

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

JOINT COMMITTEE OF PUBLIC ACCOUNTS

REPORT 243

REVIEW OF DEFENCE PROJECT MANAGEMENT

VOLUME 1 - REPORT

Australian Government Publishing Service

CANBERRA 1986



# Review of Defence Project Management Volume 1—Report

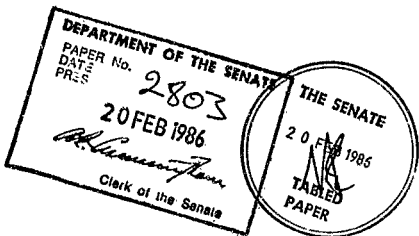
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Report

# 243

Joint Committee of  
Public Accounts

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\* Mr Cadman resigned and Mr Ruddock was appointed on  
29 November 1985

\*\* Ex-officio member being Chairman, House of  
Representatives Standing Committee on Expenditure

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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 submitted 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 the Department of Defence's management of its major capital equipment acquisitions.

The inquiry, which was commenced by the Fourteenth Public Accounts Committee in the previous Parliament in March 1984, arose out of the Committee's report on *HMAS Tobruk* (Report No 223) which identified major deficiencies in Defence's management of the project and the September 1983 Report of the Auditor-General which reviewed ten major Defence capital equipment projects. The Auditor-General's Report was prompted by adverse findings in several audits of Defence capital equipment projects in recent years.

The Committee examined in detail sixteen current or recent major Defence equipment projects. Eleven of the projects have failed or may fail to be completed on time, to budget or to technical requirements. In large part, this poor record was the result of ineffective project management and inefficient decision-making procedures and resource management within the Department of Defence.

During the inquiry there were three significant developments in Defence project management:

- the creation of a new Capital Procurement Organisation centralising much of the Defence equipment procurement functions and foreshadowing the delegation of increased authority and resources to project directors (June 1984);
- the abolition of the Department of Defence Support and the absorption of most of its functions within the Department of Defence; and
- the major re-structuring of the Basic Pilot Trainer Aircraft Project involving the cancellation of a local aircraft design for the licensed production of an overseas design.

The Committee has made sixty-five recommendations for action by the Department to improve the effectiveness and efficiency of Defence project management and related Departmental systems. Several themes summarise the bulk of these recommendations:

- the operations of the individual Service procurement organisations need to be integrated more effectively within the Capital Procurement Organisation and the Capital Procurement Organisation given greater autonomy;
- during the period of defining and developing major projects especially, the Capital Procurement Organisation should be given increased responsibility and control;
- during the implementation of projects the project director should be given increased authority and the project office more dedicated resources;

- Departmental procedures must ensure that decision-making is expedited and the quality of management information greatly improved;
- greater emphasis must be given to the skills, relevant experience and resources needed for effective professional project management; and
- contracting and contract administration must be strengthened and relations with Australian suppliers improved generally.

The Committee found that the Department of Defence generally accepted the nature of the problems. The Capital Procurement Organisation initiative made reference to the criticisms of Defence project management voiced by the Public Accounts Committee and the Auditor-General. However, Defence argued that other priorities limited the transfer of increased authority and resources to project management. This view, the Committee believes, overlooks the high resource costs of existing practices.

The apparent secondary priority accorded efficient and effective Defence project management moved the Committee to recommend a number of changes to improve accountability for the capital procurement program of the Department of Defence to the Parliament.

The Committee was not able to examine to its satisfaction aspects of the supply of stores and post-delivery support of Defence equipment. It intends to pursue this matter. Australian Industry Participation aspects of Defence project management will be the subject of further Committee examination.

The Committee is grateful to the Department of Defence and other Commonwealth agencies for the co-operation and assistance extended it throughout the inquiry. The Committee thanks Mrs H Mayer, MP who chaired the Sectional Committee for the inquiry and the members of its Secretariat for the support given to this reference.

For and on behalf of the Committee.

Senator G Georges  
Chairman

M J Talberg  
Secretary  
Joint Committee of Public Accounts  
Parliament House  
CANBERRA  
10 February 1986

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ABBREVIATIONS

AAC	-	Australian Aircraft Consortium
ADFA	-	Australian Defence Force Academy
ADP	-	Automatic Data Processing
AFP	-	Australian Frigate Project
AIP	-	Australian Industry Participation (Program)
BPFA	-	Basic Pilot Trainer Aircraft (Project)
CAC	-	Commonwealth Aircraft Corporation
CAFm	-	Chief of Air Force Materiel
CAM/CMAT-A	-	Chief of Army Materiel
CAPO	-	Contract Acceptance and Purchase Order
CCP	-	Chief of Capital Procurement
CDF	-	Chief of Defence Force
CMP	-	Configuration Management Plan
CNM	-	Chief of Navy Materiel
CPM	-	Critical Path Monitoring
CPO	-	Capital Procurement Organisation
CS <sup>2</sup>	-	Cost Schedule Control System
DDS	-	(formerly) Department of Defence Support
DFDC	-	Defence Force Development Committee
DHC	-	Department of Housing and Construction
DOD	-	Department of Defence
DORC	-	Defence Operational Requirements Committee
DSARC	-	(US) Defence Systems Acquisition Review Council
DSDC	-	Defence Source Definition Committee
DSTO	-	Defence Science and Technology Organisation
EAS	-	Equipment Acquisition Strategy
ECP	-	Engineering Change Proposal
EDE	-	(Army) Engineering Development Establishment
FASDIMP	-	First Assistant Secretary Defence Industry and Materiel Policy
FASFDA	-	First Assistant Secretary Force Development and Analysis
FASFIN	-	First Assistant Secretary Financial Services and Internal Audit

FASPB	-	First Assistant Secretary Programmes and Budgets
FMS	-	Foreign Military Sales (United States)
FSC	-	Force Structure Committee
FYDP	-	Five Year Defence Program
GAF	-	Government Aircraft Factories
GFE	-	Government Furnished Equipment
GFI	-	Government Furnished Information
GOSIEAA	-	(Navy) General Overseer Survey and Inspections East Australia Area
HDR	-	Hawker de Havilland
IDC	-	Inter-departmental Committee
ILS	-	Integrated Logistic Support
LMP	-	Logistics Management Plan
LOA	-	Letter of Offer and Acceptance (US FMS)
MEP	-	Major Equipment Proposal
MOA	-	Memorandum of Arrangements
MOU	-	Memorandum of Understanding
ODP	-	Office of Defence Production
PARCBS	-	(Navy) Production Authority Representative, Contract Built Ships
PD	-	Project Director
PERT	-	Program Evaluation and Review Technique
PMAP	-	Project Management and Acquisition Plan
QA	-	Quality Assurance
QC	-	Quality Control
RAAF	-	Royal Australian Air Force
RAN	-	Royal Australian Navy
RFT	-	Request for Tender
TADS	-	Tactical Air Defence System
USN	-	United States Navy
WND	-	Williamstown Naval Dockyard

## 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:

1. Where major disagreements within Defence Committees impede procurement action, the Secretary of the Department of Defence report to the Minister on the nature of the disagreement and the alternative courses of action. (Paragraph 3.16)
2. Staff Targets submitted to Defence Operational Requirements Committee (DORC) incorporate preliminary cost estimates based on whole of life costs for the proposal under consideration and comparable estimates for other options. (Paragraph 3.20)
3. Feasibility studies undertaken by Service sponsors be monitored by the Defence Central Studies Unit to achieve high standards of consistency. (Paragraph 3.20)
4. (a) Sole responsibility for advancing a project from acceptance into the Five Year Defence Program (FYDP) to project approval be transferred from the Service sponsor to the Capital Procurement Organisation (CPO). Close relations must be maintained between the CPO and the Service sponsor.  
(b) Major Equipment Proposals (MEPs) submitted to the Force Structure Committee (FSC) for acceptance into the FYDP be accompanied by statements containing good quality indicative costs, alternative capability options and a firm time frame for decisions. (Paragraph 3.20)
5. Project definition studies which may be undertaken 'in house', jointly with other Departments and/or private industry or by private industry, be controlled by the CPO. (Paragraph 3.20)
6. Project definition studies include:
  - (a) key or performance specifications (including an examination of variations to specifications to contain cost and risk and maximise Australian Industry Participation (AIP));

- (b) tender-quality cost and time-scale estimates;
  - (c) detailed assessment of areas of technical risk;
  - (d) whole of life equipment support requirements;
  - (e) proposed project management arrangements including procedural and reporting arrangements with the selected supplier; and
  - (f) a draft Equipment Acquisition Strategy (EAS) including an AIP strategy. (Paragraph 3.20)
7. The endorsed Staff Target be reviewed in the light of project definition studies before endorsement as a Staff Requirement. (Paragraph 3.20)
  8. No MEPs be considered for project approval unless accompanied by:
    - (a) key specifications and an examination of differing levels of capability to contain cost and time and to provide varying levels of AIP;
    - (b) tender-quality cost and time estimates;
    - (c) a detailed assessment of areas of technical risk;
    - (d) a complete listing of equipment support requirements; and
    - (e) an endorsed EAS including an outline of proposed management arrangements. (Paragraph 3.20)
  9. The Defence Costing Manual at present being revised include a section describing procedures for costing major equipment proposals. These procedures should address the need for estimates to:
    - (a) cover all project elements;
    - (b) be built up from the lowest work task level;
    - (c) meet confidence levels required for the stage of development of the project; and
    - (d) include appropriate contingency allowances. (Paragraph 3.27)
  10. Appropriate training programs be instituted following the issue of the revised (and expanded) Defence Costing Manual. (Paragraph 3.27)

11. Consideration be given to the establishment of a Project Costing Unit within the CPO with links to the Financial Services and Internal Audit Division and with specific responsibility for:

- (a) providing expert advice on project costing;
- (b) monitoring the quality of project estimates; and
- (c) maintaining an equipment cost data base. (Paragraph 3.27)

12. (a) As the key planning documents an Equipment Acquisition Strategy (EAS) and a Project Management and Acquisition Plan (PMAP) must be compiled for all major projects irrespective of the coverage of other documents.

(b) The EAS must be endorsed by the Defence Source Definition Committee prior to project approval and form part of the submission to Government.

(c) The PMAP must be agreed upon by all Departmental parties (Service sponsor, project director, functional agencies) before the commencement of the implementation phase. Where detailed plans are not possible prior to commencement, indicative planning must be undertaken before significant related work commences. Later revisions of the PMAP should incorporate the subsequent detail. (Paragraph 4.16)

13. The EAS and PMAP provide a definitive baseline for the project director, with the PMAP being a binding agreement between the Departmental parties involved in project implementation. Amendments to the PMAP would therefore be subject to formal procedures. (Paragraph 4.16)

14. Guidelines for the compilation of the EAS and PMAP be augmented to require that:

- (a) resource plans include detailed consideration of computer services and manpower needed throughout the life of the project;
- (b) the level of assessed risk is appropriately matched by monitoring and control systems; and
- (c) all information and control requirements are assessed for their cost effectiveness. (Paragraph 4.18)

15. A study be undertaken to establish the feasibility of applying computer simulation modelling techniques to project planning. (Paragraph 4.21)

16. Adequate computer support be provided for project planning with priority in the areas of schedule analysis and resource scheduling and levelling. (Paragraph 4.23)

17. At the outset of each project, an adequate planning team including appropriate technical and industrial expertise must be established. Where internal expertise is unavailable, specialist planning expertise should be contracted from outside the public sector. (Paragraph 4.25)

18. For major projects the project director have responsibility for the development of tender and contract specifications from the endorsed Staff Requirement and be given sufficient technical staff on a full-time basis and/or priority access to staff in the functional technical areas to manage this responsibility. (Paragraph 6.22)

19. Where in-house technical expertise is lacking, funded project definition studies be used to obtain tender-quality specifications. (Paragraph 6.22)

20. For design and development projects, consideration be given to employing outside and possibly overseas technical management expertise on a contract basis. (Paragraph 6.22)

21. Request For Tender documents include a full description of:

- (a) all build or production control standards to be applied; and
- (b) all quality and other technical management procedures to be applied for the duration of the contract. (Paragraph 6.22)

22. A single set of comprehensive guidelines be issued for Defence tendering, source selection and contract negotiation. These guidelines should pay particular attention to phased tendering options and post-tender negotiations with tenderers for major contracts to ensure that:

- (a) potential suppliers are given adequate opportunity to obtain clarification of Requests For Tender at tenderers' conferences;
- (b) requests for clarification of individual tenders are handled to ensure other tenderers are not disadvantaged; and

- (c) there is a comprehensive assessment of each short-listed tenderer's capability to supply the item to requirement and to the time and cost proposed. Management as well as technical capability should be assessed. (Paragraph 6.29)
23. Increasing use be made of incentive pricing in Defence contracts for both cost re-imburement and fixed price contracts. Incentives should cover cost schedule and quality deliverables. (Paragraph 6.50)
24. Programs be instituted to:
- (a) train staff in the Purchasing Authority in these new types of contracts; and
  - (b) acquaint and obtain the support of local industry for such contracts. (Paragraph 6.50)
25. All contracts include provision for arbitration to resolve contractual disputes. (Paragraph 6.50)
26. Progress payments not be made before prompt certification of the work for compliance with quality requirements. (Paragraph 6.50)
27. Current Excusable Delay provisions be revised to precisely specify the events for which claims can be made and the period of consultation to resolve claims. Each party to the contract should be similarly bound. (Paragraph 6.50)
28. Multiple project definition studies be considered to maintain competition in the award of production or development contracts. (Paragraph 6.50)
29. Wherever possible, use be made of commercial contracts rather than Foreign Military Sales arrangements for US-sourced major equipment items. (Paragraph 6.57)
30. A Cost Schedule Control System (CS<sup>2</sup>) development program be introduced to assist Australian Defence contractors to upgrade their management information systems. (Paragraph 8.20)
31. CS<sup>2</sup> must become the basis for cost and schedule reporting by contractors for all major projects. (Paragraph 8.20)
32. Progress payments be geared to the submission of satisfactory CS<sup>2</sup> reports. (Paragraph 8.20)
33. Greater priority in financial and manpower resources be given to the extension, development and upgrading of computer support for project management and the target date for the integration of Service systems be brought forward. (Paragraph 8.25)
34. Tender specifications incorporate detailed quality control requirements audited during tender evaluation. (Paragraph 8.39)
35. A quality management program be commenced to ensure that all local suppliers of items of major equipment comply with Australian Standards AS 1822, as a minimum, by the end of 1987. Thereafter no contracts should be entered into with local suppliers which do not meet these standards at the time of commencement of work. (Paragraph 8.44)
36. For all major projects involving significant technical risk, responsibility for the quality assurance function be vested in the project director and appropriate quality assurance personnel seconded to the project office. (Paragraph 8.46)
37. Contract change proposals which are initiated by the Service sponsor and which affect cost or time must be subject to the agreement of the project director and require offsetting savings to be provided by the sponsor. Agreement between the project director and the Service sponsor should not impose irrecoverable costs on the contractor. (Paragraph 8.58)
38. Project directors be given authority to approve contractor-initiated contract change proposals provided that the changes do not amend the technical characteristics in the Staff Requirement, the overall project budget or approved completion date. (Paragraph 8.58)
39. The Services, in consultation with the appropriate Australian industry, review their present design approval procedures to see whether they can expedite design and development projects. (Paragraph 8.58)
40. Contractors be encouraged to provide notice of pending contract change proposals. (Paragraph 8.58)
41. As a matter of priority the regional operations of the Defence Purchasing Organisation be reviewed to reduce purchase order processing times. (Paragraph 9.7)

42. The Chief of Capital Procurement issue consolidated guidelines covering total project documentation requirements. Such documentation must be standardised across the Services to the maximum extent possible. (Paragraph 9.21)
43. The proposed project documentation guidelines address the format and content of project progress reports and require:
  - (a) reference to issues outstanding from previous reports;
  - (b) a report of progress, nature of problems and remedial action taken or proposed;
  - (c) summary information only, supported where necessary by sufficient explanatory detail; and
  - (d) the use of straight forward language (technical terms and acronyms should be defined). (Paragraph 9.27)
44. Quarterly Milestone Reports to senior management must include an analysis of cost and schedule variances and a summary of proposed remedial action. (paragraph 9.27)
45. An internal efficiency and effectiveness review of a major project be undertaken by the end of 1986. This review should help establish the methodology of future regular internal reviews of major equipment projects. (Paragraph 9.30)
46. The Chief of Capital Procurement issue, as a matter of priority, a comprehensive Defence Project Management Manual for the guidance of project directors in all Services. Where there is conflict between the Manual and Service procurement instructions, the Defence Project Management Manual should take precedence. (Paragraph 9.32)
47. The Service sponsor appoint a representative to liaise with the project office at the time the draft Staff Target is raised. That position should continue to function as the sponsor representative throughout the period of the project. (Paragraph 10.18)
48. A project director be appointed within the CPO at the commencement of detailed project definition. For major projects, where responsibility for the definition studies rests with the project director, a dedicated project team sufficient to conduct or supervise the studies should be established. (Paragraph 10.18)

49. The endorsed Staff Requirement establish the basis for sponsor requirements and form the basis of a binding agreement between the Service sponsor and the project director. Subsequent amendments to the staff Requirement should be subject to formal procedures and the mutual agreement of the Service sponsor and project director. (Paragraph 10.26)
50. Full authority must be given to the project director to expedite the project within the endorsed parameters relating to technical performance, cost and time, subject to annual Budget allocations and Government policies. (Paragraph 10.26)
51. The size and composition of the project office be directly related to the scope of tasks necessary for the efficient exercise of authority granted to the project director under recommendation (50) above. (Paragraph 10.33)
52. The project directors of large and complex projects be assisted by their own technical staff. Whether these specialist staff are transferred on a permanent basis to the CPO or seconded temporarily should be decided on practical grounds. (Paragraph 10.33)
53. Selection criteria for all project directors positions must give the highest priority to experience and training in project management. (Paragraph 11.12)
54. Selection criteria for other senior project personnel stipulate prior project management experience and training as a necessary qualification. (Paragraph 11.12)
55. Where experienced project management personnel are not available from within the public sector, project management services be obtained from the private sector on a contract basis. (Paragraph 11.12)
56. The Department of Defence report to the Committee what steps it proposes to take to reduce recruitment times for civilian staff. (Paragraph 11.17)
57. As a measure to reduce the effect of civilian recruitment delays, consideration be given to establishing a pool of staff within the CPO to assist projects on a short-term basis, preferably in the initial phases. (Paragraph 11.17)

58. Universities and other tertiary institutions in Australia be invited to develop for Defence staff special post-graduate courses which give emphasis to the deficiencies in project management identified in this Report. (Paragraph 11.25)
59. Project management training be incorporated in the undergraduate courses to be given at the new Australian Defence Force Academy. (Paragraph 11.25)
60. With the establishment of Australia-based higher level project management training, the use of overseas courses be substantially reduced. The purpose of Overseas training should be to give project Staff exposure to the management of similar projects by Allied services and to advanced project management practices generally. (Paragraph 11.25)
61. The Public Service Board be invited to develop, in consultation with Defence and other relevant Commonwealth agencies, a career path, possibly not confined to Defence, for civilian project management personnel. (Paragraph 11.32)
62. The Services develop as far as possible career paths for technical staff officers within the overall materiel management area. (Paragraph 11.32)
63. (a) The promotion prospects of military officers posted for extended periods to project offices not be affected adversely.
- (b) More systematic effort be given to effective project management hand over procedures. The 'shadow posting' of key project staff prior to the assumption of their responsibilities should be considered. (Paragraph 11.32)
64. As part of the Financial Management Improvement Program, control over project administrative budgets be delegated to project directors subject to Departmental guidelines about the employment of consultancy services, ADP acquisition, etc. (Paragraph 11.39)
65. The Department of Finance investigate closely the methods used by Defence to monitor real cost changes and, for the purposes of consistency in reporting, identify an appropriate price deflator which may be used to monitor price changes. (Paragraph 11.39)
66. The Department of Defence report to the Committee on its investigation of the feasibility of introducing a comprehensive resource costing system throughout the Department and particularly within the CFO. (Paragraph 11.45)
67. The Department of Defence submit each year to the Parliament a report on its major capital equipment program detailing for each project:
- the total project cost and in-service dates initially approved/endorsed by the Government;
  - the current estimated total project cost and in-service dates;
  - an explanation of any cost and schedule variance identified in (b);
  - a summary of management action taken or proposed to correct or minimise the effect of any cost or schedule overruns; and
  - total expenditure to date on the project.
- Project costs should include all elements of the project, ie spares, support equipment, training, Australian Industry Participation, etc and cost data should be expressed on common price and exchange rate bases. Individual project report items should cover all phases of the project and refer to related projects (present or not yet approved) which address the same military capability requirement (for example specialised ammunition and training equipment). (Paragraph 12.24)
68. The reports be referred to the Auditor-General for investigation and report if the project costs escalate by more than fifteen per cent per annum or if the Auditor-General thinks fit. (Paragraph 12.24)

## CHAPTER 1

### INTRODUCTION

#### Background to the Inquiry

1.1 The inquiry has its origins in the Public Accounts Committee's previous examination of the Navy's amphibious heavy lift ship, HMAS Tobruk and the Auditor-General's September 1983 Report which reviewed project management in the Department of Defence.

1.2 In Report Number 223 on HMAS Tobruk, tabled in February 1984, the Committee noted a number of serious shortcomings with the Department's management of the acquisition of the ship. These had contributed to delays in the ship's introduction into service and to major post-delivery technical problems. The Report made a number of recommendations relating to Defence project management systems but acknowledged the need for a more comprehensive inquiry.<sup>1</sup>

1.3 The Auditor-General's September 1983 Report included the findings of a general review of Defence's management of major capital equipment acquisitions. Audit's review was prompted by unsatisfactory findings on sixteen major Defence projects examined between 1979 and 1983. The review involved a re-assessment of ten of these projects. The Auditor-General found that the Department's management practices were deficient in all major aspects of project management:

- . planning and task definition;
- . resource management;
- . contracting and production;
- . administrative arrangements; and
- . performance monitoring.

These shortcomings had contributed to:

- . significant additional costs to the Commonwealth;
- . the dedication of scarce resources towards rectifying project problems; and
- . the diminution of Defence capability through the untimely delivery of equipment and facilities and through equipment and facilities not meeting technical performance requirements.<sup>2</sup>

1. Joint Parliamentary Committee of Public Accounts (JCPA), HMAS Tobruk (Report 223) paragraphs 6.9, 6.45, 6.68, 6.69.  
2. Report of the Auditor-General, September 1983, paragraph 5.2.8.



1.4 The Audit report has been reproduced at Appendix A to this Report.

1.5 Audit stated that it was 'not in a position to recommend specific remedial action'. However, it was of the view 'that urgent action is needed so that all issues within the control of the Department are fully recognised and appropriate measures taken to contain lead times, ensure adherence to specified Service requirements and minimise cost escalation'.<sup>3</sup>

#### Previous Inquiries into Defence Procurement

1.6 Defence procurement, or aspects of it, has been the subject of three external inquiries over the past six years, by:

- the Joint Committee on Foreign Affairs and Defence in 1979;
- the House of Representatives Standing Committee on Expenditure in 1981; and
- the Defence Review Committee in 1982.

1.7 The Report of the Joint Committee on Foreign Affairs and Defence on 'Australian Defence Procurement' in November 1979 (the Katter Report) found that Defence equipment decision-making failed to promote an integrated inter-Service consideration of equipment options and lead times often exceeded the usual strategic warning periods. Contracting with Australian industry was cumbersome and complex and posed serious problems for local industry. The administration of procurement divided responsibility between too many departments and failed to recognise that procurement was a specialist activity in its own right.<sup>4</sup>

1.8 The Report of the House of Representatives Standing Committee on Expenditure on Commonwealth Government Purchasing (May 1981) found that purchasing administration within departments and authorities including Defence was inefficient. It made a number of recommendations to change Commonwealth tendering, contracting and contract administration procedures.<sup>5</sup>

1.9 The Report of the Defence Review Committee, chaired by Mr J W Utz, on the Higher Defence Organisation in Australia (October 1982) supported the Katter Report in finding that there was a need to foster a total Australian Defence Force perspective (as distinct from a single Service perspective) in the formative stages of proposals affecting the capabilities of the Defence Force. Utz recommended that the Defence purchasing function should be vested in a new Department of Defence Support and that

3. Report of the Auditor-General, September 1985, paragraph 5.2.8.
4. Joint Committee on Foreign Affairs and Defence, Australian Defence Procurement, November 1979 (Parliamentary Paper No 260/1979), pages 71,72.
5. House of Representatives Standing Committee on Expenditure, Commonwealth Government Purchasing, May 1981 (Parliamentary Paper No. 107/1981), pages 1,2.

Defence procurement functions be restructured within Defence around a central procurement organisation which both improved the Departmental contribution and maximised the managerial role of the existing Service Chiefs of Materiel.<sup>6</sup>

#### The Significance of Major Defence Equipment Acquisitions

1.10 Outlays on major Defence equipment in 1985-86 are estimated to total \$1,558 million or 24 per cent of 1985-86 Defence outlays.<sup>7</sup> Table 1.1 shows the growth in total capital equipment expenditure as a proportion of Defence outlays over the past thirteen years.

1.11 The increasing proportion of Defence outlays allocated to equipment acquisition since the mid 1970s reflects the commitment of recent Governments to the major upgrading of the equipment of the Australian Defence Force.

1.12 These figures underlie the importance of Defence project management practices. Inefficient or ineffective management has the potential to incur very large additional outlays for the Commonwealth through schedule slippages, cost increases and equipment not meeting requirements.

#### Inquiry Objectives

1.13 The inquiry was not concerned with policy issues including the merits of the strategic assessments or judgements of capability requirements which underlie equipment decisions nor with the choice of specific items of defence equipment. These questions are outside the concern of the Public Accounts Committee.

1.14 The inquiry focused on decision-making processes, organisational arrangements, resource management and management information systems.

1.15 The Committee considered that the range of shortcomings identified by the Auditor-General required it to examine the totality of activities associated with the acquisition of major defence equipment, from the conception of a broad requirement to the introduction of a specific brand of equipment into service. The Committee decided also that an effective review of Defence management systems demanded the detailed examination of the management of a number of individual projects.

1.16 Accordingly, the following terms of reference were adopted:

to examine current equipment acquisition projects in the Department of Defence, with a view to recommending any changes that may be required to ensure:

6. Defence Review Committee, The Higher Defence Organisation in Australia, Final Report, October 1982 (Parliamentary Paper No.407/1982), pages xvi,xix,xxi.
7. Budget Statement 1985-86 (1985-86 Budget Paper No.1), page 84.

Table 1.1 Growth in Outlays on Defence Equipment as a Percentage of Total Defence Outlays 1972-1973 to 1984-1985

Year	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85
Capital Equipment	12	7	6	8									
Capital Facilities	5												
Manpower	52	61	58	58	55	54	53	51	50	54	50	46	44
Operating Costs	31	28	30	28	27	28	28	30	31	29	28	27	26

- Notes:
- Percentages may not total 100 due to rounding.
  - Defence co-operation is included in operating costs.
  - Category proportions are influenced by variations in other categories
  - Historical data up to and including 1974-75 have not been adjusted in line with the reclassification of defence expenditure as defence function expenditure. See the 1973-74 budget speech.
  - 1983-84 & 1984-85 data taken from the 1984-85 Defence Report.

Sources:

- Department of Defence, Defence Report 1982-83 Canberra, 1983.
- Department of Defence, Defence Report 1984-85 Canberra, 1985.

- effective accountability for public monies and for other aspects of project management;
- efficient decision-making procedures;
- the most effective use of resources; and
- the efficient management of projects to achieve time, cost, quality and specification objectives.

1.17 The central issues of the inquiry were efficiency, effectiveness and accountability.

1.18 Efficiency concerns the management of resources to achieve a given output at the minimum cost (economy) or the maximum output for a given input (productivity). In considering changes to improve efficiency the Committee examined:

- decision-making times, staffing levels and pricing arrangements to identify avoidable costs; and
- staff selection and training and computer support to identify productivity improvements.

1.19 Effectiveness, on the other hand, concerns the management of resources to ensure that actual outcomes conform with planned outcomes at the lowest cost. In considering changes to improve effectiveness the Committee examined:

- organisational arrangements to ascertain whether objectives and priorities were clearly specified;
- information systems to find out whether there was timely and accurate monitoring of project performance against objectives; and
- decision-making processes to ascertain whether alternative, lower cost courses of action were examined.

1.20 Accountability concerns the duty of managers to account for their actions to higher authority, in this case Government and Parliament. In considering changes to improve accountability the Committee examined organisational arrangements and information systems to ascertain whether:

- responsibilities had been clearly delineated and authority assigned commensurately; and
- management efficiency and effectiveness were adequately monitored.

## Project Management<sup>8</sup>

1.21 Individual major Defence equipment acquisitions constitute 'projects' in their own right because they are unique and finite undertakings. The efficient and effective management of a project may require different management arrangements and skills from the management of routine or repetitive undertakings. Because of the complexity of many projects, project-based organisations have evolved whereby the resources necessary to implement a project are assembled (to varying degrees) in one organisational unit under the control of a single manager. In contrast, routine undertakings are usually managed in a functionally based organisation by the co-ordination of resources under the control of individual functional managers.

1.22 Project management, therefore, can be defined as the overall planning, control and co-ordination of a project from inception to completion within time, cost, quality and technical requirements.<sup>9</sup>

### The Major Equipment Acquisition Process

1.23 In Defence, equipment procurement is seen as the initial phase of a larger 'materiel cycle'. This begins with the conception and definition of a requirement, proceeds to the selection of a materiel solution, the acquisition of a specific equipment item, the introduction of that equipment into service, the maintenance of the equipment and its eventual disposal.<sup>10</sup>

1.24 The procurement phase extends from the definition of requirements to the delivery of equipment into service. It covers a sequence of discrete activities which may be summarised as follows:

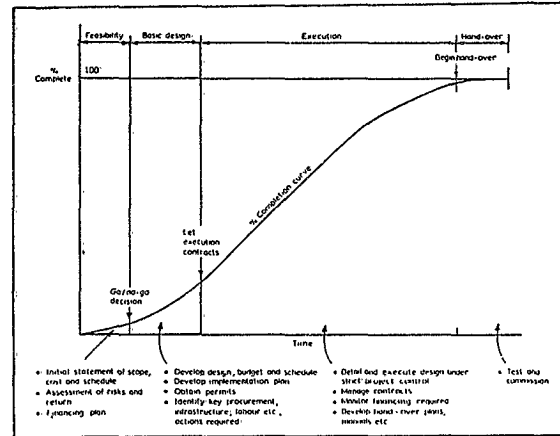
- . definition of requirements;
- . evaluation of options;
- . specification of preferred option;
- . planning the project;
- . obtaining government approval;
- . tendering;
- . contracting;

8. The following paragraphs are based on a survey of the project management literature undertaken for the Committee by Dr R.K. Murfet.
9. Chartered Institute of Building, Project Management in Building, UK, 1982, cited in I.D. Ide, Project Management Education, Final Year Research Project, School of Architecture and Building, South Australian Institute of Technology, November 1984.
10. See the description in Department of Defence, Army Office Instructions (1976), Amendment No.22, June 1981, chapter 19, (part 1).

- . administering the contract; and
- . handing over to users.

1.25 Superimposed on this progression will be a number of decision points: approval, contract, handover, etc. Major Defence equipment projects can thus be depicted as having a life cycle. Figure 1.1 describes a simplified project life cycle.

Figure 1.1: The Life Cycle of a Project.

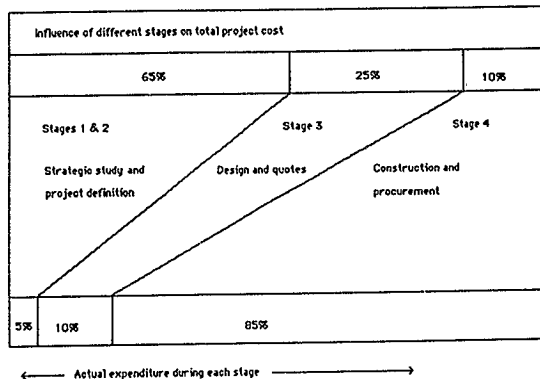


Source : Morris, P.W.G., Project start-up: Getting going effectively, International Journal of Project Management, Vol. 2 No. 2, p. 82-88.

1.26 Many project management theorists consider that the initial phases of a project are the most critical for its ultimate success. According to one writer, 'the activity which has the most far reaching effect on the project is the extent, detail and realism of the project plans. Most of the problems which develop on a project can be traced back to faulty planning.'<sup>11</sup> In the construction industry in Australia it has been claimed that 65 per cent of all potential cost savings will be realised, if at all, during the feasibility and definition phase which typically accounts for only five per cent of total project costs.<sup>12</sup> Figure 1.2 illustrates this relationship between project spending and productivity.

11. J.S. Baumgartner 'Project Management' R D Irwin, Homewood, Ill, 1963, page 15.
12. 'The Vital First Five Per Cent', PA Management Report, November 1983, page 6.

Figure 1.2 The Relation Between Project Spending and Productivity  
- "The Inverse Law of Capital Projects"



Source : PA Management Report, November 1985, page 6

#### Method

1.27 To meet its inquiry objectives the Committee chose the following method of inquiry:

- the criteria for efficient and effective project management were established;
- a representative sample of major Defence projects was compiled;
- the histories of the projects were assessed in detail against the criteria established;
- specific findings were grouped and tested against general evidence on Departmental management practices; and
- possible means of overcoming the assessed shortcomings were evaluated.

1.28 The Committee exercised particular care in:

- establishing the evaluative criteria; and
- selecting the sample of projects.

