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JOINT COMMITTEE ON FOREIGN AFFAIRS AND DEFENCE

Industrial support for defence needs and allied matters

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** Chairman of Sub-Committee C which conducted the Inquiry.

* Members of Sub-Committee C.

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TERMS OF REFERENCE

1. That a Joint Committee be appointed to consider and report on - (a) foreign affairs and defence generally, and

   (b) such matters as may be referred to the Committee -

   (i) by the Minister for Foreign Affairs;

   (ii) by the Minister for Defence, or

   (iii) by resolution of either House of Parliament.

2. That the Committee consist of eight Members of the House of Representatives nominated by the Prime Minister, six Members of the House of Representatives nominated by the Leader of the Opposition, four Senators nominated by the Leader of the Government in the Senate and three Senators nominated by the Leader of the Opposition in the Senate.

3. That every nomination of a Member of the Committee be forthwith notified in writing to the President of the Senate and the Sepaker of the House of Representatives.

4. That the Members of the Committee hold office as a joint Committee until the House of Representatives expires by dissolution or effluxion of time.

5. That the Committee elect as Chairman of the Committee one of the Members nominated by the Prime Minister or by the Leader of the Government in the Senate.

6. That the Chairman of the Committee may, from time to time, appoint another member of the Committee to be the Deputy

Chairman of the Committee, and that the Member so appointed act as Chairman of the Committee at any time when the Chairman is not present at a meeting of the Committee.

7. That the Committee have power to appoint Sub-Committees consisting of four or more of its Members and to refer to any such Sub-Committee any of the matters which the Committee is empowered to consider.

8. That the Committee or any Sub-Committee have power to send for and examine persons, papers and records, to move from place to place and to meet and transact business in public or private session and notwithstanding any prorogation of the Parliament.

9. That the Committee have leave to report from time to time and that any Member of the Committee have power to add a protest or dissent to any report.

10. That seven Members of the Committee constitute a quorum of the Committee and three Members of a Sub-Committee constitute a quorum of that Sub-Committee.

11. That, in the event of an equality of voting, the Chairman, or the Deputy Chairman when acting as Chairman, have a casting vote.

12. That the Committee have power to consider and make use of the minutes of evidence and records, of Joint Committees on Foreign Affairs and Defence, appointed in previous Parliaments, relating to any matter on which those Committees had not completed consideration.

13. That the Committee be provided with all necessary staff, facilities and resources and be empowered with the approval of the President of the Senate and the Speaker of the House of Representatives, to appoint persons with specialist knowledge for the purposes of the Committee.

14. That the Committee in selecting particular matters for investigation take account of the investigations of other Parliamentary Committees and avoid duplication.

15. That the foregoing provisions of this resolution, so far as they are inconsistent with the standing orders, have effect notwithstanding anything contained in the standing orders.

TERMS OF REFERENCE FOR SUB-COMMITTEE C

To investigate and report on industrial support for defence needs and allied matters giving particular attention to manufacturing and other back-up industries and research facilities.

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PREFACE

On the 17 and 18 March 1975 resolutions were passed by both Houses of Parliament establishing the Joint Committee on Foreign Affairs and Defence. It was empowered to consider and report on:

- foreign affairs and defence generally; and
- such matters as may be referred to the Committee by:
  - the Minister for Foreign Affairs
  - the Minister for Defence, or
  - by resolution of either House of Parliament.

On 4 May 1975, the whole Committee resolved "that a Sub-Committee to be known as the "Sub-Committee on Industrial Support For Defence Needs and Allied Matters" investigate and report on industrial support for defence needs and allied matters with particular attention being given to manufacturing and other back-up industries and research facilities.

Subsequent to that resolution, the Committee appointed seven of its members to the "Sub-Committee on Industrial Support for Defence Needs and Allied Matters". Mr D.J. Hamer, D.S.C. M.P. was appointed Chairman.

The other Members appointed were, Senator the Hon. R. Bishop, Deputy Chairman, Mr J.L. Armitage M.P., the Hon. G.M. Bryant E.D. M.P., Dr R.E. Klugman M.P., Mr M.J. Neil M.P. and Mr J.R. Short M.P.

The Sub-Committee held its first meeting on 4 May 1976 and agreed that it should commence its work with a study of the Aerospace Industry. This was followed by studies of the Munitions, Electronics and Shipbuilding Industries. In considering these industries particular attention was given to their capacity to provide maintenance, production and research and development facilities for support of the defence forces in both low-level and high-level threat situations.

Since its formation the Sub-Committee met on forty-nine occasions. Evidence was taken at ten public and in-camera hearings which were held in Canberra and Sydney. Fourteen field inspection meetings were held involving visits to all States. These inspections encompassed a broad spectrum of military, research and industrial establishments. Thirty-five witnesses gave evidence from departments of state, industry and trade unions and associations. Sixty major submissions were received. In a number of cases supplementary submissions were provided as well as background papers.

On 9 June 1977 the Committee tabled its Interim Report, prior to the winter recess of the Parliament. At that time Chapters 6 and 8, the Electronics Industry and the Committee's Conclusions and Recommendations were incomplete. Chapter 6 has been incorporated in this Final Report and constitutes the only substantial difference between it and the Interim Report. The Committee subsequently decided against incorporating a separate Chapter of Conclusions and Recommendations. These are contained in the text of the Report following the relevant Chapter.

Mr I.B. Fleming O.B.E., was appointed special adviser to the Sub-Committee. Mr Fleming's assistance has been invaluable and the Committee expresses its appreciation to him.

The Committee wishes to express its sincere appreciation to all those who in any way have assisted in this inquiry. Those persons who submitted evidence to the Committee are listed at the back of the report.

The Committee acknowledges the assistance of the Parliamentary Reporting Staff, the Parliamentary Library and the Australian Government Publishing Service. The Committee is particularly appreciative of the frequent assistance it has received, often at short notice, from the Departments of Productivity and Defence.

The major historical source used in the compilation of the report has been D.P. Mellor - "Australia in the War of 1939-1945, Volume V, The Role of Science and Industry". A history of the Department of Supply by T. Lawrence entitled "The Department of Supply - Its Origins and Functions" also was of great assistance

D.J. Hamer D.S.C., M.P.
Chairman

1. INTRODUCTION

1.01 During the course of World War 2, Australia built up a substantial defence industrial capacity, with a wide range of capabilities, for the provision and support of major and minor equipment for all three Armed Services. The nation did not become self-sufficient but it did develop a high degree of self-reliance. With the cessation of hostilities in 1945 a large proportion of the capacity was closed down or put to normal peacetime pursuits and, as was inevitable, some capabilities went into decline through lack of defence orders.

1.02 Since that time there has undoubtedly been significant growth in the level of technology in some areas of our defence industry. It is quite apparent, however, that increases in the technical complexity of modern weapon systems and in the techniques involved in their design and manufacture have left many of our capabilities behind; that the gap in our technological self-reliance has been widening; and that, because of the very high cost of current equipment and the impossibility of economic justification for substantial local participation in the provision of the small quantities that are needed or can be afforded, the gap will continue to widen, and possibly at a faster rate, unless a determined effort is made to reverse the trend.

1.03 In its present examination of the defence need for industrial support the Committee has recognised that much defence equipment will have to be supplied from overseas sources

for many years to come. It has no argument with the defence industrial policy which is stated in the Defence White Paper November 1976 as being[1]:

> "..... to ensure that the Defence Force can be supported and maintained in Australia, utilising for the provision of equipment and materiel, a combination of local industry, selective stockholding and reliable overseas sources of supply. A further objective is the progressive development of a range of basic technologies and capacities which would facilitate an intensification and diversification of present activities to match force expansion, should the need arise."

The Committee's concern is rather that the closure of gaps in technology and capability may not be receiving sufficient priority and its investigation has been directed towards this aspect.

1.04 Nor does the Committee disagree with the statement of industry activities contained in the White Paper. In fact it considers that the following extract[2] from that Paper provides a good description of what industrial support for defence means:

> "Industry activities .... include the establishment and maintenance of the capability to repair, maintain, modify and adapt to the Australian environment a wide range of equipment and weapons systems of the forces, and to manufacture high volume consumable and minor equipment items such as spare parts, ammunition, clothing, and personal and field communications equipment.
>
> "Also included are the manufacture of many general equipment items, such as military vehicles and engineering plant, the sustaining of the capability to construct and modernise selected naval vessels,

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1. Page 51, para 25
2. Page 51, paras 28, 29, 30

and the sustaining of an aircraft industry able to provide support and selective manufacturing capability.

"Implicit in these activities is a basic design and development capability which will permit selective local design and development of equipment, modifications and adaptions to overseas designs, as well as production."

The Committee's concern in this case is that ineffective implementation of the Defence Industrial Policy quoted in para. 1.03 may be the cause of an apparently inadequate and discontinuous defence workload and hence could be jeopardising the maintenance and up-grading of industrial competence in many of the listed activities.

1.05 Some of the organisations looked at by the Committee are almost totally dependent on defence work for their existence while others are in business primarily for commercial reasons. Although some of their problems may differ, there are nonetheless factors common to each type of organisation that have influence on the level and effectiveness of the defence support they are able to give. Particular attention has been given to these areas of commonality.

1.06 Defence contracts have some impact on most types of industry but in many cases the workload they generate is only a relatively small proportion of the total business and/or the product is not of a nature that requires maintenance support. The Committee decided to confine its examination to those industries which it regarded as having major defence importance in both the provision and continuing support of defence equipment. The industries so selected were Munitions, Aerospace, Electronics and Shipbuilding,

and account was taken of the substantial support capabilities that exist within the Service Depots, in the Research and Development (R & D) Establishments and the Guided Weapons Support Facility of the Department of Defence and in the airlines.

1.07 Although the industries associated with raw materials, both metallic and non-metallic, were not specifically examined, their defence significance has been indirectly recognised in subsequent chapters of this report where the effects of deficiencies in the local availability of various materials have been highlighted.

2. THE GUIDELINES FOR CONSIDERATION OF DEFENCE INDUSTRY

2.01 From the outset the Committee rejected as unrealistic the extreme concepts that in normal peacetime circumstances Australia should, on the one hand, be completely self-reliant in defence support capability or, on the other, has no need for defence production capacity. An appropriate middle course was recognised as being difficult to define and, as far as practicable, the Committee concerned itself only with defence implications while acknowledging that economic and, possibly, social issues would almost inevitably be involved in any positive action it might recommend. It was of the opinion that the broad requirements for the Australian Defence Industry should have no security classification, should be the subject of informed debate and, above all, be explicit.

2.02 Early in its deliberations the Committee considered it essential that the capabilities and deficiencies of industry, including the associated R & D capacity, be assessed over a range of potential strategic situations. To this end it gave regard to the nature and scale of possible future conflicts, the warning times that might be available and the problems that could arise from peacetime reliance on the supply of defence equipment from overseas. The guidelines thus established and dealt with below have provided the framework within which the examination has been pursued.

2.03 Since World War 2, Australia has been engaged in

four "wars".[1] In each our Forces were committed to action in regions away from the mainland and to a large degree were supported by logistic systems already established by our Allies. In general there was no great impact on workload in our defence industry. These types of conflict may not be repeated but there are other low and high-level situations that may arise.

2.04 The Committee sees low-level conflict being essentially limited with regard to both purpose and means, typical examples being:

- Attacks by guerilla groups, either national or sub-national; minor guerilla/terrorist raids on Australian sovereign territory, shipping, aircraft or Australian nationals abroad;
- Interference with Australia's use of its maritime economic zone;
- Demarcation disputes relating to seabed or surface boundaries;
- Confrontational disputes with neighbouring countries;
- Interference with Australia's rights to free passage at sea or in the air.

2.05 Some of these types of low-level conflict may arise with little or no warning so that the need for an independent and rapidly responsive resistance capability is real. The Committee understands that our Regular and Reserve Forces/Civil Forces would be capable of containing such conflict without recourse to the full mobilisation of national resources. It is concerned, however, that although general lines of communication

1. Korean war, Malayan insurgency, Vietnam war, Indonesian confrontation

would almost certainly remain open, some overseas countries from whom we obtain military supplies might, perhaps because of a possible clash of interest in the issues involved in the conflict, decide to cut off supply of equipment and spares despite stringent contractual or treaty arrangements.

2.06 A more serious form of low-level conflict would result if Australian Armed Forces were used beyond our territorial waters and exclusive economic zone to frustrate developments in our vicinity which would pose a threat to Australia's interest. The Committee believes it should be assumed that such operations would be conducted by the existing Defence Force and that the operations might be prolonged (for, say, twelve months).

2.07 The Committee has concluded that to be able to deal with the types of low-level situations that have been postulated it is necessary, in the light of possible short warning and partial denial of supply, that:

(a) Australian industry be maintained in a state competent to overhaul and repair essential defence equipment for up to twelve months without overseas supply, i.e. with spares available from stockpile or from local productive capacity;

(b) Ammunition stocks, or the ability to manufacture stocks, be available in Australia sufficient to cover twelve months' consumption at the expected usage rate;

(c) R & D and design capability be maintained at a level ensuring adequate support to the Services in such areas as the assessment and solution of technical

operational problems, the extension of equipment roles and the development of alternate components in the event of overseas supply stoppage;

(d) In the equipment selection process adequate weight be given to the likely reliability of a supply source and the possible undesirability of sourcing all equipment from one country.

2.08 The Committee has identified three scenarios which it considers would constitute high-level conflict situations, viz;

- Major raids on Australia or her territories;
- Lodgement on Australian territory; and
- Attempts at general invasion.

It holds the view that, because of the implications of such action for regional and global balances of power, these situations would be most unlikely to arise except against a general background of international chaos. It acknowledges, however, that in the longer term there is the possibility that an invasion or major raid could be mounted against Australia without this pre-condition.

2.09 The Committee realises that the super-powers are putting a lot of effort into ensuring that nuclear war never happens, but it considers that, since neither human institutions nor mechanical devices are infallible, a nuclear outbreak must be accepted as a possibility at any time and with little warning. In the aftermath of such a war our major Allies could be absorbed fully by events in other parts of the world and their capacity to assist us could be severely diluted or, perhaps, destroyed. Our security treaties could become inoperative and we could well be faced with the problem of providing from our own

resources the equipment needed to deal with a major threat. In that event we would be forced to accept less than the most sophisticated weapon systems because of the limitation of our industrial base.

2.10 The Committee has recognised that in these circumstances a potential enemy would be no better placed and the degree of sophistication of his weapons would not likely be higher. It has been assessed by the Committee that it would take him three years to build up the capability to mount a major raid on Australia and five years to mount an invasion.

2.11 In relation to these build-up periods, the Committee stresses that warning time for potential threats and the time available to carry out Defence preparations are not necessarily one and the same thing. History can point up many cases of lengthy gaps between the time at which a government's advisers have regarded a conflict as being likely, and when the government has been prepared to accept the political risk of an appropriate mobilisation of resources to meet it. It is vital that Party foreign and defence policy attitudes should be sufficiently bi-partisan to reduce this gap to a minimum.

2.12 Recognising that a high-level threat to Australia could arise in a situation of world chaos and that there would then be a strong likelihood that overseas supplies would not be available during either the build-up or the combat period, the Committee has concluded that:

(a) Australia's defence industrial base, in R & D, design, production overhaul and repair, should be maintained in peacetime at a level of capability

and capacity from which, given five years warning, expansion to self-reliance in the provision of equipment of moderate complexity could be achieved. Such achievement could require stockpiling now in those areas where current deficiencies could not be overcome within the five year time frame;

(b) The planned rate of expansion should be such that, within three years from go-ahead, industry would be capable of providing the Services with the level of support needed to resist a major raid.

2.13 The Committee accepts that its assumptions as to types of conflict, warning times and partial or full denial of overseas supply are open to argument. Indeed it has noted that government policy as outlined in the Defence White Paper (November 1976) gives little credence to the likelihood of significant conflicts arising with little or no warning or to the possibility of a nuclear exchange or a situation of international chaos.

2.14 The Committee takes the view, however, that whatever the level of probability, there should be national awareness of the substantial gaps that exist in our defence industrial capacity and the problems we could face if suddenly forced by world events to become at least largely self-reliant or, in the extreme, self-sufficient. Such awareness is an important step towards the exercise of balanced judgement and the initiation of reasoned action while there is time to do so in an orderly manner.

3. IMPORTANT FACTORS INFLUENCING THE LEVEL AND EFFECTIVENESS OF INDUSTRIAL SUPPORT

INTRODUCTION

3.01 In evidence submitted to the Committee by industry there was a common theme of concern over matters that were, in its view, adversely influencing the level of industrial support that could be provided in peacetime and, more importantly, in times of emergency. For instance, it was consistently said that the communication link with the Department of Defence was unsatisfactory; that industry should be involved much earlier than currently it claims to be in the defence forward planning process; that a greater proportion of defence R & D activity and funds should be placed with industry. From various areas came the plea for a "Buy Australian" Act. These issues of common concern are considered in this chapter of the report while issues specific to particular industries are dealt with in subsequent chapters.

CONSULTATION AND FORWARD PLANNING

The Communication Problem

3.02 Industry in general is very critical of what it regards as the lack of an effective communication link with the Department of Defence. It holds the view quite strongly that, through the absence of proper consultation, industry is not being involved sufficiently early in the equipment procurement planning procedure, that there is inadequate recognition of the reality of long lead times associated with the design, development and/or pre-production processes and

that not enough attention is being given to the importance of workload stability in the maintenance of a competent and responsive industry. It considers that, as a result, work which should be done in Australia and which would contribute to the technology base is being lost because the extent, nature and phasing of Australian participation is being determined without the benefit of an industry input. A further concern of industry is that by itself it is unable to identify the capabilities and resources that are needed for defence purposes and hence sensibly to forward plan its structure and facilities.

3.03 Although there appears to be a quite commonly held industry attitude towards the consequences of inadequate consultation, no such general consensus has emerged during the Committee's investigations as to the sort of liaison system which industry would see as satisfying its points of criticism. Perhaps a summation of the individual views would suggest that in the view of industry there should be:

- The issue of a government policy statement confirming the intention to maintain a strong defence industrial base with continuity of workload and stressing the essentiality of close and continuing liaison between the Department of Defence and industry;
- The establishment of a permanent high level joint Defence/Industry committee to examine and recommend on such issues as the directions in which the capabilities of industries should be developed and the means by which particular equipment requirements should be met;

- The setting-up of supporting joint Defence/Industry working groups specialising in discrete segments of industry.

3.04 The Department of Defence informed the Committee that it acknowledges the existence of a communication problem but believes that the extent of the problem has been exaggerated by industry. It pointed out that there are established procedures through which the Department advises industry of its coming requirements and consults with industry as projects develop, quoting as an example the defence fixed communications network project now in the early stage of development. At the same time it expressed concern that too often industry fails to accept that exploratory approaches concerning forthcoming requirements are only exploratory and complains when indicative timescales are not met.

3.05 Despite the above sort of difficulty the Department stated that various possible ways of improving the consultative situation are being explored. It said that, while some industries favour the re-creation of the type of Industry Advisory Committee structure that was functioning some years ago within the Department of Supply, others were strongly opposed. It believed that meeting with the boards of companies could be a more effective avenue in some cases but not in others. It considered that, although the use of seminars for the dissemination of information had not been very productive in the past, it is an approach which may possibly be pursued again with different industry groupings. In fact the Department was able to offer no complete solution to the problem because it saw some fundamental incompatibilities between the needs of industry and the realities of defence planning.

Forward Planning for New Equipment

3.06 The Department of Defence planning procedures for reaching a statement of requirement for a generic type of military equipment appear to the Committee to be quite logical. Simply expressed, the process starts from a strategic assessment which provides the guidance for identifying the need for a particular military capability, the statement of which becomes documented as a Staff Objective. Assuming the capability is not held or is obsolete in the form in which it is held, a broad description of the functions and desired performance required of equipments or systems that might provide the capability is established as a Staff Target, which also specifies the basis for the necessary technical, operational and cost feasibility studies. Resulting from those studies, a broad statement of the function, main features and performance of the generic type of equipment or system required for Service use is recorded as a Staff Requirement. Not in every case do all the steps necessarily occur in formal and discrete fashion but endorsements at appropriate level are required throughout the process.

3.07 In the normal course of events the Staff Requirement is the document against which equipment or system proposals are sought from industry and, in a formal sense, its issue, with Government endorsement, sets the time at which industry first becomes aware of the requirement. In practice, however, especially in the case of a major piece of equipment, industry - particularly overseas industry - would almost certainly have advance knowledge of the need well before the Staff Requirement is issued. It is in fact a criticism by local industry that the Staff Requirement becomes influenced by the characteristics

of equipment known to be available overseas and that, because an existing equipment can thus be acquired within a relatively short timescale, not only is the possibility of local development ruled out but also the nature of local participation tends to be circumscribed.

3.08 The Department of Defence on occasion uses local industry resources in feasibility studies and/or seeks proposals against Staff Targets particularly, when, in its view, there is some prospect of a local involvement in design and development either alone or in collaboration with overseas industry. While local industry welcomes such cases it considers that it should have the same sort of earlier access to all new equipment planning in order to ensure an effective industry input into the decisions that set the nature of its involvement and hence the scope and size of the impact on its workload. The industry argues also that without such access it is given no opportunity to put forward proposals for local design and development because there is too little lead time available when the requirement finally emerges.

3.09 The Department of Defence in evidence expressed the view that it is premature to involve industry in the planning process in respect of an equipment requirement until there is reasonable certainty that that requirement will lead to a hardware development and/or production programme. It pointed out that in building up the rolling five-year programme, which provides the basic defence programming and planning framework, there are many competing demands for limited resources and a potential new item could be deferred, set aside indefinitely or possibly cancelled. It stated that careful consideration is always given by the Department

during the early development of a new equipment requirement to the impact it could have on industry and that industry is brought in at an early stage if the Department feels that its involvement could be substantial.

The Views of the Committee

3.10 The Committee recognises the problems that confront the Department of Defence in programming a large number of competing requirements within a limited budget and accepts that, in the interest of national security, the maintenance of a high level of operational capability in the Service must be given due priority. It considers, however, that in the programming process insufficient emphasis is given to the essential role of industry as the fourth arm of defence and that more use should be made of defence procurement in peacetime to extend industrial capability and hence national self-reliance.

3.11 It seems to the Committee from the evidence it received that the complaint of industry is not that no thought is given by the Department of Defence to local participation in equipment purchases but rather that judgements as to the nature and extent of involvement are taken by people without sufficient understanding of industry's needs for continuity of suitable work. What industry wants is to have an active part in the making of those judgements at the earliest possible time in respect of each new equipment requirement. It wants to be sure that opportunities for local design and development are not lost; that where there are good prospects for desirable collaborative design and/or co-production activity specific equipment decisions are taken early enough to allow realisation of those prospects; that wherever possible there

is inter-Service standardisation of equipment; and that in formulating the rolling defence programme the need for workload continuity is recognised in the phasing of individual projects.

3.12 The Committee has sympathy with the views of industry on those issues and sees the need for much closer liaison with the Department. However, it is clearly not in a position to make firm suggestions as to the type of consultative and investigating machinery which might satisfy the industry stance and not put substantial impediments in the way of the Department's planning and programming roles. Perhaps the Defence (Industrial) Committee or a standing panel of that Committee might provide the central core supported by working groups specialising in discrete segments of activity and representative of the Department of Defence, the Department of Productivity (when appropriate) and the sector of industry relevant to each segment. Whatever the machinery that might be established it is important that industry be so identified with its output as to minimise complaints and lobbying pressures when the industry viewpoint on any issue is not accepted.

EQUIPMENT PROCUREMENT PRACTICES

Procurement Stages

3.13 Procedures for the procurement of defence equipment vary with the nature of the store being bought. Where it is a straightforward "off-the-shelf" item tenders are called and the contract goes to the lowest suitable tenderer. In the case of more specialised equipment the procedure is more elaborate and is frequently spread over a long time span.

3.14 The Committee was informed by the Department of Defence that subsequent to the feasibility studies mentioned in para. 3.06 and to decisions to proceed further with a project there are three identifiable stages that can follow. Firstly, there is a Project Development Stage which involves a detailed operational, technical and cost analysis of a system or equipment and during which cost/capability "trade-offs" are assessed and limited consideration is given to proposals concerning phasing, contractual, and Australian industry participation aspects where these are of significance. Secondly, there is a Project Definition Stage which involves the establishment of detailed technical and performance specifications and refined accurate costs for a nominated system or equipment and the development, when appropriate, of Australian industry participation. The third stage, which may be combined with the second, is the Contract Definition Stage which involves development of the full contractual agreement in respect of the defined system or equipment, including Australian industry participation aspects.

3.15 The process of obtaining industry inputs into this staged concept has been evolving over the years. Practices have varied from the formal open tendering system to the quite informal seeking of proposals from potential suppliers. The approach has depended upon such issues as whether equipment exists overseas or locally that will substantially meet the requirement, whether further development is required to ensure that an existing equipment will fully meet the requirement, whether the requirement is modified so that an existing equipment becomes acceptable or whether it is necessary to arrange for ab initio design and development locally or overseas or collaboratively to satisfy the requirement.

Tendering Practices

3.16 It has become apparent to the Committee that, in the purchase of defence equipment, the normal open tendering system, except in very straightforward cases, is disliked by both the Department of Defence and by industry. Both consider it is costly and time consuming and that in some spheres of activity it encourages too many firms with the result that orders are fragmented and continuity of work is adversely affected. Industry complains also that too frequently it happens that after expensive tenders are prepared and submitted the requirement changes and either contracts are not let or delays are imposed which make tender revalidation necessary, again an expensive process.

3.17 To avoid putting a large number of firms to the high costs incurred in submitting full competitive tenders in a situation where design and development as well as production may be involved, the Department of Defence advised the Committee that it is now using a tiered system of tendering. The first step in this process is the public announcement of an intention to purchase an equipment having certain broadly stated characteristics and requesting companies, local and overseas, who may have an interest in supplying such equipment to register this interest by a written statement of their resources and relevant experience. The most likely contenders of those registering interest are then given more information on the requirement and asked to submit tenders to undertake a contract definition exercise. Of those so tendering two are usually selected and given funded contracts to provide the detailed technical and costing information required for contract definition and, in the case of overseas firms,

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proposals in respect of Australian industry participation. The final selection is then made. The advantages of this system are firstly that only two firms become involved in the expensive phase of the tendering process and they are assisted by the provision of defence funds, and secondly, because of the way in which the steps are phased there is probably less likelihood of cancellation or significant delay in the letting of the final contract.

3.18 The Committee was informed that there are occasions where it is considered more appropriate to allocate work to a specific company because, for instance, of a need to conserve a particular technology or capability. This is done on what is called a restricted or negotiated tender basis. Although it is a procedure used in many countries it is generally viewed with disfavour by contracting authorities because it is open to malpractice and there can be difficulty in ensuring that the price is protected. It can nevertheless be attractive as a means of developing the concept of centres of excellence for specific technologies and hence overcoming the problems of delay and fragmentation that result from open competitive tendering. It is in fact a form of rationalisation by specialisation which, in the context of maintaining and developing capabilities, has much to recommend it, particularly in the prevailing situation where there is insufficient defence work to provide workload continuity.

3.19 The same end result may in some cases be achievable in a contractually more acceptable way by using an adaptation of the period contract approach that is applied frequently in the purchase of routine supplies. Resulting from the calling of competitive tenders, firms would be assessed in respect of such

relevant factors as resources, technical capabilities, design and development skills and cost structure. Particular firms would then be selected as the centres for work related to specific types of technology. Safeguards lie in the time limits that would be placed on the duration of the resulting contracts and in the competition that could be provided by overseas suppliers. The Committee understands that the Telecommunications Commission (formerly the PMG) has successfully used a similar procedure for many years.

3.20 There could be circumstances where a better solution might result from the use of the negotiated tender procedure with a consortium of firms. This would be applicable particularly when an equipment being developed locally has features spread over a range of technologies (e.g. the Barra sonobuoy).

Committee Comment

3.21 The Committee agrees with the Department of Defence and with industry that, because many of the defence purchases which lead to significant workload in industry relate to quite complex equipment, the use of open competitive tendering is frequently inappropriate. It is expensive and time consuming for industry to have to tender on that basis and the fragmentation of orders that it can cause mitigates against continuity of workload and retention of capabilities.

3.22 Due to the lack of sufficient defence work to sustain substantial competition, the Committee favours in principle the concept of specialisation because it sees this as providing the only practicable way of achieving some degree of workload continuity and capability development in the areas of high

and relatively high technology that are relevant to defence equipment. It considers therefore, that, for a significant amount of defence business, selective tendering in one form or another is highly desirable. The actual form it should take and the degree of competitiveness that might be achievable would be determined by the characteristics of the particular requirement, but the Committee would expect any specific case to fall within one of the categories outlined in paras 3.17-3.20. With regard to specific allocations the Committee considers that appropriate control measures could be instituted which would eliminate the possibility of impropriety, but would not unduly restrict procurement procedures.

THE USE MADE OF INDUSTRY IN SUPPORT OF DEFENCE

Defence Industrial Policy

3.23 The policy of the Department of Defence in respect of defence industry gives priority to those activities which provide support for the existing forces on current and foreseeable tasks and in lower level contingencies which could possibly arise at short notice. Lower priority is given to the establishment and maintenance of production facilities appropriate to large scale contingencies which are assessed as being less likely and more remote in time. While recognising the importance of maintaining industrial capability at a sufficient level to permit industrial expansion to keep pace with force expansion, it takes the line that in current strategic circumstances diversion of resources to bridge the acknowledged technology gaps could not be justified on a national priorities basis. It might be argued that the Department gives insufficient recognition to the requirement that would exist for a rapid build-up in self-reliance in the type of high level conflict

situation postulated by the Committee, or of the problems there would be in reaching an adequate measure of self-reliance from a position such as now exists in which there are many quite serious deficiencies in capability. Some of the more important of these deficiencies are mentioned in the chapters dealing with specific industries.

3.24 The Committee was informed by the Department that, within the framework of its industrial policy, some 60-70% of defence expenditure on the purchase of equipment and stores and the repair and overhaul of equipment has been spent in Australia in each of the last five years. The figure in 1975-76 was $252 million or 63% of a total of $400 million. The Committee notes however that of $138 million included for new capital equipment for the Services in that total, about 75% was spent overseas and that there are other inclusions which make the percentages somewhat misleading when relating them to the real impact on defence industry.[1]

Research and Development

3.25 The Committee was informed by the Department of Defence that the main task of the Defence Science and Technology Organisation (DSTO) is to maintain a data base for Service use on the state of the art in defence science and technology which, because of the degree of sophistication of the equipment used by the Services, requires coverage of a broad spectrum of technologies. It gains access to overseas technology through various technical co-operation programmes and arrangements. It keeps abreast of laboratory techniques and capabilities that are of relevance to Australian defence. It undertakes studies

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in such areas of defence interest as force structure, strategy and major equipment selection. It provides direct assistance in the Services' equipment acquisition process. These are functions which in the main are outside the scope of industry and which, in a number of cases, must by their very nature be performed by Government officials rather than by representatives of private industry. The area of greatest interest to industry, that of new equipment development, occupies about 20% of the DSTO resources. Total expenditure by DSTO including that arising from equipment development is in excess of $100 million at the present time.

3.26 Representatives of industry in their evidence to the Committee were critical of the small amount of defence equipment design and development undertaken in Australia and of the lack of continuity of such work as is undertaken. They claim also that a very much larger share of defence research and development expenditure should be spent in industry, some suggesting that the share should be consciously increased to as high as 50% over the next ten years.

3.27 In respect of industry's point of criticism the Department of Defence stated that Australia cannot undertake economically the design and development of all its equipment and that, because of the availability of equipment from other countries and a desire to avoid waste of resources in duplication, most major equipment in use is of overseas design. It saw no prospect of keeping a number of separate firms occupied in this type of activity and in turn was critical of the firms for not of their own volition having the initiative to get together in partnerships or consortia in order to widen

capability and minimise fragmentation of the available work. The Department also pointed out the difficulty of specifying in areas of rapidly advancing technology the characteristics required of a product that will take several years to design, develop, produce and make operational. It argued that a commitment to the development of such a product implied either a commitment to its eventual use even though a better or cheaper product might have emerged elsewhere, or a willingness to speculate on success and accept the risk of failure.

3.28 The Committee accepts that there are limitations to the extent and complexity of equipment design and development that can be done locally and that inevitably there will be the continuing need for many years to use major equipment items that are mostly of overseas design. It does not accept, however, that it is any more difficult for Australia than for any other country to specify the characteristics against which the development of a new product might be undertaken. Quite complex products that have, in fact, been taken from ab initio design to in-Service use have been eminently successful in satisfying requirements, in maintaining professional skills and in providing manufacturing workloads.

3.29 The Committee is greatly concerned by the failure of the Department of Defence to have more of its equipment developed in Australia. It recognises that high start-up costs are involved but it considers that a practice of adopting overseas designs in all cases would ignore the real probability that locally designed and developed equipment would better meet the local requirements, would receive stronger in-service support and could well prove to finish with lower whole-of-life costs. It is concerned that Australia is effectively subsidising

overseas research and development on defence equipment when the gaps in technological capability and self-reliance are widening and must continue to widen unless more positive attitudes are developed towards the merit of doing things locally.

3.30 In respect of their claim for a greater share of defence R & D expenditure (vide para. 3.26) the industry representatives expressed concern at the comparatively extensive use by the Department of Defence of in-house facilities, particularly at WRE, for research, design and development work of an applied nature. They claimed that such activity when product oriented is more appropriately carried out by industry because, if it is to be implemented effectively, with minimum delay and with maximum long term benefit, it needs to be done in the factory environment, where from the outset the design takes into account the techniques and processes involved in subsequent production and thus avoids the need for extensive re-design after the prototype stage, and where the advantages of "spin-off" can best be utilised and exploited. They took the view, too, that the stimulus provided by such work plays an essential part in the retention and development of technological capability in industry.

