THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

JOINT COMMITTEE OF PUBLIC ACCOUNTS

REPORT 263

ASPECTS OF DEFENCE EQUIPMENT SUPPORT

VOLUME 1 - SPARES AND AMMUNITION

Australian Government Publishing Service

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Aspects of Defence Equipment Support Volume 1—Spares and Ammunition

Report

263

Joint Committee of Public Accounts

Parliament of the Commonwealth of Australia 1986

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DUTIES OF THE COMMITTEE

Section 8.(1) of the Public Accounts Committee Act 1951 reads as follows:

> Subject to sub-section (2), the duties of the Committee are:
>
> (a) to examine the accounts of the receipts and expenditure of the Commonwealth including the financial statements transmitted to the Auditor-General under sub-section (4) of section 50 of the Audit Act 1901;
>
> (aa) to examine the financial affairs of authorities of the Commonwealth to which this Act applies and of intergovernmental bodies to which this Act applies;
>
> (ab) to examine all reports of the Auditor-General (including reports of the results of efficiency audits) copies of which have been laid before the Houses of the Parliament;
>
> (b) to report to both Houses of the Parliament, with such comment as it thinks fit, any items or matters in those accounts, statements and reports, or any circumstances connected with them, to which the Committee is of the opinion that the attention of the Parliament should be directed;
>
> (c) to report to both Houses of the Parliament any alteration which the Committee thinks desirable in the form of the public accounts or in the method of keeping them, or in the mode of receipt, control, issue or payment of public moneys; and
>
> (d) to inquire into any question in connexion with the public accounts which is referred to it by either House of the Parliament, and to report to that House upon that question,
>
> and include such other duties as are assigned to the Committee by Joint Standing Orders approved by both Houses of the Parliament.

PREFACE

This Report presents the findings of the Committee's inquiry into two aspects of Defence equipment support:

- the supply of spares and ammunition (supply support); and
- the provision of technical documentation for equipment operators and maintenance personnel.

The Report has been presented in two volumes, the first on spares and ammunition and the second on technical documentation. Because of the extended time taken to obtain certain evidence relating to technical documentation, the tabling of Volume Two has been deferred until early in the 1987 Autumn Sitting.

The inquiry was begun in April 1986 as a follow-on investigation to the Committee's earlier Review of Defence Project Management. The Report on Defence Project Management, tabled in February 1986, noted shortcomings in the provision of initial spares and technical documentation and in equipment handover procedures in a number of major Defence projects. These findings suggested significant deficiencies in the ability of the Services to support equipment after it had been introduced into service.

The Committee decided to assess the adequacy of present stocks of spares and ammunition to meet authorised operations and training objectives and the timeliness, completeness and utility of technical documentation in the hands of equipment operators and maintenance personnel. Options for improving the effectiveness and efficiency of spares and ammunition supply and of the production of operating and maintenance handbooks or manuals were examined.

The Committee collected a great deal of its evidence from a detailed examination of the supply and technical support of six major Defence equipment items.

The Committee was disappointed to find that existing Defence statistics did not allow an adequate measurement of the overall impact of spares shortages on operational and training levels. It was also not possible to assess the adequacy of existing spares and ammunition stocks to support the increased activity levels required to deal with the short-term contingencies envisaged by Australia's current strategic planning.

The Committee found that stockholdings of spares were generally sufficient to support current authorised operations and training levels. However, operations and training had been restricted on occasions by spares shortages. The Committee doubted whether current stocks would be sufficient to support increased activity levels for some equipment items. Stocks of ammunition on the other hand were not sufficient to meet current practice and training allowances. Although all Services had experienced shortages of spares and ammunition, Navy suffered substantially greater shortages than the other Services. Army had experienced the least shortages.

Shortages of spares and ammunition were mainly the result of inadequate assessments of initial requirements, problems in forecasting demand, the failure to apply appropriate provisioning policies and procedures, procurement and delivery delays and funding restraints. The Committee considered that the effectiveness of supply support could be improved considerably by better spares assessment procedures and maintenance planning, the introduction of improved inventory management systems and the provision of additional computer support.

The Committee also noted considerable scope for improving the efficiency of the existing single-Service supply systems by reducing the overall size of the inventory and by reducing inventory holding costs. The costs of procurement could be reduced also, particularly by pursuing more competitive sources of supply and by reducing administrative lead times and other costs associated with Defence purchasing.

The Department of Defence acknowledged the scope which existed for improving the effectiveness and efficiency of supply support and advised the Committee of a number of major measures it had taken in recent years to improve the performance of the three Service supply systems. Although the Committee believed many of these measures would improve the effectiveness and efficiency of supply support, it had serious doubts about the underlying strategy of the Department's major initiative, the joint Supply Systems Redevelopment Project and about the effectiveness of the present organisational arrangements for co-ordinating supply support policies and priorities. The Committee was particularly concerned with the poor performance of the Navy supply system and believed urgent remedial action was required.

The Committee made twenty-nine recommendations for action by the Department of Defence, the individual Services and the Departments of Finance and Local Government and Administrative Services to improve effectiveness and efficiency in the supply of spares and ammunition.

Throughout the inquiry the Committee received extensive co-operation and assistance from the Department of Defence. The Committee thanks the Department of Defence and other Commonwealth agencies for their efforts. The Committee also thanks Mrs Helen Mayer, MP who chaired the Sectional Committee which conducted the inquiry, the Committee's specialist advisers and the members of the Secretariat for the considerable support given to the reference.

For and on behalf of the Committee

Senator George Georges
Chairman

M J Talberg
Secretary
Joint Parliamentary Committee of Public Accounts
Parliament House
CANBERRA
26 November 1986

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ABBREVIATIONS

AIP	-	Australian Industry Participation (Program)
ARL	-	Aernonautical Research Laboratories (Defence Science and Technology Organisation)
CDF	-	Chief of the Defence Force
CLSSA	-	Co-operative Logistics Supply Support Arrangement
CPO	-	Capital Procurement Organisation
DCO	-	Defence Contracting Organisation
DLO	-	Defence Logistics Organisation
EDP	-	Electronic Data Processing
EOQ	-	Economic Order Quantity
FMS	-	Foreign Military Sales (United States)
FORP	-	Forward Ordering Review Period
FYDP	-	Five Year Defence Program
ILS	-	Integrated Logistic Support
LOT	-	Life of Type
MRL	-	Materials Research Laboratory (Defence Logistics Organisation)
NAVSUP	-	Central Navy Supply EDP System
NSC	-	Navy Supply Centre
ODP	-	Office of Defence Production
PISCES	-	Principal Item Stock Control and Entitlement System (Army)
QA	-	Quality Assurance
QC	-	Quality Control
RAAFSUP	-	Central RAAF Supply EDP System

RFT	-	Request for Tender
SCUBA	-	Stock Control (System) Usage Based (Items) Army
SSLM	-	Single-Service Logistic Management
SSRP	-	Supply Systems Redevelopment Project

GLOSSARY[1]

Administrative Lead Time	-	The period which elapses from the beginning of the requirement determination process to the issue of a firm ordering document to a supplier. It comprises the requirement determination lead time and the contracting lead time.
Consumable Item	-	Repair parts and other stores used up in the repair and overhaul of parent equipment or repairable items.
Consumption Period	-	The planned period between successive replenishments for each stores item.
Contracting Lead Time	-	The period which elapses from the issue of a document authorising procurement to the issue of a firm ordering document to the supplier.
Customer Satisfaction Rate	-	The number of demands from units for stores satisfied by the issue of items from stock expressed as a percentage of all stores demands. It may relate to demands satisfied by the supporting stores depot or to demands satisfied by all stores depots.
Delivery Lead Time	-	The period which elapses from the availability of an item for delivery from the manufacturer's premises to the receipt of that item at the final destination stated on the contract.
Dues-in	-	Quantities of stores on order but not yet in stock.

1. This glossary has been compiled from definitions appearing in:
   - RAN Manual of Stores Provisioning Policy and Procedures NAVSUPMAN 14 (ABR 5569), March 1986.
   - Army Supply Service Manual, Volume 1, PAM3, Provisioning Reference Manual, February 1986.
   - RAAF Manual of Provisioning (Provisional), AAP907, September 1975.

Dues-out	-	Dues-out are classified into long-term and short-term dues-out. Long-term dues-out are earmarked stock ie stocks reserved for a customer against some future use. Short-term dues-out are items which are out of stock and for which there are no recorded dues-in.
Economic Order Quantity	-	The quantity of a stores item which minimises the costs of both provisioning and holding the item. The calculation of the economic order quantity takes into account usage, order placement cost, inventory holding cost and value.
Forward Ordering Review Period	-	A statement of the quantity of stock required to cover re-supply lead times, the consumption period and the supply margin.
Insurance Items	-	Major spare assemblies of equipment which are unlikely to fail through normal use but which are prone to damage by accident and, if damaged, would require lengthy repair times and a consequesnt loss of availability of a weapons platform. Examples include aircraft wings and ships' propeller shafts and hubs.
Inventory Holding Cost	-	The cost of warehousing stores including labour and facility costs and the cost of the capital invested in the inventory.
Life of Type Purchases	-	Purchases of spare parts in quantities which are estimated to be sufficient to support a parent equipment until the end of its planned service life. This may be done because of the future cessation of manufacture of the parts or to achieve overall cost savings.

Lifed Items	- Stores items which have a limited shelf-life, for example fresh foodstuffs, medical stores and certain munitions items. They are usually managed on a first-in, first out basis.
Order Placement Cost	- The administrative cost of placing an order and receiving the items into store.
Procurement	- The process of obtaining material and services from sources outside the supply organisation.
Production Lead Time	- The period which elapses from the issue of a firm ordering document to the availability of the material for delivery at the manufacturer's premises.
Provisioning	- The process involved in determining requirements and acquiring material. It includes assessment, requirement computation, acquisition and distribution.
Repairable items	- Assemblies and sub-assemblies of equipment which are removed, repaired, tested and eventually replaced on the equipment. They are also referred to as exchangeable or rotable items or Maintenance Supply Items.
Replenishment	- The provisioning of stores for the continuing support of equipment following that provided by initial provisioning.
Re-supply Lead Time	- The sum of the administration, production and delivery lead times.
Spares Assessment	- The process of determining the minimum range and depth of spares to be held for a particular equipment item. The result is often a specified index or scaling of parts.
Supply Margin	- The increment of stock held to provide against minor variations in usage and delays and losses in delivery.

LIST OF RECOMMENDATIONS

The Committee has made a number of recommendations which are listed below, cross-referenced to their locations in the text. The Committee's analysis in the text should be referred to when considering these recommendations.

The Committee recommends that:

the Department of Defence

1. (a) reviews the definition of user requirements for the Supply Systems Redevelopment Project (SSRP) in the light of the results of the Supply Performance Measurement Study; and

   (b) includes in the further submission on the SSRP requested by the Committee in Report 254 a report on the results of that review;

   (Paragraph 3.56)

2. gives consideration to supplementing the current Surge and Sustainability Study by conducting, within existing training levels, a program of specific exercises in the north of the continent, supported from bases in the south, to test and identify possible weaknesses in the Services' supply systems;

   (Paragraph 3.56)

3. re-structures the Supply Systems Redevelopment Project (SSRP) to achieve a major up-grading of the existing Navy supply EDP systems in the short-term possibly using the Army SCUBA system as a model;

   (Paragraph 4.69)

4. requires, before the re-structured SSRP is approved:

   (a) its endorsement by each of the Services, and

   (b) the development of an adequate project performance monitoring system;

   (paragraph 4.69)

5. institutes a uniform policy on the level of supply margins for major munitions items;

   (Paragraph 5.72)

6. establishes a joint project to plan and supervise the computerisation of the Services' ammunition inventory management systems;

   (Paragraph 5.72)

7. urgently reviews the operation of the Government Munitions Factory Workload Co-ordination Committee with a view to allowing more economic production runs and minimising the disruptions to delivery programs caused by changing customer priorities;
(Paragraph 5.72)

8. takes major steps to improve the quality of factory management and to bring the supporting management information systems up to an acceptable level;
(Paragraph 5.72)

9. allows the government munitions factories to purchase materials in advance or in anticipation of orders after the successful introduction into the factories of computer-based materials planning systems;
(Paragraph 5.72)

10. undertakes a study to develop objective quality standards to replace existing subjective quality standards in ammunition manufacture;
(Paragraph 5.72)

11. promulgates uniform Defence Quality Assurance policies which minimise the undertaking of additional audits of suppliers where those suppliers have been assessed as meeting the appropriate Australian Standard and whose quality control systems are audited on an annual basis;
(Paragraph 5.72)

Navy and Army

12. (a) undertake an in-depth review of their inactive stocks to better identify candidates for disposal possibly using the recent Air Force study as a model; and

(b) give consideration to developing automated inventory screening and disposal management EDP systems similar to the Air Force ELCID system;
(Paragraph 6.66)

the Department of Defence

13. considers implementing a scale of inventory holding charges whereby customers would be debited for material used and be credited for material returned;
(Paragraph 6.66)

Air Force

14. determines the level of wastage of lifed items in its stores inventory and reviews the adequacy of its present controls;
(Paragraph 6.66)

the Department of Defence

15. undertakes a major study to identify domestic stores in the Services' centrally-managed inventories as candidates for local procurement or single-Service management with the ultimate objective of achieving major reductions in the numbers of items carried in the Services' inventories;
(Paragraph 6.66)

16. evaluate existing Service warehousing technologies to ascertain the scope for improved labour productivity and/or reduced staffing levels in stores depots;
(Paragraph 6.66)

Navy

17. assigns greater priority to the enhancement of computer support of its stores depots with a view to improving the accuracy of stockholding records and reducing the costly by-passing of the computer systems by manual stores demands;
(Paragraph 6.66)

Air Force and Army

18. take major steps to reduce the number of service personnel engaged in inventory management;
(Paragraph 6.66)

the Department of Defence

19. re-commences, as a matter of priority, its study of single-Service management of warehousing;
(Paragraph 6.66)

all Services

20. increase the level of surveillance of prices paid for replacement stores procured under direct purchasing arrangements, especially the prices of parts purchased from single sources;
(Paragraph 7.98)

Navy

21. attempts wherever possible to purchase replacement stores direct from the actual manufacturer of the item rather than through the parent equipment manufacturer possibly using Air Force procedures as an appropriate model;
(Paragraph 7.98)

all Services

22. improve their spares assessment procedures and equipment management systems to provide for the specification of lower cost commercial spares wherever possible and to monitor the performance of those items;
(Paragraph 7.98)

23. increase their monitoring of US Foreign Military Sales purchases to identify opportunities for lower cost or local sources of supply;
(Paragraph 7.98)

the Department of Industry, Technology and Commerce

24. provides assistance to the Services, in consultation with State industry development authorities, to identify suitable qualified Australian suppliers for spares and ammunition presently purchased from overseas;
(Paragraph 7.98)

Navy

25. takes steps, as a matter of urgency, to apply economic order quantity principles in its replenishment provisioning;
(Paragraph 7.98)

the Departments of Finance and Local Government and Administrative Services

26. respond, in the Finance Minute on this Report, to the proposals put to the Committee by the Defence Contracting Organisation to improve Commonwealth purchasing policies and procedures;
(Paragraph 7.98)

the Department of Defence

27. increases the level of financial delegations to the commanding officers of Navy and Air Force stores depots to the same level as exists in Army;
(Paragraph 7.98)

the Department of Finance

28. considers issuing further guidelines on the use of credit cards for the payment of accounts, preferably after taking into account the results of the present pilot exercise in the Department of Defence; and
(Paragraph 7.98)

the Secretary of the Department of Defence and the Chief of the Defence Force

29. (a) jointly review, as a matter of priority, the performance of the Defence Logistics Organisation against its stated objectives taking into account the shortcomings in supply support identified in this Report; and

(b) inform the Committee of the timetable and progress of the review in the Finance Minute on this Report. (Paragraph 8.31)

Members of the Sectional Committee at RAAF No 7 Stores Depot, Toowoomba, 16 May 1986

Present: Mr Gary Nehl, MP, Mrs Helen Mayer, MP (Chair), Senator Barney Cooney, Wing Commander Scott Bray (Commanding Officer, No 7 Stores Depot), Mr Phillip Ruddock, MP and Senator Graham Maguire.

Photograph courtesy of The Chronicle and Downs Star Newspaper

CHAPTER 1

INTRODUCTION

- Background to the Inquiry
- Inquiry Objectives
- Scope of the Inquiry
- Conduct of the Inquiry
- Structure of the Report

Background to the Inquiry

1.1 The Inquiry into Aspects of Defence Equipment Support was begun as a follow-on to the Committee's Review of Defence Project Management. The earlier Report examined the Department of Defence's management of its major equipment acquisitions and recommended a range of measures to improve the efficiency, effectiveness and accountability of Defence project management.

1.2 The Report on Defence Project Management noted specific shortcomings in the support of several major Defence equipment items including:

- the under-estimation of spares and other support requirements;
- the late identification of facilities requirements; and
- ineffective procedures for the handover of equipment to users.[1]

1.3 The Committee indicated in the Report that it intended to address these matters in a follow-on inquiry.

1.4 The direction of the Committee's inquiry was influenced by two factors: in the first place recent Reports of the Auditor-General which commented adversely on the in-service support on major equipment items; and in the second place by the fatal gassing of sailors aboard HMAS Stalwart in October 1985 in circumstances which appeared similar to an earlier incident aboard HMAS Tobruk reported upon by the Committee.

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1. Joint Parliamentary Committee of Public Accounts (JPCPA), Report 243, **Review of Defence Project Management**, Volume 1, paragraphs 9.8 to 9.14.

1.5 Audit found that operations and training involving the Army's M113 A1 Light Armoured Vehicles had been affected by reductions in the number of serviceable vehicles and considered that better Army management practices would have ensured the acquisition of up to date information on equipment modifications, reduced delays in resolving technical problems and maintained a sufficient level of spare parts. Audit also found that the RAAF's Number 92 Wing which operates the P3C Orion Long Range Maritime Patrol Aircraft would have had difficulty in supporting a sustained increase in aircraft flying hours. The Wing's capability and performance had been affected by shortages of both operational aircraft and trained aircrew.[2]

1.6 In its Report on HMAS Tobruk the Committee found that poor design of the ship's sewerage system and inadequate operating procedures had contributed to the death by gassing in December 1981 of a Naval Reserve Cadet.[3] In October 1985 three sailors from HMAS Stalwart died as a result of their inhaling toxic gases generated in the ship's sullage tanks.[4]

1.7 The Committee reported on two earlier occasions on aspects of Defence equipment support: in 1981 on the repair and overhaul of aircraft and in 1982 on the administration of the HMAS Stirling naval base in Western Australia. In Report 187 on the 1978-79 Auditor-General's Report the Committee noted serious shortcomings in the Air Force computerised supply system, long lead times in acquiring spare parts, difficulties in assessing future spare parts requirements, delays in developing new repair and maintenance facilities and shortages of skilled maintenance personnel.[5] In Report 193 on the 1979-80 and March 1981 Auditor-General's Reports the Committee expressed its concern at the centralisation of the Navy supply function in Sydney.[6]

Inquiry Objectives

1.8 The in-service support of Defence equipment is a large and complex undertaking. Equipment support is part of the logistics function and comprises:

- the replacement, repair and maintenance of equipment in service;
- the management of equipment-related stores including their cataloguing, warehousing, accounting, distribution and disposal;

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2. Report of the Auditor-General, September 1985, pages 16-25. Report of the Auditor-General, March 1986, pages 29-41.
3. JPCPA Report 223, HMAS Tobruk, paragraphs 7.1 - 7.33.
4. See the reports in, for example, The Age, 24 October 1985, page 1, 'Navy Orders Inquiry into Gassing of Sailors'.
5. JPCPA Report 187, The Reports of the Auditor-General - Financial Year 1978-79, pages 1-15.
6. JPCPA Report 193, Report of the Auditor-General - 1979-80 and March 1981, pages 1-13.

- the provision of quality assurance and transport services; and

- the contribution of engineering and supply expertise to the determination and selection of equipment requirements.

1.9 According to the 1984-85 Annual Report of the Department of Defence, 'the logistic function in the Defence Force (excluding defence facilities) involves an inventory of some 1.6 million items, employs around 30,000 personnel, both military and civilian; and had an expenditure (excluding manpower) of $966 million in 1984-85, or some 15.5 percent of total defence expenditure.'[7]

1.10 For the purposes of the present inquiry the Committee decided to concentrate its attention on two aspects of Defence equipment support:

(1) the supply of spares and ammunition; and

(2) the provision of technical documentation necessary to operate and maintain defence equipment.

1.11 The Committee believed, in view of the background information, that these aspects warranted the closest attention.

1.12 The Committee set itself five inquiry objectives; to ascertain whether:

(1) the overall level of spares and ammunition is sufficient to meet stated Defence objectives;

(2) the supply of spares and ammunition to operational units is timely and sufficient (though not excessive) to meet day to day operational requirements;

(3) Defence spares and ammunition procurement management arrangements ensure value for money;

(4) the technical data provided equipment users are timely and adequate for the safe and effective operation and maintenance of equipment; and

(5) technical data in the hands of users incorporate current operational experience and the latest advice from equipment manufacturers, particularly in relation to actual or potential technical problems or equipment failures.

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7. Department of Defence, Defence Report 1984-85, page 81.

1.13 The Committee intended the inquiry to be a relatively brief and modest one in comparision with Defence Project Management. The Committee wished to determine the adequacy of the present level of equipment support, identify the sources of any shortcomings and assess their significance in a brief report to Parliament by the end of the 1986 Budget Sittings. The inquiry proved to be a much larger and more difficult task than the Committee anticipated.

1.14 The second objective, the supply of day to day spares and ammunition requirements, could not be achieved in the time frame set by the Committee. It would have involved an examination of the Services' extensive transport and distribution systems. The Committee decided instead to focus on the adequacy of overall stockholdings of spares and ammunition.

1.15 The Committee decided also to extend its consideration of efficiency issues to consider the scope for reducing the size and cost of the spares and ammunition inventories as well as economy in replenishing the inventories.

Scope of the Inquiry

1.16 In assessing the effectiveness and efficiency of the supply of spares and ammunition the Committee considered:

- the decision making processes whereby Defence objectives are translated into target activity levels for equipment and practice and training allowances of ammunition;
- the policies which determine overall stockholding levels of spares and ammunition;
- the procedures used to monitor and control stock levels; and
- the procedures used to determine replacement quantities of spares and ammunition and to monitor procurement action.

1.17 In considering the effectiveness and efficiency of the supply of technical documentation to equipment operators and maintainers the Committee examined the policies, procedures and resources applied in the acquisition, production, distribution and revision of technical documentation.

1.18 Because of the HMAS Tobruk and HMAS Stalwart incidents the Committee decided to pay particular attention in its examination of technical documentation procedures to Navy shipboard fire and gas control systems.

1.19 The supply of spares and ammunition is managed largely on an individual Service basis and therefore the Committee's inquiry focussed on the three single-Service supply systems. Within each Service supply policies and priorities are developed by the Service Offices while the supply assets ie the stores inventories are managed by the Support or Logistic Commands. Overall Defence supply policies and priorities are developed and co-ordinated by the Defence Logistics Organisation in the Department of Defence. Within Defence a growing emphasis is being given to developing more integrated supply systems. The Committee gave particular attention to this issue.

1.20 Reponsibility for technical documentation rests with the Services' technical services divisions. To date there has been little co-ordination or common policy development in this area.

Conduct of the Inquiry

1.21 The inquiry commenced in April 1986 when the Committee wrote to the Department of Defence asking for details of supply and technical documentation procedures and advertised for submissions from interested individuals and organisations.

1.22 The inquiry was conducted by the Sectional Committee responsible for the Review of Defence Project Management.

1.23 The Committee chose to centre its initial investigation on the supply and technical support of a sample of six major equipment items, two from each Service. The six selected equipments were the FFG Guided Missile Frigates and the Humpty Doo Transmitting Station (Navy), the M113 A1 Light Armoured Vehicles and Rapier Surface to Air Missile System (Army) and the F111 Strike and Reconnaissance Aircraft and P3C Orion Long Range Maritime Patrol Aircraft (Air Force). The light armoured vehicles and the P3C aircraft were selected because they had been the subject of recent Auditor-General's Reports. The other items were selected because of the Committee's knowledge of them from the *Defence Project Management Inquiry*.

1.24 The Committee submitted a questionnaire to the Department of Defence seeking details of spares and ammunition holdings and the technical documentation issued for each of the selected equipment items. Where possible the Defence questionnaire response has been incorporated in the Minutes of Evidence. The Committee also sought details of Navy shipboard fire and gas control procedures as well as the Naval Board of Inquiry Report on the fatal gassings on board HMAS Stalwart.

1.25 The Defence questionnaire responses were referred to three specialist advisers appointed by the Committee for the task. Mr J F Collins reviewed the response on the supply of spares and ammunition and Dr R D Beebe reviewed the response on technical documentation. Mr R J Parkinson reported on the response on Navy fire and gas control systems.

1.26 In addition to the questionnaire responses and supplementary material from the Department of Defence, submissions were received from ten individuals and companies and one State government.

1.27 The Committee held four public hearings, on 5 and 10 June 1986 and on 21 and 22 July 1986. Details of the hearings and the witnesses who appeared are provided at Appendix A.

1.28 The Committee also conducted a series of inspections in April and May 1986 of operational units and support facilities associated with a number of the selected equipments and visited the three Support/Logistic Commands. Details of the Committee's inspections program are provided at Attachment B.

1.29 The Committee followed-up the hearings with written questions to the Department of Defence. Wherever possible, the questions and the Defence responses have been incorporated in the Minutes of Evidence.

1.30 Because of the sensitive and technical nature of the issues involved, the Committee did not conduct hearings on the subject of Navy shipboard fire and gas control systems. Instead, the Committee referred its specialist adviser's report to the Navy for its written response. The adviser's report and the Navy response have been reprinted in Volume 2 of this Report.

Structure of the Report

1.31 The Report is presented in two volumes. The first volume addresses the supply of spares and ammunition and the second volume, technical documentation including Navy fire and gas control systems.

1.32 This volume, Volume One, comprises six major chapters. Chapters 3 to 5 consider the adequacy of current stockholdings and possible means of improving the assurance of supply. Chapters 3 and 4 examine the supply of spares and Chapter 5 examines the supply of ammunition. Spares and ammunition have been treated separately because of differences in stock holding policies and because of the different types of issues which arose in the Committee's inquiry. Chapters 6 and 7 address efficiency questions. Chapters 6 considers whether some stock holdings might be excessive and Chapter 7, whether the costs of replenishing stocks might be reduced. Finally, Chapter 8 considers overall Defence policies and priorities for supply support and considers whether the present organisational arrangements are effective.

CHAPTER 2

SUMMARY OF FINDINGS AND RECOMMENDATIONS

- Inquiry Objectives
- Adequacy of Current Stockholdings of Spares and Ammunition
- Scope for Improving the Effectiveness of Supply Support
- Economy in Inventory Holdings
- Value for Money in Replenishment Provisioning
- Overall Policies and Priorities for Supply Support

Inquiry Objectives

2.1 The Committee sought to ascertain:

(1) whether current stockholdings of spares and ammunition were sufficient to meet approved Defence objectives;

(2) the scope for improving the supply of spares and ammunition, ie the effectiveness of supply support; and

(3) the opportunities for achieving greater economy or efficiency in supply support by:

(a) reducing the size and cost of the spares and ammunition inventories; and

(b) minimising prices and reducing the costs of purchasing.

2.2 The Committee drew a great deal of its evidence from a detailed examination of spares and ammunition support for six major Defence equipment items.

2.3 In the course of the inquiry the Committee considered the three Services' spares and ammunition provisioning policies and procedures and their inventory control systems. The Committee also examined the involvement of the Capital Procurement Organisation, the Defence Contracting Organisation and the Office of Defence Production in supply support.

2.4 Finally, the Committee turned its attention to overall Defence policies and priorities for supply support by looking at the role of the Defence Logistics Organisation.

Adequacy of Current Stockholdings of Spares and Ammunition

2.5 The Committee found that stocks of spares were generally sufficient to meet planned peacetime operations and training. However, each of the Services had on occasions experienced difficulties in completing planned operations and training activities because of spares shortages. Navy suffered more significant shortages of spares than the other Services.

2.6 The Committee was concerned to find that existing Defence statistics did not allow an adequate measurement of the effects of spares shortages on military operations and training. Each of the Services' spares inventories is managed on a commodity basis and not on the basis of weapon systems. It was not possible therefore to assess adequately the overall effectiveness of each of the Services' supply systems.

2.7 For these reasons it was also not possible to assess whether existing stocks of spares could support the increased activity levels required to deal with the short-term contingencies envisaged by current strategic guidance. Nevertheless, the Committee noted that, on the basis of present peacetime equipment availability rates, the Defence Force would have had difficulty in meeting planned wartime availability rates for some major equipment items.

2.8 The Committee found that current stocks of ammunition were insufficient to meet present practice and training allowances. Each Service had experienced ammunition shortages. However, Navy experienced significantly greater shortages than the other Services. The Committee was concerned to note that shortages of ammunition had forced Army to breach contingency reserves.

Scope for Improving the Effectiveness of Supply Support

2.9 The evidence of spares and ammunition shortages indicated considerable scope for improving the effectiveness of supply support.

2.10 The Committee believed that an essential first step was to develop a better supply performance data base. It was pleased to note that the Department of Defence had recently commenced two major studies, a supply performance measurement study and a study to assess the ability of the Defence Force to meet current contingencies (the Surge and Sustainability Study). However, the Committee believed these measures needed to be supplemented by specific exercises in the field to test the effectiveness of the supply support system.

