met by the FFGs which could provide a minimum protective capability, especially in northern focal areas. The availability of underway replenishment can increase the time on station of destroyers (and other ships) being used for operations in these areas, and hence in some cases could decrease the numbers needed. The FFGs are capable ships by regional standards and will be made even more capable by the provision of the Seahawk helicopter. They will be in the fleet until at least the year 2010.

The DDGs are in a somewhat different category. They are 20 years old and are expensive to run (their crew is almost double that of an FFG). In some areas they are more capable than the FFGs (such as better command and control, two 5-inch (127 mm) guns rather than a single 76 mm gun, a three-dimension as well as a two-dimension radar, and a twin rather than a single fire-control channel for the area air defence missile system). To the extent that destroyers are expected to operate in less complex battle environments than those for which they were designed, and in smaller numbers, their command requirements would not be as great as for the "task group". This consideration, and the high operating cost and age of the DDGs, leads this Review to have some concerns about their continuing relevance to the fleet.

However, an expensive modernisation program, costing $308 million, is already under way and is planned to be complete for all three ships between 1987 and 1990. It is too late now to change this program, with the possible exception of cancelling the modernisation of the third ship (HMAS Hobart) and paying it off. The ship could be paid off early, but it might be more appropriate to keep it in service until the early 1990s when the fifth or sixth FFG is commissioned. The savings would be about $32 million in capital costs and $8 million in average operating costs, and 330 crew would be available for higher-priority tasks.17

If the Government decides—as an alternative to paying off HMAS Hobart—to keep all three DDGs in the fleet, the destroyer force of nine ships would be operational to about the end of this century. The main implications of this for the Review's recommendations would be to increase the pressures for more personnel in the Navy (see Part 9).

Taking all these factors into account, the Review considers that the number of destroyers needed in the fleet, as an essential core force, is eight to nine. The Review therefore supports Navy's proposal to reassess the direction of its New Surface Combatant Project, which had previously sought retention of the 12-destroyer fleet.

17 There could also be savings resulting from the transfer of HMAS Hobart's warshot air defence missiles to the fifth FFG ($33 m is programmed for the latter's missile outfit), although this would depend on decisions yet to be taken on missile updates. The estimated saving of $32 m in capital costs is net of expected cancellation penalties of some $100 m, and other work would have to be rescheduled back into Garden Island Dockyard to maintain a constant annual workload of 1.4 m man-hours.

On the basis of 10 years of operations after modernisation, the DDGs will start to pay off from about 1998. A final decision on whether to replace them is not needed until the early 1990s. But preliminary studies should continue now, with a view to funded studies being placed with industry in the later 1980s to refine procurement options. A government decision on source selection would probably be sought in the early 1990s.

Fundamental considerations in the final decision on whether and how to replace the DDGs will be trends in the survivability of destroyer-type vessels against stand-off missile attack, as well as further progress in the development of capability priorities for our maritime strategy. The latter will be influenced by the direction of military capabilities in our region.

Other decisions are required, however, about the need for lesser-capability warships in the fleet. A requirement is seen for a ship that is less capable than a destroyer, but considerably more capable than the Fremantle class patrol boats. To fulfill the needs of maritime tasks envisaged in Part 3, there is a need for an intermediate class of ship that is capable of sustained patrols in our key maritime areas and focal points in all sea states.

For peace-time tasks, there is a need to be seen to be demonstrating sovereignty over our extensive resource and fishing zones, important offshore installations and territories, coastal areas and focal points.18 Larger ocean patrol ships, perhaps to be known as light patrol frigates, are required to provide an effective presence in more exposed or distant waters. They will have the sea-keeping, endurance and reconnaissance capabilities that patrol boats do not have and yet they will not be as expensive to acquire or maintain as destroyers.

In low-level contingencies, we would want to operate naval forces dispersed over broad areas of our northern and north-western approaches and to take protective measures in other maritime areas. In conjunction with the operations of other assets, such as maritime-patrol aircraft, intensified reconnaissance and patrol operations could be undertaken by the new class of warship in disputed or threatened areas, but within range of our land based fighter aircraft. Their most valuable characteristics would be endurance and good reconnaissance and communications capabilities and their ability for intercept and arrest.