3.31 The attitude of the Department of Defence is that as a general rule the applied research and initial design work relevant to a possible new project would be done in-house and that industry would be brought in to undertake the development steps from the prototype, which may be little more than conceptual, to the fully engineered product. The Department takes the view that this procedure helps it to maintain competence across the range of its scientific and technological responsibilities

and at the same time makes best use of the available resources in skills, capabilities and facilities that exist both in its establishments and in industry.

3.32 The Committee considers it extremely important that industry be involved to the maximum extent feasible in design and development programmes because only in this way does it appear possible to sustain a fully effective defence support capability. It believes also that association with advanced technology defence equipment must be utilised to the full in developing the industrial technology base in the wider national sense. At the same time, however, it cannot ignore the very considerable defence importance of the Department's establishments and of the need to ensure that the younger scientists and engineers in those establishments are given the opportunity to develop their expertise by involvement in such programmes and by overseas attachments.

3.33 Two aspects of the Department of Defence attitude give the Committee a measure of concern. Firstly, it would expect that it is in the conceptual stage of new project design that the greatest professional interest is gained and that, when isolated from this part of the activity, the competence and motivation of the industrial design personnel could suffer. Secondly, it considers that, unless industry is brought in at a very early stage of a new design and is able to provide a production engineering influence on that design almost from the outset, there is a very real probability of substantial delay when the project is passed to industry while re-design for production is undertaken. This in turn could lead to cancellation of the project because of its impact on cost and

because in the meantime a suitable overseas designed product may have emerged. The Committee is firmly of the view, therefore, that, where feasible, industry should be given ab initio responsibility for design and development programmes. It recognises, however, that there will be cases where that will not be feasible, and in such cases, considers that industry should be involved at the earliest practicable stage.

3.34 The Committee believes that perhaps more consideration should be given to ways and means of involving industry in co-development programmes with another country or countries. It realises that a virtual pre-requisite is a requirement by each country for basically the same product at about the same time but notes that there have been past successes in this category, Jindivik being one and the overall Barra Sonobuoy system being another. In 1968 CAC designers worked with British Aircraft Corporation designers in UK on a design study aimed to satisfy a then existing RAAF requirement for an advanced trainer. The Committee understands that it did not proceed beyond the study stage partly because there was no parallel RAF requirement and partly because the numbers needed by the RAAF were too few to justify the risk of moving into a full scale programme.

3.35 The Committee is not in a position to assess what particular percentage of the defence research and development funds might be spread to industry. There is clearly a large proportion of those funds required to cover the expenditure involved in meeting those Departmental science and technology responsibilities that are beyond the ambit of industry. However, the Committee does wish to see a greater recognition of the importance of developing the technological capabilities of industry.

Industry Participation in Overseas Procurement

3.36 During the course of its investigations the Committee has become aware of the various ways in which industry can become involved when products of overseas origin are purchased. Historically the pattern has been local manufacture under a licence arrangement of the product being purchased. This procedure has tended to be expensive because the production establishment costs have usually been disproportionately high in relation to the manufacturing costs for what in most cases have been short production runs. A more recent approach looks to the negotiation of a co-production arrangement under which Australian industry would make components of an overseas product for all customers, preferably as a sole source. This would normally be associated with a partial local manufacturing programme and components made under the co-production arrangement would be fed into the local assembly line. This approach has much to recommend it but has so far been relatively unsuccessful because ideally it requires a decision to purchase a product before that product has gone into production in the country of origin. The longer the decision is delayed the less the prospect of achieving a useful arrangement. The Committee believes, however, that it is an approach which should always be closely investigated during the competitive phase of any overseas procurement.

3.37 Another area of involvement is through offset contracts in which there has been mixed success. Aerospace has been the industry which has most benefitted from a Government policy which seeks to commit overseas suppliers to provide an

offsetting workload in Australian industry. The problems in enforcing a commitment are discussed later in paras 5.77 - 5.79.

3.38 The offsets policy which was endorsed by the Government in 1970 has resulted in orders on local industry worth about $140 million. This is a significant figure but it appears to the Committee that the policy is pursued less rigorously by some Departments and instrumentalities than by others. Quite obviously, if this policy is to be effective there must be strict adherence to it by all purchasing authorities.

Maintenance Support

3.39 The Services make substantial use of industry in the overhaul, repair and modification of defence equipment. Reference is made to this activity in the appropriate industry chapters.

PROTECTION FOR AUSTRALIAN DEFENCE INDUSTRY

General Comment on the Need for Protection

3.40 The Committee has been concerned to note from the evidence received that the practice in defence procurement appears to be first to look overseas for equipment before giving attention to the possibility of obtaining it locally. This is perhaps understandable in the short-term because in many cases there are delivery delays and substantial initial cost penalties incurred in using local industry. It concerns the Committee, however, that it is a practice which mitigates against the achievement of long-term self-reliance and ignores the possibility of closed supply lines and the restriction that it can place on national independence.

3.41 The Committee is well aware that there are significant limits on what can be done locally but as stated already in para. 3.29, it is deeply concerned that gaps in technological capability are widening and that not enough is being done to change that situation. What the Committee wants to see is a change in attitude which will lead to a careful assessment of the possibility of local procurement preferably before, but certainly not later than, consideration is given to an overseas source. A decision giving preference to the overseas source should necessarily be supported by reasoned argument.

3.42 If Australia is to be able to withstand the type of high level conflict situation that the Committee has postulated in Chapter 2, then clearly much more must be done to build up local capability before the event. Procedures must be accepted that allow pricing of defence production on a basis that wherever possible the price to the Services of the locally produced article is competitive with that from overseas. Consideration must also be given to the possible need for a "Buy Australian" policy. These issues are considered in the following paragraphs.

Costing procedures and pricing policies

3.43 In the course of its investigations the Committee has examined the basis on which work for the services is priced and the influence this might have on the level of work placed with local industry and hence on the level of local capability.

3.44 For those companies and undertakings which are very largely dependent on defence for their workload there has, for the most part, since World War 2, been insufficient work to match the available capacity, the level of work has been subject to relatively large and frequent fluctuations and the general atmosphere has not encouraged the extensive up-dating of plant and equipment that has really been necessary. The result has been high costs because productive man-hours have been too few to absorb the overheads and continuing efficiency of operation has been hampered by the inadequacies of plant and the lack of workload stability.

3.45 For many years the costing procedures and pricing policies applied to the government factories, now operated by the Department of Productivity, have made allowance for the need to maintain defence production capacity at a level in excess of that required for peacetime operations. It was considered that it would be wrong in principle for Service orders to have to carry the burden of this excess capacity and that in practice it would act to deter the Services from placing orders locally. For this reason direct labour on defence work has been priced at what is called the "normal manhour rate", being broadly the rate which would recover all direct and overhead costs that would be incurred when operating at full single-shift capacity. Because a substantial part of overhead is fixed, this pricing basis ceases to recover all costs when the level of work declines below that matching single-shift capacity. Such unrecovered costs are met from an appropriation item known as "Reserve Capacity Maintenance - Government Factories".

3.46 For reasons dealt with in more detail in paras 4.54 and 4.55 but primarily because of a very severe drop in defence orders over recent years, a special "defence munitions manhour rate" was introduced in 1976/77 in those government factories involved in munitions production. This recovers only the cost of the direct worker - what he is paid and the provisions made for his leave, contingent compensation liabilities, etc. While this has meant a substantial increase in the Reserve Capacity Maintenance (RCM) appropriation, it is claimed that there is added inducement for the Services to buy locally rather than overseas because of the marked reduction in the amount charged against individual Service orders.

3.47 In attempting to augment an inadequate defence workload, the government factories have from time to time been permitted to seek non-defence work of a nature that in general should assist in the retention of skills. The pricing of such work has been on the basis of what the market will bear subject to recovery of at least all direct costs and those overhead charges directly associated with doing the work. Such contributions as have been made to fixed overheads have reduced the cost of maintaining the factories.

3.48 The actual manhour rates on the above three bases vary from factory to factory but the Committee understands that for example the current rates at one of the munitions factories are approximately:

Normal manhour rate	$12.60 per hour
Defence munitions manhour rate .	$ 5.60 per hour
Non-defence manhour rate	$ 9.20 per hour

If all costs were to be absorbed in the predicted workload for the year the rate would have to be about $23 per hour.

3.49 The RCM concept has in recent times been extended to the two main private companies in the aerospace industry, Commonwealth Aircraft Corporation Ltd (CAC) and Hawker de Havilland (Australia) Pty Ltd (HDH). Both of these companies are heavily dependent on a defence workload. Each operates facilities which are considered by Department of Defence to be an essential part of the defence industry base and in which there is very substantial government investment in land, buildings, plant and equipment. Both companies are permitted to undertake work against non-Australian-defence orders using government facilities with the

proviso that such orders are priced to recover all costs associated with doing the work and, in the aggregate over any one financial year, make an agreed but relatively small contribution to fixed costs.

3.50 It is to be noted that the private sector of industry must bring to account such real items of expenditure as interest on capital, taxes, insurance, depreciation, etc. which are not a charge in government factory accounting arrangements. This puts the private sector at some disadvantage when competition with government factories is involved. The Committee understands, however, that in the case of the munitions factories there is in fact very little competition with private industry and that where CAC and HDH are competing with the Government Aircraft Factories (GAF), which again is not common, any disadvantage in pricing is minimised by the reserve capacity maintenance provisions applicable to all three.

3.51 The Committee was informed that the 1976/77 appropriation for RCM is $48.3m, of which $31.0m relates to the Munitions Factories and $17.3m to the aerospace industry (comprising $6.3m to GAF and $11.0m to the private sector).

3.52 The provision of funds for the maintenance of essential capacity is accepted by the Committee as being necessary while that capacity is only partially used. It is obviously more desirable, however, that the level of workload be increased, preferably by work of a defence nature, because it is work, not funds, that exercises and maintains capabilities. More

non-defence work could probably be obtained by lowering the manhour charging rate but the Committee recognises that this would allow the defence supported industry to compete unfairly with established private industry in the majority of cases.

3.53 If workload remains inadequate and it can be demonstrated by a soundly based forecast of future defence need that existing capacity is excessive then clearly that capacity should be reduced. The Committee stresses however that in its view the forecast would not be soundly based if it did not take into account the industrial need in the possible conflict situations postulated in Chapter 2.

3.54 Consideration was given by the Committee as to whether the RCM concept might appropriately be extended to other industries which are involved in defence work. It noted that those industries (munitions and aerospace) for which RCM is now appropriated were established for defence purposes, are regarded as defence essential and are almost totally dependent on defence work for their existence. It noted, too, that no other industries appear to be in this category in a total sense but that there are sections of some companies, perhaps particularly in the electronics field, that do meet the test of defence essentiality although not that of total dependence on defence. The Committee has doubts as to the practicality of applying RCM to such sections, where defence work would in general be providing only a minor portion of the overall work-load, but, because of the importance it places on the retention of capabilities, considers that further study of this aspect is necessary.

"Buy Australian" Policy

3.55 It has been suggested to the Committee by several witnesses that the Government should establish a "Buy Australian" policy. The inspiration for this has been the Buy American Act of 1933 which applies to government purchasing in the USA. This Act contains strict regulations covering the American content of all government purchases and provides a margin of as much as 56% for the local product in the case of defence equipment. However, purchasing decisions made in the US have been the subject of constant litigation and appeal because of the strict percentage guidelines laid down in the Act and Executive Orders made under it. The Committee considers that a similar Act in Australia would suffer no better fate and would prefer to see the procurement process unhindered by more regulation than is necessary.

3.56 It was the view of industry that a policy involving Ministerial discretion as to the level of protection in a particular case is preferable to the strict regulatory provisions of an Act of Parliament. The Department of Defence also stated its preference to be for a discretionary policy, commenting that, if the level of preference were fixed the Department would be forced to purchase all its low technology equipment in Australia at a premium and as a consequence would have reduced ability to subsidise the more desirable high technology work which might require a higher premium than any Act could reasonably specify. Eventually this would mean that only low technology products would be purchased from Australian industry.

3.57 There is currently no centralised government purchasing in Australia. However, there is a Ministerial Sub-Committee under the chairmanship of the Minister for Administrative Services, which was set up to examine cases in which a discretionary preference might be given to Australian products in order to build up particular capabilities that might be considered necessary for reasons of national interest. The initiative for referring such cases to the Sub-Committee rests with the Department making the purchase so that unless a specific request is submitted by that Department no consideration is given to Australian preference. In fact it is not necessary for tenders to be called in Australia if the purchasing Department is of the opinion that the local product is unsuitable. Furthermore a Department making a purchase is free to indent directly from overseas.

3.58 A further factor which tends to encourage overseas procurement is that customs duties are not payable by Government Departments. Long established government policy requires that, when considering overseas tenders for a government purchasing contract, account must be taken of applicable duties in the comparison of prices. However, reasons can often be advanced as to why a local product is unsuitable and therefore, even if the price is competitive on a duty paid basis, such a product may not be favoured when a decision to purchase is made.

3.59 The Committee feels strongly that a "Buy Australian" attitude of mind must be developed. It believes that it is not the "Buy American" Act by itself which determines the outcome in US Government purchasing decisions but rather an attitude of

mind which shows a positive preference to buy the home product wherever feasible.

3.60 The Committee is of the opinion that, in the defence area, the building up of a local technology base should be an important consideration in any procurement decision. If procurement procedures do not recognise this factor then a system needs to be set up within the Department of Defence which will ensure that defence purchasing decisions are taken only after proper consideration has been given to local products, if any, which may warrant discretionary preference.

3.61 Because it considers that at all times the criteria for local v. overseas purchasing decisions must be public, the Committee concludes that a publicly declared "Buy Australian" attitude is necessary. It concludes also that the policy should be kept continually under review and that if it is not being properly implemented consideration may then have to be given to the difficult task of drafting appropriate legislation.

4. THE MUNITIONS INDUSTRY

INTRODUCTION

The Nature of the Industry

4.01 The Munitions Industry exists to undertake the production of military weapons, ammunition, equipment and stores needed by the Armed Services. In the Australian context, and indeed in generally accepted terminology, its capabilities do not include the manufacture of warships, military aircraft, guided weapons or defence electronics. The industries having those capabilities are treated in subsequent chapters.

4.02 As in many other countries, the peacetime industry in Australia consists primarily of a series of Government owned and operated munitions factories supported as necessary in supply and/or sub-contractor roles by commercial industry. Their existence is solely for strategic reasons and is virtually entirely dependent on Service orders.

The Industry Prior to World War 2

4.03 Munitions production in Australia commenced in 1888 when the privately owned Colonial Ammunition Company established a factory at Footscray, Victoria, and produced ammunition for the Colonial governments of that day.

4.04 In the early 1900s the Commonwealth Department of Defence undertook investigations into the manufacture of cordite for small arms ammunition and the manufacture of rifles. The results were the establishment of an explosives factory at

Maribyrnong, Victoria, which started production of cordite in 1912, and a small arms factory at Lithgow, New South Wales, which was officially opened in mid-1912. During World War 1, this latter factory achieved an output rate of 30,000 rifles per year from plant designed for half that rate and substantial numbers of rifles were shipped to the United Kingdom.

4.05 Apart from rifles and ammunition not a lot was achieved in the munitions production field during the 1914-1918 war. It is noteworthy however that some 5,000 Australians went to the UK as munitions workers and many gained experience which was later to be of great value as the Australian munitions industry developed. Also of great value was the purchase in the UK immediately after the war of a large quantity of surplus machine tools for a fraction of their real worth.

4.06 In 1921 the Government leased the Colonial Ammunition Company facilities at Footscray and in 1927 purchased them outright. At about the same time the explosives factory at Maribyrnong was expanded to be able to make a wider range of explosives and to undertake shell and bomb filling, and an ordnance factory was established, also at Maribyrnong, initially to make tools, then shells and later guns, the first of which (a 3" gun) was not completed until the end of 1936.

4.07 Of great significance to the future of Australia's industrial base was a decision in April 1938 to establish armament annexes for the manufacture of munitions in industry and in State Government instrumentalities, such as railway workshops. The decision was in line with the generally accepted

concept that the government munitions factories should operate on a small but economic scale in peacetime, keeping abreast of developments in manufacturing techniques and processes and providing the base for the wartime expansion of industry. It not only led to an extremely successful association between industry and the Government owned and operated factories but also was almost certainly the primary cause of the enormous development of industrial capacity and competence during the 1939-1945 war.

The Industry in World War 2

4.08 At the outbreak of war the effective Australian munitions production capability existed almost entirely in the four Government factories already mentioned in paras 4.04 and 4.05. During the next few years there was an immense expansion of capacity for the manufacture of a wide range of munitions. New Government operated facilities[1] were created, many of them in country areas, and industry-operated annexes[2] rapidly came into being in all States of the Commonwealth. Originally it was proposed that there should be about 20 such annexes; in the event that number grew to a peak in the order of 200 in 1943.

4.09 Production of rifles, guns, small arms ammunition, shells, bombs, fuses and many other high usage stores reached substantial levels. For instance, more than 400,000 0.303 in. rifles were produced during the war in the Lithgow small arms factory and in a series of new factories that were built in western New South Wales. The peak rate of output was 136,000 in 1943.

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1. Vide Annex 4.1
2. Vide Annex 4.2

4.10 There was a heavy demand for explosives and propellants and for shell and bomb filling capacity. To cope with that demand major new facilities were created at St Marys and Mulwala in New South Wales, at Albion in Victoria and at Salisbury in South Australia.

4.11 To meet the requirements for guns and their mountings, particularly large calibre naval guns, a new heavy ordnance factory was built at Bendigo in Victoria in 1942. The ordnance factory at Maribyrnong was expanded to provide for a wider range of activities, including ball bearing manufacture which in 1943 was transferred to a new factory at Echuca in Victoria.

4.12 In 1940 a programme to develop and produce a medium (30 ton) tank was put in hand but it did not get beyond the manufacture of prototype and early production models before it was decided in 1943 to use the resources for what were considered to be higher priority tasks. Sixty-six tanks were produced but were never used operationally.

4.13 During the course of the war, capabilities existing at some Australian universities in the field of optics were enlisted to assist, organise and educate industry in the manufacture of such essential optical instruments as periscopes, prismatic compasses and gun sights.

The Industry Post-World War 2

4.14 Very shortly after the cessation of hostilities many of the production facilities had either been closed down or put to other uses. Some Government owned and operated factories established during the war were retained for continuing munitions production purposes, others were taken over by commercial industry.

The large explosive factory at Salisbury became in 1947 the headquarters for the joint UK-Australia Long Range Weapons Establishment and many of the widely dispersed buildings were used as laboratories or for test missile preparation purposes.

4.15 The explosives factory at Albion, which had been managed for the Commonwealth by ICIANZ and had been closed down at the end of the war, was re-opened in 1954 for the manufacture of high explosives.

4.16 The only substantial new facility built since the war, the munitions filling factory at St Marys, was constructed on a site adjacent to the wartime St Marys factory, which had become an industrial estate, and commenced operating in 1957.

4.17 By that time the munitions industry consisted essentially of eight government owned and operated factories supported by a large number of commercial companies supplying goods and services or acting as sub-contractors. Four of the factories were for the production of engineering type stores and four for explosives production and filling. They were:

Small Arms Factory, Lithgow (SAF)	)
Ammunition Factory, Footscray (AFF)	) Engineering
Ordnance Factory, Maribyrnong (OFM)	)
Ordnance Factory, Bendigo (OFB)	)
Explosives Factory, Maribyrnong (EFM)	)
Albion Explosives Factory (AEF)	)
Mulwala Explosives Factory (MEF)	) Explosives
Munitions Filling Factory, St Marys(MFF))	

4.18 Since 1945 the factories have been involved in satisfying many different defence requirements, some of the more important programmes in respect of workload having been the FN rifle, 7.62 m.m. ammunition production, 4.5 in. naval gun mountings, 4.5 in. and 105 m.m. shell production, fuses of various types, RDX high explosive and solid fuel rocket motors for the locally developed Malkara and Ikara guided weapons.

4.19 In the period since 1945 there have been some severe workload fluctuations during which the factories have from time to time been forced actively to seek non-defence work to augment their workload. Following the quite major decline at the end of the war there was a build-up in the early 'fifties to satisfy increased defence requirements during the Korean War. There was then a gradual decline to a serious trough which bottomed in 1965. Substantial defence orders created another peak in 1970 but since that time there has been a major decrease in ordering level, some of the more important reasons having been:

- the reduction in usage of ammunition and other expendable stores since the Vietnam involvement and the cessation of National Service training;
- the completion of stockpiling programmes undertaken in the 'sixties;
- the availability for training usage of excess reserves of some expendable stores without the need for new production.

The problems this has created for the factories is considered in para 4.29 et seq.

Control of the Government Munitions Factories

4.20 Throughout their history the Government Munitions Factories have operated under direct Departmental control.

From their inception until early 1939 that control was exercised by the Department of Defence, in which in 1921 a Munitions Supply Board was established with responsibility for developing munitions manufacturing capacity and a Contracts Board (as part of the Munitions Supply Board) with authority to control contracts, purchases and sales for the Department. In 1933 a Principal Supply Officers' Committee was set up in the Department of Defence to plan for war in respect of munitions and supplies, including the potential use of the nation's industrial resources in the manufacture of munitions.

4.21 In April 1939 a new Department of Supply and Development was created which took with it the two Boards and the Supply Committee referred to above and hence responsibility for the munitions factories. The very important Supply and Development Act of 1939 which gave the Department its charter is still basically the Act which inter alia provides the authority for the operation of the factories.

4.22 In June 1940 the munitions and aircraft production activities were transferred to a new Department of Munitions and what remained of the Department of Supply and Development was transferred in October 1942 to form part of a new Department of Supply and Shipping. In the meantime in June 1941 aircraft production was taken from Munitions with the creation of a separate Department of Aircraft Production and was returned to it in November 1945.

4.23 In April 1948 the Department of Supply and Shipping, shed of some of its functions, once again became the Department of Supply and Development, into which the Department of Munitions

was immediately re-absorbed and from which the Department of Supply emerged in March 1950 as little more than a change in name. It was the Department with responsibility for defence industry and its main relevant functions were munitions and aircraft production, defence research and development (including the operation of the newly created Long Range Weapons Establishment at Salisbury and Woomera in South Australia), defence facilities planning and defence contracting. It was thus a Department with a major part to play in defence logistics and it continued in this role until it was disbanded in June 1974. There was a period of seven years from 1951 to 1958 when the munitions and aircraft production functions were passed to a new Department of Defence Production but that Department and Supply worked so closely together as to be almost the one Department.

4.24 When the Department of Supply went out of existence in 1974 its functions were widely dispersed. Research and development went to the Department of Defence as did responsibility for all defence industry other than the aircraft industry. Contracting went to the Department of the Special Minister of State. Control of the operation of the Government factories and responsibility for the aircraft industry formed part of the functions of a new Department of Manufacturing Industry which in December 1975 was replaced by a Department of Industry and Commerce. In October 1976 those functions were taken from Industry and Commerce and put with a new Department of Productivity where they still remain.

THE PRESENT STRUCTURE OF THE INDUSTRY

4.25 The structure of the industry remains basically as was set out in para 4.17, with eight government owned and operated

factories supported by commercial industry in a sub-contractor role or as the supplier of such items as materials, forgings, castings and tools and gauges.

4.26 The main capabilities embraced in the four engineering factories (SAF, Lithgow; AFF, Footscray; OFM, Maribyrnong; and OFB, Bendigo) are:

- manufacture of ordnance and general engineering equipment;
- manufacture of small arms ammunition, fuses, primers and cartridge cases;
- manufacture of rifles, machine guns and personal weapons;
- manufacture of projectiles, rocket motors and missile launchers;
- manufacture of aircraft bombs;
- reconditioning of guns and gun mountings;
- machining and fabrication of miscellaneous products within the range of light and heavy engineering.

4.27 The main capabilities embraced in the four explosives factories (EFM, Maribyrnong; AEF, Albion; MEF, Mulwala; and MFF, St Marys) are:

- manufacture of military type explosives;
- manufacture of gun and rifle propellants;
- filling and assembly of military explosive stores;
- manufacture of rocket propellants and assembly of rocket motors;
- rocket motor design and development

- essential ancillary capabilities to sustain the above end-capabilities, e.g. acid treatment, rocket motor insulation, nitroglycerine manufacture.

4.28 The industrial companies that provide the necessary peacetime support for munitions production are in business primarily for commercial purposes in their areas of specialisation and are not dependent on defence work for their continued existence. An exception is the small but important precision optics industry, with skills that have no counterpart in the government factories and with much of its special plant and test equipment provided by what is now the Department of Productivity on a hiring basis. The Department in fact has a substantial amount of munitions plant and equipment on loan or hire to commercial industry for defence production purposes.

THE PRESENT STATE OF THE INDUSTRY

4.29 In all the munitions factories there has been a very considerable decline in defence workload over the last seven or eight years. In 1969-70 the eight factories together employed about 7,200 people and had a total workload of approximately 5¾ million manhours, 80% of which was on Australian defence orders and 20% on defence type equipment for export and a miscellany of commercial orders. By 1972-73 employment was down to a little over 6,000 and the workload to a total of about 3⅔ million manhours; by 1975-76 the approximate figures were 5,000 and 2⅓ million respectively. The present employment level (April 1977) is 4,700 and the total workload in financial year 1976-77 will be about 2 million manhours, of which approximately 64% will be on Australian defence orders. The defence workload has thus fallen from 4.6 million manhours in

1969-70 to 1.3 million manhours in 1976-77, a decrease of almost 75% in the seven years.[3]

4.30 The Committee was advised by the Department of Defence that it has been agreed by the Government that in none of the munitions factories should the workforce be allowed to fall significantly below the minimum level assessed as necessary to maintain the skills and technology required for essential defence capabilities. That level is defined as the Critical Labour Level and is subject to continuing review as changes arise in the nature of the defence requirement.

4.31 Work done in the factories is priced on a basis that excludes the cost of retaining for an emergency capacity in excess of that needed for peacetime operations. This procedure is detailed in Chapter 3 where it is noted that the difference between total operating costs and recoveries from sales is met from a reserve capacity maintenance (RCM) appropriation. Operating costs rose from $46 million in 1969-70 to $56 million in 1975-76 whilst recoveries decreased from $43 million to $35 million in the same period. The RCM subsidy increased therefore from $3 million to $21 million in that six year period and in 1976-77 is expected to rise further to almost $30 million.[4]

4.32 In 1969-70 the total labour force was fully engaged in satisfying firm orders for defence or non-defence work. The Committee was informed that, despite energetic efforts to obtain non-defence work, because of the decline in workload and the

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3. Evidence received from Department of Productivity
4. Evidence received from Department of Productivity

policy of non-retrenchment there were in 1975-76 about 350 people who were not gainfully employed and hence were contributing nothing to revenue. The cost of retaining these people had of course to be met from the RCM appropriation. It is understood that normal wastage has reduced the number in this category to about 160 at the present time and that total strength is still a little above Critical Labour Level.

4.33 The total book value of plant and equipment in the factories is about $92 million. Much of it is obsolete, some machines being as old as 55 years, and much of it is in worn condition and unsuitable for close tolerance work. For many years there was substantial expenditure on the purchase annually of replacement plant and on the purchase from time to time of such plant and equipment as was needed for specific manufacturing programmes (e.g. the re-equipping of SAF, Lithgow for FN rifle production). In the recent climate of declining defence workload, however, it has been difficult to justify any significant plant replacement programme despite the productivity benefits that would undoubtedly accrue. The Committee was informed that, whereas at the end of the 'sixties expenditure for this purpose was in excess of $5 million per year, over the last three years it has been less than $1½ million per year or only a small fraction of the earlier figure when the erosion of inflation is taken into account.

4.34 The reduced level of defence work in the government factories has led to a reduction in the amount of work sub-contracted to, and the value of supplies bought from, commercial industry. The effect on the state of individual firms has no doubt varied from firm to firm but in general

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should not have been of great consequence.

STRATEGIC NEED FOR THE INDUSTRY

The Department of Defence View

4.35 The Department of Defence has submitted in evidence to the Committee that ".... a local munitions manufacturing capability is and will remain an essential element of the total Australian defence capability." It regards the existing abilities of the munitions factories to be generally adequate for producing most of the types of ammunition, guns and general ordnance stores used by the Services. It considers it to be economically impracticable, however, to produce in peacetime all of the wide range of munitions that are required, frequently in small numbers. The important need in the Department's view is to maintain the basic skills and technologies of the industry so that capacity can be expanded within a reasonable warning period to meet requirements for most of the types of munitions now imported, particularly those of a high usage nature.

The Committee's Attitude

4.36 The Committee considers that the munitions factories should have the capability and capacity to provide on a regular basis in peacetime all the needs of the Services for high usage, expendable type munitions and that in a low level conflict situation it should if necessary be able rapidly to mobilise its resources and expand output to a level which would keep the Services supplied.

4.37 In the Committee's view a sufficient range of capability and in-depth skills should be maintained in the munitions factories to form the base for timely expansion of

capacity both in the factories and in commercial industry to enable local production of all Australia's munitions requirements in the event of the sort of high level conflict postulated in Chapter 2.

EFFECTIVENESS OF THE INDUSTRY IN SATISFYING THE STRATEGIC NEED

Capabilities and Deficiencies

4.38 Almost all the munitions items used by the Australian Services are of overseas design and many are supplied from overseas sources. The local munitions factories do nevertheless have the ability to produce a wide range of those items, and to a standard of quality that, in the view of some who gave evidence to the Committee, is higher than in most overseas countries. They have also a limited capability, in conjunction with the Defence R & D establishments, to modify the design of some types of overseas supplied equipment and stores for such reasons as to permit the substitution of local materials, to overcome design defects or to effect improvements in produceability, quality, performance, safety or cost.

4.39 Although the factories have the technical competence and basic skill to produce most types of munitions, concentration has tended to be on the high usage items which give long production runs, e.g. rifles and the various types of ammunition and their fuses. The larger and higher unit cost types of store such as armoured fighting vehicles are normally bought overseas, primarily because in general they are needed only in small quantities. In the opinion of the Department of Defence, the high cost of establishing the necessary capacity for their production can rarely be justified particularly in those cases

where only a short term workload would result and where substantial tooling and new machine tools would be involved. There are other more sophisticated types of store such as torpedoes where the establishment of a local production capability in the munitions factories would require a significant expansion both of technical know-how and of plant and equipment.

4.40 There are thus deficiencies in the manufacturing abilities of the factories brought about largely because economic considerations have over the years placed limits on the types of munitions to be produced locally, and hence on the acquisition of the wider range of machine tools and equipment and, in some cases, of the specific sorts of expertise that would be needed to give an across-the-board capability.

4.41 The Department of Defence has advised the Committee of deficiencies in the local availability of some materials and components used in some of the stores that are being locally produced. They gave as examples steel tubing for bombs, steel armour plate, several chemical products and electro-slag refined steel for new generation gun barrels. They saw such deficiencies being overcome by the installation of plant to operate on a non-economic basis or by stock-piling the deficient material. The Committee is concerned that the latter may too frequently be the preferred course when in the interest of self-reliance the proper solution would be the former. A case brought to the notice of the Committee was the possible purchase by commercial industry of an electro-slag refining unit at an installed cost in the region of $2 million. Government assistance was sought because the company considered that the main initial use would be for defence purposes and that time would be needed to develop

the wider use that could make the plant economically viable. The assistance has not been granted.

4.42 The Department of Defence attitude in respect of original design is that local activity is justified where there is a specific Australian need not met by overseas designs. It sees it as an unwarranted expense, however, to conduct original design in the full range of Service munitions in the present circumstances where proven designs are available under reasonable conditions from overseas.

4.43 Having noted the benefits both to the Services and to industry that have accrued in the aerospace field from the local ability to design and develop such defence equipment as Jindivik and Ikara, the Committee considers it a significant deficiency in Australian self-reliance that only very limited capacity of this nature in both size and scope is available in the munitions factories. It is concerned too that the munitions design activities appear in general to be related more to the modification and correction of deficiencies of overseas designs then to the creation of new stores to satisfy Australian defence equipment. One notable exception brought to the notice of the Committee is the local ability for rocket motor design and development which stemmed from engagement in major aerospace design and development projects (viz. Malkara and Ikara).

Workload Issues

4.44 As noted in para 4.29 the defence workload in the factories has fallen from 4.6 million manhours in 1969-70 to about 1.3 million manhours in the present financial year (1976-77). Some of the more important reasons have already been

mentioned in para 4.19 but briefly stated the decline has been due primarily to changes in strategic circumstances and in stockpiling policies.

4.45 The Committee received evidence, however, indicating that the situation has been aggravated by the Services ordering overseas items within the manufacturing capability of the munitions factories. The lower prices and better delivery times that overseas manufacturers can frequently quote because of continuity and stability of production are undoubtedly attractive to Service purchasing officers. The fact must not be ignored, however, that an already large expenditure for the maintenance of capacity in the munitions factories will continue to grow larger if work is not placed locally. Overseas ordering could in fact prove to be false economy in many cases. Furthermore, purchasing locally not only helps the economics of operating the factories but it also provides the only basis on which skills can be maintained.

4.46 The Committee was disturbed to receive evidence which indicated that items have been bought overseas that were also being produced locally and that some of the overseas products were of inferior quality. Low production quantities and lack of standardisation in the requirements of the three Services already create problems which become compounded if the size of production runs are further reduced by part ordering from overseas. Needless to say the Committee would regard it as indefensible to accept products from overseas to lower quality standards than are demanded from local production.

4.47 Several witnesses, while being of the view that a significant increase in the level of Service orders was unlikely in the foreseeable future, were critical of the current system of piecemeal ordering which they regarded as unnecessarily inefficient and costly because of the number of short production runs that it

involved.[5] The Committee accepted their point of view and welcomed advice by the Department of Defence that a Munitions Factory Workload Committee had recently been set up with representation at an appropriate level from both Defence and Productivity to examine Service requirements with a view to planning the input of work into the factories in the best way to achieve efficiency and the maintenance of skills. The Committee suggests that attention be given also to the achievement of inter-Service standardisation to the maximum feasible extent.