2.11 The causes of spares and ammunition shortages also had to be addressed. The Committee found that generally spares shortages had arisen from unanticipated demands, procurement and delivery delays, the unavailability of funds and the failure to apply appropriate provisioning policies and procedures.

2.12 Despite the inherent difficulties in forecasting spares demands, the Committee found there was considerable scope for improving the accuracy of demand forecasting by improved initial spares assessment procedures and better maintenance planning. The Services have attempted to improve demand forecasting by improving the liaison between supply and maintenance personnel.

2.13 Delivery delays reflected procurement problems over which the Services had little short-term control. However, the Committee was concerned at the contribution of very lengthy provisioning and contracting lead times within the Defence organisation.

2.14 Shortages of funds for spares support reflected cost pressures on capital equipment budgets and Defence priorities. The Committee discussed capital cost overruns in its Report on Defence Project Management. Although the Committee did not see its role extending to questioning budget priorities, it was concerned to note that budgetary decisions on spares support had been taken on the basis of inadequate information. The Committee believed that false economies had been made in some cases as a result of the imposition of tight financial constraints.

2.15 Service spares provisioning policies attempt to set stockholdings at levels sufficient to cover expected consumption in the re-supply period. Shortages of stock can arise when forecasts of demand and re-supply times prove inaccurate. Random variations in demand and lead times should be covered by a supply margin or buffer stock. Unfortunately, the Services have not been able always to apply fully these provisioning policies because of funding constraints and the limitations of their computerised supply management systems. The Committee's assessment of the situation was complicated by the significant differences in provisioning policies and procedures among the Services.

2.16 The Department of Defence has responded to the accumulating inadequacies of the three Services' computerised supply systems with the Supply Systems Redevelopment Project (SSRP). The SSRP, which was established in 1975, aims to redevelop each of the supply systems on an integrated basis to provide greatly improved supply management from the depot level to the central policy and resource allocation level.

2.17 The Committee was encouraged by the proposals to improve the effectiveness of spares support. However, it had doubts about the soundness of the strategy underlying the SSRP. The Committee believed that the SSRP is very ambitious. However, the promised benefits are too far in the future and urgent action is required to improve the marked shortcomings of the Navy supply system in particular. The Committee recommended the re-structuring of the Supply Systems Redevelopment Project.

2.18 Shortages of ammunition largely reflected problems in provisioning and procurement since ammunition was not subject, like spares, to fluctuating demand. The Committee chose to focus on the supply of ammunition from the government munitions factories, the single most important source of high use ammunition. The Committee believed that the delivery performance of the munitions factories was not good. The Office of Defence Production should take major steps to improve the quality of factory management and factory management systems generally. Also, the co-operation of the Services was required to improve the planning of factory workloads and overcome inefficient quality assurance procedures.

Economy in Inventory Holdings

2.19 Notwithstanding significant supply shortages, the Committee found there existed substantial opportunities for reducing the size and cost of the Services' stores inventories.

2.20 The Services' inventories contained high levels of inactive stocks which should be more closely monitored for possible disposal action. They also contained high levels of domestic items which could be better managed by units using local purchasing arrangements.

2.21 The Committee also found that warehousing costs could be significantly reduced. Staffing levels at stores depots could be decreased and labour productivity increased by the introduction of modern warehousing technologies. Productivity could be improved also by better computer support, particularly at Navy depots. There were substantial opportunities to reduce labour costs by substituting civilian for service personnel thereby freeing more service personnel for military tasks. There appeared to be considerable savings to be achieved by introducing single-Service managed warehousing in major urban centres.

2.22 The Committee made a number of recommendations aimed at increasing the timely disposal of excess stocks, reducing the range of items carried and reducing warehousing costs.

Value for Money in Replenishment Provisioning

2.23 Replenishment provisioning appeared to offer the greatest scope for economies in supply support.

2.24 The Committee found that some Defence suppliers were charging excessive prices. Unfortunately, the Services were not adequately monitoring spare parts prices, especially the prices they were paying for the assurance of conformance with specifications. Also the Services had not, until recently, given sufficient attention to identifying lower-cost commercial substitutes. Navy relied too much on prime contractors for spares support rather than purchasing directly from the actual manufacturer.

2.25 There was room for all Services to extend the application of economic order quantity principles. Navy's failure to apply economic order quantity principles at all was a serious shortcoming.

2.26 Lengthy purchasing lead times added greatly to the costs of replenishment provisioning. There was considerable opportunity for reducing contracting lead times associated with the public tendering process. The overall costs of purchasing could be reduced by extending the use of local purchasing and improving payment arrangements for minor purchasing.

2.27 The Committee believed that there was substantial scope for greater value for money in replenishment provisioning by the closer monitoring of spare parts prices and the use of US Foreign Military Sales arrangements, by sourcing spares from actual manufacturers rather than prime contractors, by greater use of lower-cost commercial spares, by the increased application of economic order quantity principles, by reducing the lead times associated with public tendering, by extending the use of local purchasing and by improving payment procedures for minor purchases.

Overall Policies and Priorities for Supply Support

2.28 The Inquiry revealed the need for greater commonality in policies and procedures for supply support and for improvements in the effectiveness and efficiency of the single-Service supply systems. Responsibility for overseeing these changes rests with the Defence Logistics Organisation (DLO) of the Department of Defence.

2.29 Because of what it considered to be the limited achievements of the DLO so far, the Committee had doubts about the ability of the DLO to achieve these changes.

2.30 The Committee believed there was a need to review the effectiveness of the present organisational relationships for supply support. It believed that the effectiveness of the DLO could be improved by a closer relationship between the DLO and the Services. The Committee was concerned that there should be no dilution of the responsibility of the Secretary of the Department of Defence for policy, organisation and resources. The Committee considered that the most satisfactory arrangement would be for the Secretary and the Chief of the Defence Force (CDF) to have joint responsibility for the DLO. The details of such an administrative arrangement would be best left to the agreement of the Secretary and the CDF.

CHAPTER 3

ADEQUACY OF CURRENT STOCKHOLDINGS OF SPARES

- Measuring Supply Effectiveness
- The Committee's Approach
- Analysis of the Sample Inventory
- Existing Supply Performance Monitoring
- The Committee's Findings
- Recommendations

Measuring Supply Effectiveness

3.1 Defence objectives for equipment support can be specified in terms of target equipment rates of effort. Target rates of effort, which may be expressed as flying hours for aircraft, fuel consumption for ships and track kilometres for armoured vehicles, are equipment usage rates considered necessary to meet Defence Force operational and training requirements.

3.2 Present Australian defence objectives were summarised for the Committee as:

> for the (Australian Defence Force) to prepare in peace to undertake any low-level contingency that might arise at short notice with little warning[1]

3.3 In assessing the adequacy of present spares stockholdings the Committee therefore had to consider whether those levels were sufficient to sustain:

(1) current, peacetime rates of effort; and

(2) the increase in rates of effort required to deal with credible short term contingencies.

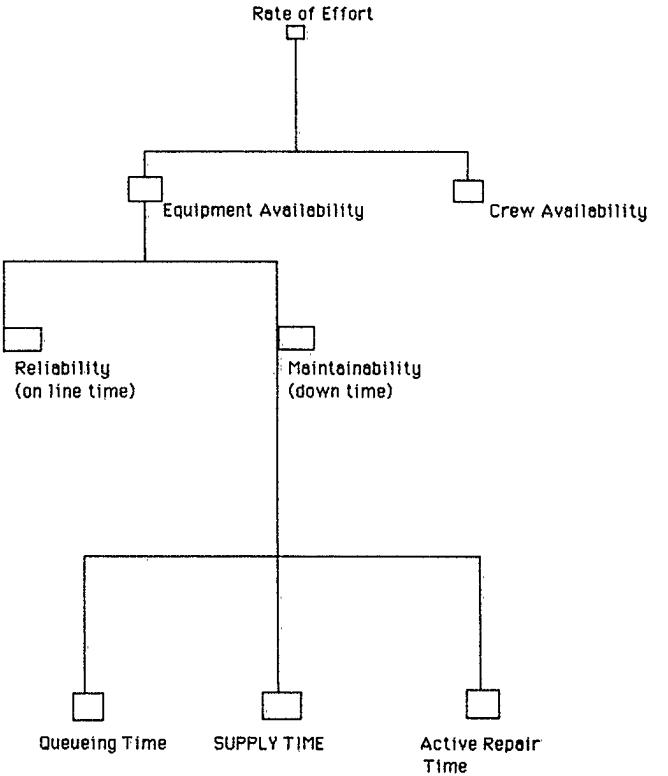
3.4 Spares stockholdings affect the achievement of target rates of effort through equipment availability rates, ie the percentage of time equipments are available to perform their primary roles. Of course, equipment availability is not the only factor determining actual rates of effort. Actual rates of effort will be governed also by the number of equipment assets and crew availability.

3.5 Shortages of spares decrease equipment availability rates by adding to the time equipments are unserviceable. Equipment availability rates will be affected also by equipment reliability ('on-line' time), time awaiting maintenance and

1. 'In camera' evidence from the Director-General, Joint Operations and Plans (Commodore Ian MacDougall), 10 June 1986.

Diagram 3.1

Relationship between Spares Availability and Rate of Effort



Source: Adapted from Department of Defence, Supply Policy Branch, Training Notes.

active repair and overhaul time. Diagram 3.1 depicts the relationship between spares availability and equipment rates of effort.

3.6 The availability of spares may be measured in several ways:

(1) the percentage of inventory line items with zero stocks;

(2) the percentage of line items in short supply, ie items whose stockholdings fall below certain minimum safety levels;

(3) the percentage of inventory accounts with short term dues-out; and

(4) customer satisfaction rates, ie the percentage of demands for stores which are satisfied by issue from existing stock.

3.7 Short term dues-out are items which were out of stock and for which there were no dues-in or stock on order. They are sometimes referred to as back-orders. Long term dues-out are ear-marked stock, ie items in stock but reserved for other customers.

3.8 Customer satisfaction rates are the most widely used measure of spares availability. At the central policy level they are the major means of monitoring the overall performance of the Defence supply system. Short term dues-out is probably the best measure of the performance of an inventory control system. If replenishment provisioning procedures are effective, dues-out *should be nil. Any stock-outs should be covered by dues-in.*

3.9 An illustration of these concepts is provided in Diagram 3.2 using the example of the Air Force spares support system.

3.10 Generally, customer satisfaction rates are measured at two levels in the supply system, from:

- the supporting stores depot (called point of entry supply effectiveness); and
- all stores depots (net supply effectiveness).

3.11 No Service maintains records of stock-outs. Navy does not collect statistics on the number of items where stocks fall to what is called the Short of Stock/Rationing level. Air Force does not maintain records of dues-out and Navy could provide this information for 1985-86 only.[2] Air Force unfortunately do not collect statistics on point of entry customer satisfaction rates. In all Services management attention is focussed on trends in customer satisfaction rates over time not on actual levels at any one time.[3]

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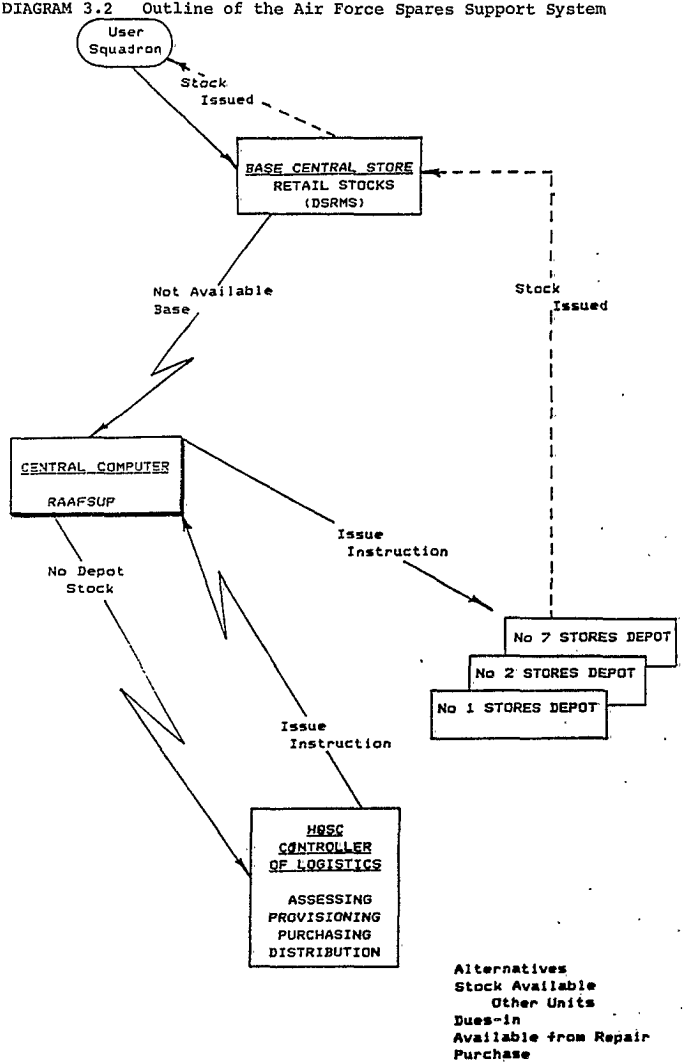
2. Minutes of Evidence, op cit, page 187.
3. Ibid, 965-966.

DIAGRAM 3.2 Outline of the Air Force Spares Support System



Source: Department of Defence, Supply Policy Branch, Training Notes.

3.12 Stores demands are required to be satisfied within the time frames designated by the Australian Standard Materiel Issue and Movement Priority System (AUSMIMPS). Generally, delays will be associated with demands not satisfied by the supporting depot. Statistics on the satisfaction of stores demands within AUSMIMPS time frames are not maintained at a central level.

3.13 Theoretically, the optimum level of spares stockholding can be specified as the customer satisfaction rate below which target rates of effort will be not be achieved. Optimum customer satisfaction rates are unlikely to be 100 percent since this would equate to having 100 percent of equipment serviceable 100 percent of the time. One hundred percent equipment availability rates would be uneconomic if not technically unfeasible.[4]

The Committee's Approach

3.14 The Committee approached its task in four stages, by:

(1) collecting information on spares availability for a sample of six equipment items;

(2) attempting to measure the impact of spares availability on equipment availability rates for each of the sample equipment items;

(3) relating actual equipment availability rates to planned and actual (peacetime) rates of effort for the sample items; and

(4) comparing actual equipment availability rates to the target equipment availability rates specified for wartime operations.

3.15 On 14 April 1986 the Committee submitted a questionnaire to the Department of Defence seeking details of stockholdings, usage rates and re-supply lead times for selected spares itmes. On 23 April and between 15 and 19 May 1986 the Committee conducted inspections of a number of operational units and support facilities. On 10 June 1986 at public and 'in camera' hearings in Canberra the Committee questioned senior Defence officials on its preliminary findings. In July and August 1986 the Committee sought additional statistical information in correspondence with the Department.

3.16 The task was not as easy nor as straightforward as the preceeding description may suggest. Assessing the impact of spares availability on the achievement of current rates of effort was made difficult by the inadequacies of existing Defence supply statistics. Spares availability rates could not be identified for all of the sample items. Equipment availability rates could not

4. 'In camera' evidence from the Chief of Army Logistics (Major General John Stein), 10 June 1986.

Table 3.1 LIST OF SAMPLE SPARES ITEMS

Serial No.	Description	High Unit Cost (C)	High Use (P)	Short Shelf-Life (L)	Country of manufacture
FFG Frigate					
1N	Sep Track Illum Radar Antenna	C			USA
2N	Comb. Antenna System Antenna	C			USA
3N	LM2500 Gas Generator	C			USA
19N	Lamp		R		AUST
20N	Lamp		R		USA
21N	Cable Assembly		R		USA
37N	Adhesive			L	USA
38N	Paper Dry Silver			L	AUST
39N	Silicon Sealant			L	USA
Humpty Doo Transmitting Station					
4N	Frequency Translator Module	C			AUST
5N	Transformer	C			AUST
6N	Frequency Translator Module	C			AUST
22N	Capacitor		R		AUST
23N	Semiconductor diode		R		USA
24N	Socket Plug-in		R		AUST
Rapier Surface to Air Missile System					
7A	Sub-Reflector and Dome Assy.	C			UK
8A	Range Unit	C			UK
9A	Synthesizer Electronic Freqcy.	C			UK
25A	Insert Flexible Coupling		R		AUST
26A	Jack, Levelling		R		UK
27A	Valve, Electronic		R		UK
M113 Al Light Armoured Vehicles					
10A	76mm Gun Barrel	C			UK
11A	Differential Steering Control	C			USA
12A	Engine 6V53	C			USA
28A	Fuel Filter Element		R		USA
29A	Track Shoe		R		AUST
30A	Road Wheel		R		AUST
F111 Strike and Reconnaissance Aircraft					
16R	RH Inboard Spoiler Actuator	C			USA
17R	TF 30 P3 Engine	C			USA
18R	Case and Vane Assembly	C			USA
34R	Wing Pivot Bearing		R		USA
35R	Fuel Nozzle Support		R		USA/AUST
36R	Electron Tube		R		?
52R	Impact Bag			L	USA
53R	Bearing			L	USA
54R	Bearing, Roller			L	USA
P3C Orion Long Range Maritime Patrol Aircraft					
13R	Engine A/C T56	C			USA
14R	Propellor	C			USA
15R	Receiver Infra Red	C			USA
31R	Sonobuoy		R		USA
32R	Thermocouple Inserts		R		USA
33R	Blade, Compression		R		USA
49R	Bearing Ball Annular (9344)			L	AUST
50R	Bearing Ball Annular (9345)			L	AUST
51R	Bearing Ball Annular (9346)			L	AUST

Source: Department of Defence, Confidential Submission (JCPA File 1986/6/B47)

be broken down to identify spares-related factors. The Committee therefore had to rely on indirect or partial performance indicators.

3.17 Assessing the adequacy of current stock levels to support the increase in rates of effort required to meet low-level contingencies was even more difficult because of the inherent limitations of equipment availability and rates of effort statistics. Peacetime equipment availability rates may be no guide to wartime performance levels where lower serviceability standards can be tolerated. Overall rates of effort are not a good indicator of operational readiness where lower-level contingencies require that some sub-systems be maintained at higher states of readiness than others.

Analysis of the Sample Inventory

3.18 From the total inventory of equipment-related stores for each of the selected equipment items the Committee selected the three most important items from the following categories:

- high unit cost spares;
- high use spares; and
- limited shelf-life spares.

3.19 This was done because it was presumed that these spares categories would be subject to the most intensive management. Table 3.1 lists the 45 spares items for which detailed stockholding data was obtained.

3.20 The Committee's analysis of stockholding data revealed that at 30 June 1985 three spares items had nil stocks. Nil stocks were also recorded against six other items. However, one item had been superceded, initial stocks of three items had yet to be delivered and holdings of two items were recorded in another inventory account.[5] The Department of Defence subsequently advised the Committee that it considered six of the 45 sample spares items to have been in short supply at 30 June 1985, including five Navy spares and one Army spare.[6] Table 3.2 summarises the spares availability situation for the sample items at mid 1985.

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5. Within Defence, equipment asset holdings are registered in three separate accounts:
   - 'end' or 'principal' items, eg vehicles, guns, small arms (Only Army operates an end items account through its Principal Items Stock Control EDP System, PISCES);
   - 'items in use', eg tools, jigs, fixtures, test equipment and so called 'hot spares' such as amplifiers and receivers; and
   - 'items in stock', ie other repairable parts and consumable parts.
6. Minutes of Evidence, op cit, pages 1422-1423.

TABLE 3.2 Stock Situation Sample Spares Items: 30 June 1985

	Number of items listed	Number of items with zero stocks[1]	Number of items in short supply[2]
FFG Frigates	9	-	2
Humpty Doo	6	1	3
M113 A1	6	-	1
Rapier	6	1	-
F-111	9	-	-
P3C	9	1	-
Total Sample	45	3	6

Notes: 1 Questionnaire Response

2 Department of Defence

Source: Department of Defence, confidential submission, JPCPA File 1986/6/B4/7. Minutes of Evidence, op cit, pages 1422-1423.

3.21 As over 13 percent of the sample spares items were in short supply the Committee was concerned to ascertain the situation concerning the total spares inventories supporting the six equipment items. As Table 3.3 shows, the 45 spares items, though important, represented a very small proportion of the total spares inventories for these equipments.

3.22 Requests to the Department of Defence for information on the availability of all spares for the six equipment items disclosed that, except for the FFG Frigates, a breakdown of spares availability data by parent equipment item was not available.

3.23 Aggregate spares availability statistics themselves do not give a good picture of the overall effectiveness of the supply system. Customer satisfaction rates lump together mops and brooms with turbine engine blades and armoured vehicle track shoes. Shortages of the latter group of spares are much more likely to result in decreased equipment availability. Only Air Force collects statistics on customer satisfaction rates weighted by item criticality.

3.24 The Committee subsequently sought statistical information that would relate equipment availability rates to the availability of spares. Unfortunately, only Air Force collects statistics on spares-related equipment unavailability rates. Indeed, Army found it difficult to provide any historical equipment availability statistics. Air Force has recently begun to collect data on the percentage of days aircraft were unserviceable as a direct result of shortages of spares. These statistics, which are available from July 1985, provide insufficient historical data for meaningful conclusions about the overall impact of spares shortages to be drawn.

3.25 Navy and Air Force maintain statistics on priority spares in short term short supply. All three Services collect data on sensitive and critical stores items in long term short supply which are subject to intensive supply management. An historical analysis of these statistics can give an indirect assessment of the operational significance of spares shortages. The statistics are described briefly below.

3.26 Navy collects statistics on Urgent Defect Reports (URDEFs) and Controlled Critical Items (CCIs). URDEFs report defects in a ship or shore installation which significantly limits, or may limit, its sea going, fighting or operational efficiency or safety. URDEFs mainly relate to items which affect availability on an irregular or one off-basis. Historical data on spares-related URDEFs however is not available. CCIs are stores items which are equipment-related and mission essential and for which shortages exist or are predicted to exist. Since they reflect persistent supply problems, CCIs are intensively managed within Navy Support Command.[7]

7. Minutes of Evidence, op cit, pages 963, 1008.

TABLE 3.3 Spares Inventories, Six Selected Equipment Items: Summary Statistics

	Date Equipment introduced into service	Number of Line items catalogued or assessed	Number of Line items initially purchased	Number of Line items currently purchased
FFG Frigates	1980-1984	107 000	2 000[1]	68 000
Humpty Doo NCS	1982	na	3 508	3 508
M113 A1	1964	Information classified		
Rapier	1980-81			
F-111	1973	102 000	75 200	94 879
P3C	1978	88 000	35 400	84 174

Note: 1. First of seven incremental buys that constitute the initial spares support for the FFGs. Approximately 61 400 lines have been delivered to date.

Source: **Minutes of Evidence**, op cit, pages 1109-1110, 1510-1511.

3.27 Army maintains records of stores items in sensitive and critical supply. Sensitive items are items in short supply identified as having the potential either to adversely affect an activity or to draw adverse public comment. Critical items are sensitive items for which the stock and procurement situation is so adverse as to affect the level of current or proposed activity and/or jeopardise training and operational readiness. The categories cover both equipment and personnel-related stores. Details of sensitive and critical items are published monthly in the Army Supply Bulletin and are managed within Army Logistic Command by formal committees supported by as necessary by working parties.[8]

3.28 Air Force collects statistics on demands referred to Headquarters Support Command for equipment-related items without which an aircraft would be operationally grounded and which cannot be satisfied by the supporting stores depot (AOG inabilities) and demands referred to Headquarters Support Command for items without which an aircraft may not be able to fulfil its mission and which are not available from the supporting stores depot (UNDA inabilities). Like Navy URDEFs, AOG and UNDA inabilities represent short-term restrictions on equipment availability. Air Force also monitors and intensively manages Significant Logistics Items (SIGLOGs) and Critical Logistics Items (CLICS). A SIGLOG arises when a support problem has the potential to seriously affect fleet availability. A Critical Logistic Item Committee is organised within Headquarters Support Command to investigate the more serious and intractable problems.[9]

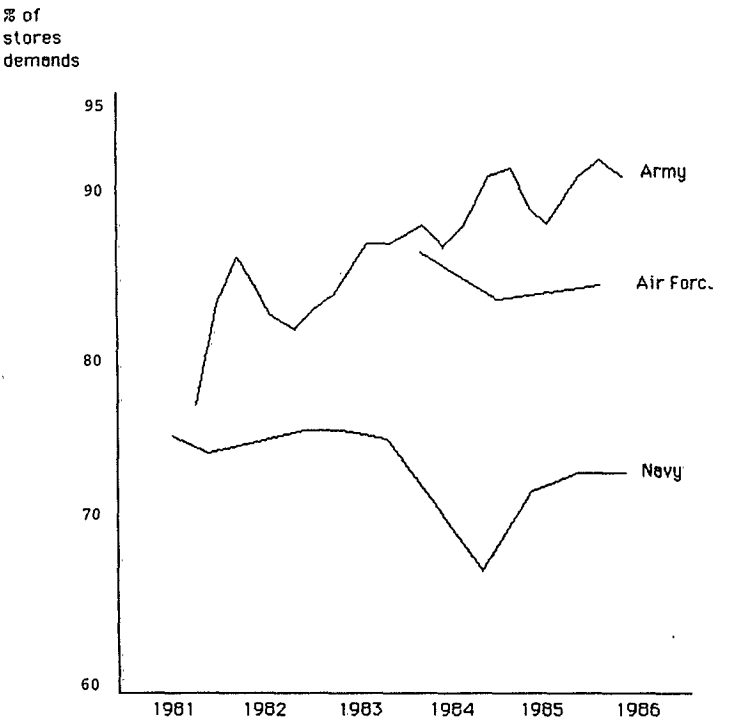
3.29 Finally, the Committee examined historical data on planned and actual rates of effort for the six equipments to ascertain whether shortages of spares had affected either the achievement of planned rates of effort or the planned rates of effort themselves. Since much of the foregoing statistical data was provided by the Department on a confidential basis it has not been reproduced in the Report.

3.30 Because of the inadequacies of much of the statistical material the Committee had to rely to a considerable extent on qualitative evidence gathered during its inspections of operational units and support facilities. Summary reports of the spares situation with respect to each of the six equipment items are provided at Appendix C.

3.31 The Committee found that five of the six equipment items had experienced significant spares support problems over the past six years and, in the case of four of the items, supply problems had been persistent. However, with the exception of the M113 A1 vehicle fleet, shortages of spares did not appear to have affected the achievement of planned rates of effort. Because of supply problems the availability of M113 A1 vehicles has been barely sufficient on occasions to meet major exercise commitments. Although spares shortages need not compromise the achievement of current rates of effort they can contribute to

8. Minutes of Evidence, op cit, pages 961-963.
9. Ibid, pages 963-964.

Diagram 3-3 National Customer Satisfaction Rates[1] by Service: 1981-82 to 1985-86.



Note: 1 Percentage of all stores demands satisfied from all depots by issue from stock

Source: Minutes of Evidence, op cit, pages 908-909, 916.

unacceptable equipment availability levels. The Committee found that Air Force would have had difficulty in meeting target availability rates for its F111 and P3C aircraft over the past six years. Shortages of spares appeared to have contributed significantly to reduced P3C aircraft availability rates. Less than acceptable equipment availability rates called into question the Services' ability to sustain the increased rates of effort which may be required in a wartime situation.

Overall Supply Effectiveness

3.32 The Chief of Supply told the Committee that 'our experience has been that our stocks are, by and large, adequate for the strategic guidance that we have at present and that is natural experience that is born out by some of the Dibb Report.... That does not mean to say that with more information we could not make a more precise assessment of what we should be holding ... Also, that does not mean to say that we could not use better methods of making an assessment of what we should be holding.'[10]

3.33 Representatives of the Services pointed to statistical evidence to support this view. An analysis of customer satisfaction rates shows the overall availability of spares to be increasing. Diagram 3.3 depicts the changes in the percentage of stores demands satisfied from all depots for each the Services from 1981-82 to 1985-86. The number of stores items in critical or sensitive supply constitutes a very small proportion of each of the Service's total stores inventories. Table 3.4 lists the numbers of critical and sensitive supply items managed by each of the Services from 1980-81 to 1985-86. Finally, an examination of recent annual Australian Defence Force Training Reports revealed no mention of shortages of spares affecting the achievement of the Chief of the Defence Force's training objectives.[11]

3.34 Defence witnesses acknowledged that, although the overall spares stockholdings were adequate for current major operational and training requirements, existing stock holdings were inadequate in other respects.

3.35 The Chief of Supply informed the Committee that 'there is a discrepancy between what is required for spares in peacetime and what is required for the actual contingency in the strategic guidance.'[12] Spares stock holding policies are based on peacetime usage rates. The Department had instituted a Surge and Sustainability Study to ascertain what additional stocks of spares would be required for the low level contingencies defined by present strategic guidance.[13]

3.36 Also, there are times when spares shortages disrupt training programs. The Deputy Chief of Naval Staff told the Committee that 'there are times when exercises cannot take place because of some equipment failure due to some spare part not

10. Minutes of Evidence, op cit, pages 455-456.
11. 'In camera' evidence, 10 June 1986.
12. Ibid.
13. Minutes of Evidence, op cit, page 457.