Against the threat of escalation, the light patrol frigates would be joined by destroyers with more capable weapons and sensor systems. The new class of ship could also undertake important national tasks in more southerly waters protecting our shipping and focal areas. In summary, these warships would primarily be for ocean patrol and sovereignty tasks, but with the ability also in some circumstances to relieve patrol and sovereignty tasks, but with the ability also in some circumstances to relieve patrol and anti-submarine warfare tasks. But they will be more flexible than patrol boats and will be able to operate in the same sea areas and in the same range of our land-based fighter aircraft. Their most valuable characteristics would be endurance and good reconnaissance and communications capabilities and their ability for intercept and arrest.

It is not the purpose of this Review to suggest a particular design, but it would be considerably larger (about 2000 tonnes standard displacement) than the missile-equipped fast attack craft in many other navies. The most valuable characteristics would be range, sea-keeping, endurance, good surveillance and local command, control and communications capabilities, rather than advanced or complex weapons and high speed. It would have a helicopter deck and a hangar for a reconnaissance helicopter, but desirably would also be able to operate the Seahawk ASW helicopter being acquired for the FFGs. It would be equipped with a gun and an air defence system for self-protection. Weight and space should be reserved for other capabilities such as
surface-to-surface missiles and, if shown to be technically feasible, the ability to operate towed acoustic surveillance arrays.

It is recommended that consideration be given to building these ships in Australia. Local modification of an existing design would appear practicable. They could be introduced during the early-to-mid-1990s as we phase out the first five of the Fremantle class and the three remaining DEs. The cost of eight such vessels might be in the order of $2000 million. Reducing the destroyer force from 12 to 8 or 9 and the patrol boat force from 15 to 10 would release some 1000 personnel to crew the new class of ship and to reduce the manpower pressures in other areas such as the mine countermeasures force. Construction should be subject to open tender, possibly in more than one yard. Consideration could be given to constructing additional units, depending on the cost-effectiveness of the initial eight ships. On this basis, the Navy’s major surface units would eventually comprise 10 patrol boats, of Fremantle or equivalent size, at least 8 light patrol frigates and 8 to 9 capable destroyers depending on decisions to be taken later on whether to replace the DDGs.19

Navy helicopters

Navy helicopters specially designed for ASW work have come under close scrutiny. The DFDC and the Chiefs of Staff Committee (COSC) have several times in recent years reaffirmed these as being an essential force element. Following the aircraft carrier decision, the DFDC has favoured the use of dispersed small platforms (that is, destroyers and the like) rather than a helicopter carrier as a basis for ASW helicopter operations at sea. The recent government decision to acquire eight capable Seahawk ASW/anti-surface surveillance targeting (ASST) helicopters at a cost of $424 million for their introduction is consistent with that judgement.20

At present, Navy aims to provide at short notice four Sea King ASW helicopters for shore-based focal area operations on the east coast of Australia and to increase the aircraft committed to six within 30 days, for operations from more general locations on the Australian mainland. At up to six months’ notice, Navy plans to deploy six Sea Kings to sea on a chartered merchant ship, but planning for this has not proceeded beyond the feasibility study stage. This is acceptable in current strategic circumstances. The six FFGs are capable of carrying two Seahawk helicopters each. There is little priority for further ASW capability beyond the eight Seahawk helicopters already on order, given the low submarine threat and that we have capable LRMP aircraft and are developing towed arrays. Further, this Review does not give much weight to the role of escort vessels equipped with ASW helicopters for anti-submarine protection of shipping in wider ocean areas, where evasive routing can be undertaken.

Nevertheless, there is a need for additional helicopters to enter service with the two new FFGs, and for a peace-time attrition reserve. The timing of this acquisition should take account of any benefit of production continuity with the initial helicopters. The Defence Program makes provision for a total of eight additional helicopters, including four for attrition, at a cost of $193 million. There would then be 12 Seahawk helicopters available to the fleet—for embarked operations on the six FFGs, shore-based training, and maintenance support.