4.48 The Committee was informed by the Department of Defence that when the stockpiling problem became apparent it was not possible to stop production in mid-stream and emergency orders were placed in 1972 to allow an orderly run-down. Shortly thereafter the possibility was canvassed of diverting to the factories defence orders placed overseas and at the same time strong joint Departmental/Union efforts were made to obtain orders to supplement the defence workload. The latter efforts had some limited success but the diversion of defence orders did not prove to be a fruitful avenue. The workload run-down continued and as mentioned in para 4.30, critical labour levels were set for each of the factories as being the minimum workforce levels to maintain the necessary skills. The Committee endorses the concept but considers it to be incomplete without there being a parallel "critical workload level". It sees no point in setting a minimum workforce level if there is an inadequate workload to keep that workforce properly occupied.

5. It was submitted to the Committee by an informed witness that "at the moment we are getting orders, as the Services require them, from the individual Services. They will give us a small order for 76mm today, the Navy will give us a small order for something else tomorrow, the Air Force will order a little 30mm and then the Army will order a little more, so we get a myriad of tiny orders.... If they can give us their delivery requirements over a 5 year period we can then run the production in a position that would give the greatest economy of production".

4.49 The managements of the factories have continued to make strong endeavours to obtain commercial work which would assist in the absorption of some of the overheads not recovered by defence production. The engineering factories have generally been more successful in this than the explosives factories, because their skills are not so narrowly specialised, but they do still have a significant amount of idle capacity. The view was expressed by at least one management that, if more suitable plant was available to it, more commercial work could be attracted. The Committee accepts the need to fill the idle capacity gap, but sees no other value in taking on commercial work unless it is of a nature that utilises and exercises the skills and facilities that must be retained for defence purposes.

4.50 The Committee was informed that less than 5% of the workload of the munitions factories will result in 1976-77 from the sale of its products overseas. It regards this as an unsatisfactorily low figure and considers that, if Australian defence orders are unlikely to rise substantially over the next ten years, then it is imperative that the munitions factories become more active and competitive in the world market. The best way to exercise defence munitions production skills is by making defence munitions.

4.51 In suggesting such action, the Committee is aware of the restrictive nature of Government policy on the sale of warlike stores to foreign countries. It is aware, too, that because most of the locally produced munitions are of overseas design, there would normally be restrictions placed by the overseas country on the territories, if any, into which the Australian factories could sell. The competitive position would

also be unfavourable because the country of origin would almost certainly have larger volume production providing learning benefits that could not be matched by the local factories, which could also be carrying the quite significant burden of licence and royalty fees.

4.52 As evidenced by sales successes with Jindivik and Ikara, products of local design have achieved better penetration of overseas markets than those of overseas design that are produced locally. Indeed the 5% figure noted in para 4.50 stems largely from the munitions factories' share of the workload arising from Ikara sales to UK and Brazil. The Committee sees this as lending further support to the arguments in para. 4.43 concerning expansion of design capability in the munitions factories as a step towards greater self reliance.

The Influence of Costing Procedures

4.53 The procedures for costing work in the munitions factories are dealt with at some length in Chapter 3, where the reserve capacity maintenance concept and the various man-hour rates are described.

4.54 Because of the present extremely low utilisation of capacity and the need to maintain a wide range of capabilities, overheads are disproportionately high and efficiency is low. In view of the propensity of the Services to buy supplies overseas that could be produced locally, the Department of Productivity, with Department of Defence agreement, introduced in 1976-77 a "defence munitions man-hour rate", defined in para. 3.46, as the basis for charging the labour content of Australian defence orders on the factories, with material being

charged as usual at cost.

4.55 The purpose of this concept, which causes substantial increase in reserve capacity maintenance cost, was to reduce the amounts to be borne by the Service equipment votes to a level which would make the local source as attractive to the Service purchasing officers as the overseas sources. The Committee endorses this as a sensible approach in present circumstances and considers that the Services should be instructed that, unless there is overwhelming reason why purchasing overseas is in the national interest, they must purchase munitions items from the local factories wherever possible. The arguments of para. 4.45 cannot be too strongly emphasised.

4.56 The Committee considers that while the factories are working at such low capacity utilisation there should be agreement that the "defence munitions man-hour rate" apply also as the lowest level at which offers may be priced for the sale overseas of local defence munitions products. It recognises, however, that, as and when workload in the factories reaches a level at which the workforce is fully and effectively occupied, the charging rate should be increased to ensure that overseas sales make at least some contribution to fixed overheads and hence assist to reduce the reserve capacity maintenance appropriation.

4.57 In respect of commercial work the Committee is not in favour of quoting at less than the non-defence man-hour rate as defined in para. 3.47 unless it is of a nature that provides very substantial benefit in the retention of a specific essential skill which would not otherwise be exercised. Nor does it wish to see the factories put in a favoured position when competing with

industry for routine commercial work.

Rationalisation of Capacity

4.58 The munitions factories as they exist today were structured to provide production capacities against Service provisioning bases which have for a number of years been no longer applicable in terms of defence planning policy. As expressed by the Department of Defence in evidence ".... they have production capacities in many areas well beyond any we could foresee using in all but major extended conflicts".

4.59 The Committee accepts that argument, and that the munitions industry should be operated as economically as possible, with the proviso, however, that equipment and capabilities must be retained on a scale which allows for rapid expansion in the type of high level conflict situation postulated in Chapter 2. It was informed that the Departments of Productivity and Defence have for some years been studying alternative ways of rationalising the factories so that operating costs can be reduced without the loss of essential capabilities. From advice given to the Committee it is quite apparent that, in the case of the three explosives factories now located at Maribyrnong, Albion and Mulwala, the cost of technically preferable rationalisation plans could be prohibitively high and the savings in operating costs quite small. Studies in respect of the two ordnance factories (OFM and OFB) are still incomplete. As a result no rationalisation decisions have been made.

4.60 The Committee believes that the rationalisation studies should be completed as soon as possible and decisions taken, so that doubts as to the future of individual factories can be resolved and effective long-term planning can proceed.

The Special Case of the Precision Optics Industry

4.61 After World War 2 precision optical munitions work declined to no more than the repair and replacement of prisms, lenses, graticules, etc. In the mid-fifties, however, the optics group at the Weapons Research Establishment did make significant advances in the development of cameras with very wide angle lenses for use in missiles and target aircraft for miss-distance recording purposes. Because substantial quantities of cameras were required, industry within the WRE complex at Salisbury became involved, and there now exists in South Australia a significant precision optics capability.

4.62 The Committee was informed that, although assisted by the then Department of Supply with the provision of plant and test equipment on a hiring basis, the small industry has had continuing problems in maintaining technical viability. Various reasons were given, including an almost complete lack of Service orders despite the increasing use and importance of optical systems in so many military equipments. It is quite clear that on defence orders the industry cannot be competitive with overseas suppliers because demand is not generating the production quantitie needed to amortise research and development outlay.

4.63 The Committee believes that unless further helped this industry could fall by the wayside and another deficiency in defence industry capability be created.

CONCLUSIONS AND RECOMMENDATIONS

Problem of the Industry

4.64 The Committee sees the munitions industry as an essential national defence industry which is in serious decline as the result

of a very severe decrease in defence workload since 1970. In the government munitions factories, which form the backbone of the industry, the workforce is down to a level which is barely capable in most areas of maintaining essential capabilities and skills. There are elements of the workforce that are not gainfully employed. The costs of maintaining capacity are increasing and yet not enough money is being spent on the necessary up-grading of facilities to achieve higher levels of productivity.

Defence Workload

4.65 What the industry most needs is a workload and that workload should be in the production of munitions items. Preferably the work should come from orders placed to satisfy Australian defence requirements and the Committee sees it as essential that purchases be made locally to the maximum feasible extent. To this end, in the present circumstance of a completely inadequate workload and the continually increasing cost of maintaining under-utilised capacity, the Committee recommends that critical workload levels should be established for each of the factories and that the Defence purchasing system should be instructed that, wherever possible, munitions items must be purchased from the local factories unless there are clear and overwhelming national interest reasons for overseas purchase. It recommends, too, that careful attention be given to establishing ordering patterns designed to maintain as great a degree of workload continuity as can reasonably be achieved.

Overseas Sales

4.66 Recognising that any major increase in the level of Service ordering of high usage expendable type stores is unlikely in the short-term future, the Committee has concluded

that the factories should become more active and competitive in the world market for such stores. It has reached this conclusion because continuity in producing munitions items is of far more relevance to the maintenance of defence production capability than is a miscellany of unrelated commercial work. Despite the difficulties enumerated in para. 4.51, the Committee recommends that strenuous efforts be made to achieve overseas sales and that policies in relation to pricing and to foreign sales of this nature be made as non-restrictive as possible.

Commercial Work

4.67 The Committee does not wish to denigrate the benefit that can accrue from commercial work, more particularly in the engineering factories. It sees such work to be of little value, however, unless it has a reasonably high technology content that can utilise and exercise the facilities and skills needed to be maintained for munitions production. On balance the Committee recommends that a limited amount of high technology work should be sought but that it should be priced on a basis that makes a contribution to the fixed overheads of the factory (except in the special circumstance referred to in para. 4.57) and does not make for unfair competition with commercial industry. At the same time it recognises that low grade commercial work, provided it is similarly priced, could on occasion be useful in plugging a workload gap.

Design Capability

4.68 The Committee has concluded that the lack of a significant ab initio design capability in the munitions factories is a quite serious deficiency. It is limiting in terms both of national self-reliance and the resultant inability to create

products which should better be able to satisfy Australian defence requirements, provide more stable workload and have overseas sales potential. The Committee realises that this sort of capability cannot be built up overnight but is concerned that the lack of it puts Australia in a position of increasing foreign dependence and in a continually worsening technological situation. It therefore recommends that the Department of Defence should if at all possible provide small development type projects of a nature that would satisfy defence requirements for a range of engineering and explosive type stores and at the same time allow expansion over a reasonable timescale of the scope and size of the limited design capacity presently existing in the munitions factories.

4.69 The cost inherent in such a recommendation is probably already largely covered by existing appropriations insofar as existing personnel and facilities are concerned. Additional costs would be incurred in providing for extra personnel and material but the Committee sees the long term benefit more than outweighing the slow build up of expenditure that would be involved.

Rationalisation

4.70 The Committee has concluded that some rationalisation or re-structuring of capacity is required, provided that essential equipment and capabilities are retained on a scale which would allow rapid expansion in an emergency. It is aware that joint studies are proceeding in the Departments of Defence and Productivity which are determining the needed capabilities, predicting the forward workload and establishing the capacities required in terms of physical and human resources. It considers

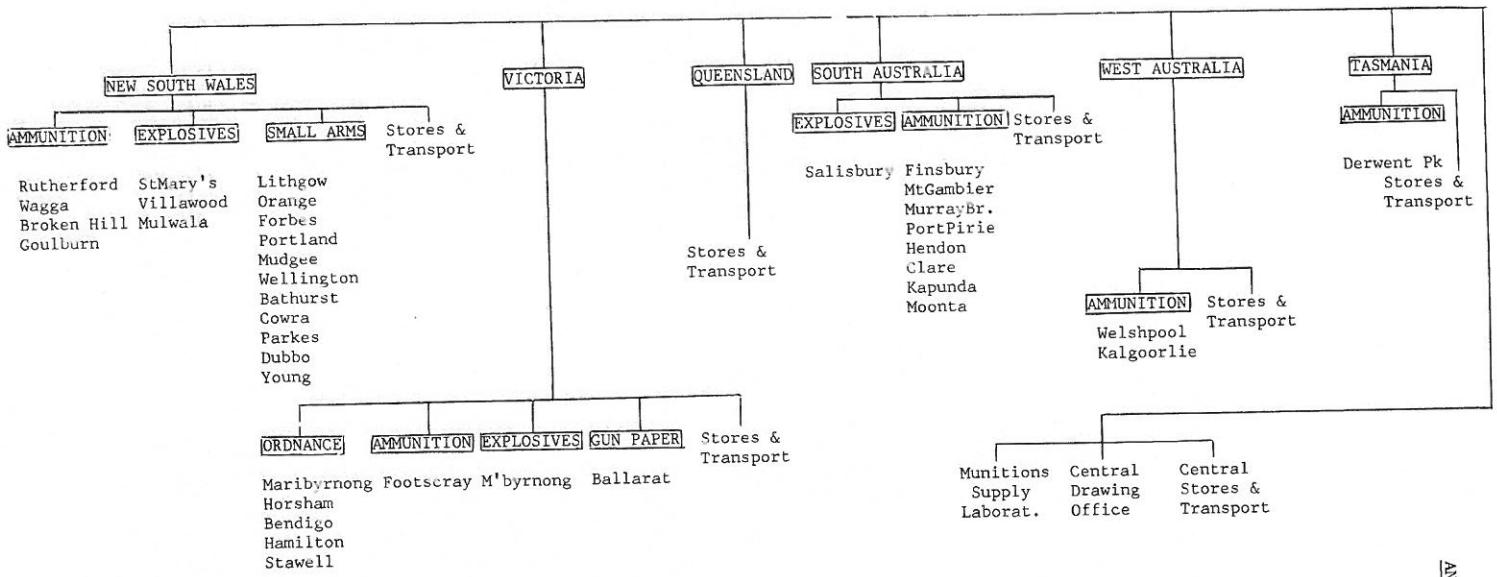
that those studies should have regard for the possible need to retain capacity in excess by perhaps 50% of that indicated by immediate forward workload planning as a reserve for potential emergency situations. It recommends that the studies be brought to completion and decisions be made as soon as possible so that long-term planning in respect of the future activities of each of the factories can proceed. It recommends also that the studies should subsequently be extended to embrace the development of a planning basis for commercial industry involvement in situations of serious emergency.

Optical Munitions

4.71 Having in mind the considerable importance of precision optics in a wide range of defence equipments, the Committee has concluded, and recommends accordingly, that the Department of Defence should take action to ensure that at least the nucleus of this defence capability is maintained by appropriate development and production orders. It is a capability not available in the Government factories and one that would be vital were Australia to be forced into reliance on local resources.

ANNEX 4.1

MUNITIONS ESTABLISHMENTS
December 1943



* Factories operating before 1939

Source: D.P. Mellor - Australia in the War of 1939-45
Volume V The Role of Science and Industry p46.

ANNEX 4.2

List of Establishments housing Government Annexes*

NEW SOUTH WALES

Establishment	Project
Stewarts and Lloyds (Aust) Pty Ltd Newcastle	25-pdr shell forgings 5.5-in shell machining
NSW Railway Workshops, Eveleigh	Shell
NSW Railways, Chullora	Originally tank assembly, later auxiliary marine craft
NSW Govt Railway Workshops, Eveleigh	Radar equipment
Colonial Sugar Refining Co, Pyrmont	Activated carbon Shell Glycerine
R.B. Davies Pty Ltd, Marrickville	Grenades 36 Grenades 68
Duly and Hansford Pty Ltd, Marrickville	Fuses, Gaines
Electricity Meter Manufacturing Co Pty Ltd, Waterloo	Fuses 20-mm Oerlikon shell
Electricity Meter Manufacturing Co Pty Ltd (Westinghouse Rosebery Works), Waterloo	Primers
Amalgamated Wireless (A/sia) Ltd, Ashfield	Fuses 20-mm Oerlikon shell
Commonwealth Steel Co Ltd, Waratah	Shell and 4.2-in mortar bombs Gun forgings

* Source: D.P. Mellor - Australia in the War of 1939-45, Volume V, The Role of Science and Industry, pp.50-56.

Establishment	Project
Gilbert and Barker Pty Ltd, Alexandria	Fuse, contact mine, A.T. Fuse 231
E.R.L. Products Pty Ltd, Glebe	Aircraft bomb pistols Primers
Plumbs (Aust) Pty Ltd, Alexandria	Shell
Westinghouse Brake (Aust) Pty Ltd, Concord	Depth charge pistols and primers
Broken Hill Pty Company Ltd, Newcastle	Shot Shell Magnesium powder 80-ft Steel lighters
Timbrol Ltd, Rhodes	Aniline, Monoethylaniline, Diethylaniline, etc
General Motors-Holden's Ltd, Pagewood	25-pdr Gun howitzers
Bradford Kendall Ltd, Alexandria	Aircraft bombs assembly Tank castings; general engineering Heat Treatment capacity
S.T. Leigh Pty Ltd, Kensington	Fuses
Slazengers Pty Ltd, Alexandria	Rifle and Bren-gun components and boxes Filter pads for anti-gas respirators
Slazengers Pty Ltd, Putney	Auxiliary marine craft Timber creosoting
Slazengers Construction Co Pty Ltd, Newcastle	Auxiliary marine craft
Rylands Bros (Aust) Pty Ltd, Newcastle	2-pdr links and Bren-gun magazines
Lever Bros Pty Ltd, Balmain	Glycerine
Industrial Steels Ltd, Lidcombe	Tank castings and track links Bomb castings, machining and assembly

Establishment	Project
Hadfields Steelworks Ltd, Alexandria	Tank and carrier castings; general engineering
Quality Castings Pty Ltd, Waterloo	Silicon iron castings
Coote and Jorgensen Ltd, Alexandria	Tank gears and parts; components for marine craft
Sonnerdale Pty Ltd, Petersham	Gear boxes for tanks; marine engine gear boxes General capacity for production of gears
Acetone Pty Ltd, Lane Cove	Acetone
Australian Window Glass Pty Ltd, Alexandria	Optical glass
Howard Auto Cultivators, Northmead	Owen gun parts Pistols
Airzone (1931) Ltd, Camperdown	Grenades assembly
Australian Consolidated Industries Ltd, Waterloo	Mortar bomb castings
Commercial Steels and Forge Co (Aust) Pty Ltd, Lidcombe	Stores accommodation
Cooper Engineering Co Pty Ltd, Mascot	Tracer and Igniter No.12, fuses Jigs, tools and gauges
Automatic Totalisators Ltd, Sydney	Jigs, tools and gauges
Goulburn Gas and Coke Co Ltd	Contribution towards gas mains
Sulphide Corporation Ltd, Newcastle	Nickel matte roasting
Australian Aluminium Co Pty Ltd, Granville	Aluminium scrap remelting
Davies Shephard (Sydney) Pty Ltd, Mascot	Torpedo components
Sydney Williams and Co Pty Ltd, Dulwich Hill	Tools and gauges

Establishment	Project
Fletcher Springs Pty Ltd, Redfern	Small wire springs
G.E. Crane and Sons Pty Ltd, Sydney	Duralumin, alclad and aluminium sheet
Australian General Electric Ltd, Auburn	5-KVA alternators
A.W. Fairfax Pty Ltd, Fivedock	Mortar bombs, machining
Wunderlich Ltd, Rosehill	Mortar bombs, machining
Westinghouse Rosebery Pty Ltd, Waterloo	5-KVA generating sets
Imperial Chemical Industries of Aust and NZ Ltd, Botany	Chlorine, perchlorethylene, hexachlorethane
Australian Gaslight Co, Mortlake	Plant for disposal of fatty acids from Lever Bros' glycerine plant
	Toluol from coal gas
Silovac Electrical Products Pty Ltd, Camperdown	Tools and gauges
Clyde Engineering Co Ltd, Granville	Buildings and equipment
Ferrier and Dickinson Ltd, Marrickville	Auxiliary marine craft outfitting depot
Hastings Deering Service Ltd, Sydney	.38 pistols
Chubb's Australian Co Ltd, Sydney	Recuperator blocks
A. Goninan & Co Ltd, Newcastle	Refrigeration barges
Tulloch's Pty Ltd, Rhodes	Auxiliary marine craft
British Optical Co Pty Ltd, Darlinghurst	Optical munitions
NSW Railways, Cardiff	Tools, jigs and gauges

VICTORIA

Establishment	Project
Chas Ruwolt Pty Ltd, Richmond	Mortar bombs Gun production, etc. A.P. Shot Mortar bombs and A.P. Shot Steel barges
Chas Ruwolt Pty Ltd, Holmesgien	Armour plate castings
Victorian Railways, Newport	Shell
Victorian Railways, Melbourne	Electrical instruments
Australian Glass Manufacturers Co Pty Ltd, Spotswood	Shell machining 3.7-in Shell machining 4.5-in smoke Shell forging Fuses Diecasting Toolsetters' training school
H.V. McKay, Massey Harris Pty Ltd, Sunshine	Shell A.P. Shot
McKenzie and Holland Pty Ltd, Newport	Fuses Aircraft practice bombs
Johns and Waygood Ltd, South Melbourne	Mortar bombs
Ford Manufacturing Co of Aust Pty Ltd, Geelong	Mines Auxiliary marine craft, with facilities for assembling and launching
No.5 Explosives Factory, Albion (under management of ICIANZ)	TNT, Cordite 1, Carbamite, Ballisite, etc Charcoal and Gunpowder Experimental Station
Imperial Chemical Industries of Aust and N.Z. Ltd, Deer Park	Gunpowder Signal cartridges, Tracer shot cartridges Percussion Caps Methanol Primer caps for grenades Trench mortar cartridges A.S.

Establishment	Project
Imperial Industries (cont)	Chlorosene Chlorosene packing unit Solid sodium chlorate Pure potassium and barium chlorates Sodium perchlorate
H.E. Brehaut Pty Ltd, Mont Albert	Tail units for aircraft bombs, mortar bombs
Thompsons Engineering and Pipe Co Ltd, Castlemaine	Forging, machining and testing for guns, etc
John McIlwraith and Co Pty Ltd, Richmond	Fuses tracer and igniter No.12
Sutton Tool and Gauge Manufacturing Co Pty Ltd, Northcote	Tools and gauges
Purvis Glover Engineering Pty Ltd, Footscray	Fuses Primers
W.G. Goetz and Sons Ltd, Spotswood	Fuses
J.W. Handley Pty Ltd, Abbotsford and Brunswick	Optical munitions
Dominion Can Co Pty Ltd, Melbourne	Fuses
Melbourne Iron and Steel Pty Ltd, Brooklyn	Casting of bomb ingots for Ordnance Factory Preparation and rolling of steel for A.P. shot
Australian Paper Manufacturers Ltd, Maryvale	Paper wood cellulose
Maryvale and Melbourne	Alpha cellulose board
British United Shoe Machinery Co of Aust Pty Ltd, Fitzroy	Heat treatment, anti-tank gun components Recuperators for anti-tank guns
Metropolitan Gas Co, Fitzroy	Machine-gun carriers
Ruskin Motor Bodies Ltd, West Melbourne	Assembly of aircraft bombs
Marfleet and Weight Pty Ltd, Abbotsford	Heavy machine tools

Establishment	Project
Albright and Wilson (Aust) Pty Ltd, Yarraville	Phosphorus grenades Amorphous phosphorus Calcium phosphide
Olympic Tyre and Rubber Co Ltd, Footscray	Field telephone cable
F.L. Cook and Williams Pty Ltd, Abbotsford	Grenades
Jeffree Bros, Bendigo	Aluminium powder - flake and blown
Stanger and Co Pty Ltd, West Preston	Tools and gauges
Commonwealth Fertilisers and Chemicals Ltd, Yarraville	Pyrites roasting plant in connection with production of sulphuric acid and oleum
H.A. Chivers, Melbourne	Torpedo components
Myttons Ltd, South Melbourne	Primers
Metropolitan Gas Co, West Melbourne	Ammonia liquor
Ammonia Co of Aust Ltd, Spotswood	Ammonia liquor
Aluminium Fabrication Factory, Wangaratta (under management of Aust Aluminium Co Pty Ltd)	Aluminium fabrication
Waldown Pty Ltd, Collingwood	Electric drills and grinders
W. Watson and Sons Ltd, Tunstall	Pyrometers
Steel Co of Aust Pty Ltd, Coburg	Tank-track links
University of Melbourne	Valve manufacture investigation
Specialised Engineering Products Co, East Brighton	Torpedo components
Crusader Plate Co Pty Ltd, Abbotsford	Mortar bombs, smoke
J. Botterill and Fraser, South Melbourne	Auxiliary marine craft

QUEENSLAND

Establishment	Project
Toowoomba Foundry Pty Ltd, Toowoomba	Primers
Metal Products Pty Ltd, Albion	Shell igniters, gaines
Ford Motor Co of Aust Pty Ltd, Eagle Farm	Water transport barges
Queensland Railways, Ipswich	Tools, jigs and gauges
SOUTH AUSTRALIA	
South Australian Railways, Islington	Shell machining Shell forging
Pope Products Ltd, Beverley	Gaines, Aircraft practice bombs
General Motors-Holden's Ltd, Woodville	Aircraft bombs
Woodville and Beverley	Gun production Polsten gun
Woodville and Birkenhead	Torpedo components
Woodville	Ammunition boxes 40-mm shell
Broken Hill Pty Co Ltd, Whyalla	Shell Forgings
Kelvinator (Aust) Pty Ltd, Keswick	Primers
Perry Engineering Co, Mile End	Shell forgings and machining Forgings
Richards Industries Ltd, Keswick	Cartridge containers, etc
B.S. Williams, trading and Wheatley and Williams, Bowden	Non-ferrous castings
David Shearer Ltd, Mannum	Track links for machine-gun carriers
Southcott Ltd, Adelaide	Heat treatment of tools and gauges

Establishment	Project
Horwood Bagshaw Ltd, Mile End	Anti-tank guns
Wiles Chromium and Electroplating Co Ltd, Mile End	Wiles mobile cookers
British Tube Mills (Aust) Pty Ltd, Kilburn	Oil and fuel bottles for torpedoes Cold-drawn steel tubes
Stewarts and Lloyds (S.A.) Pty Ltd, Kilburn	Hot-rolled tubes for hollows
I.C.I.A.N.Z. Ltd, Osborne	Calcium chloride
S. Aust. Railways, Islington	Tools, jigs and gauges
WESTERN AUSTRALIA	
W.A. Railways, Midland Junction	Shell forging and machining
Geo Hill and Co, Perth	Primers
Boltons Ltd, Perth	Mortar bombs, machining
Hadfields (W.A.) Ltd, Perth	Mortar bombs, castings
F. Tough, Perth	Optical munitions
West Australian Government: Midland Junction Railway Workshops and State Engineering Works, North Fremantle	Development of steel casting capacity
W.A. Railways, Midland Junction	Tools, jigs and gauges
TASMANIA	
Tasmanian Railways, Launceston	Shell, Mortar bombs
Henry Jones and Co Pty Ltd, Hobart	Primers
Associated Pulp and Paper Mills Ltd, Burnie	Chlorine
E.N. Waterworth Annexe, University Grounds, Hobart	Prisms and optical munitions
Electrolytic Zinc of Aust Ltd, Risdon	Zinc alloy

Establishment	Project
Tasmanian Railways, Launceston	Tools, jigs and gauges

OPTICAL MUNITIONS

The Optical Munitions Project was distributed among the following organisations, in order of importance:

University of Melbourne
Commonwealth Solar Observatory
E.N. Waterworth Annexe, Hobart
University of Sydney
Australian Optical Co Ltd, Sydney and Melbourne
National Standards Laboratory
University of Western Australia
University of Adelaide
Council for Scientific and Industrial Research
Sydney Technical College
Melbourne Technical College
British Optical Co Pty Ltd, Sydney

5. THE AEROSPACE INDUSTRY

INTRODUCTION

A Defence Dependent Industry

5.01 The Australian aerospace industry has, from its inception, been dependent for its existence almost entirely on the defence workload arising from its primary role in support of the Armed Forces. This has applied as much to the private as to the public sector organisations.

The Industry in World War 2

5.02 Although there had been earlier sporadic attempts to establish the design and manufacture of aircraft in Australia, it was not until 1935 that, at the request of the Commonwealth Government, a syndicate of major Australian-based firms agreed to form a company of predominantly Australian capital and control capable of producing at least a portion of Australia's requirements for military aircraft and engines. Resulting from this move, Commonwealth Aircraft Corporation Pty Ltd (CAC) was incorporated in October 1936 and became established at Fishermens Bend, Melbourne. By the outbreak of the war in September 1939, it had commenced delivery of Wirraway aircraft to the RAAF; a UK de Havilland Company subsidiary, which had started in Australia in 1927, was commencing to produce Tiger Moth aircraft in a small facility at Mascot; and the Aircraft Construction Branch of the newly created Department of Supply and Development was developing plans for the Beaufort production programme, having only just come into being in Melbourne in July 1939.

5.03 During the next five years, despite difficulties in obtaining manpower and machine tools, the industry was advanced to the stage where it could design and build modern operational aircraft using materials and equipment largely of Australian origin. This high degree of self-reliance was acquired over a series of major projects, some involving manufacture under licence of overseas designs (Wirraway and Mustang at CAC; Tiger Moth, Dragon and Mosquito at de Havilland; Beaufort, Beaufighter and commencement of Lincoln at the Government factories) while others were of local design and manufacture (Wackett trainer, Boomerang fighter, CA4/CA11 torpedo bomber and CA15 fighter, all at CAC).

5.04 Substantial use was made of facilities in the various State railway workshops and in the automotive sheet metal body plants. Government funded annexes were set up in private industry to draw on specialist skills. Numerous firms, large and small, became producers of parts. Quite high levels of output were achieved, e.g. Wirraway production peaked at 45 aircraft per month and Beaufort at 37 per month. Employment in the industry, including that on overhaul and repair work, had built up to 44,000 by mid-1944 and was still well above 30,000 when hostilities ceased in August 1945.

The Industry Post-World War 2

5.05 At the end of the war orders were cut and output rates were reduced to a comparative trickle. Many plants were closed down and others converted to normal peacetime pursuits. The employment level had dropped to 11,400 by mid-1946, 7,500 by mid-1947 and 6,600 by mid-1948. Lincoln bomber and

Mustang fighter production continued slowly until 1952 and ten of the Lincolns underwent a major conversion to the maritime reconnaissance role.

5.06 The first post-war orders of significance were placed in August 1946 with de Havilland for the production under licence of 50 (later increased to 80)Vampire fighter aircraft and with CAC for the Nene engines to power those fighters. Of greater long term effect was a decision taken late in 1947 to undertake the design and development of a pilotless target aircraft for use at the guided weapons testing range then being established at Woomera, South Australia. This project was put in hand at the Government Aircraft Factories (GAF), became known as Jindivik and commenced production in the early 'fifties. At the beginning of 1950, 48 Canberra bomber aircraft were ordered from GAF and in May 1951, 72 (later increased to 112) Sabre fighters were ordered from CAC together with the Avon engines for both those aircraft types. At the end of 1951 orders were placed with CAC for the manufacture of 62 of the locally designed Winjeel primary trainer aircraft and with de Havilland for the first 41 of what later became a total of 109 Vampire advanced trainers powered by imported Goblin engines. In 1953 work was commenced at GAF on the design of a heavy anti-tank guided weapon to meet a British War Office requirement. The resultant Malkara project was put into production later in the 'fifties against a British Army order.

5.07 In meeting the demands of these concurrent programmes employment in the industry reached its highest post-war peak of 12,300 in mid-1955. As the programmes tapered off,

however, the level fell, quite rapidly from 11,400 in mid-1956 to about 7,500 by mid-1957 and then more slowly to 6,500 by mid-1961.

5.08 Because of the unsuitability of the Fishermens Bend airfield for the testing of jet aircraft a new final assembly and flight test facility was established under GAF management at Avalon, near Geelong, and was brought into operation in 1953. As against that significant expansion of capacity, a substantial amount of floor space used by the industry in Melbourne, Sydney and Adelaide was closed down in a series of rationalisation exercises between 1950 and 1960.

5.09 During the 'sixties the industry became involved in two major military aircraft production programmes viz. the Mirage fighter and the Macchi trainer. Approval was given at the end of 1960 for partial manufacture of 30 Mirage aircraft, with GAF as the prime contractor for the aircraft and CAC for the Atar engine. CAC was also the main airframe sub-contractor, responsible for wing and fin manufacture. Subsequent orders increased the total number of aircraft to 100 single seat and 16 dual seat, and the programme was completed late in 1968. Local content in terms of manhours reached about 65% in the airframe and about 85% in the engine but less than 5% by value of the equipment, including avionics, was produced locally.

5.10 The Macchi programme was approved in October 1965, with CAC as prime contractor for both the aircraft and the Viper engine and Hawker de Havilland (Australia) Pty Ltd (HDH) as the main sub-contractor, responsible for wing and empennage manufacture. The initial order for 75 aircraft was subsequently

lifted to 97 and the production programme was completed towards the end of 1972. Local content in terms of manhours was about 90% in the airframe and engine and less than 10% by value of the equipment was locally produced.

5.11 In the field of indigenous design and development, mention has already been made in para. 5.06 of the initiation of the Jindivik and Malkara programmes. The latter was terminated in 1960 after the production of about 1,000 missiles for the UK but the former has been the subject of continuing development and is still in production. The Ikara anti-submarine guided weapons system design and development programme was started in 1960 under the project responsibility of Aeronautical Research Laboratories (ARL). The Missile design was done by ARL in conjunction with GAF, the guidance system by Weapons Research Establishment (WRE) and the ship handling and launching equipment by CAC. The system is still in production for the RAN, the RN and the Brazilian Navy. Based on the Ikara missile GAF became engaged in 1970 in the design and development for the RAN of the Turana target drone powered by a small jet engine in place of the solid fuel motor in Ikara. There has so far been only limited production. Another much publicised indigenous project has been the Nomad light utility aircraft also designed, developed and being produced by GAF.

5.12 In 1970 the industry commenced to benefit from a Government policy which looked to the placement in local industry of an offsetting workload against purchases overseas of major equipment. More is said of this offset policy later in this chapter. Also at about that time a contract aimed at the introduction of a new technology was arranged with the Bell

Helicopter Company under which the company undertook to have manufactured in the Australian industry a total of 191 light helicopters, of which Army was to take 75 and the remaining 116 were to be sold commercially by Bell. The contract was terminated when the Army order was completed at a reduced number of 56 - no civil machines were produced. CAC was the main local contractor in the programme, with GAF involved in rotor blade and major fibreglass honeycomb component manufacture.