TABLE 3.4 Number of Stores Items in Critical or Sensitive Supply[1] by Service: 1980-81 to 1985-86

	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
NAVY						
Shortages exist	8	10	10	4	15	11
Shortages can be predicted	31	17	33	23	13	12
ARMY						
Items in critical supply	-	-	-	-	-	-
Items in sensitive supply	3	3	3	4	2	5
AIR FORCE						
Critical logistic items	n.a.	n.a.	1	2	1	-
Significant logistic items	n.a.	n.a.	2	9	3	1

Note: 1. Includes all stores, ie. equipment and personnel related stores, but excludes munitions.

Source: Minutes of Evidence, op cit, pages 963-964, 1057.

being on board ship, and that is not an unusual circumstance.'[14] Navy do not maintain records of what percentage of exercise time is affected by spares unavailabilities. However, in the opinion of some senior Naval personnel it was significant. These effects can be mitigated by air freighting in spares or re-scheduling exercises. However, on some occasions serious shortages persist for a considerable period of time.[15]

3.37 Finally, some Services have experienced more significant shortages of spares than others. For the 1986 quarter Army was achieving national customer satisfaction rates of over 90 percent whereas Navy was experiencing national customer satisfaction rates of over 70 percent (see Diagram 3.3).

3.38 The Chief Superintendent of Supply, Naval Support Command acknowledged that Navy's overall availability statistics reflected a significant shortage of spares and pointed to funding restrictions as the cause.[16]

3.39 The Director-General of Operations, Air Force informed the Committee that Air Force achieves its annual rate of effort and generally achieves to target for training. 'We have not had anything occur that became so significant that we could not achieve our rate of effort because of a shortage of spares specifically, other than unusual arisings ... In terms of peacetime flying we have had some shortfalls but they have been unscheduled and they have not lasted over a very long period.'[17] The Deputy Chief of the Air Staff instanced a number of cases where the Air Force had to restrict rates of effort because of shortages of spares.[18]

3.40 The Director-General of Supply-Army told the Committee that none of the items on Army's current Sensitive Items list 'is sufficient to degrade seriously our ability to conduct meaningful training.'[19] The Chief of Army Logistics pointed out that 'Army is less dependent on a smaller number of significant capital equipment items than, say, the Air Force with its aircraft and the Navy with its ships. Flowing from that in part is the fact that we therefore tend to have a larger number of any individual specific type of equipment than the Air Force might have in aircraft, or the Navy in ships. That gives us greater flexibility in meeting downtime problems that serviceability might produce for a particular type of equipment.'[20]

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14. 'In camera' evidence, 10 June 1986.
15. Minutes of Evidence, op cit, page 629.
16. Ibid.
17. 'In camera' evidence, 10 June 1986.
18. Minutes of Evidence, op cit, page 641.
19. 'In camera' evidence, 10 June 1986.
20. Ibid.

Existing Supply Performance Monitoring

3.41 The Committee's investigation disclosed:

(1) the general inadequacy of present methods of monitoring the performance of the single-Service supply systems against current, peacetime objectives;

(2) the inability of the Services to assess adequately the capacity of current stocks to sustain the increased rates of effort required by current strategic guidance; and

(3) the marked differences among the Services in the scope and depth of their supply management statistics generally.

3.42 The Chief of Supply acknowledged that 'what we have in place is a very crude measurement of availability of spares.'[21] The Chief of Naval Support Command told the Committee 'our general statistics at the moment ... are almost meaningless. This is because ... we have our mops mixed up with our toothpaste and with our diesel engines. So the overall figure does not mean anything to you or me in terms of overall effectiveness.'[22] Generally, existing spares availability statistics are collected on a commodity group basis and not on the basis of individual weapons systems or weapon's platforms. The Chief of Supply informed the Committee that:

> In years gone by we managed our entire inventory by weapons systems so that the maintenance and the supply factors were brought together in a judgment on how we were proceeding. In the 1950s we changed to the NATO codification and classification system, which required us to manage our inventory by commodity groups. That denied us the opportunity to make fine judgements on weapon systems' availability.[23]

3.43 In response to these recognised deficiencies the Defence Logistics Organisation recently commenced a Study into Supply Performance Measurement. Navy and Air Force have introduced logistics information systems which will allow them eventually to collect spares availability data for major end equipment items. Army informed the Committee that with its new Principal Item Stock Control EDP System (PISCES) they were getting to the stage 'where we are able to monitor what our readiness is on some individually important items of equipment that we would consider principal items.'[24] Further improvements to supply performance monitoring are restricted by the

21. 'In camera' evidence, 10 June 1986.
22. Minutes of Evidence, op cit, page 485.
23. Ibid, page 491.
24. Ibid, page 489.

limitations of the existing single-Service EDP (ie computer-based) supply systems. A major object of the Supply Performance Measurement Study is to provide policy guidance on performance measurement for the Defence Supply Systems Redevelopment Project which aims to integrate and upgrade each of the single-Service supply EDP systems.[25]

3.44 The variety of supply performance statistics reflects differences among the Services in the importance of equipment availability for operational readiness and in the level of development of computer-based inventory management systems. As noted, Navy and Air Force 'tend to be far more equipment oriented and, therefore, far more dependent these days on repair parts management because the relationship between operational readiness and the physical readiness of equipment is very much dependent on a complex inventory of repair parts.'[26] Air Force closely monitors aircraft availability at a central level whereas in Army vehicle availability is not monitored closely above the unit commander level.[27] The operational differences are mirrored also in different organisational arrangements for supply and support (ie technical services).[28]

3.45 Historical factors associated with the independent development of the single-Service supply EDP systems are important also. Air Force undertook the earliest EDP developments. Navy intended to follow suit. However, Navy's development and further development of the Air Force systems have been deferred in the interests of the joint Supply Systems Redevelopment Project. Army has the latest EDP supply management system and produces a greater range of management statistics. Navy and Air Force EDP supply management systems remain largely based on manual procedures existing in the late 1960s.[29]

The Committee's Findings

3.46 All Services have experienced difficulties in supporting planned peacetime levels of operations and training for some equipment items and extended periods of spares shortages have had to be managed. Overall, Army has experienced the least shortages of spares and Navy the most shortages. Navy has also experienced a much higher incidence of critical or sensitive shortages of spares than the other Services.

3.47 The Committee could not draw any firm conclusions about the impact of spares shortages on the operational readiness of the Defence forces. The achievement of overall planned rates of effort is not an entirely satisfactory measure of operational

25. Minutes of Evidence, op cit, pages 1001-1003
26. 'In camera' evidence, 10 June 1986.
27. See September 1985 Report of the Auditor-General, op cit, pages 17-18.
28. Organisational issues are discussed in Chapter 8.
29. Department of Defence, Report of the Supply Systems Redevelopment Project Business Review Working Group, December 1982, pages 3-4 (Classified document).

readiness. Focussing on overall rates of effort for multiple weapon platforms like modern military aircraft and naval vessels ignores the availability of individual weapon systems. Mission-specific rates of effort need to be examined. Also, for many equipment items it is difficult to gauge operational readiness by reference to rates of effort. As the Dibb Report noted, 'safety standards dictate minimum flying hours for pilots, but there is less precision in determining minimum steaming times required for Navy vessels or minimum field training for ground forces to remain operational.'[30] Even if realistic, mission-specific rates of effort could be established, existing supply performance statistics do not allow an accurate assessment of the adequacy of existing stocks of spares to support current rates of effort.

3.48 An assessment of the adequacy of existing stock holdings to support the increased rates of effort required to cope with the short-term contingencies identified in current strategic guidance is even more difficult. Not only is there insufficient data to assess the ability of the Australian Defence Force to sustain increased rates of effort but also there is no stockholding policy for war reserves of spare parts. Nor, it seems, have logistic support arrangements been adequately tested in military exercises.

3.49 According to the Dibb Report, 'no policy recommendations on war reserves have been put to Ministers since 'interim' proposals were considered by the Government in 1963. This institutional stalemate reflects the differences between the policies of the individual Services, and a lack of agreement over the appropriate contingencies against which stocks should be held. There is also no agreement on the formula to be applied across the range of consumable items. Piece-meal policies reflecting differing single-Service philosophies seem to have been the result.'[31]

3.50 Dibb also reported that logistic support concepts and principles 'have not been subject to the same extent of testing in exercises as have joint force combat operations and command and control ... Current exercises are typically preceded by a considerable effort to accumulate extra support resources to ensure that logistic problems do not constrain operational activities.'[32]

3.51 The Dibb Report concluded that 'it is by no means obvious that our current stocks would be inadequate for the more credible kinds of contingencies.'[33] The Department of Defence told the Joint Committee on Foreign Affairs and Defence, 'in the light of current benign strategic circumstances only a few elements of the Australian Defence Force are kept at a high level

30. Review of Australia's Defence Capabilities, op cit, page 56.
31. Ibid, page 97.
32. Ibid, page 106.
33. Ibid, page 97.

of readiness. Lower readiness of the other elements is manifested in constrained training activities, flying hours, steaming times and consequently lower expenditure on ammunition and maintenance spares ... These lower states of readiness mean that we could not support any sustained combat involving our forces beyond low level operations.'[34].

3.52 The Committee was pleased to note that the Department of Defence had acknowledged the inadequacies of existing supply effectiveness statistics and its inability to assess the capacity of the ADF to meet current contingencies. The Department had commenced studies to correct these deficiencies. The Supply Performance Measurement Study and the Surge and Sustainability Study are very important measures and the Committee will be interested to learn their outcome.

3.53 The Committee does not wish to prejudge the success of these studies. However, it has a number of concerns about the effectiveness of the announced measures.

3.54 The report of the Supply Performance Measurement Study is expected at the end of March 1987 well after the planned date for finalising user requirements for the Supply Systems Redevelopment Project (SSRP) in October 1986. The study should have been undertaken early in the definition phase of the SSRP.[35] Not only does it appear late in the day to specify performance measures on a first principles basis but also inter-Service agreement and support may be difficult to secure. Differences among the Services in the relation between equipment availability and operational readiness have given the Services different focuses for their supply management systems. The independent development of single-Service supply EDP systems has led to considerable differences in the level of sophistication of these systems. Whereas Navy can see a great deal to gain from SSRP, Army appears generally satisfied with its existing EDP supply systems.[36] The resolution of these differences may be beyond the capacity of the Study working group or even the Defence Logistics Organisation.

3.55 The Surge and Sustainability Study should be a major exercise. Statistical analysis needs to be supplemented by testing the effectiveness of the single-Service supply systems through exercises in the field. To this end the Committee supports the suggestion of the Dibb Report that a program of specific exercises be conducted 'in the north of the continent supported from bases in the south, to test and identify weaknesses in the logistic train. This program might be preceded by some computer modelling of selected logistic problems.'[37]

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34. Joint Committee on Foreign Affairs and Defence, The Australian Defence Force. Its Structure and Capabilities, October 1984, pages 73-74.
35. JPCPA, Report 254, op cit, made a number of criticisms of the SSRP acquisition strategy and project planning (see paragraphs 3.19 to 3.92).
36. Minutes of Evidence, op cit, page 631.
37. Review of Australia's Defence Capabilities, op cit, page 106.

Recommendations

3.56 The Committee recommends that the Department of Defence:

1.(a) reviews the definition of user requirements for the Supply Systems Redevelopment Project (SSRP) in the light of the results of the Supply Performance Measurement Study; and

(b) includes in the further submission on the SSRP requested by the Committee in Report 254 a report on the results of that review; and

2. gives consideration to supplementing the current Surge and Sustainability Study by conducting, within existing training levels, a program of specific exercises in the north of the continent, supported from bases in the south, to test and identify possible weaknesses in the Services' supply systems.

CHAPTER 4

IMPROVING THE EFFECTIVENESS OF SPARES SUPPORT

- The Scope for Improvement
- The Committee's Approach
- Analysis of Spares Shortages
- Spares Provisioning Policies and Practices
- Spares Support Budgets
- Spares Purchasing
- Recent Improvements
- The Supply Systems Redevelopment Project
- Summary of Findings
- Recommendations

The Scope for Improvement

4.1 The Committee's analysis of supply effectiveness data in Chapter 3 indicated that stocks of spares were sufficient to support current overall rates of effort. Nonetheless, the Committee concluded that each of the Services had experienced reduced levels of equipment availability because of shortages of particular spares. The inadequacy of existing supply effectiveness statistics made it difficult to measure the magnitude of the operational effects of spares shortages. The Committee experienced particular difficulty in assessing the capacity of current stockholdings to support the increased rates of effort required by present strategic guidance.

4.2 The seriousness of spares shortages varied markedly among the Services. Since the statistics were first collected in late 1981 Navy had experienced significantly lower customer satisfaction rates than the other Services. In early 1986 Navy was experiencing net rates of just over 70 percent whereas Air Force had achieved net customer satisfaction rates of over 80 percent and Army, in excess of 90 percent.[1] Navy's net customer satisfaction rate was actually less than what it had been in late 1981. Over the same period Army rates had steadily increased.

4.3 The comparision of overall customer satisfaction rates suggested that Navy's overall stock holdings were too low and Army's, perhaps too high. This view received some support from the evidence of the Services representatives.

4.4 Navy Office, though not Naval Support Command, has a net customer satisfaction rate target of 90 percent. The Naval Support Commander told the Committee that he was 'just a little cautious about talking in terms of specific percentages, except to say that we are some way behind. There is room for improvement.'[2] The Controller of Logistics, Air Force informed the Committee that Air Force did not have a target satisfaction

1. Refer Diagram 3.2, Chapter 3.
2. Minutes of Evidence, op cit, page 484.

rate but, 'historically, the 80-81 percent appears to be effective. We are achieving the output required ...(We) are attempting to ... give better support with less resources rather than look for more resources.'[3] Army told the Committee that 'once you approach the 90 percent satisfaction level, you have to put in probably undue resources to achieve even small increases in levels of improvement.'[4]

4.5 Overall spares availability statistics may give a misleading picture of supply effectiveness since they ignore item criticality, ie they lump together mission critical spares and domestic stores.

4.6 An analysis of numbers of critical or sensitive spares in short supply revealed low levels of apparently random shortages. Again, Navy experienced significantly higher shortages than the other Services.

4.7 The inadequacy of present supply effectiveness statistics itself suggested that there was scope for improved management of the Services' inventories. The Services acknowledged that improved management information systems could assist them to achieve substantial gains in supply effectiveness. For instance, Army attributed the improvement in customer satisfaction rates largely to the introduction of the Stock Control Usage Base Army (SCUBA) EDP system. More efficient supply management procedures (specifically in the area of minor purchasing), the use of economic order quantities and improved relations with suppliers had assisted also.[5]

The Committee's Approach

4.8 The Committee believed that it was not its role to assess or argue the case for additional funding for spares support. It is for the Government to take decisions on funding priorities within the Defence function. Rather, the Committee wished to ascertain the scope for improving supply effectiveness by the better management of existing resources.

4.9 The Committee approached its task in three stages, by:

(1) analysing the causes of existing spares shortages to discover what areas of inventory management exhibited shortcomings;

(2) assessing relevant management policies and practices; and

(3) reviewing recent improvements.

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3. Minutes of Evidence, op cit, page 486.
4. Ibid, page 484.
5. Ibid, page 483.

Analysis of Spares Shortages

4.10 Stocks of spares are determined on the basis of forecast usage. Forecasts are based largely on historic usage. Shortages of stock or stock-outs will occur if estimates of demand were inaccurate or if holdings were not stocked to requirements because of the lack of funds or procurement problems. Supply management is therefore closely bound up with the other elements of the logistic chain. Technical manpower availability and skill levels, the availability of test and support equipment, technical documentation and the quality of maintenance planning all contribute to the effectiveness of spares support.[6] Frequently, a shortage of spares is a manifestation of problems in engineering support and purchasing.

4.11 The Committee examined the causes of spares shortages experienced by the six sample equipment items. Its investigation revealed four major causes of spares shortages:

(1) inadequate assessment of initial spares requirements (eg. FFG Frigates);

(2) unexpected additional usage of spares arising from equipment design faults or declining equipment reliability associated with age or technological obsolescence (FFGs, M113 A1 vehicles);

(3) delivery delays and lengthening re-supply lead times especially for overseas-sourced items (FFGs, M113 A1, Rapier and F111); and

(4) budgetary restrictions, specifically the decisions of Navy and Air Force in the early 1980s not to replenish buffer stocks or supply margins and the inability of Army to fund the necessary supply margin for M113 A1 vehicle track shoe assemblies.[7]

Budgetary factors tended to operate by exacerbating the effects of initial disturbances of usage patterns and lead times.

4.12 The examination also pointed to inadequate local stocks arising from shortcomings in the geographical distribution of stockholdings (Humpty Doo Transmitting Station). This aspect of spares support was not addressed in this inquiry.

4.13 The Services' own analysis of spares shortages support this assessment. Air Force provided the Committee with the results of an analysis of recent critical spares shortages based on the perceptions of customers. The study indicated that 42 percent of spares shortages occured because no stock level had

6. Minutes of Evidence, op cit, page 187.
7. Refer Appendix C.

been established (first demand or erratic past consumption), 34 percent because of outstanding dues-in and 8 percent because of insufficient repairable items. Reasons were not determined in 16 percent of cases.

4.14 The analysis underlined the contribution of source selection decisions, project management and maintenance planning to spares support difficulties. The Committee could not, in this inquiry, hope to tackle each of these influences singly. Instead, the Committee concentrated on the interfaces between the supply system and these other equipment support systems.

4.15 The Committee's investigation suggested three main areas where management procedures might be improved:

(1) spares provisioning policies and practices;

(2) spares support budgeting; and

(3) purchasing action.

Spares Provisioning Policies and Practices

4.16 Each Service has developed its own procedures for determining the required levels of stockholdings of spares ('provisioning' in Defence terminology). Although provisioning procedures vary among the Services, the underlying supply concepts are the same. Provisioning policies and procedures differentiate between initial procurement and follow-on or replenishment provisioning.

4.17 Different provisioning policies and procedures apply to the different categories of equipment-related stores. Defence categorises equipment-related stores into repairables, consumables and insurance items. Repairable items are those assemblies and sub-assemblies which are removed, repaired, tested and eventually replaced on the parent equipment. They are characterised by high dollar value and are often referred to as rotable or exchangeable items. Consumable items (also called repair parts) are parts or supplies used up in the repair and overhaul of the parent equipment or repairable items. Insurance items are a special category of repairable items which, although unlikely to fail through normal use, are prone to damage by accident and, if damaged, would require lengthy repair times with reduced availability of the weapons platform. Insurance items are limited to a relatively small number of items such as aircraft wings and ships' propeller shafts and propeller hubs.

4.18 Initial spares support is provided out of the equipment acquisition or project budget and is managed by the project office within the Capital Procurement Organisation.

4.19 For consumable spares, the range and depth of initial spares to be purchased will be set at a level assessed as sufficient to ensure the required level of equipment availability during the first two to three years of the equipment's service life. Two to three year's stock coverage is considered

sufficient to allow reliable usage patterns to be established and to cover replenishment lead times. Sometimes life of type purchases of consumable items are made when the parent equipment is scheduled to be removed from service at a specified time or when advice is received that the spares item is going out of production.

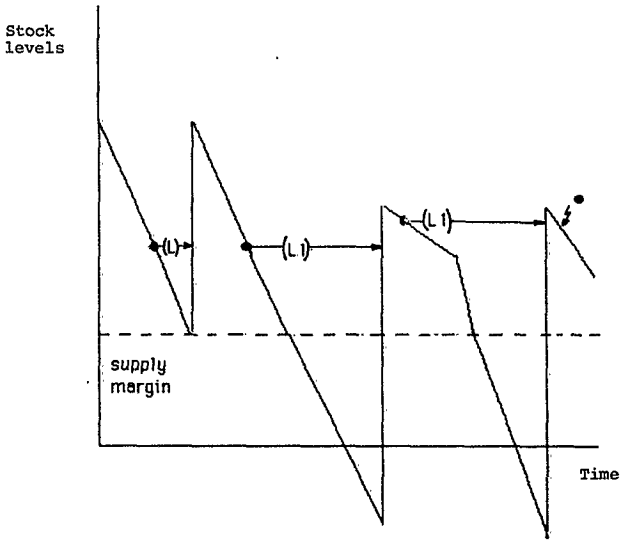
4.20 Quantities of repairable parts and insurance items sufficient to last the estimated service life of the parent equipment will be included in initial spares support. The range and depth of repairable parts to be procured will be based on an engineering assessment of the numbers of items required to stock the total repair pipeline at the target rate of effort. That assessment will take into account the number of equipments, the mean time between failures and the mean time to repair the items concerned as well as losses resulting from the items deteriorating beyond economical repair during the life of the equipment. The number of insurance items purchased will be determined by an assessment of the risk of damage to the item, the consequences of such damage for equipment availability and the length of the re-supply lead time.

4.21 Replacement purchases of spares are part of annual operating outlays. With the exception of domestic stores, (eg mops and brooms) replenishment provisioning is undertaken centrally by the single-Service supply organisations, ie Naval Support Command in Sydney and Army Logistic Command and Air Force Support Command in Melbourne. In the case of Army and Air Force, domestic stores are procured locally by stores depots and operational units.

4.22 Replenishment quantities of repairables and insurance items are determined by attrition.

4.23 Replenishment quantities of consumable spares are determined by the use of a mathematical formula called the Forward Ordering Review Period (FORP) algorithm. The FORP algorithm is a statement of the quantity required to cover consumption over a specified period (the consumption period is usually 12 months) and the re-supply lead time plus an allowance to cover variations in consumption rates and lead times (the supply margin). The quantity of spares to be procured at any one time is determined by subtracting from the FORP quantity (plus any items on back order), the quantity of stock on hand or due in against previous orders. Replenishment provisioning in each of the Services is supported by EDP systems which automatically generate provisioning reviews when stock levels fall below a certain level. The provisioning review point is set at that stock level required to cover forecast consumption during the re-supply period plus the supply margin. The recommended re-order quantities thus calculated will be adjusted to take account of shelf life and other quantitative storage restrictions (eg minimum safe storage requirements for hazardous materials). Air Force and Army also take into account economic order quantities (including minimum order quantities, minimum order values and economic production quantities).

Diagram 4.1 Illustration of the Difficulties of Determining the Appropriate Re-order Point



● = Re-order Point
L = Lead Time

Source: Department of Defence, Supply Policy Branch, Training Notes.

4.24 In all cases, the actual quantities procured will depend, of course, on the availability of funds.[8]

4.25 Under these provisioning arrangements stock outs and shortages of supply can occur if actual consumption rates or re-supply lead times exceed forecasts and the supply margin or if the required re-order quantities are not procured because of budgetary restrictions or inadequate data. Diagram 4.1 provides a graphical illustration of how stock outs can result from lengthening re-supply lead times and increasing consumption rates. It also illustrates the difficulty supply managers face because of the time lags in the replenishment provisioning process.

4.26 Existing Defence spares provisioning policies are soundly based on modern inventory management principles. In practice, however, it has not been possible to fully apply these policies. The chief reasons are the lack of provisioning data and inadequate computer support. These deficiencies, which exist in each of the single-Service supply systems, are evident in all elements of spares provisioning: demand forecasting and the application of lead times and supply margins.

4.27 Demand forecasting suffers from the limited application of forecasting techniques and insufficient material requirements planning. Air Force estimates demand on the basis of equipment rates of effort. Navy and Army forecasting is based on historic usage. The drawback with using historic usage is that the bulk of the Defence spares inventory has a low and random demand. Given the limited historical data that can be stored on existing EDP systems, the estimates used in the replenishment provisioning formula can be quite inaccurate. Air Force believes that better forecasts can be obtained by using the numbers of assemblies and sub-assemblies undergoing maintenance. Better forecasts may be obtained by using better forecasting methods. The longer-term solution to demand forecasting problems seems to lie in extending the use of materials requirement planning, ie. the capability of equipment maintainers (the supply system's customers) to forecast their spares requirements. Air Force and to a lesser extent Army have introduced EDP support into their maintenance systems. What is required is an interface between the supply and maintenance EDP systems so that, on the one hand, maintainers can reserve stock and, on the other hand, supply managers can obtain better forward estimates of demand.[9]

4.28 At present each of the Services uses standard re-supply lead times in their replenishment provisioning formula for a large part of their inventories. Army applies standard lead times to locally purchased spares and to items purchased under government to government arrangements, ie items with some assurance of supply. Navy and Air Force apply them to about 80 percent of their inventories, generally the low value and low

8. A more detailed description of the Services' provisioning policies and procedures can be found in the Minutes of Evidence, op cit, pages 140 - 164.
9. Ibid, pages 626 - 629.

turnover items. Different lead times are applied depending on the source of the item and the method of procurement. The chief reasons standard re-supply lead times are used are the lack of reliable data, the cost of effort involved and the limited capacity of existing EDP systems to maintain individual lead time data.[10] Although the use of standard re-supply lead times may be economical for low value items, it is not satisfactory for high cost items.

4.29 Where used, supply margins also are applied on a fixed basis. The Chief of Supply told the Committee that one could not apply it to individual line items because we did not have the statistical processes available and in inventory management one applies supply margins ... to individual line items. Because of the lack of data and the lack of processes, we applied them to groups of commodities and we left the Services to make their own determinations how they would apply them.[11] The Committee was informed that 'with adequate computer support supply margins can be applied more effectively on an individual basis to each item procured, using the demand history and actual lead times applicable to that item.'[12] The Services are authorised to establish supply margins of up to six months. Within Army, which alone has continued to apply supply margins, the size of the supply margin depends on the method and source of procurement. Supply margins of less than six months are applied to items purchased under government to government arrangements and to items purchased locally by stores depots.[13]

4.30 The Committee's review of existing replenishment provisioning policies and procedures pointed to the importance of the application of selective inventory management principles whereby the more important inventory items are subject to the more detailed provisioning in order to economise management resources. Each Service's policies recognize this principle in certain areas; for example, in the application of re-supply lead times. However, the principle is not applied extensively or consistently among the Services. Navy does not apply selective inventory management principles to a significant extent. Army applies these principles by having separate inventory management systems for principal items (PISCES) and replacement stores (SCUBA). Air Force applies the principles by subjecting inventory items with an annual buy value of less than $5,000 to minimum provisioning review.[14] The Committee believed there was considerable scope for extending the application of selective inventory management principles to all high cost, high use and mission critical items in each of the Services' inventories.

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10. Minutes of Evidence, op cit, pages 1481-1484.
11. Ibid, page 624.
12. Ibid, page 157.
13. Ibid, pages 627 - 628.
14. Ibid, pages 187 - 188.

Spares Support Budgets

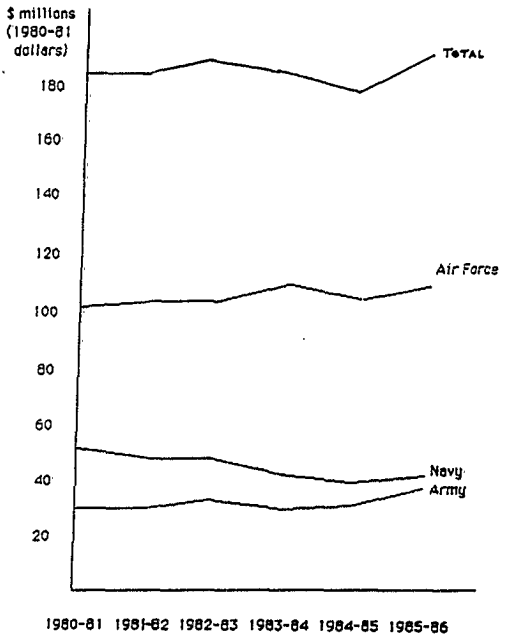
4.31 The Department of Defence acknowledged that in a number of projects actual initial spares support was less than that assessed to be required.[15] Financial restrictions on initial spares support tend to arise from cost over-runs on parent equipment items and under-estimation of the range and depth of initial spares. The Committee addressed the former in its Report on Defence Project Management. The latter indicated shortcomings in technical spares assessing and initial spares budgeting. In the preparation of cost estimates for project approval, initial spares support is calculated using broad percentage guidelines. The percentages, which are based on historical experience, vary with the nature of the parent equipment. After project approval more refined estimates of initial spares support are produced based on technical assessments.[16] The Committee questioned whether percentage budgetary guidelines were a satisfactory basis for project approval estimates of spares support. Report 243 noted a number of projects where initial spares were underestimated.[17] Securing approval for cost increases to cover the under-estimation of initial spares may be difficult since it is usually possible to defer part of initial spares support until after the equipment has been introduced into service.

4.32 The Department of Defence told the Committee that, although the percentage of the Defence budget going to replacement stores had declined in recent years, there had continued to be significant growth in overall outlays on replacement stores.[18] Diagram 4.2 shows the real growth in outlays on equipment-related replacement stores by Service between 1980-81 and 1985-86. Real outlays have been calculated using price indices for all replacement stores provided by the Department of Defence.[19] These statistics show that, except for 1984-85, total outlays on equipment related stores were maintained in real terms. However, there were significant differences among the Services. Whereas Army and Air Force maintained real growth in outlays, Navy experienced an overall decline in real outlays over the period. Some caution should be applied in interpreting the statistics since the price indices used cover all replacement stores including personnel-related stores.

4.33 Navy's removal of supply margins in 1980-81 appears to have been a major cause of that Service's declining spares availability rates.[20] The removal of supply margins by Air Force in 1981-82 and 1982-83 resulted in a decline of Air Force spares support also.[21] While Navy's spares support situation

15. Minutes of Evidence, op cit, page 641.
16. Ibid, pages 159, 169, 171.
17. JPCPA Report 243, op cit, paragraphs 9.10.
18. Minutes of Evidence, op cit, pages 165-168.
19. Ibid, pages 618 - 623.
20. Ibid, pages 629, 639.
21. RAAF, Bow Wave Study (Working Party to Investigate Replacement Equipment and Stores Funding Deficiencies), Volume 1 - Executive Summary (Classified document).