1.29 It was concerned to ensure that the sample not be biased nor the criteria be unrealistic.

1.30 The Committee selected some sixteen projects from a list of 64 recent or current major projects provided by the Department of Defence plus the Jindalee project managed by the Defence Science and Technology Organisation. Major capital equipment projects are defined by Defence as those costing \$10 million or over. Of the sixteen projects selected, four had been included in the Auditor-General's Report and six were nominated by the Department of Defence in response to an invitation from the Committee to name six 'successful' projects. Defence's list of six projects was provided with a disclaimer that the nominated projects were illustrative and not necessarily 'successful'.<sup>13</sup>

1.31 Table 1.2 lists the sixteen major equipment projects examined together with summary data.

1.32 The sample included the three largest peacetime Australian Defence projects ever undertaken (the F/A-18 Tactical Fighter Project and the two Frigate Projects) as well as a range of smaller projects covering most types of equipment and methods of acquisition (including overseas procurement and local design and development) in each of the three Services. There were seven Air Force, five Army and four Navy projects in the sample. The total current estimated cost of the approved phases of the sixteen projects is about \$6,618 million. Including the not yet approved phases their total current estimated cost is about \$7,283 million.<sup>14</sup> Outlays on the projects in 1985-86 are estimated to total \$1,352 million or 87 per cent of outlays on major Defence equipment in 1985-86.<sup>15</sup>

1.33 Two of the projects (the Hiport/Medport Mobile Radio Terminals and the US-built Frigates) were reported on previously by the Committee.<sup>16</sup>

1.34 Five of the sixteen projects were relatively straight forward 'off the shelf' buys (Medium Trucks, Rapiet, F-111A Attrition Replacement Aircraft, C-130H Simulator and the Additional P3C Orion Aircraft). Three projects were only in their early phases (Australian Frigate Project, Small Arms and Hamel) and only seven had been completed or substantially completed at the time of the review (Medium Trucks, Hiport/Medport, Tactical Air Defence System, US-built FG Frigates, Rapiet, F-111A Attrition Replacement Aircraft and C-130H Simulator).

13. Correspondence, dated 13 June 1984 (PAC File 1983 (10) A 1/2).

14. JCPA, Review of Defence Project Management, Minutes of Evidence, pages 2825-2828.

15. Ibid, page 3078.

16. JCPA, Auditor-General's Report, March 1982 (Report 222), Chapter 1.

Table 1.2 Summary Data - Sixteen Projects

Project	Current estimated total project cost (a) \$m	Project time (Commencement date - Current estimated or actual completion date)			
		1970	1980	1985	1990
<b>AIR FORCE:</b>					
1. Tactical Air Defence System (TADS)	21.68	Oct/73 — Apr/85			
2. Jindalee (Stages A & B)	40.94	Oct/69 — 1985/86 — Late 1980s			
3. C-130H Simulator	8.80	Mar/76 — Aug/85 — Phase 2B			
4. F-111A Attrition Aircraft	60.03	Jul/80 — Jan/84			
5. Basic Trainer (Phases 1 & 2)	99.10	Oct/78 — Apr/87 — Mid 1991 — Phase 4			
6. P3C Orion	411.99	Oct/79 — Nov/86			
7. F/A-18 Tactical Fighter	3396.03 <sup>(b)</sup>	May/75 — May/90			
<b>ARMY:</b>					
8. Small arms (Phases 1,3)	6.10	Sep/82 — Dec/85 — Phases 2,4,5 — 1997			
9. Rapier Air Defence	95.80	Aug/70 — Nov/81 — Aug/85 — Phase 3 — End 1988			
10. Hiport/Medport	31.32	Oct/78 — Sep/86			
11. Medium trucks	215.90	Apr/76 — 1986/87			
12. Hamel light gun (Phases 1,2 & 3)	56.11	Dec/74 — 1988+ — 1991+ — Guns — Ammunition			
<b>NAVY:</b>					
13. HMAS Success	208.92	Jan/74 — Feb/86			
14. Minehunter Catamarans (Phases 1 & 2)	91.13	Sep/74 — 1987 — Phase 3			
15. US-built Frigates (FFGs 01-04)	1015.56	Aug/73 — Sep/85			
16. Australian Frigates (FFGs 05,06)	859.06 <sup>(b)</sup>	Aug/76 — 1991 — 1993 — FFG05 — FFG06			
<b>TOTAL:</b>	<b>6618.47</b>				

Notes: (a) Approved phases only  
 (b) Latest approved total project cost (F/A-18, December 1982; Australian Frigates, December 1983)  
 (c) ■■■■■ = Not yet approved phase

Sources: (1) Volume 2, Chapters 2-17  
 (2) Department of Defence, *Minutes of Evidence*, op.cit, pages 2825-2828

1.35 The Committee has supplemented the evidence of the sixteen projects with evidence from the Tobruk project and five others examined by the Auditor-General (the Oceanographic Ship - HMAS Cook, Fremantle Class Patrol Craft, Modernisation of the River Class Destroyer Escorts, Humpty Doo Naval Transmitting Station, and the Air Traffic Control Surveillance Radar-East Sale).<sup>17</sup>

1.36 The evaluative criteria have been compiled from a comprehensive reading of the project management literature, a broad review of the practices of allied Defence procurement agencies, a survey of several other Commonwealth agencies with large capital equipment budgets and the Department's own procurement policies.

#### Conduct of the Inquiry

1.37 The inquiry formally began in March 1984. The Committee asked the Department of Defence to provide submissions on the sixteen projects selected. Public hearings were held on eleven projects between May and October 1984. The Committee's program of hearings was interrupted by the December 1984 election. Following the appointment of a new Committee in the Thirty-Fourth Parliament, hearings were resumed in March 1985. Hearings on individual projects were concluded in May 1985 and evidence was taken from the Department of Defence on general project management issues between May and June 1985. In addition to the evidence of the Department of Defence, the Committee took evidence from the former Department of Defence Support, the Department of Housing and Construction and a number of companies which have contracted for major Defence projects. In July and August 1985 the Committee undertook a tour of inspection of Defence facilities and sites associated with several of the projects reviewed. Details of the inquiry program together with lists of witnesses and submissions are provided at Appendices B, C and D.

1.38 To assist the Committee in its hearings, the Secretariat undertook a comprehensive and detailed audit of the records of the sixteen projects. Following the hearings supplementary information was provided by Defence. This information, wherever possible, has been incorporated in the Minutes of Evidence.

#### The Structure of This Report

1.39 The Report has been presented in two volumes. This, the first volume comprises the main report and contains the findings, recommendations and supporting arguments. The second volume contains analyses of the evidence relating to each of the sixteen projects. It presents and summarises much of the detail on which the conclusions in this volume are drawn. The following chapters will make frequent reference to Volume Two. The assessments in Volume Two are designed to stand alone.

17. Report of the Auditor-General, April 1980.  
Report of the Auditor-General, September 1980.  
Report of the Auditor-General, September 1981.  
Report of the Auditor-General, March 1982.

1.40 This volume is divided into three parts:

- . an overview of the principal findings and recommendations;
- . a 'process-oriented' analysis of Defence project management, examining in turn each discrete phase of the equipment acquisition process, ie
  - project definition,
  - project planning,
  - financial programming,
  - contracting,
  - Australian Industry Participation,
  - contract administration,
  - 'in house' project implementation; and
- . the supporting framework of Departmental organisational structures, resource management systems and the machinery of accountability.

## CHAPTER 2

### OVERVIEW OF FINDINGS AND RECOMMENDATIONS

#### The Record of the Projects<sup>1</sup>

2.1 Eleven of the sixteen projects examined have failed or may fail to be completed on time, to budget or to technical requirements. Of the five 'successful' projects, three are still at an early stage of development. Four projects (HMAS Success, Minehunter Catamarans, Basic Trainer and Hiport/Medport) qualify as especially unsuccessful having incurred significant cost and/or schedule overruns or persistent technical problems.

2.2 In seven projects the major equipment items were or are likely to enter service significantly behind approved target dates. A major element of an eighth project (the Hamel Light Gun Project) has slipped considerably. Figure 2.1 shows the performance to schedule of each of the projects as measured by the difference between the contracted acceptance date and the actual acceptance date (or latest estimate) expressed as a percentage of the time between the contract date and the initial contracted acceptance date. Almost all projects incurred some slippage in individual elements although not all these slippages affected the final acceptance date.

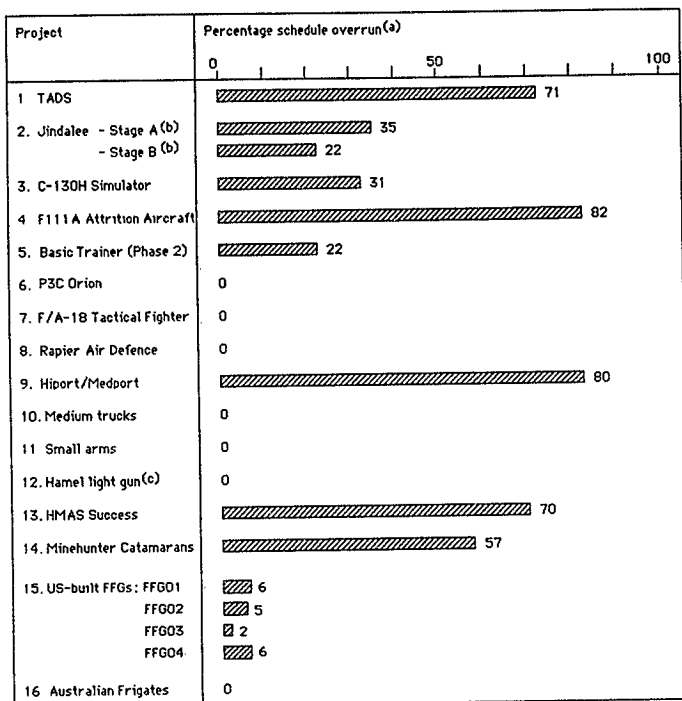
2.3 Eight projects incurred significant overall real cost increases, that is, allowing for inflation and exchange rate movements. The Committee has been unable to satisfy itself as to the precise magnitude of the real cost increases. The Department of Defence supplied real cost data for the sixteen projects but the Committee queries the appropriateness of the basis of the calculations employed by the Department. Deflating project cost increases for price movements will obscure the cost effect of the schedule slippages identified above. Figure 2.2 shows the movement in nominal and real total project costs, as estimated by the Department of Defence, for each of the projects as measured by the difference between initial approved total project costs and actual or latest estimate. In two cases up to date estimates were unavailable and the most recent approved costs have been included.

2.4 In three projects (US-built Frigates, F-111A Attrition Replacement Aircraft and Rapier) the major equipment items entered service requiring major modifications or the resolution of significant technical problems. In five other projects (Minehunter Catamarans, Tactical Air Defence System, Jindalee, Basic Trainer and Hiport/Medport) major difficulties were or have been experienced in meeting technical requirements.

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1. The following is a summary of the evidence in Volume 2, Chapters 2-17.

Figure 2.1 Schedule Slippages - Sixteen Projects



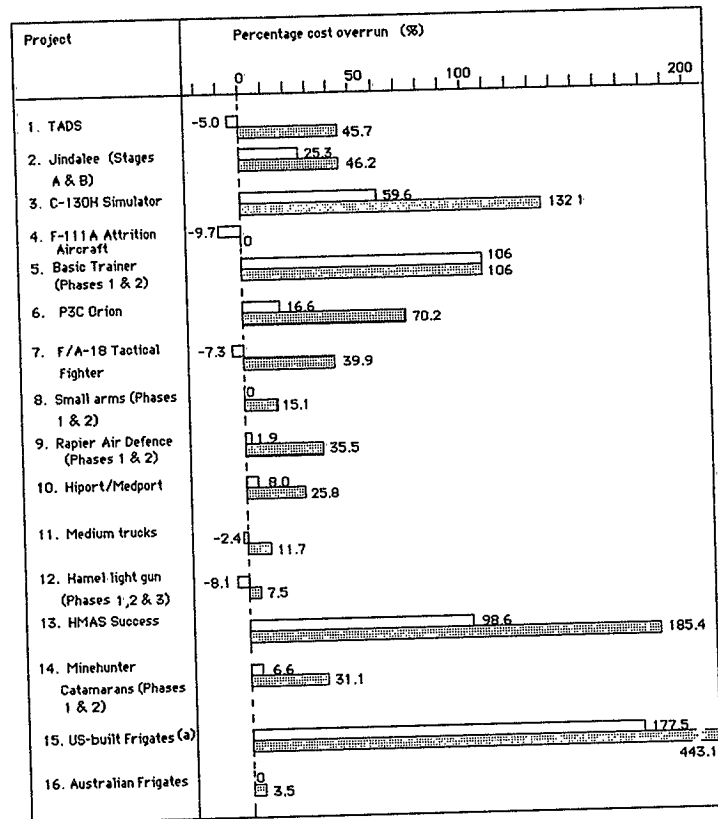
Notes : (a) = 
$$\frac{(\text{Actual acceptance date}) - (\text{Contracted acceptance date})}{(\text{Initial contracted acceptance date}) - (\text{Contract [Signature] date})} \times 100$$



(b) Planned versus actual completion dates

(c) Ammunition phase has slipped two years from planned.

Source Volume 2, Chapters 2-17

Figure 2.2 Cost Overruns - Sixteen Projects



Key:  Real Cost Variations  
 Nominal Cost Variations

Note : (a) Initial approved project cost entailed a two ship acquisition including helicopters. Final approved cost covers a four ship acquisition minus helicopters.

Source : Department of Defence, Minutes of Evidence, op cit, pages 2825-2828

2.5 Of the sixteen projects only four (Rapier, F-111A, C-130H Simulator and the FFG Frigates) have been completed, in the sense that all the major equipment have entered service. Two more (Hiport/Medport and the P3C Orion Aircraft) are expected to be completed in 1986. The Committee was unable to fully assess the final phases of the completed projects.

#### The Effectiveness of Defence Project Management

2.6 Most of the lack of success of the projects was the result of ineffective Defence project management. The Committee identified shortcomings in all aspects of project management and, to varying degrees, these shortcomings were apparent in most projects. The most common problems with Defence project management were:

##### Project Definition

- poor assessment of technical and financial risks;
- under-estimates of cost and time;

##### Project Planning

- inadequate planning of ancillary aspects such as equipment support, facilities, Australian Industry Participation;
- a lack of attention to management information and control arrangements;

##### Contracting

- inadequate specification of technical requirements;
- a lack of comprehensive evaluation of tenderers;
- contractual terms and conditions which did not reflect an equitable sharing of risk and/or failed to protect the Commonwealth's interest;

##### Contract Administration

- change control procedures which did not submit the (sometimes) large number of technical changes to the discipline of cost and schedule maintenance;
- inadequate monitoring of contractor performance;
- inadequate computer support of the project office;
- slow responses to project difficulties;

#### In-house Implementation

- unsatisfactory project records and reports; and
- an absence of project evaluation and review machinery.

2.7 Figure 2.3 summarises the shortcomings in each of the projects.

2.8 The Committee noted also that there was a reluctance on the part of Defence to seek and use readily available advice outside the public sector.

2.9 Poor project definition and planning generally reflected a lack of management resources during the early phases of a project, particularly experienced personnel in the project office, and inadequate project co-ordination. A more general lack of technical and contracting expertise contributed to the shortcomings in contracting. Subsequent implementation problems have arisen because of the dispersal of project responsibilities and authority, inadequate management information systems and the limited computer support of the project office.

2.10 Shortcomings in project definition and planning have had a cumulative effect. For instance, an under-estimation of the degree of risk generally entailed a lack of attention to management resources, reporting systems and contractual controls. As Figures 2.1 to 2.3 show, the least successful projects suffered the most comprehensive shortcomings.

2.11 The more successful projects have gained because management effort has been applied commensurate with the inherent risk of the project. The less successful projects suffered because the risk was poorly assessed and/or the management response was inadequate. Figure 2.4 compares the level of management resources assigned with the magnitude of risk inherent in each of the sixteen projects.

2.12 The fact that successful projects were few and project management shortcomings common indicated to the Committee:

- the limited development of effective project management systems in Defence; and
- the low priority accorded project management in the allocation of Departmental resources.



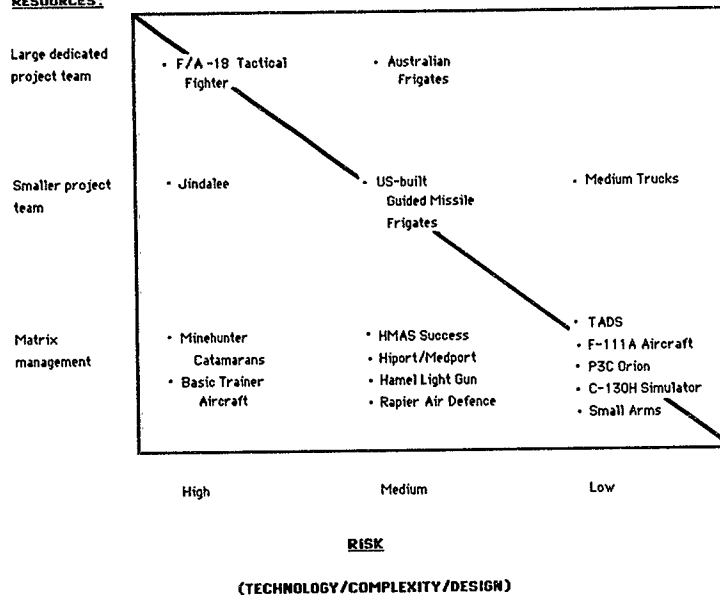
Figure 2.3 Summary of Project Management Shortcomings  
- Sixteen Projects

Project	Contract administration											In-house implementation	
	Problem category	Project definition	Project planning	Financial programming	Contracting	Australian Industry Participation	Performance reporting	Computer support	Quality assurance	Change order procedures	Government Furnished Equipment /Information	Integrated Logistic Support	Documentation, etc
1. TADS	X	X	X				X			X		X	X
2. Jindalee	X	X					X					X	X
3. C-130H Simulator		X	X				X	X			X	X	
4. F-111A Attrition Aircraft		X	X	X			X				X	X	
5. Basic Trainer Aircraft	X	X	X	X		X	X		X			X	X
6. P3C Orion	X	X	X				X	X					
7. F/A-18 Tactical Fighter	X		X										
8. Small arms	X						X					X	
9. Rapier Air Defence	X	X					X				X	X	X
10. Hiport/Medport	X	X		X		X	X		X			X	X
11. Medium trucks							X	X				X	
12. Hamel light gun	X	X	X				X				X		X
13. HMAS Success	X	X		X		X	X	X		X		X	X
14. Minehunter Catamarans	X	X		X		X	X			X		X	X
15. US-built Frigates	X		X		X			X				X	
16. Australian Frigates		X						X		X	X		

Source : Volume 2, Chapters 2-17

Figure 2.4 Comparison of Project Management Resources and Assessed Risk  
- Sixteen Projects.

**RESOURCES:**



**RISK**

(TECHNOLOGY/COMPLEXITY/DESIGN)

- Notes (a) Risk was measured by reference to:
- the level of new technology;
  - project complexity (number of elements and time frame); and
  - the level of design effort.
- (b) Projects on the diagonal were assigned management resources commensurate with the level of risk in the project. Projects lying to the left of the diagonal had insufficient management resources.

## Efficiency of Defence Project Management

2.13 In addition to project management arrangements for individual projects, the Committee scrutinised overall Defence procurement decision-making processes and general resource management within the Department. It identified inefficiencies in a number of areas: project approval procedures, contractual arrangements, project administration and resource management.

2.14 The Committee found that:

- the evaluation of project proposals did not always
  - assess alternative, cost saving options, or
  - consider varying the specifications to contain cost or schedule;
- few contracts provided effective incentives for the contractor to minimise cost or perform to schedule;
- the lines of communication and control were often lengthy and complex, slowing decision times;
- administrative lead times within the external purchasing authority responsible for contract administration were also lengthy;
- the productivity of project management resources was constrained by
  - limited staff training and project management skills,
  - high staff turnover and low retention of knowledge and skills,
  - minimal computer support; and
- the allocation of project management resources was made in the absence of any internal resource costing system.

## The Response of the Department of Defence

2.15 Defence has acknowledged many of the difficulties identified in the Report, in particular project organisation and staffing, training, computer support and contracting arrangements. According to the Department, its project management systems have been continually evolving since they were established in the mid 1970s. Increasing use has been made of dedicated project teams, project directors have been assigned increased managerial authority, better project planning procedures have been developed, modern project planning techniques introduced and computer support given to project offices.<sup>2</sup>

2. Minutes of Evidence, *op cit*, pages 2167, 2171-2172 and 2191.

2.16 In response to the findings of the Utz Report on the Higher Organisation of the Department of Defence and also in response to criticisms by the Auditor-General and this Committee, major equipment acquisition functions have been centralised in the Capital Procurement Organisation (CPO) established in June 1984. The Department believed the new CPO would overcome the unsatisfactory dispersal of project responsibility and authority, allow more authority to be vested in project directors, simplify project organisational arrangements, allow project directors to better co-ordinate the inputs from functional areas and generally reduce decision-making times.<sup>3</sup>

2.17 The CPO was established after the inquiry began and the Committee had no evidence to assess the impact of the associated changes which were, up to the conclusion of the inquiry, still being implemented. The Committee believes that the changes embodied in the CPO initiative will effect a significant improvement in the management of major Defence equipment acquisitions. Its recommendations have been drafted with this factor in mind.

2.18 The Committee has a number of concerns about the adequacy of the CPO initiative.

- It is concerned that the change may represent only a formal change in the top management structure that will leave the underlying intra-Service relationships unchanged. The Committee believes that the procurement function should be given autonomy or independence from the Services. There has been a tendency for the Service sponsors or functional areas to maintain undue control over the technical aspects of projects. As a result large numbers of specification changes have been made, usually with adverse effects on cost and schedule.
  - Most project directors still do not have authority commensurate with their enhanced responsibilities. In addition to the limited control over technical aspects, project directors have limited control over project administrative resources.
  - The CPO initiative makes no explicit reference to training and other critical personnel management issues.
  - The current draft CPO ADP Strategic Plan envisages only a limited and gradual upgrading of computer support for project management.
- 2.19 Of even more concern to the Committee was:
- Defence's perceptions of the magnitude of the problems revealed in the evidence; and

3. Minutes of Evidence, *op cit*, pages 3165-3185.

the priority it accorded improvements in the efficiency and effectiveness of project management.

2.20 Some senior Defence officers disputed the extent to which projects have run over cost or schedule.<sup>4</sup> Cost and schedule overruns can be measured by reference to either the initial Government approval or the latest approval. There appears to be disagreement about which is the most appropriate 'performance baseline'.<sup>5</sup> In the Committee's view, the lack of agreement as to project baselines was a major shortcoming recurring throughout Defence project management.

2.21 Efficient project management appeared to be accorded a secondary priority within Defence.<sup>6</sup> The savings foregone by projects not being delivered to cost represent resources not available to be applied to other Defence purposes and the shortfall in capability which may result from project delays is a cost to Defence preparedness.

#### Accountability

2.22 The unsatisfactory status accorded to project management within Defence underlined for the Committee the importance of public accountability, the third element in the inquiry's terms of reference. If other Defence priorities outweigh efficient project management, then the choices and their consequences should be made explicit. Unfortunately, Parliamentary scrutiny of the Defence equipment acquisition process is inadequate. In the first place it is unsystematic and in the second the requisite information is not routinely available. The Committee concluded that the current reporting arrangements to Parliament need to be substantially improved.

#### The Recommendations

2.23 The Committee has made some sixty-eight recommendations with the object of improving the effectiveness, efficiency and accountability of Defence project management.

2.24 To improve the effectiveness of Defence project management the Committee has recommended:

- (1) assigning the Capital Procurement Organisation (CPO)
  - increased control over the initial phases of the development of projects (recommendations 4, 5 and 48), and
  - increased authority over technical aspects of equipment procurement (18, 36, 38 and 52);
- (2) clarifying the delineation of responsibilities between the CPO and the Service sponsor or client organisation (13, 47 and 49);

4. Minutes of Evidence, op cit, page, 2252.

5. Ibid, pages 2252-2254.

6. See Department's comments at: Minutes of Evidence, op cit, pages 2167, 2174 and Report of the Auditor General, September 1983, page 37.

(3) delegating more authority to project directors, especially over technical and administrative aspects (18, 36, 38, 50 and 64);

(4) increasing the level of staffing of project offices, especially technical staff (17, 18, 47, 51 and 52);

(5) increasing the level of computer support to project offices (16, 33);

(6) making greater use of project management expertise outside Defence, especially that in the private sector (5, 17, 19, 20 and 55);

(7) implementing improvements in Defence project management information systems, including

- project documentation (2, 4, 6, 7, 11, 12, 13, 14, 21, 42, 43 and 46),

- internal reporting (44),

- project evaluation and review (45); and

(8) improving the level of control over post-contract project implementation through

- more flexible tendering procedures (21, 22 and 34),

- stronger contractual penalties (26 and 29), and

- programs to improve cost and schedule performance monitoring (30, 31 and 32) and quality management (34, 35 and 36) among Australian Defence suppliers.

2.25 The further centralisation of procurement functions, the increased delegation of authority to project directors and increased computer support to project offices will improve also the efficiency of Defence project management by shortening decision chains and increasing productivity. The Committee believes there is considerable scope for further improving the efficiency of Defence project management by:

(9) modifying Departmental procurement approval procedures to

- speed decision-making (recommendations 1, 38, 39, 40 and 41), and

- improve the quality of information available to decision-makers
  - to allow a fuller consideration of cost-saving options (2, 3, 4, 7, 8, 10 and 11), and
  - to avoid costly changes during project implementation (12, 13, 14, 37 and 49);
- (10) increasing the level of project management skills within Defence by
- giving greater emphasis to project management experience in selecting key project personnel (53 and 54), and
  - expanding project management training at all levels (10, 24, 30, 58, 59 and 60);
- (11) increasing the retention of project management skills by developing career paths in project management and related areas (53, 54, 61, 62 and 63);
- (12) consolidating Defence project management procedures and practices (9, 22, 42, 43 and 46);
- (13) providing stronger contractual incentives for suppliers to meet requirements on time and to cost (23, 24, 26 and 28); and
- (14) reducing the potential for post-contract delays by simplifying
- design approval (40),
  - contract change orders (37, 38 and 39), and
  - dispute resolution (25 and 27) procedures.

2.26 The implementation of a number of these recommendations (contract project management services, computer support, training) will require additional resources. Others (project office staffing) will involve a reallocation of existing Defence resources. The Committee believes that improved efficiency will provide the necessary offsetting savings.

2.27 Improved accountability will be assisted by centralising functional responsibilities, establishing firm management performance baselines and improving management information systems. To provide the necessary external oversight the Committee has recommended annual reporting to Parliament on the major Defence equipment program (recommendations 67 and 68).

2.28 A number of recommendations will require action by or the co-operation of agencies outside the Department of Defence, specifically the Public Service Board (recommendation 61), the Department of Finance (65) and the Auditor-General (68).

2.29 In a number of instances the Committee has recommended further inquiry by Defence and report to the Committee (recommendations 15, 41, 45, 56, 57 and 66).

## CHAPTER 3

### PROJECT DEFINITION

3.1 Project definition refers to the initial phase of procurement action. It commences with the identification of a capability requirement (a Staff Objective or Staff Target)<sup>1</sup> and is substantially completed with a proposal being placed before Government seeking endorsement to a generic equipment solution,<sup>2</sup> that is, at 'project approval'.

3.2 Prior to project approval, programming and funding action is necessary. This aspect is discussed in Chapter Five.

3.3 The objective of project definition should be to provide the Government with the most cost effective option for meeting Defence requirements within the limits of financial guidance provided. Project definition should provide 'sufficient detail to enable a decision to proceed to procurement... with a high degree of assurance of the outcome in terms of cost and performance'.<sup>3</sup>

1. In Defence usage, Staff Objectives, Targets and Requirements are defined as follows.
  - . A Staff Objective is a statement of a capability considered to be necessary for the effective conduct of operations.
  - . A Staff Target is a statement describing in broad terms the functions and desired performance of an equipment or system as a basis for determining the technical and scientific feasibility of the proposal, the risks involved and indicative costs.
  - . A Staff Requirement is a statement of the function, main features and performance required of an equipment or system which can reasonably be expected to be available in the stated time frame to enable proposal requirement definition and acquisition to proceed. (Department of Defence, Defence Instructions (General) ADMIN 05-1 (August 1980), paragraph 8).
2. By 'generic' Defence mean that approval is sought to acquire for example, a particular number of trucks having cross-country capability and a load capacity of about four tonnes without specifying a particular source of supply. The particular brand of vehicle will usually be determined later following a process known as source selection. (Minutes of Evidence, op cit, page 2180).
3. Department of Defence, Army Office Instructions (1976), Amendment No. 22 (June 1981), Chapter 19, paragraph 19102.

3.4 Project definition, in the view of the Committee, requires:

- the full identification and thorough analysis of capability requirements;
- the evaluation of both equipment and non-equipment options;
- the identification of the whole of life cost of equipment options;
- the refinement of key performance specifications, through measures such as 'trade-offs' to achieve cost efficiency;
- the complete identification of all elements of the proposed project - facilities, manpower, training, support equipment, spares and the like; and
- full and accurate estimates of risk, cost and time scale.

3.5 Failure to comprehend and meet these exacting requirements of project definition has serious consequences for maximising Defence effectiveness within the financial resources made available by the Government and for timely delivery of new equipment. For instance, an under-estimate of cost may, in the face of financial constraints, cause the project to be 'stretched-out' or critical elements cut back. An under-estimate of risk may lead to inadequate management resources being allocated to implement the project. Poor specifications may lead to re-tendering, re-negotiated contracts or costly post-delivery modifications.

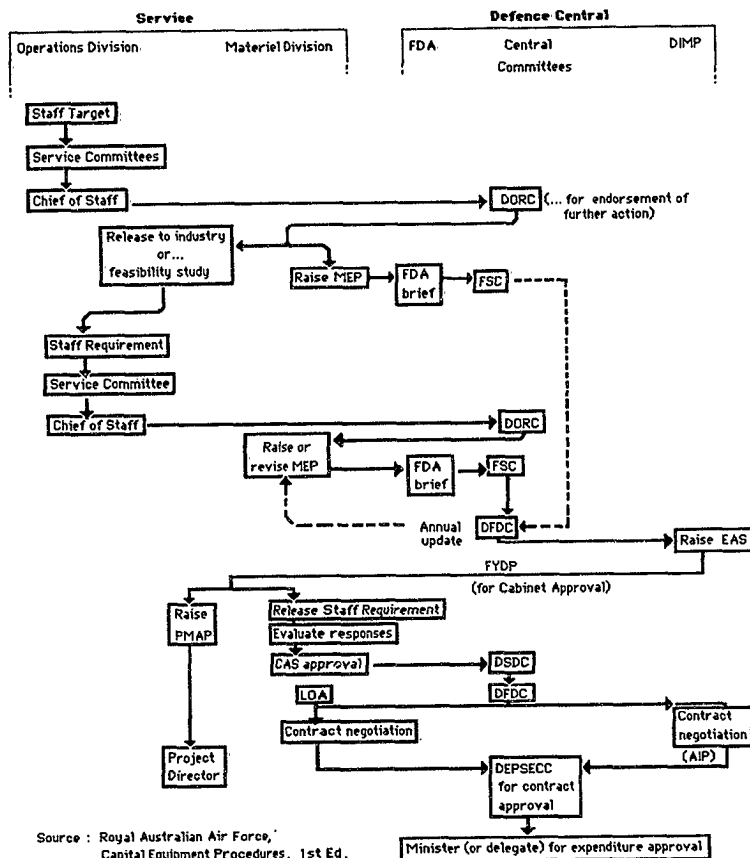
#### Project Definition in Defence

3.6 During the initial period of project definition, responsibility is carried by the Service operational requirements areas. The Capital Procurement Organisation (CPO) may provide assistance to the Services prior to accepting primary responsibility for procurement at the time of the endorsement of the Major Equipment Proposal (MEP) by the Defence Force Structure Committee (FSC).<sup>4</sup>

3.7 Figure 3.1 outlines the decision-making process associated with the preparation of a project for Government approval.

4. A fuller description of the Defence decision-making process leading up to project approval is provided in Minutes of Evidence, op cit, pages 3095-3155.

Figure 3.1 Outline of the Defence Acquisition Decision-making Process from the Staff Target to Project Approval



Source : Royal Australian Air Force, 'Capital Equipment Procedures, 1st Ed, Annex A to Chapter 6.

## Summary of Evidence

3.8 Project definition was a significant problem area for half of the 16 projects examined by the Committee. The major shortcomings were:

- . difficulty in reaching agreement on capability requirements (FFG helicopters<sup>5</sup>);
- . failure to assess with sufficient thoroughness alternative options (Basic Trainer - cost saving pilot training options,<sup>6</sup> F/A-18 - single role versus multi-role aircraft<sup>7</sup>);
- . failure to adequately consider trading off full compliance with user requirements for cost or schedule savings (Basic Trainer,<sup>8</sup> P3C Orion<sup>9</sup>);
- . under-estimates of project costs (Basic Trainer,<sup>10</sup> Jindalee,<sup>11</sup> P3C Orion,<sup>12</sup> US-built FFGs,<sup>13</sup> HMAS Success,<sup>14</sup> Minehunter Catamarans<sup>15</sup>) and omissions (Hamel,<sup>16</sup> Rapier<sup>17</sup>);
- . inadequate assessment of technical risk, particularly the level of design or development required (Minehunter Catamarans,<sup>18</sup> Hiport/Medport,<sup>19</sup> Tactical Air Defence System<sup>20</sup>); and
- . inordinate delay in finalising project definition (Rapier,<sup>21</sup> Hamel,<sup>22</sup> Small Arms Replacement,<sup>23</sup> Jindalee<sup>24</sup>).

3.9 Deficient technical specifications were also evident. They occurred in the context of tendering to industry and are discussed in Chapter Six.

5. Volume 2, paragraphs 2.34-2.46.
6. Ibid, paragraphs 8.23-8.27.
7. Ibid, paragraphs 6.15-6.19.
8. Ibid, paragraphs 8.57-8.60.
9. Ibid, paragraph 7.30.
10. Ibid, paragraphs 8.33-8.40.
11. Ibid, paragraph 10.10.
12. Ibid, paragraph 7.32.
13. Ibid, paragraphs 2.13-2.15.
14. Report of the Auditor-General, September 1983, pages 25, 54-55.
15. Volume 2, paragraphs 5.29-5.31.
16. Ibid, paragraph 16.25.
17. Ibid, paragraph 15.7.
18. Ibid, paragraphs 5.10-5.18.
19. Ibid, paragraph 17.22.
20. Ibid, paragraph 11.28.
21. Ibid, paragraphs 15.3-15.4.
22. Ibid, paragraphs 16.4-16.13.
23. Ibid, paragraphs 14.7-14.17.
24. Ibid, paragraphs 10.7-10.11.