5.13 Due mainly to the impact of the Mirage programme the employment level in the industry rose from 6,500 in mid-1961 to about 8,900 in 1966 with a subsequent decline to the present level of about 5,500 (April 1977).

Investigations of the Industry

5.14 During the post-war years the industry has been subjected to a number of studies concerned primarily with the issues of forward workload, capacity and structure. The most recent and significant of these was the review undertaken in 1974-1975 by the Industries Assistance Commission, whose main conclusions were that:

(a) The Government should decide and state publicly a policy on the capability required of the industry for defence purposes;

(b) The Defence authorities should plan their operations so as to have available a reasonably stable flow of work for the industry and should involve industry at the earliest possible stage in the planning process for the procurement of defence equipment;

(c) A reasonable proportion of relevant R & D expenditure

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should be directed to the industry;

(d) The industry should be rationalised in a manner that accords with the Government policy of (a) above and with greater specialisation of activities as between the three major contractors;

(e) Where feasible and where duplication of capacity permits, there should be a system of competitive tendering for defence work within which provision for local industry preference could be incorporated;

(f) Where practicable, fixed price and incentive type contracts should replace cost plus type contracts for defence work placed with local industry.

5.15 The conclusions and recommendations of the IAC were largely accepted by the Government but there were some significant exceptions and differences of emphasis. In a press release on 21 July 1976 the relevant Ministers stated that the suggested re-structure of the industry would proceed generally along the lines recommended by the IAC but that the Government could give no guarantee of a workload to fully occupy the retained capacity which would exceed that needed for the expected defence workload. It left those IAC recommendations relating to GAF's capacity and form of management in abeyance until studies were completed. The matters of industry rationalisation and GAF management are discussed in some detail in paras 5.30 - 5.43.

5.16 In the Ministerial statement, participation of industry in studies to determine the nature and extent of local involvement in the supply of defence aerospace equipment was put on a rather vague "where possible and appropriate" basis. Supply source decisions were stated as being based on such

factors as the importance of self-reliance, reliability of overseas sources and comparative costs and lead-times. The Government did not accept that there should be a fixed level of preference for local industry.

5.17 The statement noted that the Minister for Defence would determine the allocation of defence R & D tasks on the basis of best achieving overall defence objectives within the limits of funds available. It pointed out that only a small proportion of defence R & D expenditure is on the development of new equipment but that efforts would be made to increase the use of industry resources.

THE PRESENT STRUCTURE AND STATE OF THE INDUSTRY

The General Situation

5.18 The aerospace industry as currently structured for defence purposes comprises the three main organisations to which reference has already been made, viz. CAC, HDH and GAF, plus a wide range of sub-contractors whose defence aerospace workload in general constitutes only a minor part of their overall activities. For purely maintenance work - overhaul, repair and modification of aircraft, engines and equipment - use is also made of the substantial capacity available in Service depots and in the airlines, particularly Qantas.

5.19 The main problem that has faced the industry for many years has been the lack of an adequate, balanced and reasonably stable workload. This has led to considerable difficulty in achieving efficient day-to-day operation, and uncertainty as to the future has discouraged effective forward

planning. In the present financial year (1976-77) the total direct shop-floor workload[1] in CAC, HDH and GAF is 2.8 million manhours. This compares with about 4.5 million manhours in 1966-67 at the peak of the Mirage programme and with a figure of 3.5 million which was assessed by Defence (Industrial) Committee Panel[2] in 1972 as being about the minimum level that "....would allow maintenance of technical viability in a rationalised industry provided the workload is spread over all existing capabilities."

Government Involvement in the Industry

5.20 Understandably the involvement of Government in the industry is substantial because the industry exists primarily for, and is heavily dependent on, defence work. Apart from owning GAF and hence having direct control over the operations of that organisation, it has agreements with the private companies which establish the bases under which they undertake work for the Commonwealth and make use of government provided assets.

5.21 At the present time the government owns about 70% of the combined assets of CAC, HDH and GAF in land, buildings, plant and equipment and it continues to provide to the private firms those assets necessary for defence work but for which

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1. This can be defined as the manhours arising from direct labour in the workshop on manufacturing, assembly, testing and maintenance tasks. It includes the associated quality control effort but not indirect labour (e.g. planning) or engineering (e.g. draughting)

2. Report of Defence (Industrial) Committee on Australian Aircraft Industry - July 1972 (classified)

there would be little commercial justification. In recent years government expenditure on land and buildings in the industry has been relatively insignificant and the annual outlay on plant and equipment has been steadily declining, the amount in 1976-77 being less than $1 million, and that very largely at GAF.

5.22 A relatively small amount ($½ million in 1976-77) of government funds is spent on the study, improvement and/or development of design and manufacturing techniques and processes, directed towards the improvement of productivity. Approximately 75% of the provision in 1976-77 has been allocated to GAF.

5.23 Mention has already been made in para. 3.45 of the provision of a reserve capacity maintenance appropriation to allow for the retention of capacity in excess of that needed for peacetime operation without artificially loading the cost of individual Service orders with that burden. The appropriation in the present financial year is $17.3 million for the aerospace industry. It allows work for the Services to be charged at present at a rate of about $14-$15 per manhour and commercial and offset work to be taken on at substantially lower rates provided there is in the price at least some contribution to fixed costs. The amount of the appropriation is high because there is not enough work to absorb the heavy overheads.

Government Aircraft Factories (GAF) - Current Status

5.24 GAF is completely government owned and is operated under the direct control of the Department of Productivity. Its factories are located in Victoria, partly at Fishermens Bend near Melbourne and partly at Avalon near Geelong. It has an effective computer-aided aircraft and guided weapon design

capability with good supporting laboratories and developmental workshops. Its production facilities include significant capacity for such processes as chemical milling, metal bonding and the fabrication and assembly of non-metallic components. The final assembly and flight test complex at Avalon provides excellent capacity for aircraft in production, overhaul or retro-modification programmes.

5.25 The workload at GAF in 1976-77 is just over 1 million manhours arising primarily (80%) from production of the indigenous projects, Jindivik, Ikara, Turana and Nomad and about 10% from offset contracts. Maintenance work for the Services provides only some 6% of the load. It is to be noted that Australian defence orders account for no more than 20% of the total work, the bulk of the remaining 80% resulting from overseas orders for Jindivik, Ikara and Nomad. Present employment level is 2,340 (April 1977).

Commonwealth Aircraft Corporation Ltd (CAC) - Current Status

5.26 CAC is a privately owned company located adjacent to GAF at Fishermens Bend. Its shareholders are BHP Nominees Pty Ltd (33.4%); Nobel Australia Pty Ltd (15%); North Broken Hill Ltd (12.5%); Broken Hill South Ltd (12.5%) Rolls Royce Ltd (10%); EZ Ltd (8.3%); and P and O (Aust.) Holdings Pty Ltd (8.3%). It has an aircraft design capability with rather less capacity than that of GAF and a proven competence in the development of complex electro-hydraulic systems. Its production facilities provide for the manufacture of both aircraft and aero engines and include a light alloy foundry and a precision casting capacity. It has adequate engine assembly and test facilities for both production and overhaul programmes, but lack of an

adjacent airfield places some restriction on aircraft overhaul work.

5.27 The majority (53%) of CAC's 890,000 manhours in 1976-77 is being spent on Service maintenance work, including the manufacture of spares, associated primarily with Atar engine overhaul and repair. The company's activities on the Bell helicopter programme and on the Ikara launcher and ship handling equipment are now virtually complete. There is some work arising from the locally generated Barra sonobuoy project, for which CAC is the mechanical design authority. Offset contracts and commercial work provide about 8% and 23% respectively of the total load. Present employment level is 1510 (April 1977).

Hawker de Havilland (Australia) Pty Ltd (HDH) - Current Status

5.28 HDH is a wholly owned subsidiary of the British Hawker Siddeley Group with facilities at Bankstown and Lidcombe in NSW and at Guildford in Western Australia. It has appreciably less design capacity than either GAF or CAC but a very useful competence in design study and systems analysis type activities. At the Bankstown factory it has airframe manufacturing capacity and is well established for fixed and rotary wing aircraft overhaul. The capacity at Lidcombe is concerned primarily with the overhaul of a wide range of piston, turboprop, turboshaft and small turbojet engines. Engine component repair facilities include electron beam welding. At Guildford (WA) the capacity is used mainly to provide overhaul support for the RAAF training aircraft operating at Pearce.

5.29 The HDH workload in 1976-77 amounts to about 870,000 manhours of which approximately 47% is overhaul and repair

work and the manufacture of spares, 26% on offset contracts, 20% on commercial orders and 7% on miscellaneous Government tasks. This company continues to be the most successful Australian contractor in the offsets field. Present employment level is 1540 (April 1977).

RATIONALISATION OF THE INDUSTRY

The IAC Review in 1974-1975

5.30 Because of problems confronting the industry, particularly those resulting from a declining defence workload, the Government in 1974 referred the industry for review by the Industries Assistance Commission(IAC). The conclusions of that review have already been summarised in para. 5.14. In relation to the structure of the industry the detailed recommendations were that:

"the core of the local industry, i.e. the three major contractors, be restructured on the following lines:

- implementation of the proposal for consolidation at Bankstown of HDH facilities currently located at Lidcombe and Bankstown;
- implementation of CAC restructure proposal for Fishermens Bend;
- scaling down of capacity at GAF to the level consistent with both the likely volume of future workload and the Government's defence production requirements;
- GAF to be made a statutory corporation and GAF, CAC and HDH to continue to operate as separate entities".

Government Decisions

5.31 After a review by the Government of productive capacity to be retained for defence purposes, HDH, CAC and GAF it was stated in the Ministerial release of July 1976 referred to in para. 5.15 that:

> "In general conformity with the Industries Assistance Commission's recommendations, a restructuring of the three major firms is proposed with greater specialisation in their main areas of defence activity. Each firm would retain capabilities of a broad nature which permit limited competition. Major programmes would involve all three firms to a varying extent with one taking the prime contractor role.
>
> "Specifically it is proposed to consolidate at the Bankstown site the two Commonwealth-owned factories operated by Hawker de Havilland, a privately-owned firm, with the following general capabilities:
>
> - repair and overhaul of a wide range of piston, turbo-shaft, turboprop and small turbojet engines, helicopter transmissions and fixed and rotary wing airframes;
> - reduced manufacturing capacity for sheet-metal and machined components will be retained giving some capability for component manufacture, including offset orders.
>
> "The Commonwealth Aircraft Corporation, a privately owned firm, will reduce the size and scope of its defence activities by vacating the defence aircraft sheet-metal and airframe fields. Its specialised future role in the defence field will be:
>
> Manufacture, repair and overhaul of jet engines, including associated sheet-metal activities together with capability for engine modification and spares

production; design and manufacture of systems and components involving like technology.

"The Government Aircraft Factories will take over at a reduced scale of capacity some of the airframe activities previously carried out by CAC while retaining the present spread of capabilities. Its future role will be:

Design, development and production of aircraft and guided missiles, together with capability for modification, spares production and airframe repair and overhaul.

"The recommendation by the Commission that GAF should be scaled down in size and become a Statutory Corporation is still under study by the Government."

Progress Towards the Rationalised Industry

5.32 The Committee understands that at the date of this report detailed planning of the consolidation at Bankstown of the two factories operated by HDH at Lidcombe and Bankstown is at an advanced stage. The re-structuring of CAC and the consequential changes at GAF have not yet proceeded and decisions have still to be taken concerning the form of management of GAF and whether or not it should be scaled down in size.

The Attitude of Industry to Rationalisation

5.33 The private sector of the industry advised the Committee that it was in general agreement with the recommendations of the IAC in respect of rationalisation but expressed considerable concern with the government decision, outlined in the previous paragraph, defining the post-rationalisation capabilities and activities of CAC, HDH and GAF.

5.34 Both CAC and HDH informed the Committee that it was their intention to continue to seek Government and commercial contracts that would enable them to maintain substantial aircraft design, development, manufacture, modification, overhaul and repair capability. Both stressed the opinion that, although agreeing with the principle of greater specialisation, there was in the interests of efficiency a need for competition. HDH in particular, pressed strongly for implementation of the IAC recommendation that GAF should become a statutory corporation, liable for the same commercial costs and free to operate with the same degree of management autonomy and flexibility as the private sector organisations. It considered that only in this way would fair competition be possible, more particularly because at present the Department that has direct responsibility for the operations of GAF is also the Department that recommends to which of the three organisations major defence aerospace projects should be allocated.

5.35 HDH could see no justification for restriction of its manufacturing role, stating that after rationalisation there would still be adequate physical capacity at Bankstown to allow the company to have substantial involvement in the expected trainer, fighter and tactical transport programmes or in offsets arising from those programmes and to be possibly the prime contractor for, say, the trainer programme. It considers, therefore, that it should be given the opportunity to compete for airframe work on a fair and equal basis with GAF.

5.36 CAC expressed concern that, if it was restricted to engine type activity, an important national resource with much in-built experience and expertise would be lost. It intended

therefore to remain in the aircraft business even if it were found necessary to obtain new facilities adjacent to an airport. In this regard, the Committee was interested to note the recent award of a $6.2 million contract to CAC, with EMI as the main electronics sub-contractor, for the installation and testing of the Barra system in the Orion P3C maritime patrol aircraft. This contract includes design and development of the installation and of the interfaces with other systems in the aircraft. The physical work of installation and testing will be done by CAC at the RAAF Edinburgh base in South Australia.

The Committee's Views on Rationalisation

5.37 Despite the arguments put forward by CAC and HDH the Committee supports the need for rationalisation of the industry and agrees with the concept of greater specialisation by the three major organisations in their main spheres of defence activity along the lines intended by the Government. It considers that for many years there have been too few major projects and too many gaps in workload continuity to maintain effective competitive capabilities across the industry and it sees this as a continuing situation. Furthermore, on the evidence available to it, it would seem to the Committee that the facilities of the three organisations are to a significant degree complementary to one another and that there are only limited areas of work where true competitive bidding would be practicable. It believes that in the longer term there could be appreciable advantage in further rationalisation by amalgamation of at least the two Melbourne-based organisations.

5.38 Military aircraft built locally under licence have in the past provided the major portion of the industry's workload. Generally speaking the life of any particular type has been in the order of twenty years from approval to commencement of service phase-out whereas the associated manufacturing programme has extended over only the first seven or eight of those years. Because there have not been enough programmes of this nature on a regularly phased basis, severe fluctuations in workload have resulted, with a concomitant adverse effect on the capability of the industry to handle such programmes efficiently. The Committee attaches considerable importance to the need for continuity of experience in the management and execution of major projects and considers that it will be achieved only if due account is taken of the industrial need in the phasing of new programmes and there is continuity of prime contractor responsibility.

5.39 In the opinion of the Committee defence requirements leading to local ab initio aerospace design and development programmes are too few to justify the use of government funds to retain substantial resources in design personnel, computers, laboratories and testing facilities, in more than one organisation. It does, however, recognise the need for each organisation to have sufficient Government-funded design expertise to be able to give effective engineering support to the manufacturing, overhaul and repair activities in which it is engaged against Australian defence orders. It considers that any extension of this expertise in the non-defence area is a matter for judgement by the individual private sector firms.

GAF as a Statutory Corporation

5.40 The IAC has expressed the view that GAF operates in an environment of restricted autonomy and flexibility, exempt from certain commercial charges, without a profit motive and with only limited incentive to improve efficiency. In recommending that it be made a statutory corporation, the objective of the IAC was apparently to have GAF put on a full commercial basis so that it would not be in an unfair competitive relationship with CAC and HDH - presumably neither favoured nor disfavoured. Its stated intention was that the three organisations should be liable for the same types of commercial costs and eligible for the same forms of assistance.

5.41 If the aerospace industry was a truly commercially viable industry then it might be possible to judge the relative capabilities of the participating organisations by the levels of their performance and profitability. But it is the Committee's view that this industry is not, and has little prospect of becoming, commercially viable. It looks to the Government for the major part of its workload and for subsidised[1] assistance in obtaining most of its non-government work, whether of an offset or straight commercial nature. Furthermore, as mentioned earlier it is structured in a way that provides few avenues for practicable competition now, and will provide less after rationalisation.

5.42 The Committee therefore considered the issue not from the "unfair competition" aspect but rather in the light

1. See paras 3.47 3.49 and 5.23 for the basis of the RCM appropriations paid to CAC and HDH as well as to GAF.

of the possible national benefit that might result from taking GAF outside direct Departmental control. It formed the opinion that, because the whole "raison d'etre" for GAF is to undertake defence work, it would be unrealistic to assume that, as a quite heavily subsidised government owned and operated defence production facility, it could sensibly be given the autonomy and flexibility inherent in a commercial organisation. It found persuasive, too, an argument in a submission by the Department of Industry and Commerce which, in dealing with the "pros and cons" of GAF as a statutory corporation stated that:

> "Alleged greater freedom in such as funding activities, in undertaking design and development work, in giving terms when selling, in dealing with the workforce and in entrepreneurial activities generally would prove to be largely illusory in practice."

5.43 On balance the Committee was unable to recognise any overwhelming reason for recommending that the present arrangement of Departmental control of GAF should be altered. It does consider, however, that there should be more openness of information concerning operating costs and levels of assistance and that a requirement to make such information publicly available would be a useful incentive towards the achievement of greater operating efficiency.

THE STRATEGIC NEED FOR THE INDUSTRY

The Department of Defence Attitude

5.44 The attitude of the Department of Defence remains basically as stated in a submission on strategic considerations put to the IAC and published in its 1975 report on the aerospace industry. Briefly summarised, the Department considers that the

primary defence role of the aerospace industry is to provide effective support to the Services in the areas of design and development, servicing and repair, the manufacture of spares and modification kits, the incorporation of modifications and the provision of technical services. It regards such support as necessary for the effective peacetime operation of military aircraft by the Defence Force and as providing the base from which expansion in an emergency could, if necessary, be implemented.

5.45 An indigenous capability to redesign existing equipment to meet changing operational requirements, to correct inherent deficiencies or to adapt designs to local environmental and operating conditions is regarded by the Services as essential. The maintenance of this capability, which provides a measure of self-reliance and independence from foreign organisations, requires the local availability of aeronautical design skills across all the relevant disciplines such as aerodynamics, structures, materials, avionics systems, propulsion and manufacturing processes. Occasionally there is a need to draw on these skills to satisfy specific requirements which might not be adequately met by products obtainable from overseas (e.g. Ikara).

5.46 From the viewpoint of the Services it is not essential that their aircraft or other prime equipment be produced locally. It is however accepted that in the case of indigenous design projects there must obviously be the ability and capacity to manufacture and evaluate prototypes and to carry through the subsequent production programmes. It is also recognised that the Services have benefited from the better level of

technical and maintenance support behind those aircraft or engines of overseas design that have been manufactured locally.

5.47 The continuing objectives of the Department of Defence as expressed in the 1976 Defence White Paper include "....the sustaining of an aircraft industry able to provide support and selective manufacturing capability".

The Views of the Committee

5.48 In low level conflict situations the Committee sees the role of the industry as being little different to that in peacetime. There would be the need for continuing overhaul and repair support, possibly at a higher level of activity depending on the nature of the conflict and the extent to which it demanded increased flying effort. Similarly, the rate of output of those spares already being locally produced could need to be accelerated and there could also be the need to commence producing a wider range of spares.

5.49 Aircraft manufacturing programmes in hand at the outbreak of a low level situation would probably continue as planned, with possibly a stepped-up rate of output being called for if the conflict showed signs of becoming of long duration. There would not be the time even in the most serious of the low level situations visualised by the Committee to deliver aircraft from a newly started production programme.

5.50 The Committee considers that in the most serious of the high level scenarios which it has postulated the strategic need would exist for the industry, from indigenous resources and during the presumed five-year build-up period, to develop

the capability to produce those spares not already stockpiled that would be required to keep current aircraft and equipment operational. There would also be the strategic need within the same timescale for the industry to start producing aircraft of as high a level of sophistication as the design and manufacturing capabilities of the aerospace and supporting electronic and other related industries would permit. During the course of such a conflict a very substantial increase could be expected in the level of overhaul, repair and general technical support required of industry.

CAPABILITIES AND DEFICIENCIES OF THE INDUSTRY

Design and Development

5.51 In the field of design and development there are professional skills and physical facilities available that allow the aerospace industry, augmented where necessary by the defence R & D establishments, to provide very competent and essential technical support to the Services and to undertake major design projects of a quite sophisticated nature. The extent of the resources does, however, place a restriction on the size and complexity of programme that can be tackled within an acceptable timescale. The design ab initio of a jet trainer type of aircraft with or without a ground attack capability would lie within the capability, whereas that of a Mirage replacement type of aircraft would be beyond it. The Ikara system was near the limit in the guided weapons field.

Airframe Manufacture

5.52 In airframe manufacture there is no lack of ability to undertake the jig assembly, final assembly, fit-out,

ground and flight test activities associated with the production of almost any aircraft used or likely to be required by the Services. Economic factors would probably be the determinant of the extent, if any, of local involvement. There are however, very major deficiencies in the availability in Australia of raw and partly processed materials and in capacity for parts fabrication.

5.53 Almost all the raw materials used in the production of aircraft in this country are imported. They are generally to tight specifications and in many cases (e.g. titanium alloys) are beyond the present ability of the local materials industry to produce. In those cases where the local industry could fairly readily acquire or develop the capability (e.g. aircraft specification aluminium alloy sheet and extrusions) the local demand is so low as to make supply unattractive to companies concerned in satisfying a commercial market. In the area of partly processed materials, there are quite serious limitations to the size of forging that can be produced. In the case of the Mirage, for instance, the heavy wing and fin spars and many of the fuselage frames are machined from high alloy forgings that are well beyond the capacity of locally available forging plant. In this regard the Mirage is reasonably typical of modern practice except that there is now greater use of large titanium and steel forgings which further aggravate the problem. There is also increasing use of the new high strength non-metallic materials (e.g. carbon fibre, boron fibre) not yet made in this country and the production of which, due to the small demand, would again be unattractive to potential local suppliers.

5.54 Routine machining capabilities exist in the industry, including a growing number of numerically controlled machines. Machines are not available, however, with capacity for slab and sculpture milling of wing skins or of sufficient size for machining large spar and fuselage frame forgings. In general, capacity exists for most sheet metal fabrication, both light alloy and steel, but there has yet been little experience in handling the titanium alloys. Nor has there been experience as yet in the fabrication and moulding of high strength non-metallic materials, but existing facilities for the production of structural fibreglass components would be of relevance.

Engine Manufacture

5.55 Final assembly and test of all military engines now in service in Australia or which will come into service in new aircraft types is for the forseeable future, within the capability of either the industry or the airlines and RAAF depots. However, self reliance in the manufacture of engines is, as with airframes, severely limited by deficiencies in the local availability of raw materials and some of the more important fabrication facilities and processes.

5.56 Quite high local content in terms of manhours was achieved in the Avon, Atar and Viper jet engine production programmes (in the order of 80-90%) but it was necessary to import virtually all raw materials in each case. That would continue to be the situation for any new engine programme. More recent engines are using manufacturing techniques, such as the casting of turbine blades, which are outside the present local capability and which would call for heavy outlay in plant and equipment. Materials are becoming more exotic and there would be no commercial incentive to produce them locally.

Equipment Manufacture

5.57 As noted in paras 5.09 and 5.10 very little of the equipment in the Mirage and Macchi aircraft was produced in Australia. In the main the local content related to items of high or relatively high usage such as wheels and brakes and rubber fuel cells. It is in fact in the equipment area generally and avionics in particular, that perhaps the most serious deficiencies in aerospace capabilities and capacity lie.

5.58 Since World War 2, when buying aircraft of overseas design for supply either from the overseas source or from local manufacture under licence, it has been the general practice to accept the avionics equipment fit as used by the air force of the country of origin, and to purchase it from that country. It has been argued that a high cost premium has not been justifiable for doing little more than assembling a small number of equipments from components that would almost inevitably have had to be bought overseas. There has been little local experience for many years in the development or manufacture of military airborne avionics. From time to time however, the electronics industry has been involved in the design and production of airborne navigational aid equipment for civil aircraft.

5.59 Perhaps the most beneficial project from the viewpoint of relevant experience has been Ikara for which quite complex tracking, guidance and control systems were developed by WRE in conjunction with the aerospace and electronics industries.

Committee Comment on the Deficiencies and Their Implications

5.60 Although recognising that the Australian Aerospace Industry has a wide range of capabilities, the Committee is

concerned that, due largely to the effect of workload inadequacies and fluctuations over a period of many years, there are quite serious deficiencies not only in that industry but also in those other industries on which it would be forced to depend in a circumstance demanding self reliance. Furthermore, within its capabilities there are capacity limitations that could restrict the nature of programmes which might be undertaken and plant limitations that cause low productivity.

5.61 The Committee accepts the inevitability of a restriction on the size of the aerospace design and development resources that the nation can afford to keep actively engaged. It considers it essential, however, that there be continuity of programmes to exercise and further develop these most important skills. This matter is discussed further in paras 5.72 - 5.74 et seq.

5.62 In respect of airframe and engine manufacture the Committee was informed that, because a lot of the plant and equipment used by the industry is obsolete and in worn condition, there are adverse effects on productivity and hence on costs. The Committee was concerned to note that expenditure from defence funds in this area has been steadily declining over recent years and as noted in para. 5.21 is now less than $1 million per annum. It regards this amount as being completely inadequate for the up-grading of existing capabilities and hence as contributing nothing to the considerable cost that would be involved in overcoming very important deficiencies that have been mentioned in previous paragraphs. It believes that there needs to be a clear understanding by the Government that without the injection of very substantial funds for new plant and processes, the industry in Australia would be unable to manufacture completely any current operational aircraft or its engines or

the majority of its equipment.

5.63 Looked at in the light of the strategic guidelines set out in Chapter 2, the Committee considers that the industry could provide the necessary level of support to the Services in the assumed range of low level situations. It believes, however, that the ability of the Services to keep their aircraft and equipment operational in those situations will be heavily dependent on adequate provisioning and continuity of supply of overseas sourced spares. Denial of supply by a foreign country in conjunction with an inadequate holding of spares normally bought from that country would create shortage problems beyond the ability of local industry to solve in the short term.

5.64 In the most serious of the high level scenarios postulated in Chapter 2, demanding the attainment of self-reliance over a five year build-up period, the Committee considers that the level of industrial capability achievable would depend to a great degree on actions taken beforehand to overcome major deficiencies. For instance, in the case of materials, if no prior action had been taken either to establish an indigenous capacity to produce military specification materials or to stockpile a wide range of such materials, then the task of keeping current aircraft and equipment operational would become virtually impossible because the local industry would find itself unable in many cases to produce spares to an acceptable standard for use when current stocks ran out. In respect of the design and manufacture of new aircraft in such circumstances, limitations in the range of available materials would present major problems. It could, for example, be quite impossible to produce a useable gas turbine engine.

5.65 The Committee is not able to assess the establishment and subsidy costs that would be involved in developing and supporting in peacetime an effective local materials capability. Nor is it able to assess the feasibility and timescale of creating such a capability if it had to be done in a conflict situation without access being available to overseas plant, equipment and expertise. It believes strongly, however, that competent studies should be made not only in the materials field but also in those other areas that have been mentioned where major deficiencies existing at the outbreak of hostilities could prevent a useful measure of self-reliance being achieved within the necessary timescale.

THE WORKLOAD NEEDS OF THE INDUSTRY

The Need for a Policy

5.66 Workload is perhaps the most important single issue bearing on the capabilities and deficiencies of any industry. If there is ample work of a suitable nature, in being and in prospect, morale remains high, all the skills are exercised and there is the confidence to invest in the upgrading of capabilities and the elimination of deficiencies. Too little work leads to stagnation. These factors apply equally to defence industry where their influence is obviously critical in determining the sort of base from which expansion could occur in a sudden emergency and the degree of self-reliance and effectiveness that could be achieved in an acceptable timescale.

5.67 The Committee has become firmly convinced that, while there is general acceptance of the need for an effective aerospace industry as an essential element of Australia's

national defence capability, there is insufficient recognition of the fact that the industry can become and remain effective only so long as it has an adequate, properly balanced and reasonably stable workload. This apparent lack of recognition concerns the Committee because it implies that too little regard has been given to the very serious effects that workload inadequacies and fluctuations in the past have had on performance and costs and to the conditions of uncertainty and low morale they have caused.

5.68 The Committee accepts that the Government is not able to guarantee any specific level of workload. However, it considers it essential that there be a strong and clearly defined Government policy stating that a moderate-sized, balanced and efficient aerospace industry is necessary in the national interest, and requiring that from all new aircraft, guided weapons and aerospace equipment programmes, there shall be a substantial flow of work to the industry; that in the phasing of those programmes proper weight shall be given to the needs of the industry in respect of continuity and stability of workload; and that in determining the extent of participation by the industry, regard shall be taken of the need to maintain an effective balance of capabilities.

5.69 The participation of industry could be through the design, development and manufacture of indigenous projects or of joint projects in collaboration with overseas partners, co-production or licence manufacturing arrangements, or through orders placed as offset against overseas purchases.

Design and Development Programmes

5.70 The Committee has noted that past local design and development programmes have apparently been very successful not

only in providing products well matched to the requirements against which they were designed but also in building up that most important element of industrial capability in support of the Services, viz. a fundamental expertise in applied aeronautical engineering.

5.71 The Winjeel primary trainer, designed and built by CAC has only quite recently been retired after a long period of service with the RAAF. The Ikara anti-submarine guided weapon system, in the design of which both GAF and CAC played major roles, is in service not only with the RAN but also with the Royal Navy and the Brazilian Navy. The Committee understands that the sales of this system to UK and Brazil have earned some $80 million. Jindivik, although not designed against an Australian requirement, was designed in Australia, is now in service with the RAN and is in continuing use in the UK. It is still in production almost 25 years after its initial flight and has earned about $36 million from sales to UK, USA and Sweden. Malkara saw long service as an anti-tank weapon with the British Army and achieved an export income of some $7 million. It was in fact the first guided weapon to go into service with the British Army. Nomad will shortly be in service with the Australian Army and is achieving commercial sales both locally and overseas. Turana is in the evaluation stage prior to entering service as a target drone with the RAN.

5.72 In the course of those projects skills have been gained in many areas and the Committee considers it important that they be built on. To this end two programmes that would be within the capability of the Australian industry in conjunction with defence R & D establishments are proposed as being worthy of early and careful investigation.

5.73 Involvement in Jindivik, Malkara, Ikara and Turana has led to the accumulation of a substantial amount of knowledge and experience in the field of unmanned flight. In the opinion of the Committee this background would have considerable relevance to the design and development of a remotely piloted vehicle (RPV) with a significant endurance capability for use in a reconnaissance role.

5.74 The second proposal of the Committee relates to a Macchi replacement aircraft and is dependent on the current MB326H having sufficient life to remain in service, possibly with some equipment up-dating and fatigue modification, until the late 1980s. Assuming that should be the case, and despite the fact that there are several trainers already available overseas that could probably satisfy the Service need, the Committee considers that the design ab initio of a jet trainer would be of immense benefit to the local industry and to the Services. It would maintain design expertise in many areas that pilotless vehicles do not exercise; it would give the Services an aircraft into which all their requirements would have been incorporated; it would provide the industry with a substantial production workload; and it would open up the possibility of collaborative design and manufacturing arrangements with perhaps New Zealand and some of the SE Asian countries, which could lead to a significant increase in the number of aircraft to be produced.

Manufacturing Workload

5.75 The Committee was informed of studies being undertaken by industry at the request of the Department of Defence concerning possible opportunities for local participation in a requirement for a tactical transport aircraft to replace the Caribou at present

in service with the RAAF. It appears doubtful that a significant amount of design work will result although there could be the need for some collaborative development in adapting an existing overseas design to the local need. The number of aircraft required will not justify their local manufacture but the Committee considers that a decision to purchase any particular aircraft type must be contingent on the firm assurance of an adequate workload from co-production, offset and possibly final assembly activities.

5.76 Another programme that should have a very substantial impact on industry workload is the Tactical Fighter Force (TFF) project (loosely termed the Mirage replacement). The Committee accepts that the local content in the building of those aircraft that will go into service with the RAAF may not be large. It considers, however that in this case, too, the signing of a contract for a specific aircraft type must be contingent on firm assurances of suitable and adequate workload. It believes that the engine, including its accessories, and the avionics equipment, should receive particular consideration in co-production and/or offset packages because they would provide high technology work of a nature that is so necessary for the extension of capability in critical areas of the aerospace and electronic industries. Such action would at the same time ensure the availability of strong industrial support in those two areas. The Committee sees long term support advantage in undertaking final assembly of the aircraft because the added knowledge so acquired has considerable relevance to the subsequent incorporation of modifications.

5.77 Offset contracts involving the aerospace industry have provided orders that now total in the region of $70 million. That in itself is a significant amount, but of greater significance

has been their impact on standards of management, productivity and quality control. Achievement of orders on the basis of price equality has been and still is very difficult. Frequently local industry is bidding from the top of the learning curve against an alternative supplier who is well down it; as a general rule it has to bring its raw materials from overseas and send its finished products back, involving heavy freight penalties; its labour costs are high; and in many cases it has to amortise tooling and start-up costs over a relatively short production run. The industry has been helped considerably by Departmental acceptance of favourable pricing bases for this type of work.