An ASW helicopter specifically to replace the Sea King helicopter is not required in view of the capabilities and potential of the Seahawk. The Review earlier recommended that, as Navy intends, at least some of the Sea Kings be used for precursor minesweeping, instead of planning just for extensive use of helicopters of opportunity. The Sea King’s life of type is currently 1995. The need for dedicated precursor minesweeping helicopters will need to be reviewed before then so that, if necessary, provision need be made in the present Defence Program. These helicopters would be capable of towing only light precursor sweeps, and they should not be a high-cost military minesweeping helicopter designed for more extensive sweeping. If helicopters are required for offshore counter-terrorist operations after the Wessex helicopters are withdrawn from service in 1989, it is suggested that the Government purchase utility helicopters from funds other than the Defence Vote. These operations would be a less capable helicopter than the Seahawk.

The Review does not support the scope or timing of this proposal. The Squirrel light helicopters, the 8 Sea King helicopters, the 16 Seahawks and the 12 reconnaissance helicopters provide an adequate level of capability through to at least the mid-1990s.

AIR DEFENCE

Australia’s air defence system should include means of detecting, tracking and identifying potential intruders, intercepting them with fighter aircraft, and protecting key points against enemy aircraft which may evade interception. A specific task is the land-based air defence of shipping. This section addresses these components, together with command and control requirements.

Target acquisition and identification

This Review has earlier recommended that OTHR command a very high priority. The successful operational performance of this radar would dramatically enhance our air defence alert and early warning capabilities by the end of this decade. Currently, our capability is minimal against aircraft which set out to approach at low level even a single defined target such as Darwin, let alone a more random penetration of our airspace.

19 On 3 March 1986, the Chief of Naval Staff issued a revised Force Structuring Policy relating to surface combatants. The Policy advises that Navy is to plan on there being three tiers within the surface fleet: high-capability vessels for ocean operations; vessels with lesser capabilities suitable for operations in the Exclusive Economic Zone and proximate waters and for dealing with contingencies credible in the shorter term; and vessels suitable for coastal operations with primarily defensive capabilities. The Policy states that the New Surface Combatant Project is to be directed at the second level of the tiered force. This revised policy is generally consistent with the approach recommended by this Review.

20 The helicopters will be fitted with sonobuoys, magnetic anomaly detection, radar, data link, communications, and a navigation system.
Where we wish to intercept potentially hostile aircraft detected by OTHR with a high degree of confidence, tracking and targeting information is likely to be required. Ground-based microwave radars could provide this in some circumstances but their range is limited, particularly against low-altitude targets.

The air intercept microwave radar system on the F/A-18 fighter may prove to be capable of exploiting targeting information direct from OTHR with reasonable probability of success. However, the full expectations of OTHR may not be realised, and there will then be a need for some form of additional sensors. Options to be considered include airborne early-warning and control (AEW&C) aircraft systems and radars mounted on aerostats. The latter alternatives could have only limited utility along our northern coastline because they may be affected by the adverse weather conditions prevailing for much of the year.

This Review takes the position that while investigation of AEW&C options should go ahead, there should be no acquisition of these systems until OTHR is further developed and its ability or otherwise to provide adequate targeting information to the F/A-18 is determined. Current circumstances do not demand AEW&C aircraft, and should the strategic situation change in the near future, acquisition could proceed.21

The position should be reviewed after data on the operational performance of OTHR is assessed.

Irrespective of the final position adopted on AEW&C aircraft, ground-based radars will still be required to provide air traffic control and high-definition targeting close to airfields, major installations, and concentrations of deployed forces.

The current capability is one radar in Darwin, one at Williamtown, and a mobile unit held at Amberley. A radar is also being installed at Tindal. Air Force proposes a fixed radar at Mount Goodwin south-west of Darwin, at a cost of $16 million, to enhance the control and coverage of the approaches to Darwin/Tindal. It would also extend the radar coverage of airspace intended for use by F/A-18 aircraft during training.

Beyond these radars, this Review considers that the priority for subsequent systems should go to providing mobile radars, possibly combined tactical air defence and air traffic control radars, sufficient to serve at least a further two fighter bases elsewhere in northern Australia, or in the offshore territories if required. Acquisition in the time-frame 1989-85 would be appropriate. The estimated cost for two such systems is $40 million. Approximately 45 additional personnel would be required to operate the total of three mobile radar systems at peacetime rates of effort.