## Consideration of Issues

3.10 The Committee sought to identify possible sources within project management for the noted shortcomings in project definition. The following four aspects were seen to be significant:

- . difficulties created by the Defence Committee system in reaching agreement on capability requirements;
- . incomplete scrutiny of proposals;
- . poor cost estimation procedures; and
- . inappropriate management organisation and inadequate management resources.

### Reaching Agreement on Capability Requirements

3.11 The Committee acknowledges the problems of defining capability requirements in a situation of limited financial resources and perceived low-level defence threat.<sup>25</sup>

3.12 The system of Defence Committees is designed to bring a large number of considerations to bear on project proposals. The joint consultative process however does not necessarily operate to expedite decisions on equipment proposals in a timely fashion.

3.13 One case in point examined by the Committee was the extended and costly delay in deciding on the role and capability of the helicopters intended for the four frigates purchased from the United States between 1975 and 1984. The four frigates were delivered without helicopters, an integral part of their capability, and the first three will require expensive modifications to enable them to deploy the helicopters finally selected. The Department argued that the delays were caused by the lack of suitable helicopters and weapon and sensor systems. While this contributed to the delay, Defence took a long time to finalise criteria on which it could determine what equipment was suitable. The difficulty apparently lay in a dispute between the frigate and aircraft carrier lobbies within Defence. The Government decision against a new aircraft carrier served to resolve the helicopter capability question. The dispute within the Defence Committees had serious cost and military implications.<sup>26</sup>

3.14 It is clear that Defence Committee disagreements need to be formalised and higher authorities must be willing to act promptly where advisory bodies fail to make prompt or timely recommendations.<sup>27</sup>

25. See, for example Paul Dibb 'Australia's Security Environment and Defence Policy' Journal of the Royal United Services Institute of Australia V7(2) June 1985, pages 16-22.

26. Volume 2, paragraphs 2.34-2.46.

27. Defence Review Committee, op cit, paragraphs 5.22-5.23.

3.15 The central problem is one of providing overall force structure guidance on which to judge individual equipment capability requirements. This problem has been long recognised and debated. One view is that the issue lies in a lack of coherent government policy on defence posture and hence the degree of preparedness.<sup>28</sup> Another view attributes the source to the difficulty of providing government, through the joint consultative process within Defence, with hard forward planning options.<sup>29</sup> The issue is being addressed in the current review into Australia's Defence Capability Requirements by Mr Paul Dibb. Mr Dibb was due to report to the Minister for Defence in early 1986.

3.16 The Committee recommends that:

1. Where major disagreements within Defence Committees impede procurement action, the Secretary of the Department of Defence report to the Minister on the nature of the disagreement and the alternative courses of action.

#### Scrutiny of Requirements and Proposals

3.17 Equipment requirements and resultant proposals are formulated and submitted by individual Services. Defence procurement policy requires comprehensive, detailed and thorough scrutiny of requirements and proposals in an orderly fashion.

3.18 The process is time-consuming but this fact need not be a problem if the proposals come to be adequately defined before Government approval is sought. However, existing Defence arrangements do not guarantee that this will be done.

#### Findings

3.19 The Committee reached the following conclusions.

- Instructions for the preparation of a Staff Requirement by the Service sponsor provide for but do not require
  - a comparison of 'whole of life' costs of generic options,
  - completion of a feasibility study to establish the most cost effective generic solution, and
  - detailed assessment of technical risk.<sup>30</sup>

28. W.B. Pritchett 'Consultants Extraordinary' Pacific Defence Reporter, May 1985, pages 8-9.

29. Hugh White 'No Minister, Say the Defence Mandarins' Sydney Morning Herald, 15 May 1985.

30. Defence Instructions (General), ADMIN 05-1, August 1980, Annex C.  
Royal Australian Navy Project Management Manual, ABR 5069, January 1982, Chapter 5.  
Army Office Instructions, op cit chapter 19.  
Royal Australian Air Force, Capital Equipment Procedures, AAP 5332.001, October 1983, Chapter 3.

- Project feasibility studies have not always been adequate.<sup>31</sup>
- Initial vetting of a Staff Requirement by the Defence Operational Requirements Committee (DORC) does not ensure
  - that options other than for equipment are canvassed, and
  - that there will be an independent assessment of options.<sup>32</sup>
- Staff Requirements are neither formulated by Service sponsors nor examined by the DORC, with economic or resource considerations foremost in mind. Strategic and military issues predominate at these levels.<sup>33</sup>
- MEPs are developed from the endorsed Staff Requirement. Examination by the FSC of MEPs is influenced by the independent assessment by the Force Development Division. That Division is constrained by time and its own small staff of analysts to a largely reactive response to proposals.<sup>34</sup> Additionally, the sequencing of separate consideration of strategic requirements by DORC and resource programming by FSC carries with it the danger of seeking to accommodate projects to available resources, that is, the availability of funds may dictate to a large degree the final equipment decision.<sup>35</sup>
- Procedures allow but do not require that project definition studies are used in a 'positive loop' to modify Staff Requirements to take account of, for example, cost or what is currently available from industry.<sup>36</sup>

31. For example, the Basic Pilot Trainer Aircraft Project, Volume 2, paragraphs 8.22-8.41.

32. See Joint Committee on Foreign Affairs and Defence, op cit, pages 36-37 and Defence Review Committee op cit, paragraphs 5.150-5.157.

33. Defence Instructions (General), ADMIN 05-1, op cit, paragraphs 19-22, Annexes D and E.

34. Minutes of Evidence, op cit, pages 2226-2228. Defence Review Committee, op cit, paragraphs 4.63, 4.71-4.86.

35. Ibid, paragraphs 5.47, 5.137-5.142.

36. Defence Instructions (General) ADMIN 05-4, August 1978. Army Office Instructions, op cit, paragraphs 1955, 1963-1966, 1983-1988.



The Committee recommends that:

2. Staff Targets submitted to the Defence Operational Requirements Committee (DORC) incorporate preliminary cost estimates based on whole of life costs for the proposal under consideration and comparable estimates for other options.
3. Feasibility studies undertaken by Service sponsors be monitored by the Defence Central Studies Unit to achieve high standards of consistency.
4. (a) Sole responsibility for advancing a project from acceptance into the Five Year Defence Program (FYDP) to project approval be transferred from the Service sponsor to the Capital Procurement Organisation (CPO). Close relations must be maintained between the CPO and Service sponsor.
- (b) Major Equipment Proposals (MEPs) submitted to the Force Structure Committee (FSC) for acceptance into the FYDP be accompanied by statements containing good quality indicative costs, alternative capability options and a firm time frame for decisions.
5. Project definition studies, which may be undertaken 'in house', jointly with other Departments and/or private industry, or by private industry, be controlled by the CPO.
6. Project definition studies include:
  - (a) key or performance specifications (including an examination of variations to specifications to contain cost and risk and maximise Australian Industry Participation (AIP));
  - (b) tender-quality cost and time-scale estimates;
  - (c) a detailed assessment of areas of technical risk;
  - (d) whole of life equipment support requirements;
  - (e) proposed project management arrangements including procedural and reporting arrangements with the selected supplier; and
  - (f) a draft Equipment Acquisition Strategy (EAS) including an AIP strategy.

7. The endorsed Staff Target be reviewed in the light of project definition studies before endorsement as a Staff Requirement.
8. No MEPs be considered for project approval unless accompanied by:
  - (a) key specifications and an examination of differing levels of capability to contain cost and time and to provide varying levels of AIP;
  - (b) tender-quality cost and time estimates;
  - (c) a detailed assessment of areas of technical risk;
  - (d) a complete listing of equipment support requirements; and
  - (e) an endorsed EAS including an outline of proposed management arrangements.

#### Estimating Project Cost

3.21 Project costs were frequently under-estimated by Defence.<sup>37</sup> The persistence of this problem appears to arise from four sources:

- Departmental costing procedures which do not provide adequate guidance or which are not followed;
- limited 'in-house' costing expertise;
- inadequate scrutiny of cost estimates provided by industry; and
- incentives within the Defence decision-making process to understate project costs to facilitate project approval.

3.22 Until recently responsibility for initial and pre-approval estimates lay with the Service sponsor. Since mid 1984 the Capital Procurement Organisation has assumed responsibility for pre-approval estimates.<sup>38</sup>

37. See paragraph 3.8.

38. Minutes of Evidence, op cit, pages 2295 and 2347.

3.23 The Defence Costing Manual describes the costing concepts, standards and types of cost to be applied across the range of Defence functions. The manual does not describe how to cost equipment projects.<sup>39</sup> A Departmental review of costing stated 'the rules are neither sufficiently comprehensive nor adequately understood to ensure a consistent approach throughout the Department and the Defence Force'. A major revision of the manual is underway and due for completion in May 1986.<sup>40</sup>

3.24 The RAN Project Management Manual, issued in January 1982, contains a description of project estimating techniques and categories of cost estimates required for the various stages of development of a project. Budget quality estimates should be within 20 per cent of actual.<sup>41</sup>

3.25 Costing for design and development projects has presented considerable difficulty. Defence does not employ cost engineers and appears to have limited technical expertise to undertake these tasks.<sup>42</sup> In recent years Defence has used funded industry project definition studies to provide better estimates. Industry studies have not always been satisfactory. Industry costings have not always contained sufficient costing detail or consideration of risk factors.<sup>43</sup> The Department is aware of this problem and believes that 'the ultimate way out ... is in contract incentives', for example, target price incentive contracts.<sup>44</sup>

3.26 If, as suggested above, the present force structure guidance is inadequate, equipment decisions will tend to be based on financial programming criteria. That is, projects will be fitted to the funds available.<sup>45</sup> Under these conditions there is an incentive for Service sponsors to under-estimate project costs to gain approval. Sponsors operate on the expectation that approved projects will be difficult to cut back if subsequent cost overruns occur or if there are budgetary constraints on the program. The Committee believes that project sponsors must be accountable for the accuracy of their pre-approval cost estimates. The accountability issue is addressed in Chapter Twelve.

39. Department of Defence, FINSERVMAN 5, Volume 1, Costing General Systems.

40. Department of Defence, Departmental Finance Instruction No. 2/84 'Costing Policy Within the Defence Organisation', 10 April 1984.

41. RAN Project Management Manual, op cit, Chapter 16, Annexes B,C,D and E.

42. Minutes of Evidence, op cit, pages 2349-51.

43. Ibid, pages 2352 and 2355-56.

44. Ibid, page 2358.

45. W.B. Pritchett, op cit, page 9.

3.27 The Committee recommends that:

9. The Defence Costing Manual at present being revised include a section describing procedures for costing major equipment proposals. These procedures should address the need for estimates to:

- (a) cover all project elements;
- (b) be built up from the lowest work task level;
- (c) meet confidence levels required for the stage of development of the project; and
- (d) include appropriate contingency allowances.

10. Appropriate training programs be instituted following the issue of the revised (and expanded) Defence Costing Manual.

11. Consideration be given to the establishment of a Project Costing Unit within the CPO with links to the Financial Services and Internal Audit Division and with specific responsibility for:

- (a) providing expert advice on project costing;
- (b) monitoring the quality of project estimates; and
- (c) maintaining an equipment cost data base.

#### Organisation and Resources

3.28 It was evident that this stage of project management has often been poorly organised and inadequately resourced. The Department of Defence acknowledged a lack of resources affected the HMAS Success and Minehunter Catamarans projects.<sup>46</sup>

3.29 Prior to endorsement of the Staff Requirement, the major responsibility for the quality of work rests with the Service sponsor, usually the Service Operational Requirements Branch or Division. In the case of Army and Navy, the Service Materiel Branches within the CPO carry the further responsibility for refining proposals through definition studies. That responsibility is retained in Air Force Operational Requirements Division until projects are approved by Government.<sup>47</sup>

46. Volume 2, paragraphs 4.47 and 5.21-5.24.

47. RAN Project Management Manual, op cit, paragraphs 301. Army Office Instructions, op cit, paragraphs 1907. Royal Australian Air Force, Capital Equipment Procedures, op cit, paragraph 202.

3.30 Project management organisation varies. Army relies largely on a co-ordinative system of project management whereby the project director has a largely co-ordinative role and managerial authority remains with the functional areas. This practice is also followed by Navy and Air Force for their smaller projects. In the past five years or so these two Services have assigned large dedicated project teams to manage major projects such as the Australian Frigate and the F/A-18 projects from a relatively early stage of development.<sup>48</sup> As a result of this, the Committee believes, definition of these projects has been good.

3.31 Typically however, full-time project management commences too late or without the resources to satisfactorily complete the project definition tasks. Reliance on responses from functional areas of the Department is an inadequate managerial strategy for this critical phase.

3.32 These management weaknesses are apparent in all Services although there is a growing recognition of the value of establishing dedicated project offices much earlier in the life of a project. Army has yet to advance its project management resources to such a level in this initial definition stage. This issue is taken up again in Chapter Ten.

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48. Minutes of Evidence, op cit, pages 1945-1978.

## CHAPTER 4

### PROJECT PLANNING

4.1 Project planning is organising the means to achieve the desired outcomes of the project. Whereas project definition is concerned with the objectives and dimensions of the project, planning is concerned with the means. Planning documents define the structures by which the project is to be managed and planning targets become the baselines against which the performance of project management can be measured. In the project life cycle project planning overlaps project definition.

4.2 Project planning, in the view of the Committee, consists of:

- . defining all tasks required to implement the project;
- . estimating the resources required to carry out these tasks;
- . scheduling activities and resources;
- . identifying areas of risk and formulating appropriate systems to minimise and overcome such risk; and
- . establishing milestone or review points for the achievement of critical activities.

4.3 Effective project planning must meet several criteria.

- . An overall project plan must be in place before significant project activity commences. Detailed planning documents should be complete prior to the implementation phase.
- . Project planning documents must be developed by an appropriately qualified team led by the project director. Agreement to the plans must be obtained from all areas involved in implementation.
- . Plans must comprehend all project activities commencing with definition studies and concluding with the introduction of the equipment into service. It is important for Defence equipment acquisition plans to embrace Integrated Logistics Support, Australian Industry Participation (AIP), facilities and personnel.

- Plans should signify the interrelationships between project activities and identify the sequence of critical activities or 'critical path'.
- Planning documents must clearly allocate responsibility for tasks, establish performance standards against which to measure achievement and provide for contingencies.
- Although plans will be refined as the project develops, the major planning baselines - budgets, schedules, task statements - should remain firm. Where extraneous factors force changes to these baselines, Ministerial approval for the changes should be required.

#### Project Planning in Defence<sup>1</sup>

4.4 The responsibility for project planning in Defence rests with the Chiefs of Materiel in the Capital Procurement Organisation and centres on the development, issue and endorsement of two major documents, the Equipment Acquisition Strategy (EAS) and the Project Management and Acquisition Plan (PMAP). Prior to the establishment of the Capital Procurement Organisation (CPO), the Defence Industry and Materiel Policy Division was responsible for the EAS.

4.5 Defence Instructions state that the EAS should be produced after the endorsement of the Staff Requirement and agreed to before industry is approached.<sup>2</sup>

4.6 As an overview planning framework, or initial plan, the EAS contains a broad statement of project management arrangements, a timetable for critical activities, details of the tendering and contracting strategy and an identification of review and decision points. Endorsement by the Defence Source Definition Committee is required.

4.7 Draft Defence Instructions state that the PMAP usually will be issued before the issue of requests for tender and may need revision or augmentation as the project develops.<sup>3</sup>

4.8 The PMAP is a detailed control plan covering the implementation phase. It contains details of the size and composition of the project office, a comprehensive listing of project tasks and detailed internal management arrangements and schedules for the production and delivery of prime equipment, government furnished equipment, support and facilities. It also contains details of AIP, reporting systems, review points, scheduling of expenditure and acceptance procedures.

1. This summary of Defence project planning procedures is drawn from Defence Instructions (General) ADMIN 05-3, June 1977, Paragraphs 95,96 and Annex A.
2. Ibid, Annex A, paragraph 8.
3. Draft Instructions for Procurement of Defence Equipment and Associated Services, November 1983, Paragraph 173.

#### Summary of Evidence

4.9 All 16 projects examined by the Committee displayed some shortcomings in planning.

4.10 The examination identified several planning shortcomings.

#### Documentation

Three projects, Jindalee, Rapier and C-130H Simulator had neither EAS nor PMAP documents. Jindalee was controlled by an Air Force Project Directive, and the C-130H by a Logistics Management Plan (LMP). The US-built Frigate Project, F-111A and F/A-18 did not have an EAS and PMAPS were not issued for HMAS Success, Minehunter Catamarans and TADS.

#### Timing

PMAPS for Hamel, Hiport/Medport, F-111A and Basic Trainer Projects were issued following rather than prior to contract.

#### Scope

Planning either excluded, or did not cover adequately, support requirements (F-111A, C-130H Simulator, Rapier and Hamel), facilities (Hamel and the Australian Frigate Project), or AIP/Local sourcing (Rapier, Hamel, Minehunter Catamarans, and the Australian Frigate Project).

#### Content

Network planning was not used in Jindalee or TADS.

4.11 Inadequate project planning contributed in a major way to difficulties experienced in six projects - Hiport/Medport,<sup>4</sup> Minehunter Catamarans,<sup>5</sup> HMAS Success,<sup>6</sup> Basic Pilot Trainer,<sup>7</sup> TADS<sup>8</sup> and Jindalee.<sup>9</sup> It is too early to assess how far the shortcomings noted in the planning of a number of new projects will affect their outcomes.

#### Consideration of Issues

4.12 The Committee found the sources of planning difficulties in four areas:

- EAS and PMAP procedures and documentation;
- the application of modern planning techniques;

4. Volume 2, paragraphs 17.39-17.41.
5. Ibid, paragraphs 5.10-5.18.
6. Ibid, paragraphs 4.45-4.47.
7. Ibid, paragraphs 8.28-8.32.
8. Ibid, paragraphs 11.15-11.21.
9. Ibid, paragraph 10.12.

- . the level of computer support available for project planning; and
- . staff resources.

#### Procedures

4.13 The EAS and PMAP system is sound. However, the procedures are not always followed and the content of the documentation is not sufficiently comprehensive.

4.14 The Hamel and Jindalee projects were initiated prior to the introduction of the EAS and PMAP procedures in 1977. The issue of these planning documents is discretionary. On occasions other documents (contracts, Staff Directives) have been considered adequate for planning purposes.<sup>10</sup>

4.15 The Committee believes that an EAS and a PMAP must be issued for all major projects. An endorsed EAS must be lodged with the submission to Government for project approval and a PMAP agreed to before the contract date.

4.16 The Committee recommends that:

12. (a) As the key planning documents an Equipment Acquisition Strategy (EAS) and a Project Management and Acquisition Plan (PMAP) must be compiled for all major projects irrespective of the coverage of other documents.
  - (b) The EAS must be endorsed by the Defence Source Definition Committee prior to project approval and form part of the submission to Government.
  - (c) The PMAP must be agreed upon by all Departmental parties (Service sponsor, project director, functional agencies) before the commencement of the implementation phase. Where detailed plans are not possible prior to commencement, indicative planning must be undertaken before significant related work commences. Later revisions of the PMAP should incorporate the subsequent detail.
13. The EAS and PMAP provide a definitive baseline for the project director, with the PMAP being a binding agreement between the Departmental parties involved in project implementation. Amendments to the PMAP would therefore be subject to formal procedures.

#### Documentation

4.17 Guidelines for the preparation of EAS and PMAPs do not address the need to include in the documentation:

10. For example, the Jindalee, C-130H Simulator and Basic Pilot Trainer projects.

- . explicit allowance for areas of risk, for example, contingency plans, identification of priority areas for management control;
- . consideration of the need for cost effective management information systems; and
- . comprehensive resource plans, including personnel and ADP plans.

4.18 The Committee recommends that:

14. Guidelines for the compilation of the EAS and PMAP be augmented to require that:
  - (a) resource plans include detailed consideration of computer services and manpower needed throughout the life of the project;
  - (b) the level of assessed risk is appropriately matched by monitoring and control systems; and
  - (c) all information and control requirements are assessed for their cost effectiveness.

#### Planning Techniques

4.19 Project planning techniques such as Program Effectiveness Review Technique (PERT) and Critical Path Monitoring (CPM) are well understood in Defence. However, they appear to have only recently been applied to a significant extent within Defence project offices. Defence generally has relied on contractor-supplied PERT and CPM data. Air Force Materiel Division has a section providing networking and schedule analysis support for 24 Air Force projects.<sup>11</sup>

4.20 Other project planning techniques such as resource scheduling and levelling and sensitivity analysis are used, usually in manual systems.<sup>12</sup> The application of computerised simulation modelling to project planning appears to have been little used.<sup>13</sup> The Committee considers that there may be considerable scope for the application of simulation modelling to project planning.

4.21 The Committee recommends that:

15. A study be undertaken to establish the feasibility of applying computer simulation modelling techniques to project planning.

11. Minutes of Evidence, op cit, pages 2742-2752 and 3083-3086.

12. Ibid, pages 2746-2747.

13. Ibid, pages 2460-2461.

JCPA, HMAS Tobruk, op cit, paragraphs 6.33-6.36.

## Computer Support

4.22 The effective application of these techniques to complex major Defence equipment projects requires computer support. Defence acknowledges that the present level of computer support to project management generally is unsatisfactory.<sup>14</sup> The draft ADP Strategic Plan for the CPO envisages an expansion over the next few years in the level of computer support for project planning and other aspects of project management although the target levels for each need area are not specified.<sup>15</sup>

4.23 The Committee recommends that:

16. Adequate computer support be provided for project planning with priority in the areas of schedule analysis and resource scheduling and levelling.

## Staff Resources

4.24 Many project planning shortcomings appear to derive from the shortage of dedicated project personnel in the initial period of a project.<sup>16</sup> Because of Defence's limited use of modern computerised project planning techniques it may be that the level of in-house planning expertise is deficient. To augment its project planning expertise the Navy negotiated period contracts for project management consultancy services with a number of firms in 1984.<sup>17</sup>

4.25 The Committee recommends that:

17. At the outset of each project, an adequate planning team including appropriate technical and industrial expertise must be established. Where internal expertise is unavailable, specialist planning expertise should be contracted from outside the public sector.

14. Minutes of Evidence, op cit, page 2742.

15. Department of Defence, Capital Procurement Organisation, (Draft) 1985/86 ADP Strategic Plan, July 1985, paragraphs 38-46.

16. See Chapter 3.

17. Minutes of Evidence, op cit, page 1303.

## CHAPTER 5

### FINANCIAL PROGRAMMING

5.1 This chapter describes the processes whereby major equipment proposals are allocated funding priority in the light of strategic requirements and financial constraints.

#### Financial Programming in Defence<sup>1</sup>

5.2 The major resource planning instrument in Defence is the Five Year Defence Program (FYDP). The FYDP is a rolling financial program in which year one provides the basis for draft annual Budget estimates.

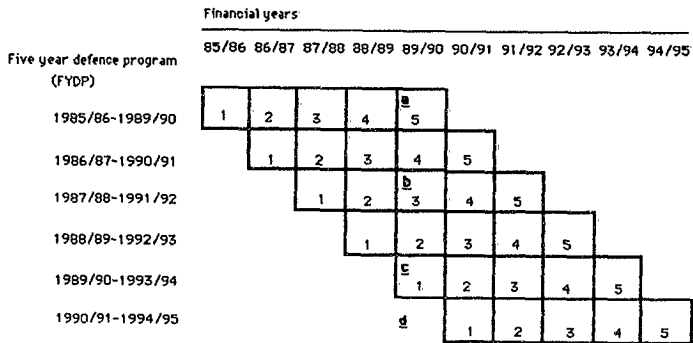
5.3 Schematically the FYDP operates as follows:

- Services assess their capability and define their needs through Staff Requirements;
- Staff Requirements are scrutinised by the Defence Operational Requirements Committee (DORC) to determine their priority in terms of strategic guidance and overall military capability requirements;
- endorsed Staff Requirements form the basis of Major Equipment Proposals (MEPs);
- MEPs are scrutinised by the Defence Force Structure Committee (FSC) which, taking account of the military priority established by DORC, assigns financial priority in view of the Government's forward financial guidance;
- if endorsed, proposals are normally placed in year five of the FYDP. The proposal will be progressively refined through the completion of the project definition tasks outlined in Chapter Three; and
- in year one, proposals which are sufficiently advanced in their definition are given approval and gain a place in the draft new capital equipment sub-program of Defence estimates. The balance of the capital program represents existing commitments. Budget approval is sought.

5.4 Figure 5.1 provides a diagrammatic representation of the FYDP process.

1. The following is based on the description of the Five Year Defence Program provided to the Committee by the Department of Defence, Minutes of Evidence, op cit pages, 2192-2206.

Figure 5.1 Diagrammatic Representation of the Five Year Defence Program



- Key
- a Denotes an equipment proposal submitted into the program during 1984/85. It would have been listed in FYDP 1985/86-98/90 as a Year 5 Item
  - b Is the same proposal two years later, listed as a Year 3 Item.
  - c During 1989/90 the same proposal which has been subject to annual updates (and in this case has not been advanced or deferred) is now shown as a Year 1 in FYDP 1989/90-93/94.
  - d Shows that the proposal has received Cabinet approval for commitment of funds. It is now an approved project and is included in the Estimates for 1989/90. For this project, the year of decision is 1989/90.

Source . ABR 5069 - RAN Project Management Manual, January 1982, Canberra, Annex to Ch 2

5.5 The purpose of the FYDP is to provide for the orderly development and funding of capital equipment projects. The emphasis is on predictability and control. In practice these criteria are tempered by the need to accommodate a degree of flexibility. The management of the FYDP is subjected to changes in defence policy (for instance the post-Afghanistan period), to changes in the state of the economy and to so-called 'windows of opportunity'.<sup>2</sup>

5.6 The financial guidance on which the FYDP is predicated must be set realistically to reflect the likely availability of funds. This has not always been possible and adjustments brought about by the annual Budget process can disturb a planned allocation of funds. Despite this, the Department of Finance told the Committee that 'the effects on Defence programs of budgetary reductions are more reasonably balanced and their disruptive effects minimised if they are considered within the long-term planning framework provided by the FYDP'.<sup>3</sup> By implication, adjustments would be ad hoc and potentially more damaging without a planning framework.

5.7 Table 5.1 illustrates the gap between financial guidance, budgetary allocations and actual outlays for the financial years 1980-81 to 1984-85. For example, the financial guidance given for 1983-84 (column 4) was for a 7.7 per cent real growth in Defence outlays in the 1980-85 FYDP where it was year four. In the 1981-86 FYDP it was reduced to 6.7 per cent, in the 1982-87 FYDP increased to 7.4 per cent and the 1983-88 FYDP reduced to 4.5 per cent. The actual real growth in Defence outlays in 1983-84 was 4.1 per cent.

#### Summary of Evidence

5.8 Programming adjustments, many of a material nature, affected more than half of the projects examined. These adjustments occurred in four areas:

- the deferral or acceleration of project approval;
- changes to equipment numbers;
- phasing of projects; and
- rate of expenditure.

2. Minutes of Evidence, *op cit*, pages 2242-2243.  
3. *Ibid*, page 3311.

Table 5.1 Growth Rates of Defence Outlays - Comparisons of Financial Guidance, Budget Allocation and Actual Outlays Between 1980-81 and 1984-85 (Per cent)

FYDP	1980-81	1981-82	1982-83	1983-84	1984-85
1980-85	5.5	6.2	7.3	7.7	7.6
1981-86		5.3	6.4	6.7	6.6
1982-87			4.3	7.4(a)	7.9
1983-88				4.5(a)	4.5(a)
1984-89					4.5(a)
Budget Allocation	7.1	5.3	4.3	4.1	3.3
Actual Outlays	5.6	-1.7	4.6	4.1	3.3(Est)

(a) The Defence Forward Estimates for the three years 1983-86 were lodged prior to the change of Government in March 1983 on the basis of the annual growth rates in the previous Government's financial guidance. The Minister for Defence adopted a planning basis of around 4.5 per cent annual real growth.

Source: Department of Finance, Minutes of Evidence, op cit, page 3315.

5.9 Approvals to proceed with the C-130H Simulator,<sup>4</sup> the Hamel Light Gun,<sup>5</sup> and apparently the Small Arms Replacement<sup>6</sup> projects were deferred for budgetary reasons. In two instances, the FFG helicopters<sup>7</sup> and F/A-18 Project,<sup>8</sup> decisions were deferred to allow extended time for source selection. On the other hand the P3C Orion<sup>9</sup> and F-111A Attrition<sup>10</sup> projects were brought forward on the FYDP to take advantage of windows of opportunity.

5.10 Funding considerations appear to have led to significant reductions in the number of Minehunter Catamarans<sup>11</sup> and FFG helicopters.<sup>12</sup> Changes to Government defence policy

4. Ibid, paragraphs 12.6-12.7.
5. Ibid, paragraphs 16.30 and 16.32.
6. Ibid, paragraph 14.17.
7. Ibid, paragraphs 2.34-2.46.
8. Ibid, paragraphs 6.10-6.11.
9. Ibid, paragraphs 7.4-7.6.
10. Ibid, paragraph 9.4.
11. Ibid, paragraph 5.5.
12. Ibid, paragraphs 2.34-2.46.

post-Afghanistan added a fourth frigate to the US-built FFG project.<sup>13</sup>

5.11 The deferral of production of ammunition for the Hamel Light Gun<sup>14</sup> and the separation of TADS from the related RECAP radar project<sup>15</sup> illustrate how budgetary considerations may cause elements of a project to be separated out and deferred. Post-approval funding cuts were made to the C-130H<sup>16</sup> and TADS<sup>17</sup> projects.

5.12 Changes to the timing of approval and quantities of equipment may influence the effectiveness of the defence force structure. Changes to the phasing and rate of expenditure may also have efficiency costs.

#### Consideration of Issues

5.13 Programming adjustments are made because of:

- . changes in Defence priorities;
- . budgetary restrictions; and
- . windows of opportunity.

5.14 The Committee does not wish to debate the merits of decisions based on changes in military priorities since the issue falls outside its terms of reference. Financial programming should have sufficient flexibility to accommodate changes in military priorities although these adjustments are not likely to be frequent.

5.15 Budgetary restrictions and windows of opportunity are of concern to the Committee. They relate to factors which are part of the process of financial programming. The Committee considered:

- . whether there is scope for reducing the level of what are essentially short-term programming adjustments; and
- . whether the quality of information on which short-term programming decisions and windows of opportunity are taken can be improved.

#### Short Term Programming Adjustments

5.16 Pressure on the Defence capital equipment budget has arisen from five sources:

- . actual Budget allocations falling below the levels of financial guidance, for instance, in 1981-82, 1982-83, 1983-84 and 1984-85;

13. Volume 2, paragraph 2.8.
14. Ibid, paragraphs 16.30-16.34.
15. Ibid, paragraph 11.4.
16. Ibid, paragraph 12.7.
17. Ibid, page 193.



- high levels of committed funds in the capital equipment budget
- currently a small number of major projects dominate available funds (for instance the F/A-18 project payments will absorb \$912 million of the \$1,558 million 1985-86 major capital equipment program);
- serious price impacts arising from exchange rate changes;
- poor correspondence of billings with scheduled payments under US Foreign Military Sales arrangements (this issue was prominent in the early 1980s but may have receded in recent years); and
- increases in the real costs of approved projects.

5.17 As Defence acknowledges capital expenditure is especially vulnerable to budgetary restrictions. Cuts will usually be made first in yet-to-be approved projects. However, circumstances may also require that currently approved projects are to be affected. This will involve:

- stretching out projects through extended phasing, lengthened delivery periods and other measures to slow rates of expenditure; or
- reducing or paring back components which may be seen not to directly affect Defence capability - spares and support equipment are particularly vulnerable.<sup>18</sup>

5.18 Most of the sources of budgetary pressure are outside the short-term control of Defence decision-makers. Quite reasonably Governments want to be able to change the priority accorded to Defence in the Budget. However, the Committee believes that more realistic forward financial guidance can and should be provided. Table 5.1 shows that financial guidance has been almost consistently optimistic.

#### Quality of Programming Information

5.19 Defence programming procedures require consultation with Service sponsors and reconsideration by the FSC where budgetary restrictions result in changes to a project. However, the examples of 'hurt analysis' provided to the Committee were based largely on qualitative data.<sup>19</sup> This is not a good basis on which to make decisions between projects. Better programming decisions require a costing data base and computer support.

18. Minutes of Evidence, op cit, pages 2247-2249.

19. Ibid, pages 2830-2834.

The Department lacks an integrated computer-based project management information system to facilitate efficient programming decisions across the range of major projects.<sup>20</sup>

#### Windows of Opportunity

5.20 Decisions to proceed with the P3C Orion and F-111A Attrition projects earlier than planned had impacts on other projects either approved or yet to be approved.

5.21 The FYDP needs flexibility to respond to surprises such as shutdowns in overseas production lines (the P3C Orion Project). Such options should not be too easy lest they mitigate the fundamental planning purpose of the FYDP. The problem again is one of providing adequate data on which to base cost effective programming decisions.

5.22 The Draft ADP Strategic Plan for the Capital Procurement Organisation envisages the long term establishment of an integrated computerised project management information system.<sup>21</sup> The Committee believes that such an integrated computerised project management information system must possess a capability for the analysis of programming options.

5.23 Defence project management information systems are further addressed in Chapter Eight.

20. Minutes of Evidence, op cit, pages 2368-2369.

21. Capital Procurement Organisation, Draft 1985/86 ADP Strategic Plan, op cit.

## CHAPTER 6

### CONTRACTING

6.1 This chapter examines the development stage from project approval to contract. This phase of acquisition involves the refinement of specifications, request for information prior to tender, request for tender, tender evaluation, contract negotiation and the terms and provisions of contracts. A major area of government-to-government contracting, United States Foreign Military Sales (FMS) arrangements, is also considered.