5.78 The Committee has received mixed views from witnesses on the efficacy of the offsets policy. In the aerospace field it has clearly been reasonably successful, but very much less so in the electronics and munitions industries. Its greatest weakness stems from the fact that the onus put on the overseas firm to achieve a given level of offset is on a "best endeavours" basis rather than being mandatory - some firms go to extreme lengths to meet the commitment; others tend to brush it aside. It seems to the Committee that if it were made mandatory there could well be added cost to be borne by the Commonwealth, either through a higher price for the product against which the offset is sought, or through further subsidy to the local contractor to allow him to quote competitively. Alternatively, if the Australian purchasing authority was shown to be prepared to reject equipment, even though it might be technically the most suitable, because the supplier would not accept a mandatory commitment, a marked improvement in the offset situation might result.

5.79 The Committee considers that the first of these alternatives could prove difficult to control while the second may not necessarily be in the national interest. It believes that, despite the duplicated effort and delays it would impose, the only practical solution may be to require that, while there is still a competitive position on the equipment being acquired, a reasonable proportion of the related offset contracts must be negotiated to the stage where they are ready for signature at the same time as the main contract. This procedure would ensure not only that a workload is received but also that it is of a suitable nature.

Maintenance Work

5.80 A large and reasonably stable element of workload arises from the overhaul, repair and modification of Service aircraft, engines and equipment. This is spread generally between the Service depots, the aerospace industry and the airlines, the very approximate overall proportions over the last few years having been 25%, 55% and 20% respectively. The importance of this work to the industry becomes clear from the fact that in absolute terms it provides almost one million manhours per year or about one third of the present total workload. It therefore plays a major part in the retention of skills, in absorbing overheads and in providing a measure of workload stability. For these reasons, the industry considers that less work of this nature should be retained in the Service depots and, more particularly, that less should be placed with the airlines.

5.81 The Committee accepts that there is a need for the Services to maintain depot level capabilities within their own resources for emergency use, for the training of technical

maintenance personnel and to provide independence in forward deployment situations. It accepts also that it is logical to use the airlines for this sort of work when a particular capacity that exists for airline needs can also satisfy a defence requirement on a continuing basis and so avoid the cost of duplicating the specific capacity in industry. The Committee considers, however, that the work retained in Service depots should be kept to an essential minimum. In circumstances where a specific capacity has to be created outside the Service (e.g. to overhaul a particular engine), the capacity should be established in industry rather than in the airlines.

CONCLUSIONS AND RECOMMENDATIONS

5.82 During the investigation of the aerospace industry it has become apparent to the Committee that, although this essential defence industry is able to give to the Services a good measure of independence from foreign organisations in the peacetime operation of their aircraft, there are many deficiencies which if not remedied would impose severe restrictions on what it could achieve in conditions of extreme emergency.

5.83 It is the view of the Committee that an insufficient and fluctuating workload has been the root cause of most of the industry's problems. Not only has it impacted adversely on the efficiency and effectiveness of the industry but, equally seriously, it has created an environment inimical to investment in the upgrading or development of facilities needed to narrow the capability gaps.

5.84 The Committee believes the situation has been aggravated by the way in which the present structure of the industry has led

to the inadequate workload being spread too thinly over the three main organisations. It therefore welcomes the Government's intentions as set out in para. 5.31 concerning rationalisation by specialisation and recommends that they be implemented accordingly. In relation to the IAC recommendation that GAF be made a statutory corporation, the Committee for the reasons given in paras 5.41 and 5.42, sees no compelling argument for changing the existing arrangement of direct departmental control. It recommends, however, that the technical and financial performance of GAF should be as open to public scrutiny as is that of the private firms.

5.85 Arising from its consideration of the capabilities of the industry, the Committee has concluded that in low level conflict situations the industry would be able to provide adequate support to the Services, except possibly in the circumstance where denial of supply by a foreign country might result in shortages of spares beyond the ability of the industry to produce in the short term. It is very concerned, however, that due to substantial deficiencies in expertise, plant, equipment and production processes, the industry is not at present able to manufacture completely any current operational aircraft and is, furthermore, in a very vulnerable strategic position because of its almost complete dependence on overseas sources for its raw materials. The Committee has therefore been forced to conclude that in the most serious of the postulated high level scenarios the effectiveness of the industry would be determined very largely by prior Government attitudes and policies concerning the provision of wider capabilities and a properly balanced and continuous workload.

5.86 Some of the more serious of the physical deficiencies in capability have been referred to in paras 5.52 - 5.58. Their influence on the possibility of achieving self-reliance in an

emergency is obvious. The cost of overcoming them would clearly be substantial but the Committee is not in a position to make an assessment. It recommends that the Government sets up an expert group representative of the Departments of Defence and Productivity and of the appropriate industries to examine and report on the implication of current deficiencies, on the feasibility, cost and timescale of up-grading or establishing the capabilities that are now partly or totally deficient, and on the cost of stockpiling where that may be a practicable alternative (e.g. raw materials).

5.87 Deficiencies in expertise at all levels in the aerospace industry from management to the shop floor have grown primarily from the lack of a balanced and continuing workload. Because the industry is so heavily defence oriented, that workload must come substantially from defence equipment and maintenance needs. Being concerned that this factor appears not to have been properly recognised in the past, the Committee has concluded that there is a positive need for a strong and clearly defined government policy on the issue and recommends that the basic principles of that policy should be along the lines set down in para. 5.68.

5.88 Being aware of the importance to the Services of a broadly based engineering competence in industry and having noted the success achieved by past indigenous design and development programmes, the Committee has concluded that the special skills which have been acquired should be built on. To this end it recommends that the possible implementation of two project proposals set out briefly in paras 5.73 and 5.74 should receive early consideration by the Government.

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5.89 In respect of two major new aerospace equipment programmes under investigation by the Department of Defence, viz. the Caribou replacement and the TFF project, the Committee considers that, although a large local content may not be economically feasible, it should be maximised in those areas providing continuing support capability, technology gain and skill enhancement which can be justified on a cost/benefit basis and in the case at least of the TFF, should include final assembly, fit-out and test. At the same time it recognises that the main workload possibilities will probably rest in obtaining suitable co-production and offset arrangements. It recommends that decisions to purchase specific aircraft must be contingent on firm assurances of adequate levels of suitable workload; that the local industry should be closely involved in decisions as to what is a suitable workload; that high technology engine and avionics work should form a substantial part of that workload; and that the reciprocal purchase of Australian defence products should be actively pursued as a very effective form of offset.

5.90 Offset contracts have in general been of appreciable benefit to the aerospace industry. Quite clearly more such work would be obtainable if undertakings by overseas firms to achieve accepted levels of offset were made mandatory. The Committee has commented in paras 5.78 and 5.79 on several ways in which this might be done.

5.91 The Committee has recognised the importance of aerospace maintenance work to the industry. It recommends that the level of work retained in Service depots be kept to that needed to maintain essential in-house capabilities and that the facilities of the airlines be used only when they provide a specifically needed capacity which would have to be duplicated if the work was put with industry.

6. THE ELECTRONICS INDUSTRY [1]

INTRODUCTION

The Nature of the Industry

6.01 In this chapter the term "Electronics Industry" is used to embrace those organisations which apply the principles of the science and technology of electronics in the design, development and/or manufacture of:

- components (e.g. resistors, capacitors, transistors, integrated circuits, hybrid circuits, switches, relays, connectors, etc.);
- consumer products (e.g. radio receivers, television sets, tape recorders, etc.);
- telecommunications equipment (e.g. telephone and telegraph equipment, radio and TV transmitters, etc.);
- industrial products (e.g. computers and data processing equipment, machine tool control systems, etc.).

6.02 In the defence field, the products of the industry are to be found as equipments in their own right, for example Army pack radios, or as elements in systems having a wider engineering base, for instance, inertial navigation and weapons delivery systems in military aircraft.

1. A Glossary of Technical Terms employed in this chapter is included at Annex 6.2.

6.03 In the context of its terms of reference - industrial support for defence needs - the Committee has taken account of the capability existing not only in the commercially based electronics industry but also that available in such Government establishments as the Weapons Research Establishment (WRE) in South Australia and the Guided Weapons and Electronics Support Facility (GWESF) in New South Wales. At the same time the Committee has been made aware of the apparent lack of any significant capability in the commercial industry for the development and production of the more complex multi-discipline types of systems mentioned in the previous paragraph and which in the aerospace field, for example, form a substantial part of what is commonly referred to as avionics equipment.

Brief Historical Background

6.04 The electronics industry in Australia came into being shortly before World War I and by 1919 was producing wireless (radio) equipment on a significant scale. In 1923 the first locally manufactured broadcasting station was installed and, with the establishment of other stations in the major cities, a steadily expanding radio receiver industry developed during the 1920's. Creation of capacity for the manufacture of components followed closely behind. Expansion of the consumer industry continued steadily through the 1930s, but of perhaps greater significance from the defence viewpoint was the growth at that time in the development and manufacture of what is generally known as professional electronic equipment - high quality equipment designed for long life under exacting conditions of operation. This growth was stimulated by a substantial demand for radio broadcast transmitters and led, inter alia, to the setting up of capacity to make transmitting valves.

6.05 In 1937, the Department of Civil Aviation placed orders on Australian industry for communication transmitters and receivers and radio beacons to serve the growing airline network. In 1938 the Navy placed contracts for the construction of shore-based low-frequency (LF) and high-frequency (HF) wireless transmitting and receiving stations at Canberra and Darwin; the RAAF ordered LF and HF transmitting and receiving equipment to establish a radio network throughout Australia; and the Army placed contracts for the local production of field telephone switchboards and two new types of field wireless sets. In 1939, the local manufacture of carrier telephone equipment was started to meet the requirements of the Post Master General's (PMG's) Department.

6.06 During World War 2 the number of people employed in the industry doubled to approximately 10,000. Not only did the value of the output also double (to about $12 million in the last year of the war) but the orientation changed from primarily consumer products, particularly domestic radio receivers, to telecommunications type equipment. The range of equipment produced included several forms of radio transmitters and receivers, radar, line communication equipment and field telephones. A significant part of the output went to the Allied Forces in the South West Pacific area. The industry also became involved in the manufacture of aircraft instruments. Considerable research and development assistance was provided by the Council for Scientific and Industrial Research (CSIR) and the PMG's Department.

6.07 At the end of the war the requirement for defence type equipment fell away almost to zero. However, the market for consumer products grew very rapidly and this, together with a deliberate policy by the PMG's Department of buying Australian-made telecommunications equipment wherever possible, caused the rate of expansion of the industry to be maintained. Indeed, the very heavy demand for television receivers which followed the commencement of TV transmissions in September 1956 led to a substantial increase in the rate of expansion. The industry did, however, become fragmented and when the decline in demand for TV sets came in the early 1960s the position of a number of those local manufacturers who had specialised in consumer products and components became untenable. Some firms closed down, others were absorbed in a rationalisation process and others diverted resources away from the consumer to the professional electronics field.

6.08 During the latter part of the 1960s and the early 1970s the industry generally moved towards greater emphasis on the professional and industrial product market. In particular, some companies became heavily dependent on orders from the PMG's Department. Attempts were made to obtain a larger share of the defence electronics market but with little success beyond fixed telecommunications equipment and Army radio pack-sets. Segments of the industry did, however, have substantial design, development, production and support involvement in the Ikara anti-submarine guided weapon programme and more recently some segments have been associated with the design and development of the Barra sonobuoy and the Mulloka sonar equipment, both of which are ongoing projects.

6.09 At the end of 1973 the industry faced the start of what has been a continuing severe downturn in activity. There has been a serious decline in the level of production of components, consumer products and telecommunications equipment. The reduction in employment has been even more drastic, being intensified by the introduction in some areas of a limited amount of cost-saving automatic process and test equipment. By the end of April 1977 the work force in the industry had in fact decreased by more than 13,000 in little more than three years; i.e. a reduction of about one-third in the total employment level of 40,000 in 1973/74.[2] There were various reasons for the downturn - the general economic situation, fragmentation of the industry, reduced Government ordering levels, escalating labour costs, equal pay determinations, exchange rate fluctuations, the interrelated effects on exports and, not least, cuts in the level of tariff protection that became effective in the second half of 1973.

Tariff Protection for the Industry

6.10 In December 1972 the question as to the nature and extent of assistance, if any, which should be accorded the production in Australia of electronic and electrical equipment was referred to the Tariff Board.[3] Because of the very large span of activity covered by the reference, the task was split into a number of sub-elements. In respect of the electronics industry, consideration was given first to consumer electronic equipment and components and then to the professional telecommunications and data processing areas.

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2. Figure provided in evidence by Standard Telephones and Cables (STC) Pty Ltd.
3. Now the Industries Assistance Commission (IAC).

6.11 Prior to the date of the reference the level of duty had remained steady for many years at 45% general and 27.5% preferential for the majority of electronic components and equipment. During the course of hearings the Government announced in July 1973 an across-the-board cut of 25% in the level of tariff protection, thus reducing the effective duties to 33.75% general and 20.63% preferential.

6.12 In its report of September 1973 on the component and consumer product part of the industry the Tariff Board concluded that the high level of protection afforded the local industry had encouraged too many organisations to establish production facilities. This had led to fragmentation of a relatively small domestic market and in turn had discouraged any effort to benefit from the economies of scale that exploitation of potential export markets might have provided. Furthermore, in relation to defence significance the Board reported that "the advice provided (by the Departments of Defence and Supply) did not support the argument advanced by the industry for high rates of protection on defence grounds". The Board therefore recommended that the duty on components should be reduced to 25% and on consumer equipment (television receivers and audio equipment) to 30%. At the same time it acknowledged that the recommendation would cause a considerable reduction in Australian production of components and equipment and hence in employment in those areas. The Government did not accept the recommendation and in November 1973 decided that the level should be 35% for both components and equipment, with special additional interim assistance for certain components identified as having defence, telecommunications and technological significance.

6.13 The report on the telecommunications segment of the industry was issued by the Industries Assistance Commission (IAC) in April 1976. Its recommendation that a duty of 30% should apply both to transmitting and broadcasting equipment and to telephone and telegraph equipment was accepted by the Government in September 1976. Although industry sought a higher level of protection (at least 35%) the IAC considered that its recommended level would enable the Australian industry to meet overseas competition in most areas of local production. In its report it quoted Department of Defence evidence stating that "the prime defence importance of the local electronics industry lies in its ability to design and develop equipment to the specific requirements of the Australian Services". It went on to note that defence purchases of local electronic equipment represented only a small fraction of the output of the telecommunications industry.

6.14 A third segment of the electronics industry which has defence relevance - that concerned with automatic data processing (ADP) equipment and parts - was reported on by the IAC in August 1976. The recommendation was that a general duty of 6% should apply, supplemented by a bounty reducing over a seven-year period and based on value added in Australia by ADP equipment manufacturers. The level of bounty recommended was 20% for the first three years, 15% for the next two and 7.5% for the final two. The Government did not accept the recommendation in respect of its application to cathode ray tube display terminals (CRT's) which makes up the largest part of local production. It decided instead in November 1976 to maintain the existing tariff rate of 24% for CRT's. It did, however, accept the 6% duty plus reducing bounty recommendation for all other ADP equipment.

THE STRUCTURE OF THE ELECTRONICS INDUSTRY

The Spread of Capability

6.15 Capability in the electronics and computer fields is spread across commercial industry and government establishments. Accordingly, in considering the structure of the industry in the context of its defence relevance, it is necessary to take note of the considerable use made by the Department of Defence of government facilities, for many of which it has direct responsibility.

Government Facilities used for Defence Support

6.16 The overhaul and repair of much defence electronic equipment, particularly that associated with guided missiles and front line aircraft, is carried out in Service maintenance organisations. This practice has stemmed to a degree from the fact that because the sophisticated test equipment required for day-to-day operational maintenance has in many cases provided most of the test capability for full overhaul, there has been difficulty in justifying the heavy expense of duplicating the capacity in industry for a comparatively small maintenance workload. There is also the need in the Services to maintain within their own resources the skills and capability required to keep equipment serviceable in forward deployment situations.

6.17 A useful level of experience in the design, development and prototype manufacture of electronic equipment and of advanced systems incorporating electronics has been built up within WRE on the base of the engineering experience

gained during a long period of association with guided weapons testing. It has been drawn on by the Department of Defence in the conceptual and prototype stages of such projects as Ikara and Barra. Factory level overhaul and modification of the Tartar missile is undertaken at GWESF, which also has specialised calibration and environmental testing facilities. There are limited design and manufacturing capabilities within the Government Aircraft Factories (GAF) for some types of missile and aircraft electronic/avionic equipment supported by a quite extensive environmental testing capacity. Ammunition Factory Footscray (AFF) is involved in electronic fuse work and in assembling printed circuit boards for Ikara. The facilities of Qantas are also used for the maintenance of some avionics equipment.

The Private Sector of the Industry

6.18 The role of the private sector industry in the defence field has embraced such areas as the design and manufacture of HF communications receivers and transmitters, HF and VHF manpack radios, test equipment, etc; participation in the design, engineering for production and subsequent manufacture of elements of systems that have been developed in Australia (e.g. Ikara); the integration of systems containing units from a variety of sources (e.g. training simulators); and the provision of maintenance, post-development and training support for Service equipment.

6.19 All of the major firms, with the exception of Amalgamated Wireless Australasia (AWA), and many of the smaller firms that make up the industry, are predominantly or wholly overseas owned. Those most directly involved in

the more important areas of defence work are listed at Annex 6-1. Dependence on defence orders for their workload varies. Some, such as AWA, Philips, Plessey and Standard Telephones and Cables (STC) cover a wide spectrum of activity and, in the commercial sense, are very much less dependent than others, such as British Aircraft Corporation (Australia) Pty Ltd and EMI Electronics (Australia) Pty Ltd, which exist primarily to undertake defence type work. The major government customer is the Australian Telecommunications Commission which obtains a very large proportion of its equipment requirements from the local industry.

6.20 In limited areas, the Department of Defence where necessary assists the industry by the provision of specialised plant and machinery, by entering production agreements aimed at ensuring continued manufacture of specific items for which there is a small but continuing defence need, or by the payment of government subsidies to sustain the production of particular components of defence significance.

THE PRESENT STATE OF THE INDUSTRY

6.21 As noted in para. 6.09 the electronics industry over the last three or four years has suffered a severe downturn in activity. The sector of the industry most hardly hit has been that involved in the manufacture of consumer product components and assemblies. This in itself is not of great direct defence significance but the consequent substantial reduction in the size of the industrial base does have indirect effects of considerable importance. This aspect is dealt with later.

6.22 Of more direct relevance to defence capability than erosion of the consumer industry has been the decline also in the professional electronics area. One firm, STC, which became virtually independent of the consumer field in the 1960s submitted employment charts which showed a reduction from 3,800 to 2,400 in the number of employees over the last three years. It informed the Committee that it had been forced to close down a facility manufacturing microwave link equipment due largely to the effect of escalating wage rates and exchange fluctuations on pricing for a market which was mainly outside Australia. It stated that in its opinion there had been a marked decrease in the technical capacity of the high technology sector of Australian industry, including the electronics industry, and reinforced this view by referring to a recent survey which had shown a decline of about 35% in the number of personnel in industrial R & D establishments since mid-1973. Plessey stated in evidence that it was currently using only about 47% of the capacity that it had been operating in 1972-73.

6.23 In a written submission AWA stated that " ... the reserve capacity of the electronic industry to meet defence needs has fallen dramatically in the last decade and, relative to the technology of the day, is now lower than that of 1939". In giving evidence to the Committee, witnesses from the Company quantified this statement by saying that in their view, whereas in 1939 perhaps 80% of the then available electronic technologies were being utilised by the Australian industry, the percentage had declined to about 40% by 1972 and had dropped further to about 25% since the start of the downturn. The Committee recognises that these are "broad-brush" figures but considers them to be of relevance in contrasting the present

state of the industry to that which could be needed in various strategic situations. The deficiencies are discussed later in this chapter.

6.24 The Committee has been left in no doubt that the electronics industry is in a depressed state and there is ample evidence of declining capability in areas of defence importance. This has been acknowledged by the Department of Defence in a statement to the Committee that the contraction of the industry is adversely affecting the maintenance of essential skills. At the same time, however, the Department has said that defence requirements are estimated to use less than 5% of the industry employment and that any foreseeable increase in defence work-load can do little to raise the general level of electronics industry production.

THE STRATEGIC NEED FOR THE INDUSTRY

Department of Defence Attitude

6.25 The Department of Defence takes the view that, while continued operation of the electronic items and computers contained in major weapons and communications systems used by the Services is fundamental to the functioning of the Defence Force, it is neither essential nor practicable that all Australia's requirements for such systems should be designed and/or produced locally.

6.26 The Department sees it necessary that, as a minimum, there be the capability in Australia:[4]

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4. These requirements are referred to later in para. 6.65.

- to manufacture high-usage items such as field communications equipment and specialised items of Australian design, and
- to support the installation, maintenance and necessary modification of the wide range of electronic equipment and associated software purchased overseas.

Because of the trends towards more sophisticated systems it places particular emphasis on the need to have available locally a sufficient knowledge of, and familiarity with, equipment and systems design concepts to enable the development and incorporation of major modifications and improvements, including, in the case of computer-based equipment, changes to existing software programmes and the development of new programmes required in the application of local tactical doctrine.

The Committee's Views

6.27 The Committee considers that in low-level conflict situations the role of the electronics industry would be a moderate extension of its peacetime role. There would probably be a higher level of output required of some of those items already being produced at the outbreak of hostilities and of equipment undergoing overhaul and repair.

6.28 The Committee takes the view, however, that the ability of the Defence Force to deploy and to fight is perhaps more dependent on electronic equipment in one form or another than on any other component of its inventory. It considers therefore that, in the high-level conflict scenarios that it has postulated, the need for rapid expansion, in breadth and

depth, of the electronic, electro-mechanical and systems integration capabilities of industry would be of paramount importance. The industry would be called on to produce spares needed to keep current equipment and systems operational when existing stockholdings became exhausted and to undertake the development and production of such new equipment and systems as may be required. There could also be a substantial increase in the demands made on industry for overhaul, repair and general technical support.

CAPABILITIES AND DEFICIENCIES OF THE INDUSTRY

The Technology Base

6.29 In evidence to the Committee, AWA expressed the view that, except in isolated pockets of advanced technology, the Australian electronics industry is, in the overall, about five years behind the state of the art as it exists in the more highly developed parts of the world. It also stated (vide para. 6.23) that in its opinion only some 25% of the currently available electronic technologies are at present being actively practised in the industry. In making these observations the Company was referring to the situation applying in the non-government sector.

6.30 The Committee has noted that within the R & D establishments of the Department of Defence, particularly WRE, there is maintained a continuing channel of access to many overseas technology advances, especially those of UK and North American origin, and the ability to undertake development and prototype activity across a broad range of electronic disciplines. It recognises that such in-house

capability is clearly of substantial benefit to the Services in allowing conceptual research and initial design against specific requirements to be readily embarked upon and in providing an informed source of advice in the evaluation and selection of new equipment, in the effective deployment of that equipment and in the assessment and rectification of any major in-service problems or role deficiencies. It believes however that, in a number of technologies of defence importance, industry, through lack of an appropriate workload, is unable to acquire or sustain expertise - yet it is industry rather than R & D establishments that in an emergency would be required to play a major part in the engineering, production and support of high technology equipment.

6.31 Across the range of technologies embraced by electronics, industry has had little or no recent involvement in such widely diverse areas as radars, infra-red techniques, the defence applications of lasers or the broad field of electronic warfare. A previously strong capability in communications technology, particularly in the high frequency (HF) spectrum, is in danger of decline. Expertise built up in the field of HF and VHF manpack radios is no longer being used. Computer technology is held on only a limited scale.

6.32 As against the many quite serious deficiencies the Committee has noted some areas in which a good level of capability is either held or is being established. For instance, the ability to design and produce integrated micro-circuits is leading to higher levels of sophistication in locally produced equipment. There is increasing use being made of digital techniques for a wide range of applications.

The use of optical fibre systems is being developed. Association with the Barra and Mulloka projects[5] is creating a strong sonar capability, of considerable importance to an island continent such as Australia. Microwave technology is being enhanced by the Interscan project.[6]

6.33 Although being encouraged by these examples of a spread of competence, the Committee fears that still rapidly continuing advances in the science and technology of electronics will leave the industry of this country with an increasingly inadequate technology base and hence with substantial deficiencies in defence support capability. (See also para. 6.51.)

Design and Development Competence

6.34 Reference was made in Chapter 3 (paras 3.25 - 3.35) to the matter of design and development of defence equipment and to the concern of the Committee that there is not more such work being done locally to bridge gaps in technological capability and self-reliance. In the field of electronics it is probably true to say that there are personnel within the industry with sufficient basic knowledge to cover most areas of technical expertise. The numbers are so few, however, as to place severe limitations on the total effort available and

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5. In the case of both the Barra sonobuoy project and the Mulloka sonar project the conceptual research and initial design work were carried out by WRE. The engineering development work is being done in industry.

6. Interscan is a time reference scanning beam (TRSB) microwave landing system which appears likely to be adopted by ICAO as the international standard. Conceptual and early development work was done by CSIRO. Engineering development is being done by industry in conjunction with CSIRO and the Departments of Transport and Productivity.

the infrequency or, in some cases, complete lack of opportunity inhibits the establishment or retention of an effective design and development competence in many of these areas of expertise.

6.35 Much of the equipment that goes into modern fighting machines, whether they be ships, tanks or aircraft, is a mixture of the output of several engineering disciplines. Individual "black boxes" may not be purely electronic in nature but may for instance contain as well a mix of elements of an electrical, mechanical or optical nature. In the aerospace field such equipment, classified as avionics, may typically represent some 20% by value of the flyaway cost of a combat aircraft. For the reasons noted in para. 5.58, almost all equipment in this category has in the past been bought overseas and, as a result, an Australian avionics industry has never become established. There is thus only very limited capability in this country for the design and development of this type of equipment and such as does exist is located mainly in government R & D establishments rather than in the manufacturing industry. The Committee considers this to be a most serious deficiency from a defence support viewpoint and one that could become critical in any situation demanding a substantial level of self-reliance.

6.36 Another extremely important area in which there appears to the Committee to be only limited capability in industry is that of systems integration, in which a diversity of individual sub-systems and components is brought together into an overall system that provides information in a suitable form to the operator and which functions without problems of incompatibility or mutual interference. The satisfactory integration of the numerous sensors (for example radar, laser,

inertial navigation, air data, approach aids, etc.), the computers and the various displays in a combat aircraft is a highly complex task. Equally complex can be the introduction into such a system of changes that might for instance be required to provide a desired role extension for the aircraft. The ability to do this sort of development work in a timely manner is dependent to a large degree on empiricism and hence on continuity of experience. The Committee has noted with satisfaction the work currently proceeding on the integration of the Australian Barra sonobuoy system into the RAAF Orion P3C long-range maritime patrol aircraft and welcomes it as being indicative of a Department of Defence intention to establish and maintain a continuing capability in this type of activity.

6.37 The increasing use of computers and digital techniques in a wide variety of applications including modern weapons systems has produced a requirement for a high level of competence in the generation and development of the software needed for the effective exploitation of the full potential of such systems. The Committee has noted a growing capability in this area both in-house in the Department of Defence and in industry.

6.38 Because the electronics industry has had so little involvement in the design and development of relatively complex defence equipment there has been little incentive to make widespread use of important contemporary techniques such as computer-aided design. Design competence has also been restricted to some extent by the lack of a local widely-based components industry, a situation aggravated by the substantial decline of that industry in recent years.

Production Capabilities

6.39 The achievement of a self-reliant manufacturing capability in the Australian electronics industry is dependent on many factors, not the least being the availability locally of materials, most of which are needed in a highly processed form. The Committee understands that, although a lot of the basic minerals exist in Australia, their refinement and processing has, in many cases, to be effected overseas because the size of the local market has generally been too small to justify the cost of establishing the relevant capacity.

6.40 High purity metals both ferrous and non-ferrous, precious metals, silicion for semi-conductors, silicones for insulating materials, natural or synthetic quartz for oscillators and filters, ceramics, certain moulding resins, glass fibre laminates for printed circuits, metallic ink for thick film components are all materials of importance to the industry.

6.41 The Committee accepts that the attainment of self-sufficiency in the provisioning of some of these materials would almost certainly be ruled out by economic considerations and sees stockpiling where necessary in these areas as the only sensible alternative, particularly in view of the now very limited Australian components manufacturing industry.

6.42 As already noted (para. 6.09), that part of the electronics industry manufacturing components has been severely curtailed in recent years. With few exceptions the production of discrete components (e.g. resistors, capacitors, thermionic valves, etc.) has virtually ceased and there is now little capability left in the country for

the manufacture of such items to basic commercial quality, let alone to military specification standards. The loss of this particular capability is regarded by the Department of Defence as being of no great significance, at least in the present peacetime environment. The Department has pointed out that in locally developed equipment it has always been necessary to use a substantial proportion of imported components because of the limited availability of suitable type approved components from local sources, and that, in the support of equipment of overseas origin, spare components must in general be identical to those in the original build if fully effective operation of the equipment is to be maintained. The Department of Defence has, nevertheless, been giving limited support in the form of subsidies and production agreements to sustain the manufacture of particular discrete components such as metal glaze resistors, ceramic transducers and semi-conductors.

6.43 Two extremely important micro-electronic type components which are being produced in Australia are monolithic integrated circuits (IC) and thick-film hybrid circuits. The production of both has been supported by government subsidy and the Department of Defence has continued to give financial assistance to the ongoing development of capabilities, including design and diffusion, at the monolithic IC facility which, in conjunction with the then Department of Supply, it established from defence funds in 1967 at AWA. In another important component area, the Department has recently provided financial assistance for the establishment of a multi-layer printed circuit board capability in industry.

6.44 In the assembly of electronic equipment local industry normally lacks the volume of throughput to allow it to compete with overseas industries enjoying far greater economies of scale or to justify the cost of establishing automated logistics and production techniques - for instance, the automatic delivery of components from store, the automatic positioning of components, automatic wiring and soldering or wrapping of joints. Its facilities and processes thus tend to be outdated. Furthermore its ability to produce some of the types of equipment referred to in paras 6.31 and 6.35 would be quite limited, determined perhaps more by the effect of economic considerations than by any inherent lack of technical competence.

6.45 In regard to the general capability of the industry, not just in respect of defence involvement, the Committee was impressed by the view of one industry witness who expressed concern that there was no longer the continuity and consistency of an Industry Policy which had previously applied for many decades through Governments of differing political persuasions. The witness maintained strongly that in more recent years radical changes of policy had created instability in the industry through lack of long-term expectations and had been a major factor in inhibiting the investment needed to update the facilities and manufacturing techniques used by the industry.

THE EFFECTIVENESS OF THE INDUSTRY IN THE CONTEXT OF THE STRATEGIC GUIDELINES

Support of Existing Equipment of Overseas Origin

6.46 Electronics industry spokesmen consider that the use made of their industry by the Department of Defence in the peacetime support of equipment of overseas origin is insufficient to ensure the existence of an effective nucleus support capability on which to build in time of need. They complain that the electronic and avionic type systems embracing the most recent technologies are being almost wholly supported at all levels of maintenance down to depot level within well-equipped Service facilities and that only those older type equipments, perhaps requiring re-work or modification, are being put out to industry. They recognise that the Services must be able to undertake first and second line maintenance at their own bases but they believe that the present practice in respect of depot level maintenance is not allowing industry to develop the skills and experience needed for support of the more advanced and up-to-date systems.

6.47 The Department of Defence argues that the sophisticated test equipment required by the Services for day-to-day operational maintenance is substantially that needed also in undertaking complete overhaul. The cost of duplicating this equipment in industry would be very high and could rarely be justified on the basis of what is a relatively small maintenance workload.

6.48 The Committee considers that if industry is to be sustained as the fourth arm of defence then it must be given continuing exposure to the most up-to-date systems and

equipments being used by the Services. Ideally this exposure would be achieved through the design, development and/or manufacture of such systems and equipments. Because this may rarely be feasible, at least in the foreseeable future, the placement of in-depth maintenance with industry appears to provide the only satisfactory alternative, bearing in mind that defence equipment in general is significantly more advanced than anything industry is likely to encounter in its normal commercial activities.

6.49 The Committee recognises that the wider use of industry in the maintenance field could well lead initially to increased capital investment. However, it finds the Departmental argument in respect of test equipment to be less persuasive now than it might have been some years ago. With the growing use of digital techniques, most modern systems have an in-built self-test capability which is able to establish whether individual line repairable units are or are not serviceable. The computerised automatic test equipment, which is then used to locate faults and to do the post-repair checks, is basically of a general purpose nature, subject primarily to software adaptation. This means that less special-to-type test equipment is required as each new system is introduced.

6.50 The ability of the industry (or of the Service depots) to keep equipment of overseas origin in an operational state is extremely dependent on the continuing availability of overseas sourced spares. Given those spares there would be no insuperable problems but if for any reason supplies were cut off the situation would become critical as previously accumulated stocks became exhausted. There would undoubtedly

be many spares that, in such an emergency, local industry could make, albeit at a cost, given the engineering data and materials or perhaps even on a reverse engineering basis with some improvisation in respect of materials. There would, however, be very real limitations to what could be done in the electronic components area. These limitations have for long existed to a significant degree but are now more marked as a result of the recent major decline in the components industry. The Committee sees stockpiling of components and of appropriate raw materials as being the only practicable solution, short of a deliberate policy to create and sustain a very much more self-reliant industry.

The Ability to Expand in an Emergency

6.51 On the evidence presented to it, the Committee is clearly of the opinion that the electronics industry is not being maintained at a level of either capacity or capability from which it could effectively expand in a situation of international chaos. There has never been a policy aimed towards the achievement of self-reliance. As a result, important strategic materials have still to be imported; the ability to produce electronic components is in decline; many electronic and electro-mechanical technologies of defence importance are not being practised; design, development, production and test processes and facilities are in many cases outmoded; and, most importantly, there has been a serious drift of experienced people from this shrinking industry.