Diagram 4.2 Growth in Real Outlays on Equipment-related Replacement Stores by Service: 1980-81 to 1985-86



Source: Minutes of Evidence, op cit, pages 1487, 1491-1492.

remains unsatisfactory, Air Force's situation, which was the subject of a major internal study in December 1984, seems to have improved. Air Force pointed to management action and the re-introduction of supply margins in 1983-84.[22] Navy has commenced a study, similar to the Air Force study, to ascertain the magnitude of the problem it faces.[23] Although the decisions to remove supply margins were taken by Navy and Air Force according to their own funding priorities, overall Defence budgetary decisions may have contributed to these Services' difficulties. Supply margins have been used by the Services since modern inventory management concepts were introduced. In the light of the Government's post-Afghanistan defence initiatives, the Department of Defence promulgated a policy allowing the Services to progressively introduce supply margins of up to six months. However, the Services were not given additional funding in the Budget.[24] The Committee did not press Navy on the issue of its funding priorities. However, it was concerned that the squeeze on spares support funds had been allowed to persist for so long. Only now was Navy attempting to assess the magnitude of the equipment support problem that had resulted.

4.34 A large part of the budgetary difficulties the Services face in spares support appears to be the lack of information to support budget submissions. The Chief of Supply told the Committee that 'quite often it is difficult to support some of the submissions we make before the consultative group because of the lack of information.'[25] The Chief Superintendent of Supply, Naval Support Command added that 'bidding for money is a very difficult process. We are never quite sure about the accuracy of our bids in terms of dollars and manpower because we cannot forecast our requirement to the degree of accuracy we would like.'[26]

4.35 The lack of information extends to financial management information generally. At present, the Services cannot tell what it is costing them in spares to operate a specific weapons platform. In some cases they can tell what it is costing to maintain the related spares inventory. There is only limited computer support given to the financial management of the supply function.[27]

Spares Purchasing

4.36 The Committee was concerned to note the significant incidence of delivery delays and lengthening re-supply lead times.

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22. Minutes of Evidence, op cit, pages 626, 627.
23. Ibid, page 629.
24. Ibid, page 625.
25. Ibid, page 615.
26. Ibid, page 617.
27. Ibid, pages 701 - 702.

4.37 An analysis of the sample spares items revealed re-supply lead times ranging between 90 and 1283 working days. These re-supply lead times comprised:

- contracting lead times, ie the time taken between raising a procurement demand and placing an order with a supplier; and
- production and delivery lead times ie the time between the placing of an order and final delivery.

Among the sample items, contracting lead times varied between less than one day and 758 working days. Production and delivery lead times ranged between 29 and 1095 working days.[28]

4.38 To these re-supply lead times can be added administrative lead times, ie the time taken between the identification of a requirement and the raising of a procurement demand. The matter of administrative lead times is addressed in Chapter 7.

4.39 Contracting lead times will vary considerably depending on the method of procurement. These methods range from direct orders on local suppliers by supply depots and units to public tender action through the Defence Contracting Organisation and include a variety of government to government purchasing arrangements. Contracting lead times will be quite short in the case of local purchases but can be lengthy in the case of public tenders. The scope for reducing the time and cost of purchasing action is also addressed in Chapter 7.

4.40 Production and delivery lead times will vary depending on the source of supply, the availability of raw materials and production technologies. Because of the exacting specifications of many military spares production, delivery lead times will be lengthy. The Committee was not concerned about the length of the lead times per se but about lengthening lead times and delivery delays.

4.41 The analysis of the sample spares revealed significant production and delivery delays because of:

- competition from other customers;
- items out of production;
- the difficulty in interesting other manaufacturers in the Services' small order quantities; and
- industry generally carrying smaller inventories of materials and finished items.[29]

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28. Department of Defence, confidential submission, JPCPA File 1986/6/B/4/6.
29. Refer Appendix C.

4.42 Many of these difficulties reflected initial source selection decisions and the Services' reliance on overseas sources of supply. The development of alternative, local sources of supply may overcome some of these difficulties. However, this was an issue the Committee did not pursue in the inquiry.

4.43 Other difficulties reflected trends in industry world-wide. A significant number of spares are produced, however, in government-owned factories managed by the Department of Defence. As Government factories are much more significant as suppliers of ammunition, the Committee has considered the delivery performance of government factories in Chapter 5.

4.44 There may be scope for reducing production and delivery delays by the greater monitoring of purchasing activity and closer liaison with suppliers. The Committee addressed these issues in its *Report on Defence Project Management*.[30] Navy is handicapped in procurement monitoring by a lack of computer support. Army and Air Force supply EDP systems have procurement sub-systems which monitor procurement demands, purchase orders and receipts allowing Army and Air Force supply managers to hasten overdue orders.[31]

Recent Improvements

4.45 Since the early 1980s a number of measures have been taken to significantly improve the effectiveness of the single-Service supply systems.

4.46 Navy and Air Force have re-organised their supply organisations to integrate more closely supply and support functions. A closer working relationship between supply managers and maintenance managers should allow better forecasting of spares demands and more effective management of spares shortages. Army has employed an integrated or 'logistics' approach for some time.[32]

4.47 Improvements in project management have addressed the difficulty of estimating initial spares support. Better project planning and the establishment of dedicated Integrated Logistic Support managers on the project team have meant that spares assessing has been given more management attention than had sometimes occured in the past.[33] Perhaps because of the number of single ships of type in the RAN's fleet, Navy has experienced particular problems in this area. Navy has undertaken several reviews of its spares assessing procedures and recommendations to change labour-intensive and time-consuming practices were being considered at the time of this Report.[34]

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30. Refer JPCPA Report 243, op cit, Chapter 8.
31. Minutes of Evidence, op cit, pages 182-186.
32. Ibid, pages 187-188, 476-477, 485, 487, 489, 491, 696-702.
33. Ibid, pages 624-629.
34. Ibid, pages 651-658.

4.48 A large number of enhancements to the single-Service supply EDP systems have been made. All Services are in the process of extending on-line access to their central EDP systems. Army and Air Force have extended EDP support to the supporting depot level, increasing visibility over their total stores inventory.[35]

4.49 Air Force re-introduced supply margins in 1983-84 for inventory line items with annual order values up to $5,000. Supply margins were extended to lines costing up to $25,000 in 1985-86. (The $25,000 line cost limit includes 95 percent of line items purchased and 77 percent of dollars obligated by Air Force.) Navy has not re-applied supply margins to its spares inventory except for certain safety-related stores.[36]

4.50 The Department of Defence made particular point of the Supply Systems Redevelopment Project. The Supply Systems Redevelopment Project envisages major improvements by the wholesale redevelopment of existing EDP systems on an integrated basis. The Department believes further significant improvement of provisioning procedures, budgetary processes and procurement activities requires the redevelopment rather than the enhancement of the existing single-Service supply EDP systems. Although there is scope for additional computer support in procurement and financial management, existing levels of EDP support in the supply function are high. The single-Service supply EDP systems are among the largest computer systems in Australia. However, the existing machines have limited design life, limited on-line access and, in the case of Navy and Air Force, the software is based on manual procedures existing in the late 1960s.[37]

The Supply Systems Redevelopment Project (SSRP)

4.51 The SSRP was established in 1975 under Defence Central management. Until 1983 progress was slow because of the diversion of resources to the conversion of the single-Service EDP systems from Honeywell to UNIVAC machines. The Project was reviewed in December 1982 and re-cast in its present form in 1983.[38]

4.52 SSRP aims to:

(1) replace some ageing machines;

(2) convert existing manual sub-systems; and

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35. Minutes of Evidence, op cit, pages 651-658.
36. Ibid, pages 636-637.
37. The background to the Supply Systems Redevelopment Project is described in JPCPA Report 254, op cit, Appendix 1, Volume 3.
38. This and the following outline of SSRP are taken from Department of Defence, Report of the SSRP Business Review Working Group, December 1982 (Classified Document).

(3) develop three common supply systems (with unique-to-Service elements where required by different Service roles).

The development of common supply systems is justified, by the Department, by the need to collect standard supply data (particularly costs), to facilitate the interchange of data between the single-Service supply systems and to allow the application of common supply policies and procedures.

4.53 Planning for the project identified deficiences at all levels in the Services' supply systems. EDP support at the policy and resources level (ie Defence Central and the Service Offices) was very limited. There was a need to support the Five Year Defence Program (FYDP) processes, monitor obligations and expenditure, cost activities on a weapons system basis and model the inventory impact of supply, technical and operational decisions. The executive level (ie the Support/Logistic Commands) lacked adequate asset visability, on-line access to the central data bases, linkages with the engineering and maintenance systems and computer support for procurement activities. The depot and base level lacked adequate performance monitoring, procurement support facilities and, in the case of Navy, adequate asset visability and inventory management capability. EDP support at the unit level was almost non-existent.

4.54 SSRP consists of five separate projects to be implemented in two stages:

Stage 1 - 1984 to 1993/4

(1) development of a common depot/base system (with 'unique to Service' elements as appropriate) for stores depots and bases;

(2) development of an initial policy and resource system for Defence Central and the Service Offices for the purpose of financial estimation, budgeting, management and control;

(3) enhancements of the existing executive systems of the Services to overcome costing deficiencies pending the development of a common executive system in Stage 2;

Stage 2 - 1987/88 to 1995/96

(4) development of a common executive level system to serve RAAF Headquarters Support Command, Army Logistics Command and Navy Support Command; and

(5) development of a common policy and resource system based on experience gained from the initial development.

4.55 Stage 1 was initially planned to be completed at the end of 1984-85.[39] However, according to the latest schedule, user requirements for the initial policy/resource level project were not expected to be finalised until June 1986 and the depot/base level project proposal not until October 1986.[40]

4.56 SSRP was part of a $300 million administrative computing proposal (Project DESINE) submitted to the Committee by the Department of Defence in April 1986. The Committee's Report found that the planning, systems definition and cost/benefit studies necessary to justify the SSRP had not been completed. Nor had the project been subject to the full process of scrutiny and review within the Department. The Committee recommended that the Department of Defence not proceed with the acquisition of development equipment until the project definition studies had been completed and a further submission detailing the results of these studies had been lodged with the Committee. The Committee also found that the proposed implementation strategy entailed significant schedule risks, large financial risks and limited Australian industry participation.[41]

4.57 Since the Committee did not have available, at the time of finalising this Report, final definition of the SSRP Stage 1 proposals it could not assess whether the proposal adequately addressed the shortcomings identified in the inquiry.

Summary of Findings

4.58 The Committee found that significant shortages of spares had arisen because of:

(1) an inability to accurately forecast-

- demand, and
- re-supply lead times;

(2) an inability to apply adequate supply margins to cope with variations in demand and lead times; and

(3) shortages of funds.

4.59 It is difficult to estimate accurately initial spares requirements in the absence of actual consumption data and there will always be a random element in actual spares consumption. However, there is scope for improving the quality of initial spares assessing and subsequent demand forecasts. Spares assessing seemed to be a particular problem in Navy.

39. SSRP Business Review Working Group, op cit, Annex B to Executive Summary.
40. JPCPA Report 254, op cit, Appendix 1, Volume 3, pages 21-22.
41. Ibid, Chapter 1, pages 1-5.

All Services experienced problems establishing a sound basis for demand forecasting in replenishment provisioning. Some Services were moving to refine their existing demand forecasting methods. All Services placed considerable store in improving the flow of information between supply and maintenance personnel to provide more accurate forecasts of demand. There was a need to improve the quality of maintenance planning and provide an automatic link between the supply and maintenance EDP systems.

4.60 Existing spares provisioning policies provide for the inclusion of re-supply lead times and supply margins in the determination of replenishment requirements. However, standard lead times and supply margins are applied in many cases. Although the use of standard lead times and supply margins for low cost, non-critical and short lead time spares may be satisfactory, for other spares the use of standard lead times and supply margins is not satisfactory. A more selective approach to spares provisioning is required. The Services have partially applied selective inventory management principles. However, there is substantial scope for extending the application of these principles.

4.61 Although budgetary restrictions have affected initial spares support, the overall level of funding for replacement spares has been maintained in real terms. Within this overall funding situation, however, Navy's outlays on replacement spares have actually declined in real terms. The source of this decline was not ascertained. Ultimately, funding levels reflect overall Defence and Service priorities. The Committee did not consider its task was to question these priorities or recommend increased funding for spares. However, it was concerned to note that budgetary decisions have been taken on the basis of inadequate information. There is a need to collect better information about the costs of spares support for individual weapons systems.

4.62 These shortcomings have been acknowledged by the Department of Defence. Defence was able to point to action taken or underway to improve the effectiveness of spares support. In an attempt to improve demand forecasting the Services had invested more effort in initial spares assessment and had instituted closer organisational links between supply and maintenance personnel. Most importantly, the Department of Defence had established a joint Supply Systems Redevelopment Project to redevelop each of the single-Service supply systems on an integrated basis. The project is to address each of the areas where EDP support is inadequate.

4.63 The Committee endorses many of the proposals to improve the effectiveness of spares support. It has major concerns however about the soundness of the strategy underlying the Supply Systems Redevelopment Project (SSRP).

4.64 The SSRP is a long-term project. The proposed redevelopment of the depot/base systems, the core of the Services' supply EDP systems, is not planned for completion until 1993-1994. This target may even be optimistic given the slow initial progress of the project and the shortcomings in project planning and the equipment acquisition strategy noted in Report 254.

4.65 The integration of the three supply systems is a laudible objective but the Committee questioned whether the objective was too ambitious for a single project which encompasses the wholesale redevelopment of the existing supply EDP systems. The Committee questioned also the deferral of needed enhancements of existing systems, especially Navy's, in the interest of the project.

4.66 The Committee believes that the Navy supply EDP system should be upgraded urgently. An upgrading of the Navy supply EDP system is critical for the effective spares support of the proposed new submarines and the possible acquisition of eight new surface ships in the 1990s.

4.67 The Committee concluded therefore that the SSRP ought to be restructured to achieve more modest but critical enhancements to the Navy supply EDP system in a short time frame. Improvements to the Navy system could be based on the Army's SCUBA system which appears to be working effectively.

4.68 The long term integration objectives of SSRP are worthwhile. It is important therefore that the project be carefully managed. In the Committee's view, SSRP was as important a Defence project as many major capital equipment acquisitions. It was essential that SSRP be fully endorsed by all the Services and that the project be closely monitored during its implementation.

Recommendations

4.69 The Committee recommends that the Department of Defence:

3. re-structures the Supply Systems Redevelopment Project (SSRP) to achieve a major upgrading of the existing Navy supply EDP systems in the short-term possibly using the Army SCUBA system as a model; and

4. requires, before the re-structured SSRP is approved:

   (a) its endorsement by each of the Services; and

   (b) the development of an adequate project performance monitoring system.

CHAPTER 5

THE EFFECTIVE SUPPLY OF AMMUNITION

- Introduction
- Existing Ammunition Provisioning Policies and Practices
- The Committee's Approach
- Analysis of Ammunition Stockholdings Data
- Consideration of Issues
- Forecasting Customer Requirements
- Production and Delivery Lead Times
- Delivery Performance of Australian Government Munitions Factories
- Summary of Findings
- Recommendations

Introduction

5.1 Under the heading 'ammunition' may be included a very wide variety of munitions items ranging from cartridge and propellant actuated devices and pyrotechnics to bombs and guided missiles. In this inquiry the Committee focussed its attention on major munitions items - gun ammunition, bombs, mines, torpedoes and guided missiles together with their spare parts. There are 251 major munitions items in the total Defence inventory.[1]

5.2 Ammunition items ('natures' in Defence terminology) each consist of a number of components; for example, cartridges or warheads, propellants, fuses and primers and casings or shells. Some ammunition items have shelf life restrictions because the quality of the explosive material can deteriorate over time. The Services monitor the quality of their ammunition stocks by periodically subjecting propellants to chemical testing and 'proof testing', ie firing, other components; for example, fuses and primers. Because of these factors ammunition inventories are managed on the basis of production lot or batch number as well as stock numbers.

5.3 Stockholdings of ammunition have been addressed separately from spares because of the different policies governing the provisioning of ammunition and the different issues which arose from the Committee's inquiry.

Existing Ammunition Provisioning Policies and Practices

5.4 The Department of Defence informed the Committee that:

> 'In broad terms the initial purchase of ammunition to support a new weapons system comprises:

1. Minutes of Evidence, op cit, page 1487.

(1) a contingency reserve (or war reserve) quantity (This requirement is initially procured and subsequently maintained or replaced as a charge to the capital vote);

(2) a unit entitlement quantity (*ships' outfit in Navy* terminology); and

(3) a practice and training allowance sufficient to effectively introduce the weapons system into service and to cover the procurement lead time until deliveries are made from the first follow-on or replenishment order.'[2]

Initial coverage is generally between two and three years although it will be increased if provision lead times exceed this period.

5.5 Contingency reserves are calculated in accordance with policies promulgated in the Services' wartime operational plans. Training requirements are calculated from the Services' annual Statements of Objectives and Activities which forecast training objectives and activities five years ahead.

5.6 Initial purchases of ammunition are managed as a separate project to procurement of the weapon system. With the exception of Navy, ammunition projects are managed by procurement teams under the supervision of the Service Chiefs of Materiel within the Capital Procurement Organisation. Within Navy initial purchases of ammunition are the responsibility of the Director-General of Supply.

5.7 Defence advised that 'because of the necessarily long lead times involved in setting up local manufacturing capability for the munitions involved, initial stocks of ammunition, with few exceptions, are procured from overseas.'[3]

5.8 In peacetime, follow-on supplies of ammunition will be almost exclusively devoted to replacing stocks consumed in approved annual practice and training exercises. As the Department of Defence noted, 'since this usage rate is set by tables of allowances or similar documentation, usage and hence calculation of replacement requirements tends to be deterministic in comparison with the probabilistic nature of the demand forecasting task associated with follow-on spares support.'[4]

5.9 Replenishment quantities of ammunition are determined according to the same principles as for follow-on spares. However, only Army presently includes a supply margin in its provisioning for ammunition. With the exception of guided weapons, ammunition is replenished on an annual basis.[5] Follow-on purchases of guided weapons tend to be made on a case by case basis because of their high cost and their typically limited production runs.

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2. Minutes of Evidence, op cit, page 146.
3. Ibid.
4. Ibid, page 157.
5. By contrast, provisioning reviews of spares are instigated when stock levels fall below a specified re-order quantity.

5.10 Responsibility for replenishment provisioning of ammunition rests within the Headquarters Logistic Command in the case of Army and Headquarters Support Command in the case of Air Force. Within Navy, responsibility for follow-on supplies of *ammunition rests (as it does with initial supplies)* with the Director-General of Supply, Navy Office in Canberra.

5.11 The less complex, high use types or natures of ammunition are largely manufactured in Australia at the Australian government munitions factories. In the case of Army the government munitions factories are the largest supplier. The more complex lower usage natures tend to be imported. In some circumstances items are imported pending the development of a local manufacturing capability.

5.12 According to the Department of Defence, the major planning difficulty in provisioning ammunition 'involves reconciling annual requirements, necessarily limited in size, with optimum production quantities in the case of the Australian government munitions factories, or with minimum production or order quantities in the case of overseas suppliers.'[6]

5.13 Ammunition ordering and stockholding information is maintained on essentially manual systems because of a combination of security classification and technical data factors.[7] Air Force has some limited ammunition-related data on its retail level supply EDP system. Army and Navy are taking steps to introduce a computer-based system for the management of their ammunition inventories.[8]

The Committee's Approach

5.14 The adequacy of current ammunition holdings can be assessed by reference to

(1) the achievement of annual training and exercise firings programs; and

(2) the maintenance of authorised contingency reserves.

5.15 Shortages of ammunition may lead, in the short term, to re-scheduling of exercises and training. In the longer term they may lead to either a reduction in training and exercise firings or the breaching of contingency reserves. Navy and Army informed the Committee that shortages generally reduce the number of practice and training firings rather than contingency reserves. Contingency reserves are identified separately at the national inventory management level. Breaches of contingency reserves to meet training and exercise commitments require approval at a senior level within the Services.[9]

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6. **Minutes of Evidence**, op cit, page 157.
7. As noted, the ammunition inventory is managed by production lot numbers not stock numbers. Existing supply EDP systems do not have the flexibility to cope with both lot numbers and stock numbers.
8. **Minutes of Evidence**, op cit, page 179.
9. Ibid, pages 1087-1088

Table 5.1 LIST OF SAMPLE AMMUNITION ITEMS

Serial No.	Description	High Unit Cost (C)	High Use (R)	Country of manufacture
FFG Frigates				
55N	Harpoon missile	C		USA
56N	Standard missile	C		USA
57N	76 mm HE IR	C		USA
70N	76 mm VTNF		R	ITALY
71N	20 mm Cartridge (C.I.W.S.)		R	USA/AUST
72N	76 mm BL&P		R	USA
Humpty Doo Transmitting Station				
	No ammunition applicable			
Rapier Surface to Air Missile System				
58A	Rapier missiles	C		UK
M113 A1 Light Armoured Vehicles				
61A	Cast 76 mm Tracer	C		AUST
62A	Cast 76 mm HESH	C		AUST
63A	Cast 76 mm SMK	C		UK
F111 Strike and Reconnaissance Aircraft				
67R	Mk 84 Bomb, HE	C		AUST
68R	Mk 82 Bomb, HE	C		AUST
69R	BDV 33C/B Practice Bomb	C		AUST
82R	20 mm Cartridge Practice		R	NORWAY
83R	Chaff		R	USA
84R	20 mm Cartridge HE		R	NORWAY
P3C Orion Long Range Maritime Patrol Aircraft				
64R	Harpoon missile	C		USA
65R	Mk 44 Torpedo	C		USA
66R	Mk 46 Torpedo	C		USA

Source: Department of Defence; Confidential Submission (JPCPA File 1986/6/B4/7)

5.16 Significant shortages of ammunition will therefore be reflected in the first instance in reduced training and exercise firings. Because of this, the Committee concentrated its attention on ascertaining the incidence of shortages which have *resulted in reductions of annual practice and training firings* rather than on determining whether current contingency reserves were at the required levels.

5.17 The Committee's investigation proceeded in three stages:

(1) an analysis of stockholdings of ammunition relating to the sample equipment items;

(2) an assessment of the impact of any shortages of ammunition on the achievement of the practice and training allowances laid down for the sample equipment; and

(3) an assessment of the total number of major munitions items whose stocks were insufficient to meet laid down practice and training allowances.

Analysis of Ammunition Stockholding Data

5.18 From the total inventory of major munitions items for the six selected equipments the Committee selected the three most important items according to unit cost and use. Table 5.1 lists the eighteen ammunition items for which detailed stockholding data was obtained. The sample covered 60 percent of the major munition items used by the selected equipment items. The sample was smaller than the corresponding sample of spares items since the Humpty Doo Transmitting Station possessed no munitions, the Rapier Air to Surface Missile System fired only one type of missile and a couple of munitions items (the Harpoon guided missile and the Mark 46 Torpedo) were common to two or more equipments.

5.19 An analysis of Defence stockholding data disclosed that stocks of a number of the eighteen sample ammunition items were insufficient to meet annual training and practice allowances at 30 June 1985.[10] Details of the shortfalls have been withheld for security reasons.

5.20 An analysis of annual ammunition training and practice allowances for the six equipments over the past six years revealed steady reductions in training and practice allowances for two equipment items.[11] However, these reductions did not appear to be related to any shortages of ammunition.[12]

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10. Department of Defence, confidential submission (JPCPA File 1986/6/B4/7).
11. *Ibid.*
12. Ibid.

5.21 Information subsequently provided by the Department of Defence disclosed that for a significant number of major munitions items there were insufficient stocks to meet annual training and practice allowances. Navy suffered more significant shortages of ammunition than the other Services.[13] Again, details have been withheld for security reasons.

5.22 On occasions shortages of ammunition have eaten into Army's contingency reserves. No historical data was available and Army could not advise how long the breaches had persisted. Air Force policy was that contingency reserves will not be drawn on during peace time. Navy does not maintain statistics on breaches of contingency reserves. Nevertheless, it informed the Committeee that such occasions were rare and normally existed for short periods only.[14]

Consideration of Issues

5.23 Measuring shortages by reference to annual firing allowances may give a misleading picture of operational readiness. On the one hand, allowances have not been established for all items (eg. certain high explosive shells are not used in peacetime). On the other hand, current training standards are those established for peacetime and do not reflect the full capabilities of the weapons. Higher training standards have applied in the past (eg. during the Vietnam War).

5.24 It was difficult to assess also whether ammunition outlays had been subject to tighter budgetary constraints than other areas of Defence expenditure. Total real outlays on ammunition have declined in two of the past six years. Diagram 5.1 depicts the growth of real outlays on 'Weapons, armaments, ammunition and explosives' by each of the Services between 1980-81 and 1985-86. *Real outlays have been calculated using* price indices supplied by the Department of Defence. The variability in outlays revealed in the table may be the effect of a small number of high value orders over the period.

5.25 However, stockholdings of ammunition like stockholdings of spares have been constrained in recent times to accommodate the lower levels of operational readiness justified by Australia's current strategic circumstances and the budgetary priority given to investment in major capital equipment. These *judgements are justified* on the grounds that 'training intensity and stock levels can be lifted more rapidly than the more substantial investment items can be introduced and that our strategic assessment makes the associated shorter-term risks acceptable.'[15]

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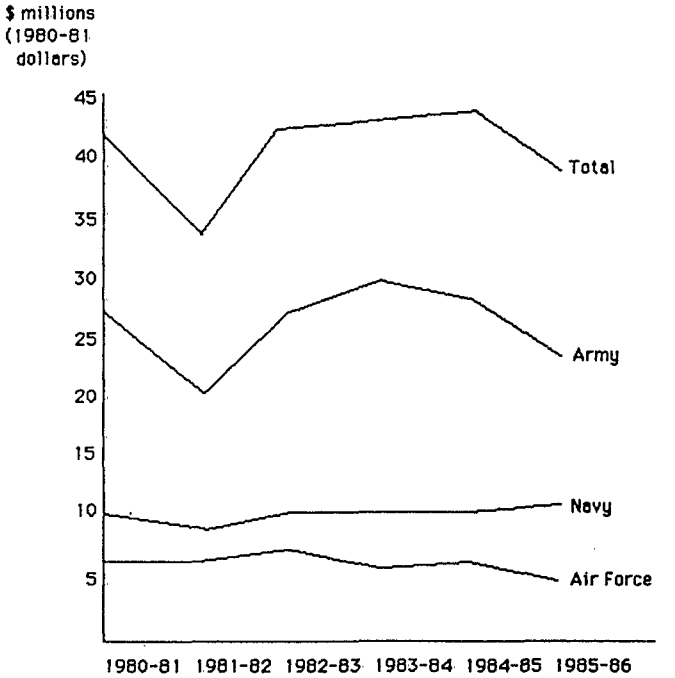
13. JPCPA File 1986/6/B4/7, op cit
14. Ibid.
15. Department of Defence, quoted, Joint Committee of Foreign Affairs and Defence, op cit, page 74.

Diagram 5.1 Growth in Real Outlays on Weapons, Armaments, Ammunition and Explosives by Service: 1980-81 to 1985-86.



Source: Minutes of Evidence, op cit, pages 1487, 1493-1494.

10 Because ammunition consumption is fixed by training objectives and the availability of funds, shortages of ammunition will tend to arise from procurement problems.

5.26 An analysis of Army and Air Force munitions items in short supply indicated that the shortages were caused by contracting delays, technical problems (including design faults and difficulties in meeting specifications) and production delays.[16]

5.27 The Committee's analysis of sample ammunition items revealed also very long production and delivery lead times. Long lead times were experienced with both Australian and overseas suppliers. Production and delivery lead times varied between 86 days and three and a half years for overseas-sourced items and between two years and four and a half years for locally-sourced items.[17]

5.28 There appeared to be three areas where management action might be taken to reduce the incidence of ammunition shortages:

(1) the application of supply margins or buffer stocks;

(2) reducing administrative lead times associated with requirement determination and purchasing action; and

(3) reducing production and delivery lead times.

5.29 At present, only Army applies supply margins for ammunition. The basis of Navy and Air Force practice was not ascertained. Because ammunition provisioning action is managed using largely manual processes there is considerable scope for more accurate assessment of replenishment requirements and for reducing the associated administrative lead times. The Air Force ammunition inventory is managed by EDP systems at the Support Command and base retail level. Navy and Army informed the Committee that they are in the process of developing computer-based ammunition supply management systems.[18]

5.30 The Committee gave particular attention to the scope for reducing production and delivery delays, if not the length of production and delivery lead times themselves. The Committee asked whether, in the longer term, there were opportunities for improving the delivery performance of suppliers or locating alternative sources of supply.

16. Department of Defence, Confidential Submission, JPCPA File 1986/6/B4/7.
17. Ibid.
18. Minutes of Evidence, op cit, page 506.