6.2 Government purchasing policy requires financial and contractual probity, fair competition, orderliness and consistency. The Committee did not focus on these issues requirements but sought to identify areas of contracting which affect the efficiency and effectiveness of Defence project management.

6.3 Efficient and effective contracting requires that:

- . Requests For tender provide a complete specification of user and project requirements;
- . tenderers are given the flexibility to offer alternative solutions to satisfy user requirements;
- . the evaluation of tenders is consistently based on
  - user requirements, and
  - the tenderers' capacity to deliver to time, cost and quality requirements;
- . tender evaluation and contract negotiations are completed within the tender validity period; and
- . contracts provide
  - a precise delineation of responsibilities between contracting parties,
  - clear specifications of all contract deliverables, and
  - an equitable sharing of financial and technical risk.

## Contracting for Major Defence Projects<sup>1</sup>

6.4 Technical, operational and support areas of the Services have the responsibility for developing equipment specifications. Government purchasing policy requires that specifications are not unduly restrictive of competition and Australian Industry Participation (AIP). Guidelines have been formulated to standardise specifications and, as far as possible, substitute commercial for military specifications.<sup>2</sup>

6.5 In many Defence equipment projects it is not possible to adopt open tendering based on full specifications. Phased tendering may be required if there is a limited or unique source of supply, where the technology is specialised, where AIP requirements are particularly important or where there is a need for a more refined definition of requirements to reduce risk.

6.6 Phased tendering normally comprises:

- . industry seminars;
- . invitations to register interest;
- . requests for proposals;
- . funded project definition studies to supply development specifications and cost plans; and
- . requests for tender.

6.7 Responsibility for issuing invitations to register interest, requests for tender and the tender evaluation process is vested in either the Chief of Materiel or Service Procurement Authorities. In some circumstances tenderers' conferences may be called to clarify tenders. Pre-contract negotiation conferences may also be held. The Financial Services and Internal Audit Division routinely receives copies of draft major contracting documents.

6.8 In the case of major projects, the Chief of Materiel may convene evaluation teams for assessing tenders. The tender evaluation report is initially submitted to the Defence Source Definition Committee which makes recommendations to the Defence Force Development Committee. The latter Committee seeks Government approval.

1. The following description of Defence contracting procedures has been drawn from:  
Defence Instructions (General), ADMIN 05-3 'Instruction for the Procurement of Equipment and Associated Services' June 1977 and draft Gated November 1983 and Defence Instructions (General), ADMIN 05-4 'Release of Staff Requirements and Similar Documents to Industry' August 1978.
2. Minutes of Evidence, op cit, pages 1871-1872, 1875-1882.

6.9 Contract negotiations in Australia are undertaken by the Purchasing Authority, now a Division in Defence (previously located in the former Department of Defence Support). Overseas negotiations are conducted by either the Head of Defence Staff and Tender Board, Washington or the Chief Purchasing Officer, Department of Foreign Affairs, London. For major projects the Chief of Materiel usually appoints a negotiating team which will be issued with a negotiating directive. The team may include contract specialists of the Purchasing Authority and the Attorney-General's Department. The terms and conditions of all contracts are governed by standards administered by the Purchasing Authority, Tender Board, Washington and the Chief Purchasing Officer, London.

6.10 All communication with the tenderers after the closing of tenders and all communication on all contractual matters after the contract is handled through the Purchasing Authority.<sup>3</sup>

### Summary of Evidence

6.11 Serious problems arose in the contracting phase of several projects, specifically with HMAS Success,<sup>4</sup> Hiport/Medport,<sup>5</sup> Basic Trainer<sup>6</sup> and Minehunter Catamarans.<sup>7</sup> Similar problems were identified by the Auditor-General with HMAS Tobruk,<sup>8</sup> Humpty Doo Naval Communications Station,<sup>9</sup> the East Sale Air Traffic Control Radar<sup>10</sup> and Fremantle Class Patrol Craft.<sup>11</sup>

6.12 The evidence related to three main areas:

- . specification of requirements;
- . evaluation of tenders; and
- . contractual provisions.

6.13 In a number of projects tender specifications were:

- . inaccurate (Minehunter Catamarans,<sup>12</sup> HMAS Tobruk<sup>13</sup>);

- 
3. Defence Instructions (General), ADMIN 05-3, op cit.
  4. Volume 2, paragraphs 4.12-4.27.
  5. Report of the Auditor-General, September 1983, pages 14-25.
  6. Volume 2, paragraphs 17.30-17.37.
  7. Report of the Auditor-General, March 1982, pages 20-23.
  8. Volume 2, paragraphs 8.64-8.69.
  9. Ibid, paragraphs 5.16-5.18.
  10. Report of the Auditor-General, May 1983, pages 10-16.
  11. Report of the Auditor-General, March 1982, pages 28-35.
  12. JCPA, Report No. 223, op cit, Chapters 2-5.
  13. Report of the Auditor-General, March 1982, pages 23-28.
  14. Report of the Auditor-General, September 1983, pages 52-54.
  15. Minutes of Evidence, op cit, pages 140-152.
  16. Report of the Auditor-General, March 1982, pages 49-51.
  17. Report of the Auditor-General, May 1983, page 11.
  18. Report of the Auditor-General, March 1982, pages 29, 32-34.

- . ambiguous or incomplete (Basic Trainer,<sup>14</sup> Hiport/Medport,<sup>15</sup> HMAS Success,<sup>16</sup> HMAS Tobruk<sup>17</sup>); or
- . lacked sufficient detail (HMAS Success,<sup>18</sup> Minehunter Catamarans<sup>19</sup>).

These shortcomings led to schedule delays during production.

6.14 There were also cases of tender evaluation not being completed until after the tender validity period had expired (Minehunter Catamarans,<sup>20</sup> Humpty Doo,<sup>21</sup> East Sale Air Traffic Control Radar<sup>22</sup>), the evaluation of tender risk, cost and schedule being inaccurate (Basic Trainer<sup>23</sup> and Hiport/Medport<sup>24</sup>) and of tenders not appearing to have been assessed consistently (Hiport/Medport<sup>25</sup>). These difficulties both delayed contracting and led to inaccurate schedules and poor contract administration.

6.15 Broad specification of contract deliverables (HMAS Success),<sup>26</sup> absence of penalties for non-compliance with requirements (HMAS Tobruk,<sup>27</sup> Fremantle Patrol Craft<sup>28</sup>), inadequate contractual allowance for differences between specifications and production or design packages supplied as Government Furnished Information (HMAS Success)<sup>29</sup> and non-explicit Excusable Delay provisions (HMAS Success)<sup>30</sup> led to contractual disputes, renegotiated contracts, or equipment which differed from requirements.

6.16 In the course of the inquiry the use of Foreign Military Sales arrangements was raised in a number of projects.<sup>31</sup>

14. Volume 2, paragraphs 8.58 and 8.65.
15. Ibid, paragraphs 17.19-17.21 and 17.24-17.25.
16. Ibid, paragraphs 4.12-4.27 and 4.34-4.43.
17. JCPA, Report No. 223, op cit, paragraphs 5.17-5.24.
18. Volume 2, paragraphs 4.34-4.43.
19. Ibid, paragraphs 5.16-5.18.
20. Report of the Auditor-General, May 1983, page 13.
21. Report of the Auditor-General, March 1982, pages 24-27.
22. Report of the Auditor-General, September 1983, pages 52-53.
23. Volume 2, paragraphs 8.33-8.40.
24. Ibid, paragraph 17.34.
25. Report of the Auditor-General, March 1982, pages 22-23. JCPA, Report of the Auditor-General - March 1982, Report No. 222, pages 1-6.
26. Volume 2, paragraphs 4.34-4.43.
27. Report of the Auditor-General, September 1983, page 16.
28. Report of the Auditor-General, March 1982, pages 29-32. JCPA, Report No. 223, op cit, Chapter 2.
29. Report of the Auditor-General, September 1983, page 33.
28. Volume 2, paragraphs 4.12-4.27.
30. Report of the Auditor-General, September 1983, pages 23-24.
31. F/A-18 Project (Volume 2, paragraphs 6.33-6.37), Guided Missile Frigates Project (Volume 2, paragraphs 2.58-2.69)

## Consideration of Issues

6.17 The Committee examined four issues raised in the evidence:

- . specification of requirements;
- . evaluation of tenders;
- . contractual provisions; and
- . the use of FMS arrangements.

## Specification of Requirements

6.18 Inadequate specification of user and project requirements had their origin in:

- . limited technical knowledge;
- . shortages and turnover of staff; and
- . unsatisfactory project definition and planning procedures.

6.19 Design and development projects inevitably involve some incompleteness in specifications. The source of many problems in the Basic Trainer, Minehunter Catamaran and HMAS Success projects reflected inexperience within defence and the Australian aerospace and shipbuilding industries. Gaps in knowledge need to be identified early and resources applied to obtain the expertise required.

6.20 Navy admitted that a lack of technical expertise was the source of a number of contracting problems with HMAS Success and the Minehunter Catamarans.<sup>32</sup> This shortage resulted in technical requirements being poorly specified and/or inadequate evaluation of industry proposals and tenders.

6.21 In the Basic Trainer project the evidence suggested that design approval procedures were not agreed to, or at least not clarified with the contractor prior to contract.<sup>33</sup> In HMAS Success user requirements relating to ammunition, cargo handling and storage systems were not finalised until well into the build.<sup>34</sup> In the Minehunter Catamaran project initial (in-house) project definition failed to adequately assess technical risk and notional equipment was used as a basis for the design of the prototype vessels, carrying considerable design risk.<sup>35</sup>

32. Volume 2, paragraphs 4.47 and 5.13.
33. Ibid, paragraphs 8.50, 8.65 and 8.68.
34. Ibid, paragraphs 4.34-4.43.
35. Ibid, paragraphs 5.12-5.17.

6.22 The Committee recommends that:

18. For major projects the project director have responsibility for the development of tender and contract specifications from the endorsed Staff Requirement and should be given sufficient technical staff on a full-time basis and/or priority access to staff in the functional technical areas to manage this responsibility.
19. Where in-house technical expertise is lacking, funded project definition studies be used to obtain tender-quality specifications.
20. For design and development projects, consideration be given to employing outside and possibly overseas technical management expertise on a contract basis.
21. Request For Tender documents include a full description of:
  - (a) all build or production control standards to be applied; and
  - (b) all quality and other technical management procedures to be applied for the duration of the contract.

#### Tender Evaluation

6.23 Shortcomings were evident in three areas:

- . extended evaluation activity;
- . poor quality technical evaluation; and
- . inconsistent treatment of tenderers.

6.24 Several factors contributed to delays in finalising tender evaluation and source selection:

- . revision to tender specifications (Humpty Doo);<sup>36</sup>
- . unsatisfactory tender responses/proposals (Air Traffic Control Radar, East Sale);<sup>37</sup>
- . under-estimates of the magnitude of the evaluation task (Humpty Doo,<sup>38</sup> Minehunter Catamarans);<sup>39</sup> and
- . lack of staff (East Sale).<sup>40</sup>

36. Report of the Auditor-General, March 1982, pages 24-25.

37. Report of the Auditor-General, September 1983, page 53.

38. Report of the Auditor-General, March 1982, pages 24-25.

39. Report of the Auditor-General, May 1983, pages 13-14.

40. Minutes of Evidence, op cit, pages 145-146.

6.25 In each of the above projects evaluation was not finalised before the expiry of the tender evaluation period requiring the re-validation of tenders or calling of new tenders. In the case of one item of Government Furnished Equipment for the East Sale radar, a preferred tenderer declined to re-tender.<sup>41</sup> All of these factors reflected poor project definition.

6.26 Inadequate tender evaluation was the result of insufficient time (Basic Trainer - decision to expedite the project quickly)<sup>42</sup> or the initial under-assessment of the level of risk attaching to the project (Hiport/Medport).<sup>43</sup> The outcome was that tenderers were not comprehensively assessed on their capability to do work to requirements and to the time and cost proposed. In both cases the proposals were contained in funded definition studies. Defence tender evaluation procedures are sound, but as Air Force acknowledged, there is a need in design and development projects and projects where competitive tenders have not been sought for a more comprehensive assessment of tenderers' management and technical capabilities.<sup>44</sup>

6.27 In the Hiport/Medport project the successful tenderer was given the opportunity to clarify tender information which led to a significant increase in its tendered price. The other short-listed tenderer's price was adjusted without reference to that tenderer. Defence argued that there was no need to consult because of the disparity in prices. The other short-listed tenderer's prices were adjusted for contingencies not included in the submitted tender. Defence stated that to require a tenderer to enter into clarifying discussions would incur costs to the tenderer and raise expectations. Its action did not compromise the principle that, between closure of tenders and announcement of selection, no tenderer is permitted to provide information which would alter the basis of its tender.<sup>45</sup> The Committee believes that equity demanded that the tenders be formally re-validated.

6.28 With respect to the Minehunter Catamaran project, Defence was critical of the sequential nature of tendering and the prohibition on publicising its choice of notional equipment. Defence argued that this factor reduced the precision of definition in areas of the Shipbuilder's Estimating Package.<sup>46</sup> The Committee took the view that the source of the difficulty lay in the design concept chosen rather than the tendering procedures per se. If the risk of parallel design of the vessel and selection of the equipment was judged acceptable, then more restrictive tendering should have been used to refine the design parameters as closely as possible.

41. Report of the Auditor-General, September 1983, page 53.

42. Volume 2, paragraphs 8.9 and 8.37.

43. Ibid, paragraph 17.22.

44. Minutes of Evidence, op cit, pages 1513-14.

45. JCPA, Report No. 222, op cit, pages 5, 6, 29, 33-35.

46. Volume 2, paragraph 5.17.

6.29 The Committee recommends that:

22. A single set of comprehensive guidelines be issued for Defence tendering, source selection and contract negotiation. These guidelines should pay particular attention to phased tendering options and post-tender negotiations with tenderers for major contracts to ensure that:

- (a) potential suppliers are given adequate opportunity to obtain clarification of Requests For Tender at tenderers' conferences;
- (b) requests for clarification of individual tenders are handled to ensure other tenderers are not disadvantaged; and
- (c) there is a comprehensive assessment of each short-listed tenderer's capability to supply the item to requirement and to the time and cost proposed. Management as well as technical capability should be assessed.

#### Contract Provisions

6.30 Contractual shortcomings comprised:

- specifications which did not fully meet client requirements (a problem discussed above); and
- terms and conditions which did not sufficiently protect the Commonwealth's interest.

6.31 Contract penalties and incentives generally cover price, delivery, quality and excusable delay.

#### Price

6.32 Pricing may be on one of a variety of bases - firm, fixed, fixed with incentive fee, cost re-imburement or cost re-imburement with incentive fee. The selected price base may rest on a judgement of administrative cost, projected inflation rates or an equitable sharing of risk between Defence and the supplier.

6.33 Defence has had limited knowledge and experience of incentive fee contracts.<sup>47</sup> Within the 16 projects examined there were some 12 major commercial contracts. Only two had incentive arrangements. Half were priced on a fixed basis (which allowed indexed increases in labour and material costs). In the United States more extensive use is made of incentive fee contracts. To date incentive provisions have largely been confined to matters such as weight control (HMAS Success) and contractor support (Australian Frigate).

47. Minutes of Evidence, op cit, pages 1865-66.

6.34 In theory a tightly controlled cost re-imburement contract may be no more expensive than a firm price contract where the contractor has made a generous allowance for risk.<sup>48</sup> However, simple cost re-imburement means that the Commonwealth bears all the risks and, on design and development projects which can usually only be negotiated on a cost re-imburement basis, risks are considerable.

6.35 The Committee believes that, in general, contract incentives will be more efficient and effective than tight administrative control. Defence experienced considerable difficulty in controlling the cost re-imburement contract used in the Basic Trainer project.<sup>49</sup>

#### Delivery

6.36 Liquidated Damage provisions may be included in contracts to cover the event of non-delivery. In general the settlement of such damages in court has been unsatisfactory. Defence cited two unresolved cases, one which has lasted four years (engines, HMAS Cook) and another, ten years (cabling, Oberon Submarines).<sup>50</sup>

6.37 Negotiated damages may prove to be more expedient and cost-effective, particularly since the inclusion of liquidated damage provisions adds a cost for the contractor.

#### Quality

6.38 Liquidated Damages and warranties are the normal contractual provisions to cover design, performance or workmanship failures. Tenderers for Defence equipment are usually asked to quote the price of such warranties. Of the 16 major contracts, 11 contained warranties. Six warranties covered performance or fitness for use, two related to design while three covered only workmanship and materials. Warranty claims have been made under six contracts.<sup>51</sup>

6.39 As with Liquidated Damages, warranties represent a cost to the contractor and the price may outweigh their value. In the Navy's view one per cent of the capital cost is a reasonable amount to pay for a warranty. However, of ten items to be purchased for the second Australian Frigate, the cost was quoted at around three per cent.<sup>52</sup>

6.40 Warranties also may expire during lengthy periods of storage, that is, the warranty may no longer apply when the item is issued for use.<sup>53</sup>

48. Minutes of Evidence, op cit, page 2359.

49. Ibid, page 1513.

50. Ibid, page 1869.

51. Ibid, pages 2924-3064.

52. Ibid, page 2931.

53. Ibid, page 1888.

6.41 There needs to be some assurance that equipment items conform with requirements. Warranties are a contractual means of providing that assurance. Equipment testing and tight contract supervision are other methods which may be more cost-effective in certain circumstances. The Committee considered that tying progress payments to satisfactory quality audits may be effective but this should not excuse the contractor of liability for any defective work subsequently found.

#### Excusable delay

6.42 The aim of excusable delay provisions in a contract is to protect contractors against events over which they have no control, including action which has been initiated by the customer.

6.43 The Auditor-General in reporting on HMAS Success noted that current provisions were too general and needed to be more specific as to events for which claims could be made and the period during which negotiation should take place.<sup>54</sup>

6.44 At present Defence is not prepared to include contractual penalties against the Commonwealth in relation to compliance with the contract.

#### Findings

6.45 The Committee concluded that overall most of the contracts examined did not fully protect the Commonwealth's interest by an equitable sharing of financial and technical risk. In conjunction with inadequate project monitoring and control systems these directly contributed to the major difficulties encountered in the Success and Tobruk projects. Improved contractual terms and conditions have been obtained in more recent projects.

6.46 The lack of firm contractual penalties and incentives reflected:

- the unwillingness of industry to negotiate such provisions (which may stem from their market position or possibly inexperience); and
- the lack of contracting expertise within organisations responsible for contract negotiation (the Purchasing Authority and Attorney-General's Department).

6.47 An effective Defence contracting strategy needs to maintain a level of competition until the signing of the contract. This may be difficult to achieve in the high technology area of Defence, particularly in design and development projects where Defence can be locked into single sources of supply through funded project definition studies.

54. Report of the Auditor-General, September 1983, pages 23-24.

6.48 In the early 1970s the Defence Legal Services Committee of Review found that the Attorney-General's Department lacked expertise especially in United States procurement law.<sup>55</sup> Overseas suppliers do not normally agree to contracts written in Australian law. Contracts with US firms can be written in specific State rather than Federal US law. According to Defence the majority of major contracts during the past five years have been written in Australian law.<sup>56</sup>

6.49 This lack of expertise may have also been aggravated by the transfer of the Defence purchasing function among three departments over the past five years leading to a possible loss of experienced staff.<sup>57</sup>

6.50 The Committee recommends that:

23. Increasing use be made of incentive pricing in Defence contracts for both cost re-imburement and fixed price contracts. Incentives should cover cost, schedule and quality deliverables.
24. Programs be instituted to:
  - (a) train staff in the Purchasing Authority in these new types of contracts; and
  - (b) acquaint and obtain the support of local industry for such contracts.
25. All contracts include provision for arbitration to resolve contractual disputes.
26. Progress payments not be made before prompt certification of the work for compliance with quality requirements.
27. Current Excusable Delay provisions be revised to precisely specify the events for which claims can be made and the period of consultation to resolve claims. Each party to the contract should be similarly bound.
28. Multiple project definition studies be considered to maintain competition in the award of production or development contracts.

#### Foreign Military Sales Arrangements

6.51 United States Foreign Military Sales have been used for three projects (F/A-18, US-built Frigates, F-111A) and a significant element of a fourth (Australian Frigate Project).

55. Report of the Defence Legal Services Committee of Review, November 1971, pages 75-82.

56. Minutes of Evidence, *op cit*, pages 1869-70.

57. Ibid, pages 1835-37.

6.52 Under FMS arrangements, the US Government contracts, on Australia's behalf, with US suppliers on terms no less favourable than it would for its own Services. Project management is handled by the relevant US Military Service, for example the US Navy in relation to the F/A-18 project. Management costs are 3 per cent of the cost of the item plus the direct costs of the administrative effort by the US Service project manager. The total is considerable. For the F/A-18 project it was estimated to be \$89 million in December 1983 prices.<sup>58</sup>

6.53 Defence has favoured FMS over commercial contracting in a number of projects, citing certain advantages such as:

- . it avoids establishing a large project management organisation in the US;
- . Australia benefits from US Government purchasing power and expertise; and
- . in some cases there is no option when acquiring sensitive military items.<sup>59</sup>

6.54 The use of FMS arrangements was the subject of critical comment by the Joint Committee on Foreign Affairs and Defence which argued that Australian rather than United States agencies should oversee Australian expenditure and that Australia failed to gain the full benefit of training in overseas procurement practice and law.<sup>60</sup>

6.55 The Committee found that several aspects of FMS were unsatisfactory.

#### Understatement of full cost of FMS

It is difficult to identify all the hidden levies or costs introduced by the US Government. The US Government will not give commercial pricing information and if it is aware that such information has been sought from commercial suppliers beforehand it may refuse to allow an FMS purchase.<sup>61</sup>

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58. Minutes of Evidence, op cit, pages 598-599.  
59. Ibid, pages 596-603, 1198-1217.  
60. Joint Committee on Foreign Affairs and Defence, op cit, pages 42, 44.  
61. Defence Instructions (General) ADMIN 05-3, Draft dated November 1983, paragraph 81.

#### Limited cost visibility

Although detailed financial information has been obtained through US Service project offices, effective use of this information has been constrained because of a fear that the US Government would withhold further information if Australia used it in formal contract negotiations.<sup>62</sup>

#### Poorly scheduled billings

In the past initial estimates of expenditure patterns have been well out of line with actual billings. The problem appears to have lessened in recent years thereby improving financial programming.<sup>63</sup>

#### Difficulties in achieving AIP

Strong supplier relationships and market barriers, protectionist legislation, the limited time between the FMS Letter of Offer and Acceptance and notification of the contractor and the lack of AIP Agreements with US Suppliers have made the achievement of AIP under FMS arrangements difficult.<sup>64</sup>

#### Overstatement of the savings in project management costs

A large number of Australian personnel were posted to the United States to monitor the FMS aspects of the FFG Frigate projects.<sup>65</sup> On the P3C Orion Project the RAAF found it could provide its own quality assurance at a fraction of the cost of using FMS arrangements.<sup>66</sup>

#### Inadequate contractual protection of Australia's interests

The satisfactory resolution of contractual problems in a number of projects depended on the goodwill of the US agencies rather than the terms of a contract which adequately protected Australia's interests (FFG Frigates,<sup>67</sup> F-111A<sup>68</sup>).

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62. Volume 2, paragraphs 2.61-2.63.  
63. Ibid, paragraphs 2.63 and 6.121-6.122.  
Minutes of Evidence, op cit, pages 588-596.  
64. Volume 2, paragraphs 2.74-2.78.  
65. Ibid, paragraph 2.59.  
66. Ibid, paragraph 7.33.  
67. Ibid, paragraphs 2.62-2.63.  
68. Ibid, paragraph 9.24.



6.56 It seems unlikely that Australia could negotiate better FMS contracts than are made with other US Government customers. Australia has relied on office-to-office agreements covering the supply of financial data and other reports and the secondment of Australian personnel. The effectiveness of these informal arrangements in minimising costs to Australia and generally ensuring our interests are protected in the US Government's dealings with its suppliers appears limited.

6.57 The Committee recommends that:

29. Wherever possible, use be made of commercial contracts rather than Foreign Military Sales arrangements for US-sourced major equipment items.

## CHAPTER 7

### AUSTRALIAN INDUSTRY PARTICIPATION

7.1 Australian Industry Participation (AIP) is a Defence program with the aim of maximising the involvement of Australian industry in Defence procurement. AIP comprises local design and development activity, adaptation and assembly of overseas designs in Australia and a range of production tasks by Australian industry including co-production, part-production and offsets.

7.2 The policy is a response to the situation that about two-thirds of Defence procurement involves overseas purchases, usually of limited items of sophisticated equipment.<sup>1</sup>

7.3 AIP policy has evolved to serve four objectives:

- . promotion of self-reliance in supply;
- . technological advancement of key industries;
- . provision of whole of life support for defence equipment; and
- . maintaining key industrial capability.<sup>2</sup>

7.4 In June 1984 the Government released a Defence Industry Policy Statement which gave priority to the objectives concerned with technology transfer and equipment support.<sup>3</sup>

7.5 The AIP program distinguishes between:

- . designated work (local assembly, part production);
- . eligible or related offsets (technology transfer, co-production, reciprocal purchases); and
- . unrelated offsets (other, non-project-related work placed with local industry by overseas contractors preferably but not necessarily of a defence related nature).

7.6 Designated work is a contract deliverable. Offsets relate to an obligation by the overseas contractor to provide benefits to Australian industry by way of technology transfer, co-production, reciprocal purchases and other work. AIP policy requires that offsetting orders to the value of 30 per cent

1. Reports of the Auditor-General on Efficiency Audits. Administration of the Australian Industry Participation Program in Relation to Overseas Procurement October 1984, paragraph 1.6.
2. This outline of the AIP program is drawn from submissions of the Department of Defence, Minutes of Evidence, op cit, pages 1820-1834 and 3205-3250.
3. Minister for Defence, Media Release No. 105/84, Defence Policy for Australian Industry, 3 June 1984.

of the contract value (excluding designated work) of an overseas purchase should be given to Australian industry over a stated period, often five years.

7.7 Agreements have been negotiated with a number of overseas countries for their governments to apply their 'best endeavours' to meet AIP objectives on defence orders placed in these countries. The agreements specify offset objectives of 25 per cent of orders. This falls short of longstanding Offsets Policy objectives.<sup>4</sup>

7.8 The AIP program is administered by the Department of Defence, specifically by the Defence Industry and Materiel Policy Division within the Capital Procurement Organisation (CPO).

7.9 Responsibility for the monitoring and enforcing of the offsets component of AIP was the responsibility of the former Department of Defence Support along with the civil offsets program. Civil offsets are now administered by the Department of Industry, Technology and Commerce.

#### Summary of Evidence

7.10 AIP relating to each of the 16 projects examined is summarised in Table 7.1. The table shows the value of overseas contracts, AIP obligations contracted and credits accepted.

7.11 Many of the projects are in their early stages and credits achieved to date are low. For some of the earlier projects, particularly the US-built Frigates, achieved AIP levels are unsatisfactory.

7.12 Apart from the limited achievement of AIP objectives, the AIP program has affected projects in other ways:

- contract negotiations have been complicated and delayed through contractors being required to negotiate satisfactory AIP provisions;<sup>5</sup>
- AIP has involved large Government expenditures on industrial infra-structure and substantial price premiums have been accepted for items procured;<sup>6</sup> and
- greater project management resources are required to administer the program.<sup>7</sup>

#### Auditor-General's Efficiency Audit

7.13 In October 1984 the Auditor-General completed an Efficiency Audit of the AIP program. Its main findings were:

4. Minutes of Evidence, op cit, pages 1225-1233.
5. Report of the Auditor-General, March 1982, pages 24, 53.
6. Volume 2, paragraphs 3.64 and 6.38-6.49.
7. Ibid, paragraph 3.55.

Table 7.1 Australian Industry Participation: Targets and Achievements - Sixteen Projects

Project	Value of Overseas Contracts let to date \$m	Total AIP Obligation \$m	Total Achieved AIP \$m	Designated work		Related Offsets		Unrelated Offsets	
				Target \$m	Actual \$m	Target \$m	Actual \$m	Target \$m	Actual \$m
1. TADS	12.00	3.97	3.97	3.47	3.47	0.50	0.50	0.00	0.00
2. Jindalee	(a)	-	-	-	-	-	-	-	-
3. C-120H Simulator	5.33	1.53	1.53	1.53	1.53	0.00	0.00	0.00	0.00
4. F-111A Attrition Aircraft	(b)	-	-	-	-	-	-	-	-
5. Basic Trainer	(c)	-	-	-	-	-	-	-	-
6. P3C Orion	263.54	79.11	7.05	0.00	0.00	79.11	7.05	0.00	0.00
7. F/A-18 Fighter	2296.00	647.80	294.15	249.40	193.00	398.40	101.15	0.00	0.00
8. Small arms	4.39(d)	1.25	0.40	1.25	0.40	0.00	0.00	0.00	0.00
9. Rapier Air Defence	87.10	26.13	29.05	(13)	14.98	(13)	14.07	0.00	0.00
10. Hipart/Medport	13.39	8.04	12.32	7.60	11.30	0.44	1.02	0.00	0.00
11. Medium trucks: - 4 tonne - 8 tonne	39.86 36.06	34.05 13.02	19.41 11.10	-	13.21 1.81	-	6.20 9.29	0.00 0.00	0.00 0.00
12. Hamel light gun	15.30	(e)	-	-	-	-	-	-	-
13. HMAS Success	18.94	4.79	4.07	2.84	4.07	1.95	0.00	0.00	0.00
14. Minehunter Catamaran	63.48	14.53	4.63	6.94	4.20	7.59	0.53	0.00	0.00
15. US-built Frigates	213.20(f)	56.62	14.00	0.00	0.00	56.62	14.00	0.00	0.00
16. Australian Frigates	306.45	77.31	2.76	(g)	-	-	-	-	-

Notes: (a) 75-80% Australian involvement in development and production.

(b) AIP not applicable as aircraft only available from USAF stock through FMS

(c) Minister for Defence announced 9 July 1985 that cheaper options to Project WAMIRA were to be sought. Whichever option is chosen, manufacture is intended in Australia.

(d) General purpose machine gun only.

(e) AIP obligation against 30% of overseas purchase price has not been sought.

(f) FFGs 01 and 02 only (1976 prices).

(g) No commitment for any particular category.

Source: Department of Defence, Minutes of Evidence, op cit, pages 2769-2777

- . levels of technology transfer have been limited (with the exception of the F/A-18 project);
- . with a non-price indexed level of obligations, inflation has eroded the benefits of AIP; and
- . apart from the gains under the F/A-18 project, AIP under US Foreign Military Sales arrangements has been poor.<sup>8</sup>

7.14 Despite improvement in recent years, the administration of the program suffered from:

- . an absence of a statement on Defence industry capability requirements on which to base AIP selection and industry assistance;
- . difficulties in establishing the full cost of AIP;
- . problems with valuing technology transfer;
- . inadequate contractual support to AIP; and
- . unsatisfactory administrative arrangements concerning the delineation of administrative responsibilities, assessment procedures and program data bases.<sup>9</sup>

7.15 These matters were raised with Defence during the inquiry.<sup>10</sup> Because of the limited time then available, the Committee decided to defer its consideration of AIP aspects of Defence project management to its review of the Auditor-General's Efficiency Audit.<sup>11</sup> That inquiry will cover the effectiveness as well as the efficiency of the total AIP and Offsets programs. In particular, it will examine:

- . other options for achieving technology transfer and whole of life equipment support; and
- . the effectiveness of the AIP program in meeting the policy objectives announced by the Government in June 1984.

8. Reports of the Auditor-General on Efficiency Audits, op cit, pages 77-78.

9. Ibid, Sections 2-5.

10. Minutes of Evidence, op cit, pages 1898-1942.

11. Following closely upon the Auditor-General's Efficiency Audit, the Committee of Review on Offsets (Chaired by Mr B S Inglis) reported on the Government's Offsets Policy and Program in December 1984.

The Government announced its response to the Inglis Report in January 1986 (Joint Statement by the Minister for Industry, Technology and Commerce and the Minister for Defence, Government Affirms Commitment to Offsets, 15 January 1986).

## CHAPTER 8

### CONTRACT ADMINISTRATION

8.1 This chapter covers the major part of the implementation phase which extends from contract to the handover of equipment to the Service user.

8.2 Contract administration comprises those activities designed to ensure the completion of contracted tasks on time, to cost and to requirement. It includes:

- . cost and schedule monitoring;
- . quality assurance; and
- . contract change order procedures.

### COST AND SCHEDULE MONITORING

8.3 The dual purpose of monitoring is to measure actual cost against budget and physical progress against plan or schedule. Effective cost and schedule performance monitoring requires:

- . agreed performance baselines;
- . not only actual cost and time expended but estimates of cost and time to complete the project;
- . early warning to identify variances which may become significant; and
- . adequate detail to address and take appropriate remedial action.

8.4 The reporting needs of the project director and that of the contractor will naturally differ. The latter in particular will be concerned with managing production activities, stock control, etc. Broadly the format of reports for the project director will vary with the nature of the project.

8.5 Computer generated cost and schedule reports will be necessary for projects where the number of activities and inter-related sequences are high.

### Project Cost and Schedule Monitoring in Defence

8.6 Contracts generally specify the information required by Defence and the contractor has the freedom to determine how such information is to be provided in a cost efficient manner. The main cost and schedule reports supplied by the contractor are contract funding and milestone reports. These are normally issued on a quarterly or monthly basis.<sup>1</sup>

1. Minutes of Evidence, op cit, pages 2743-2746 and 3081-3082.

8.7 In practice the level of cost information provided in contract funding reports is a direct function of the price basis of the contract. In the case of firm price contracts Defence 'visibility' is relatively limited. Cost re-imburement contracts on the other hand will require greater detail in funding reports. Schedule reports typically take the form of bar charts showing scheduled dates, achievement and current slippage.<sup>2</sup>

8.8 Defence has limited computer resources for the analysis of cost and schedule data.<sup>3</sup>

#### Summary of Evidence

8.9 The quality of project cost and schedule reports examined varied greatly. Most were unable to provide adequate forewarning of problems and were deficient in the detail required for effective management.