6.52 Mention was made in para. 6.09 of the drop of 13,000 (about 33%) in the level of employment in the

electronics industry in little more than three years to April 1977. The Committee understands that of that number 1,700 were engineers, technicians and skilled tradesmen. While few of these people might have had direct involvement in defence work - the majority came from the commercial components and consumer product sections of the industry - they had accumulated a considerable amount of relevant experience. What this means in terms of the ability to expand in an emergency is the loss of people knowledgeable in large scale production techniques and the availability of fewer experienced engineers and technicians to plug the very many gaps that would need plugging if this country should become isolated from overseas designs and supplies.

6.53 In addition to the loss of people with experience, the lack of employment opportunity has removed the incentive for young people to seek tertiary training and qualifications for entry to the electronics industry. For as long as this circumstance prevails there will be a growing future problem of professional and sub-professional staff shortage which will take many years to overcome. The Committee has been told that it takes at least five years from the commencement of his/her training for an engineer or technician to start to become effective and perhaps another ten years of experience before he/she is sufficiently mature to lead the effort on even a relatively minor project.

6.54 Quite clearly, the human resource factor would be at least as critical as any other in determining how self-reliant in the field of electronics Australia could become in a position of isolation. Policy decisions supported by money, if taken while access to overseas sources is still open, can

fairly readily overcome deficiencies in physical capacity - they cannot quickly produce experienced people. That needs not only time but also the availability of a suitable and continuing workload.

WORKLOAD CONSIDERATIONS

6.55 Much of what has been said in Chapter 3 has direct relevance to the electronics industry, especially those sections dealing with equipment planning and procurement practices and the support role of industry. It sets out the Committee's attitude concerning the use that it believes should be made of defence procurement in peacetime to increase national self-reliance through the extension of industrial capability, including most importantly the maximum feasible involvement of industry in equipment design and development programmes.

6.56 Similarly, because of the very close association between aerospace and electronic technologies, many of the views and conclusions expressed by the Committee in Chapter 5 in respect of the aerospace industry are equally relevant to the electronics industry. Indeed there are specific workload proposals in that chapter which, if implemented, would lead to substantial involvement of the electronics industry, particularly in the avionics field.

6.57 The Committee recognises, however, that within the foreseeable future there will not be a defence workload that will suffice to keep all the important areas of defence electronic and avionic type capability exercised. It accepts that for many years it will be necessary to purchase major

defence equipments, such as combat aircraft, overseas. Even though they may be produced in Australia, at least in part, the ability to make significant changes to their original designs will be severely restricted by the very real problems and costs that would be involved in integrating any important systems alterations. In the electronic and avionic type areas, therefore, these purchases are unlikely to offer opportunity for local design and development work - indeed, a useful production workload would depend on suitable co-production and offset arrangements.

6.58 The defence requirements for such specialised equipments as radars are small and intermittent and do not generate a sufficient workload to maintain a long-term capability in this field. On the other hand major requirements being developed for new communications equipment appear likely to provide a substantial boost to capability in that particular area.

6.59 Australian industry participation (AIP) through the Government offsets policy has proved to be a very useful source of technology, workload and management technique to the aerospace industry. That it has so far been relatively unsuccessful in its application to the electronics industry has been due, in the opinion of industry witnesses, partly to the fact that the overseas contractors have not been given clear guidelines as to the preferred type of work - in what particular technologies - and especially because AIP has not been a mandatory condition of overseas procurement. In other words it has been left to the overseas firms to make best endeavours to achieve a certain level of offset of an undefined nature, or in many cases to try to persuade their own equipment

suppliers to make those endeavours. In the circumstance there has been no great enthusiasm on the part of the overseas firms and offers have frequently been no more than a series of unrelated low technology tasks - a bit of this and a bit of that, as one witness put it. Nor have the local firms been particularly enthusiastic because they have found themselves involved in quite extensive and costly tendering for few useful orders.

6.60 It seems to the Committee that, as a matter of national policy, there is an urgent need for those electronic and allied technologies to be identified in which the electronics industry should be involved and for deliberate action then to be taken to ensure continuing design, development, production and maintenance opportunities in those specific technologies. Where appropriate, this action should embrace both the defence and non-defence sectors and should be so structured as to ensure the effective participation by industry in the provision of equipment being purchased from overseas sources as well as in locally generated programmes. It is visualised by the Committee that the Defence R & D establishments would continue to maintain an across-the-board competence, particularly in any important relevant technologies not identified for industry involvement.

CONCLUSIONS AND RECOMMENDATIONS

6.61 Having noted the substantial decline of the electronics industry in recent years, not only in size but also in range of capabilities, the Committee has been led to conclude that Australia is now more heavily dependent on overseas sources for the supply of its defence electronic

and electro-mechanical equipment, and of the supporting spares, than at any time before or since World War 2.

6.62 A large proportion of the more sophisticated equipment in modern weapons systems (aircraft, ships, tanks, etc.) is of a multi-discipline nature, referred to earlier in this chapter as avionics type equipment. The electronics industry has had only quite limited exposure to this type of equipment in design, production or maintenance and has had little opportunity to gain experience in the integration of such equipment into more extensive systems.

6.63 In some areas where expertise has been developed over the years, particularly in the communications field, there are now definite signs of waning competence. The components section of the industry has suffered a major cutback in the range of its capabilities. That, together with the severe reduction in the size of the consumer products industry, has resulted in a substantial loss of professional, sub-professional and skilled trades personnel. It has also discouraged young people from training to enter the industry.

6.64 It seems to the Committee that in the course of the Tariff Board and Industries Assistance Commission (IAC) inquiries into electronic equipment there has been completely inadequate recognition given to the considerable defence importance of the electronics industry. The resultant recommendations, which appear to have been based purely on theoretical grounds and presumably on the assumption that Australia will have continuing access to overseas sources of supply, have greatly weakened the industry's base and its ability to expand effectively in an emergency when those sources may in fact be no longer available.

6.65 The Committee is firmly of the opinion that there is not the capability in the industry now to perform the range of tasks seen by the Department of Defence as being the minimum necessary (vide para. 6.26) and that there is not sufficient defence use being made of the industry to allow it to achieve even that minimum level. It considers this to be an untenable position and recommends that an examination be undertaken as a matter of urgency by the Defence (Industrial) Committee (DIC) of the present shortcomings of the industry, the range of electronic and allied technologies in which, from the defence viewpoint, it should be involved and the actions required to ensure the achievement and sustenance of an adequate level of competence and capacity.

6.66 The Committee has concluded that there is need for consistency of Government policy so that decisions by industry concerning urgently required long-term investment in upgrading facilities and manufacturing techniques can be taken with confidence (vide para. 6.45).

6.67 In dealing with the aerospace industry (Chapter 5) the Committee concluded that skills already acquired in the pilotless aircraft field should be built on and recommended that the design and development of a remotely piloted vehicle should be undertaken. It also recommended that, in respect of major new aerospace equipment programmes under investigation, particularly the TFF project, Australian industry participation should be in those areas conferring continuing support capability, technology gain and skill enhancement, with special attention being given to work related to the engines and the avionics equipment. The Committee repeats those recommendations as being of equal importance in

their potential for providing substantial workload of defence significance in the electronics industry.

6.68 On the matter of tendering for offset work, the Committee has noted the concern of industry with the high costs in which they can become involved. It strongly maintains that reasonable assistance in meeting these costs should be given by Department of Defence because frequently the local industry is having to put a lot of effort, much of it wasted, into meeting the quotation requirements of several potential overseas suppliers for a particular item when only one supplier can succeed in obtaining the order.

6.69 The Committee has concluded and recommends accordingly, that, as a means of increasing its competence, the electronics industry should be given greater exposure to the more up-to-date defence electronic and avionic type equipment by a larger input of appropriate maintenance work by the Services.

6.70 As already noted, much of what has already been said in Chapter 3 and many of the views and conclusions in respect of the aerospace industry (Chapter 5) have considerable relevance to the electronics industry. It is suggested that reference be made back to those two chapters. On one specific point the Committee draws attention to the views it has expressed in para. 3.32 concerning the need for the younger scientists and engineers in the Department of Defence R & D establishments to be given the opportunity to develop their expertise by overseas attachments and travel to international forums; an arrangement accepted in the case of universities but not Defence scientists. It considers such on-the-job

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training to be of inestimable value, particularly in areas of rapidly advancing technology.

6.71 The Committee cannot conclude its consideration of this industry without expressing its deep concern at the present seriously inadequate state of its defence capability in general and particularly its quite limited competence in the design, manufacture and support of multi-discipline type equipment that plays such a major part in current weapons systems. Electronics in one form or another is the key to the Defence Forces' ability to deploy and to fight.

ANNEX 6.1

COMPANIES OF RELEVANCE TO AUSTRALIAN DEFENCE ELECTRONICS WORK

Electronics

Amalgamated Wireless (Australasia) Ltd
British Aircraft Corporation (Australia) Pty Ltd
EMI Electronics (Australia) Pty Ltd
Fairey (Australasia) Pty Ltd
Hawker de Havilland (Australia) Pty Ltd
L.M. Ericsson Pty Ltd
National Instrument Company
Philips Industries Holdings Ltd
Plessey Australia Pty Ltd
Racal Electronics Pty Ltd
Siemens Industries Ltd
Standard Telephones and Cables Pty Ltd

Computer Peripherals and Hardware

Amalgamated Wireless (Australasia) Ltd
Control Data (Australia) Pty Ltd
Information Electronics
Sperry Univac Computer Systems Ltd
Racal Electronics Pty Ltd

Software

Amalgamated Wireless (Australasia) Ltd
Burroughs Ltd
Computer Sciences of Australia Pty Ltd
Control Data (Australia) Pty Ltd
Honeywell Pty Ltd

International Business Machines (Australia) Ltd

International Computers Ltd Australia

Interdata Computers Pty Ltd

National Cash Register Co Pty Ltd Australia

Sperry Univac Computer Systems Ltd

GLOSSARY OF TECHNICAL TERMS EMPLOYED IN CHAPTER 6

Capacitors: An assembly of one or more pairs of conductors separated by insulators, used to obtain an appreciable capacitance, sometimes of a specified value.[1]

Integrated Circuits: A development of micro electronics in which a whole circuit is constructed by micro manipulation and processing of a single block or chip of semiconductor, usually crystalline silicon. Separate containers and wire connections between circuit elements are completely eliminated and complex structures can be achieved.[1]

Hybrid Circuits: Thick/thin-film hybrid circuits consist of one or more substrates upon which the composing elements of the circuit (primarily resistor networks) have been deposited and to which discrete components (such as diodes, transistors, chips, capacitors and inductors) have been attached by split-tip series resistance welding or by themo compression bonding, or by soldering (thick-film hybrids only). After components and external leads are attached, the circuit is normally encapsulated in a resin compound.[2]

Transistor: An active semiconductor device with three or more electrodes.[1]

Inertial Navigation/Inertial Guidance System: A self-contained system which can automatically determine position, velocity and attitude of a moving vehicle for the purpose of directing

its future course, based on prior knowledge of time, gravitational pull, initial position, initial velocity and initial orientation relative to a known reference frame; an inertial guidance system is capable of determining its present position, velocity and orientation without the aid of external information. The generated navigational data is used to determine the future course for a vehicle to follow in order to bring it to its destination ... the total system consists of accelerometers, gyros and a computer.[3]

Cathode Ray Tube Display Terminals: A funnel-shaped vacuum tube specially constructed to allow direct observation of the behaviour of cathode rays. Essential parts are: an electron gun in the neck which produces and projects a beam of electrons; a screen treated with a phosphor (a substance capable of luminescence) which receives the electron beam; and a means of producing electric or magnetic fields between the two which focus the beam onto the screen and move it rapidly across the screen in any desired manner.

Microwave Link: A means of communication between two points utilising very short electromagnetic waves which extend from frequencies of about 1000 megacycles per second to about 30,000 megacycles per second; or almost to the infra red region, i.e. from about 30 centimetres to 1 centimetre in wavelength.[1]

Software: In its most general form, software is a term used in contrast to hardware to refer to all programs which can be used on a particular computer system. More specifically the term is applied to all those programs which in some way can assist all users of a particular type of computer to make

best use of their machine, as distinct from specific programs written to solve the problems of any particular user. In this case software is usually produced by the computer manufacturer, and the importance of software is such that investment in its production is a major item in the development and marketing of computers.

Infra Red Techniques: For example, infra red detectors. These are thermal devices for observing and measuring infra red radiation.[1]

Optical Fibre Systems: Transmitting communications by light beams guided through glass fibres became a practical reality during 1976. Most of these new systems generate a light signal with a gallium arsenide light-emitting diode (LED) - similar to, but smaller than, the diodes used for the readouts on digital wrist watches and pocket calculators. The signal to be transmitted varies the current as it passes through the LED, causing corresponding variations in the brightness of the light. A receiver at the other end of the fibres detects the variations in the light signals and translates them into copies of the original message. In optical communications, signals similar to radio waves are transmitted on a beam of light, which focuses on the end of a glass fibre only 0.05 to 0.15 millimetres in diameter which may be hundreds of metres long. Optical fibres have many advantages over copper-wire systems. Being thinner, they require less space and weigh less. They also have less cross talk between channels and suffer less interference from lightning or radio transmissions.[4]

Silicon: An abundant non-metallic element. It is an intrinsic semiconductor and is one of the most important materials in the manufacture of transistors.[1]

Silicones: Complex compounds of silicon used in electronics as moisture-repellant insulating mediums.[1]

Quartz: Natural crystalline silicon dioxide with marked "piezo-electric"properties and"dielectric strength". (Piezo-electric properties refers to the ability of certain crystals to develop an electric charge or potential difference across some of the crystal faces when the crystal is subjected to mechanical strain and conversely to produce mechanical forces when a voltage is applied in a suitable manner. Dielectric strength refers to the potential gradient at which electric failure or breakdown occurs). Quartz fibres are often used in sensitive instruments because of their great elasticity and physical and chemical stability.[1]

Oscillators: For example, crystal controlled oscillator: an oscillator whose frequency of oscillation is governed by a piezo-electric crystal unit.[1]

Filters: For example, crystal filter: a filter network which includes one or more piezo-electric crystals to provide resonant or anti-resonant circuits.[1]

Ceramics: Substance used in capacitors etc. because of its high permittivity (ratio of the electric displacement to the electric field strength at a given point).[1]

Glass Fibre Laminates: Material used in making printed circuit boards.

Metallic Ink: An ink providing electrical contact of varying resistance between points on a printed circuit board or other base material.

Thermionic Valves: A vacuum valve in which one of the electrodes, normally the cathode, is heated for the purpose of causing electron or ion emission from that electrode.[1]

Monolithic Integrated Circuit: An integrated circuit whose elements are formed in situ upon or within a semiconductor substrate with at least one of the elements formed within the substrate.[5]

Terminology applied to Armed Services Maintenance Levels:

Operational Maintenance: that degree of maintenance normally assigned to the Unit which operates the equipment.

Intermediate Maintenance: that degree of maintenance normally assigned to maintenance squadrons.

Depot Maintenance: that degree of maintenance performed on materiel requiring major overhaul/complete rebuild of parts, assemblies, sub-assemblies and end items.

Footnotes:

1. Handel, S. A Dictionary of Electronics (Second Edition 1967), various pages.
2. McGraw Hill, Encyclopedia of Science and Technology 1977, p.688.
3. Ibid, pp. 99, 100.

Footnotes (cont'd)

4. World Book Science Annual (Chicago Field Enterprises Educational Corporation 1976-77), pp. 262-263.

5. IEEE Standard Dictionary of the Institute of Electrical and Electronics Engineers (New York Wiley 1972). (IEEE Standard No. 100), p. 354.

7. THE SHIPBUILDING INDUSTRY

BASIS OF EXAMINATION

7.01 In its consideration of the Australian shipbuilding industry the Committee has examined the defence support capabilities of the Naval dockyards and the merchant shipbuilding industry in terms of both ship construction and ship repair and maintenance. It has not attempted to study or make judgements on those issues affecting the commercial future of merchant shipbuilding in this country except insofar as they have been seen to be of relevance to defence support capability and to national security in the wider sense.

INTRODUCTION

Shipbuilding Before World War 2

7.02 The first naval ship assembled in Australia was the destroyer Warrego in 1911. In 1913 the keels of a cruiser and two destroyers were laid at Cockatoo Island and by 1916 these ships had been completed, another destroyer had been built and the keel had been laid for a second cruiser. From then until 1939 the programme of naval construction was quite spasmodic and, with the exception of the 4,800 ton seaplane carrier Albatross, involved only small ships.

7.03 Commercial shipbuilding was limited to small wooden ships until quite late in World War 1 when orders were placed for twenty 5,500 dwt and two 12,800 dwt ships, none of which had

been completed by the end of the war.[1] The two larger ships were built by Cockatoo and the smaller ships were spread between five yards. Largely because of the need to import steel plate and many other components the industry was not competitive and by 1939 most yards had either ceased operations or become involved with the docking and repair of small coastal vessels.

The Industry in World War 2

7.04 At the outbreak of World War 2, Cockatoo Docks and Engineering Co. Pty Ltd Sydney, was the only sizeable ship-building and marine engineering organisation still functioning in Australia and it was primarily the nucleus of skill existing there that provided the base for wartime expansion.

7.05 During the 1939-45 period shipbuilding for the Royal Australian Navy was carried on in about ten separate yards. The main warships launched from these yards were three Tribal Class destroyers (all from Cockatoo Docks), twelve River Class frigates of which six were not completed until after the cessation of hostilities and sixty corvettes. All these ships were basically of British design with some Australian modifications, particularly in the areas of accommodation and armament. The fitted-out ships had a very substantial local material equipment and manufacturing content but some dependence remained on overseas supply for such equipment as gyro-compasses.

7.06 The initial emphasis on the use of the resources of the commercial yards that were being established was for the

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1. For explanation of methods of defining sizes of ships see Annex 7.1.

satisfaction of naval needs for small general purpose ships, lighters and corvettes and for the conversion of merchant ships to troop transport, hospital and armed merchant cruiser roles. The Government did, however, decide early in 1941 to launch a merchant shipbuilding programme. To this end it set up an Australian Shipbuilding Board with responsibility for the design, procurement, supervision of construction and the acceptance of vessels and for the repair and maintenance of all merchant ships, including the provision of dry-docking facilities.

7.07 Resulting from the Government decision thirteen "A" Class cargo ships of about 9000 dwt were built (about 98% local manufacture and material) and commissioned over the years 1943 to 1946. Constructing the hulls for these ships presented less difficulty than producing the engines, boilers and auxiliary equipment. The capacity that existed when the Shipbuilding Board was formed was capable of providing only about one-third of the machinery requirements for the combined naval and merchant ship programmes. Attainment of the necessary output was a significant achievement against a background of shortages of modern heavy machine tools and suitable engine assembly workshops.

7.08 The original plan for the construction of sixty "A" Class ships had to be curtailed largely as a result of the need to direct labour and materials to the repair of ships suffering damage at the hands of the Japanese. Because it was quicker to repair than replace, it became more important to keep existing ships in operation than to build new ones. The docks along the eastern seaboard, particularly those in the Sydney area, were called upon to provide substantial resources for the repair and

maintenance of ships of the Allied navies and of the many merchant ships operating in the South-West Pacific region.

7.09 The capacity for handling repair and maintenance was to a large degree determined by the number and size of the dry-docking facilities that were available together with suitably equipped repair workshops. Most of the very heavy workload in this category was undertaken in the dry docks at Cockatoo Docks, Mort's Dock and Engineering Co. Ltd, Sydney, the NSW State Dockyard at Newcastle, HMA Naval Dockyard, Williamstown and Duke and Orr's Amalgamated Dry Docks Ltd, Melbourne. Only the first two of these organisations had docks large enough for cruisers, light fleet carriers or large merchantmen. The capacity was augmented in mid-1944 when a large graving dock was brought into operation at Cairncross, Brisbane, able to accommodate any vessel capable of negotiating the Brisbane River to that point.

7.10 A decision was taken in mid-1940 to build at Garden Island, Sydney, a graving dock of sufficient size to handle capital ships. This proved to be a task of considerable engineering magnitude and the dock with its supporting workshops was not completed until March 1945. It was however, able to accommodate capital ships of the British Pacific Fleet which arrived in Australian waters for the final drive on Japan and has since provided a very significant and continuing support capacity.

Naval ship construction and repair since 1945

7.11 In the period since World War 2, five destroyers, six destroyer escorts, twenty patrol boats, a destroyer tender, four

survey and research ships and a number of smaller vessels, including heavy landing craft, have been built locally for the Royal Australian Navy.

7.12 Two of the five destroyers were Battle Class (3,450 tonnes) built between 1946 and 1951; the other three were Daring Class (3,670 tonnes) constructed over the period 1949 to 1959. The destroyer escorts were River Class (2,750 tonnes) built between 1957 and 1971.[2] All were basically of British design with some local operational and environmental modifications. In the case of the destroyers the changes related mainly to secondary armament and crew accommodation. The destroyer escorts were fitted with the improved fire control equipment and four were equipped with locally designed and developed Ikara anti-submarine weapon system. Construction of the destroyers and destroyer escorts was divided between Cockatoo Docks and HMA Naval Dockyard, Williamstown. There was a substantial imported content, including most of the electrical, electronic and communications equipment. The boilers and turbines for the main engines in all three Daring destroyers were made at Cockatoo although some forgings and castings for the machinery were imported because at that time suitable capacity to produce these materials did not exist in Australia. The gear-boxes were made at the Ordnance Factory, Bendigo. All of the armament (i.e. guns, torpedo tubes, and anti-submarine mortars) was manufactured in Australia, also at Bendigo.

7.13 The twenty patrol boats were Attack Class (149 tonnes) built over the period 1964 to 1968. They were of Australian design but they too contained a lot of imported hardware, including engines and gearboxes, motor generators, radars, echo sounders and gyro compasses. Construction and fitting-out was

2. See Annex 7.1.

divided between the commercial shipyards of Evans Deakin and Walkers, the former using Commonwealth Engineering Ltd as a major sub-contractor.

7.14 The destroyer tender HMAS Stalwart (10,700 tonnes) was built at Cockatoo in 1966-68. Walkers' shipyard built two of the survey ships, the first being HMAS Diamantina a converted frigate of 2,040 tonnes in 1944-45 and the second HMAS Kimbla of 765 tonnes in 1955-56. The largest of the survey ships, HMAS Moresby of 2,340 tonnes was constructed by NSW State Dockyard in 1963-64 and one of the smaller vessels, HMAS Flinders of 765 tonnes by HMA Naval Dockyard, Williamstown in 1972-73.

7.15 Thus in the last 32 years little use has been made of the merchant shipbuilding industry for the construction of naval ships. As with shipbuilding, so too has almost all the repair and re-fit of naval vessels and support vessels carried out since World War 2 been in the Naval Dockyards or at Cockatoo. The commercial dockyards have been used for that type of work only on minor or non-combatant vessels away from the Sydney and Melbourne areas.

Merchant Ship Construction and Repair Since 1945

7.16 Since 1945 the major commercial shipyards have produced approximately 125 merchant ships varying in size from less than 1,000 dwt to a maximum of 85,000 dwt and totalling in the order of 1.6 million dwt. Of that total more than 1 million dwt has been built in the last fifteen years, about 73% coming from the Whyalla Shipbuilding and Engineering Works (a division of BHP Co. Ltd) in South Australia, 16% from the NSW State Dockyard at Newcastle, and the remainder from Evans Deakin Industries Ltd, Brisbane, Cockatoo Docks and Engineering Co. Pty Ltd Sydney

(now Vickers Cockatoo Dockyard Pty Ltd), Adelaide Ship Construction Pty Ltd and Walkers Ltd, Maryborough.[3]

7.17 For a variety of causes, not least being a substantial excess of capacity over demand, profitability generally speaking in these yards has not been high, particularly in more recent years, despite subsidy assistance. For commercial reasons, Adelaide Ship Construction closed down in 1973, Walkers withdrew from shipbuilding in 1974 and Evans Deakin ceased its shipbuilding operations in 1976. The first of these three firms had been producing tugs, supply ships and barges; Walkers built survey vessels, service vessels and dredges within a capacity that was limited to vessels of about 100 metre length; Evans Deakin had the capacity to build large ocean-going vessels up to a size of about 76000 tonnes dwt.[4]

7.18 In addition to the yards already mentioned, a large number of other yards scattered around the Australian coast has been constructing a wide range of relatively small ships. The nature and extent of the activities of these yards have varied widely but over the years they have built a substantial tonnage of such vessels as fishing trawlers, barges, tugs, pilot ships, dredges, oil rig supply ships, floating cranes and light cargo ships. In the main only a few have been marginally profitable, although some have been successful not only in satisfying the

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3. Source: Department of Transport: Australian Shipping and Shipbuilding, 29th Edition (as at 30 June 1976) Table 16, pps 55-60.

4. Ibid., Table 16, pps 55-60.

local market but in achieving a significant amount of export business.[5]

7.19 Repair of the medium and larger merchant ships has been handled in the main by Evans Deakin at Cairncross, the NSW State Dockyard at Newcastle, Vickers Cockatoo in Sydney and Duke and Orr's in Melbourne. The graving dock at the last named yard was recently closed and replaced by a floating dock able to lift ships up to about 12,500 dwt. Whyalla has had no repair capability.

Government Assistance to the Industry

7.20 Assistance by subsidy and import restrictions has for many years been a basic feature of policy in relation to the merchant shipbuilding industry, an industry which all governments have recognised as being of defence significance. When first introduced in 1947 the subsidy was intended to offset the difference between the price of a ship built locally and that of one bought from the United Kingdom. It was set then at 25% of the total construction cost in Australia. At the same time, the importation of new or secondhand ships was prohibited unless specifically authorised by the responsible Minister.

7.21 A Tariff Board review of the industry in 1955 lifted the subsidy level to 33⅓%, a figure which was left unchanged by later reviews in 1959 and 1963. These later reviews pointed out, however, that unused capacity was a major problem confronting the industry and by 1963 it was claimed that, despite the virtual freedom from overseas competition conferred

5. See Annex 7.3.

by import restrictions, the industry was operating at less than 50% capacity. It was suggested that special measures would be needed to encourage demand and extend the scope for new tonnage to be built if the Government's stated shipbuilding policy was to be achieved.

7.22 In a further review in 1969-71 the Tariff Board concluded that the construction of large ships in Australia was, because of its high cost, having the effect of disadvantaging ship operators, increasing freight rates and affecting the competitiveness of other industries. It said in relation to defence significance that "capacity to build large vessels is only a secondary defence requirement and the very costly production of the whole range of Australian demand for these vessels is not considered justifiable on defence grounds."[6] The Board therefore in its June 1971 report recommended removal of import restrictions and changes to the levels of assistance which, while supporting the construction of smaller and more specialised vessels, were expected to cut back or stop production of larger vessels. The level of subsidy recommended was basically 25% of the local contract price for ships exceeding 75tg and up to 1,000 tg, but with provision for an interim adjustment on a sliding scale dependent on ship size which would have the effect of increasing the subsidy on ships in excess of 9,000 tg to 45% for keels laid before the end of 1975 and to 35% for keels laid before the end of 1978.[7]

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6. Tariff Board Report: Tariff Revision Shipbuilding 25 June 1971, p.19 (See also para. 7.53 (below) for detail of the Department of Defence attitude.)

7. Ibid., p.27.

7.23 In mid-1972 the Government accepted the level of assistance recommended almost a year earlier by the Tariff Board but set the minimum size of ship at 200 tg and extended the date for the application of interim adjustment to the end of 1980. At the same time it decided that approvals to import new ships would be given when no Australian yard tendered, or where the after-subsidy price from an Australian yard exceeded the normal delivered price from an overseas builder. This decision was reversed in October 1972 and the earlier import restriction procedure was re-introduced.

7.24 In December 1973 the Government decided to revert to the mid-1972 import approval scheme and to put the rate of subsidy on a sliding scale applying to all ships in excess of 150 tg reducing from 45% for keels laid before mid-1974 to 25% for keels laid after the end of 1980. In August 1976 it was decided to refer the shipbuilding industry to the Industries Assistance Commission (IAC) and in the meantime to allow the December 1973 arrangements to continue.

7.25 Resulting from its inquiry the IAC in its report of September 1976 concluded that local production of the larger ships could not be justified. It considered that there was a widening cost disadvantage, with little prospect for reversing the trend, and that the demand for such ships was insufficient to support the heavy investment regarded as necessary for productivity improvement. It stated that "...the Commission does not accept that the production of large vessels in

Australia is justified on defence grounds."[8] The main recommendations of the IAC were that the existing level and phasing of subsidy should not be varied and that restriction on the importation of new and secondhand vessels exceeding 6,000 tg should be abolished.

7.26 There has been no government decision announced in respect of the IAC 1976 recommendations.

THE PRESENT STRUCTURE AND STATE OF THE INDUSTRY

Naval ship construction and repair

7.27 The ship construction facilities of greatest defence significance are those at the Williamstown Naval Dockyard in Melbourne and the Cockatoo Island Dockyard in Sydney. These two yards together with the Garden Island Naval Dockyard in Sydney also provide a comprehensive, but not everywhere well-equipped capacity for the refit, repair, maintenance and modernisation of naval combat and support vessels.[9]

7.28 The Williamstown dockyard, with a graving dock and slipways matched to destroyer size ships is the RAN's main destroyer building and re-fitting yard. A modernisation programme is in progress, of which Stage 1, aimed at the up-grading of hull construction facilities, is well advanced. Stage 2 will provide substantially improved fitting-out and

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8. Industries Assistance Commission: Report on Shipbuilding, Canberra, Australian Capital Territory, 20 September 1976, p.75. (See also para. 7.54 below for present Defence attitude.)

9. See Annex 7.2.

refit facilities. The only new ship construction proceeding at present is a small oceanographic research ship for the Navy. There is, however, a continuing programme of routine refits of destroyers and other naval vessels and major modernisation of three destroyer escorts will shortly be commencing. Present employment level at the Yard is about 1,900.

7.29 Cockatoo Island dockyard is completely Government owned and is now operated by Vickers Cockatoo Dockyard Pty Ltd, a wholly owned subsidiary of Vickers, UK, under the terms of a lease and trading agreement which requires that the company must give priority to naval work. It has adequate slipway, wharfage and docking facilities for construction, refit and maintenance of naval vessels up to destroyer size and non-combat ships up to about 16,000 tonnes dwt. However its layout is obsolescent and an impediment to efficiency. During the last ten years special facilities have been added at government expense to allow the re-fit of Oberon class submarines and there has also been some modernisation of ship hull construction capacity. The engineering workshops are equipped for the manufacture and maintenance of ship machinery and equipment, including the manufacture of steam turbines, main propulsion turbines and high pressure marine watertube boilers.

7.30 Being required to maintain the capability to respond to naval requirements, the Cockatoo Island dockyard has a very different balance of trades in its workforce than would apply if it was a normal commercial dockyard. As a result it has difficulty in being commercially competitive unless the work being sought requires the use of specialised facilities (e.g. turbine repairs for electricity authorities). There has been

no use by Navy of the ship construction facilities over the last six or seven years and the yard has had only limited success in obtaining commercial shipbuilding orders. Its most recent contract has been the construction of a $4.5 million dredger for the Melbourne Harbour Trust. It has a continuing programme of submarine and patrol boat refits and is at present engaged in the half-life refit of a destroyer. Current employment level is about 1,500, of whom only some 130 are directly involved in new construction. They represent an important pool of specialised skills for defence purposes.

7.31 As the main RAN fleet base, Garden Island in Sydney has all the necessary facilities for the support of operational ships as well as providing the dockyard capacity for the refitting, repair and modernisation of the larger units of the fleet. It has special capabilities, particularly in respect of weapons systems and its Captain Cook dock is the largest graving dock in Australia. It does not undertake any ship construction work but it does have capability in its workshops for the manufacture of a range of replacement parts. In the 1976 Defence White Paper it was stated in regard to Garden Island that

> "...efficiency of the fleet as well as of the dockyard is presently hampered by the poor condition of the wharves and other facilities. A start will be made in the coming years to refurbish the wharves and to commence modernising the facilities."[10]

7.32 With a current strength of about 3,500 people, the Garden Island dockyard is engaged at present in a major guided

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10. Department of Defence: Australian Defence, November 1976, p.44.

missile destroyer (DDG) modernisation programme and appears to be assured of a reasonably stable workload for the next five years.

7.33 The Committee has been informed by the Department of Defence that the three dockyards - Garden Island, Williamstown and Cockatoo Island - have more than adequate capacity, with small adjustments to present manning levels, for the routine refits, repair and modernisation of the ships of the existing fleet and have a construction capability largely under utilised at present.

7.34 The Navy has a number of operational bases around Australia which, in the main, have little more than a routine maintenance capability. The most important of these from the viewpoint of support capacity is the Naval Support Facility (HMAS Stirling) under construction at Garden Island, Western Australia, which when complete will be able to provide extensive base support for destroyers and submarines. There will, however, be no docking or slipping capability within the facility, but use can be made of a Fremantle slipway which is the largest in Australia[11] and can accommodate warships up to destroyer size.

Merchant ship construction and repair

7.35 There are now only three yards in Australia able to build large or medium size merchant ships. These are the Whyalla Shipbuilding and Engineering Works, the NSW State

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11. Australian Shipping and Shipbuilding, op.cit., p.69, Table 22 (Australian Slipways and Patent Slips).

Dockyard and Vickers Cockatoo Dockyard Pty Ltd. Details of these yards are contained in Annex 7.2. In brief, the maximum tonnage of vessel that each can build is: 92,000 dwt at Whyalla, 25,000 dwt at Newcastle and 16,000 dwt at Cockatoo.

7.36 At present Whyalla has three ships under construction, of which two are bulk carriers each of 43,700 tonnes dwt and one is a roll-on/roll-off vessel of 12,700 tonnes dwt. There has in addition been a recent order placed by the SA Government for two barges. These together with the vessels under construction are all expected to be completed by the middle of 1978. The Committee believes that there is a strong probability that the yard will then close, unless some positive government action is taken.