Tactical fighter force

Parts 3 and 4 of this Review identified a requirement for up to two squadrons of fighters to meet the continental air defence task in low-conflict situations and as a basis for expansion, and a minimum of two squadrons to provide air cover for naval assets in northern waters. These tasks overlap, and would be performed by land-based fighters deployed in the north as threats developed.

In reaching a judgement on the actual number of aircraft which we should have, this Review sought advice on the basis for acquiring 75 F/A-18s for the Tactical Fighter Force. However, the justification of this number appears to rest largely on a statement to Parliament by the then Minister for Defence in April 1978 that the three-squadron structure then in the Mirage force should be retained. A more definitive analysis does not appear to be available.

Air Force advice is that deployment requirements for air intercept operations are a minimum of six aircraft in any one location. This is based on RAAF judgements on the need for a response force on stand-by, tactical employment principles, training requirements, and both scheduled and unscheduled maintenance commitments. A squadron of 16 aircraft could provide 12 on line. Concurrent deployment of a squadron to two locations would therefore be possible, although concentration in one location may be preferred.

Deployment areas in our north would be widespread. Consequently, F/A-18 aircraft may be required in each of the designated air defence sectors: at Learmonth-Derby, Darwin-Tindal, and Cape York. Up to one squadron, deployed to each area, would be capable of meeting air defence tasks expected at lower conflict levels, with some inherent reserve capacity.

The retention of three fighter squadrons is therefore considered appropriate. However, in view of the need to ensure that adequate levels of skill are maintained in the relevant aircraft roles, it is suggested that two of these squadrons specialise in the air-to-air role while the third specialises in the air-to-surface role including maritime strike. It is noted that both F-111 squadrons and up to two P3C Orion squadrons could also be made available for maritime strike operations.

Our acquisition of 75 F/A-18 aircraft provides for the progressive re-equipping over the next five years of the existing three squadrons (48), the Operational Conversion Unit (12), the Air Research and Development Unit (2) and an attrition reserve covering the first 10 years of life (13). The current plans for the introduction of the F/A-18 are consistent with objectives identified in this Review. No regional power seems to plan on having more than very limited numbers of advanced aircraft. No value is seen in retaining the Mirage, once replaced, because of the increasing difficulty of support.

Air-to-air refuelling

Air-to-air refuelling would increase the range and endurance of the F/A-18. The aircraft would then be able to operate practically anywhere within our area of direct military interest. We currently have four B707 aircraft suitable for modification to the tanker role. Limited skills in air-to-air refuelling are maintained at present in the F-111 squadrons through exercising with the United States Air Force.

Air Force advice to this Review is that the long range and high speed of the F-111 permit its use as an interceptor against enemy aircraft shadowing our naval units at ranges of about 1000 nautical miles from our air bases. The RAAF states that the F-111 is fitted with a gun and four Sidewinder air-to-air missiles and can be used in any of the conventional interceptor tasks.

There is some room to question the priority for B707 conversion. Only when the F-111 air force is phased out, or should our strategic circumstances deteriorate, will the priority for in-flight refuelling for the F/A-18 become less equivocal. Air Force advice to this Review is that the long range and high speed of the F-111 permit its use as an interceptor against high-speed enemy aircraft shadowing our naval units at ranges of about 1000 nautical miles from our air bases. The RAAF states that the F-111 is fitted with a gun and four Sidewinder air-to-air missiles and can be used in any of the conventional interceptor tasks.

While the F-111 can perform the role of a long-range maritime interceptor, the provision of aerial refuelling for the F/A-18 would allow greater assurance for our Navy air cover would be available. The Review recognises that this is an important consideration and it supports the conversion of the four B707 aircraft to the tanker role. However, this is not a high priority in current strategic circumstances and, should programming pressures arise, the proposal could be deferred.

21 The estimated cost to acquire four AEW&C aircraft is $726 m. The additional manpower would be 205, assuming that they would be supported from RAAF Edinburgh. Even this number of aircraft would provide only a very limited coverage unless alerted by OTHR.

22 Conversion to the tanker support of the F-111 would cost a further $64 million.