8.10 Limited visibility into contractor operations has meant that:

- . difficulties were not acted upon until the situation had reached serious dimensions (HMAS Success,<sup>4</sup> Minehunter Catamarans<sup>5</sup> and Hiport/Medport<sup>6</sup>); and
- . the magnitude of the difficulty was subject to disagreement between parties (Basic Trainer<sup>7</sup> and Hiport/Medport<sup>8</sup>).

#### Consideration of Issues

8.11 The sources of the performance monitoring shortcomings lay in a number of areas:

- . pre-contract project management;
- . the low level of development of performance monitoring systems in Defence; and
- . limited computer support.

8.12 In the pre-contract administration phase:

- . project reporting needs were not always identified during project definition;
- . tenderers' management information systems were not audited during tender evaluation; and

2. Minutes of Evidence, op cit, pages 2364-2371.

3. Ibid, pages 3083-3088.

4. Report of the Auditor-General, September 1983, page 21.

5. Volume 2, paragraph 5.40.

6. Ibid, paragraphs 17.49-17.52.

7. Ibid, paragraphs 8.73-8.83.

8. Ibid, paragraphs 17.51-17.52.

- . contracts did not always adequately specify reporting requirements.

8.13 Pre-contract matters were addressed in Chapters Five and Six. The two other issues are discussed in detail in the following sections.

#### Introduction of a Cost Schedule Control System

8.14 In a number of recent projects Defence has attempted to improve the basis of project performance monitoring by introducing the Cost Schedule Control System (CS<sup>2</sup>) developed by the United States Department of Defense.<sup>9</sup> Contractors for the Australian Frigate and Basic Trainer projects have been required to install management information systems and reports which meet the CS<sup>2</sup> criteria. CS<sup>2</sup> is also to be used for the operational conversion stage of Jindalee.

8.15 CS<sup>2</sup> is a reporting system which, by integrating cost and schedule performance measurement, aims to provide an overall measure of project performance in terms of 'value for effort'. It is based on the contractor's management information system and involves:

- . the breakdown of project tasks into individual work packages assigned to each organisational unit (the work breakdown structure);
- . establishment of time-phased budgets for each work package (broken into labour, materials, etc), plus an overheads budget;
- . recording direct costs against each work package;
- . the updating of estimates to complete tasks; and
- . monthly reporting for each work package on
  - schedule variance (the difference between the budgeted costs of work scheduled and performed), and
  - cost variance (the difference between the budgeted cost of work performed and actual cost).

9. The following outline of CS<sup>2</sup> is based on:

- . US Department of Defence Instruction 7000.2, 10 June 1977 - Performance Measurements for Selected Acquisitions;
- . Cost/Schedule Control System Criteria, Joint Implementation Guide; and
- . US Department of Defence Instruction 7000.10, 3 December 1979 - Contract Cost Performance, Funds Status and Cost/Schedule Status Reports.

8.16 CS<sup>2</sup> reports to Defence project directors do not need to provide details for the lower levels of the work breakdown structure. Comparisons of the budgeted cost of work scheduled (the amount of work that should have been completed in the period expressed as a proportion of the total budget to complete the task) and budgeted cost of work performed (the amount of work that was completed) give a measure of the value of work done for money spent and an indication of whether the situation is deteriorating or improving. Figure 8.1 provides a graphical illustration of these concepts.

8.17 In theory, CS<sup>2</sup> meets all the criteria of an effective project management information system. Nonetheless, it is a complicated system and may require significant changes to the contractor's management information systems. Implementation of the system in Australia has run into some difficulties. It is not yet operational in the Australian Frigate project.<sup>10</sup> Although CS<sup>2</sup> reports for the Basic Trainer project have been produced for some time, they have not been used by the project office because of measurement problems and hence doubts as to the validity of the data.<sup>11</sup>

8.18 The problems with implementing CS<sup>2</sup> stem from:

- difficulties in agreeing to performance baselines;
- accounting problems in allocating costs against work packages; and
- computer software problems, especially incorporating changes in the work breakdown structure.

8.19 The Committee believed that widespread application of CS<sup>2</sup> criteria should overcome many of the current performance monitoring shortcomings. However, increased management skills are needed to implement CS<sup>2</sup>. Also the present ARTEMIS software package appears inadequate.<sup>12</sup>

8.20 The Committee recommends that:

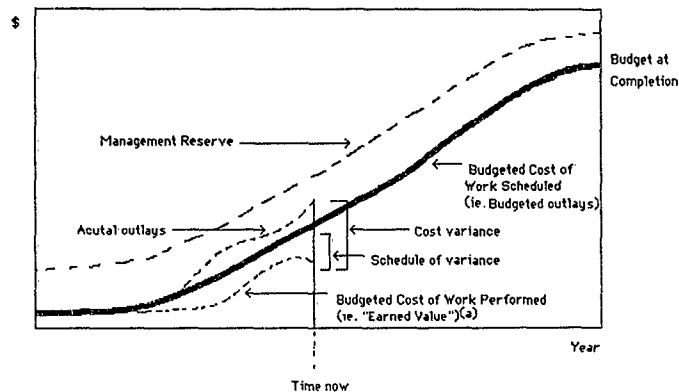
30. A Cost Schedule Control System (CS<sup>2</sup>) development program be introduced to assist Australian Defence contractors to upgrade their management information systems.
31. CS<sup>2</sup> must become the basis for cost and schedule reporting by contractors for all major projects.
32. Progress payments be geared to the submission of satisfactory CS<sup>2</sup> reports.

10. Volume 2, paragraphs 3.42-3.47.

11. *Ibid*, paragraphs 8.73-8.83.

12. *Ibid*, paragraphs 8.80-8.82.

Figure 8.1 Diagrammatic Representation of Cost Schedule Control System Concepts



Note (a) - For example, if at year 8 \$80 million has been outlaid and the estimated cost at completion is \$100 million, \$5 million more than the budgeted completion cost then the Budgeted Cost of Work Performed or "Earned Value" to date of the \$80 million spent is \$75 million. In other words, \$80 million has been paid for work worth only \$75 million.

Source. Lockheed Aircraft Corporation, C/Star - A Guide for Effective Performance Measurement, page 32.

## Computer Support of Project Management Systems

8.21 Defence has acknowledged that the level of computer support for project management systems is generally inadequate and that the best use of available project information has not been possible.<sup>13</sup>

8.22 Air Force Materiel Division has two micro computers, one dedicated to the F/A-18 Project Office (largely devoted to technical data storage and retrieval) and one providing networking and schedule analysis for 24 projects. Navy Materiel Division also has two micro computers, one dedicated to the Australian Frigate project (technical data storage and retrieval) and another largely assigned to network planning tasks. Army Materiel Branch has recently taken delivery of its first micro-computer.<sup>14</sup>

8.23 The draft ADP Strategic Plan for the Capital Procurement Organisation (CPO) identified needs in network schedules, activity monitoring, financial planning, configuration management, documentation management and information storage. Priority has been given to providing basic computer support to each Service Materiel Division. In the long-term, the Plan seeks the introduction of an integrated mini-computer network system based on single Service systems now being introduced or augmented. Long term plans for integration will not be completed until 1987-88 and the immediate period will therefore need careful management to ensure that long-term integration needs are given sufficient consideration.<sup>15</sup>

8.24 The Committee was concerned that the ADP Strategic Plan envisaged only limited resources being made available for augmenting the individual Service systems and a significant interval before planning was completed for the integration of Service systems.

8.25 The Committee recommends that:

33. Greater priority in financial and manpower resources be given to the extension, development and upgrading of computer support for project management and the target date for the integration of Service systems be brought forward.

### QUALITY ASSURANCE

8.26 Quality assurance covers those activities concerned with ensuring that the equipment acquired complies with specifications.

8.27 Quality control relates to the methods used by the contractor to ensure that required quality standards are maintained during manufacture. Quality assurance, on the other hand, is the responsibility of the client. It involves proof that quality control requirements have been met.

13. Department of Defence Capital Procurement Organisation, Draft 1985/86 ADP Strategic Plan, op cit, pages 2, 7, 9.

14. Minutes of Evidence, op cit, pages 3083-3088.

15. Department of Defence Capital Procurement Organisation, Draft 1985/86 ADP Strategic Plan, op cit, pages 6-12.

8.28 Effective management of quality assurance requires:

- specifications which incorporate adequate criteria for the acceptance of equipment;
- prospective suppliers' quality control systems being vetted before contracts are awarded;
- contractors' quality control systems being monitored during the contract to allow, as needed, remedial action; and
- contractual incentives for the contractor to meet quality requirements.

8.29 The level of quality assurance needed will be directly related to the nature of equipment being acquired. The most stringent quality assurance measures will be taken when equipment specifications depart most from general commercial standards.<sup>16</sup>

8.30 Australian quality management standards describe three levels of quality management.

- AS 1821 applies where the purchaser considers that quality control is essential in all phases of manufacture, that is design, development, manufacture, assembly, testing, etc.
- AS 1822 is less stringent and covers quality control during manufacture, assembly and testing of supplies and services.
- AS 1823 is the least extensive and applies where conformity with requirements can be established by inspection of the finished product and at specific stages of production.<sup>17</sup>

### Quality Assurance in Defence

8.31 In Air Force and Navy functional responsibility for quality assurance (QA) rests with the respective Chiefs of Technical Services. In Army quality assurance is the responsibility of the Chief of Army Materiel (who is also responsible for technical services).

16. The foregoing has drawn from the analyses of quality assurance in large engineering projects in:

- W J Archibald 'Manufacture of Submerged Repeaters at Liverpool, NSW for the Sydney - Vancouver Submarine Cable'; and
- Mike Roach 'Quality Assurance for Energy Related Projects', papers presented to the Australian Organisation for Quality Control QUALCON 84 Conference, 18-19 October 1984.

17. JCPA, Report 223, op cit, page 36.

8.32 With the exception of the Australian Frigate project, where quality assurance staff are part of the project team, quality assurance services are undertaken by staff of the Service QA Directorates often based at contractors' plants.

8.33 Project quality control requirements are normally outlined in a Quality Control Plan, a contract deliverable which is vetted by Defence. The first Defence projects required to meet AS 1821 - AS 1823 were the Australian Frigate and the Basic Trainer projects.

8.34 Compliance with specifications is covered by warranty and Liquidated Damages provisions in most contracts.<sup>18</sup>

8.35 In the case of Foreign Military Sales (FMS) arrangements, United States military quality control standards (which are equivalent to the Australian standards) apply and responsibility for quality assurance is carried by the United States project manager. In the case of the F/A-18 project QA tasks have been delegated by the US Navy to the Air Force Director-General of Quality Assurance.<sup>19</sup> In the P3C Orion project, where US military quality control standards also apply, quality assurance was contracted to the US Navy.<sup>20</sup>

#### Summary of Evidence

8.36 Five projects examined by the Committee (HMAS Success, US-built Frigates, P3C Orion, C-130H Simulator and Medium Trucks) experienced shortcomings in contractor quality control. The Tobruk project also shared those problems. These shortcomings were responsible for delay and rework (HMAS Success,<sup>21</sup> C-130H Simulator<sup>22</sup>) and operational problems (HMAS Tobruk<sup>23</sup>). Quality problems impinged on acceptable standards in the US-built Frigates<sup>24</sup> and P3C Orion<sup>25</sup> projects but did not affect delivery timetables or performance. In the case of the Australian Frigate project, the failure of the contractor to meet required standards prior to commencement of construction has the potential to create difficulties in the future.<sup>26</sup>

8.37 The Committee identified several factors contributing to these shortcomings.

- Details of certain quality requirements were either not defined or not approved until well into construction (HMAS Success - painting,

weight-control)<sup>27</sup> or were inadequately specified (HMAS Success - welding).<sup>28</sup>

- Contractors' quality control systems failed to meet required standards until well into the project (HMAS Success,<sup>29</sup> Australian Frigate,<sup>30</sup> C-130H Simulator<sup>31</sup> and HMAS Tobruk).<sup>32</sup>

- Responsibility was ill-defined (HMAS Tobruk-weight control),<sup>33</sup> on-site representation inefficient or inadequate (HMAS Tobruk,<sup>34</sup> HMAS Success<sup>35</sup>) or project management inefficient in responding to adverse quality assurance reports (HMAS Tobruk,<sup>36</sup> HMAS Success<sup>37</sup>).

#### Defining Quality Requirements

8.38 The problem is most apparent when overseas designs and hence overseas quality standards are used. Navy appears to have suffered problems due largely to recent inexperience in shipbuilding and limited technical resources in the project office. In the Australian Frigate project considerable attention was given to this matter with build control documents being incorporated into the contract.<sup>38</sup>

8.39 The Committee recommends that:

34. Tender specifications incorporate detailed quality control requirements audited during tender evaluation.

#### Vetting Contractors' Quality Control Systems

8.40 Quality control systems must be up to standard prior to the start of production otherwise there is the risk that day to day pressures arising from production schedules will subsume quality matters. In the case of the Australian Frigate project, Williamstown Naval Dockyard is working to a phased quality management implementation plan. This has yet to prove a satisfactory approach.<sup>39</sup>

8.41 Difficulties are apparent in quality management within Australian industry. Although Australian Standards AS 1821, 1822 and 1823 were introduced in 1975, Defence stated that only 155 of 5,800 suppliers had quality control systems which had been

18. For a more detailed description of Defence Quality Assurance arrangements, see Minutes of Evidence, op cit, pages 1881-1890.

19. Volume 2, paragraph 6.94.

20. Ibid, paragraphs 7.33-7.35.

21. Ibid, paragraphs 4.51-4.54.

22. Ibid, paragraphs 12.18-12.20.

23. JCPA, Report No. 223, op cit, pages 61-80.

24. Volume 2, paragraph 2.66.

25. Ibid, paragraphs 7.33-7.35.

26. Ibid, paragraphs 3.36-3.41.

27. Volume 2, paragraphs 4.35 and 4.39.

28. Ibid, paragraphs 4.41-4.42.

29. Ibid, paragraph 4.54.

30. Ibid, paragraphs 3.38-3.39.

31. Ibid, paragraph 12.19.

32. JCPA, Report 223, op cit, pages 21, 36-46.

33. JCPA, Report 223, op cit, pages 99-101.

34. Ibid, pages 43-45.

35. Volume 2, paragraphs 4.50-4.53.

36. Report of the Auditor-General, March 1982, pages 28-31.

37. Report of the Auditor-General, September 1983, pages 22-23.

38. Volume 2, paragraphs 3.21 and 3.25.

39. Ibid, paragraphs 3.36-3.41.

registered as meeting these standards.<sup>40</sup> In a number of the projects examined, potential suppliers' quality control systems were not audited and/or resources were not invested to assist contractors upgrade their quality control systems before the production date.

8.42 In evidence, Defence stated that it was now insisting on companies being assessed to the appropriate quality standard before production was commenced. Its current emphasis was on quality control systems auditing rather than on the traditional production-line inspections. This move was placing demands on the Service Quality Assurance Directorates to re-educate their staff and to employ more highly qualified staff. In addition some rationalisation has occurred among the three Service Directorates.<sup>41</sup> Navy will be attempting to ensure that in all future ship building contracts, progress payments are linked to certification that quality standards have been met.<sup>42</sup>

8.43 The Committee believes that stronger measures are needed to overcome quality problems with Australian Defence suppliers.

8.44 The Committee recommends that:

35. A quality management program be commenced to ensure that all local suppliers of items of major equipment comply with Australian Standards AS 1822, as a minimum, by the end of 1987. Thereafter no contracts should be entered into with local suppliers which do not meet these standards at the time of commencement of work.

#### Administrative Aspects

8.45 Army and Air Force for the most part have not experienced the same level of quality management problems as has Navy. Navy suffered from overlapping responsibilities (between the General Overseer Survey and Inspections East Australia Area (GOSIEAA) and RAN Trials and Evaluation Unit (HMAS Tobruk<sup>43</sup>)) and inadequate on-site representation (HMAS Success<sup>44</sup>). Navy has responded to these difficulties by bringing quality assurance under the direct control of the project director and improving on-site representation. These changes have been evident in the HMAS Success project since 1984.<sup>45</sup>

8.46 The Committee recommends that:

36. For all major projects involving significant technical risk, responsibility for the quality assurance function be vested in the project director and appropriate quality assurance personnel seconded to the project office.

40. Minutes of Evidence, *op cit*, page 1882.

41. *Ibid*, pages 1882-1889.

42. *Ibid*, page 350.

43. JCPA, Report 223, *op cit*, pages 99-101.

44. Volume 2, paragraph 4.53.

45. *Ibid*, paragraph 4.59.

#### CONTRACT CHANGE ORDER PROCEDURES

8.47 Contract change order procedures cover the documentation and control of changes to the contract in areas of technical characteristics, delivery and price. Discussion will concentrate on control over technical characteristics where major difficulties were identified. This aspect, which is called 'configuration control,' includes:

- design approval procedures leading to certification of a particular build pattern; and
- engineering change proposal procedures (ECP) covering changes to an existing build pattern.

8.48 Effective and efficient contract change procedures require:

- assessment to ensure that specifications are not degraded and that changes are cost effective;
- expeditious response so that the schedule is not affected, especially to the point where contractors can claim for excusable delay; and
- complete documentation of approved changes.

8.49 Ideally, post-contract specification changes should be minimal since changes will usually have cost or schedule effects. Too many changes may compromise the configuration management plan as a project control instrument. The cost effectiveness of the project also may be compromised by the insertion of 'nice to have' features.

8.50 Where user requirements are difficult to fully define, as in design and development projects, the volume of changes can be considerable.

#### Defence Configuration Control Procedures

8.51 Processing of contract changes rests with the Contracting Authority, the assessment normally being the responsibility of the Service technical services areas. In some major new projects (Australian Frigate, F/A-18) technical management has been vested in the project director and not in the functional areas.<sup>46</sup>

8.52 Generally, the contract will incorporate a Configuration Management Plan. The Plan will usually provide that proposed changes are subject to formal review by a Configuration Control Board. In the case of the Australian Frigate project, 'fast tracking' procedures give the project director authority to allow minor changes to the configuration.<sup>47</sup>

46. Volume 2, paragraphs 3.26, 6.97-6.99 and Figure 6.2.

47. Australian Frigate Shipbuilding Agreement, November 1983, Section J-10.



8.53 In Air Force projects, perhaps largely because of concern over air safety, more rigid configuration control procedures seem to be employed.<sup>48</sup>

#### Summary of Evidence

8.54 Evidence before the Committee indicated that:

- in a number of cases post-contract configuration changes entailed large increases in project costs and/or extensions of completion dates (TADS,<sup>49</sup> Hiport/Medport<sup>50</sup>);
- design control procedures in certain projects were rigid, causing delay and additional work for contractors (Basic Trainer,<sup>51</sup> Hiport/Medport<sup>52</sup>);
- processing of contract change proposals generally can be very lengthy;<sup>53</sup> and
- the number of minor changes initiated by the Service client in some cases were excessive (Basic Trainer,<sup>54</sup> Hiport/Medport<sup>55</sup>).

#### Consideration of Issues

8.55 These problems appeared to have been caused by:

- technical changes proposals not being subject to sufficient vetting in the light of their potential impact on cost or schedule;<sup>56</sup>
- over-detailed technical specifications which required formal ECPs for any change<sup>57</sup> (the alternative may be to include performance specifications in the contract and allow contractors to respond with their own engineering solutions);
- design approval procedures which required resolution and documentation of detailed design very early in the project;<sup>58</sup> and

48. Volume 2, paragraph 8.69.

49. Ibid, paragraphs 11.22-11.23.

50. Ibid, paragraphs 17.18, 17.31.

51. Ibid, paragraphs 8.64-8.69.

52. Ibid, paragraphs 17.24-17.29.

53. See Table 8.1 below.

54. Volume 2, paragraphs 8.48-8.50.

55. Ibid, paragraphs 17.16-17.22.

56. Ibid, paragraphs 8.61-8.63.

57. Ibid, paragraph 8.65.

58. Ibid, paragraph 8.67.

- contractors being unable to provide sufficient notice of change proposals to permit consideration before critical decisions were required.<sup>59</sup>

8.56 Contract change proposals can take much longer than the usually specified 30 days to process. Table 8.1 reproduces data supplied by Defence on average change order processing times within the client and purchasing offices. Delays occurred within both the client office and Contracting Authority. Defence argued that change proposals can involve complex technical issues which are difficult to assess.<sup>60</sup> On the other hand, contractors are vitally interested in early responses to their requests.

8.57 The time needed to process these proposals appears to be directly related to the number of parties involved outside the project office. Although the project director should not have the authority to change user requirements, greater delegation of authority to the project director to approve changes within these parameters appears highly desirable.

8.58 The Committee recommends that:

37. Contract change proposals which are initiated by the Service sponsor and which affect cost or time must be subject to the agreement of the Project Director and require offsetting savings to be provided by the sponsor. Agreement between the project director and the Service sponsor should not impose irrecoverable costs on the contractors.
38. Project directors be given authority to approve contractor-initiated contract change proposals provided that the changes do not amend the technical characteristics in the Staff Requirement, the overall project budget or approved completion date.
39. The Services, in consultation with the appropriate Australian industry, review their present design approval procedures to see whether they can expedite design and development projects.
40. Contractors be encouraged to provide notice of pending contract change proposals.

59. Minutes of Evidence, op cit, pages 2342-2343.

60. Ibid, page 2341.

Table 8.1 Contract Change Orders - Client and Purchasing Authority Processing Times - Sixteen Projects

Project	Variation: (a)	Client Office			Purchasing Office		
		Time (days)			Time (days)		
		Min	Max	Avg	Min	Max	Avg
1. TADS	Technical(b)	-	-	70	-	-	3
2. Jindalee	Cost	-	-	-	5	250	115
	Delivery	-	-	-	100	360	215
3. C-130H Simulator	Technical	-	-	-	10	595	105
	-	8	13	10	8	32	13
4. F-111A Attrition Aircraft	- (c)	-	-	-	-	-	-
5. Basio Trainer Aircraft	Cost	-	-	-	2	100	18
6. P3C Orion	Cost	8	8	8	149	149	149
	Delivery	0	0	0	0	0	0
7. F/A-18 Tactical Fighter	Technical	1	145	14	1	321	85
	- (c)	-	-	-	-	-	-
8. Small arms	n/a (d)	-	-	-	-	-	-
9. Rapier Air Defence	- (e)	-	-	-	-	-	-
10. Hiport/Medport	Cost (f)	-	-	-	3	322	31
	Delivery	-	-	-	19	110	51
11. Medium trucks	Technical	-	-	-	2	134	37
	Cost	-	-	-	20	100	35/40
12. Hamel light gun	Delivery	n/a(e)	-	-	-	-	-
	Technical	-	-	-	30	60	40
13. HMAS Success	Cost	6	72	30	10	235	75
	Delivery	14	28	23	10	25	15
14. Minehunter Catamarans	Technical	1	46	13	5	60	30
	Cost	11	31	19	8	20	13.5
15. US-built Frigates	Delivery	49	75	61	7	61	26
	Technical	50	315	152	4	161	45
16. Australian Frigates	- (c)	-	-	-	-	-	-

Notes: (a) Cost, Delivery and Technical variation data is shown for each project where it has been made available.

(b) Cost and Delivery data not available.

(c) Data not available in project offices because projects, (F/A-18, F-111A Attrition and Guided Missile Frigates), are procured through US Foreign Military Sales arrangements.

(d) No changes have been made to the contract for the General Purpose Machine Guns

(e) Delivery variations not applicable here.

(f) Insufficient records held by Defence.

Source: Department of Defence, *Minutes of Evidence*, *op cit*, pages 2811-2813.

CHAPTER 9

'IN HOUSE' PROJECT IMELEMNTATION

9.1 This chapter discusses the management of in-house project implementation activities, that is, those for which the project director rather than the contractor is responsible. They include:

- . Government Furnished Information and Equipment;
- . Integrated Logistic Support;
- . acceptance procedures; and
- . project documentation, reporting and review.

GOVERNMENT FURNISHED INFORMATION and EQUIPMENT

9.2 Often the project director is responsible to the contractor for the delivery of:

- . production or data packages (for example, key drawings and build procedures) known as Government Furnished Information (GFI); and
- . designated equipment items either obtained from stores or purchased under the project, known as Government Furnished Equipment (GFE).

9.3 The Commonwealth will be liable to Excusable Delay claims in the event of failure to deliver GFI or GFE on time.

Summary of Evidence

9.4 The Committee investigations revealed instances of:

- . GFE delivered late (TADS,<sup>1</sup> Australian Frigate<sup>2</sup> and Tobruk<sup>3</sup>) and delays in selecting GFE which slowed finalisation of detailed design (Minehunter Catamarans<sup>4</sup>); and
- . GFI of inadequate quality (HMAS Success - ship Production Package<sup>5</sup>) or supplied late (HMAS Success - key build documents<sup>6</sup>).

These caused contractual disputes and major slippage in schedule.

1. *Volume 2*, Paragraph 11.25.
2. *Ibid*, paragraphs 3.48-3.56.
3. *Report of the Auditor General*, March 1982, pages 29,32.
4. *Volume 2*, paragraph 5.18.
5. *Ibid*, paragraphs 4.12-4.27.
6. *Ibid*, paragraphs 4.34-4.43.

## Consideration of Issues

9.5 Among the factors which contributed to these difficulties was the level of technical support personnel provided to project management for vetting data packages and preparing contract documentation, an issue addressed in Chapter Six.

9.6 In the Australian Frigate project the evidence pointed to possible management problems at the regional level of the Defence Purchasing Organisation.<sup>7</sup> In general, as Table 8.1 showed, administrative lead times in the Purchasing Authority can be lengthy. The Committee was unable to ascertain the causes of the lengthy processing times within the Purchasing Authority in the time available. It is of the view that the absorption of the Purchasing Authority into the Department, following abolition of the Department of Defence Support, may help to reduce these times. The issue remains one which concerns the Committee.

9.7 The Committee recommends that:

41. As a matter of priority the regional operations of the Defence Purchasing Organisation be reviewed to reduce purchase order processing times.

## INTEGRATED LOGISTIC SUPPORT

9.8 Within Defence, Integrated Logistics Support (ILS) includes personnel and training, facilities, transport and handling, initial spares, support and test equipment, handbooks and other technical data. The management and timely completion of these aspects are critical to the effective introduction of the equipment into service.

9.9 Basic ILS planning should be undertaken before the finalisation of tender documents. Implementation involves the co-ordination of many functional agencies. Drawing on the experience of the US-built (FFG) Frigates project in particular, Defence has increased its efforts in this area. Dedicated ILS staff were appointed in many of the projects.

9.10 ILS was unsatisfactory however in a number of projects. It involved the under-estimate of spares and support requirements (F-111A,<sup>8</sup> C-130H Simulator,<sup>9</sup> Rapiere<sup>10</sup> and Hamell<sup>11</sup>) and the late identification of facilities requirements (Hamell<sup>12</sup> and Australian Frigate<sup>13</sup>).

7. Volume 2, paragraphs 3.54 and 3.62.

8. Ibid, paragraphs 9.31-9.32.

9. Ibid, paragraph 12.22.

10. Ibid, paragraph 15.7.

11. Ibid, paragraph 16.29.

12. Ibid, paragraph 16.25.

13. Ibid, paragraph 3.59.

9.11 The Committee was not able within the time available to examine in detail the factors contributing to these noted deficiencies. The subject is an important one and the Committee intends to address it in a follow-up to this inquiry.

## ACCEPTANCE PROCEDURES

9.12 This area covers testing, trialling and evaluation of equipment, operator familiarisation, and procedures for handover to users. Such activities should be designed to ensure that the equipment fully satisfies operational requirements.

9.13 The Audit Office found that Defence did not use, in a number of projects it examined, effective procedures for the acceptance of equipment.<sup>15</sup> The Committee, in its investigation of HMAS Tobruk found that Defence lacked a policy on the transition from the procurement phase to maintenance and support. The respective responsibilities of the project office and the maintenance agency were not clearly defined and, in HMAS Tobruk's case, communication was ineffective.<sup>16</sup>

9.14 The Committee notes the importance of this subject and intends to include it in the follow-up inquiry.

## PROJECT DOCUMENTATION, REPORTING and REVIEW

9.15 This aspect of project management includes project information storage and retrieval, progress reporting and evaluation and review activity.

9.16 Efficient and effective project management requires:

- complete and accessible records of and reasons for all project decisions;
- project progress reports which are succinct and relevant and made available on a timely basis to all parties responsible for particular project tasks; and
- post-delivery evaluation of the history of the project to identify management practices which require improvement.

## Documentation

9.17 Departmental procedures provide for the comprehensive documentation of projects. However, the quality of documentation varied widely. For some earlier projects the reasons for decisions were not always clearly recorded and for the smaller projects information retrieval, especially financial information, was time-consuming.

15. Report of the Auditor-General, September 1983, page 35.

16. JCPA, Report No 223, op cit, pages 100-101.

- 9.18 The reasons for this situation appeared to be:
- the absence of any single Departmental policy covering total project documentation requirements; and
  - the limited computer assistance available to project offices to record and store data.

9.19 Documentation control is much better on more recent projects such as the Hamel, P3C Orion, F/A-18 and Australian Frigate Projects.

9.20 Good project documentation is a basic element of efficient and effective project management. For all major projects responsibility for overall documentation control should be assigned to an individual member of the project team.

9.21 The Committee recommends that:

42. The Chief of Capital Procurement issue consolidated guidelines covering total project documentation requirements. Such documentation must be standardised across the Services to the maximum extent possible.

#### Progress Reports

9.22 There are three levels of project reporting:

- contractor supplied progress reports;
- status reports to the respective Chiefs of Materiel by project directors; and
- the project Milestone Reports prepared for senior Defence management and the Minister.

9.23 Usually contracts will require the contractor to supply progress reports at monthly or (more likely) quarterly intervals. Sometimes provision is made for conferences between the project director and contractor to consider these reports.

9.24 As far as the Committee could ascertain Defence Instructions do not address comprehensively the format or content of project reports.

9.25 Project status reports by the project director to the Service Chief of Materiel, which are usually quarterly, vary widely. The quality of these reports may depend closely on the particular project director. The Chief of Air Force Materiel requires reporting by exception on all routine project activities and detailed reports on major milestones. Navy has adopted the practice of reporting on significant phases as they occur. Army distinguishes between smoothly running (reporting by exception) and sensitive projects (full detail).<sup>17</sup> For the large projects an Executive Steering or Review Group will be appointed.

17. Minutes of Evidence, op cit, pages 3082-3083.

9.26 Quarterly Milestone Reports to senior Defence management and the Minister provide basic project information on project cost and milestone achievements. Milestone Reports examined by the Committee did not contain detailed analyses of schedule slippages or cost overruns nor indications of remedial action proposed or taken by the project director. This information, the Committee believes, is essential for effective executive oversight of the Defence Capital Procurement Program.

9.27 The Committee recommends that:

43. The proposed project documentation guidelines address the format and content of project progress reports and require:

- (a) reference to issues outstanding from previous reports;
- (b) a report of progress, nature of problems and remedial action taken or proposed;
- (c) summary information only, supported where necessary by sufficient explanatory detail; and
- (d) the use of straight forward language (technical terms and acronyms should be defined).

44. Quarterly Milestone Reports to senior management must include an analysis of cost and schedule variances and a summary of proposed remedial action.

#### Project Review

9.28 As the Auditor-General found, Defence has no dedicated project evaluation or review machinery with which to identify areas of project management requiring improvement.<sup>18</sup> Instead change has been generated by ad hoc reviews initiated by Service Chiefs of Materiel. An example was the review by the Chief of Navy Materiel in 1983.

9.29 The Committee considered that in an area as large and important as defence equipment acquisition this was an unsatisfactory state of affairs. It was, in the Committee's view, an outcome of the generally poor state of development of management information systems in this area of Defence.

9.30 The Committee recommends that:

45. An internal efficiency and effectiveness review of a major project be undertaken by the end of 1986. This review should help establish the methodology of future regular internal reviews of major equipment projects.

18. Report of the Auditor-General, September 1983, page 35.

## A DEFENCE PROJECT MANAGEMENT MANUAL

9.31 Each Service has its own set of procurement instructions and procedures which complement the more general Defence Central instructions. The Chief of Capital Procurement is progressively issuing consolidated procurement instructions.<sup>19</sup> Although the complete standardisation of procurement procedures across all Services would be impracticable, in the light of the range of problems that have been addressed in this Report, the Committee believes there is a need for a consolidated, comprehensive Defence Project Management Manual. This manual should cover all aspects of Defence project management and give particular attention to the problems discussed in this Report. It should also be the key reference document for Defence equipment procurement policies and procedures.

9.32 The Committee recommends that:

46. The Chief of Capital Procurement issue, as a matter of priority, a comprehensive Defence Project Management Manual for the guidance of project directors in all Services. Where there is conflict between the Manual and Service procurement instructions, the Defence Project Management Manual should take precedence.

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19. Minutes of Evidence, op cit, pages 3251-3261.

## CHAPTER 10

### ORGANISATION

10.1 This chapter examines the administrative framework in which major equipment acquisition is undertaken.

10.2 The issues considered cover the allocation of responsibility and authority for the implementation of a project from inception to completion.

10.3 In the Committee's view, efficient and effective administration of a project requires that:

- responsibility for all tasks essential for the completion of the project are assigned, unambiguously defined and distinctions between primary and secondary responsibility clarified;
- responsibility is matched with authority and accountability;
- parties assigned with specific areas of responsibility participate in decision-making in the areas directly related to the discharge of their responsibility;
- lines of communication and control are simplified and shortened wherever possible; and
- overall managerial responsibility is centralised to the maximum extent practicable.

#### Project Organisation in Defence

10.4 Within the time frame of the projects examined by the Committee, the organisation of major capital procurement has undergone several changes.<sup>1</sup>

10.5 Prior to the 1973-76 Defence re-organisation, responsibility for the implementation of a project was shared between the functional areas of the Services (Operations, Production, Technical Services, Supply/Logistics, etc). It was usual to appoint an officer to act on a full or part-time basis as the project co-ordinator.