7.37 The State Dockyard, located at Newcastle, is wholly owned by the NSW Government. It is expected that work on the second of two 25,000 tonnes dwt bulk carriers it has been building will be completed later in 1977. For the same reason as at Whyalla there appears to the Committee to be every likelihood that the establishment will be forced to close down its shipbuilding activities unless positive action is taken by the Commonwealth and/or State Governments to upgrade facilities and provide a workload.

7.38 As already indicated in paras 7.29 and 7.30, Cockatoo, although operated under lease by a private company, is virtually the third naval dockyard and its future peacetime use in the shipbuilding role will almost certainly be in the construction of naval support and specialised vessels rather than of merchant ships.

7.39 There are many small shipbuilders of whom only a few can be regarded as having important defence potential. Two that might be so regarded were visited by the Committee, viz. Carrington Slipways Pty Ltd at Tomago, NSW and Dillingham Shipyards (WA) Pty Ltd at North Fremantle, WA. These are representative of the more modern overseas yards which make use of the latest techniques of ship construction and have good industrial relations, which is reflected in their commercial performance.

7.40 At the present time there are thirteen dry docks in Australia capable of accommodating vessels in excess of 55 metres in length.[12] It is to be noted that none of these docks is situated further west than Melbourne; three are located within Naval dockyards and are not normally available for merchant ships (there have been only eight commercial dockings in the last ten years); the floating dock at Newcastle has just been withdrawn from service and its replacement will not be available before early 1978; and the Nicklin dock in Brisbane is a building dock, not entirely suitable for ship repair, and with access that would become limited if proposed new bridgework proceeds downstream of the dock site.

7.41 Six or seven years ago a shortage of dry-dock capacity in Australia was forecast but this has not eventuated. In fact a recent survey by Department of Transport suggests that the capacity will be adequate to satisfy demand for a number of years ahead, with the most likely growth in demand arising from the larger class of ship. Since 1967/68 an overall decline of 43% in the number of ships docked per year has created a surplus of capacity despite some increase in the average length of stay in dock. A very substantial reduction in naval dockings at

12. See Annex 7.3.

Cockatoo has left its two dry docks with about 70% commercial availability.[13]

7.42 Of the 128 Australian trading vessels over 200 tg that in mid-1976 were either in operation or under construction, only nine are beyond the docking capacity of the largest commercial dry dock, which is at Cairncross, Brisbane. Of those nine, seven are within the docking capacity of the Captain Cook dock at Garden Island. The remaining two are ANL bulk ships of 138,000 tonnes dwt which will operate overseas from the west coast.[14]

7.43 As already mentioned in earlier paragraphs, associated with those dry docks located in the Naval dockyards and at Cockatoo are quite comprehensive workshops, cranes and other facilities able to cope with the repair of naval combat and support vessels, including the repair of underwater battle damage.

7.44 The NSW State Dockyard has reasonable repair facilities although there is need for modernisation in some areas. The new floating dock of 15,000 tonne lifting capacity which is on order from Japan at an installed cost of about $8.5 million will allow the yard to accept ships of up to 35,000 tonnes dwt when it becomes operational early in 1978. This means the yard will have the ability to handle almost 100 of the 128 major Australian trading vessels.

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13. Department of Transport: Submission to the IAC Inquiry into Commercial Ship Repair, pps 5-10.

14. Op.cit., Australian Shipping and Shipbuilding: Tables 1 and 2.

7.45 The repair facilities at Cairncross were modernised five or six years ago. There is now an extensive four-berth fitting-out wharf and there are good workshop facilities within the complex. Just outside the complex Evans Deakin has extensive engineering facilities. Very good cranage exists for both the dock and the fitting-out wharf.

7.46 The Committee notes that the IAC is at present holding an inquiry into the ship repair industry and that an inquiry into the small ship industry is about to commence.

Propulsion Machinery

7.47 The Australian Government Engine Works (AGEW) at Port Melbourne which was set up in 1943 to make reciprocating steam engines, has for many years been producing large marine diesel engines. The most recent of these have been built under licence from Sulzer and are powering a number of the larger merchant ships constructed in Australia. For various reasons the cost of locally built engines has been substantially higher than the price of the same engine supplied from overseas, particularly from Japan. In fact to reduce the differential, the local engine became little more than an assembly of major overseas components. An interim report dealing with large diesels, and hence particularly with the economics of AGEW production, was issued by the IAC in 1974 following an inquiry into the diesel engine industry.[15] It recommended that there should be no assistance to the large diesel industry and the Government accepted that recommendation. As a result the production of large marine diesels has virtually

15. Industries Assistance Commission Report:Diesel Engines exceeding 1500 KW, 5 August 1974.

ceased in Australia. Unless negotiations proceeding with certain overseas firms for the continued operation of AGEW on some form of leasing basis are successful, the factory will almost certainly close down.

7.48 Capacity exists at Cockatoo for the production of steam turbines and associated boilers but this is now an outmoded form of propulsion.

7.49 Capacity of Commonwealth Aircraft Corporation Ltd for the manufacture of aircraft gas turbines may have some relevance to the manufacture of modern ship propulsion machinery but as yet the company has had no experience in the marine engine field.

Naval Systems

7.50 Australian industry has been given very little opportunity to develop capacity and capability in the manufacture of naval navigational, weapons or fire control systems and most of the support capability is located in the Naval Dockyards. Exceptions have been the Ikara anti-submarine system, and the Mulloka active sonar system which is still under development. A local communications system is being installed in the FFG destroyer force. There are undoubtedly relevant skills within the Defence R & D establishments and the electronics, aerospace and munitions industries.

THE STRATEGIC NEED FOR THE INDUSTRY

The Department of Defence Attitude

7.51 As seen by the Department of Defence, the essential defence need in its own dockyards and in the commercial industry

is the ability to maintain, repair, refit and modernise naval ships in peace and war and the relevant elements of the merchant navy in war. In the Department's view a naval ship construction ability is required for reasons of independence and self-reliance, particularly in relation to the repair of battle damage, an activity very different to the normal peacetime repair and refit function and one requiring the wider skills of a competent ship builder.

7.52 The views of the Department of Defence as expressed to the Committee were substantially the same as those given in evidence to the Tariff Board in 1971 and to the IAC in 1976.[16] They were summarised in the 1976 IAC Report in the following terms:

> "Naval dockyards undertake routine refits, repairs and modernisations and possess the necessary skills to construct warships. Commercial yards are used mainly for repair, refits and docking and for constructing smaller vessels such as patrol boats. Given major contingencies greater demand for these services would be placed on commercial yards, as well as for the replacement of various cargo carriers. Such conditions would have significant warning time, and the ability to produce items such as engines, electronic equipment and weapons systems would be as important as hull construction."[17]

7.53 At the time of the 1971 hearing the essential defence requirements in respect of the commercial ship construction and

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16. Op.cit.,footnote 8 above.

17. ibid., p.30.

repair industry were stated as being "... for efficient and strategically placed dry docking and other repair facilities and for yards capable of the fast production of a number of relatively small ships." It was also stated that

> "...while capacity to build major ships could not be effectively used in an emergency of limited duration, this capacity would become important in an extended conflict. Also in a shorter conflict, the techniques of such an industry would be readily adaptable to major ship repair work. The maintenance of a viable commercial shipbuilding industry was thus an important factor in Australian defence preparedness."[18]

7.54 In evidence to the Committee the Department of Defence witnesses confirmed the defence importance of the industry but stressed quite strongly that from the defence viewpoint the ability to build the larger type of ship, although desirable, is of secondary importance to smaller ship construction and to ship repair. They considered that although the availability of Australian merchant ships which could be used in a logistic support role could be important to the Defence Force in various contingencies, construction of new vessels of this type would probably not be possible within the likely warning time. They re-emphasised also that even if time were available, the ability to produce items such as main engines, auxiliary machinery and electronic equipment for ships is just as important a defence need as the ability to construct hulls.

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18. Op.cit., 1971 Tariff Board Report, pps 5-6.

Committee Considerations

7.55 The Committee agrees with the Department of Defence attitude towards the construction and repair of naval ships and fully supports the emphasis that the Department has placed on the requirement for ship docking and repair facilities and the contention that these should be strategically placed.

7.56 In the opinion of the Committee there would be need for a ship repair capability in all the types of conflict, both low level and high level, that the Committee has postulated in Chapter 2. The higher the level of conflict, the greater would be the probable requirement for ship repair.

7.57 At the moment, all major dry-docking facilities are on the east coast of Australia which leaves about 12,000 kilometres of coast line clockwise from Melbourne to Brisbane, with no significant facilities.[19] The Committee is strongly of the opinion that this grave weakness in strategic distribution must be remedied and considers it necessary that there be repair facilities on each coast capable of handling the largest ships operating under the Australian flag, vessels of up to, say, 100,000 tonnes. The wartime requirement is likely to be for a greatly increased amount of structural underwater repair, requiring special facilities which could not be economically viable in peacetime and which could therefore require subsidy.

7.58 The Committee considers the Department of Defence attitude to merchant ship construction to be less persuasive

19. See Annex 7.3.

than its attitude towards ship repair. In evidence the Department referred to the possible need in a contingency for accelerated production by commercial shipyards of small ships such as minesweepers, patrol vessels and landing barges. While such action may be adequate in some of the scenarios visualised in the 1976 Defence White Paper, the Committee was of the view that there could be situations within the full range of strategic possibilities where it would be necessary to use the commercial yards for the construction not only of such small vessels but also for the larger merchant ships that would be needed.

7.59 The Committee has considered it necessary to give due weight to the possible circumstance of Australia being thrown back on its own resources and having an assumed period of five years in which to undertake and complete preparations for resisting a direct invasion. In such a situation it believes that the Australian commercial shipbuilding industry would have to have completed substantial numbers of logistic support ships in the 20,000 dwt category as well as such small vessels as minesweepers, patrol boats and landing barges, because the construction facilities of Williamstown and of Cockatoo would be fully occupied in satisfying purely naval ship requirements.

7.60 Although it is quite impossible, in the high level conflict situation postulated in Chapter 2, to predict what would be the level of international trade or the availability of overseas shipping, the Committee believes that planning based on the most serious of the high level scenarios would predicate the need to be able to replace merchant ships now operating under the Australian flag at least to the size that is at present within the capabilities of the industry.

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7.61 The Committee believes that contingency planning should include the most serious of the high level scenarios postulated in Chapter 2. It follows that in the Committee's view the contingency planning should envisage the availability of an effective large shipbuilding industry within the assumed warning time.

EFFECTIVENESS OF THE INDUSTRY IN SATISFYING THE STRATEGIC NEED

Naval Ship Construction

7.62 The naval ship construction capacity at Williamstown and Cockatoo is substantially under-utilised at present and there are no expansion plans. Nor is there any foreseeable peacetime defence need to use commercial shipbuilding capacity for other than possibly Attack Class replacement patrol boats and some of the less specialised vessels such as the heavy-lift amphibious ship which the Government has recently decided to acquire. In any event the consequence of mixing naval and commercial shipbuilding in one yard can well be an inefficient and uneconomic operation. Naval construction standards are very much more rigorous because the ships must be able to withstand underwater shock and surface attack, have reasonable quietness of operation and accommodate a much more extensive range of equipment. These in turn lead to more exacting manufacturing inspection and testing processes and techniques, and hence to a different balance of trades and a greater emphasis on professional and sub-professional skills.

7.63 It can be argued that, because there is a naval ship-building and repair competence in Australia, it is not necessary to have built a specific warship in this country to be able to

keep it in an effective operational state. It is undoubtedly true that there is adequate technical capability in the Naval Dockyards and at Cockatoo to undertake the repair, including that of battle damage, refit and modernisation of combat and support vessels whether built locally or overseas. This does not necessarily mean, however, that the required level of competence can be retained without a design and construction workload to exercise and develop the wide range of necessary skills.

7.64 The Committee has noted that it is now almost ten years since the last locally built combat ship was launched and that, on present planning, several more years must elapse before any new programme can have much impact at the shipyards. In this regard it is encouraging to note that a follow-on destroyer project is now being investigated as a replacement for the present destroyer escorts which are due to start phasing out of service in 1987. This should provide time for local participation in the design of these ships as well as in their construction, provided an early decision is taken.

7.65 The Committee has noted that some updating of hull construction and fitting-out facilities is proceeding at Williamstown but is concerned that there appears to be little consideration given to remedying deficiencies of local capability in such important areas as propulsion machinery and the various electronic and electro-mechanical systems, including weapons and fire control systems, that are so vital to the operational effectiveness of a combat ship.

7.66 In the low level conflict situations visualised by the Committee there would be insufficient time to build ab initio any new naval ships, so that inadequacies in construction or fit-out capabilities in that type of conflict would be irrelevant. However, in the sort of high level conflict that has been postulated, the enforced reliance on our own resources would place critical limitations on the level of combat capability that could be achieved by any new ship built in the envisaged five-year preparation period. There could, for instance, be the need to revert to heavy and inefficient steam turbine propulsion and to little more than gun armament. The Committee feels therefore that there should be a sensibly phased programme aimed at overcoming the sort of deficiencies enumerated in the preceding paragraph.

7.67 There is already some background of capability in naval weapons. The Ikara anti-submarine guided weapon system design, development and production programmes has built up substantial knowledge in the field of modern naval equipment and its integration with other ship systems. The Committee regards it to be of considerable importance that the expertise developed in Ikara be maintained and that appropriate means be found to further extend an area of indigenous competence which is so important to the long term goal of self-reliance.

Merchant Ship Construction

7.68 The Committee accepts that in low level conflict situations a merchant shipbuilding capability has no relevance. As noted in para 7.60 however, it regards the ability to replace merchant ships now operating under the Australian flag as being

of considerable importance to national security in the sort of high level situation postulated in Chapter 2. It has therefore given attention to the future problem of reinstating the construction of medium and large merchant ships, if, in the meantime, the present capacity had closed down and the plant and equipment had been allowed to disperse.

7.69 Based on World War 2 experience it would seem that major shipyards could be built ab initio in a two to three year period. This assessment is reinforced by evidence given in 1974 to the Seapower Sub-Committee of the US House of Representatives Armed Services Committee that construction of an entirely new shipyard to the point where a keel could be laid would take 2-2½ years. That evidence went on to point out that the most critical item in expansion of shipyard capacity is the factor of human skills - management skills, engineering skills and trade skills.

7.70 The Committee is of the firm opinion that in the circumstances envisaged a delay of at least two years in re-establishing facilities and training a new work force would leave insufficient time in which to construct new ships prior to the end of the assumed five year preparatory period. It therefore regards closure of the industry as being, prima facie, against the interests of national security. In making this prima facie judgement, however, the Committee also recognises that a final judgement cannot ignore the economics of ship-building or the added defence strength achieved by encouraging the most soundly based industrial structure in Australia, and the most efficient allocation of Australia's resources.

7.71 The alternatives are to put the existing capacity on a care and maintenance basis, i.e. unused but in a state of readiness, or to re-examine the possibility of maintaining the industry in being on a more effective basis than in the past.

7.72 The Committee does not believe that the "unused but ready" approach is really practicable. Firstly it would be necessary to inject large capital sums in order to bring the present shipyards to a reasonable standard. It is naive to suppose that any government would provide substantial funds for facilities which were to remain idle. Secondly, hull construction is only one aspect of the problem and similar action would be needed in other areas such as propulsion. Thirdly, there would be enormous difficulty in achieving the necessary build up of the wide range of skills in an acceptable time period when reactivating the physical capacity.

7.73 The alternative that the Committee prefers from a national security viewpoint is to see a major shipbuilding industry kept in existence, although it is acutely aware that there are economic cost penalty levels above which no Government or community can be expected to go. Conclusions reached as to the possible avenues for holding costs down are discussed later in para. 7.88.

Ship Repair

7.74 The Committee is satisfied that, in general, the competence exists in the Naval dockyards and at Cockatoo to provide the necessary repair, refit and modernisation support for naval ships. Improvements planned for certain of the

facilities should lead to increased efficiency. Present manning is on a single shift basis so that capacity for repair work could be very substantially increased in an emergency by the introduction of multi-shift operation. Nevertheless the Committee is concerned at the low level of productivity and the incidence of industrial unrest which could seriously affect the operational availability of the fleet.

7.75 The capability also exists in the Naval dockyards and in industry to support the more complex naval equipment and ship systems that come in the main from overseas suppliers. Maintenance would become extremely difficult, however, if the supply of spares was stopped for any reason.

7.76 In relation to merchant ship repair, the Committee's views have already been expressed (para. 7.57) on the need for facilities on both east and west coasts able to handle vessels up to about 100,000 dwt. In this regard it has noted the report of a study commissioned jointly by the Commonwealth and WA Governments in 1974 on the feasibility of constructing an additional repair facility in Cockburn Sound, near Perth.[20] The cost of construction over a 13-year period was estimated in 1974 at between $51 million and $57 million. It is understood that the Commonwealth Government decided not to proceed with the proposal and that the matter is still under consideration by the WA Government. The Committee believes the attitude of the Commonwealth should be re-considered.

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20. Western Australian Government and Australian Government: Report on Cockburn Sound Ship Repair Facility, October 1974 Y. ARD(Australia) Pty Ltd Canberra, Maunsell and Partners Pty Ltd Perth.

7.77 The Committee is concerned that the Newcastle repair facilities are in need of modernisation and will not be able to handle ships larger than 35,000 dwt even when the new floating dock arrives early in 1978.

7.78 A further difficulty pointed out to the Committee was that, if major shipbuilding ceases, the capacity for certain repair work, particularly major hull repair, will cease with it. The Committee considers this to be quite unacceptable and recommends that special action be taken to retain the necessary skills and equipment.

Industrial Relations

7.79 The effectiveness of the shipbuilding industry has for many years been adversely influenced by poor industrial relations stemming in part from the inter-action between a multiplicity of unions which become involved in ship construction and repair. The extent to which demarcation and inter-Union issues have led to disputes and stoppages appears to have varied from yard to yard. The Unisearch report states that, based on information provided by one yard, 42% of all disputes arose from this source.[21] On the other hand a Department of Defence witness said that probably less than 1% of time lost from disputes in the Naval Dockyards resulted from demarcation problems. He did point out, however, that demarcation practices are a cause of loss of productivity. In this regard the Unisearch report suggests that overmanning resulting from such practices can be expected to add between 2% and 5% to ship costs. The Committee

21. Op.cit., p.50.

believes that when there is an inadequate and discontinuous workload the penalty could be higher, because in that situation the individual worker becomes increasingly protective of his own particular trade.

7.80 The Committee discussed with representatives of the ACTU the possibility of achieving a single shipbuilding union as a means of reducing disputations and eliminating much of the productivity loss caused by demarcation. The ACTU pointed out that moves in that direction were under continuing consideration - in fact there has already been some amalgamation - but that there were considerable difficulties to be faced. They accepted that the single union concept could be desirable in an industry with an adequate workload and a full order book. However they could see insurmountable problems in an industry that has such an uncertain future as the Australian shipbuilding industry.

7.81 The Committee recognises that issues other than demarcation have contributed heavily to the poor industrial record. Lack of an adequate and continuous workload, insufficient ships of a given type to allow achievement of learning benefits; programmes that have tended to stop and start; late availability of data and bought-out materials - these are some of the issues that have produced loss of motivation. An under-employed workforce becomes bored, frustrated, fearful for its future and critical of management. Thus does discontent develop into disputes and stoppages.

Productivity

7.82 The problems that lead to poor industrial relations, particularly those arising from workload uncertainty, lead also to lack of confidence by management and hence to deferment of investment in plant, equipment and facilities. This in turn seriously affects productivity and the competitive position of the industry. The Unisearch report claims that it was the delay of several years prior to mid-1972 in the announcement of Government shipbuilding policy that effectively prevented investment by the local industry at a time when overseas shipbuilders were making major improvements which greatly improved their productivity. The Australian yards thus fell further behind and there is now of course no incentive to invest.

Deficiencies of Capability

7.83 Capacity exists and materials are available for the construction of hulls for war ships up to destroyer size and for merchant ships up to about 85,000 dwt. There is, however, the need for very substantial investment in the modernisation of facilities in the commercial yards if costs are to be kept to a level that, even with appropriate subsidy, will allow the price of a locally built ship to match that of a similar ship delivered from overseas. The fitting-out work associated with such ships can also be done although in many cases much of the equipment, particularly in naval ships could not at this stage be of local origin.

7.84 As mentioned in earlier paragraphs there are serious capability deficiencies in the areas of propulsion for both naval and merchant ships and of electronic and electro-mechanical

systems. In the case of large diesel engines capacity exists in the Government Engine Works together with the Ordnance Factories to manufacture, test and assemble such engines with a high local content, but there are some components that could be beyond Australian forging and casting capacity.

7.85 In regard to ship repair, the serious deficiency arising from lack of docking and repair facilities on the west coast has been discussed in para. 7.55. There is also no significant capability in the west to handle the repair of naval ships, particularly of ships suffering from action damage.

CONCLUSIONS AND RECOMMENDATIONS

Ship Construction

7.86 The Committee has concluded that, from the viewpoint of national security in the most serious of the postulated high level conflict scenarios, there would be a very real need for an ability to produce medium and large merchant ships in Australia. It is concerned that if there were no existing shipyards, time would not permit sufficient construction of new vessels to take place should it be necessary to create and man new shipyards before any ship construction could commence. It considers therefore that steps should be taken urgently to ensure the retention of large shipbuilding facilities in Australia which in the normal course would appear to be almost certain to cease operating in the near future.

7.87 The Committee doubts the feasibility of putting the existing facilities at Whyalla and Newcastle on a care and maintenance basis (see paras 7.71 and 7.72) and believes quite

strongly that every endeavour should be made to keep the large shipbuilding facilities in existence as an economically acceptable industry. It is of the opinion that poor productivity and high costs in the past have stemmed primarily from inadequate workload, outdated plant and bad industrial relations. An important contributory factor has been the inability of the industry to offer shipbuyers terms of payment as attractive as those on offer from overseas.

7.88 Although recognising that substantial sums would be involved in modernising the facilities, the Committee proposes that consideration be given to the following interdependent actions directed towards the achievement of improved performance, as a possible basis for converting this generally uneconomic but nationally important industry into an economically acceptable industry:

- the industry be rationalised;
- the existing ship construction facilities at Whyalla and Newcastle be retained;
- there be an injection of capital at both yards on a shared basis, sharing being between the Commonwealth and NSW Governments in the case of Newcastle, and between the Commonwealth and SA Governments and BHP in the case of Whyalla, the amount of capital to be that needed to bring the physical capability of each of the yards to a standard matching that of overseas shipyards of similar capacity;
- there be workload on a continuing basis for the rationalised industry resulting from a "build in Australia" policy for Australian ships; a policy to build vessels which to the maximum feasible extent

are of standard design; and, subject to a suitable manning/productivity understanding with the maritime unions, an Australian flag policy for a proportion of overseas trade;

- there be a guarantee of improved industrial relations, particularly in respect of measures to improve productivity for ship construction and repair and an accepted objective of working towards a single ship-building union through a process of amalgamations;
- there be a system by which potential buyers of Australian built ships can be offered financial terms that are generally competitive on the world scene.

The Committee emphasises that this proposal must be viewed as "a package deal" - the elements are interdependent and the package stands or falls on acceptance of all elements.

7.89 The Committee recommends that the Government sets up an expert group comprising representatives of the Commonwealth, NSW and SA Governments, managements of the shipyards and the ACTU to examine these proposals as a matter of urgency and report on the cost and practicality of their implementation as an integrated package and whether the industry could then be reasonably expected to be economically acceptable.

7.90 The Committee recommends also that the possible retention of the Australian Government Engine Works at Port Melbourne should be included in the expert group's field of examination and that in the meantime no disposal or leasing action should be taken that would jeopardise the ability of the AGEW facility to produce large diesel engines. The Committee regards retention of that ability to be just as important as maintenance of hull construction ability and would fully

support any negotiated arrangement with an appropriate overseas firm that would ensure continued operation of the facility.

7.91 In respect of naval ship construction reference was made in para. 7.64 to an investigation that has commenced into the concepts, characteristics and costs of a new destroyer project that could serve to replace the present destroyer escorts from 1987 onwards. The Committee recommends that the investigation be expedited so that, should the project be approved, there would be sufficient time for Australian participation in the design of the ship as well as for the subsequent construction of the total number of ships required.

7.92 The Committee is concerned that there are very serious deficiencies of local capability in such areas as naval ship propulsion and the various electronic and electro-mechanical systems, including weapons systems. It recommends that the Government should call for the development by the Department of Defence of a plan aimed at a steady reduction in the level of overseas dependence in these areas that are so critical to the operational effectiveness of the Navy.

Ship repair

7.93 The Committee considers it essential that there be dry-docking and repair facilities on both the east and west coasts of Australia capable of accommodating ships of up to at least 100,000 dwt size. In this regard it has noted with considerable concern the very serious strategic weakness resulting from the lack of any significant capacity of this nature further west than Melbourne and has concluded that

action must be taken to overcome what would be a critical deficiency in a time of emergency in respect of both naval and merchant ships. It recommends that the Government re-consider with some urgency the proposals referred to in para. 7.76 for the construction of a repair facility in Cockburn Sound, near Perth with a view to their implementation on the basis of joint funding by the Commonwealth and Western Australian Governments.

7.94 The Committee notes that the largest commercial dry dock on the east coast, that at Cairncross, is not adequate to handle ships above about 85,000 dwt size. However, it does not see any justification for building a larger dry dock at this point in time because in an emergency the Captain Cook graving dock at Garden Island could be available to take the few ships that are beyond the capacity of Cairncross.

7.95 The new floating dock due to come into operation at Newcastle early in 1978 will increase the size and hence number of ships that will fall within the repair capability of that yard. The Committee recommends that, to make effective use of the increased docking capacity, the supporting workshop facilities should be modernised in these areas where present plant and processes are obsolete and a cause of low productivity.

Naval ship repair

7.96 The Committee is concerned that the wharves and some of the supporting facilities in the Naval Dockyard at Garden Island, are in poor condition and that plans for refurbishment and modernisation appear to be developing at a slow pace. It recommends that this work be given greater priority.

7.97 The Committee is concerned also at the present lack of suitable naval ship repair and refit facilities in the west. It considers that a graving or floating dock should be available at or near HMAS Stirling to allow the mid-cycle docking of any type of naval ship. This requirement would be met if the recommendation in para. 7.93 for a large dry dock in Cockburn Sound is accepted, provided that labour relations are improved to the extent where the operational capability of the Navy is not put in jeopardy.

7.98 As indicated in para. 7.74 and again in the last paragraph above and earlier the Committee is very concerned with the incidence of industrial unrest in the naval dockyards, where strikes and bans have a most damaging effect on the operational availability of the fleet. This becomes evident from a study of what is involved in a ship's operating cycle, a typical example of which for a destroyer is attached at Annex 7.4.

7.99 The navy has significant "in-house" repair and maintenance capacity in the maintenance vessel HMAS Stalwart, the submarine maintenance base HMAS Platypus at Kirribilli in Sydney, and the support facility HMAS Stirling at Cockburn Sound WA (with the use of a privately owned slipway some kilometres away).

7.100 The navy is nevertheless dependent on the civilian-manned dockyards for ship modernisation, 3 yearly refits, most "mid-cycle" dockings, and any repairs or maintenance which involve docking or are beyond the capacity of the ships'crews and the Fleet Maintenance Party.

7.101 The Committee is aware that Australia's naval dockyards have, in the past, experienced disruptions which, in some cases have hampered the operational capabilities of the fleet. In Australia there are particular problems because the main fleet base (Garden Island, Sydney) is also a naval dockyard. The Committee considers that, to the greatest extent possible, the operation of the fleet should be free of limitations arising from industrial disputes.

7.102 It believes from evidence received during this Inquiry, from a tour of inspection of these facilities, and discussions with both management and unions, that the situation in the dockyards viz. Garden Island and Williamstown has improved. The Committee endorses the recommendations of the Wilson Committee of Inquiry into Industrial Relations in the Naval Dockyards and understands that several of these recommendations have been implemented and that the remainder are under study with a view to their implementation. The Committee recognises the problems of the dockyards and can see the need for further studies in which all parties concerned are involved, before some of the more serious of these problems can be overcome. The Committee intends to carry out a further comprehensive investigation into the Dockyards.

Dissenting View by Mr Short

Mr Short has expressed his dissent from several of the conclusions and recommendations in respect of Ship Construction. In particular he disagrees with paras 7.86 and 7.87.

Mr Short considers that there is insufficient evidence to indicate that the possibility of the most serious of the postulated high level conflict scenarios on which these paragraphs are based occurring is such as to justify retention of shipbuilding facilities at Whyalla and Newcastle for national security reasons alone.

In Mr Short's view the conclusions in paras 7.86 and 7.87 pay no regard to the economic consequences for the nation as a whole. He considers that the conclusions ignore the point made by the Committee in para. 7.70, that Australia's defence strength can best be developed by encouraging the most efficient allocation of Australia's resources. It is his opinion that the Committee did not receive evidence to support the view that, if a significantly higher level of protection was required, retention of shipbuilding facilities at Whyalla and Newcastle could be justified on either national security or economic grounds, even in the unlikely event of all the suggested actions outlined in para. 7.88 being achieved.

In reaching these views, Mr Short paid particular regard to evidence presented by the Department of Defence both to the Committee and to the Industries Assistance Commission; and to the White Paper on Defence tabled in Parliament on 4 November 1976.

It also follows from the foregoing that Mr Short does not agree with the Committee's recommendation in para. 7.89.

Dissent by Mr R.F. Shipton in respect of Paras 7.62, 7.86, 7.88 of Chapter 7.

7.62 I do not consider the differences between naval and commercial construction standards to be as great as indicated in this paragraph. I believe it is a tragedy that the Department of Defence and the Shipbuilding Industry did not work together in the past using Australian design and ideas to develop and construct naval ships appropriate to Australia's needs.

7.86 I do not consider that this paragraph takes into account either the potential for growth of existing smaller or medium sized shipyards.

7.88 I do not believe that the statement "the existing ship construction facilities at Whyalla and Newcastle be retained" would necessarily meet the needs claimed.

ANNEX 7.1

DEFINITION OF TERMS

GROSS REGISTERED TONNAGE is the cubic measure of the internal capacity of a ship which is available within the hull and encloses spaces above the deck for cargo, stores, passengers and crew (with certain exceptions). Gross tonnage is expressed in units of 2.83 cubic metres per ton. It is the basis for assessing port and harbour dues and in particular is used in estimating the possible financial returns of a docking and repair facility.[1] (Abbreviated as "G.R.T.")

NET TONNAGE is also expressed in units of 2.83 cubic metres per ton and represents the volume of enclosed space in a ship which can be utilised for cargo or passengers. Net tonnage is derived from gross tonnage by deducting spaces used for accommodation of the master and crew, navigation and propelling machinery.

DEADWEIGHT TONNAGE is a measure of the weight of cargo that can be carried but also includes the weight of bunkers and stores. It is the difference between the displacement of a vessel loaded to its 'summer' loadline and the light displacement. (Abbreviated as "D.W.T.")

DISPLACEMENT is the total weight of the ship in tonnes and ranges between:

(i) lightship or unladen weight when the ship is complete and ready for sea but without crew, passengers, baggage, stores, fuel, water and cargo.

and (ii) load displacement when the ship is loaded to its deepest permitted draught.

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1. Referred to in the 1971 Tariff Board Report as "Tons Gross" (tg) 199.

An unqualified reference to displacement (e.g. in the case of naval vessels) means the "load" displacement, however in this report it is also necessary to refer to an intermediate displacement when discussing docking. The lifting capacity of a floating dock or slipway corresponds to the maximum permitted docking displacement. For stability purposes a ship normally docks with a trim by the stern which is achieved by adding to the lightship as much as 30% of the deadweight in the form of water ballast. (Usually referred to in tonnes).

It should be noted that no constant relationship exists between each of these measurements of size. Tonnage values vary considerably with the class of vessel as well as its size.

The 1974 Y. Ard Maunsell study provides in diagramatic form an illustration of typical relationships between tonnage and size for bulk and general cargo ships.[2] As an example the Y. Ard Maunsell Study quotes the case of a typical 60,000 dwt ship which would have a lightship of 13,000 tonnes giving a displacement of 73,000 tonnes with a corresponding G.R.T. of approximately 34,000 tons.

2. op. cit. Figure 1. p.4

AUSTRALIA's MAJOR SHIP CONSTRUCTION AND REPAIR FACILITIES

1. COMMERCIAL FACILITIES

(a) Whyalla - Whyalla Shipbuilding and Engineering Works[1]

Whyalla was commenced in 1940 as part of the Australian war effort and the first ships built at the yard were four corvettes for the Royal Australian Navy, each of 690 gross tonnage.

In 1957 an overall plan for development of the yard was adopted which resulted in the yard becoming completely equipped for all-welded construction. This plan also provided for increased crane capacity on the building berths and adjoining areas to enable prefabrication techniques to be fully exploited; the provision of specialised outdoor assembly areas (made possible by weather conditions) and the introduction of more formal production planning.

The Whyalla shipyard has built and designed many types of ships mainly specialised vessels such as bulk carriers oil tankers, container vessels and roll on/roll off vessels and also a 9,000 dwt semi submersible off-shore oil-drilling barge "Ocean Digger".

The equipment utilised in the yard is designed to process 20,000 tonnes of steel each year, the equivalent of building two 55,000 tonne bulk carriers.

Whyalla has signed a Technical Co-operation Agreement between itself and the world's largest shipbuilding enterprise I.H.I. (Ishikawajima - Harima Heavy Industries Company Limited) of Tokyo; which gives Whyalla direct access to the technical resources and experiences of this company.

Ship Construction

Construction is now almost completely confined to two of the larger slipways, Nos. 3 and 4.[2]

No. 3 - (260m x 33m) - Cranage 1 x 20 tonne : 2 x 10 tonne
No. 4 - (220m x 33m) - Cranage 1 x 50 tonne : 2 x 10 tonne
No. 4 berth can accommodate bulk vessels up to 80,000 dwt with difficulty - ships up to 25,000 dwt are preferred.