5.31 The Committee's analysis of production and delivery lead times associated with the sample ammunition items suggested that lead times for Australian suppliers are longer than those for overseas suppliers. The Department of Defence disputed this view. The Director-General of Supply, Army, told the Committee:

> 'Overseas supply sources used to be far superior to Australian supply sources because we used to be able to buy off the shelf, particularly in ammunition. These days, I am afraid, when we buy ammunition overseas, we also have to wait our turn to have that ammunition manufactured. So, these days, there is no guarantee that an overseas source of supply will, indeed, be any quicker than an Australian source of supply.'[19]

5.32 The Department also disputed whether the long lead times associated with the production of ammunition were a problem. The Director-General of Supply, Army, stated: 'With regard to lead times for ammunition, it is true that they are long, but ammunition, by its very nature, is not a simple item to manufacture. Our requirements are often fairly small in number and therefore we have to wait for an appropriate time for the factory to tool up and actually manufacture our requirements.'[20]

5.33 Of the eighteen sample items, five were procured from Australian suppliers, specifically the Australian Government Munitions Factories. In 1985-86, 68 percent by value of total purchases of ammunition were from Defence factories. Table 5.2 shows each Service's annual outlays on ammunition between 1980-81 and 1985-86 by major method of procurement. With 75 per cent of annual outlays on ammunition purchased from Defence factories Army is the most dependent on this source. Defence factories are also the major source of high use, standard types of ammunition.[21]

5.34 Because of the importance of the government munitions factories and their relationship to the Department of Defence, the Committee decided to concentrate its attention on the issue of whether there was scope for reducing delivery delays and production lead times within the munitions factories. There seemed to be two means by which delays and lead times could be reduced, by better forecasting of customer requirements and consequently better planning of factory workloads and by improving the efficiency of the factories themselves.

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19. Minutes of Evidence, op cit, pages 507-508.
20. Ibid, page 680.
21. Ibid.

TABLE 5.2 Outlays on Ammunition[1] by Method of Procurement by Service: 1980/81 to 1985/86

Percentage of total Service outlays

	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
Australian Government Factories						
Navy	28.7	54.7	46.1	48.1	46.8	54.2
Army	51.7	61.0	44.4	71.4	74.7	74.2
Air Force	62.7	81.8	55.1	61.1	24.1	46.3
Total	48.0	63.2	46.4	65.7	61.7	68.0
US Foreign Military Sales						
Navy	30.8	29.0	31.3	27.8	43.2	20.6
Army	7.5	9.2	13.2	7.5	5.4	9.3
Air Force	22.0	10.6	32.1	27.8	67.4	24.1
Total	14.8	14.0	19.6	13.9	22.1	13.1
Other						
Navy	40.4	16.2	22.5	24.0	10.0	25.2
Army	40.7	29.8	42.3	21.0	19.8	15.5
Air Force	15.2	7.5	12.8	11.1	8.4	29.6
Total	37.0	22.7	34.0	20.3	16.2	18.9

Note: 1. Appropriation Sub-Item 234-03, Weapons, Armaments, *Ammunition and Explosives*

Source: **Minutes of Evidence, op cit, page 1493.**

Forecasting Customer Requirements

5.35 The Chief of Supply conceded that there were:

> certain customer influences which create difficulties for the factories. Quite often the designs that are used have their origins in other countries and that limits the flexibility to make adjustments at the factories. Quality assurance standards are based on other countries' quality assurance, environments and practices. That can create difficulties for us in modifying the equipments for application in Australia. Less than optimum production runs also present difficulties to the factories because of the need to have frequent run-ups and the need to restart the learning curve. We are very much affected by that. Because of the longer lead time, we tend not to commit ourselves in the same terms that the factories would like, so that they can order equipment in advance, or prepare the production runs. So the customers themselves contribute to the difficulties.[22]

5.36 To co-ordinate the Services' forward requirements of ammunition and the munitions factories workloads the Department of Defence established in 1976 the Government Munitions Factory Workload Co-ordination Committee. The Committee, which includes the Service Directors-General of Supply and representatives of the Office of Defence Production, was given the task of establishing a five year forward ordering program by collating each of the Services ordering proposals and recommending variations to the phasing of their requirements to best accommodate both Service and factory needs. Prior to 1976 the three Services relied on factory estimates provided through the former Department of Supply in formulating budgets and forward estimates.[23]

5.37 The Chief of Supply told the Committee that:

> we are trying to get together with the factories in the Govenment Munitions Factory Workload Co-ordination Committee in order to have better forecasting of requirments, a certain amount of commitment to our longer term requirements so that the factories can be more efficient and meet our lead time requirements.[24]

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22. Minutes of Evidence, op cit, page 751.
23. Ibid, pages 1121, 1244-1255.
24. Ibid, page 681.

5.38 The Committee was concerned to note that, although the Government Munitions Factory Workload Co-ordination Committee has been in existence ten years, Defence is still trying to achieve 'a certain amount of commitment to (the Services') longer term requirements.' The Committee questioned why the Services had not been able to make better long term forecasts of their requirements given the relatively stable demand for ammunition (governed as it was by annual firing allowances). The Services needed to co-operate more with the factories to minimise the disruptions to delivery programs caused by changing customer priorities.

Production and Delivery Lead Times

5.39 The Committee asked whether the present lengthy production and delivery lead times of the munitions factories could be reduced by allowing the factories to purchase materials in advance of orders.

5.40 At present the munitions factories do not purchase material in advance or in anticipation of orders. The practice appeared to reflect funding priorities. The Department of Defence advised the Committee:

> 'any increase in the 'working capital' at a Defence factory for this or any other purpose will result in a reduction in some other area of Defence expenditure, with a resultant impact on other elements of the Defence program. As the total expenditure on the Services is the major component of Defence outlay, they will bear the major impact of such a redistribution of resources. It therefore becomes, as do all decisions in terms of changes in resource allocation within the Defence outlay, a matter of judgement by the customer (ie, the Service Office) as to the priority of reducing production lead times for some items by advance funding such material purchases compared with other competing demands for resources.'[25]

5.41 The Department noted other disadvantages with the factories purchasing materials in advance. 'If a technical defect in design or quality of materials is found a considerable loss may be experienced as the materials may not be suitable. Changes in product design or specification may also mean materials held are not required.'[26]

5.42 The Committee considered that the arguments advanced against the munitions factories purchasing materials in advance were not persuasive. The additional cost of purchasing and storing materials had to be weighed against the cost of additonal

25. Minutes of Evidence, page 1119.
26. Ibid, page 1119.

inventories to cover extended production and delivery lead times. The Committee questioned how the Defence factories could be managed on a business-like basis when necessary working capital was subject to overall Defence funding priorities. The problem of specification changes pointed to the need for better materials planning. This problem would not be significant if the Government Munitions Factory Workload Co-ordination Committee was functioning effectively. Quality problems did not constitute, in the Committee's view, an argument against advance purchases of material.

5.43 The Committee noted the inadequacies of current factory materials planning and scheduling and believed the introduction of a policy of advanced purchasing of material should be phased with the implementation of the computerised materials planning systems being introduced in a number of munitions factories.

Delivery Performance of the Government Munitions Factories

5.44 During the inquiry the Committee visited two Defence factories, the Small Arms Factory at Lithgow and the St Marys Munitions Filling Factory at St Marys. Factory managements informed the Committee that there was scope for improving their delivery performance. They identified technical problems associated with overseas designs, the late supply of materials and sub-contract items and poor scheduling of factory resources as the major sources of their difficulties.[27]

5.45 Limited information was available on the delivery performance of the government munitions factories. Since 1983-84 the Office of Defence Production has monitored factory performance on the basis of the dollar value of deliveries against the annual Operations Plan. These statistics exclude development orders and items whose delivery is affected by factors outside factory management control. Aggregate performance for all munitions factories (excluding the Albion Explosives Factory and the Mulwala Explosives Factory which operate as sub-contractors to the other munitions factories) was 70 per cent in 1983-84, 64 per cent in 1984-85 and 72 per cent in 1985-86.[28] Table 5.3 provides a breakdown of performance data for each of the munitions factories from 1983-84.

5.46 The Office of Defence Production advised the Committee that:

> aggregate 1985/86 factory performance was significantly influenced by AFF (Ammunition Factory Footscray) performance for small arms ammunition, where production was significantly disrupted by the installation and commissioning of new major plant.

27. Briefings, Small Arms Factory, Lithgow, 30 May 1986 and Munitions Filling Factory, St Marys, 30 May 1986.
28. Minutes of Evidence, op cit, page 1475.

TABLE 5.3 Delivery Performance Government Munitions Factories: 1983-84 to 1985-86

(Dollar value of orders delivered on time as a percentage of total order value)

	Small Arms Factory	Ordnance Factory Bendigo	Ordnance Factory Maribyrnong	Explosive Factory Maribyrnong	Ammunition Factory Footscray	Munitions Filling Factory	Aggregate, Six Factories
1983/84	52	46	71	19	99	65	70
1984/85	85	53	69	54	90	58	64
1985/86	91	98	78	86	83	63	72

Source: Minutes of Evidence, op cit, page 1475.

> The performance of MFF (Munitions Filling Factory) tends to be lower than that of a number of other factories because of its dependence on the timely supply of components from a wide variety of sub-contractors, munitions factories and private industry. Consequently MFF is particularly vulnerable to shortages caused by factors outside the control of MFF management.
>
> The 1983/84 performance of EFM (Explosives Factory Maribyrnong) was adversely affected by disruption to production through transfer of a major product to MFF, as part of munitions rationalisation.[29]

5.47 Prior to 1983-84 when a more formal corporate planning process was commenced for munitions, performance was assessed in terms of achieving workload budgets and meeting technical (ie quality) requirements for Service orders.

5.48 The Committee believed that the overall delivery performance of the munitions factories was not good. It was encouraged by the introduction of corporate planning in the Office of Defence Production and the development of improved performance monitoring. The Committee considered that the Munitions Filling Factory could improve its delivery performance substantially. There were measures the factory could take to improve the delivery performance of its sub-contractors.

5.49 The First Assistant Secretary, Munitions, Department of Defence, told the Committee that 'there are difficulties in deliveries in any production organisation.'[30] There is a concern about long delivery lead times but not for all products.[31] Three major problem areas in the production of ammunition were identified:

- the use of overseas designs;
- the application of quality standards; and
- factory materials requirements planning.

5.50 The Committee was advised that:

> The items which are produced in government factories are produced, in the main, to overseas designs and specifications. They are produced to specifications which are very demanding in material characteristics and call up materials which are not available off the shelf. Many of them, indeed, are special materials in small

29. Minutes of Evidence, op cit, page 1475.
30. Ibid, page 750
31. Ibid, page 751.

> quantities which have to be made up for the particular purpose. If the subcontractors who are providing those items suffer difficulty in getting the raw materials or if there is difficulty in interpreting the quality of the aspects which should apply to those materials, you can suffer delays.[32]

5.51 The Committee was advised also that 'with many of the materials we use, particularly in the explosives area, the ability to identify whether or not an item does or does not meet the specification is fairly subjective.'[33] The First Assistant Secretary, Munitions added that:

> This interpretative problem is a very real one and we are in the process now of ensuring that, when we start major batches of items, the inspection staff, the production staff and the technical staff sit down and agree on what is the basis for the particular item to be inspected - what will be accepted and what will not be accepted. Remember that the quality people do not belong to the factory in the main; they are indeed the service quality staffs. Consequently it is very important that we identify clearly what will or will not be accepted. It has been - I will be quite frank - all too often during a production process that people have identified the changes that have occurred or have to occur and then people discuss the process through. Because of the nature of the item these delays can be long and hence they do impact on production. We have recognised this now and with our major orders we are sitting down and doing this identification first, ensuring - I am not saying we will be 100 percent accurate - that at least we will be a lot further down the path than we are now.[34]

5.52 The Office of Defence Production has made efforts to improve factory materials planning and scheduling. The Committee was informed that the Office was:

> alerted to the need to improve in this area some years ago and two factories right now are in the process of introducing a fairly sophisticated computer based system of scheduling and planning which identifies materials and componentry down to very fine detail of when they are required to

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32. Minutes of Evidence, op cit, pages 753-754.
33. Ibid, pages 754-755.
34. Ibid, pages 754-755.

achieve certain delivery schedules. They also will enable us to identify what slack we have in a particular provision, in other words, identify the items which are on the critical path. This will now be available readily to the factory management staff to enable us, when there are delays, incurred for whatever reason, to talk to the customer, to identify what the delays are liable to be, to identify what rescheduling is possible, to identify what alternatives he would rather have. It may well be that a part batch can be provided whereas a full batch cannot be provided. Many of the orders are large in number and delivery is spread over 12 to 18 months, sometimes. We may well have sufficient materials for a part of the order as opposed to the whole of it.[35]

5.53 The Committee questioned the continued use of subjective quality standards in the manufacture of ammunition and the requirement for extensive audits of factory quality control systems by the single-Service Quality Assurance authorities.

5.54 The Department of Defence told the Committee that:

> there are for most items of explosive stores some standards which practicably can only be, or are best, defined and assessed subjectively employing sensory methods. These include such standards as colour, stains, burrs, surface blemishes, some radiographic criteria, etc. Again, these standards are normally established on the basis of what is achievable by Australian production. In cases of doubt or dispute, reference to the country of design origin or local experts (for example Materials Research Laboratory) is usually made to ascertain the standards which should be applied.[36]

5.55 As local manufacture of explosive stores is mainly to designs of other countries, the range and nature of subjective standards applied for Australian production is comparable to those applied in the factories of the countries of design origin. Army considered that instances of non-agreement had been few and far between. Navy advised that most problems are resolved at the pilot lot production stage. Production may be held up, especially if production does not meet the agreed initial specification.[37]

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35. Minutes of Evidence, op cit, pages 754-755.
36. Ibid, page 1124.
37. Ibid, pages 1124-1126.

5.56 With respect to Service Quality Assurance procedures the Department advised that:

> A supplier's quality system is assessed and accredited as conforming to AS1821, AS1822 or AS1823, Suppliers Quality System, to obtain confidence that the implemented system provides for the control of the product through all stages of the production cycle. Assessments are essentially historical in nature in that they related to the quality capability of the supplier at the time of assessment. Therefore to ensure continued effectiveness of the system and that the quality control measures are adequate and correctly applied it has been found necessary to conduct periodic system audits. Additionally, during production, product verification may be employed as a means of evaluating the efficiency of the quality system.
>
> The level and frequency of these quality assurance activities, depend on:
>
> (i) complexity and criticality of the suppliers;
>
> (ii) demonstrated capability of the supplier in the Class of suppliers; and
>
> (iii) past quality performance of the supplier.
>
> These practices have evolved over the years and are in accord with quality assurance practices currently employed overseas by USA, UK and other NATO countries.[38]

5.57 In general, the work undertaken for the Department of Defence in Defence factories is of a type for which a quality system satisfying AS1822 is appropriate. Not all Government munitions factories have been qualified yet to AS1822 standards.[39]

5.58 The Committee is concerned that subjective quality standards continue to be applied in explosive manufacture with the attendant risks of delayed production should disagreement arise between factory management and the Service quality staff. The Committee was surprised that 'stains, burrs, surface blemishes' could be assessed only subjectively.

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38. Minutes of Evidence, op cit, page 1128.
39. Ibid, page 1128.

5.59 Objective quality standards have replaced subjective standards in the manufacture of other products. The Committee's concern was heightened by the apparent disagreement between the Office of Defence Production and the Services, particularly Army, as to the significance of the problem.

5.60 The Committee also questioned the need for further checking of factory quality control systems where the factory had been qualified to Australian standards and was audited annually. Army considered that 'a single annual audit ... (is) inadequate to provide confidence of continued compliance with contract requirements ... The intensity of auditing depends upon the confidence held by the (Quality Assurance Representative) in the adequate application of both the base QC system and the specific-to-product QC plans.'[40] In the Committee's view, if the initial assessment and annual audits do not provide the appropriate level of assurance, the supplier should not be qualified.

Summary of Findings

5.61 The Committee found that each of the Services had experienced significant shortages of ammunition and that these shortages had affected the achievement of the Services' annual training and exercise programs. Most significantly, Navy had experienced major shortages.

5.62 For the most part, ammunition shortages had resulted from procurement problems, in particular contracting delays, and production and delivery delays.

5.63 The Committee also noted very long lead times associated with determining ammunition requirements, placing orders and producing and delivering ammunition. Production and delivery lead times for ammunition purchased from the Government munitions factories appeared excessive.

5.64 Lengthy provisioning lead times seemed to reflect the Services' reliance on manual processes for managing their ammunition inventories. Navy and Army are in the process of developing computer-based inventory management systems. Because of the problems of lack of commonality that the Committee identified in respect of spares, the Committee considered that joint development of EDP systems for the Services' ammunition inventories was required.

5.65 *Contracting lead time issues have been addressed in* Chapter 7.

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40. Minutes of Evidence, op cit, page 1129.

5.66 Production delays and lengthy production and delivery lead times at the government munitions factories reflected two problems:

(1) difficulties in forecasting the Services' requirements and hence planning factory workloads; and

(2) the unsatisfactory delivery performance of the factories themselves.

5.67 The Committee believed that existing workload planning processes for the munitions factories could be substantially improved to allow the factories to purchase material in advance of orders. At the moment the factories generally purchase on the basis of orders received. Better planning will require a greater degree of commitment from the Services as to their future requirements and a lesser willingness to change their ordering priorities.

5.68 The delivery performance of the munitions factories was not good. The Committee noted inadequacies in factory materials planning and scheduling and inefficient quality assurance procedures. A number of factories were in the process of introducing computerised materials planning systems although much work had still to be done.

5.69 The munitions factories have experienced problems arising from:

(1) the use of subjective quality standards for ammunition components and subsequent difficulties in obtaining acceptances from the Services; and

(2) the high level of auditing by the Service Quality Assurance authorities.

5.70 There was a need for greater co-operation between the factories and the Services to resolve these apparently longstanding problems. The Committee found it difficult to accept the continued application of subjective quality standards. The level of Service quality assurance auditing activity was unwarranted.

5.71 The Committee has elsewhere reported adversely on aspects of the financial management of the government munitions factories.[41] Also, the Auditor-General has made repeated criticisms of the factories financial accounting over a number of years.[42] In view of these and the other noted concerns the Committee believes that the Office of Defence Production needs to take major measures to improve the general quality of factory management and factory management information systems.

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41. JPCPA Report 242: Munitions Production Trust Account.
42. Report of the Auditor-General, April 1985, pages 22-25.
Report of the Auditor-General, September 1985, pages 27-29.
Report of the Auditor-General, March 1986, pages 46-48.
Report of the Auditor-General, September 1986, pages 46-47.

Recommendations

5.72 The Committee recommends that the Department of Defence:

5. institutes a uniform policy on the level of supply margins for major munitions items;

6. establishes a joint project to plan and supervise the computerisation of the Services' ammunition inventory management systems;

7. urgently reviews the operation of the Government Munitions Factory Workload Co-ordination Committee with a view to allowing more economic production runs and minimising the disruptions to delivery programs caused by changing customer priorities;

8. takes major steps to improve the quality of factory management and bring the supporting management information systems up to an acceptable level;

9. allows the government munitions factories to purchase materials in advance or in anticipation of orders after the successful introduction into the factories of computer-based materials planning systems;

10. undertakes a study to develop objective quality standards to replace existing subjective quality standards in ammunition manufacture; and

11. promulgates uniform Defence Quality Assurance policies which minimise the undertaking of additional audits of suppliers where those suppliers have been assessed as meeting the appropriate Australian Standard and whose quality control systems are audited on an annual basis.

CHAPTER 6

ECONOMY IN INVENTORY HOLDINGS

- The Committee's Approach
- Reducing the Size of the Inventory
  - Excess Stocks
  - Rationalisation of the Inventory
- Minimising Wastage
- Reducing Unit Warehousing Costs
  - Warehousing Technologies
  - Service - Civilian Staffing Ratios
  - Rationalising Warehousing Facilities
  - Single-Service Management
- Summary of Findings
- Recommendations

The Committee's Approach

6.1 The preceeding Chapters have attempted to assess whether the supply of spares and ammunition is sufficient to meet the Services' authorised operational and training objectives and has considered ways of improving the effectiveness of supply support. This Chapter examines whether stocks of spares and ammunition may, in some cases, be excessive and considers ways in which the size of the Services' inventories and the costs of holding them might be reduced while maintaining effective supply support.

6.2 Good inventory management needs to balance the level of customer service (effectiveness) and economy (ie the costs of providing that level of service).The costs of operating an inventory comprise:

- the costs of holding the inventory; and
- the costs of replenishing the inventory.

6.3 Inventory holding costs include the cost of the initial capital invested in the inventory and warehousing costs. The Department of Defence told the Committee that there is "no notional charge to the Defence budget on the interest cost of holding stocks but obviously that is a factor Defence must consider in the level of stocks it should hold."[1] Warehousing costs comprise the annual costs of storing, preserving, locating, packaging, issuing and disposing of stores. The costs of replenishing the inventory are the value of annual outlays on replacement stores and the costs of provisioning action. Replenishment costs are addressed in Chapter 7.

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1. Minutes of Evidence, op cit, page 700.

TABLE 6.1 Numbers of Catalogued and Stocked Lines in the Defence Spares and Ammunition Inventories[1]

	Number of Lines	
	Catalogued	Stocked[2]
Navy	764 790[3]	611 878
Army	331 500	183 779
Air Force	662 083[4]	609 037[4]
Total	1 758 373	1 404 694

Notes:
1. Includes ammunition and equipment and non-equipment related stores.
2. The number of lines for which stock accounts were maintained. The actual numbers of lines in the possession of the Services will be larger than this because many lines issued to units may no longer be carried in the stores inventory.
3. At 13 August 1986.
4. At 1 September 1986.

Source: Minutes of Evidence, op cit, pages 1402-1404.

6.4 The Committee considered three ways in which greater economy in inventory holding costs might be achievable; by reducing:

(1) the size of the inventory, ie the range and depth of stockholdings;

(2) wastage, ie losses in store; and

(3) unit warehousing costs.

6.5 Excessive stockholdings and inventory holding costs and disproportionate prices and order placement costs are not the only manifestations of inefficiency in supply support. Shortages of spares and ammunition can also impose additional costs through the cannibalisation of equipment, the use of expensive workaround measures (eg air freighting in parts from overseas) and the postponement of exercises and training. The Services were unable to provide the Committee with any information on the incidence and costs of these measures.[2]

Reducing the Size of the Inventory

6.6 At present there are more then 1.7 million line items catalogued (ie listed) in the stores and ammunition inventories of the three Services and over 1.4 million stocked lines. Table 6.1 gives a breakdown of the catalogued and stocked items in each of the Services' inventories.

6.7 The total value of the Services' spares and ammunition inventories was estimated by the Services at $3,555 million at 30 June 1986. Table 6.2 provides a dissection of the values of each of the Services' spares and ammunition inventories. Caution is required in the use of these estimates however. The inventories are valued at historical cost, ie estimated on the basis of the last posted purchase price. A large number of lines, especially ammunition items, were last purchased many years ago. For many of these items price records either do not exist or are outdated. The Services' supply EDP systems are not capable of determining the reliability of the cost estimates provided.[3]

6.8 Current stockholdings represent "sunk" costs. Any savings which can be achieved by reducing the level of current stocks will be in the form of reduced inventory holding costs and net disposal value. Greater savings lie in reducing the level of replacement purchases.

6.9 The Committee identified four possible ways in which current stockholdings might be reduced; by:

(1) reducing random or unexpected demands and re-supply lead times and hence the level of stock cover;

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2. Minutes of Evidence, op cit, pages 1058-1061.
3. Ibid, pages 1471-1472.

TABLE 6.2 Total Estimated Value of Defence Spares and Ammunitions Inventories by Service: 30 June 1986

$ million

Navy	1 270.0[1]
Army	1 186.0[2]
Air Force	1 099.0[3]
Total	3 555.0

Notes:
1. Value of Navy inventory includes both equipment and non-equipment related stores, but excludes retail inventories, ie stock holdings at base stores.
2. Value of Army inventory excludes repairable equipment-related stores.
3. Estimated value at 16 May 1986.

Source: Department of Defence, confidential submission, JPCPA file 1986/6/B4/7.

(2) reducing excess holdings, ie obsolete and surplus stocks;

(3) rationalising the inventory, ie reducing the number of lines carried; and

(4) using alternative spares support arrangements, for example contractor-provided maintenance, so avoiding the need to carry an inventory of spares for a particular equipment.

6.10 The Committee concentrated its attention on ways of minimising excess holdings and reducing the number of inventory lines. The scope for reducing unexpected demands and re-supply lead times was addressed in Chapters 4 and 5.

6.11 The Committee's decision not to examine alternative supply support arrangements should not be taken to mean that the Committee saw little scope for improvement in this area. Rather, the Committee could not, in the time available, do justice to such a complex issue. It is a issue which has received some attention within Defence. Army, in particular, was attempting to rely more on commercial sources. They told the Committee:

> We are also trying in the initial stages of procurement not to buy too much at all ... We only start providing these parts when we have justified to ourselves that we should be holding those items ourselves. As a recent example we have the recent scaling for the Mack truck.[4]

6.12 The question of placing Defence maintenance with industry was examined in a major internal review in 1980.[5] The report of the review recommended a set of principles to be applied in placing maintenance work with industry. Relative cost was considered to be only one factor. The Committee was told that the study's recommendations were not implemented.[6]

Excess Stocks

6.13 In the Committee's view, excess stocks comprised:

(1) obsolete stocks, ie those items which are no longer suitable for their designed purpose and are no longer in use;

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4. Minutes of Evidence, op cit, page 640.
5. Department of Defence, Supply and Support Organisation, Maintenance Repair and Overhaul of Service Equipment, Report by Working Group, January 1980 (Two Volumes) (classified document).
6. Minutes of Evidence, op cit, page 659.

(2) stocks in excess of anticipated requirements because of inaccurate initial provisioning; and

(3) stocks in excess of requirements because of, for example, reduced activity levels or hoarding.

6.14 Obsolete stores awaiting disposal were estimated to account for one per cent of each of the Services' stores inventories[7]. The Services do not collect statistics on the other types of excess stocks. They considered the level of surplus holdings to be very small because of the general financial restrictions on supply support and limited warehousing capacity.[8]

6.15 Each Service, however, monitors the level of inactive stock, ie stock for which there have been no issues for considerable periods. Among such stock may be obsolete or otherwise surplus items which could be disposed of. About 54 per cent of Navy stores had no recorded usage over the past four years. Thirty-four per cent of Army stores had no recorded usage over the past three years and 61 per cent of Air Force stores had no recorded usage over the past four years.[9]

6.16 The Services have different procedures for monitoring the levels of inactive stocks. Navy and Army undertake cyclic reviews which screen each item in their inventories at least once every few years. Navy has a three year cycle, Army a two year cycle. Air Force does not undertake cyclic reviews. The Services supply EDP systems have programs which allow the screening of the inventory to be done automatically.[10]

6.17 Air Force informed the Committee that the management of inactive items was manpower intensive and the identification of such items complex. 'Inactive (surplus) items are difficult to identify in an inventory which:

- includes large numbers of items subject to random and periodic usage;
- utilises initial production and cost benefits to procure items which would not be available during the later life of aircraft systems;
- seeks economies in procurement through the use of economic order quantities, economic production quantities and minimum order quantities; and
- is dependent on available manufacturer's data and projections of performance and usage to perform initial project spares assessments.'[11]

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7. Minutes of Evidence, op cit, pages 1061-1063.
8. Ibid, pages 608-611 and 639.
9. Ibid, pages 1061-1063, 1515-1516.
10. Ibid.
11. Ibid, 1062.

To this list of considerations Army added items which have an application only in wartime.

6.18 Air Force has under development, as an enhancement to its central supply EDP system, an Executive Level Computer Initiated Disposals system (ELCID) which will automate the selection and disposal of items which conform to a range of criteria. Air Force has already identified 10 per cent of its inventory as candidates for automated disposal.[12] The other Services have not undertaken similar exercises.

6.19 On the basis of the Air Force analysis it would seem that excess stockholdings represents a considerable proportion of the inventory. To a large extent, these excess holdings reflect the acknowledged difficulties of initial spares provisioning. This issue was addressed in Chapter 4. The accumulation of excess holdings may also reflect the conservatism of stores disposal procedures. At present stores items are not disposed of until it has been established that there is no further possible application for them. In a military environment a strong 'scavenger syndrome' may operate. The Committee noted similar behaviour in relation to Defence property (See JPCPA Report 261).

6.20 With the exception of Air Force the Services have not adequately addressed the issue of obsolete and surplus stocks. Managing such items is a labour intensive task which may not be always undertaken. Improvements in spares assessing should allow a greater degree of control over excess stockholdings. However, the Committee believed that Navy and Army should develop better procedures for monitoring excess stocks and that all Services should show less inclination retain stock which, although not obsolete, has only a remote chance of application.

6.21 The Committee also questioned whether there might be a significant incidence of hoarding by units, not measured by the level of inactive stocks. The Committee had no means of assessing the magnitude of hoarded stocks. The Services are unable to identify the level of retail or unit stockholdings because the coverage of their present supply EDP systems does not extend to this level. The management of retail or unit stores is the responsibility of the unit commander.[13] The Department of Defence told the Committee that it is 'a system presumption that such stocks ... are taken into use or expended within the short term.'[14] The Committee considered that, in a climate of shortages, there might be incentives for unit commanders to hoard stocks.

6.22 The Committee considered that hoarding could be discouraged and other excess stocks disposed of in a more timely fashion by introducing some user charge. At present stores are issued essentially 'free' to units. A charge based on inventory

12. Minutes of Evidence, op cit, page 1063.
13. Ibid, page 1065.
14. Ibid.

holding costs could be applied. The United States Navy operates a stock fund whereby customers pay for material used and obtain credits for material returned. There seems to be some merit in introducing such a 'closed loop' management system in the Australian Defence Force.