10.6 The effect of the 1973-76 re-organisation was to place the bulk of procurement activity in each Service under the new positions of Chief of Materiel. For large, complex projects dedicated project teams were established and project directors assigned managerial authority. The F/A-18 project office (established 1980) and Australian Frigate project office (established 1982) have large staffs and considerable financial and technical authority has been granted to the respective project directors.

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1. Defence Review Committee, op cit, pages 101-106.

10.7 There have been a number of changes also in the responsibilities of some of the Service Chiefs of Materiel in this period. In 1982 the Chief of Army Materiel assumed responsibility for Army Quality Assurance and the Engineering Development Establishment which contains the bulk of the Army's technical services personnel. In 1983 the Chief of Naval Staff instituted a number of changes to the Naval Materiel Division. The Directors-General of Naval Design, Naval Production and Naval Operations Requirements were given dual responsibility to the Chief of Naval Materiel and their respective Chiefs (Technical Services, Operations).

10.8 The establishment of the Capital Procurement Organisation (CPO) in June 1984 brought together the Service Materiel Branches/Divisions and the procurement and industry policy divisions of Defence Central.<sup>2</sup> The Chief of Capital Procurement (CCP) was given authority over the major equipment procurement budget and increased financial delegations were granted to project directors. A number of personnel from the Services' Supply and Technical Services Divisions have been transferred to the CPO. Standardised procurement procedures and instructions are being issued progressively.

10.9 In December 1984 the Department of Defence Support was abolished and its Defence production and purchasing functions absorbed within Defence. The former Defence Production Development Policy Division of Defence Support was transferred to the CPO. Responsibility for Defence purchasing has been assigned to a separate area of Defence. Figure 10.1 outlines the organisational structure of the CPO.

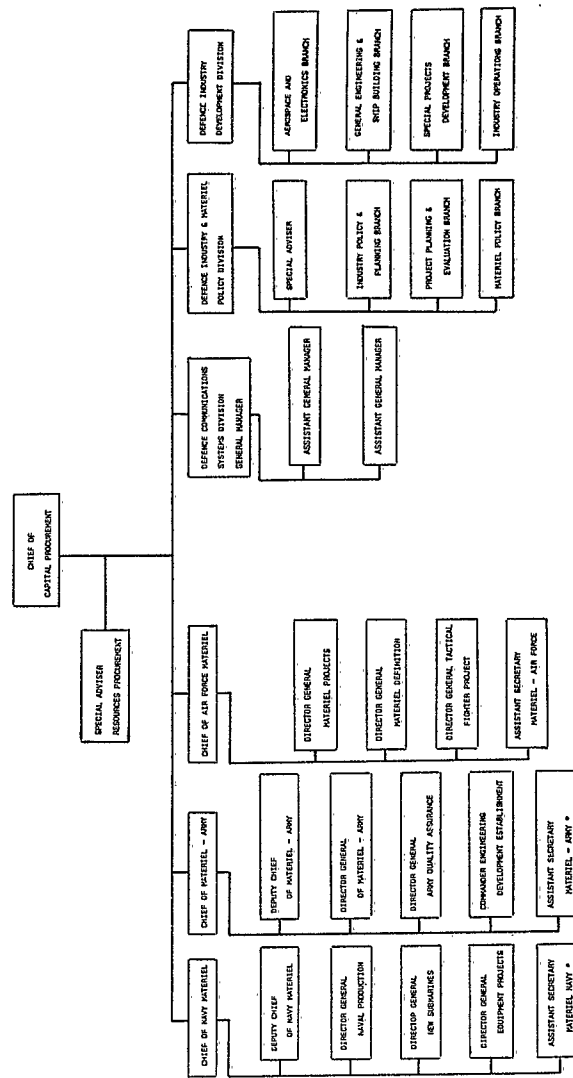
10.10 As described in Chapter Three responsibility for project definition largely resides with the Service Operational Requirements Branches or Divisions. Generally, responsibility for a project transfers to the Service Materiel Branch or Division at the time of Departmental endorsement of the Staff Requirement. The timing and management arrangements involved in the transfer have differed between the Services. Greater standardisation of practice may be achieved with the development of the CPO.

10.11 There are some important differences among the Services in project organisation. Army Materiel Branch still relies on a matrix type project organisation where the project director has a co-ordinating rather than managerial role. Navy and Air Force Materiel Divisions have assigned increased managerial responsibilities to project directors. For recent major projects Navy and Air Force project directors have been provided with large dedicated staffs.<sup>3</sup> Figure 10.2 illustrates the continuum of project organisation arrangements within Defence.

2. Minutes of Evidence, op cit, pages 3165-3185.

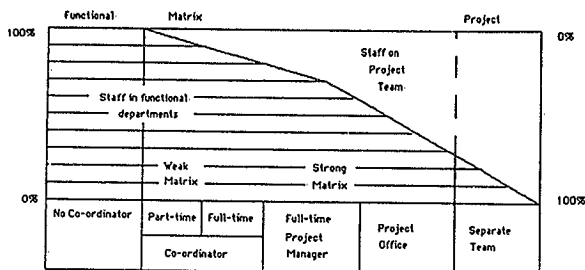
3. Ibid, pages 1945-1978.

Figure 10.1 Capital Procurement Organisation - Organisational Structure



\* Policy direction from Special Adviser Resources Procurement.

Figure 10.2 The Project Organizational Continuum



Source : ABR 5062 - RAN Project Management Manual  
January 1982, Canberra, pages 4-5.

#### Summary of Evidence

10.12 The Committee identified a number of organisational problems which affected the success of the projects:

##### Relatively late establishment of project offices

Dedicated project teams were not appointed until late in or following the project definition stage (Hamel<sup>4</sup> and Rapier<sup>5</sup>); part-time project co-ordination carried through the project definition stage (HMAS Success,<sup>6</sup> Minehunter Catamarans<sup>7</sup>); or there was an apparent absence in the early stages of a project of any clear locus of responsibility (Jindales<sup>8</sup>).

##### Poor co-ordination of the inputs of functional areas

Technical considerations tended to over-ride other project objectives (Basic Trainer,<sup>9</sup> Hiport/Medport<sup>10</sup> and possibly TADS<sup>11</sup>) or there was simply inadequate consultation between functional areas (Minehunter Catamarans,<sup>12</sup> HMAS Tobruk<sup>13</sup>).

4. Volume 2, paragraph 16.36.
5. Ibid, paragraph 15.20.
6. Ibid, paragraphs 4.44-4.45.
7. Ibid, paragraphs 5.19, 5.23.
8. Ibid, paragraphs 10.7-10.11.
9. Ibid, paragraphs 8.61-8.63.
10. Ibid, paragraphs 17.44-17.47.
11. Ibid, paragraphs 11.12, 11.28.
12. Ibid, paragraphs 5.20-5.21.
13. JCPA, Report 223, op cit, paragraphs 6.30-6.32.

Responsibilities which were overlapping, ambiguous or unassigned

Quality assurance (HMAS Success),<sup>14</sup> progress monitoring (Minehunter Catamarans)<sup>15</sup> and weight control (HMAS Tobruk)<sup>16</sup>.

##### Long or complex lines of communication and control

There was generally recurring evidence of long administrative lead times for staff recruitment, computer acquisition, employment of consultants, contracting, purchasing and contract change orders.<sup>17</sup>

##### Inadequate liaison arrangements with contractors

In a number of projects there were multiple official contact points between Defence and the contractor (HMAS Success,<sup>18</sup> Hiport/Medport,<sup>19</sup> Basic Trainer<sup>20</sup>).

#### Consideration of Issues

10.13 These problems involved four separate issues:

- the division of responsibility for carriage of the initial project phase;
- the subsequent division of responsibility for the implementation phase, particularly for technical matters;
- the authority and status of project directors; and
- the efficacy of liaison arrangements.

##### Responsibility for Carriage of the Initial Project Phase

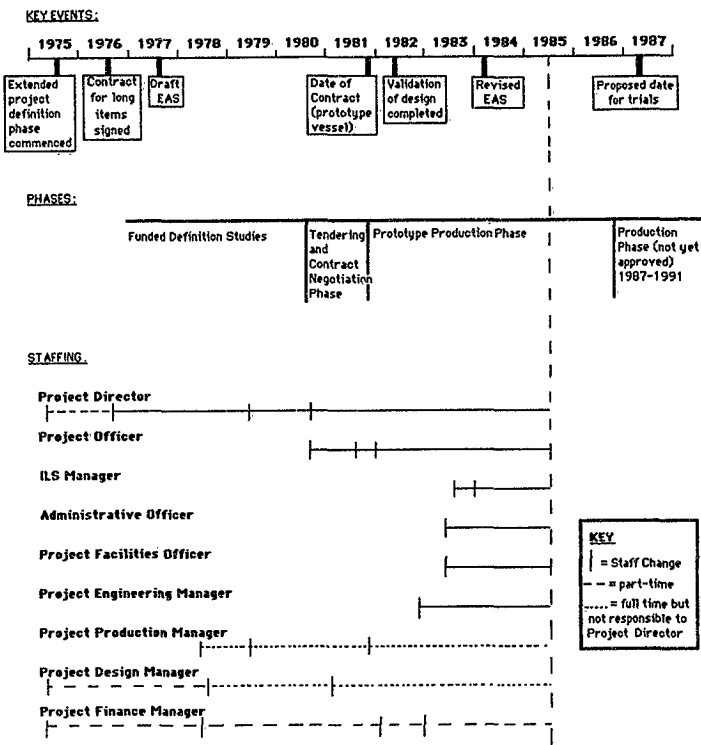
10.14 As discussed in Chapters Three and Four the project definition and planning phases of many of the projects were poorly managed. Figure 10.3, which outlines the organisation and staffing history of the Minehunter Catamaran project, illustrates the lack of dedicated staff in the initial phases of a project.

10.15 The Committee considered the question whether, to maximise the use of the limited resources available, there should be an earlier transfer of responsibility to the CPO.

10.16 The broad definition of user requirement is clearly best left in the hands of the operational requirement areas. However, the CPO may be a better location for the expertise to undertake detailed project definition studies. There will be a need to maintain close consultation with the Service sponsor

14. Volume 2, paragraphs 4.44-4.46, 4.51-4.53.
15. Report of the Auditor-General, May 1983, page 11.
16. Report of the Auditor-General, March 1982, page 28.
17. See the Australian Frigate, Jindalee, TADS, Hiport/Medport projects.
18. Volume 2, paragraphs 4.45, 4.51.
19. Ibid, paragraphs 17.47-17.48.
20. Ibid, paragraph 8.60.

Figure 10.3 Organisation and Staffing History - Minehunter Catamaran Project



since the latter remains responsible for the statement of needs, the Staff Requirement (and its revision as required in the light of project definition studies).

10.17 On balance, the Committee would favour the CPO managing, on behalf of the Service sponsor, the project definition studies. The Service sponsor would be able to revise its requirement in the light of these 'independent' studies. The merits of this organisational arrangement include the early involvement of the CPO and possibility of greater continuity of project personnel into the implementation stage.

10.18 The Committee recommends that:

47. The Service sponsor appoint a representative to liaise with the project office at the time the draft Staff Target is raised. That position should continue to function as the sponsor representative throughout the period of the project.
48. A project director be appointed within the CPO at the commencement of detailed project definition. For major projects, where responsibility for the definition studies rests with the project director, a dedicated project team sufficient to conduct or supervise the studies should be established.

**Responsibility For Technical Aspects**

10.19 For most major projects responsibility for project implementation was shared between the project director and functional directorates responsible for design, quality assurance, production control, etc. Under these arrangements there is, despite routine co-ordination and liaison procedures, the danger that technical decisions will be taken without due attention to their effect on project time and cost objectives.

10.20 The Committee questioned Defence as to why project managers could not be given responsibility for technical aspects of the project. The Service Chiefs of Materiel advised the Committee that the allocation of technical responsibility to project directors was limited by:

- scarce specialist technical resources; and
- the functional relationship of the technical services Chiefs to their Chief of Staff to enforce and maintain technical performance standards.<sup>21</sup>

10.21 There may be a relative shortage of skilled technical personnel in Defence although the Committee did not have to hand sufficient data to confirm this. Many specialist staff in the functional areas will be engaged on procurement activity and on individual projects on a full-time basis. Following the establishment of the CPO there has been a transfer of technical staff to the Service Materiel Divisions.<sup>22</sup>

21. Minutes of Evidence, op cit, pages 1981-1983, 2293-2297.  
 22. Ibid, pages 2314-2315.



10.22 Where the permanent transfer of staff to the CPO would be impractical, secondment of technical officers to the project offices on an 'as needed' basis would be the appropriate course of action. The alternative involves relegating the project to a secondary priority.

10.23 The source of the difficulty over the re-allocation of functional responsibilities appears to lie in the desire by Service sponsors to retain for as long as possible an area of discretionary control over procurement. In the Air Force for instance, airworthiness standards are used as arguments for retaining tight Technical Services Division control.<sup>23</sup>

10.24 The Committee believed that specific reference to these standards can be incorporated in Staff Requirements and thus become an integral part of binding agreements between the Service sponsor and the CPO. The CCP is responsible for the procurement complying with user requirements. That requirement should include aspects such as airworthiness, etc.

10.25 As an organisational issue this matter has and continues to threaten the authority of the CCP and project directors to control their area of responsibility.

10.26 The Committee recommends that:

49. The endorsed Staff Requirement establish the basis for sponsor requirements and form the basis of a binding agreement between the Service sponsor and the project director. Subsequent amendments to the Staff Requirement should be subject to formal procedures and the mutual agreement of the Service sponsor and project director.
50. The project directors of large and complex projects be assisted by their own technical staff. Whether these specialist staff are transferred on a permanent basis to the CPO or seconded temporarily should be decided on practical grounds.

#### Authority of the Project Director

10.27 The authority of the project director is directly related to the degree of centralisation of procurement functions. The Department in its submission to the Utz Inquiry, argued '... a more centralised procurement organisation was a pre-requisite to an increased decentralisation of authority at the project management level'.<sup>24</sup>

10.28 It is clear that project directors should not have authority to change the approved parameters of the project, that is, its performance characteristics or specifications, approved cost and delivery dates. Changes to these parameters require consideration and approval by senior Defence management or Government, acting on advice from the operational or other functional areas.

23. Minutes of Evidence, op cit, pages 1489-1490.

24. Defence Review Committee, op cit, paragraph 4.199.

10.29 The evidence examined by the Committee indicated that, notwithstanding some advances, the managerial authority of project directors remains relatively limited. Defence stated that the allocation of authority was one of the 'most vexing of project management issues'.<sup>25</sup>

10.30 The Department told the Committee that within project parameters the project director will have the facility to take decisions to expedite the project subject to:

- access to functional expertise;
- standard government procedures for staff recruitment, purchasing, ADP, etc; and
- the 'complex and inter-active nature' of Defence functions.<sup>26</sup>

10.31 To the Committee there appeared to be another factor:

- the comparative lower rank or classification of project directors relative to their counterparts in functional areas.<sup>27</sup>

10.32 In the Committee's view, Defence has the scope to allocate more authority to project directors commensurate with their increased responsibilities.

10.33 The Committee recommends that:

51. Full authority must be given to the project director to expedite the project within the endorsed parameters relating to technical performance, cost and time, subject to annual Budget allocations and Government policies.
52. The size and composition of the project office be directly related to the scope of tasks necessary for the efficient exercise of authority granted to the project director under recommendation 51 above.

#### Liaison Arrangements

10.34 Defence contractors pointed to several organisational aspects which have led to ineffective liaison in a number of projects. First, liaison was made through numerous points in the Defence organisation. Notwithstanding the directness of much of this liaison it clearly was seen as divided project responsibility and thus relatively weak project management.<sup>28</sup>

25. Minutes of Evidence, op cit, pages 2172-2173.

26. Ibid, pages 2172-2177.

27. Ibid, pages 2330-2331.

28. Ibid, pages 2019-2020.

10.35 Second, contractors were critical of absent or limited on-site representation which restricted communication and isolated Defence from project problems.<sup>29</sup> Criticism was also directed at the relative level of authority held by on-site representatives. It was said to be insufficient to resolve day-to-day problems faced by the contractor.<sup>30</sup>

10.36 Defence has acknowledged such problems and there has been significant improvements to these arrangements in such projects as HMAS Success and the Minehunter Catamarans.

#### Autonomy of the Procurement Function

10.37 The division of responsibilities for the implementation of projects raised the issue of the role of the Service Chiefs of Materiel within the CPO.

10.38 In its submission to the Utz Inquiry the Department of Defence argued that the Service Chiefs of Materiel should be solely responsible, via the proposed Chief of Capital Procurement, to the Secretary. It stated that the Defence Industry and Materiel Policy Division 'had found it necessary to become involved to a greater degree than intended in imposing considerations of overall Defence and Government Procurement Policy into project planning developed around essentially single service priorities and objectives'.<sup>31</sup>

10.39 Utz rejected the Department's argument. He recommended that Service Chiefs of Materiel retain a dual or two-hatted responsibility to the Secretary and Service Chiefs of Staff. Utz considered that this would protect the essential interests of the Services.<sup>32</sup> The dual responsibility has been retained in the CPO.

10.40 The Committee is not convinced that this decision was the most effective option. The CPO should be operated as a single procurement organisation with a common policy. An 'arms length' separation between the client (Service sponsor) and the procurement organisation (project director) seems to have particular advantages in controlling the key aspects of cost and time. Service interests can be protected just as well by a contractual type relationship with the CPO.

29. Minutes of Evidence, *op cit*, pages 2099-2100.

30. *Ibid*, page 1799.

31. Defence Review Committee, *op cit*, paragraph 4.199

32. *Ibid*, paragraph 4.196.

## CHAPTER 11

### RESOURCE MANAGEMENT

11.1 This chapter examines a number of issues which were raised during the inquiry concerning the selection, placement and training of project staff and the management of financial resources.

#### PERSONNEL MANAGEMENT

11.2 Effective personnel management, in the view of the Committee, involves:

- selection criteria which are relevant to the needs of efficient project management;
- recruitment procedures which ensure, when needed, the timely placement of staff;
- relevant post-entry training to augment skills acquired on-the-job; and
- the conservation of scarce skills and experience by minimising staff turnover and developing stable employment patterns.

#### Personnel Management in Defence

11.3 Personnel policy covering military project staff is the responsibility of the Service Chiefs of Staff. Decisions on the Service Posting Cycle are governed by over-all Service staff development objectives. The employment of civilian project staff is covered by the Public Service Act and Regulations. Security clearances are required for civilian positions and have formed a major constraint to recruitment. Within Defence the Personnel Administration and Policy Division has administrative responsibility for personnel management.

#### Summary of Evidence

11.4 Personnel issues were raised in a number of projects examined by the Committee. The major problem areas were:

- staff shortages caused by recruitment delays especially in the early phases of a project (Australian Frigate Project,<sup>1</sup> P3C Orion,<sup>2</sup> Jindalee,<sup>3</sup> and HMAS Success<sup>4</sup>); and

1. Volume 2, paragraphs 3.73-3.78.

2. *Ibid*, paragraph 7.17.

3. *Ibid*, paragraph 10.15.

4. *Ibid*, paragraph 4.47.

- discontinuity of key personnel causing problems for contractors (HMAS Success,<sup>5</sup> Basic Trainer<sup>6</sup> and HMAS Tobruk<sup>7</sup>).

11.5 Defence contractors and other witnesses also pointed to:

- limited project management experience of project staff, particularly on-site representatives;<sup>8</sup>
- inadequate post-entry training in project management;<sup>9</sup> and
- the absence of career paths to retain expertise in project management.<sup>10</sup>

#### Selection of Project Personnel

11.6 Project teams are comprised of a wide range of specialists representing different technical disciplines and experience. Generally the project director has a relevant technical background, frequently in engineering, and considerable Service experience.

11.7 The Committee was interested in the balance between technical skill and project management qualifications and experience. The Services favoured the former arguing that the nature of the projects and the different stages of the equipment acquisition process required sound technical knowledge or, at the least, relevant operational experience. Prior project management experience was desirable rather than essential. Military staff training provided the required general management skills.<sup>11</sup>

11.8 Army and Air Force particularly favoured military project directors because of the importance placed on protecting user interests. Operational experience was considered very significant.<sup>12</sup> The Committee noted that, with one exception in Army, military officers occupied project director positions in all 12 Army and Air Force projects examined. Two of the four Navy projects had civilian project directors.

11.9 With respect to the Air Force and Navy Projects examined, the project management experience of project directors ranged from three to seven and half years.<sup>13</sup> Details for Army projects were not supplied.

5. Volume 2, paragraph 4.48.

6. *Ibid*, paragraph 8.60.

7. JCPA, Report 223, *op cit*, paragraphs 6.62-6.66.

8. Volume 2, paragraph 8.68.

9. Minutes of Evidence, *op cit*, pages 2118-2121.

10. In camera Evidence, 12 June 1985, pages 341 and 366.

11. Minutes of Evidence, *op cit*, page 2105.

12. In camera Evidence, 12 June 1985, pages 374-375.

13. Minutes of Evidence, *op cit*, pages 1990-1994.

14. *Ibid*, pages 1994-1998.

15. *Ibid*, pages 2781, 2797, 2910.

11.10 Private industry appears to give greater weight in the selection of project managers to prior experience in project management.<sup>14</sup> The turnover of senior project managers in private industry appears to be lower also.<sup>15</sup>

#### Findings

11.11 The Committee reached the following conclusions.

- Similar managerial skills are required for major Defence projects as for major equipment projects elsewhere in the public sector and in private industry. These environments are not so different as to make comparisons invalid.
- Because of the multiplicity of issues bearing on Defence procurement, it is essential for project directors to have appropriate and adequate management skills and background.
- The relative importance of technical skills will be directly related to the stage of development of the project, being most important during the design and development phase.
- Project management skills must be clearly distinguished from the general management training received by military officers.
- Personnel with extensive project management skills appear to be relatively scarce in Defence. Military training does not necessarily provide these skills.
- Defence may need to use make use of contract project management services to bridge shortages of skilled project personnel.

11.12 The Committee recommends that:

- 53. Selection criteria for all project directors positions must give the highest priority to experience and training in project management.
- 54. Selection criteria for other senior project personnel stipulate prior project management experience and training as a necessary qualification.

55. Where experienced project management personnel are not available from within the public sector, project management services be obtained from the private sector on a contract basis.

14. Minutes of Evidence, *op cit*, pages 2118-2120.

15. In camera Evidence, 12 June 1985, page 341.

16. Minutes of Evidence, *op cit*, page 2124.

## Recruitment Procedures

11.13 The average lead time for civilian recruitment in project offices was around six months. Defence pointed out that the security clearance requirement makes up a considerable part of this period (between four and nine weeks) and some appointees declined offers because of the extended period finalising appointments.<sup>16</sup> Public Service Board procedures involve a 'core recruitment processing period' of about nine weeks.<sup>17</sup> Even allowing for security clearance requirements, recruitment lead times in Defence appear to be excessive.

11.14 Defence has recently re-examined its procedures for recruitment of civilians and advised the Committee that recommendations for improved action are under consideration.<sup>18</sup>

11.15 Navy has taken some steps to overcome delays involved in recruitment, specifically by:

- commencing recruitment action before project approval is granted;
- developing a pool of project staff in Navy Materiel Division; and
- negotiating a period contract with a panel of project management consultants. Some difficulties have been experienced gaining timely approval to use the panel on specific projects.<sup>19</sup>

## Findings

11.16 The Committee concluded that recruitment delays constituted a major problem, adversely influencing the critical initial phases of a project. Notwithstanding its acknowledgement of the problem Defence has made little progress in improving the situation.

11.17 The Committee recommends that:

56. The Department of Defence report to the Committee what steps it proposes to take to reduce recruitment times for civilian staff.
57. As a measure to reduce the effect of civilian recruitment delays, consideration should be given to establishing a pool of staff within the CPO to assist projects on a short-term basis, preferably in the initial phases.

16. Minutes of Evidence, op cit, pages 1300-1309.

17. Ibid, pages 1305-1306.

18. Correspondence dated 16 August 1985 (PAC File 1983 (10) B39/1).

19. Minutes of Evidence, op cit, pages 1302-1304.

## Post-entry Training

11.18 Defence Central, Army and Navy provide short induction courses for newly appointed project personnel. This training is supplemented by short generalised in-house courses on project management and by selective use of commercially-run courses in management techniques.<sup>20</sup> The Committee had insufficient data on the project staff who may have undertaken these courses to comment on their value in up-grading project management skills.

11.19 The major avenue for professional project management training has been courses run by Allied military forces. Very few overseas courses however, are dedicated to project management training. Many are designed to train technical staff officers in logistics. Army for instance has made considerable use of the Master of Science course at the Royal Military College of Science, Shrivenham, England. Navy similarly has used the Logistics Executive Development Course run by the US Army. The Air Force has yet to send staff to dedicated project management courses. Army and Navy have made use of this training with subsequent placements in project offices.<sup>21</sup>

11.20 The cost effectiveness of relying on overseas courses seems questionable. Courses need relevance to Australian conditions, particularly Australian law and industrial capacity. Army recently reviewed its use of Shrivenham and concluded that the courses, with their close connection with the military environment were preferable to 'open' tertiary courses in Australia. It foreshadowed that the Australian Defence Force Academy may be in a position in the late 1980s to make a contribution to post-graduate training. Army's survey of tertiary courses was limited.<sup>22</sup> The Committee's own investigations indicated that suitable courses are being offered by the South Australian Institute of Technology and the University of New South Wales.<sup>23</sup>

11.21 The development of local professional project management training will need to be given some priority because the number of available places on overseas courses appears to be declining.<sup>24</sup>

11.22 Army and Navy have also made use of the secondment of project personnel to project offices in Allied defence forces.<sup>25</sup>

11.23 Defence acknowledged that a great deal more needs to be done in the area of project management training.<sup>26</sup>

20. Minutes of Evidence, op cit, pages 2533-2544.

21. Ibid, pages 2782-2784 and 2792-2806.

22. A copy of the evaluation report was supplied to the Committee in confidence (PAC File 1983(10)C41/4).

23. PAC File 1983(10) B44/1.

24. Minutes of Evidence, op cit, pages 2322-2323.

25. Ibid, pages 1097, 1107-1113 and 2004.

26. Ibid, pages 2319, 2321.

## Findings

11.24 The Committee found that the effort devoted to developing and providing project management training of a suitable standard for higher level project staff has been inadequate, particularly within the RAAF. The high use of overseas courses does not appear cost effective in view of the apparent willingness of Australian tertiary institutions to gear graduate management courses to meet Defence's needs.

11.25 The Committee recommends that:

58. Universities and other tertiary institutions in Australia be invited to develop for Defence staff special post-graduate courses which give emphasis to the deficiencies in project management identified in this Report.

59. Project management training be incorporated in the undergraduate courses to be given at the new Australian Defence Force Academy.

60. With the establishment of Australia-based higher level project management training, the use of overseas courses be substantially reduced. The purpose of overseas training should be to give project staff exposure to the management of similar projects by Allied services and to advanced project management practices generally.

### Continuity of Project Staff

11.26 Information on the average tenure of project directors for each of the 16 projects is provided in Figure 11.1.

11.27 Although there is some evidence that turnover of key staff has lessened in recent years, the position is still far from satisfactory. The tenure of project directors has ranged between two and five years with that for other key project staff being less than this. There appears to be relatively little difference between military and civilian staff in relation to turnover.<sup>27</sup>

11.28 In evidence Air Force suggested that it was desirable to hold a project director for three years and Navy argued for a four-to-five year tenure.<sup>28</sup> Industry seems to provide greater incentives to keep senior project staff for most of the life of a project.<sup>29</sup>

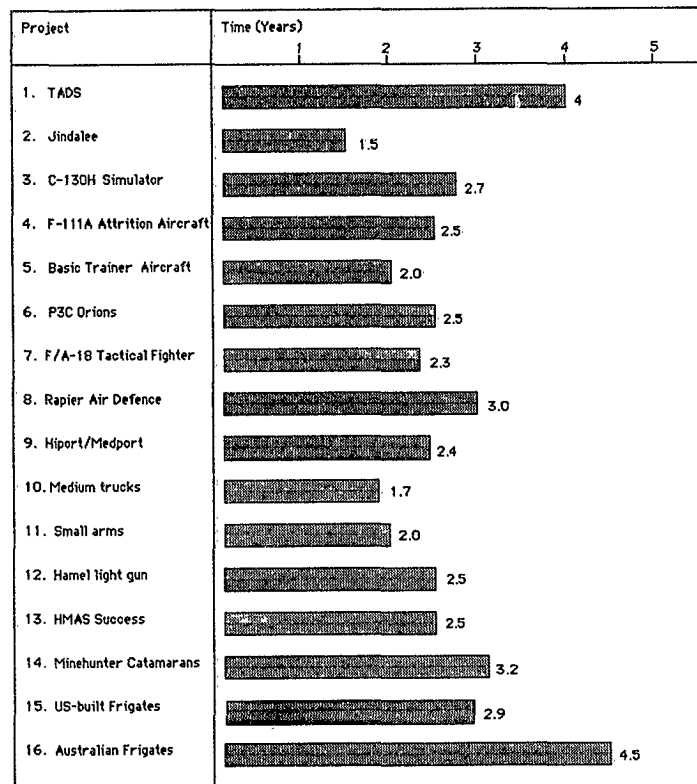
27. Minutes of Evidence, op cit, pages 1755-1756 and 2388-2399.

28. Ibid, pages 2324-2325.

29. Ibid, pages 2120, 2128-2129.

In Camera Evidence, 12 June 1985, pages 377-378.

Figure 11.1 Average Tenure of Project Directors - Sixteen Projects



11.29 The issue of continuity of key staff was acknowledged by Defence to be a problem that it found difficult to resolve. Defence stated that it may be neither possible nor desirable to hold key project staff for the duration of a project and pointed to the extended time frame for major projects, to the requirement for different skills during different phases of a major project, to the mobility of civilian appointees in comparison to firm postings for military officers and to the reluctance of the Services to depart from a regular Service Posting Cycle which tended to return military officers to operational posts following periods in project offices.<sup>30</sup>

11.30 Central to this issue was the question of whether Defence personnel management should encourage a career in project management. Defence argued that the absence of a structured career path ipso facto was not a cause of staff turnover as their experience in the computer field demonstrated. It suggested that the number of jobs in project management was too small to provide a basis for career specialisation. However, Army and Navy attempt to practise broad career streaming in the materiel area.<sup>31</sup>

#### Findings

11.31 The Committee arrived at the following conclusions.

- . The development within the military of career paths in project management is an issue which remains unresolved in the Australian Defence Forces as well as in several Allied forces.
- . Project management in Defence will be improved greatly by the development of a cadre of trained and experienced project management staff.
- . If such a development within the military is difficult, the gap could be met by civilian recruitment.
- . Increased recruitment of civilians into the CPO, may lead to the increased autonomy of that organisation vis-a-vis the Services.
- . Within the Services more action can be taken to ensure greater continuity of staff by
  - developing career paths for technical officers within the materiel cycle,
  - ensuring that military officers' promotion prospects are not disadvantaged by extended periods of service in the CPO, and

30. Minutes of Evidence, op cit pages 2270-2277.

31. Ibid, pages 2324-2325.

- 'shadow posting' key project staff for a period prior to the assumption of their responsibilities.

11.32 The Committee recommends that;

61. The Public Service Board be invited to develop, in consultation with Defence and other relevant Commonwealth agencies, a career path, possibly not confined to Defence, for civilian project management personnel.
62. The Services develop as far as possible career paths for technical staff officers within the overall materiel management area.
63. (a) The promotion prospects of military officers posted for extended periods to project offices not be affected adversely.  
  
(b) More systematic effort be given to effective project management hand over procedures. The 'shadow posting' of key project staff prior to the assumption of their responsibilities should be considered.

#### FINANCIAL MANAGEMENT

11.33 In terms of efficient project management a number of financial activities play an important role. The Committee sought and examined evidence in three areas:

- . expenditure control;
- . payments to contractors or suppliers; and
- . costing of internal resources.

11.34 Defence's compliance with the Audit Act and Financial Directions was not addressed. Instead the Committee focused on the systems of financial administration to see whether there was evidence that these aspects contributed to problems in project management.

#### Expenditure Control

11.35 The Chief of Capital Procurement controls the major capital equipment budget. Financial control over the Service equipment budgets has been delegated to the Chiefs of Materiel and increased financial control over individual projects to project directors. Managers at each of these levels are

assisted by Financial advisers who are responsive (though not responsible to) the First Assistant Secretary Financial Services and Internal Audit (FASFIN) and the First Assistant Secretary Programmes and Budgets (FASPB). These arrangements have replaced a situation whereby control of the major capital equipment budget was divided between the Service Chiefs, FASFIN and FASPB.<sup>32</sup>

11.36 The Chief of Capital Procurement, like other Defence line managers, does not have control over the administrative components of the procurement function. The time-consuming processes of obtaining approval to use consultancy services or to upgrade or acquire small computer systems can be a source of frustration to project directors.<sup>33</sup> The Government's Financial Management Improvement Program introduced in 1984 has the objective of devolving to individual Public Service managers a greater degree of control over the resources they require to do their job.<sup>34</sup>

11.37 Another major aspect of expenditure control relates to monitoring and reporting price and real cost increases in project budgets. The measurement of real cost increases is a particularly important aspect of management control. Inconsistencies in Defence evidence on this aspect were noted. Defence stated that 'there are rigorous processes under which movements in the real cost of approved equipment projects are monitored'.<sup>35</sup> In later evidence on the use of price deflators, Defence acknowledged that no single measure is used and that real cost movements in fact represent a residual after taking into account price and exchange rate changes.<sup>36</sup>

11.38 Although there is a requirement for project directors to review approved project costs every six months, total approved costs are not always updated to the latest price or exchange base. For example, the latest approved costs for the F/A-18 Project and the Australian Frigate Project are based on December 1982 and December 1983 prices respectively.

11.39 The Committee recommends that:

64. As part of the Financial Management Improvement Program, control over project administrative budgets be delegated to project directors subject to Departmental guidelines about the employment of consultancy services, ADP acquisition, etc.