Outfitting wharves are served by one 150 tonne and one 15 tonne crane. Assembly and early outfit areas adjacent to the building berths are served by the berth cranes.

Ships in the 50-80,000 dwt class impose severe strain on facilities and sizes of the order of 15,000 - 25,000 tons are preferred.

"1/10th scale " automatic flame cutting equipment is used. A considerable amount of steel fabrication work is done by local sub-contractors and fabrication in the yard is done in the open.

Since July 1971 10 ships have been produced at Whyalla the largest of which was an 85,000 dwt bulk carrier. In 1973 two vessels were completed which were the first vessels in the world to be powered by heavy duty marine turbines. Current orders will

provide work for Whyalla up to mid 1978. Two of the four ships on the order books for Whyalla are to be exported to New Zealand for trade between New Zealand and Australia. These were built at the long term subsidy rate of 25%.

Approximately 1,700 persons are employed at Whyalla in shipbuilding. Since sub-contracting has accounted for 6-11% of total ship costs, employment in this sector is also significant.

(b) New South Wales State Dockyard

The Dockyard is wholly owned by the New South Wales State Government and is located today at Dyke End peninsula, Newcastle.

Construction

New construction is carried out on two building berths (170m x 25m), which can accommodate ships of about 24,000 dwt with some difficulty but 15,000 dwt is preferred. These are served by 40 tonne cranes. Outfitting wharves are served by a total of four 6 tonne cranes - the larger berth crane can be used for some outfit. An early outfit area adjacent to the building berths is served by two 6 tonne cranes.

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1. Sources: Unisearch Report op. cit. pps 41-45; Public Evidence received by the Committee
2. A notable exception was the semi-submersible oil-drilling barge "Ocean Digger" which was too wide for any one berth and was built in Nos. 2 and 3 slipways straddling the intervening crane wall.

The State Dockyard is currently completing construction of two 25,000 dwt bulk carriers, work on which is estimated to be completed by June 1977.

Cranage is generally considered to be inadequate for modern construction techniques.

The size of the building berths imposes a severe limitation on the size of ship which can be conveniently built and the geographical location of the yard does not permit easy expansion without considerable investment. "1/10 scale" automatic flame cutting equipment is used and most steel fabrication is carried out under cover in the shipyard. Subcontractors are sometimes used for steel fabrication but not for the major part of it.

Employment

About 1,500 persons were employed in shipbuilding up to 10 January 1977, when the Dockyard was forced to reduce its workforce by some 300. Of the workforce 43% is skilled labour, 29% unskilled labour, 11% apprentices and 17% staff. Subcontractors are employed as required and the extent of subcontracting has ranged from 2-15% of ship costs in recent years.

The extent of employment in ship repair varies with the relative amounts of building and repair activities being undertaken as labour is shifted from one task to the other. Direct employment in repair work in 1976 was about 400.[3]

3. 1976 I.A.C. Report "Shipbuilding"

Associated Facilities and Repair Facilities

Facilities in outfit shops are generally satisfactory. New shops for the pipe trades and sheet metal workers have been built in the past few years.

Drawing and planning facilities are adequate but work loads are uneven due to irregularity of orders.

The most serious limitation of the yard is its geographical location on a peninsula which inhibits easy expansion.

Floating Dock

The New South Wales Government has placed an order in Japan for a new 15,000 dwt floating dock as a replacement for the previous obsolete dock. This facility should enable Newcastle to maintain its position as a ship repair facility when the dock is delivered early in 1978. The dock is to be built and installed in Newcastle at a cost of $8.56 million. The dock will be capable of lifting vessels up to 35,000 dwt which includes the majority of vessels trading on the Australian coast.

It is estimated that about 400 people will be employed when the floating dock becomes fully operational.

(c) Vickers-Cockatoo Dockyard

Vickers-Cockatoo, a subsidiary of Vickers Ltd of London, operate the Dockyard on Cockatoo Island in Sydney by lease from the Australian Government under the terms of a Lease and Trading Agreement which requires the Company to give priority to Naval work.

The role of the Cockatoo Island Dockyard is described in Clause 2-(1) of the Trading Agreement:

> "The Company shall ... undertake at the works in the most economical manner the construction, modernisation, conversion and refitting of Naval Vessels, the manufacture and repair of Naval stores and equipment. The Company shall also carry out other work sponsored by the Department of the Navy and subject to the foregoing requirements undertake commercial work to the maximum practicable extent."

Because of the need to maintain a balanced workforce (i.e. from the Defence/national interest viewpoint) this dockyard is also suited to the construction of special purpose ships which have an unusually high outfit content, requiring the use of specialised shops for the manufacture of parts and a labour force skilled in complex installation procedures.

Capability of the Dockyard

Cockatoo has the capability for fleet refit and maintenance and for construction of naval vessels up to destroyer size and non-combat ships up to about 20,000 tonnes.

(i) Repair and Refit

The principal activity of the Dockyard in recent years has been the refitting of "Oberon" class submarines for the RAN and the Trading Agreement requires the Company to give priority to this work at all times.

It is the Company's policy to optimise commercial work to ensure the maximum most economical use of the Dockyard facilities. The necessity to maintain a dockyard with the capacity to respond to Defence requirements requires the retention of trades and departments which would not be justified on purely commercial criteria. "Attack" class patrol boats are also refitted and other naval surface ships are refitted from time to time.

The level of Naval surface ship refitting varies but reached a peak in 1968-1971 and has increased during 1976 and will continue to do so in 1977.

(ii) Shipbuilding

Since 1910 ship construction has been primarily for the Royal Australian Navy and a wide range of Warships and Auxiliaries have been completed.

The role of warship construction has diminished in recent years. Since the completion of the Destroyer-Escort HMAS Torrens in 1971 a much reduced level of activity has been maintained and maintenance of the Dockyard's Naval Shipbuilding skills has been a major problem.

The last vessel constructed was an 800 litre Bucket Dredger for the Melbourne Harbour Trust completed in 1976.

Organisation

The Dockyard is functionally organised into Technical, Production and Financial Divisions. An apprentice training scheme is maintained for the fitting and turning and electrical

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trades, averaging an intake of 50 per year. A Quality Control Department has also been established to meet RAN requirements as well as commercial requirements.

Recommendations prepared during a review of facilities in 1966 have been almost completely implemented and the Dockyard now has one of the most modern conventional (non-nuclear) submarine refitting facilities in the world. The shipyard plan has only been partially implemented.

Docks and Wharves

The graving docks have the capacity to take any existing or projected RAN ship although they are too small for many merchant ships such as large tankers. Sutherland Dock, the larger of the two has a length of 210 metres and a breadth of 27 metres and was completed in 1890. Fitzroy Dock has been in operation since 1857 and has a length of 145 metres and can take a vessel of 18 metres maximum beam. Until modernisation is completed the shipyard will be deficient in prefabrication facilities and cranage, and consequently is best suited to the construction of smaller, relatively complex merchant ships and Naval vessels, rather than large tankers and bulk carriers.

The trend so far as the graving docks are concerned is for less use of the current facilities as the size of ships increases.

Workshops

The engineering workshops are equipped for the maintenance of ships' machinery and equipment and heavy commercial engineering. The Dockyard has the capacity to manufacture steam turbines and has built the main propulsion turbines for most of the warships built in Australia. High pressure marine watertube boilers have also been built.

Specialised facilities have been installed for submarine refitting and the Boiler Shop has been re-arranged and modernised and is suitable for heavy fabrication work. The specialist services such as turbine repair continue to be in demand. Much work is undertaken on a commercial basis for electricity authorities in Australia and New Zealand. Most general engineering work is undertaken in the machine and fitting shops, supported by the boiler shop.

2. NAVAL DOCKYARD FACILITIES

(a) Garden Island Dockyard, New South Wales

Garden Island was transferred to the Commonwealth Government in 1913 when the Royal Australian Navy achieved separate identity from the Royal Navy and has been described as the best-equipped naval base in the Southern hemisphere.

One of the most important features of the Garden Island facility is the Captain Cook Dock. The dock is 347m. long 45m. wide and 15m deep. It can be emptied by its three subterranean pumps in four hours. The dock was constructed during World War II and completed in March 1945.

The engineering shops flanking the dock can repair and/or refit most of the modern Navy from propeller shafts to electronic equipment. (One of the workships contains the largest lathe in the southern hemisphere, 33m. between diameters). The landmark of the dockyard is the 250 tonne crane which services the fitting-out wharf near the entrance to the dock. The dockyard is also equipped with a floating dock 57m. long, 45m, wide and 15m. deep. During the 26 years (to 1971) there had been 745 major dockings plus 184 support and small craft dockings. When Australia's missile destroyers, "Perth", "Hobart" and "Brisbane" were added to the RAN the height of the dock keel blocks was increased from 1.5m. to 1.9m. and 2.9m., due to the underwater shape of the new class of ship.[4]

Functions of the Garden Island Dockyard

Within the limits of finance allocated and to meet Naval Requirements, the formal functions of Garden Island Dockyard are to:

- Repair and refit HMA Ships and small craft allocated;
- Install, repair and refit equipment listed in the equipment of shore establishments in the East Australian Area (except that which is the responsibility of the Department of Construction);
- Maintain under delegated authority from Department of Construction agreed mechanical and electrical items in the Dockyard and some establishments in the East Australian Area;
- Construct new craft and modernise or convert ships and craft to specification. Manufacture equipment

4. Figures supplied by Garden Island on the occasion of the sub-Committee's visit July 1976.

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for new constructions and provide services in ships built in other yards, particularly testing, tuning or setting to work of weapons systems and radio equipment;

- Manufacture and repair stores for Naval storekeeping authorities, for RANEL and for the Weapons Equipment Stores Officer;
- Manufacture and install machinery and plant for the Dockyard and some other shore establishments in the area;
- Provide services to ships alongside the Dockyard including catamarans and brows, fresh and salt water, power, compressed air, steam, cranage, telephones, mobile galleys and refrigerators, shore heads and bathrooms, and provide assistance in the removal of sullage;
- Ensure safe standards are maintained in the electrical installations of naval magazine areas in East Australian Area;
- Carry out work requested by other authorities, including other governmental and semi-governmental departments and authorities, companies and private individuals which is within the limits of governmental policy and available capacity and which has been approved by the Naval Board;
- Provide on request technical advice to other Naval authorities;
- Provide contractors' support facilities.

Work Force

Garden Island wages force presently totals 2,015 adults and 297 apprentices. There are over 150 different classifications covering 24 skilled trades and 16 semi-skilled occupations. Conditions of employment are covered by two Public Service Arbitrator's Determinations, one covering the bulk of the employees and the other transport workers only. Naval Board Determinations and regulations provide further conditions. The size of the workforce varies to cope with planned commitments which also allow for a significant amount to be performed by contractors.

Salaried staff are members of twelve staff associations and their conditions of employment are governed by 19 Determinations. Under the Public Service Act 1,404 persons are on the Garden Island Establishment. However a ceiling of 1,192 persons has been set up by the Department of Defence as part of the Australian Public Service Economy Campaign.

Associated Facilities

Included in the Dock area is a large engineering workshop and work frame shop which houses machinery not only capable of carrying out most repairs to ships but has also been of assistance in other ways to Australia. This facility machined 1,300 tonnes of steel for the magnet in the Cyclotron in Canberra, planned bogey wagons for the East West Railway, and machinery for the Snowy River Scheme, while the 250 tonne crane has assisted on many occasions to lift extremely heavy electrical equipment from merchant ships.

A Weapons Shop has also been constructed for the refitting of missiles and their weapons systems together with a modern Test House and Laboratory.

(b) Williamstown Naval Dockyard

This dockyard, together with Cockatoo Island and Garden Island provides capability for fleet refits and maintenance and for the construction of Naval vessels up to destroyer size. Williamstown is under Navy management.

Facilities include two piers, (Dockyard Pier and Nelson Pier) Albert Graving Dock, administration, workshop and stores buildings, an oil fuel installation and engineering services.

The general functions and role of the Dockyard are as follows:

1. The specialist yard for the construction, major conversion and modernisation of combatant ships of the destroyer type.
2. The main refitting yard for the smaller sizes of RAN destroyers.
3. The provision of operating and maintenance facilities for patrol boats.
4. The refitting of support craft.
5. The refitting and repair of specialised Naval equipment.
6. The provision of stores facilities for construction work, refits and building.

In recent years Williamstown constructed the Type 12 Destroyer Escorts and the hydrographic ship HMAS Flinders. At present the oceanographic ship HMAS Cook is under construction

and three River Class destroyers are to be modernised.

The Dockyard's two piers are utilised for outfitting work. It has two building slips which are to be lengthened - two other slips are not used at present as they are not suitable for ships of destroyer size.

Modernisation work already in progress will provide updated facilities for hull construction including the slips, workshops and cranes. In later phases of construction one of the piers which has reached the end of its life will be rebuilt and a weapons/electronic workship will be provided.

Williamstown Dockyard has a specialist work force of 2,000 oriented towards Naval ship construction.

Modernisation

In a report in 1973 in relation to Williamstown, the Parliamentary Standing Committee on Public Works said:

> "The existing shipbuilding facilities are inefficient by today's standards and not suited to prefabrication of units and the unit construction method which is now universally accepted practice. Continued use of the outmoded facilities in carrying out the present functions of the dockyard would be uneconomical, wasteful of man hours, and would require far greater construction time than would apply with modernised facilities."

Stage 1 of a modernisation plan for the Dockyard was examined by the Parliamentary Standing Committee on Public Works and the work involved was recommended to be undertaken.

Stage 1 works in progress and scheduled for completion by the end of 1978 include:

- a steel stockyard;
- parts-making shop;
- parts marshalling area;
- panel fabrication shop;
- unit assembly shop;
- two building berths with a new 40 tonne crane;
- utilities building and engineering services;

Stage 2 Proposals

Modern workships providing the immediate back-up for onboard outfitting/refitting work situated close to shop berths do not exist at present. The Parliamentary Committee on Public Works was informed that the Administration offices require relocation and modernisation also, and that the Nelson pier has reached the end of its life and has been condemned. The Department of Defence indicated in its submission to the Public Works Committee that Stage 1 modernisation will provide the dockyard with facilities to enable it to utilise modern prefabrication methods and unit construction in its shipbuilding role, as well as providing useful other side benefits.

Stage 1 is under construction and will provide good facilities for hull construction. Hull units of 40 tonnes will be assembled under cover before erection on the building berth.

Stage 2 which complements Stage 1 includes:

- replacement of Nelson Pier and associated Cross Wharf to meet the requirement for berthing space;
- the provision of modern outfitting/refitting workshops adjacent to the berths.

The Department envisaged that a new Administration building incorporating a training centre and dockyard laboratory would be required. Diesel fuel storage tanks are required also since the old furnace fuel oil tanks are obsolescent and will be removed to make way for the new Nelson Pier Workshops.

Other requirements foreseen by Defence include a new gatehouse and police office, a building for use by naval personnel as a fleet maintenance workshop to replace the one on the existing Nelson Pier; and a Boiler House.

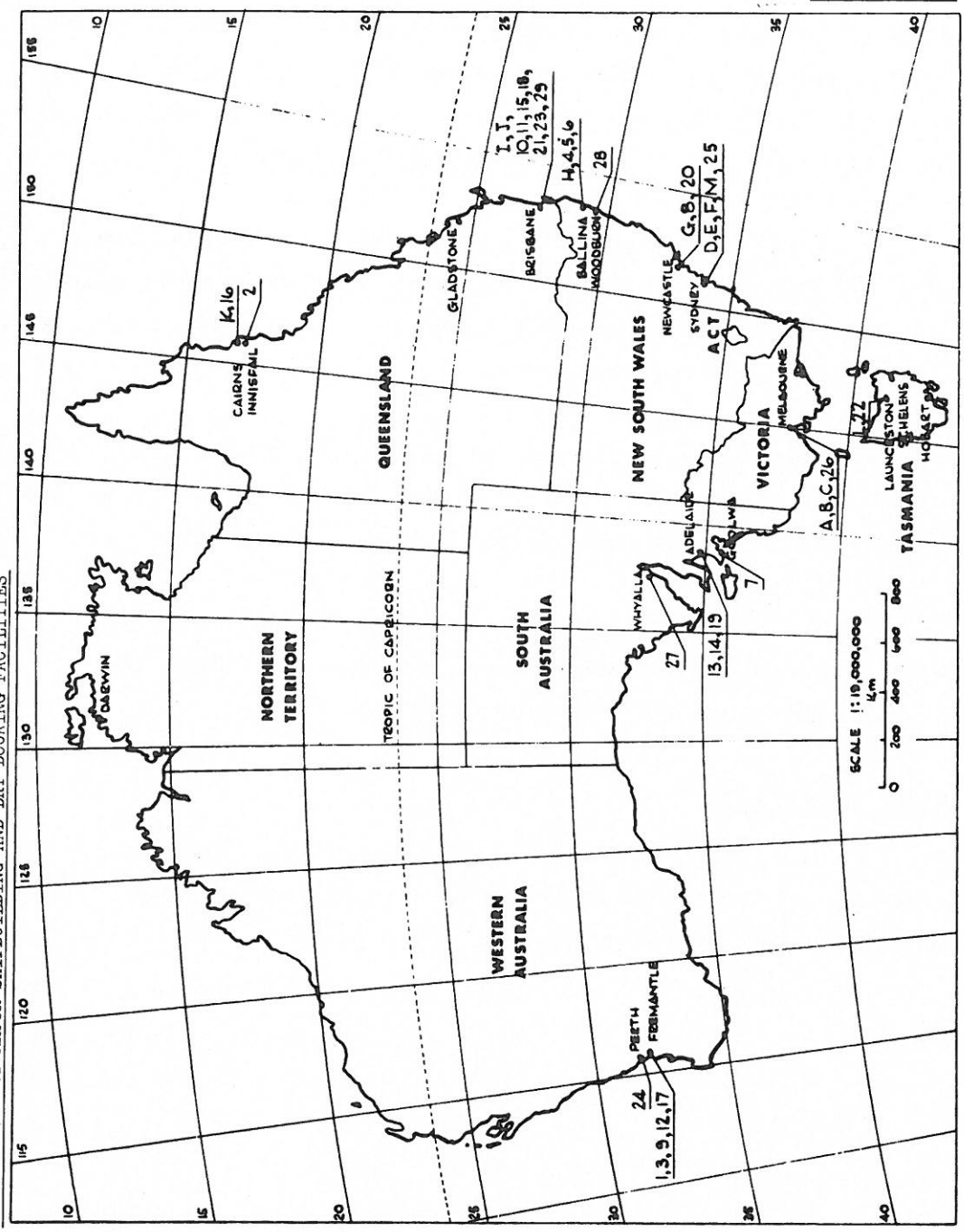
Stage 2 was estimated (at July 1976 prices) to involve expenditure of $24 million. The work is scheduled to commence in 1977-78 and to be completed in 1982.

The Joint Parliamentary Committee on Public Works recommended that this work proceed, and the Government has accepted the Committee's recommendations.

Stage 3 Proposals

This stage envisages a new weapons/electronic workshop, modernisation of other facilities and possible upgrading of Nelson Pier (East).

DISTRIBUTION OF MAJOR SHIPBUILDING AND DRY DOCKING FACILITIES



ANNEX 7.3(b)

DRY DOCKS (55 METRES IN LENGTH AND OVER)[1]

Ref No	Name	Type	Extreme Length Metres	Minimum Breadth at Entrance Metres	Depth on Sill or Blocks Metres	Approx. Maximum Tonnage Tonnes	
A	Alfred	Graving	146.4	24.4	7.9	7,600DWT	+
B	PWD of Victoria "A.J. Wagglen"	Floating	150.0	24.0	7.0	8,000DISP	
C	Hobson's Bay Steel Dock	Floating	67.1	12.8	4.9	1,400DISP	
D	Captain Cook	Graving	345.0	42.0	12.0	120,000DWT	+
E	Fitzroy	Graving	145.8	17.9	5.2	10,200DWT	+
F	Sutherland	Graving	210.0	26.7	9.1	25,000DWT	+
G	NSW State Dockyard Steel Dock	Floating	195.0	33.5	8.5	15,000DISP	*
H	Riley's Hill Dock	Graving	65.4	12.8	3.1	1,525DWT	
I	Brisbane Graving Dock Cairncross	Graving	263.2	33.5	11.3	85,000DWT	
J	Frank Nicklin	Building	244.0	35.1	8.0	66,050DWT	
K	Cairns Drydock	Graving	60.4	11.9	3.1	800DWT	
L	William Hart	Graving	62.5	12.8	3.8	1,950DWT	
M	AFD 1002 Steel Dock	Floating	62.8	13.1	4.9	1,020DISP	+

* Proposed
\+ Naval Docks

1. To be read in conjunction with Distribution Map

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ANNEX 7.3(c)

SHIPBUILDERS (Registered Under Ship Construction Bounty Act)	CONSTRUCTION RANGE AND TYPE
1. Albin Engineering Services Pty Ltd	Fishing vessels up to 31 metres. Work boats and tugs up to 400G(C)T.
2. A.K. and D.M. Allen	Tourist vessels up to 200 GT.
3. Australian Shipbuilding Industries (W.A.) Pty Ltd	All vessels up to 3,000 G(C)T.
4. Ballina Slipway and Engineering Co.	Fishing vessels up to 31 metres. Work boats and tugs up to 230 GT.
5. Barge Build Pty Ltd	Barges up to 250 GT.
6. Bob McLaren Pty Ltd	Timber fishing vessels up to 26 metres. Timber launches, work-boats, barges and survey vessels up to 210 (G(C)T.
7. Captain Sturt Marine Pty Ltd	River cruise vessels up to 950 GT.
8. Carrington Slipways Pty Ltd	All vessels up to 5,000 G(C)T.
9. Dillingham Shipyards (W.A.) Pty. Ltd.	Dredges and Barges up to 700 GT.
10. Evans Deakin Industries Pty Ltd	Vehicular ferries, dredges, barges, general cargo vessels, bulk carriers, tankers and drilling vessels up to 3,9000 GT.
11. Index Marine Pty Ltd	Tugs, workboats and barges up to 600 GT.
12. "K" Shipyard Construction Co.	Fishing vessels up to 31 metres. Barges, workboats, survey vessels and motor launch types up to 600 G(C)T.
13. Kali Boat Building and Repair Pty Ltd	Timber fishing, prawning, pleasure vessels and workboats up to 210 G(C)T.

14. Marine Finance Co Pty Ltd	Fishing vessels up to 31 metres.
15. Mill Kraft Boat Yard Pty Ltd	Timber fishing vessels, launches and passenger vessels up to 240 G(C)T.
16. North Queensland Engineers and Agents Pty Ltd	Landing barges up to 350 GT.
17. Ocean Shipyards and Offshore Engineering Services Pty Ltd	Fishing vessels under 31 metres. Survey vessels, rig supply vessels and workboats up to 450 GT.
18. Perrin Nominees Pty Ltd (Queensland Shipbuilding Industries)	Landing craft and dredges up to 650 G(C)T.
19. W.G. Porter and Son Pty Ltd	Fishing vessels up to 31 Metres
20. State Dockyard	Vehicular ferries, dredges, tankers, bulk carriers and general cargo vessels up to 2100 GT.
21. Strikers Boats (Australia) Pty Ltd	Aluminium fishing vessels up to 31 metres L.W.L. Aluminium work boats and launches up to 200 G(C)T.
22. Tamar Shipbuilding Pty Ltd	Tugs and workboats up to 330 GT.
23. The Hornibrook Group	Barges and lighters (dumb and self propelled) up to1,300 G(C)T.
24. Transfield Pty. Ltd.	Semi-submersible pontoon type drilling rigs of about 10,000 GT.
25. Vickers Cockatoo Dockyard Pty Ltd	General cargo and passenger vessels up to 12,000 GT.

26. Wadecraft Pty Ltd	Fishing vessels up to 31 metres. L.W.L. barges, workboats, survey vessels and motor launches up to 300 G(C)T.
27. Whyalla Shipbuilding and Engineering Works Pty Ltd	Tankers, bulk carriers and general cargo vessels up to 55,000 GT.
28. York Bros. (Trading) Pty Ltd	Dredges up to 850 GT.
29. B.J. and B.P. Thomson	Timber fishing vessels up to 26 metres. Timber launches, work boats, barges and survey vessels up to 210 GT.

ANNEX 7.4

TYPICAL MAINTENANCE CYCLE OF A DESTROYER

A destroyer works on a three year cycle, during which there is:

(a) A 30-week refit in a dockyard (usually Garden Island, although sometimes Williamstown) during which the ship is docked and the dockyard undertakes underwater maintenance and their laid-down component of other routine equipment maintenance, together with certain agreed defects which are beyond the capacity of ship's staff, and as many of the approved "Alterations and Additions" and "Modifications" as are possible with the available finance, equipment and labour.

(b) A 7-week mid-cycle docking, during which the dockyard undertakes essential underwater maintenance, together with rectification of defects which are beyond the capacity of ship's staff.

(c) During the remaining 119 weeks of the three year cycle, the destroyer operates on a 15-week sub-cycle. During each 15 weeks, the vessel is available for operations for 12 weeks, and is allowed one clear week in harbour for self-maintenance (without external assistance) and two clear weeks in harbour for

assisted self-maintenance. During the latter period, it is supplied with power (electricity and steam) and would normally be berthed alongside, and receive assistance from HMAS Stalwart (destroyer maintenance ship) or (when completed) HMAS Stirling (the naval base near Perth). If it is not possible to berth a ship in this manner, it would receive the assistance of technicians from a special group called the Fleet Maintenance Party.

(d) If at any time during the operating cycle a break-down occurs which affects the sea-going or fighting efficiency of the ship, and is beyond the capacity of the ship's staff to repair, the ship will be sent either to the Stalwart or Stirling or, if necessary, to one of the Naval Dockyards.

The example given, of a destroyer, is only typical. Different types of ships have different cycles; a submarine, for instance, operates on a five-year cycle including an 18 months dockyard refit. The principles however, are constant.

APPENDIX

Witnesses Who Gave Formal Evidence Before the Sub-Committee

Barlow, Mr G.E., Department of Defence

Bennett, Commodore G.A., Willamstown Dockyard

Benjamin, Mr E.J., Association of Architects, Engineers and Draughtsmen of Australia

Blakers, Mr G.E., O.B.E., Department of Defence

Braer, Mr W.A., Plessey Australia Pty Ltd

Brown, Mr. H.S., Standard Telephones and Cables

Caesar, Mr J.G., ACTU Shipbuilding Committee

Campbell, Mr G., ACTU Shipbuilding Committee

Cartwright, Mr R., Department of Defence

Compton, Air Vice Marshal L.S., Department of Defence

Eltringham, Mr D.H., Department of Defence

Fielder-Gill, Mr W., Plessey Australia Pty Ltd

Gabb, Mr A.J., Amalgamated Wireless Australasia Pty Ltd

Gordon, Mr T.B., Federated Ship Painters' and Dockers' Union

Holowell, Mr H.W., Federated Ironworkers' Association of Australia

Hill, Mr C.J., Department of Defence

Lawrence, Mr T.F.C., Department of Industry and Commerce

McKnown, Mr K., Department of Productivity

O'Connor, Mr D.J., Department of Industry and Commerce

Pheasant, Mr W.F., Professional Officers' Association

Price, Mr B.S., Hawker de Havilland Australia Pty Ltd

Raymond, Mr G.H., EMI Electronics (Aust.) Pty Ltd

Reed, Rear-Admiral M.P., Department of Defence

Rees, Mr O.R., Commonwealth Aircraft Corporation

Ring, Mr I.A., Commonwealth Aircraft Corporation

Rourke, Commodore W.J., Garden Island Dockyard

Ryan, Mr H.J., Department of Productivity

Selby-Adams, Mr W., Standard Telephones and Cables
Schurr, Mr L., Australian Council of Trade Unions
Smith, Mr P.A., Hawker de Havilland Australia Pty Ltd
Spill, Commander J.A.L., Department of Defence
Stewart, Mr R.D., Amalgamated Wireless Australasia Pty Ltd
Tange, Sir Arthur H., Department of Defence
Turnbull, Mr A.R.T., Plessey Australia Pty Ltd
White, Air Vice Marshal S.R., Department of Defence
Wood, Mr D.D., Department of Defence

The Sub-Committee Received Submissions From:

Amalgamated Metal Workers' Union, Melbourne, Vic.

Amalgamated Wireless (Australasia) Ltd, Sydney, NSW

Association of Architects, Engineers, Surveyors and Draughtsmen of Australia, Melbourne, Vic.

Association of Architects, Engineers, Surveyors and Draughtsmen Staff at Hawker de Havilland, Ltd, Bankstown, NSW

Association of Defence Contractors, Salisbury, SA

Association of Professional Engineers of Australia, Canberra, ACT

Australian Chemical Industry Council, Melbourne, Vic.

Australian Council of Trade Unions, Melbourne, Vic.

Australian Industrial Research Group, Melbourne, Vic.

Australian Synthetic Rubber Co Ltd, Altona, Vic.

Ball, Dr D.J., Canberra, ACT

British Aircraft Corporation (Australia) Pty Ltd, Salisbury, SA

Broken Hill Proprietary Co Ltd, Sydney, NSW

Comalco Ltd, Dandenong, Vic.

Committee representing Small Arms Factory Unions, SAF Lithgow, NSW

Commonwealth Aircraft Corporation, Fishermens Bend, Vic.

Comsteel Limited, Waratah, NSW

Cordwell, Mr J.L.W., St Marys, NSW

Darling Downs Institute of Advanced Education, School of Engineering, Toowoomba, Qld.

Davies-Kent (NSW) Pty Ltd, Caringbah, NSW

Defence Committee, Shop Stewards and Rank and File Unionists, Ordnance Factory, Maribyrnong, Vic.

Department of Administrative Services, Canberra, ACT

Department of Defence, Canberra, ACT

Department of Defence, Army and Navy Inspection Services, Bendigo, Vic.

Department of Industry and Commerce, Canberra, ACT

Department of Science, Canberra, ACT

Dillingham Shipyards (WA) Pty Ltd, North Fremantle, WA

Director-General of Education, Tasmania

EMI Electronics (Australia) Pty Ltd, Elizabeth, SA

Fairey Australasia Pty Ltd, Elizabeth, SA

Ferguson Transformers Pty Ltd, Melbourne, Vic.

Galbraith Engineering Pty Ltd, Perth, WA

Glen, Mr V., Salisbury, SA

Gourlay, Mr P., Whyalla Playford, SA

Hawker de Havilland Pty Ltd, Bankstown, NSW

Hosemakers Australia Pty Ltd, Bayswater, Vic.

Hunter Valley Research Foundation, Tighes Hill, NSW

Industrial Development Laboratories, Melbourne, Vic.

Inter-Union Area Committee, Commonwealth Aircraft Corporation, Fishermens Bend, Vic.

Mears, Mr A., Lyons, ACT

Mytton Rodd Ltd, Melbourne, Vic.

Neil's Television Pty Ltd, Peakhurst, NSW

O'Neill, Dr R.J., Canberra, ACT

Pead, Mr A.D., Doncaster, Vic.

Plessey Australia Pty Ltd, Sydney, NSW

Port of Launceston Authority, Tas.

Professional Officers' Association, Commonwealth Public Service, NSW Branch, Sydney, NSW

Qantas Airways Ltd, Sydney, NSW

Relf, Mr R.H.R., Sandringham, Vic.

Repco Bearing Co Pty Ltd, Launceston, Tas.

Repco Limited, Dandenong, Vic.

Small Arms Factory, Lithgow, NSW

Sola International Pty Ltd, Morphett Vale, SA

South Australian Government, Premier's Department, Adelaide, SA

Staff Associations, Aeronautical Research Laboratories, Fishermen's Bend, Vic.

Standard Telephones and Cables Pty Ltd, Alexandria, NSW

Tasmanian Government, Hobart, Tas.

Women's International League for Peace and Freedom, NSW Branch, Mosman, NSW

The Sub-Committee made Inspection Tours of:

Ammunition Factory, Footscray, Vic.

Army Aviation Centre, Oakey, Qld

Army No. 1 Base Workshop Battalion, Bulimba, Qld

Army Support Facilities, Moorebank/Liverpool, NSW

AWA Electronics Plant, North Ryde, NSW

British Aircraft Corporation (Aust.) Pty Ltd, Salisbury, SA

Carrington Slipway, Tomago, NSW

Commonwealth Aircraft Corporation, Fishermens Bend, Vic.

Comsteel Limited, Waratah, NSW

Dillingham Shipyards, WA

EMI Electronics (Australia) Pty Ltd, Salisbury, SA

Explosives Factory, Albion, Vic.

Fairey Australasia Pty Ltd, SA

Government Aircraft Factory, Avalon and Fishermens Bend, Vic.

Hawker de Havilland Australia Pty Ltd, Lidcombe and Bankstown, NSW

Hawker de Havilland (Guildford Division) WA

HMAS Leeuwin, WA

HMAS Stirling, WA

Hunting Engineering (Aust.) Pty Ltd, SA

Munitions Filling Factory, St Marys, NSW

Naval Dockyard, Williamstown, Vic.

Ordnance Factory, Maribyrnong, Vic.

Port of Launceston Authority, Tas.

Precision Tool Annexe, Launceston, Tas.

Qantas Jet Air Base, Sydney, NSW

RAAF Base, Amberley, Qld.

RAAF Base, Laverton, Vic.

RAAF Base, Richmond, NSW

RAAF Base, Pearce, WA

Small Arms Factory, Lithgow, NSW

Standard Telephones and Cables, Alexandria, NSW

State Dockyard, Newcastle, NSW

University of Tasmania, Hobart, Tas.

Vickers Cockatoo Dockyard Pty Ltd, Sydney, NSW

Weapons Research Establishment, Salisbury, SA

Whyalla Shipyard, SA

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