Rationalisation of the Inventory

6.23 In assessing the scope for reducing the range of inventory items the Committee focussed on:

- greater substitution of high cost, highly specified items with lower cost commercial items where possible; and
- reduced holdings of domestic items which could be procured directly by units.

6.24 The scope for greater substitution of highly specified items may be quite limited. Defence has a central codification and cataloguing system in which all items of supply, from screw drivers to radar receivers, are assigned a unique stock number and their physical description, performance specifications, manufacturers' stock numbers and price data recorded. The Department has invested considerable resources in cataloguing. The Defence Cataloguing Authority, located in Melbourne, employs about 170 staff and is the accredited national codification bureau.[15] The cataloguing system facilitates the identification of direct substitutes. Direct substitutes produced by different manufacturers will be assigned the same stock number. Also, if more than one Service uses a particular item the fact will be recorded at the cataloguing stage.

6.25 In the case of highly specified items the substitution of other items requires detailed engineering investigation on a case by case basis. It may be more cost effective to use the item authorised by the parent equipment manufacturer.This issue is considered further in Chapter 7.

6.26 Navy and Air Force supply EDP systems are linked to the central cataloguing EDP system (CENCAT), allowing stores demands to be validated against up to date cataloguing data. The Army supply EDP system, however, is not linked to CENCAT, limiting the timely input of cataloguing changes to Army's supply data base.[16]

6.27 By contrast, there appeared to be considerable scope for reducing holdings of domestic stores. The Chief of Supply told the Committee that there were about half a million of these items in the Defence inventory.[17] This represents 30 per cent of the Services' combined inventories. The Committee itself noted substantial numbers of domestic items in the stores depots it visited during the course of the Inquiry.

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15. Minutes of Evidence, op cit, pages 180, 220-233.
16. Ibid, pages 208-209.
17. Ibid, page 537.

6.28 Domestic items, by their nature, are available throughout much of Australia. The Committee questioned the need to manage centrally such items. Most domestic items could be purchased locally by units. Presently however, only about 15 per cent of Army total stores lines (40 per cent of consumable items), six percent of Air Force stores and one percent of Navy stores are purchased locally by stores depots and units.[18] It seemed to the Committee that there was considerable scope for extending local purchasing. This issue also is taken up in Chapter 7.

Minimising Wastage

6.29 Wastage arises in several ways, in the loss, theft and accidental damage of stores and in the deterioration in storage of goods with limited shelf-life. The Committee concentrated its attention on those stores with shelf-life restrictions ('lifed' items in Defence terminology).

6.30 At present one per cent of Navy's stores inventory is subject to shelf-life restrictions. Lifed items account for 2.5 per cent of the Air Force stores inventory. Army could not readily identify the level of its holdings of lifed items.[19]

6.31 Lifed items are separately identified in the Navy and Air Force supply EDP systems but there are no special computer programs to manage these items. Within Army lifed items are managed by manual processes. The Committee considered this an unsatisfactory situation. An enhancement of Army's central supply EDP system to allow a higher degree of control was planned to come on line in October 1986.[20]

6.32 With the exception of Air Force, the value of losses arising from lifed items deteriorating on the shelf does not appear significant. In 1985-86 Navy incurred losses totalling $53,000 due to the expiry of life in store. The situation was considered representative of recent years. The value of Army stores written off because of expiry of shelf life was $90,000 in 1985-86. Air Force also did not separately identify the value of losses from expiry of life in store but advised that all stores losses, including fair wear and tear, amounted to over $17.9 million in 1984-85. This figure includes the value of obsolete stores written off.[21] Air Force could not provide a breakdown of this figure within a reasonable timeframe.

6.33 The Committee concluded that Air Force needed to determine the value of wastage of lifed items in its stores inventory and revive the adequacy of its present monitoring and control system.

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18. Minutes of Evidence, op cit, pages 970, 1079.
19. Ibid, pages 1064-1065.
20. Ibid,
21. Ibid, pages 1018-1020.

Reducing Unit Warehousing Costs

6.34 Warehousing costs comprise the labour, facility and overhead costs incurred in maintaining the stores inventory, ie storage, preservation and repair, stock control, asset location, packaging, issue and disposal.

6.35 It is not possible to identify separately the annual costs of maintaining the Services' stores inventories. However, broad inventory holding cost factors have been estimated for the purposes of calculating economic order quantities (see Chapter 7). Army and Air Force use an inventory holding cost factor of ten per cent of purchase value. Navy has not developed an inventory holding cost factor because it does not apply economic order quantity principles.[22] A Navy Supply Division report recommended that Navy apply an inventory holding cost factor and that the Services agree to a common cost factor subject to annual review and adjustment.[23] The current Army inventory holding cost factor was set following a review in 1983. The present Air Force inventory holding cost factor has been maintained for some time because adjustment of the factor has only a minor impact on the economic order quantity calculation.[24] Applying these 'ball park' figures to the estimated value of the total Defence stores inventory gives a combined inventory holding cost of approximately $350 million per annum.

6.36 The Services have estimated that about 11,760 people are employed on a full-time equivalent basis in inventory maintenance. Table 6.3 gives a breakdown of service and civilian staff numbers engaged in the function in each of the Services.

6.37 The Committee identified four ways by which inventory inventory holding costs might possibly be reduced; by:

(1) improving warehousing technologies to reduce staffing levels or increase labour productivity;

(2) reducing labour costs by substituting civilian for service personnel;

(3) reducing facility costs by decreasing the number of stores sites; and

(4) reducing overhead costs by expanding the coverage of single-Service inventory management.

Warehousing Technologies

6.38 In its inspections of several stores depots the Committee noted the labour-intensive nature of warehousing operations and the limited investment in modern warehousing

22. Minutes of Evidence, op cit, pages 1418-1419, 1439.
23. Ibid, page 237.
24. Ibid, page 1419.

TABLE 6.3 Service and Civilian Personnel Engaged in Maintaining the Defence Stores Inventory by Service: August 1986

Full-time equivalent staff

	Service	Civilian	Total
Navy	356	1 995[1]	2 351
Army[2]	3 398	1 826	5 224
Air Force[2]	2 896	1 288	4 184
TOTAL	6 650	5 109	11 759

Notes: 1. Includes 43 part-time staff (counted as 22 full-time equivalents)

2. Includes staff engaged in maintaining general stores inventory (ie: non-equipment as well as equipment-related stores)

Source: Minutes of Evidence, op cit, pages 1419-1420.

technologies including computer support. The Committee saw examples of a number of modern warehousing systems at the Navy Supply Centre at Zetland in Sydney. However, some operations at Zetland seemed very labour intensive.

6.39 The Committee's perceptions were supported by the limited stores performance data available. The Department of Defence advised that between one and ten persons would be involved in the processing of straight-forward stores demands.[25] No data were available on the times taken to process stores demands, ie the time between the customer lodging a demand and the issue of stock from store. Stores operate to maximum processing time frames set by the Australian Standard Material Issue and Movement Priority System (AUSMIMPS). The standard processing times where stocks are held are listed in Table 6.4.

TABLE 6.4 Australian Standard Material Issue and Movement Priority System (AUSMIMPS)

Priority Level	Maximum Time Frame
1-3	24 hours
4-7	2 days
8-11	5 days
12-16	10 days

Source: Minutes of Evidence op cit, page 1078.

6.40 Navy inventory management appeared to suffer from a particular lack of EDP support.[26] Defence is also concerned about the reliability of Navy computer stock holding records.[27] These factors may explain the high level of manual by-passes of the Navy supply EDP system. The Committee Secretariat was told that 25 per cent of all Navy stores issues are processed manually.

6.41 Significant enhancements of depot and base level computer support are being implemented. The Committee believes that there is considerable scope for introducing other labour-saving technologies in inventory management; for example, in the use of bar coding and in materials handling technologies generally.

Service - Civilian Staffing Ratios

6.42 In total 57 per cent of inventory maintenance staff are service personnel. Service-civilian staffing ratios vary markedly among the Services, from 15 per cent in Navy to 69 per cent in Air Force (refer Table 6.3).

25. Minutes of Evidence, op cit, page 1078.
26. Department of Defence, Report of the SSRP Business Review Working Group, op cit (Classified document).
27. Minutes of Evidence, op cit, pages 183, 1068-1069.

6.43 The Committee questioned the justification for such high Service to civilian staffing ratios, particularly considering the significantly higher cost of Service personnel.

6.44 Defence costings made available to the Committee indicated that cost differentials between equivalent Service and civilian grades ranged between 11 and 59 per cent in terms of direct costs (ie salaries, allowances and net effective benefits - superannuation, sick, recreation and long service leave, workers' compensation, etc) and between 14 and 83 per cent in terms of full costs (ie direct costs plus administrative overheads and staff support costs).[28] Generally, the cost differentials were much greater at the lower grades.

6.45 The Department of Defence advised that 'any generalised comparative application of these costs should be approached with caution'.[29] There were a number of anomalies in the costings in the treatment of Service and civilian staff. As far as the Committee could ascertain however, these anomalies did not bias the costings one way or the other. Of course, care is needed in using the figures. They would need to be applied to the particular classification profiles of the supply organisations, taking account of the equivalence of skills. Since inventory management functions are largely performed by lower classified personnel with direct civilian equivalents, ie storemen, packers, clerks and plant operators, the overall Service-civilian cost differential would seem to be significant.

6.46 The Services defended present Service-civilian staffing ratios. The Department advised that 'cost is not always a major factor in determining whether a position is filled by a serviceman or a civilian.'[30] The basic question to be answered was whether performance of the job required knowledge of the profession of arms. Air Force, in particular, argued on the basis of the need for personnel available to work in combat areas. The Chief of Air Force Technical Services asserted the need 'to retain a reserve of deployable maintenance personnel. This is very necessary if we are to have Air Force operational flexibility.'[31]

6.47 The variation among the Services in service-civilian staffing ratios was explained in part by historical factors. Since the re-organisation of the Defence function in the mid 1970s there had been an ongoing review of the staffing of many Defence positions.[32] Simple comparisions of staff numbers also ignored the amount of contracting out that exists, especially in equipment maintenance.[33]

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28. Minutes of Evidence, op cit, pages 1176-1178.
29. Ibid, page 1178.
30. Ibid, page 605.
31. Ibid, page 599.
32. Ibid, pages 597-598,604.
33. Ibid, page 605.

6.48 The Committee was not persuaded by these arguments. Much of the Air Force argument related to maintenance not supply personnel. The Committee accepted the need for staff who could be readily deployed to combat areas. However, it found it difficult to accept that Air Force's service-civilian staffing ratios should be significantly higher than Army's (who could make a stronger claim to the redeployment argument) and several times higher than Navy's (who managed only a marginally more centralised supply organisation than Air Force, see Table 6.5 below). It may be that the Services are concerned about industrial relations issues. However, these issues were not raised in evidence. There would appear to be justification on military grounds for reducing service-civilian staffing ratios in that it would free more service personnel for military tasks. In any case, the military arguments for maintaining the present staffing ratios would need to be very strong to outweigh the large present cost disadvantage.

Rationalising Warehousing Facilities

6.49 Overall, the Services operate 81 stores and ammunition warehouse sites across the country. Table 6.5 provides a breakdown of the number of depot and base warehouse sites by Service.

TABLE 6.5 Number of Stores and Ammunition Warehouse Sites: by Service

	General Stores		Ammunition
	Depot/Wholesale	Base/Retail	
Navy	3	17	5
Army[1]		27	10
Air Force	4	14	1
TOTAL	7	58	16

Note: 1. Since the introduction of its central supply EDP system, Army has managed all its stores inventory at the one (retail) level.

Source: Minutes of Evidence, op cit, pages 1090-1092.

6.50 Table 6.5 understates the degree of geographical dispersion of warehouse sites. A number of the depots listed in the table include several geographically non-contiguous storage sites; for example, the 11 Supply Battalion in Brisbane operates from three widely dispersed sites in the Brisbane area (Meeandah, Banyo and Gaythorne).

6.51 The Committee asked whether significant savings in warehousing costs could be realised by reducing the number of warehouse sites.

6.52 An analysis of warehouse capacity utilisation rates for general stores suggested that there may be a number of base or retail stores in particular which were under-used. The data were limited. Depot capacity utilisation rates varied from 87 to 93 per cent in Navy and from 66 to 99 per cent in Air Force. Only Navy could provide capacity utilisation rates for base or retail level stores. Navy's ranged from 35 to 100 per cent. Army's capacity utilisation rate for all its general stores depots averaged 87 per cent.[34] Ammunition storage capacity utilisation has not been examined since ammunition is subject to unique storage requirements which restrict ammunition stores to less than full capacity.[35]

6.53 Army told the Committee that they had undertaken a study aimed at rationalising their stores depots about ten years ago. As a result of that study, five depots had been closed.[36] The Department of Defence advised that it was looking at the feasibility of single-Service management of warehousing, particularly in major urban centres. Under this arrangement one Service would be responsible for all warehousing in a particular centre. The study had not progressed, however, because of other priorities and the Committee was informed it may be some time before it would proceed.[37]

6.54 The Committee believed there was considerable merit in single-Service management of warehousing in major urban centres and expressed disappointment that Defence had seen fit not to pursue this initiative.

6.55 The Committee briefly considered the issue of economies in relocating warehouses to geographically more advantageous sites. Savings in transport and other locational costs would need to justify the capital costs involved. Navy considered they had a problem with urban encroachment on a number of depots in the Sydney area and had drafted plans to relocate certain depots to Jervis Bay.[38] The Committee questioned, for example, the locational advantages of the Air Forces' Number 7 Stores Depot in Toowoomba, Queensland.

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34. Minutes of Evidence, op cit, pages 1092-1093.
35. Ibid, page 1091, 1093.
36. Ibid, pages 678-679,681.
37. Ibid, pages 674-675.
38. Briefing, Headquarters, Naval Support Command, Sydney, 23 April 1986.

Single-Service Management

6.56 Single-Service management (Single Service Logistic Management - SSLM - in Defence terminology) relates to both inventory maintenance and provisioning functions and offers the possibility of reducing both inventory holding costs and replenishment costs. Under SSLM one Service is designated the sole manager of a particular item or group of items which have a common application; for example, small arms ammunition for all the Services is managed by Army and Air Force manage a range of aircraft spares for Navy and Army.

6.57 SSLM is one of a number of methods of managing common application stores. One alternative, local purchasing has been discussed. Another alternative, the establishment of a fourth supply organisation, has been adopted by some countries; for example, the United States Defence Logistics Agency.[39]

6.58 In the Australian Defence Force, SSLM has been in existence for over ten years and there appears to be considerable scope for extending its coverage. The Department of Defence could not precisely identify the number of inventory items subject to SSLM but it estimated the total at between 10 and 15 per cent of the inventory.[40]

6.59 The Chief of Supply and Support told the Committee that 'while we have a considerable number of items; it is a fairly small proportion of the total. In the United Kingdom, the Defence organisation has done quite a lot of work to try to produce a much higher proportion of its inventory on single-Service management. We would like to move the same way where it is feasible.'[41] The Department was undertaking a thorough review of the scope for more SSLM.

6.60 At present SSLM is instigated at the initiative of the individual Services and SSLM agreements are negotiated between the Service organisations. According to the Chief of Supply, the Services are now volunteering items for SSLM. There has been also a move among the Services to consider SSLM at the time of the initial purchase of parent equipment.[42]

6.61 The Committee noted the increasing emphasis being given to single-Service management after what appeared to be a slow start. It questioned why the Defence Logistic Organisation had not taken the initiative in pursuing SSLM. The issue of greater commonality is considered further in Chapter 8.

Summary of Findings

6.62 Notwithstanding significant supply shortages the Committee found there existed substantial scope for reducing the size and cost of the Defence stores inventory. The level of savings could not be quantified.

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39. Minutes of Evidence, op cit, pages 535-539.
40. Ibid, page 969.
41. Ibid, page 537.
42. Ibid, pages 537-540.

6.63 The Services' inventory contained high levels of inactive stocks which should be more closely monitored for possible disposal action. They also contained high levels of domestic items which could be better managed by units using local purchasing arrangements. Although there appeared to be benefit in hastening disposal action, the major scope for savings lay in reduced levels of replenishment provisioning.

6.64 The Committee also found that warehousing costs could be significantly reduced. Staffing levels at stores depots could be reduced and labour productivity increased by the introduction of modern warehousing technologies. Productivity could be improved also by better computer support, particularly at Navy depots. There were substantial opportunities to reduce labour costs by substituting civilian for service personnel thereby freeing service personnel, for more military tasks. There appeared to be considerable savings to be achieved by introducing single-Service management of warehousing in major urban centres.

6.65 The Committee made a number of recommendations aimed at increasing the timely disposal of excess stocks, reducing the range of items carried and reducing unit warehousing costs.

Recommendations

6.66 The Committee recommends that:

12.(a) Navy and Army undertake an in-depth review of their inactive stocks to better identify candidates for disposal possibly using the recent Air Force study as a model;

(b) Navy and Army give consideration to developing automated inventory screening and disposal management EDP systems similar to the Air Force ELCID system;

13 the Department of Defence considers implementing a scale of inventory holding charges whereby customers would be debited for material used and be credited for material returned;

14 Air Force determines the level of wastage of lifed items in its stores inventory and reviews the adequacy of its present monitoring and control system;

15 the Department of Defence undertakes a major study to identify domestic stores in the Services' centrally-managed inventories as candidates for local procurement or single-Service management with the ultimate object of achieving major reductions in the numbers of items carried in the Services' inventories;

16 the Department of Defence evaluates existing Service warehousing technologies to ascertain the scope for improved labour productivity and/or reduced staffing levels in stores depots;

17 Navy assigns greater priority to the enhancement of computer support to its stores depots with a view to improving the accuracy of stockholding records and reducing the costly by-passing the computer systems by manual stores demands;

18 Air Force and Army take major steps to reduce the number of service personnel engaged in inventory mangement; and

19 the Department of Defence re-commences, as a matter of priority, its study of single-Service management of warehousing.

CHAPTER 7

VALUE FOR MONEY IN REPLENISHMENT PROVISIONING

- Introduction
- Spare Parts Prices
- Use of US Foreign Military Sales Arrangements
- Economic Order Quantities
- Order Placement Costs
  - Requirement Determination Lead Times
  - Contracting Lead Times
  - Direct Purchasing
    - Public Tender Threshold
    - Local Purchases
    - Defence Minor Purchasing System

Introduction

7.1 This Chapter considers ways in which the direct and indirect costs of replenishment provisioning, ie the prices paid for replacement spares and ammunition and the costs of determining requirements and placing orders, might be reduced. The Chapter focusses on replenishment provisioning because most of the issues concerning initial spares and ammunition support were addressed in the Committee's Review of Defence Project Management.[1]

7.2 Economy in replenishment provisioning requires that these direct and indirect order costs be considered together. For example, the use of the public tender process to foster competition to minimise prices will involve substantial order placement costs. Similarly, increasing orders quantities to take advantage of quantity-related price discounts needs to considered against the additional inventory holding costs incurred.

7.3 Economy is not the only objective of Defence purchasing. Purchases of spares and ammunition will be subject to financial and accounting regulations designed to ensure probity and fair dealing in the expenditure of public money. Stringent requirements for accountability can impose considerable costs.[2] Commonwealth government policies of assistance to Australian industry; for example, the Australian/New Zealand Preference Policy and the Australian Industry Participation Policy constrain the application of the principle of best value for money.[3]

7.4 The Committee addressed the question of economy in provisioning by considering four areas of inquiry:

(1) the prices paid for spare parts;

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1. JPCPA Report 243, op cit, Chapters 6 and 8.
2. Minutes of Evidence, op cit, pages 763-764.
3. Ibid, pages 144,150,160 and 162.

TABLE 7.1 Outlays on Spares by Method of Procurement by Service: 1980-81 to 1985-86[1] (Percent)

	Navy[2]	Army	Air Force[3]
Australia			
Direct Purchases - Local (ie stores depots, units)	6.1	20.1	15.1
- Central (HQSC)	32.9	4.0	6.7
Public tender	13.9	11.4	15.7
Period contract	12.2	9.9	21.1
Government Factories	(3.7)[4]	12.4	-
Other	3.7	-	-
Overseas			
US Foreign Military Sales	7.6	14.3	22.1
Other	23.7	28.1	19.3
Total	100.0	100.0	100.0

Notes:
1. Air Force figures cover 1983-84 to 1985-86 only
2. Includes outlays on repairs and office requisites
3. Annual new obligations
4. Included in 'direct purchases' and 'period contracts'

Sources: **Minutes of Evidence**, op cit, pages 1021-1022, 1031
Department of Defence, Confidential Submission, JPCPA File 1986/6/B4/7

(2) the use of US Foreign Military Sales (FMS) arrangements;

(3) the application of economic order quantity principles; and

(4) the scope for minimising order placement costs.

Spare Parts Prices

7.5 The Department of Defence told the Committee that 'experience in Australia and overseas supports the conclusion that competition is the best method of ensuring economy in purchasing.'[4] In Commonwealth purchasing, public tendering has been the traditional means of obtaining competitive prices.

7.6 A variety of methods of procurement are used in the provisioning of spares and ammunition, including direct purchases, public tenders, period contracts, standardised purchasing arrangements with the government factories and commercial firms and government to government purchasing arrangements. Details of Service outlays on spares and ammunition by method of procurement are limited. Table 7.1 provides a partial breakdown of outlays on spares by method of procurement by Service for the years 1980-81 to 1985-86. Over this period there were significant variations in the relative importance of particular methods of procurement, particularly overseas non-FMS purchases. A similar breakdown of outlays on ammunition was provided in Chapter 5 in Table 5.2.

7.7 The method of procurement adopted will depend on Government policies and a number of factors of which price is only one. Strategic considerations (for example, the need for an in-country manufacturing capability), urgency of need, product quality considerations, the policies of foreign governments regarding arms exports and the uniqueness of the parent equipment will also decide the method of procurement.

7.8 The Committee was concerned that a number of purchasing arrangements including period contracts, tied purchasing arrangements such as with the Office of Defence Production factories and US Foreign Military Sales arrangements, might not be conducive to competitive pricing. As Table 7.1 shows, the value of purchases made under these arrangements is very significant. Period contract purchases, on average accounted for between 10 and 21 percent of Service outlays on spares and FMS purchases, between 8 and 22 percent of Service outlays on spares. Government factories were significant suppliers of Army spares, accounting for, on average, 12 percent of Army outlays on spares over this period.

7.9 Overall prices for spares and ammunition appear to have increased at a higher rate than prices of other comparable goods over the past six years. Table 7.2 describes the movement in price indices for replacement stores and ammunition for each of

4. Minutes of Evidence, op cit, pages 1103.

TABLE 7.2 Movement in Price Indices for Replacement Stores and Ammunition: 1980-81 to 1985-86 (1980-81 = 1.000)

(a) Replacement Stores[1]

	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86
Navy	1.000	1.063	1.202	1.232	1.432	1.589
Army	1.000	1.128	1.255	1.274	1.388	1.521
Air Force	1.000	1 110	1 292	1.322	1.367	1.512

(b) Weapons, armaments, ammunition and explosives[2]

Navy	1.000	1.096	1.255	1.318	1.467	1.597
Army	1.000	1.086	1.196	1.300	1.449	1.916
Air Force	1.000	1.116	1.266	1.304	1.546	1.708

Notes: 1. Appropriation Item 234-06

2. Appropriation Item 234-03

Source: Minutes of Evidence, op cit. page 1486

the Services between 1980-81 and 1985-86. These indices were compiled by the Department of Defence. The price indices for replacement stores relates to all stores including personnel-related stores. Over the six year period the price indices for replacement stores grew between 51 and 59 percent and the price indices for ammunition between 60 and 92 percent. In contrast, the rate of growth of the GDP Deflator for Gross Public Fixed Capital Expenditure over the same period was 58 percent and in the GDP Deflator for Gross Private Fixed Capital Expenditure, 50 percent.[5]

7.10 During the Inquiry the Committee obtained, in confidence, evidence of over-pricing of spares for two major equipment items. For one particular purchase the total price paid to a Defence contractor for a randomly selected sample of spares was nearly 13 times the total price of identical items available from retail sources. Time did not permit the Committee to extend its investigations to ascertain the extent of this apparent over-pricing of parts.

7.11 The Department of Defence believed that comparisions with the prices of similar commercial products did not necessarily mean over-charging by suppliers. Many items with a military application were required to meet performance standards exceeding those acceptable to commercial industry. Defence was prepared to pay for the necessary assurance that spare parts met specifications. The suppliers of off-the-shelf commercial products could not always provide that assurance.

7.12 Air Force informed the Committee that:

> Many spares items which are ... subject to the design criteria and specifications of a parent (prime) manufacturer or the actual (true) manufacturer can be obtained from other manufacturing sources or commercial outlets. However, the items available from the 'other' manufacturers do not necessarily meet the original manufacturer's design specification for performance and reliability of the equipment. A 'Certificate of conformance' to the design specifications and production quality control requirements may not be available for such items which, although suitable for lower risk applications, could place space/aeronautical/military communication equipment performance and the lives of personnel in jeopardy. The supply of unlisted electronic components, manufactured in Taiwan as qualified products to space and aeronautical manufacturer is a matter of continuing action in the USA.[6]

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5. Australian Bureau of Statistics, Quarterly Estimates of National Income and Expenditure, June Quarter 1986 (ABS Catalogue No 5206.0)
6. Minutes of Evidence, op cit, page 1138.

7.13 In the Committee's view, higher prices for Defence spares reflected the operation of several factors:

(1) the cost of documented assurance that an item met specification;

(2) the reliance on prime manufacturers for that assurance; and

(3) the high costs of identifying:

(a) the actual manufacturers of the parts or other suppliers; and

(b) substitute parts.

7.14 Documented assurance of conformance with specifications involved what the Services termed 'qualification' and 'traceability'. Qualification referred to the testing and qualification of materials and production processes which are usually undertaken in the development and initial production stages. Traceability refers to the documentary evidence that an item could be sourced to qualified materials and production processes. The Committee was informed that qualification could involve an initial purchase price premium of up to 500 percent and traceability a price mark-up of between five and ten percent.[7]

7.15 Even on Defence estimates, qualification and traceability accounted for only a fraction of the observed price differential in the Committee's sample. In the Committee's view the size of the price differential indicated an opportunity for unethical dealing and was of considerable concern.

7.16 The manufacturers of parent equipment also placed a mark-up on items manufactured by their sub-contractors. This mark-up includes a charge for qualification and traceability. According to the Department of Defence, 'the cost difference between procuring a spare part from the prime manufacturer or vendor and procurement direct from the actual manufacturer can be as high as 600 percent when testing is required and a mark-up of 300 percent is common.'[8] Although there were real and acceptable costs covered by the mark-ups of prime manufacturers, the size of *the mark-up warranted serious investigation.*

7.17 Because of the high price premium Air Force has a policy of purchasing from the approved or qualified source manufacturer wherever possible. One of the tasks of the initial spares assessment team is to obtain the necessary information from prime contractors to identify their suppliers. Contracts will usually specify that this information be made available.

7. **Minutes of Evidence**, op cit, page 879.
8. Department of Defence, Source Selection for the Procurement of Equipment and Stores from the USA and Canada, DI (G) SUP14-3, November 1983, paragraph 8.

This so called 'breakout' policy is being pursued by the US Department of Defence following considerable publicity about the issue.

7.18 Not all the Services pursue a break out policy however. The Chief Superintendent of Supply, Naval Support Command told the Committee:

> Where it is an equipment-related item I think by a large majority we would go to the parent equipment manufacturer for the sourcing of that item. As to some of the reasons for that ... the manpower intensive nature of these purchases enters into it and where you are comfronted with a purchase of an item which is usually sophisticated and to a tight specification it is easier, manpower - wise, to quote a part number or a stock number and go to the parent equipment manufacturer ...[9]

7.19 Army's practice was not ascertained. However, Army had elsewhere advised the Committee of their endeavours to use commercially available equipment and spares support.[10]

7.20 The Committee accepted that the Services needed to compare the savings to be achieved by sourcing spares from the actual manufacturer with the additional costs of the effort involved; for example, inventory holding costs and transport costs. However, the Committee believed that Navy, for one, relied too much on prime manufacturers for spares support and as a consequence may be paying too much for spares.

7.21 Reliance on single suppliers may be forced upon all Services by:

- equipment warranties tied to purchases of spares authorised by the manufacturer; and
- the difficulties of qualifying alternative, particularly local suppliers.[11]

7.22 The identification of substitute items is also difficult. Replenishment provisioning is based on a stock number specification. Under the Defence cataloguing system items purchased meeting a certain physical discription and performance specification are assigned a unique stock number. As noted in Chapter 6, the identification of technical substitutes requires a detailed engineering assessment. The Service may not always see this effort as cost effective. The Chief of Logistics, Air Force Support Command stated that:

> For the sake of airworthiness and other factors, ... unless you are in the position of being able to break down a part number and establish very

9. Minutes of Evidence, op cit, pages 872.
10. See Chapter 6.
11. Minutes of Evidence, op cit, 689-870.

clearly that it is something you can buy down the street for a few cents, then you are in a position of having to support the qualified item. Most of the items we buy are qualified, particularly those of a technical nature, and we tend to go to particular source, if that is the only known source availability, or if it is a market place item then we control the item through the specification, the part number detail, manufacturer detail and things like that'[12].