65. The Department of Finance investigate closely the methods used by Defence to monitor real cost changes and, for the purposes of consistency in reporting, identify an appropriate price deflator which may be used to monitor price changes.

32. Minutes of Evidence, op cit, pages 2295-2309.

33. Volume 2, paragraph 3.78.

34. Reforming the Australian Public Service: A Statement of the Government's Intentions, December 1983, Part 3.

35. Minutes of Evidence, op cit, page 2188.

36. Ibid, page 2850.

## Payments to Suppliers

11.40 In evidence the Committee was told that there were often lengthy delays in Defence payments to contractors.<sup>37</sup> Data supplied by Defence indicated however that payment processing times, within the accounting area of the Department at least, were not unreasonable.<sup>38</sup>

## Resource Costing

11.41 Internal resource costing systems are used to guide the allocation of internal resources and 'make or buy' decisions.

11.42 The Department of Defence does not have a comprehensive resource costing system which would allow it to allocate the cost of dedicated and non-dedicated management resources to individual projects. The Department of Housing and Construction, and many areas of private industry, operate such systems as an adjunct of project management.<sup>39</sup>

11.43 Defence believes that the cost of implementing such a system would be excessive and would not necessarily achieve any meaningful gain to project management. However, it has commenced an examination of the system used by the Department of Housing and Construction.<sup>40</sup>

11.44 The Committee took the view that internal costing systems are necessary for efficient project management and that in a number of projects, for example, the Basic Trainer and Hiport/Medport Projects, difficulties could have been minimised if the full cost of certain management procedures had been monitored. Total project costing would have allowed also a comparison of the costs of using US Foreign Military Sales arrangements.

11.45 The Committee recommends that:

66. The Department of Defence report to the Committee on its investigation of the feasibility of introducing a comprehensive resource costing system throughout the Department and particularly within the CPO.

37. In Camera Evidence, 12 June 1985, pages 373-375.

38. Minutes of Evidence, op cit pages 3075-3076.

39. Ibid, page 1528.

40. Ibid, pages 2835-2836.

## CHAPTER 12

### ACCOUNTABILITY

12.1 The previous chapters dealt with internal management arrangements and controls aimed at promoting efficiency and effectiveness. This chapter addresses the accountability of Defence management to the Minister and to the Parliament.

12.2 Ministerial responsibility and control is an integral part of the concept of responsible government. Parliamentary accountability is built on the concept of ministerial responsibility. Increasingly Parliament's scrutiny has extended beyond Ministers to the officials charged with implementing Government policy. Although public servants have not been held to account for Government policy they are held to answer for the quality of their advice to Government and their administration of Government policy.

12.3 There are three levels of accountability: probity, efficiency and effectiveness. Under the Audit Act and Finance Regulations departmental managers have specific responsibilities in relation to the first level. Under the Public Service Act, permanent heads have a general responsibility for efficiency. Effectiveness appears to have no similar legislative base.

12.4 The Secretary of the Department of Defence has a general responsibility for 'organisation, resources and planning'. Ministerial Instructions to the Secretary and the Chief of the Defence Force (CDF) require them to continually 'review the adequacy of organisation and procedures of the Department and the Defence Force'.<sup>1</sup> The Utz Report proposed that the Secretary and CDF be instructed both to 'promote the efficient and economical use of resources within the Defence Force'.<sup>2</sup>

12.5 Effective accountability requires:

- . the clear assignment of responsibility for the accountable action; and
- . commensurate disclosure or reporting of the exercise of that responsibility.

12.6 The former principle, which may be considered a pre-condition, has been discussed in Chapter Ten. This chapter focuses on the second principle, specifically on:

- . the quality of advice and reports to the Minister; and
- . the quality of reports to Parliament.

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1. These instructions are reproduced in the report of the Defence Review Committee, *op cit*, Appendix 4.1.  
2. Defence Review Committee, *op cit*, Annex A. pages xxxiii-xxxv.



## Advice to Government

12.7 The Committee examined two aspects of the accountability of Defence managers to Government:

- the quality of advice on project approval; and
- the adequacy of project management reports.

12.8 The two issues have been addressed in detail in Chapters Three and Nine respectively. The following discussion summarises the Committee's findings in the context of accountability.

### Project Approval

12.9 Approval to acquire major defence equipment occurs in the context of overall financial programming and budgeting. Government approval is sought successively to reserve funds (project approval), enter contractual obligations and incur expenditure (in the annual Budget). For major projects, government approval will be sought on an incremental basis. For example, approval may be sought initially to undertake funded project definition studies without any commitment to proceed to acquisition.<sup>3</sup>

12.10 While the Committee found that these programming procedures were fundamentally sound, it concluded that the quality of advice to Government on major equipment proposals has been variable. The Committee identified several shortcomings across a number of projects:

- alternative options have not always been identified and/or adequately assessed;
- conflicting views within Defence have not been made explicit; and
- proposals have not been supported by reliable data, especially cost estimates.

12.11 In Chapter Three the Committee made a number of recommendations to rectify these shortcomings.

### Project Monitoring and Control

12.12 The Minister is kept aware of the progress of major equipment projects on a regular basis via the Quarterly Milestone Reports. As was discussed in Chapter Nine, these reports are not management-oriented documents and give no detail of project difficulties or corrective management action.

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3. Minutes of Evidence, op cit, pages 2180-2181, 2200.

12.13 Strict procedures apply to control project cost approvals. Project directors are required to review existing cost approvals every six months. Ministerial approval must be sought to vary any total approved project cost.<sup>4</sup>

12.14 However, as was discussed in Chapter Eleven, cost approvals are not compiled on a common price base and have not always been updated at appropriate intervals in line with price and exchange rate movements.

### Reports to Parliament

12.15 Information on major defence equipment acquisitions is provided to Parliament on a regular basis via the Budget Papers and the annual Defence Reports. This information provides only summary data on selected projects and hence gives little clear indication of the performance of Departmental project management.

12.16 Unlike other capital outlays such as the Public Works Program and (recently) major ADP acquisitions, the acquisition of major defence equipment is not subject to systematic Parliamentary scrutiny. This is perhaps not surprising in view of the sensitivity of some of the considerations surrounding the choice of defence equipment. Given the size of these outlays and their importance to Australia's defence capability, greater Parliamentary scrutiny is required.

12.17 The annual Defence estimates, including the major capital equipment program, are subject to the scrutiny of the Senate Estimates Committees. By their nature the Estimates Committees' examinations are brief and confined by the annual Budget cycle. Although the Committees are attempting to broaden the scope of their inquiries to efficiency and effectiveness issues, their limited time horizon does not allow them to adequately comprehend multi-year defence projects.

12.18 The major Parliamentary examination of defence equipment acquisition has been provided by the Joint Committee on Foreign Affairs and Defence. This Committee has made two reports on defence procurement matters in recent years (on the Defence Industry in 1977 and on Defence Procurement in 1979). However, these reports (reflecting the Committee's broad terms of reference) have focused primarily on strategic and force structure policy issues and less on management systems or efficiency and effectiveness per se.

12.19 Further scrutiny is undertaken by the Joint Parliamentary Committee of Public Accounts and the House of Representatives Standing Committee on Expenditure. The defence related inquiries of these Committees have been generated largely by the reports of the Auditor-General. The Auditor-General has told the Committee that Audit's capacity to monitor effectively Defence procurement on a continuing basis is limited.

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4. Minutes of Evidence, op cit, pages 2251-2259.

## Findings

12.20 The Committee considers the present Parliamentary scrutiny of Defence capital equipment acquisition ad hoc and inadequate. Parliamentary scrutiny should be increased not only because of the size of the outlays but also because of the significance of the management problems that have been identified in this and other Reports.

12.21 It is important that Parliamentary scrutiny assist rather than hinder the remedy of perceived shortcomings by the Defence organisation.

12.22 The Committee recognises that improved Parliamentary scrutiny of the Defence equipment acquisition process will need to take account of:

- . the typically long project time scales;
- . the sensitivity of much project information concerning national security matters and the protection of the Commonwealth's negotiating position in commercial contracts; and
- . the cost of accountability.

12.23 The Committee considered a number of options ranging from improved reporting requirements to a permanent Parliamentary Committee on the Parliamentary Public Works Committee model. It favoured a proposal similar to the Selective Acquisition Report procedures of the US Congress.

12.24 The Committee recommends that:

67. The Department of Defence submit each year to the Parliament a report on its major capital equipment program detailing for each project:
- (a) the total project cost and in-service dates initially approved/endorsed by the Government;
  - (b) the current estimated total project cost and in-service dates;
  - (c) an explanation of any cost and schedule variance identified in (b);
  - (d) a summary of management action taken or proposed to correct or minimise the effect of any cost or schedule over runs; and
  - (e) total expenditure to date on the project.

Project costs should include all elements of the project, ie spares, support equipment, training, Australian Industry Participation, etc and should be expressed on common price and exchange rate bases. Individual project report items should cover all phases of the project and refer to related projects (present or not yet approved) which address the same military capability requirement (for example specialised ammunition and training equipment).

68. The reports be referred to the Auditor-General for investigation and report if project costs escalate by more than fifteen per cent per annum or if the Auditor-General thinks fit.

APPENDIX A

Review of Defence Project Management  
Extract, Report of the Auditor-General, September 1983

5.2 Project Management Review

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5.2.1 INTRODUCTION

Recent Auditor-General's Reports have highlighted perceived shortcomings in the management of a number of large Defence projects.

The Department currently has approximately 150 major projects underway worth an estimated \$7000 million with expenditure in 1982-83 estimated at \$750 million. If salaries and administrative costs are excluded then capital equipment expenditure represents approximately 45% of funds appropriated to the Department. Sound project management practices are important on materiality, risk and cost effectiveness grounds as well as for the proper maintenance of the defence capability. Accordingly, this Office undertook a general review of departmental practices in this important area.

It was prompted by the findings in a number of audits in recent years of capital acquisition projects in Defence which brought to light apparent shortcomings in departmental management practices.

Project management is a systematic process of planning, review and utilisation of resources aimed at achieving a product with certain technical performance objectives, on time and within cost. It is a means of achieving a project's objectives rather than an end in itself. Project management is an all-encompassing term embracing the consideration of all aspects of a project from inception to ultimate completion.

The audit review entailed comparison of the Department's project management practices with the more important project management elements.

Any capital acquisition project should progress through the phases of planning, execution and review if its objectives are to be achieved in a timely and efficient manner. Sound project management comprehends attention being given to the following basic elements:

- planning and task definition
- resource management
- contracting and production
- administrative arrangements, and
- performance assessment.

These project elements are not discrete and in fact there is considerable overlap among them. For each element the emphasis will vary according to the project to be undertaken. The factors affecting emphasis include the degree of assessed technical and financial risk, level of technology, size and complexity of the project as well as organisational structure. Most of the elements involve a continuous or iterative process throughout a project's life. Moreover, it is important to recognise that if, for example, the planning and task definition element is deficient the remaining management elements will suffer as a consequence. In other words, a shortcoming in one area of management can have a domino effect in the other areas of management.

The assessment of the Department's project management practices involved a re-examination of projects reported in this or previous Auditor-General's Reports with a view to identifying specific shortcomings in departmental practices. Ten projects covering each of the three Services were included in the review and comprised:

*Auditor-General's Report*

*Project*

1. Darwin Communications Centre—Humpty Doo Transmitting Station Mar. 1982

2. Minehunter Catamarans . . . . .	May 1983
3. Fleet Underway Replenishment Ship—AOR-1 . . . . .	Sept. 1983
4. Medium Girder Bridge Acquisition . . . . .	Mar. 1982
5. Mobile Radio Terminals . . . . .	Mar. 1982
6. Air Traffic Control Surveillance Radar—East Sale . . . . .	S-pt. 1983
Air Defence Radars and Tactical Air Defence Radar System . . . . .	Sept. 1980
Airfield Surveillance/Precision Approach Radars . . . . .	Sept. 1980
Airfield Surveillance/Precision Approach Radars . . . . .	Mar. 1982
7. Construction of Oceanographic Ship for RAN . . . . .	Apr. 1980
Oceanographic Ship . . . . .	Sept. 1981
8. Amphibious Heavy Lift Ship Acquisition . . . . .	Mar. 1982
9. Fremantle Class Patrol Craft Acquisition . . . . .	Sept. 1980
Fremantle Class Patrol Craft . . . . .	Mar. 1982
10. Modernisation of River Class Destroyer Escorts . . . . .	Sept. 1981

More detailed descriptions of the projects, audit findings and conclusions in respect of perceived shortcomings in those projects together with departmental comment/explanations are contained in the respective Reports. Most of the illustrative examples contained in this Paragraph were described more fully in the earlier Reports; some of the examples however, were noted during the re-evaluation of the projects listed.

### 5.2.2 PLANNING AND TASK DEFINITION

It is obviously crucial to the success of a project that there be adequate and effective planning during which a project's objectives and the means by which they are to be attained are clearly defined. If this does not occur then the effects or symptoms may not surface until a considerable way into a project, thereby obscuring the real cause of the problem and complicating its rectification for future projects.

The principal matters that need to be addressed and resolved during planning and task definition include:

- time, cost and technical performance objectives
- feasibility studies
- technical and financial risk assessments
- design aspects
- contractual aspects
- production aspects and quality assurance arrangements
- supply and support considerations, and
- review of similar projects as part of the on-going learning process.

The more important of these components are discussed hereunder.

#### *Project Feasibility Studies*

Feasibility studies are conducted at the outset of a project to enable a more accurate and detailed definition of technical performance, time and cost parameters. Included in feasibility studies are assessments of technical and financial risk associated with a project as well as project definition contracts, where appropriate.

In none of the projects reviewed, Audit identified shortcomings in feasibility studies in respect of certain components of the projects that contributed to additional costs to the Commonwealth.

#### *Prime Equipment, Support Facilities and Other Support Aspects*

If the provision of support facilities and other support aspects such as training, publications, repair and maintenance facilities lags behind the acquisition of prime equipment then the in-service performance of that equipment may well be diminished. The

review identified seven cases where the provision of certain support activities was inadequate.

#### *Appropriate Classification of the Design Selected*

The Department is generally faced with three broad design options namely:

- a proven design
- a modified proven design, and
- an *ab initio* design.

Within each, there are various technology options. As combinations of each design and technology option entail significantly different financial and technical risk implications, early investigation and regular review should enable a project to be appropriately classified. The classification of a project will in turn affect the emphasis placed on the various project elements mentioned previously. As an example, where a design is an *ab initio* one then planning, task definition and regular project review and assessment would normally be more critical than if the design is a proven one, other things being equal. Audit considers that the Department appropriately classified the projects reviewed. Nevertheless in four cases, changed circumstances during the course of a project necessitated revised financial and technical risk assessments. In those cases, Audit considered that the Department did not act expeditiously to change the emphasis of the various project elements.

#### *Tender Specifications*

Tender specifications need to be accurate and sufficiently detailed to enable tenderers to submit responses that will enable the best selection to be made in a timely and cost effective manner and ultimately enable an effective contract to be negotiated. Audit considers that in three cases examined the Department did not issue tender specifications which ensured, as far as possible, that an effective contract would be negotiated thus assisting the achievement of technical performance objectives, on time and within cost.

#### *Examples*

Set out below are some examples illustrating inadequacies in planning and task definition.

#### *Minehunter Catamarans*

The need for a specialised facility for construction of glass reinforced plastic hulls was identified in 1975. It was the Department's intention that the cost of the facility be met by the shipbuilder and reflected in the cost of the hulls but no explicit provision was included in the project cost or timing. This omission effectively delayed the project by 12 months and led to a significant underestimation of the project cost.

#### *Humpy Doo Transmitting Station*

Investigation of the site selected for the facilities and antennae farm did not identify that the site was subject to flooding, wet soil conditions, lightning strikes and rat infestations. The disclosed cost of rectifying these problems was an additional \$100 000.

The lack of design investigation resulted in the air conditioning system being inadequate for its assigned task. Audit was unable to quantify the cost of this deficiency but noted the significant potential cost and defence capability implications of inadequate air conditioning on the sensitive and expensive transmitting equipment.

#### Mobile Radio Terminals (Hiport/Medport):

A USA Military Specification invoked by the contract had been amended by the USA authorities prior to the Australian contract being let and a test procedure which the Army intended would apply to Hiport/Medport had been deleted. The amendment was not noted until two years after the contract was signed resulting in a lower level of confidence in the adequacy of equipment. The Department considered it to be more cost effective to accept the risk associated with not testing the equipment rather than incur possible additional costs (estimated by the contractor at \$2 million) and further delays (6-12 months).

The original project did not include such support equipment as trailer-mounted generators to power the Hiport/Medport terminals, trucks to carry the terminals and pull the trailer-mounted generators and various items of Government Furnished Equipment for the RAAF's terminals.

If not for slippage in the project, the Department would have had terminals worth approximately \$17 million which could not be powered or moved without affecting other equipment on issue to the units receiving Hiport/Medport terminals. The additional cost for this essential support equipment was estimated at \$0.7 million (June 1978) for generators and trailers plus an unspecified amount for trucks.

#### 5.2.3 RESOURCE MANAGEMENT AND CO-ORDINATION

Large Defence projects rely heavily on effective management and co-ordination of funds, manpower, equipment, facilities and stores over a considerable number of years.

Components of resource management and co-ordination are addressed below.

##### Project Time Objectives

The achievement of project time objectives are necessary to ensure that new or replacement equipment and facilities are provided in a manner consistent with defence capability requirements.

Seven out of the ten projects examined were completed or likely to be completed long after their planned in-service date with the resulting implication of reduced defence capability.

##### Network Planning Techniques

Network planning techniques (e.g. Program Evaluation and Review Techniques and Critical Path Analysis) are intended to bring together various project activities and events in such a manner that they can be undertaken in the best sequence, with proper regard to their interrelationships.

These techniques enable the identification of a project's critical time-path and thus allow close control of overall progress. Audit considers they are a very useful technique for large and complex projects such as those the Department undertakes. They also allow the planning of activities and interrelationships to be separated from the actual scheduling (or dating), thereby overcoming one of the major defects of traditional time planning methods such as bar charts and schedules of key events (milestones).

These techniques are now well established and refined and network planning is used by the Department for the management of some projects. It was not evident, however, that the techniques were being used as a matter of course for all projects, where this was appropriate.

#### Government Furnished Equipment and Information

Equipment and information crucial to the orderly progression of projects which the Department undertakes to supply to its contractors must be delivered on time. Audit noted that, in five cases, the supply of certain Government Furnished Equipment and Government Furnished Information was late with consequent adverse effects on time and cost.

##### Project Cost Estimation

Project cost estimates have major impact on the Commonwealth's overall budgetary process and on the assessment of a project's success or otherwise in terms of its cost objective. In the normal course, project costs should reflect the FULL resource cost of projects (funds, manpower, equipment, facilities, stores and the like) and not just selected items. Audit noted that in eight projects examined, costs generally were significantly underestimated and certain resource costs were excluded. This resulted in adverse effects on the budgetary process and distortion of the real project costs.

##### Examples

The following table sets out the Department's time-objectives compared to actual results for projects examined:

Projects	Expected fully in-service date when projects approved	Actual in-service date (or latest estimate) date	Variation
1. Humpty Doo Transmitting Station	December 1978	November 1983	5 yrs
2. Minehunter Catamarans	Completion date of testing	Assessment expected	
(a) Prototypes	August 1982	April 1987	5 yrs
(b) Land Based Magnetic Test Range	March 1979	July 1983	4 yrs
3. Fleet Underway Replenishment Ship AOR-1 (Local build)	1982	1986	4 yrs
4. Army Bridging	1976-77	1976-78	1 yr
5. Mobile Radio Terminals (Hiport-Medport)	Equipment deliveries to commence 1980	April 1984	4 yrs

The consequences of poor resource management and co-ordination as well as inadequate time management are illustrated below.

**Oceanographic Ship—HMAS Cook**—Late delivery of Government Furnished Equipment was a serious problem during the construction of *HMAS Cook*. Only one of 36 major items was delivered on time and some were nearly four years late. Data logging equipment planned to be operational during June 1980 at a cost of \$0.4 million is still not operational. The expected date of acceptance into service is now June 1984 with a revised cost of \$1.5 million.

**Minehunter Catamarans**—In November 1975 the estimated project cost was \$60.8 million (at August 1975 prices) for 8 catamarans. The latest estimate is \$197.3 million

for 6 catamarans (at December 1982 prices). These estimates, however, make no provision for the many man years of manpower resources required to design and develop this vessel. Although cost was apparently a prime factor in selecting the catamaran design, failure to make such a provision has greater significance given the decision to design the vessel *ab initio*. Moreover, cost comparisons sighted by Audit made no allowance for the support required by the Minehunter Catamarans in prolonged operations and during rough sea voyages.

#### 5.2.4 CONTRACTING AND PRODUCTION

##### Tender Evaluation

It is essential during the tender assessment process that:

- a thorough but timely examination is made of all the technical and financial aspects of a tenderer's response
- all tenderers are assessed against the same criteria and the criteria-weightings remain constant, and
- an accurate assessment is made of the technical and financial risks involved and these are in turn reflected adequately in the contract.

Audit considers that in seven projects there were components of these projects where these matters were not adequately addressed and resolved, resulting in significant additional costs and contract deliverables that do not meet quality and performance standards.

##### Quality Requirements

In order that contract deliverables meet stated technical performance objectives on time and within cost, it is essential that effective quality control and quality assurance systems are in place early in a project's life and operate continuously throughout it.

It is for the contractor's quality control system to ensure appropriate quality requirements are met and for the Department's quality assurance system to ensure that the contractor meets these requirements.

Effective quality control and quality assurance depend on adequate production specifications and the way these specifications are developed.

Audit noted in seven cases examined that the quality requirements expected of some of the Department's contractors were either ill-defined or not adequately enforced and departmental quality assurance performance was, on occasions, inadequate and untimely.

##### Protection of the Commonwealth's Interests

In framing contracts the Commonwealth's interests are best protected if:

- contract terms reflect closely the assessed technical and financial risks,
- contract deliverables are clearly specified in terms of technical performance requirements, time and cost, and
- respective roles and relationships of the Commonwealth and its contractors are clearly defined.

Audit noted in six projects reviewed instances where the Commonwealth's interests were not adequately protected. Contracts did not always reflect closely the technical and financial risks involved and contract deliverables were not clearly specified.

The effect of these shortcomings was reflected in increased costs to the Commonwealth, lower technical performance characteristics of the contract deliverables and diminished defence capability.

##### Project Payments

Four instances were noted by Audit where the Commonwealth did not receive value-for-money and where it was considered contract deliverables were not of a standard sufficient to justify payment.

##### Examples

The consequences of inadequate management of the contracting and production elements, are illustrated below.

##### Fleet Underway Replenishment Ship—AOR-1

The construction contract has been marked by protracted renegotiation of cost and time requiring the redefinition of the ship to be built. This has directed effort by both parties away from achieving the project's earlier objectives and has resulted in significant additional cost to the Commonwealth.

Despite an adverse quality assurance report on the painting of the engine room, \$5.6 million was paid for the milestones defined as 'ship main engines' and 'ship main gearboxes'. Rectification of the engine room painting subsequently necessitated the removal of the engines and the gearboxes.

The Department's assessment of the Shipbuilder's costing of an additional \$0.2 million (August 1978 prices) for the manufacture, installation and setting-to-work of motorised roller pallet conveyors, was inadequate. The full extent of this task was not identified in the tender specification and so was treated as a modification to the contract.

##### Humpty Doo Transmitting Station

The Department was tardy in regard to the possibility of seeking redress from the contractor responsible for the supply and installation of the original microwave bearer system. Evidence available to Audit indicates that, as at 1 June 1983, approximately 2.5 years after the system was found not to meet the stated operational requirements, the Department had not sought a legal advising on its position in this matter.

##### Fremantle Class Patrol Craft:

The lead craft and follow-on craft contracts did not contain overweight compensation clauses for exceeding the contractually agreed lightweight or standard displacements. The lead craft was 20.1 tonnes (9.5%) overweight and follow-on craft were overweight by between 5% and 11%.

The contract between the lead craft contractor and follow-on craft contractor did not specify that either of the parties to the contract was to inform the Commonwealth of which documents or drawings were despatched, received and when. There were delays in delivery of drawings to the follow-on craft contractor who decided to commence construction using non-validated drawings. Eighteen months after commencement of construction, 43 of a total of 788 drawings had still not been received. The Commonwealth had little control over the flow of documentation between the two contractors.

Audit noted that the Commonwealth concluded, *inter alia*, a full and final settlement with the follow-on craft contractor of certain outstanding claims related to the overweight problem in the patrol craft. These claims were settled during December 1982 for an amount of \$4.5 million.

### 5.2.5 ADMINISTRATIVE ARRANGEMENTS

Effective project management requires sound administrative arrangements to ensure that:

- responsibility for goal achievement is centralised to the extent practicable and clearly defined, and
- commensurate authority is delegated to enable adequate discharge of that responsibility.

This principle is expanded hereunder.

#### *Responsibility of a Project Director*

The Department is organised on a functional basis, i.e. separate groups concern themselves only with individual aspects of a project. As a consequence, responsibility for a project is dispersed among these various functional areas. A project director co-ordinates project activity but ultimate responsibility for a particular Service's projects rest with the respective Chief of Materiel.

Audit considers that project directors need to be given more effective control of their respective projects so that project administration and control can be enhanced.

Preferably, a project director should:

- have responsibility for the planning, execution and review as well as the success of a project in terms of its time, cost, and technical performance objectives
- have status equal to or greater than line managers to enable effective allocation of departmental resources
- act as the central authority for all technical and administrative decisions and for reporting to top management, and
- have sufficient staff resources to achieve the project's objectives.

Such arrangements do not exist in Defence.

#### *Project Management Career Path*

Project management has presently developed to such an extent that it has become a specialisation in its own right requiring extensive experience through a clearly definable career path as well as specialised training and study. This Office noted that the Department provides training in project management but considers that the scope of present courses could be improved.

#### *Communication and Co-ordination*

Communication and co-ordination are particularly important for any large organisation. The review disclosed that the present organisation structure does not facilitate effective communication and co-ordination within the Department, with other departments and with contractors. This has resulted in adverse effects on project timing and costs. Audit considers that bringing staff involved with a project into a single project management team would reduce problems associated with divergent objectives and facilitate co-ordination and communication.

### 5.2.6 PERFORMANCE ASSESSMENT

Effective and continuous review of a project's progress is crucial to the achievement of its technical performance objectives on time and within cost. An attempt should be

made to anticipate problems and to take pre-emptive action. The control mechanism instituted to affect this continuous review process operates by establishing a system:

- to provide timely information on a project's progress
- to ensure that there is effective review of this information, and
- to enable appropriate and timely corrective action to be taken, based on the previous information and review processes, so that a project can move directly towards its technical performance objectives in a timely and cost effective manner.

In any organisation managing a program of projects it is imperative that there be a learning process which contributes to the body of project knowledge. Project management practices need to be continually reassessed so that, where possible, a project's mistakes and problems are not repeated in concurrent and future projects.

#### *Performance Monitoring*

The monitoring of a project requires that the following aspects be known:

- plan for meeting the time, cost, and technical performance requirements
- actual status of a project compared to the plan, and
- corrective action that is required when significant deviations from the plan appear.

Two of the principal elements of control are time schedules compared to actual progress and budgeted costs compared to actual costs.

Audit noted that in most cases reviewed there were aspects of the Department's performance monitoring process which were considered inadequate.

#### *Project Objectives*

The effective control of time, cost and technical performance parameters is becoming increasingly more difficult with the increase in size and complexity of projects combined with the rate of technological change. Deviations in any of the above parameters are likely to result in resource costs in excess of those allocated to a project, unsatisfactory technical performance characteristics and adverse effects on other projects through competition for scarce departmental resources.

Audit concluded that in some projects the Department has not met its technical performance objectives in all respects, on time and within cost.

#### *Acceptance Procedures for Equipment and Facilities*

An essential element of any project is that there be adequate and effective procedures to ensure that before a product is accepted into service it meets required quality and technical performance characteristics. Audit concluded that in a number of projects examined the Department did not have adequate and effective procedures to ensure products accepted into service were of the required standard.

#### *Past Project Performance Assessment*

It was not apparent that there was an established mechanism dedicated to implementation of improvements to the system.



### Examples

Set out below are examples which Audit believes indicate inadequate performance assessment.

#### *Humpy Doo—Transmitting Station*

Indications are that the malfunctioning air-conditioning system and the standby power supply were accepted without adequate testing or with known shortcomings. Both systems have experienced continuing problems and the air-conditioning system now threatens the operating performance of other equipment.

The Microwave Bearer System was required to be available for almost 100% of the time. The system was inoperable on several occasions in the month it was commissioned (September 1980). The system continued to malfunction and an additional lower frequency bearer was installed at an approximate cost of \$0.1 million until a long term solution could be implemented. It is now planned that the problem be rectified as part of the proposed Backup Intersite Links for Naval Communications Station Darwin project at an estimated cost of \$2.5 million.

#### *Oceanographic Ship—HMAS Cook*

Inaccurate installation of the main propeller shafting by the shipbuilder indicated weaknesses in contractor quality control and Navy quality assurance arrangements. These defects resulted in serious and unacceptable stress levels on the engines and torsional vibration of the propulsion system which became evident during basin and sea trials testing. Audit noted that significant additional costs were incurred in correcting the problem.

The data logging computer is crucial to the function of HMAS *Cook* as an oceanographic ship. Audit noted that the commencement of quality assurance inspection of the ship's data logging computer was untimely.

The total time underway for HMAS *Cook* from commissioning on 28 October 1980 to 10 September 1982 was 24 days out of a total of 686 days.

The RAN has had no vessel fully capable of performing oceanographic surveys since the decommissioning of HMAS *Diamantina* in December 1979.

#### *Mobile Radio Terminals (Hipori/Medport)*

Audit noted similarities in the problems associated with this project and those of the earlier Radio Relay Terminals (MRC-127) Project (reported in the Auditor-General's Report for the year ended 30 June 1976). A separate development contract was considered unnecessary in both cases because of the assessed low technical risk, however, in each case substantial problems arose because the development effort required was significantly greater than anticipated.

### 5.2.7 GENERAL OBSERVATIONS AND DEPARTMENTAL COMMENT

The Defence Act provides for command of the Defence Force to be vested in the Chief of Defence Force Staff (CDFS); it also provides that the CDFS and the Secretary, Department of Defence should 'jointly have the administration of the Defence Force'. The more precise responsibilities of the Secretary, the CDFS and other senior officials and Service officers are amplified through a series of directives issued by the Minister for Defence.

The Department advised that it is a large corporate entity comprising some five or more individual bodies each with differing requirements and demands which have to be knit together under a comprehensive and highly structured management system. There

exists, at any one time, a multiplicity of objectives, such as operational, manpower and financial, which, either severally or singly and depending on the prevailing circumstances, are of a higher order than a particular set of project objectives and may be of higher priority. In other words, efficient project management may not always have first priority and may be subjugated to one or more of these higher order priorities. For example, financial or manpower constraints may require a ship construction program to be slowed down resulting in the inefficient use of the shipbuilder's labour. Alternatively, to meet an urgent operational requirement it may be necessary to defer certain elements of a manufacturing task to enable the equipment to be put into service earlier and for the deferred tasks to be completed later in less efficient ways. Also funding constraints may require some projects to be either abandoned completely or set aside temporarily to allow higher priority projects to proceed unaffected.

The Department does not argue that its capital equipment projects are free from difficulties, but it does suggest that its approach to their management is as effective and successful as could be expected given the total environment in which Defence has to conduct its multiplicity of activities and the severe resource constraints under which it has had to operate in recent years.

In responding to specific matters raised by Audit the Department also stated that:

- it has recently carried out extensive work to strengthen its quality assurance arrangements and procedures
- it agreed that in-house design engineering and other costs have not been included in project costs but stated that such costs had been taken into account where appropriate in deciding the choice of equipment or the strategy to be adopted in satisfying a service requirement. Whilst accepting the general thrust of Audit comments it said that in-house cost estimates are often difficult to establish and of doubtful use in choosing between equipment alternatives
- there may well be benefit in either deferring or advancing the planned in-service date beyond that first set by Service planning documents to take advantage of windows of opportunity, i.e. to obtain other equipment more cheaply than would otherwise be possible. These accelerated procurements are not achieved without significant impact on other planned acquisitions, some of which have to be deferred because of funding limitations
- it is not possible, nor is it feasible, because of the scarcity of sufficiently qualified and experienced people and general manpower constraints, to extend the establishment of dedicated project teams
- its approach to project management although not explicitly and comprehensively defined in any single department-wide instruction, is recorded in specific project planning documents such as Equipment Acquisition Strategies, Project Management and Acquisition Plans, Service Project Directives and the like and in more general Service documentation, and
- the administrative cost burden of project management is already high and Defence would be cautious about adding to it and, additionally, would only be able to apply more measures to project management at the expense of other competing priorities.

The final report of the Defence Review Committee (The Utz Report) in 1982 noted a history of criticism and complaint surrounding Defence procurement and discussed possible organisational changes that would alleviate some of the present difficulties. It recognised also that many of the difficulties in this area were caused by

factors outside Defence's control. It stated however, that there were opportunities for improving internal efficiency within the Department and went on to advocate a complete review of present procedures and delegations relating to capital equipment procurement.

The Government has not yet responded to the Utz Report but the Department is progressing the review of procurement arrangements commended in the Report.

#### 5.2.8 CONCLUSIONS

This Office considers that the Department's project management practices for major projects covered by this review were unsatisfactory, contributing to:

- significant additional costs to the Commonwealth (incurred and prospective)
- the need for scarce resources to be engaged in rectifying project problems, and
- diminution of the Defence capability through untimely delivery of equipment and facilities and through equipment and facilities not meeting technical performance objectives.

While recognising the complexities of the planning and forecasting task and the need for appropriate reconsideration and readjustment of Defence priorities in the light of financial constraints and changing circumstances, Audit believes that the projects referred to above demonstrate problems of a kind which skilled project management should be able to avoid. Audit is not in a position to recommend specific remedial action although it seems that organisational complexities may in part be the underlying cause. Audit is of the view that urgent action is needed so that all issues within the control of the Department are fully recognised and appropriate measures taken to contain lead times, ensure adherence to specified service requirements and minimise cost escalation.