7.23 Air Force acknowledged nonetheless that 'there are a large number of (highly specified) items which are commercially available to military specifications and are not unduly pricey.'[13] Air Force appeared to acknowledge also that more effort could be applied towards identifying low cost, commercial substitutes. Air Force told the Committee that its equipment configuration management system, which was not fully developed, 'utilises appropriate item codification data to determine any restrictions or exclusions necessary in procuring an item ... The correct use of the data will ensure that highly specified and costly items are not purchased when a commercially available standard is acceptable for the application.'[14]

7.24 The Committee considered that insufficient effort had been made in the past to specify lower cost commercial spares whenever possible. The Committee believed that such a policy could achieve substantial savings in spares support and was interested to follow-up progress with the Air Force initiative.

7.25 Where no substitute items or alternative suppliers were available, prices needed to be closely monitored and assessed. The Committee's evidence suggested that in some non-competitive situations the Services were being over-charged. The Committee asked therefore how prices for items purchased under 'tied' arrangements were monitored.

7.26 Most non-competitive quotations above the public tender threshold are subject to formal cost investigation by the Defence Contracting Organisation. Formal cost investigation is not carried out if the value of the requirement is less than $30,000 or if knowledge of previous prices paid or the tenderers' past history recommends against it. The Department of Defence estimated that about 75 percent of single-source quotations are referred for formal cost investigation.[15] The practice regarding purchases below the public tender threshold was not ascertained. The Committee noted that the value of direct purchases of spares exceeded the value of purchases of spares through public tendering. Cost investigation appeared to be the responsibility of the purchaser, ie the Support/Logistic Command, stores depot or unit.

12. Minutes of Evidence, op cit, 872-873.
13. Ibid, page 874.
14. Ibid, page 1143.
15. Ibid, page 1136.

7.27 The Committee concluded that:

(1) some suppliers are charging excess prices on spares;

(2) the Services have not been adequately monitoring spare parts prices especially to ascertain exactly what they are paying for qualification and traceability;

(3) Navy in particular is not doing enough to avoid reliance on prime equipment manufacturers for supply support; and

(4) the Services have not given sufficient attention to identifying lower cost commercially available substitutes.

7.28 The Committee acknowledged Air Force efforts towards 'breaking out' spare parts sourcing and towards developing engineering management systems that would identify commercial substitutes. The other Services, especially Navy, could do well to follow the Air Force example.

Use of US Foreign Military Sales Arrangements

7.29 In 1985-86 FMS purchases comprised 18 percent of total outlays on spares and ammunition. The relative use of FMS has varied among the Services over recent years but generally Air Force and Navy have made much more use of this purchasing channel than Army.[16]

7.30 There are three purchasing options under FMS:

- Co-operative Logistic Supply Support Arrangements (CLSSA);
- Direct Requisitioning Procedures (DRP); and
- Firm Order Cases.

7.31 The Department of Defence advised the Committee that:

> Of the three, CLSSA provides the highest degree of assurance of supply, since Australia has a definable investment in the US Department of Defence inventory and, having regard to priorities, has equal access to that inventory, along with the US Services, for support of the nominated end items of equipment of major weapons systems. DRP procedures allow access to US stocks only so long as their holdings are above their

16. Minutes of Evidence, op cit, pages 1492, 1494.

re-order point level, while the Firm Order Case approach requires placement of a commercial type order by the US DOD, acting essentially as an agent of Australia.[17]

7.32 The Department could not provide a breakdown of FMS outlays by type of case but CLSSA appears to be the major channel of FMS purchases of spares and ammunition.[18] At mid-September 1986, Defence payments to establish an Australian investment in the US Department of Defence logistics system totalled $38.3 million.[19]

7.33 According to Air Force most FMS purchases involve low cost items. FMS purchases of Air Force spares accounted for 49 percent of line items purchased and 33 percent of dollars spent.[20]

7.34 FMS clients are charged the cost to the US of acquiring the item plus accessorial charges (currently averaging 8.7 percent of order value).[21] FMS administrative and contracting lead times appear to be significantly shorter than lead times for Australian and overseas commercial purchases. An Air Force study revealed average FMS lead times to be 36 percent of those for overseas commercial purchase orders, 24 percent of those for procurement demands (ie purchases through the Defence Contracting Organisation) and 42 percent of those for purchase orders (ie direct purchases).[22]

7.35 The typically shorter provisioning lead times for FMS - sourced items is also reflected in initial spares provisioning policies whereby two years requirements are purchased for FMS - sourced items and three years requirements for commercially-sourced items.[23]

7.36 However, the Department of Defence advised the Committee that:

> Whilst there are nominally many advantages flowing from the use of FMS arrangements (procedures) there is an increasing tendency towards commercial purchasing. Experience to date has provided evidence in certain cases of more satisfactory delivery and pricing schedules being obtained through direct commercial negotiation by staff of the Head of Australian Defence Staff in Washington.[24]

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17. Minutes of Evidence, op cit, pages 144-145.
18. Ibid, page 1256.
19. Ibid, page 1534.
20. Ibid, page 682.
21. Ibid, pages 1261,1340.
22. Briefing, Headquarters, Air Force Support Command, Melbourne, 19 May 1986.
23. Minutes of Evidence, op cit, page 155.
24. Ibid, page 145.

7.37 Among the difficulties with FMS purchases are that there is little prior knowledge of the price to be paid (clients are given an indicative price only) and the fact that the US government is reluctant to provide price data to allow cost comparisons between FMS and US commercial sources because of concern about being seen to be competing with US industry.[25]

7.38 The Committee discussed these and a number of other shortcomings in its Review of Defence Project Management.[26] The present inquiry confirmed the Committee's earlier expressed concerns.

7.39 Because sourcing replenishment purchases of spares and ammunition through FMS arrangements was a simple and well established routine, the Committee was concerned that FMS might be used too frequently to the exclusion of lower cost or local suppliers. The possibility appeared significant since most FMS - sourced purchases are for low cost items.[27]

7.40 The Committee's concern was re-enforced by the evidence of the Department of Defence. The Chief of Supply told the Committee.

> One of the problems faced by a person who receives a number of requests, if that item was originally sourced overseas and it is quite readily identified by its stock number, and given the staff shortages in Support Command, it is far easier for him and it is far more practical for him to place that order through FMS. If he were to delay placing that order through investigation of sources in Australia or to find a cheaper alternative in Australia, and find whether that person had the commercial and engineering capacity to take on the task, he would be adding to his task many fold ...[28]

7.41 The Department was concerned about this situation. The Chief of Supply stated that 'there is a member of the Defence Industry Division in Air Force Support Command to peruse the procurements that are straying overseas, or could be placed overseas, to ensure that they are all located in Australia. In the case of Army and Navy, I have been concerned for some time in the levels that could be going overseas and we have started some pilot studies with State development organisations to try to get a feel for just how much is going overseas which could be better sourced in Australia.'[29] The Committee did not ascertain what was involved in the Defence Industry Division's perusal nor what action had followed it.

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25. Minutes of Evidence, op cit, pages 862 and 1332.
26. JPCPA Report 243, paragraphs 6.51-6.57.
27. Minutes of Evidence, op cit, page 871.
28. Ibid, page 686.
29. Ibid, page 685.

7.42 Navy and Air Force informed the Committee they had experienced difficulty in interesting local industry in their requirements. The difficulty had arisen from a lack of manpower and time to research opportunities for Australian industry participation, problems experienced in obtaining the necessary manufacturing data from overseas owners and the limited scale of the Services' requirements. Air Force emphasised that 'local suppliers need to qualify components, preferably with the prime manufacturer, before we can really do business with them.'[30]

7.43 The Committee believed there had been insufficient monitoring of FMS and other overseas-sourced purchases of spares and ammunition. It was unsure as to what might be the best way of increasing the level of scrutinity without adding too much to administrative lead times. The Committee considered that the establishment of joint pilot studies with industry was a worthwhile initiative. It believes, however, that the Services have a problem in interesting local industry. The Department of Industry, Technology and Commerce and the State industry development authorities could provide assistance in identifying suitably qualified Australian suppliers.

Economic Order Quantities

7.44 The application of economic order quantity principles is a feature of efficient inventory management systems. The economic order quantity (EOQ) concept involves the setting of order quantities to minimise the indirect costs of the inventory, ie order placement costs and inventory holding costs. EOQ should be one of the factors used in determining replenishment quantities of stores and ammunition.

7.45 The EOQ concept should be distinguished from the economic order value and economic production quantity concepts which involve the maximisation of price discounts on orders placed.

7.46 EOQs are calculated by a formula which takes into account cost to order, annual average usage, unit price and storage cost. Procurement of too small a quantity will incur additional order placement costs which outweigh the consequent reduction in inventory holding costs. Conversely, procurement of too large a quantity will result in additional inventory holding costs which will outweigh the consequent reduction in order placement costs. The application of EOQ principles therefore will tend to result in low purchase value items being bought in larger quantities less frequently and high value items being bought in lesser quantities more frequently.[31]

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30. Minutes of Evidence, op cit, page 689.
31. Royal Australian Air Force, AAP907, Manual of Provisioning (Provisional), September 1975, Section 2, Chapter 6.

7.47 Like other provisioning factors, the application of EOQ will be offset by shelf life and other quantitative storage restrictions and by life of type provisioning policies.

7.48 EOQ policies are applied generally in Army and Air Force replenishment provisioning with the exception of FMS-sourced items. Navy have provision for but do not apply EOQ principles. Within Army and Air Force EOQs are not always purchased depending upon data availability, cost and funds available. Air Force advised the Secretariat that about 20 percent of their supply classes and another 668 individual line items have EOQ factors build into their provisioning data base. Also the length of the EOQ-derived stock cover period is limited to a minimum of one year and a maximum of five years.[32]

7.49 Navy's failure to apply EOQ principles suggests significant inefficiencies in their replenishment provisioning. The reasons appear to be the initial cost of procuring stocks at the economic order quantity level and the additional workload in obtaining and recording EOQ data. The lack of application of EOQ principles among all the Services appears to reflect the budgetary pressures on supply support.

7.50 The Committee believes that many budgetary 'savings' on spares support may be false economies. The Services need to compare budgetary savings with the costs of not purchasing economic order quantities. The Committee considers that Navy should apply EOQ principles in replenishment provisioning as a matter of priority.

7.51 In considering the scope for greater efficiency in spares and ammunition purchasing the Committee also asked whether the Services were tailoring their re-order quantities to take advantage of any price discounts based on economic production runs or economic order values. Economic production quantity factors are taken into account in planning the workloads of the government factories. Improvements to factory workload forecasting were addressed in Chapter 5. Economic order value factors are not built into the Services' provisioning formulas because of the variability of quantity-related price discounts. Rather, the Services attempt to take advantage of local knowledge.

7.52 The Committee considers that the Services need to do more to ascertain what local industry is doing to better avail themselves of opportunities for lower prices. Again, the Department of Industry, Technology and Commerce and the State industry development authorities could provide assistance.

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32. Minutes of Evidence, op cit, pages 1410-1411.

Order Placement Costs

7.53 Order placement costs comprise the costs of determining re-order requirements, placing the order and receiving the items into store.

7.54 Army and Air Force have estimated order placement costs for the purpose of calculating economic order quantities. Army presently apply order placement costs of $100 per order placed through Headquarters Logistic Command, $65 per order placed through FMS arrangements and $50 per order placed through stores depots. Air Force apply to all orders an order placement cost of $44 per order.[33] Army order placement costs were based on a 1983 study and Air Force costs on a 1984 study. Navy have not estimated order placement orders because they do not apply economic order quantity principles in replenishment provisioning. The Defence Contracting Organisation told the Committee that they estimate the cost of placing orders through their organisation at between 2.5 and 3 percent of contract value.[34]

7.55 Order placement costs will vary with the number of personnel engaged in the provisioning process and with the length of the provisioning lead time.

7.56 The Department of Defence estimated that the equivalent of 1698 full-time civilian and service personnel were engaged in provisioning replacement stores and ammunition throughout Defence.[35] Provisioning activities encompass technical assessment, source selection, purchasing, delivery and acceptance. The Committee did not obtain a breakdown of provisioning staff by Service.

7.57 Provisioning lead times, which the Services refer to as administrative lead times, comprise:

- a requirement determination lead time[36], and
- a contracting lead time.[37]

7.58 Table 7.3 provides details of overall administrative lead times by method of procurement experienced by Air Force between 1982-83 and 1985-86.

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33. Minutes of Evidence, op cit, pages 1419-1420.
34. Ibid, page 858.
35. Ibid, page 140 (amended).
36. The lead time from the identification of a requirement to the issue of a purchase order in the case of purchases up to $20,000 or the issue of a procurement demand in the case of purchases above $20,000.
37. The lead time from the issuing of a procurement demand to the placement of an order through the Defence Contracting Organisation.

Table 7.3 Overall Administrative Lead Times by Method of Procurement - Air Force 1982-83 to 1985-86 (calendar days)

	Purchase Orders	Procurement Demands
1982-83	213	n.a.
1983-84	228	357
1984-85	189	327
1985-86	144	285

Source: Minutes of Evidence, op cit, page 1515.

7.59 The Services were able to supply limited information only on requirement determination lead times. Navy did not collect statistics on administrative lead times generally but estimated average requirement determination lead times of between 21 and 28 days. Army advised that requirement determination lead times for the Committee's sample of spares and ammunition items ranged from 11 days to 130 days for the spares items and from 156 days to 211 days for the ammunition items. Air Force did not provide information on requirement determination lead times but estimated that the lead time between the production of a provisioning review and the registration of a buy proposal average 24 days in 1985-86.[38]

7.60 The Report noted earlier the very lengthy lead times associated with provisioning activities, especially with contracting. The sample spares and ammunition items examined in Chapters 4 and 5 experienced contracting lead times ranging between less than one working day to 758 working days in the case of the spares items and between 7 working days and 195 working days in the case of the ammunition items.

7.61 The range of contracting lead times encompass a variety of contracting methods and types of equipment. The Committee could obtain only limited data on average lead times for particular contracting methods. The lead times for contracts placed through the Defence Contracting Organisation, ie purchases in Australia above the public tender threshold, averaged 150 days in 1985/86.[39] By contrast, an Air Force study had revealed FMS administrative lead times in the range of 65 to 100 days.[40]

7.62 Although overall administrative lead times appeared to be declining, in the Committee's view they remained excessive and could only be remotely acceptable in peacetime. The Committee identified three ways by which these lead times might be reduced:

38. Minutes of Evidence, op cit, pages 1514-1515.
39. *Ibid*, page 771.
40. Briefing, Headquarters, Air Force Support Command, Melbourne, 19 May 1986.

1. reducing requirement determination lead times;

2. reducing public tender contracting lead times; and

3. increasing the level of direct purchases, ie purchases below the public tender threshold.

7.63 A general reduction in administrative lead times appeared to offer substantial scope for reducing order placement costs. The Committee did not address staffing issues in replenishment provisioning. The Committee was aware however that reductions in order placement costs had to be balanced against other methods of improving economy in purchasing. Measures to achieve more competitive pricing may well entail increases in order placement costs; for example, the costs of additional price surveillance. Nonetheless, these measures should be capable of being accommodated within reduced overall administrative lead times.

Requirement Determination Lead Times

7.64 The lengthy requirement determination lead times identified seem to reflect the limitations of the current supply EDP systems discussed in Chapter 4. Limitations exist in provisioning data bases and on-line data entry and access.

7.65 The Chief of Supply told the Committee:

> quite often in the provisioning process one needs access to usage history in order to make a *judgement on how much should be acquired.* At present, because of computer limitations, it takes a considerable amount of time...[41]

7.66 An internal audit of aspects of Air Force provisioning procedures reported time-consuming manual double checking and recalculation of re-order quantities generated by the Air Force Supply EDP system partly because of concerns about the accuracy of computer records.[42]

7.67 As noted in Chapter 4 each of the Services are in the process of extending on-line data entry and access to their central supply EDP systems. The Services also are examining the desirability of introducing automated purchasing systems for low value orders.[43]

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41. Minutes of Evidence, op cit, page 845.
42. Ibid, pages 1268-1272.
43. Ibid, page 845.

Contracting Lead Times

Contracting lead times vary with the method of purchasing. Direct purchases by stores take less time than public tenders. A representative of the Defence Contracting Organisation told the Committee:

> I do not think you can say that any particular technique is the best. It is a matter of using a technique which is appropriate to the sort of supply one is contracting to buy. Normally, if there is a repetitive product of which one buys a large number over a period, with frequent small purchasing then obviously a period contract is the approach. If it is an annual buy, as often happens in the ammunition field, the standardised contract approach is better. It depends very much on the ordering pattern that drives the sort of contract that one arranges...[44]

7.68 The Committee was not concerned to canvass the relative merits of different types of contracts. Rather, the Committee was interested to ascertain what could be done to reduce lead times for all types of contracts. The Committee decided to concentrate on the scope for reducing the lead times for public tendering.

7.69 The Defence Contracting Organisation is the contracting authority for Defence purchases in Australia above the public tender threshold (currently $20,000). In 1985 the Defence Logistics Organisation accounted for about 67 per cent of the number of contracts and 33 per cent of the value of contracts processed by the Defence Contracting Organisation.[45]

7.70 The Defence Contracting Organisation acknowledged that there was considerable scope for reducing contracting lead times. The Organisation had set itself the goal of reducing average lead times from 150 days at present to 100 days by 1988-89. Average lead times had been reduced already from 270 days in 1981-82.[46] These lead time targets relate to all contracts except major contracts whose value exceeds $10 million.

7.71 According to the Organisation, contracting lead times are divided evenly among processing contract documentation in the Defence Contracting Organisation, technical assessments and providing additional technical information by the client organisation and the period tenders are open. The Organisation expects that the planned 50 percent reduction in lead times will be split equally between themselves and their clients. The following measures have been introduced to reduce processing times within the Defence Contracting Organisation:

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44. Minutes of Evidence, op cit, page 850.
45. Ibid, pages 766-773.
46. Ibid, page 827.

- standardisation of contract documentation;
- office automation;
- computerised management information systems; and
- staff training.[47]

7.72 The Defence Contracting Organisation believed that improvements in the efficiency of their operations were significantly constrained by present Commonwealth purchasing policies and procedures. They identified several policies and procedures which could be changed to improve efficiency:

- Australian/New Zealand Preference Policy;
- advertising in the Purchasing and Disposals Gazette; and
- funds availability requirements.

7.73 The Organisation put the following proposals to the Committee:

Australian/New Zealand Preference Policy.

The administration of this policy involves a considerable amount of time in investigation, analysis, submissions to the interdepartmental committee and post contractual disputes. Only a relatively small number of contracts have been awarded on preference grounds. As at 30 June 1986, 23 cases had been forwarded to the Advising Departments for determination under the guidelines for discretionary preference since January 1984 and in no case was the Departmental recommendation changed. These cases took an average 110 days to decide before purchase action could continue.

The administration of Australian/New Zealand preference should be simplified to eliminate the reference of discretionary preference cases. The long delays caused by the present system lead to tender validity expiry which in turn gives rise to other problems of tender revalidation.

To avoid overlap with the Australia/NZ preference scheme it is suggested that it would be simpler if the Australia/NZ preference applied only up to the threshold at which the Offsets Policy applies (ie $2.5M).

47. Minutes of Evidence, op cit, pages 829-832.

Advertising in the Purchasing and Disposals Gazette

Finance Direction 25/2 requires that tenders should be advertised first in the Gazette. The Gazette is published each Wednesday. Tender advertisements have to be received at the Gazette office by 2.00 pm on Friday before the day of publication. Apart from being unreliable, ie material delivered on time is not published in the next Gazette, the inflexibility alone is a constraint which can cause over a week's delay in advertising tenders. It is proposed that public advertising and release of tenders should not be delayed until the Gazette has carried the advertisement. The DCO advertises tenders in the press by direct mailing and by 'Tender tex'.

Funds Availability

In cases where Procurement Demands prove to be underfunded when tenders are received, there is often a considerable delay while the client obtains approval from the Minister or his delegate under Finance Regulation 48C to incur additional expenditure. In many cases, the delays lead to tender validity expiring and leads to a requirement for either re-validation or the re-calling of tenders.

It is suggested that a facility for automatic increase where the increase is within, say, twenty percent of the Procurement Demand would substantially reduce the number of cases in which delay occurs for this reason. To avoid over-expenditure of funds allocated to the department it would be necessary to reserve part of each year's allocation of funds for this purpose.[48]

7.74 The Committee sees considerable merit in the proposals submitted by the Defence Contracting Organisation but did not have time to raise these proposals with the Department of Local Government and Administrative Services, the department responsible for overall Commonwealth purchasing policy, nor with the Department of Finance. The proposals deserve to be given close consideration in the review of Commonwealth purchasing being conducted jointly by the Departments of Finance and Local Government and Administrative Services.

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48. Minutes of Evidence, op cit, pages 1103-1104.

Direct Purchasing

7.75 In Chapter 6 the Committee noted the considerable scope that existed for extending the level of local purchases of replacement stores. In this Chapter the Committee expanded its attention to all purchases below the public tender threshold, ie direct purchases. There were two issues involved in extending the level of direct purchasing:

- increasing the public tender threshold; and
- increasing the importance of local purchases.

7.76 Direct purchases are made by the Support and Logistic Commands, stores depots and units. Between 1980-81 and 1985-86 direct purchases accounted for 39 percent of Navy outlays on replacement stores, 24 percent of Army outlays and 22 percent of Air Force outlays. Local purchases by depots and units, accounted for 20 percent of Army outlays on replacement stores, 15 percent of Air Force outlays and 6 percent of Navy outlays over the same period (see Table 7.1).

The Public Tender Threshold

7.77 In 1985-86, the public tender process accounted for 10.7 percent of Navy outlays on spares, 12.5 percent of Army outlay and 13 percent of Air Force outlays (see Table 7.1).

7.78 The Department of Local Government and Administrative Services told the Committee that the public tender threshold is set at that level which divides the volume of purchases 80 percent to 20 percent and the value of purchases 20 percent to 80 percent; so that 80 per cent of the number of purchases and 20 percent of the total value of purchases should amount to less than $20,000. The application of this principle was considered to ensure an efficient allocation of purchasing resources. The threshold is reviewed every two to three years depending on the rate of inflation.[49]

7.79 The Department of Defence suggested to the Committee that the present public tender threshold was too low and should be increased. In the first place, they argued, Defence expertise was such that proper and qualified evaluation can be undertaken to identify the best source of supply and (with appropriate delegations) ensure appropriate approvals are given. In the second place, it would be more consistent with the direction of the Government's Financial Management Improvement Program to relate the threshold to expenditure delegation levels. Present Defence delegations in many cases exceed the public tender threshold.[50]

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49. Minutes of Evidence, op cit, page 848.
50. Ibid, pages 834-835, 1102.

7.80 The Defence Contracting Organisation and the Department of Local Government and Administrative Services cautioned against raising the public tender threshold on the grounds of:

- the threshold had recently been raised;
- industry may react adversely; and
- the trouble purchasing officers had experienced in getting quotes immediately below the threshold when the threshold was too high.[51]

7.81 The Department of Finance challenged Defence's argument about the need to relate the threshold to expenditure delegation levels. The public tender threshold and delegations served different purposes. The public tender threshold was designed to ensure probity and fair dealing in Commonwealth purchasing. Expenditure delegations were designed to improve administrative efficiency.[52]

7.82 The Committee accepted that the public tender threshold served to ensure competition and that competition was the most effective means of ensuring economy in purchasing. The Committee was concerned to reduce order placement costs not competition.

7.83 The Committee concluded that little improvement in the economy of replenishment provisioning would be achieved by raising the public tender threshold. At present only a relatively small proportion of Service outlays on spares are purchased through the public tender process. Given the small value of most purchases the proportion of spares orders placed through the Defence Contracting Organisation is likely to be even lower. The Committee earlier noted its concern that the present levels of scrutiny of spares prices and overseas purchase orders through the Service Support/Logistic Commands may be inadequate. The level of surveillance would need to be improved before consideration was given to raising the overall level of direct purchases. The Committee emphasised instead the need to reduce processing lead times within the Defence Contracting Organisation and noted the need for the Services themselves to reduce the contracting lead times asociated with clarifying their requirements and providing additional technical data.

7.84 The Committee believed there was greater opportunity for reducing order placement cost by expanding the use of local purchasing within present direct purchasing levels.

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51. Minutes of Evidence, op cit, pages 847-848.
52. Ibid, pages 837.

Local Purchases

7.85 In Chapter 6 the Committee suggested that inventory holding costs could be reduced by reducing the number of domestic items in the inventories by expanding the level of local purchasing by stores depots and units. Army data indicated that a greater reliance on local purchasing might also lower order placement costs substantially. Depot order placement costs in Army were one half those at Headquarters Logistic Command.

7.86 The Department of Defence acknowledged the advantages of expanding local purchases but suggested that greater use of local purchasing entailed certain disadvantages:

- the non-application of economic order quantity principles;
- an increase in the variety of the inventory;
- a deterioration in quality control; and
- an increase in depot staff workloads.[53]

The Committee believed that these disadvantages were either outweighed by the advantages of local purchasing or could be overcome by the application or extension of appropriate procedures.

7.87 Increasing the level of local purchasing requires an increase in financial delegations to the commanding officers of stores depots and units. These delegations are set by the Minister for Defence. For stores depots, present delegations vary widely among the Services. In Navy the delegation ranges between $2,000 and $20,000, in Air Force it is set at $12,000 and in Army, at $50,000.[54] The Committee believed that the level of delegations in Navy and Air Force stores should be raised to Army's level.

The Defence Minor Purchasing System

7.88 The Department of Defence drew to the Committee's attention a proposal to improve the efficiency of local purchasing.

7.89 The Department operates a cash payment facility for minor purchases called the Defence Minor Purchasing System. The system is operated outside the capital cities and is limited to purchases of $100 and less.

53. Minutes of Evidence, op cit, pages 1080-1081.
54. Ibid, pages 1079-1081.

7.90 Defence proposed that the system be extended to capital cities and the cash limit raised to $500.[55] At the moment, minor purchases are expedited through departmental payment arrangements whereby suppliers receive cheques processed through the Defence Finance Offices and the Department of Finance.

7.91 The Department of Finance argued strongly against the proposal. It claimed:

- its payment processing times averaged only two to three days;
- the proposal contradicts the purpose of the current Defence Minor Purchasing System, namely an expanded petty cash system; and
- the proposal entails an expansion of the level of payments made outside the centralised Finance cheque issue system, risking the integrity of the system, a loss of expenditure control and a loss of the economies of scale presently enjoyed.[56]

7.92 The Committee accepts the need for a speedier form of payment for minor purchases than Department of Finance cheque. This would assist many small Defence suppliers with cash flow problems. However, the Committee believes that Finance's arguments against expanding the Defence Minor Purchasing System are persuasive. It was particularly concerned at the prospect of an expansion of number and size of advance accounts managed by departments and the consequent reduction in financial control and accountability.

7.93 However, there were other means of meeting Defence's needs; for example, by the use of corporate credit cards. The Department of Defence had elsewhere informed the Committee that it had arranged for the issue of credit cards for local purchases on a pilot basis.[57] The Committee endorsed this initiative. It believed the Department of Finance could assist by issuing further guidelines on the use of credit cards in Commonwealth agencies.

Summary of Findings

7.94 The Committee found that some Defence suppliers were charging excess prices. The Services were not adequately monitoring spare parts prices, especially the prices they were paying for the assurance of conformance with specifications. Also the Services had not, until recently, given sufficient attention to identifying lower cost commercially available substitutes. Navy relied too much on prime contractors for spares support.

55. Minutes of Evidence, op cit, page 836.
56. Ibid, pages 839-840 and pages 1384-1387.
57. Ibid, page 1082.

7.95 There was room for all Services to extend the application of economic order quantity principles. Navy's failure to apply economic order quantity principles at all was a serious shortcoming.

7.96 Lengthy purchasing lead times added greatly to the costs of replenishment provisioning. There was considerable opportunity for reducing contracting lead times associated with the public tendering process. Overall costs of purchasing could be reduced by extending the use of local purchasing and improving payment arrangements for minor purchasing.

7.97 The Committee believed that there was substantial scope for greater value for money in replenishment provisioning by the closer monitoring of spare parts prices and the use of US FMS arrangements, sourcing spares from actual manufacturers rather than prime contractors, greater specification of commercial items wherever possible, the increased application of economic order quantity principles, reducing the lead times associated with public tendering, extending the use of local purchasing and improving payment procedures for minor purchases.

Recommendations

7.98 The Committee recommends that:

20. the Services increase the level of surveillance of prices paid for replacement stores procured under direct purchasing arrangements, especially the prices of parts purchased from single sources;

21. Navy attempts wherever possible to purchase replacement stores direct from the actual manufacturer of the item rather than through the parent equipment manufacturer possibly using Air Force procedures as an appropriate model;

22. the Services improve their spares assessment procedures and equipment configuration management systems to provide for the specification of lower cost commercial spares wherever possible and to monitor the performance of those items;

23. the Services increase their monitoring of US Foreign Military Sales purchases to identify opportunities for lower cost or local sources of supply;

24. the Department of Industry, Technology and Commerce provides assistance to the Services, in consultation with State industry development authorities, to identify suitably qualified Australian suppliers of spares and ammunition presently purchased from overseas;

25. Navy takes steps, as a matter of urgency, to apply economic order quantity principles in its replenishment provisioning;

26. the Departments of Finance and Local Government and Administrative Services respond, in the Finance Minute on this Report, to the proposals put to the Committee by the Defence Contracting Organisation to improve Commonwealth purchasing policies and procedures;

27. Defence increases the level of financial delegations to the commanding officers of Navy and Air Force stores depots to the same level as exists in Army; and

28. the Department of Finance considers issuing further guidelines on the use of credit cards for the payment of accounts, preferably after taking into account the results of the present Defence pilot exercise in the Department of Defence.

CHAPTER 8

OVERALL POLICIES AND PRIORITIES FOR SUPPLY SUPPORT

- The Committee's Approach
- The Allocation of Responsibilites for Supply Support
- The Development of the Defence Logistics Organisation
- Summary of Evidence
- The Effectiveness of the Defence Logistics Organisation
- Organisational Issues
- The Committee's Findings
- Recommendations

The Committee's Approach

8.1 The previous Chapters have focussed on the policies, procedures and resources of the single-Service supply organisations. This Chapter looks at Defence supply support from the central policy making and resource allocation level. The differences in supply support policies and priorities among the Services and the scope for improving the effectiveness and efficiency of supply support in each of the Services are noted. The Chapter considers whether present organisational arrangements at the policy making and resource allocation level are capable of achieving the greater commonality of policies and the improvements in effectiveness and efficiency the Report argues are required.

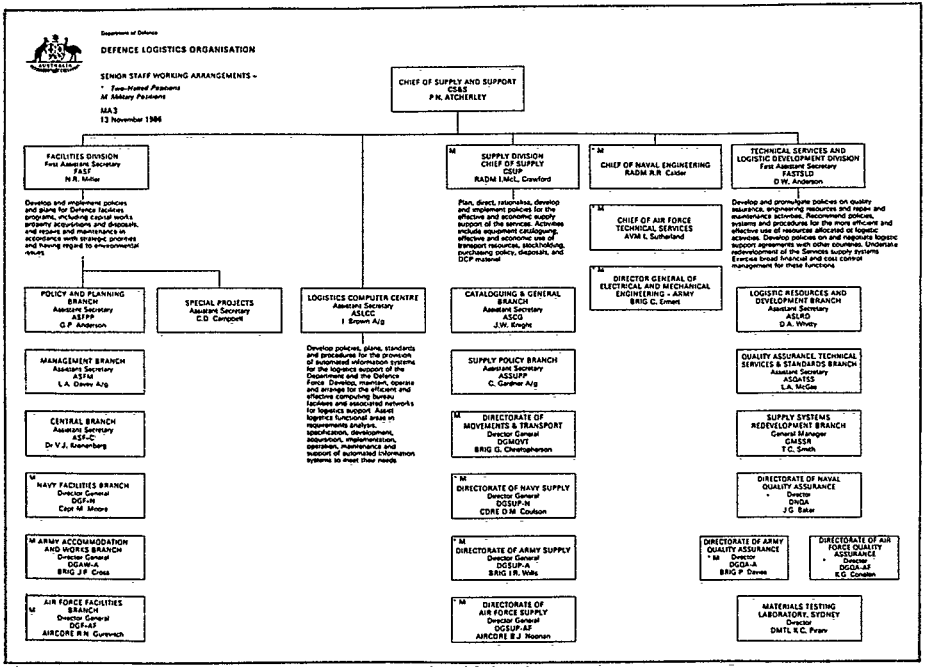
The Allocation of Responsibilities for Supply Support

8.2 Responsibility for the acquisition and management of the spares and ammunition inventories rests with the three Service supply organisations. These organisations exercise their responsibilities subject to the overall command of the three Service Chiefs and the Chief of the Defence Force (CDF).

8.3 Responsibility for overall Defence policies and resources for supply support is assigned to the Chief of Supply in the Defence Logistics Organisation (DLO). The Chief of Supply is responsible to the Chief of Supply and Support who, in turn, is responsible to the Secretary of the Department of Defence. The duties of the Chief of Supply are to 'plan, direct, rationalise, develop and implement policies for the effective and economic supply support of the Services.'[1] Responsibility for the implementation of the Supply Systems Redevelopment Project, however, is exercised by the First Assistant Secretary, Technical Services and Logistics Development Division of the Defence Logistic Organisation. Administrative arrangements in the Defence Logistics Organisation attempt to integrate supply and technical

1. Minutes of Evidence, op cit, page 991.

Diagram 8.1 Defence Logistics Organisation - Senior Staff Working Arrangements November 1986.



Source: Department of Defence

services, ie engineering and maintenance, aspects of equipment support in a modern 'logistics' approach. The DLO has responsibility for a number of other functions including the administration of the Defence facilities program. Figure 8.1 outlines the senior staff working arrangements of the Defence Logistics Organisation.

8.4 The Chief of Supply and Support told the Committee that:

> the key objective of the DLO ... in the logistics field ... is to take a perspective across the totality of the "logistics" activities (supply, technical services, movement and transport) of the Services and and to consider policy issues, resources and priorities at a central level.[2]

8.5 The DLO has four specific roles:

(1) to develop overall Defence logistic policies, in particular to develop common policies and procedures across the Services where this is feasible and desirable;

(2) to oversight the financial allocations for supply and support;

(3) to improve the efficiency and effectiveness of the logistic activities of the single Services; and

(4) to undertake some logistic activities on behalf of the CDF, including common supply computer systems and the Defence cataloguing system.[3]

8.6 The DLO thus has few operational logistics functions and no overall executive responsibility for supply support. It has no authority to impose common policies or improvements on the Services[4]. Policy is decided and implemented by way of the "consultative and joint process."[5]

8.7 The situation contrasts with that of the Capital Procurement Organisation where the Chief of Capital Procurement (CCP) has responsibility for both procurement policy and the management of the capital equipment program.

8.8 The Chief of Supply and Support argued that:

> whereas it is feasible for the CCP to be directly involved in the procurement of major capital equipment, because of the relatively small number of cases involved, the Department's involvement in

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2. Minutes of Evidence, op cit, page 981.
3. Ibid, pages 519-520.
4. Ibid, pages 523-542.
5. Ibid, pages 522-542.

supply and technical services matters cannot readily be conducted on an individual case basis (noting that there are 1.6 million line items of stores and many millions of mostly individually small transactions and decisions made annually), except where significant expenditures or policy issues are involved.[6]

8.9 The Chief of Supply added that:

> one of the reasons why you find that Supply and Support is different is that it is a factor very relevant to the operational readiness of the Services and the Defence Force. There is a greater immediacy associated with that than there is perhaps with capital equipment. As the single Service Chiefs have their responsibilites for the operational readiness of their forces, they guard that right very jealously. They are looking for short, unambiguous lines of authority over these activities which determine the readiness of their forces.[7]

8.10 In other respects the allocation of responsibilities between the DLO and the Services reflects the respective responsibilities of the Secretary of the Department and the Chief of the Defence Force. The Secretary is responsible for advice to the Minister for Defence on policy, resources and organisation. The CDF is responsible to the Minister for the preparedness of the Defence Force within approved policies and subject to the resources allocated. The Chief of Supply and Support said that 'this means that the Secretary has the primary responsibility for developing policy which includes logistic policy and oversighting resources and financial control. The CDF has primary responsibility in operational logistics.'[8]

The Development of the Defence Logistics Organisation

8.11 The DLO in its present name and structure was established in late 1984. However, the Organisation has its origins in the Supply and Support Organisation set up in the re-organisation of the Defence function in the mid-1970s.

8.12 The present structure of the DLO reflects the recommendations of the Utz review of the Higher Defence Organisation in 1982. Utz found that there was insufficient integration of supply and technical services functions at the policy level and recommended the establishment of a 'Supply and Support Policy Development Division' within the Supply and

6. Minutes of Evidence, op cit, page 984.
7. Ibid, page 525.
8. Ibid, page 589.

Support Organisation in addition to the Service technical services chiefs.[9] In late 1984 the Technical Services and Logistic Development Division was created and the name of the Supply and Support Organisation changed to the Defence Logistics Organisation. The Defence Facilities Division has added to the then Supply and Support Organisation in July 1984. In July 1986 the Logistics Computer Centre was created within the DLO from elements of the Defence Computer Services Division.[10]

Summary of Evidence

8.13 The Committee's examination revealed considerable differences among the Services in:

(1) spares and ammunition provisioning policies and procedures; for example, in the application of supply margins and economic order quantity principles and in initial spares assessment procedures;

(2) the application of economic inventory control principles;

(3) management information systems and the development of performance indicators;

(4) the extent of computer support at all levels; and

(5) funding priorities.

8.14 The Committee appreciated that some of the differences reflected the differences in the operational roles of the three Services and the relative importance of equipment availability for operational readiness. Other differences reflected the lack of co-ordination of the development of the single Service supply systems.

8.15 The Committee's examination revealed also substantial scope for improving the effectiveness and efficiency of the single-Service supply systems through improved management systems and increased computer support. These improvements required the co-operation of each of the Services.

8.16 The Department of Defence acknowledged both the need for greater commonality in supply support policies and procedures and the scope for improved effectiveness and efficiency. Indeed, the statement of DLO roles incorporates these objectives.

8.17 During the Inquiry the Department of Defence discussed a number of improvement programs and projects managed by the DLO, the most important of which was the Supply Systems Redevelopment

9. Defence Review Committee, The Higher Defence Organisation in Australia, Final Report, October 1982, paragraphs 4.153-4.158.
10. Minutes of Evidence, op cit, pages 985-986.

Project. The Committee endorsed these initiatives. However, the Committee has elsewhere expressed its doubts about the soundness of the strategy underlying the Supply Systems Redevelopment Project.

The Effectiveness of the Defence Logistics Organisation

8.18 The Committee asked whether the DLO has been effective in achieving greater commonality in the Services' supply support policies and procedures and increasing the efficiency and effectiveness of the single-service supply systems.

8.19 The Committee concluded that the achievements of the DLO to date had been limited.

8.20 Although the DLO had existed under its present name since only late 1984, the basic organisation was established a decade ago. Common logistic policies, for example, Single Service Logistic Management, have been in existence for many years. What was new about the DLO appeared to be the adoption of a logistics approach to supply support and the acquisition of the Defence logistic computing services functions.

8.21 Yet at the end of this decade the Committee noted:

(1) a marked degree of non-commonality among Service provisioning policies and procedures;

(2) a backlog of accepted but unimplemented improvements to the single-Service EDP systems;

(3) the slow initial progress of the Supply Systems Redevelopment Project; and

(4) the disparate performance records of the three Service supply systems.[11]

8.22 This situation did not reflect a lack in development of common supply policies. The DLO advised the Committee of 24 Defence Instructions relating to supply matters promulgated by the DLO since 1978 and 13 Supply and Support Instructions issued by the Chief of Supply since 1983.[12] Twenty more instructions were in the process of preparation at the time of this Report

8.23 The Committee believed that the limited effectiveness of the DLO was due in large part to the limited authority of the DLO to actively pursue common policies and improvements. The DLO's limited authority relected the division of responsibilities for logistic policy and operational logistics between Defence Central and the Services. The Committee considered how common logistic policies and improvements might be more effectively implemented.

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11. See Chapter 4.
12. Minutes of Evidence, op cit, pages 993-1000.

Organisational Issues

8.24 At present the implementation of common supply policies is facilitated through the 'two hatted' Service Director-General's of Supply. These officers are responsible to the Chief of Supply but are also responsive to their Service Chiefs of Staff. The link with the Services was strengthed by the recent designation of the Chief of Supply as a military position.[13]

8.25 The Committee considered that the authority of the DLO vis a vis the Services could be increased by either giving the DLO an executive role akin to that of the Capital Procurement Organisation or by placing the DLO under the control of the CDF.

8.26 The desirability of giving the DLO an executive role was considered by the Utz Report. Utz found that 'to give the Chief of Supply and Support the right to issue directions to the Services on supply and technical services matters would be an unwarranted interference with the right and responsibilities of the CDF.'[14] Utz thought there were considerable benefits arising from the present consensus decision making process including the likelihood that changes were not made without a full understanding of consequences and the desirability of each Service having the opportunity to assess own needs. The Report also noted the diseconomies associated with having to co-ordinate a large number of spending decisions which, by their nature, have to be made at the local level. Nonetheless, Utz acknowledged the need for supply and support matters to be considered with greater emphasis on the needs of the Australian Defence Force (ADF) as a whole. This should be done through the office of the CDF.[15]

8.27 The involvement of the Chief of the Defence Force in logistics matters was under consideration within the Office of the CDF at the time of this Report. A position of Vice Chief of the Defence Force had been created early in 1986 and the new Vice Chief had been given the task of reviewing the structure of the Headquarters of the ADF. Options were being considered including the creation of a position of Assistant Chief of Logistics, making the Chief of Supply responsive to the CDF while remaining responsible to the Chief of Supply and Support ('two hatted' in Defence terminology) and making the position of Chief of Supply and Support itself responsible to the CDF.[16] At present, the Assistant Chief of the Defence Force (Operations) told the Committee, "the CDF Staff deal very much in broad policy and priorities."[17] There is only a very small staff looking after logistics within the Headquarters of the ADF. Also, there was a need for a senior and experienced logistics officer within the Headquarters staff because logistics was a very specialised area and most service officers within the Headquarters staff had only

13. Minutes of Evidence, op cit, pages 986, 989.
14. Defence Review Committee, op cit, paragraph 4.140.
15. Ibid, paragraphs 4.141-4.148.
16. Minutes of Evidence, op cit, pages 585-587.
17. Ibid, page 584.

a broad understanding.[18] The Committee would be interested to know the timetable for the resolution of this matter.

The Committee's Findings

8.28 The Committee agreed that operational logistics should remain under the control of the individual Services because of the close relation between logistics and operational readiness. However, the Committee was concerned of the degree of non-commonality among Service supply policies and procedures and of the inadequacies of the single-service supply systems. There was a need to subject the supply support policies and priorities of the individual Services to the overall requirements of the Australian Defence Force to a greater degree than appears to have existed in the past.

8.29 The Committee considered that the effectiveness of the present organisational relationships for supply support should be reviewed. It believed that the effectiveness of the DLO could be improved by a closer relationship between the DLO and the Services. A closer relationship could be secured by giving joint responsibility for the DLO to the Secretary and the CDF or by giving primary responsibility to the CDF. The Committee was concerned that there should be no dilution of the Secretary's responsibility for policy, organisation and resources. The Committee considered that the most satisfactory arrangement would be for the Secretary and the CDF to have joint responsibility for the DLO. The details of such an administrative arrangment would be best left to the agreement of the Secretary and the CDF.

8.30 A closer relationship between the DLO and the Services should not lead to excessive staffing of the DLO with military officers. The Committee is concerned about the conflict between the Services'posting cycles and the development and retention of necessary logistics skills. Career paths in Defence logistics should be open to the best qualified and experienced people, many of whom were to be found in industry as well as on the civilian side of Defence.

Recommendations

8.31 The Committee recommends that the Secretary of the Department of Defence and the Chief of the Defence Force:

29 (a) jointly review, as a matter of priority, the performance of the Defence Logistics Organisation against its stated objectives taking into account the shortcomings in supply support identified in this Report; and

(b) inform the Committee of the timetable and progress of the review in the Finance Minute on this Report.

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18. Minutes of Evidence, op cit, pages 591-592.

APPENDIX A

Aspects of Defence Equipment Support

List of Hearings and Witnesses

Thursday 5 June 1986, Canberra

Private Individuals	Dr G L Brown
	Mr D A Frith
	Col J R Lenehan
Logistic Support Services	Dr R B Turtle
Raychem (Australia) Pty Ltd.	Mr F M FitzGerald
Observers	Mr R Alfredson
	Ms S Baker
	Ms C Keens
	Mr D Spedding

Tuesday 10 June 1986, Canberra

Department of Defence	Mr D W Anderson
	Mr P N Atcherley
	Col R W Bade
	Air Cdre R G Berriman
	Brig P J Bray
	Rear Adm R R Calder
	Cdre D M Coulson
	Rear Adm I McL Crawford
	Brig R W Fisher
	Air Cdre A L Furniss
	Mr F R Harvey
	Mr M Ives
	Cdre I D MacDougall
	Dr M K McIntosh
	Rear Adm D J Martin
	Col R M Millar
	Mr W G Pattinson
	Brig B D Phillips
	Air Cdre C J Prior
	Rear Adm N Ralph
	Air Vice-Marshal P J Scully
	Maj-Gen J N Stein
	Air Vice-Marshal I T Sutherland
	Mr L Tregear
	Brig I R Wills
Observers	Mr D S Lennie
	Mr D J Louttit
	Mr J Smythe
	Mr D Spedding

Tuesday 10 June 1986, Canberra

In Camera hearing

Monday 21 July, 1986 Canberra

Department of Defence	Mr D W Anderson M P N Atcherley Air Cdre R G Berriman Mr D N Biddle Brig P J Bray Rear Adm R R Calder Air Vice-Marshal B H Collings Cdre D M Coulson Rear Adm I McL Crawford Cdre A R Cummins Mr R H Englund Brig C Ermert Brig R W Fisher Air Cdre A L Furniss Mr F R Harvey Brig B W Howard Cdre A L Hunt Mr R C Lane Mr L A McGee Mr W G Pattinson Mr A D Powell Maj Gen N R Smethurst Maj Gen J N Stein Air Vice-Marshal I T Sutherland Brig I R Wills
Observers	Mr D S Lennie Mr J Louttit Mrs Perry Ms A Roberts Mr C Roe Mr D Spedding

Monday 21 July 1986, Canberra

In camera hearing

Tuesday 22 July 1986, Canberra

Department of Defence	Mr D W Anderson Mr P N Atcherley M C W Barclay

Mr F N Bennett
Air Cdre R G Berriman
Brig P J Bray
Rear Adm I McL Crawford
Air Cdre A L Furniss
Mr F R Harvey
Brig B W Howard
Mr C S Landau
M W G Pattinson
Mr A D Powell
Major Gen J N Stein
Air Vice-Marshal I T Sutherland
Gp Capt E McL Weller
Brig I R Wills

Observers

Mr D S Lennie
Mr J Louttit
Mr A Pearson
Mrs S Perry
Ms A Roberts
Mr C Roe
Mr D Spedding

Tuesday 22 July, 1986, Canberra

In camera hearing

APPENDIX B

Inquiry into Aspects of Defence Equipment Support

Inspections

Inquiry into Aspects of Defence Equipment Support

Inspections

Wednesday 23 April 1986

SYDNEY	Garden Island - HMAS Darwin - RAN Fleet Intermediate Maintenance Activity Zetland - Naval Supply Centre

Thursday 15 May 1986

IPSWICH	RAAF Base Amberley - F111 Aircraft and Support Facilities
TOOWOOMBA	RAAF 7th Stores Depot

Friday 16 May 1986

BRISBANE	3/4 Cavalry Regiment, Enoggera - M113 Light Armoured - Vehicles Supply Battalion, Meeandah

Monday 19 May 1986

PUCHAPUNYAL	Armoured Centre - M113 A1 Light Armoured Vehicles
MELBOURNE	Defence Centre, 350 St Kilda Road - HQ Army Logistic Command - HQ Air Force Support Command

Friday 30 May 1986

LITHGOW	Small Arms Factory
ST MARYS	Munitions Filling Factory

APPENDIX C

Summary Reports of Spares Support Situation

Six Sample Equipment Items

FFG Guided Missile Frigates

Analysis of the Questionnaire response revealed two of the nine sample FFG spares to be in short supply. Supply effectiveness rates for the FFG class appear to have improved since 1983 when records were first kept.[1] Although current 'on board' supply effectiveness rates are not as high as the RAN would wish they are better than those achieved by the US Navy FFGs.[2] Part of the FFG supply effectiveness problem seems to have been the result of the initial underestimation of the range and depth of spares required. From an initial buy of 40,000 lines the range of spares has increased to about 60,000 lines. Navy has estimated that about ten percent of FFG annual support expenditure goes to satisfying shortfalls in the project estimates.[3] Analysis of FFG Urgent Defect Reports (URDEFs) has shown that the bulk of them relate to the ships' weapons and propulsion systems and to be mostly spares-related. The number of FFG URDEF arisings appears to be declining, especially for the RAN's newer ships. However, since 1984-85 four to five FFG items have been included on the Navy's Controlled Critical Items list. Supply difficulties have resulted, on occasions, in the cannibalisation of spare parts.[4]

Although there have been significant deficiencies in spares support for the FFGs they do not appear to have affected ship availability and the achievement of current rates of effort. In recent years FFG class rates of effort, as measured in fuel consumption, have exceeded planned rates by a significant margin. Current and foreshadowed ship availability rates are slightly below target. The RAN attributes this to the FFG modifications program and not spares shortages.[5] With a multiple weapon platform like an FFG it is difficult to draw conclusions about operational readiness from overall equipment availability rates.

Humpty Doo Transmitting Station

The Committee's questionnaire ascertained that three of the nine sample Humpty Doo Transmitting Station spares were in short supply and that the three high cost items had not been delivered. Customer satisfaction rates and historical URDEF data for Humpty Doo are not available.[6] The Committee inspected Humpty Doo in August 1985 during the Defence Project Management Inquiry and its investigations of spares support issues were limited. Nonetheless, those investigations revealed significant difficulties in the initial support of the facility and persisting shortages of high use spares. The Committee also noted inadequacies of building design which have continued to impose a significant maintenance burden on equipment housed within.[7]

1. Department of Defence, confidential submission, JPCPA file 1986/6/B4/7.
2. Briefing, Naval Support Command, Sydney, 23 April 1986.
3. Minutes of Evidence, op cit, pages 637-638.
4. Briefing, Naval Support Command, Sydney, 23 April 1986.
5. Minutes of Evidence, op cit, page 1008.
6. Ibid, pages 1008,1010.
7. Briefing, Humpty Doo Transmitting Station, 1 August 1985.

No Humpty Doo items have been included on the Navy's Controlled Critical Items list. The Transmitting station has functioned continuously since it went on air in October 1982 with the exception of one 24 hour period due to switching power supply problems. Trials to fully evaluate the performance of the facility have yet to be completed. Individual equipment availability rates (the station has several backup systems) have varied between 60 and 70 percent in the 'wet' season and in excess of 80 percent in the 'dry'.[8]

M113 A1 Light Armoured Vehicles

One of the six M113 A1 vehicle items included in the questionnaire sample was in short supply. Supply effectiveness data for the total M113 A1 spares inventory is not available. Four M113 spares items (including two multi-vehicle items) have been included on Army's Items in Sensitive Supply list over the past six years.[9] However, Army believes the incidence and severity of problems experienced with the support of the vehicles have lessened in recent years.[10] One M113 A1 item is on the 1986-87 Sensitive Items list.

The Army does not use target equipment availability rates against which spares shortages can be assessed. Indeed, Army could not provide the Committee with historic equipment availability data.[11] In the past, equipment availability has not been monitored closely above the unit commander level.[12] The situation may change with the introduction of the PISCES management information system. A breakdown of vehicle serviceability rates at one unit showed that the repair of about forty percent of unserviceable vehicles was delayed awaiting spares.[13]

The September 1985 Auditor-General's Report reported serious shortages of track shoes and pads, Scorpion gun breech rings and yokes and 12 volt lead acid batteries.[14] Live firings of the 76mm gun on the Scorpion Fire Support Vehicle have been restricted until the gun turrets have been fitted with new breech rings and yokes. All fleet guns are not expected to be operational until December 1986. Premature cracking of the Scorpion gun breech rings and yokes occured in 1982-83. M113 A1 track shoes and pads were placed on the Army's Sensitive Items

8. Minutes of Evidence, op cit, pages 1006, 1008.
9. Minutes of Evidence, op cit, page 1488.
10. Briefing, Headquarters Logistic Command, Melbourne, 10 May 1986.
11. Minutes of Evidence, op cit, pages 1008-1009.
12. Refer Report of the Auditor-General, September 1985, op cit, pages 17-18.
13. Briefing, Armoured Centre, Puckapunyal, 19 May 1986.
14. Report of the Auditor-General, September 1985, op cit, pages 20, 23.

list in 1980. Army informed the Committee that often the stock level had been, at best, barely sufficient to satisfy priority exercise requirements.[15] Army has submitted a proposal to acquire additional stocks of the track shoes and pads. Production of a new specification 12 volt battery commenced in 1986 and the item has been removed from the 1986-87 Sensitive Items list.[16]

Over the past six years M113 A1 vehicle rates of effort have fallen significantly below target. The Committee was not able to assess the contribution of spares shortages to these shortfalls. Nonetheless, supply problems have restricted the task worthiness of the M113 A1 vehicle fleet.

Rapier Surface to Air Missile System

Despite difficulties in establishing initial spares requirements, the Rapier Surface to Air Missile System has experienced no significant spares shortages to date. None of the six Rapier items in the questionnaire sample was in short supply. The Committee could obtain little data on the overall level of Rapier spares in short supply or on equipment availability. However, no Rapier items have reached the Army's Sensitive Items list. Apart from the first two years, planned missile firings have been achieved. Report 243 noted in the initial acquisition of the equipment a significant under-estimation of repair parts and of equipment for the Rapier Base Repair Facility as well as difficulties in establishing local production capabilities.[17] Army told the Committee that Rapier had enjoyed 'relatively trouble free operation but the weapons technology enforces a heavy maintenance burden.'[18] The Committee noted what appeared to be an excessive number of catalogued and stocked lines for a mobile surface to air missile system. About 95 percent of Rapier parts by value are purchased from the United Kingdom and Army is concerned about the very long re-supply lead times.[19]

F111 Strike and Reconnaissance Aircraft

The F111 strike and reconnaissance aircraft have experienced significant spares support difficulties in the past. The Committee reported on these supply problems in 1980.[20]

None of the nine F111 spares items included in the questionnaire sample was in short supply. Air Force statistics indicated that over the past fifteen months F111 unavailability rates attributable to shortages of spares have been within

15. Briefing, Headquarters, Army Logistic Command, Melbourne, 19 May 1986.
16. **Minutes of Evidence**, op cit, pages 744-749.
17. JPCPA Report 243, op cit, Volume 2, paragraphs 15.7, 15.9-15.15.
18. Briefing, Headquarters, Logistic Command, Melbourne, 19 May 1986.
19. Ibid.
20. JPCPA Report 187, op cit, pages 1-15.

acceptable levels until very recently. However, the numbers of unsatisfied priority demands for F111 spares have been increasing over the past four years and five F111 spares items have appeared on the Air Force significant logistic items lists over the past four years. Three of these items were on the list for nearly two years or more.[21]

The bulk of F111 spares shortages relate to avionics spares. The major sources of these supply problems appear to be declining equipment reliability and serviceability (especially the analogue avionics) and long re-supply lead times. Eighty percent by value of F111 spare parts are procured under US FMS arrangements. The supply situation is expected to worsen after the US Air Force completes converting its F111 fleet from analogue to digital avionics in 1988. The Air Force has proposed the expenditure of $500 million on an avionics modernisation program for the F111.[22]

Overall F111 aircraft availability rates have been declining in recent years. Shortages of spares may have contributed to this decline. The shortage of maintenance crew noted in Report 187 may also have been a significant contributing factor.

Actual F111 flying hours have fallen slightly short of target over the past six years. A comparison of target on-line aircraft numbers and actual numbers of aircraft on-line indicates that over the past six years the Air Force would have had difficulty deploying the required number of aircraft. The number of on-line aircraft has been affected by the fitting of the Pave Tack Target Acquisition Designation and Tracking System beginning in late 1983.[23]

P3C Orion Long Range Maritime Patrol Aircraft

The acquisition of additional P3C aircraft to replace the earlier P3Bs was examined in the Report on Defence Project Management where concern was expressed about contractual provisions for spares support and under-spending on aircraft support.[24]

The March 1986 Auditor-General's Report found that the effectiveness of the Long Range Maritime Patrol Force had been affected by shortages of operational aircraft and trained aircrew. During the period of review (1980-81 to 1984-85) the Force was undergoing the transition from the P3B to the P3C aircraft. Although the Force was generally capable of meeting authorised annual flying hours, Audit considered that, in the short term, difficulties could arise if the Force was required to respond to a sustained increase in rates of effort. Audit found

21. **Minutes of Evidence**, op cit, pages 1450-1452.
22. Briefing, RAAF Base Amberley, 16 May 1986.
23. Department of Defence, confidential submission, JPCPA File 1986/6/B4/7.
24. JPCPA Report 243, op cit, Volume 2, paragraphs 7.27 to 7.31.

that existing general stores levels were sufficient to meet current rates of effort. The major factors limiting aircraft availability appeared to be the availability of trained maintenance crew and the complexity of maintaining two aircraft types.[25]

None of the nine P3C spares included in the Questionnaire was in short supply. However, Air Force statistics indicated that shortages of spares have resulted in unacceptably high aircraft unavailability rates. Indications are that spares-related unavailability rates are declining. The numbers of unsatisfied priority demands for P3C spares have declined over the past four years.[26] However, four P3 equipment items have been included in the lists of significant Air Force logistic items over the past four years. The longest was on the list for eight months.[27]

Although P3C availability rates have steadily increased over the past six years, average monthly numbers of serviceable P3 aircraft have fallen well short of target serviceable P3 aircraft numbers.[28]

From 1981-82 to 1984-85 actual rates of effort for the P3 aircraft have fallen significantly short of planned rates of effort. Some of the shortfall can be explained by the fact that part of the P3 authorised flying hours (specifically maritime search and rescue) is demand-driven. Nonetheless, aircrew and aircraft availability appear to have significantly restricted the achievement of planned rates of effort. Shortages of spares as well as shortages of aircraft and ground crew have been the major limitations on aircraft availability. Deliveries of new P3C aircraft and additional aircrew from 1985 can be expected to increase the Air Force's capacity to meet current planned rates of effort. However, as Audit noted, increased actual rates of effort may place pressure on aircraft maintenance capabilities.

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25. Report of the Auditor-General, March 1986, op cit, pages 29-41.
26. Minutes of Evidence, op cit, page 1489.
27. Ibid, pages 1450-1452.
28. Department of Defence, confidential submission, JPCPA file 1986/6/B4/7.