#### 5.3 Army Provisioning System

An audit was conducted of aspects of policy and procedures relating to the Army process of provisioning for stores of relatively low cost and high volume such as spare parts, clothing and general stores. At the time, Army holdings of these stores approximated \$375 million. The audit addressed factors pertinent to Army Office, Headquarters Logistics Command (HQLC) and supply battalion/depots and assessed the use and capability of the SCUBA (Stock Control Usage Based—Army) system as an aid to determining Army stores requirements.

The more important audit findings and recommendations for improvement together with departmental responses are shown below.

##### *Economic order quantities*

*The formula*—Army uses a generally accepted mathematical formula for Economic Order Quantity (EOQ) designed to minimise total inventory costs (ordering and holding costs) while maintaining sufficient stock to satisfy demand. Applying the formula to determine the desirable quantity and frequency of purchase enables optimum inventory investment.

Audit noted that there was no firm policy directive to purchase EOQ and, in a number of instances where a quantity other than EOQ has been purchased, Audit found no documented explanation for the decision taken. This Office recognises that purchasing of the EOQ may not always be practicable because of constraints such as funds restrictions, supplier requirements and shelf life. Documentation and review of variations from that general practice should, however, be necessary controls.

## APPENDIX B

### Review of Defence Project Management List of Hearings and Witnesses

Monday 30 April 1984, Canberra

In camera hearing

Tuesday 22 May 1984, Sydney

Department of Defence

Mr G E Ferris  
Cdre O J Hughes  
Mr W T A Murphy  
Cdre J S Partington  
Capt B J Read

Observers

Mr P Inglis  
Mr D Lennie

Monday 28 May 1984, Canberra

Department of Defence

Mr A S Bennett  
Air Vice-Marshal A E Heggen  
Mr W T A Murphy  
Group Capt J T Owens  
W/CmDr R G White  
Mr D D Wood

Department of Defence Support

Mr C W Barclay  
Mr D F Bruce  
Mr P G Gifford  
Mr C C Halton  
Mr P G Terrill  
Mr J F Vickery

Observers

Mr P Inglis  
Mr D Lennie  
Mr J Louttit

Friday 8 June 1984, Canberra

Department of Defence

Mr F N Bennett  
Mr H H G Dalrymple  
Mr G E Ferris  
Cdre O J Hughes  
Mr W T A Murphy  
Cdre J S Partington  
Capt B J Read  
Rear Adm W J Rourke  
Mr D D Wood  
Mr J A Woodger

Observers

Mr P Inglis  
Mr D Lennie  
Mr J Louttit  
Mr A Sirr  
Mr G Sobell

Wednesday 18 July 1984, Sydney

In camera hearing

Wednesday 18 July 1984, Sydney

Department of Defence

Mr F N Bennett  
Capt P Dechaineux  
Air Vice-Marshal A E Heggen  
Mr W P Meaney  
Mr W T A Murphy  
Group Capt K R Webber

Observers

Mr P Inglis  
Mr D Lennie  
Mr A McKenzie  
Mr M Newberry  
Mr R Roxburgh  
Mr P Worthy

Friday 10 August 1984, Laverton

Department of Defence

Mr A S Bennett  
Mr F N Bennett  
Air Vice-Marshal A E Heggen  
Mr P W Hider  
Air Cdre H J F Roser

Observers

Mr T Coles  
Mr P Inglis  
Mr D Lennie

Monday 3 September 1984, Canberra

Department of Defence

Mr A S Bennett  
Mr F N Bennett  
Mr F R Harvey  
Air Vice-Marshal A E Heggen  
Mr P W Hider  
Air Cdre H J F Roser  
Group Capt K R Webber  
Sqn Ldr R W Weight  
Group Capt E M Weller

Observers

Mr P Inglis  
Mr D Lennie  
Mr J Louttit

Monday 10 September 1984, Canberra

Department of Defence

Mr F N Bennett  
Lt Col R J Copley  
Lt Col G T Eberett  
Mr F R Harvey  
Major-Gen K Taylor

Observers

Mr P Inglis  
Mr D Lennie  
Mr J Louttit

Wednesday 3 October 1984, Canberra

In camera hearing

Wednesday 3 October 1984, Canberra

Department of Defence

Mr F N Bennett  
Sqn Ldr K F Clarke  
Mr K G Conolan  
Group Capt G R Giles  
Air Vice-Marshal A E Heggen  
Mr P W Hider  
Mr W T A Murphy

Observers

Mr J Barker  
Mr P Inglis  
Mr A Kirby  
Mr D Lennie  
Mr J Louttit

Monday 8 October 1984, Canberra

In camera hearing

Monday 8 October 1984, Canberra

Department of Defence

Mr F N Bennett  
Lt Col A R Burke  
Prof P T Fink  
Air Vice-Marshal R G Funnell  
Group Capt G Gunton  
Mr W Howard  
Wing Cmdr J E Kentish  
Mr W T A Murphy  
Mr J E Patterson  
Major-Gen K Taylor

Department of Defence Support

Mr H E Fisher  
Dr J Stals

Observers

Mr J Barker  
Mr P Inglis  
Mr A Kirby  
Mr D Lennie  
Mr J Louttit

Friday 29 March 1985, Canberra

In camera hearing

Friday 29 March 1985, Canberra

Department of Defence

Mr J M Cross  
Cdre A R Cummins  
Mr B A Foster  
Mr F R Harvey  
Mr W McC Millen  
Capt C J Nisbet  
Rear-Admiral W J Rourke  
Mr P G Terrill  
Mr C Tolano  
Mr D D Wood

Department of Housing and  
Construction

Observers

Mr G W Martin

Mr P Inglis  
Mr G Koehne  
Ms L Latham  
Mr D Lennie  
Mr N Levings  
Mr J Van Beurden

Monday 15 April 1985, Canberra

Department of Defence

Mr R P Bywater  
Mr R E Christensen  
Major D J Fry  
Mr F R Harvey  
Mr I F Hayes  
Mr W McC Millen  
Rear-Admiral W J Rourke  
Major-Gen K J Taylor  
Mr P G Terrill  
Mr C J Tolano  
Mr D D Wood

Department of Housing and  
Construction

Observers

Mr G W Martin

Mr P Inglis  
Mr G Koehne  
Ms L Latham  
Mr D Lennie  
Mr N Levings  
Mr J Russell

Wednesday 24 April 1985, Canberra

Department of Defence

Mr F R Harvey  
Air Vice-Marshal A E Heggen  
Group Capt J T Owens  
Group Capt D A E Tidd  
Mr D D Wood

Observers

Mr P Debnam  
Mr G Dodgson  
Mr K Faul  
Mr G Koehne  
Mr D Lennie  
Mr N Levings  
Ms D North  
Mr M Setch

Friday 17 May 1985, Canberra

In camera hearing

Friday 17 May 1985, Canberra

Amalgamated Wireless  
(Australasia) Limited

Mr P A Hamilton  
Mr J Roser

Association of Professional  
Engineers

Mr M T Ebdon  
Mr T A Fallon  
Mr J D Vines

Department of Housing and  
Construction

Mr D A Cook  
Mr G W Martin  
Mr R H Thomas

Observers

Ms P Gaughwin  
Mr G Koehne  
Mr D Lennie  
Mr J Russell  
Ms J Shaw

Monday 20 May 1985, Canberra

Australian Aircraft  
Consortium Pty Ltd

Mr P J Debnam

Observers

Air Cdre R Kee  
Mr G Koehne  
Mr D Lennie  
Mr J Louttit  
Ms D North  
Mr P Roberts  
Group Capt D Tidd

Wednesday 29 May 1985, Canberra

Department of Defence

Mr J G Baker  
Mr C W Barclay  
Mr A S Bennett  
Mr F N Bennett  
Rear-Admiral I McL Crawford  
Mr F R Harvey  
Mr L A McGee  
Mr M C Morrison  
Brigadier I R Wills  
Mr D D Wood

Observers

Mr B Boland  
Mr B Dudek  
Mr K Goffey  
Mr G Koehne  
Mr D Lennie  
Mr N Levings  
Mr P Roberts  
Ms J Shaw

Thursday 30 May 1985, Canberra

Cockatoo Dockyard Pty Ltd

Mr J C Jeremy  
Mr R F Jones  
Mr F Simpson

Department of Defence

Mr B E Duke  
Major-Gen D Mack M Francis  
Brigadier A W Hammett  
Air Vice-Marshal A E Heggen  
Rear Adm B L West  
Mr D D Wood

Hawker de Havilland Limited

Mr S Schaetzel  
Mr P A Smith

Observers

Ms C Keens  
Mr G Koehne  
Mr D Lennie  
Mr N Levings  
Mr J Van Buerden

Wednesday 12 June 1985, Sydney

In camera hearing

Tuesday 18 June 1985, Canberra

Department of Defence

Mr F N Bennett  
Sir William Cole  
Mr B E Duke  
Brigadier A W Hammett  
Mr F R Harvey  
Air Vice-Marshal A E Heggen  
Mr M H Ives  
Brigadier I J Meibusch  
Mr J Moten  
Mr M J Murray  
Cmdr R Ray  
Rear Adm B L West  
Mr D D Wood

Observers

Ms C Keens  
Mr G Koehne  
Mr D Lennie  
Mr P Lidbetter  
Mr J Louffit  
Mr J Van Buerden

APPENDIX C

Review of Defence Project Management

Tour of Inspections

**Defence Project Management Inquiry**

**Tour of Inspection**

**29 July - 2 August 1985**

**Monday 29 July**

- . Engineering Development Establishment, Monegeeta, Victoria.
- . Army School of Transport, Puckapunyal, Victoria.

**Tuesday 30 July**

- . Williamstown Naval Dockyard, Melbourne.
- . Long Range Maritime Patrol Aircraft Squadron, Edinburgh RAAF Base, Adelaide.

**Wednesday 31 July**

- . Jindalee (Over the Horizon Radar) Project, Alice Springs.

**Thursday 1 August**

- . Tindal RAAF Base (under construction), Katherine, Northern Territory.
- . Naval Communications Transmitting Station, Humpty Doo, Northern Territory.
- . Naval Patrol Boat Base, Darwin.

**Friday 2 August**

- . Operational Deployment Force, Lavarack Barracks, Townsville.

**APPENDIX D**

**Review of Defence Project Management**

**List of Published Submissions**

	Pages Minutes of Evidence
<u>Amalgamated Wireless (Australasia) Limited</u>	1733 - 1737
<u>The Association of Professional Engineers, Australia</u>	1648 - 1704
<u>Cockatoo Dockyard Pty Limited</u>	2014 - 2065
<u>Department of Defence</u>	
Absorption of the Department of Defence Support	3186 - 3201
Additional 10 P3C Orions Project	684 - 716
Army Medium Trucks Project	789 - 803
Army Small Arms Replacement Project	866 - 877
Australian Frigate Project	1118 - 1190
Basic Trainer Aircraft Project	1425 - 1452
Cl30H Simulator Project	742 - 758
Defence Brief on GOSIEAA	4 - 30
Defence Industry Policy and Project Management	
- The Inter-Relationship of Defence Project Management, Defence Industry and General Industry Policy	1820 - 1834
- Submission by the Department of Defence to the Committee of Review on Offsets	3221 - 3250
Defence Procurement Decision-making Processes	3095 - 3155
Establishment of the Capital Procurement Organisation	3165 - 3185, 3251 - 3260
F111A Attrition Aircraft Project	442 - 459
Fleet Underway Replenishment Ship Project (HMAS Success)	226 - 250
Guided Missile Frigates (FFG01-04) Project	1090 - 1117

	Pages Minutes of Evidence
Hiport/Medport Mobile Radio Terminals Terminals Project	1131 - 1329
Jindalee Over the Horizon Radar Project	1029 - 1068
Minehunter Catamaran Project	356 - 376
New Tactical Fighter F/A-18 Project	501 - 557
Principles of Defence Project Management	2162 - 2219
Project Hamel 105mm Close Support Weapon System	968 - 994
Project Management Information Systems	3079 - 3088
Rapier Project - Air Defence Weapon System	1308 - 1395
Responsibilities and Authority of Defence Project Director	3159 - 3164
Service Posting Cycle	3202 - 3204
Tactical Air Defence System	86 - 104
<u>Department of Defence Support</u>	153 - 188
<u>Department of Housing and Construction</u>	1519 - 1595
<u>Hawker de Havilland Limited</u>	2103 - 2114



JOINT COMMITTEE OF PUBLIC ACCOUNTS -  
PRESENTATION OF REPORT

SENATOR MAGUIRE:

MR PRESIDENT,

ON BEHALF OF THE JOINT PARLIAMENTARY COMMITTEE OF PUBLIC ACCOUNTS, I PRESENT THE 243RD REPORT OF THE COMMITTEE ON DEFENCE PROJECT MANAGEMENT AND MOVE - THAT THE REPORT BE PRINTED.

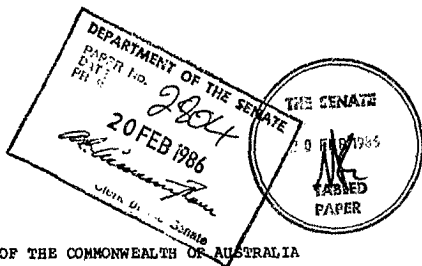
(WHEN AGREED TO)

MR PRESIDENT,

I MOVE - THAT THE SENATE TAKE NOTE OF THE REPORT AND SEEK LEAVE TO INCORPORATE MY SPEECH IN HANSARD AND TO CONTINUE MY REMARKS ON THE RESUMPTION OF THE DEBATE.

(WHEN LEAVE GRANTED)

I MOVE - THAT THE RESUMPTION OF THE DEBATE BE AN ORDER OF THE DAY FOR THE NEXT DAY OF SITTING.



THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

JOINT COMMITTEE OF PUBLIC ACCOUNTS

REPORT 243

REVIEW OF DEFENCE PROJECT MANAGEMENT

VOLUME 2 - PROJECT ANALYSES

Australian Government Publishing Service  
CANBERRA 1986



Review of Defence  
Project Management  
Volume 2—  
Project Analyses

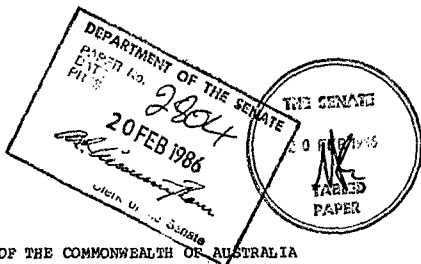
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Report

**243**

Joint Committee of  
Public Accounts

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THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

JOINT COMMITTEE OF PUBLIC ACCOUNTS

REPORT 243

REVIEW OF DEFENCE PROJECT MANAGEMENT

VOLUME 2 - PROJECT ANALYSES

Australian Government Publishing Service  
CANBERRA 1986

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Canberra

JOINT COMMITTEE OF PUBLIC ACCOUNTS

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	J R SHARP, MP
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H MAYER, MP (Chair)

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SENATOR G R MAGUIRE	G B NEHL, MP
	G F PUNCH, MP
	A C ROCHER, MP

\* Mr Cadman resigned and Mr Ruddock was appointed on  
29 November 1985

\*\* Ex-officio member being Chairman, House of  
Representatives Standing Committee on Expenditure

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.

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ABBREVIATIONS

AAC	-	Australian Aircraft Consortium
ADFA	-	Australian Defence Force Academy
ADP	-	Automatic Data Processing
AFP	-	Australian Frigate Project
AIP	-	Australian Industry Participation (Program)
BPTA	-	Basic Pilot Trainer Aircraft (Project)
CAC	-	Commonwealth Aircraft Corporation
CAFM	-	Chief of Air Force Materiel
CAM/CMAT-A	-	Chief of Army Materiel
CAPO	-	Contract Acceptance and Purchase Order
CCP	-	Chief of Capital Procurement
CDF	-	Chief of Defence Force
CMP	-	Configuration Management Plan
CNM	-	Chief of Navy Materiel
CPM	-	Critical Path Monitoring
CPO	-	Capital Procurement Organisation
CS <sup>2</sup>	-	Cost Schedule Control System
DDS	-	Department of Defence Support
DFDC	-	Defence Force Development Committee
DHC	-	Department of Housing and Construction
DOD	-	Department of Defence
DORC	-	Defence Operational Requirements Committee
DSARC	-	(US) Defence Systems Acquisition Review Council
DSDC	-	Defence Source Definition Committee
DSTO	-	Defence Science and Technology Organisation
EAS	-	Equipment Acquisition Strategy
ECP	-	Engineering Change Proposal
EDE	-	(Army) Engineering Development Establishment
FASDIMP	-	First Assistant Secretary Defence Industry and Materiel Policy
FASFDA	-	First Assistant Secretary Force Development and Analysis
FASFIN	-	First Assistant Secretary Financial Services and Internal Audit



FASPB	-	First Assistant Secretary Programmes and Budgets
FMS	-	Foreign Military Sales (United States)
FSC	-	Force Structure Committee
FYDP	-	Five Year Defence Program
GAF	-	Government Aircraft Factories
GFE	-	Government Furnished Equipment
GFI	-	Government Furnished Information
GOSIEAA	-	(Navy) General Overseer Survey and Inspections East Australia Area
HDH	-	Hawker de Havilland
IDC	-	Inter-departmental Committee
ILS	-	Integrated Logistic Support
LMP	-	Logistics Management Plan
LOA	-	Letter of Offer and Acceptance (FMS)
MEP	-	Major Equipment Proposal
MOA	-	Memorandum of Arrangements
MOU	-	Memorandum of Understanding
ODP	-	Office of Defence Production
PARCBS	-	(Navy) Production Authority Representative Contract Built Ships
PD	-	Project Director
PERT	-	Program Evaluation and Review Technique
PMAP	-	Project Management and Acquisition Plan
QA	-	Quality Assurance
QC	-	Quality Control
RAAF	-	Royal Australian Air Force
RAN	-	Royal Australian Navy
RFT	-	Request for Tender
TADS	-	Tactical Air Defence System
USN	-	United States Navy
WND	-	Williamstown Naval Dockyard

(x)

## CHAPTER 1

### OVERVIEW OF VOLUME 2

1.1 Within this volume are sixteen case-studies of recent capital procurement projects. The sixteen projects represent a spectrum across the capital acquisition program and include four Navy, five Army and seven Air Force projects with a combined approved value of \$6,618 million. Actual expenditure on these projects is likely to exceed the latest approved figure.

1.2 For convenience of analysis five categories have been adopted. See Table 1.1.

#### Off-the-Shelf Replacement

1.3 This category includes projects where the tasks of defining requirements, selecting equipment and determining desired in-service dates are simplified by the broad concept of maintaining or restoring military capability usually by equipment which is already 'on the market'.

1.4 Four Army projects - the Medium Trucks (\$216 million), Small Arms Replacement (\$6 million), Hamel Light Gun (\$56 million) and the Rapier Air Defence System (\$96 million) - and three Air Force projects - F-111A Attrition Aircraft (\$60 million), additional P3C Orion Aircraft (\$42 million) and the C-130H Flight Simulator (\$9 million) - fit within this broad grouping.

1.5 Most of these augmentation, upgrade or replacement projects provided opportunities for local production or assembly tasks.

1.6 The level of Australian industry involvement for the Medium Trucks project was relatively high, and because of the policy of commonality with civilian trucks, life-time maintenance considerations appear to be adequately handled. Local production of the Hamel Light Gun has been delayed by design and material requirements. A major weakness of this project has been the slowness in achieving production capacity for the ammunition, which is now substantially out-of-phase with gun production. Insufficient resources were devoted to the development of industrial capacity for the production of the Rapier missiles; local manufacture of the engines has also proved unsatisfactory. These issues detract from the effectiveness of the weapons system. The Small Arms Project has not yet moved into local production.

1.7 Local assembly tasks for the F-111A Attrition aircraft will be completed in 1986 and are within the capability of RAAF Service Maintenance Units. Until these additions (wing tip extensions and heavy under-carriages) are fitted the four

TABLE 1.1

## CLASSIFICATION OF THE SIXTEEN PROJECTS

Off-the Shelf Replacement (7)

- Medium Trucks  
Manufacture and assemble existing technology: low risk
- Small Arms  
Manufacture and assemble existing technology within industry capability: low risk
- Helmet Light Gun  
Manufacture and assemble existing technology, some development of industry capability: medium risk
- Rapier Air Defence  
Overseas (UK Government) purchase of prime equipment: some local manufacture involving development of industry capability: medium risk
- F-111A Attrition  
Overseas FMS purchase: minor modifications: low risk
- P3C Orion  
Overseas Commercial purchase: local installation of additional equipment: low risk
- C-130H Simulator  
Overseas FMS purchase: low risk

Modification-in-Production (1)

- Tactical Air Defence System  
Overseas prime supplier, technical up-date, local assembly: low risk

High Technology Buy (2)

- F/A-18 Tactical Fighter  
High technology overseas suppliers, local assembly and AIP designated work: high risk
- Guided Missile Frigates  
High technology overseas assembly: medium risk

Construction (Major) in Australia (2)

- HMS Success  
Local construction of overseas design: large overseas component: high risk
- Australian Frigates  
Local construction of overseas design: large overseas component: high risk

Development, Design or Research (4)

- Minehunter Gatamaran  
Local ab initio design and construction, new technology: high risk
- Hiport/Weport  
Local modification of existing equipment: medium risk
- Basic Trainer  
Local ab initio design, existing technology: high risk
- Jindalee  
Local ab initio development, new concept: high risk

aircraft fall short of performance requirements. Attrition aircraft have been needed for seven years. The ten P3C Orion replacement aircraft are being progressively delivered to Edinburgh, South Australia where local fitting of sonic processors, obtained from the UK, is proceeding satisfactorily.

1.8 With the exception of the C130H Simulator Project, there have been fewer management problems associated with these projects. Matrix management structures operated in each project except for the later phases of the Medium Trucks. In each case the Project Co-ordinator or Manager has been a Service officer, usually with direct experience of the equipment area concerned.

1.9 A number of these projects have been phased and included lengthy periods of evaluation or testing of equipment. During these periods investigations were undertaken to establish, as needed, the local industry capability to manufacture and provide life-time support. AIP objectives figured prominently in this regard. Implementation of this objective has not been achieved in a timely fashion in all projects. It is too early to comment on the Small Arms project.

1.10 There is some evidence that the immediate past problems which had hindered Defence-industry relationships may have diminished. Defence claims a better understanding by industry of military specifications and of quality control and assurance standards. Contract administration has been given more attention by Defence, particularly in the light of experience, for example with the F-111A Attrition aircraft.

1.11 The Air Force's experience with acquiring the C-130H Simulator illustrates how easy it was to assume that an off-the-shelf replacement procurement could be managed with minimal attention to the comprehensive process of acquisition. The level of management skills applied to this project proved inadequate. A more thorough technical study or evaluation of the production item was required to see whether it met Australian specifications. It did not and an unexpected and significant design effort was required. Similarly, the approach taken to assess spares and ground support equipment was deficient; Government-funded investment in industry was also seriously under-estimated. The project benefited from the continuity of a key specialist throughout its development, production and commissioning. In this respect the project was an exception to the general experience of discontinuity in key personnel in defence project management.

1.12 Much greater attention to project planning is needed for off-the-shelf replacement projects. Problems lie mainly in defining and documenting tasks and integrating all aspects so that the central tests of project management - cost, time and quality - are met. Where these issues were adequately tackled, such as with Medium Trucks, a matrix structure of responsive functional areas, supplemented by strong on-site representation

during the production phase, proved adequate. Where planning and documentation is inadequate, the matrix management structure is unsuitable for a strong gearing-up of the project.

#### Modification-in-Production

1.13 The Air Force project, the Tactical Air Defence System (TADS) (\$22 million), is a project involving contractor-initiated modifications during production.

1.14 TADS is a mobile automatic computer-assisted communications adjunct to radar units. The Air Force Staff Requirement in 1974 was explicit, seeking 'an operationally proven system'. Project definition and tendering substantially followed this route but, following the award of the prime contract to Westinghouse (US) in July 1981, the project was subjected to major technical modifications to introduce fibre optic cable technology into the equipment. These changes were accompanied by some problems with the maintenance of Australian Standards on manufactured items and installation. The risks of substantial cost penalties and the extended time frame for delivery of prime equipment as well as maintenance, ground support and spares, apparently were considered by the Air Force to be justified. The project achieved its desired quality objective but at the expense of major cost and time overruns.

#### High Technology Buys

1.15 The Air Force's F/A-18 Tactical Fighter Project (\$3,396 million), and the Navy's US-built Guided Missile Frigates (\$1,015 million) fall within a third category of high technology buys.

1.16 The F/A-18 project incorporates Australian assembly of 73 of the 75 aircraft, associated operational equipment, support including spares, test equipment, simulators and training. Although much of the equipment is sourced in the United States the project includes a sizeable level of AIP. Total project cost encompasses direct expenditure on creating industrial capacity to handle designated work and upgrading facilities for the first two squadrons at Williamstown.

1.17 The selection of the aircraft was reduced to a short-list of two in 1979. In January 1980 a dedicated project team, the Tactical Fighter Project Office (TFPO), was established and undertook evaluation of the two contending aircraft, as well as carrying out work on aspects such as operations, engineering, AIP and spares support. The Government subsequently announced that it was deferring a decision on final selection pending further development of both aircraft. This was substantially overcome by mid 1981 and, following contract negotiations in the United States, the Minister announced in October 1981 the decision to acquire the F/A-18 at a then approved cost of \$2,427 million. That approved cost was revised in August 1983 to \$3,396 million.

1.18 Considerable management effort has been devoted to the F/A-18 project. A complex set of relationships exist within the project, with the Australian Government sub-contracting to the US Navy management over the assembly stage. The capacity of the TFPO to handle matters, such as Engineering Change Proposals and assessment of spares and support equipment, had an immediate impact on maintaining the project on schedule.

1.19 The project has been well planned and managed, and at this early stage is operating well. Most aspects of Australian participation have responded to the major challenges of designated work or assembly of high technology modular components.

1.20 Like the F/A-18, the US-built Guided Missile Frigates (FFGs 01-04) Project (\$1,015 million) was managed as a Foreign Military Sales arrangement. The project, approved by the Government in April 1974, initially comprised the purchase of two ships, supporting equipment, training and helicopters to operate from the ships. In October 1977, and again in April 1980, the Government approved the acquisition of a third and fourth FFG. The helicopter component was removed from the project in mid 1982. With the commissioning of HMAS Darwin the project is substantially completed.

1.21 Project organisation and staffing (relative to other RAN projects) was strong. Features such as the neglect of Australian interests in the FMS arrangements, cost overruns, the limited achievement of the AIP objectives and the need for extensive post-delivery modifications to three ships qualify the success of the project.

1.22 Many of the management lessons learnt from the FFG project were incorporated in the Australian Frigate Project.

1.23 The evidence indicates that Air Force and Navy are prepared to strengthen the management effort, whether by contracted services from the US Navy or its own projects offices, devoted to high value, high technology projects. Australian participation, centred on aircraft assembly, engine and radar production in the case of the F/A-18, was aimed at maximising areas of local life-time support and serviceability. AIP arrangements, in Deeds with the United States Government, were developed at the time of the major contracts. This was far more satisfactory than the post-contract attempts to gain AIP under the FFG project.

#### Major Construction in Australia

1.24 A fourth grouping centres on projects involving major construction in Australia using overseas design packages with some modification. Two Navy projects, the HMAS Success (\$209 million) and the Australian Frigate project (\$859 million) fall within this

category. HMAS Success is being built at Cockatoo Dockyard, Sydney, and the two Australian Frigates at Williamstown Naval Dockyard, Melbourne.

1.25 HMAS Success is to be the Navy's new fleet replenishment ship. The need for such a vessel was formalised in a Staff Requirement in June 1964. There followed considerable re-assessment and deliberations over the next 15 years prior to the signing of a construction contract of \$68.4 million in October 1979. The selected design involved a French Production Package supplied to Codock as Government Furnished Information. This differed substantially from the contract specifications, and resulted in a protracted dispute between the contractor and the Commonwealth. During the period of dispute insufficient staff resources were allocated to work on design modifications, badly organised on-site representation contributed to confusing quality assurance arrangements, and key Australian build documents contained inadequate definitions of construction standards. The project has experienced, to date, real cost increases of \$72 million.

1.26 It was clear that management was not geared to handle a situation which was to be solved only by contract renegotiation involving extending the acceptance date by 3 years and changing from a fixed price to a fixed price incentive contract of \$149.9 million (January 1983 prices). The situation was further exacerbated by incompetent RAN management, especially of basic planning in areas such as cargo handling and storage. When, after five years, the Cargo Working Party (CWP) finally made its decision, it failed to examine the implications of the chosen pallet on related design factors - forklifts, ammunition lifts, strength of decks and storage arrangements.

1.27 The project is now operating smoothly. The early years demonstrated the major problems created by poor project management skills and resources. The inefficiencies over this period have had a significant cost and delay effect.

1.28 The two Australian Frigates, delivery dates 1991 and 1993 respectively, will be built largely to the configuration of HMAS Darwin, the latest US-built Frigate constructed for the Navy. The cost will be substantially greater than the imported Frigates. The project is in its early stages and the large dedicated project team have yet to be adequately tested. Project definition aspects, which attempted to minimise risk, planning and contracting are sound.

1.29 Potential problems relate to the capacity of Williamstown Naval Dockyard to build the vessels to cost, time and quality requirements. About half of the project budget is to be spent in Australia. To date Australian industry has experienced problems meeting specifications for equipment and delays in meeting orders for materials may shortly impact on build schedules.

1.30 Navy has upgraded its project management for this major project. Whether this will be matched by the quality of the contractor's performance remains problematic. Williamstown's record is not encouraging. However, since its modernisation program commenced, with its new management, there are positive signs that some of these risks may be diminishing. Time will be vital in this regard.

#### Research, Development, Design and Production

1.31 Four projects - Army's Hiport/Medport mobile radio terminals (\$31 million), Navy's Minehunter Catamarans (\$91 million), and Air Force's Jindalee Over-the-Horizon Radar (OTHR) (\$41 million) and Basic Trainer (\$99 million) fall within this area of locally managed research and development.

1.32 The Hiport/Medport project, which aimed to provide Army and Air Force with long- and medium-range transportable radio terminals for its deployed forces, was a case where initial assessments of technical risk and hence the capability of industry to deliver what was thought to be a modified production item, were seriously in error. The original Staff Requirements broadly conceived a relatively straightforward purchase. The project passed through a funded project definition stage, and it is clear now that Army was ill-equipped, as were the tenderers, to gauge the extent of the design requirements. The resultant contract proved inappropriate to the heavy load of design change drawings, testing and approvals required. Disputation followed as the contractor was bound by a firm price. Defence eventually agreed to major revisions in procedures, and to new time and cost parameters. The project was managed by a Co-ordinator gaining functional support, as needed, in the traditional matrix arrangement. The contractor had direct lines of communication with numerous points in that system. There is little doubt that a much stronger Project Director was needed to re-orient the contract and administration to handle the unexpected problems which arose. Poor initial planning was clearly a major factor. Army's reaction to the fundamental issues which emerged was slow and rigid. A strong Project Director with both the power and flexibility to respond quickly to new conditions is important for this type of project.

1.33 The Minehunter Catamaran project, the subject of a project definition study, suffered from inadequate assessment of technical risk and, especially, industry capacity to construct a highly demanding vessel. A Land Based Magnetic Test Range, a facility to be constructed by the Department of Housing and Construction which also initially failed to grasp the engineering task involved, was poorly designed.

1.34 The evidence points to a management organisation during the initial period which was incapable of vital tasks, such as realistic scheduling of work and thus accurate control over performance. Sequencing of purchase of major equipment proved faulty, and the critical design team remained remote from rather than integrated with project management.

1.35 As with HMAS Success, the problems required a major renegotiation of the contract. A significant improvement in the resources and deployment of staff in the Project Office included more sophisticated management information systems.

1.36 The Jindalee Over-the-Horizon Radar has moved at a measured pace for the last twelve years. This has required extended financial and time provisions. The phasing of the project, under the control of the Defence Science and Technology Organisation (DSTO), has reached a point where Service Evaluation Trials will determine whether the experimental OTHR will be converted into a fully operational system covering Australian northern approaches. Industry definition studies have been incorporated into the phasing.

1.37 The Air Force Basic Trainer project has run into major cost and time overruns and following Cabinet consideration new tenders were called in August 1985.

#### Management and Risk

1.38 The Committee assessed, in terms of manufacturing technology, design, complexity and sourcing, general levels of risk attached to each project. Details are at Table 1.2 and Figure 1.1.

1.39 Broadly three management arrangements were applied to projects. These have been categorised as large dedicated project teams, smaller project teams and a matrix management arrangement. Figure 1.1 illustrates where the match between risk and management effort has been successful. All projects on the diagonal were judged by the Committee as having adequate management. Projects to the left were seen by the Committee as experiencing problems which needed a stronger management effort.

#### Summary Data

1.40 Table 1.3 provides summary data on cost variations for each project. Figure 1.2 summarises the project management shortcomings identified in each of the sixteen projects.

TABLE 1.2

LEVEL OF RISK - SIXTEEN PROJECTS

TECHNOLOGY	DESIGN, COMPLEXITY	SOURCING	RISK
Advanced	Substantial Build	Major Aust	High
F/A-18	F/A-18	HMAS Success	F/A-18
Guided Missile Frigates	Guided Missile Frigates	Aust. Frigates Hiport/Medport	Jindalee
Minehunter Catamarans Jindalee	Minehunter Catamarans Basic Trainer HMAS Success Aust. Frigates	Minehunter Catamarans Basic Trainer Jindalee Hamel	Minehunter Catamarans Basic Trainer
Mixed	Moderate Build	Medium Aust	Medium
TADS		F/A-18	Aust. Frigates
Rapier	Rapier	Rapier	Rapier
Hamel Hiport/Medport Basic Trainer	Hamel Hiport/Medport Jindalee	Medium Trucks Small Arms	Hamel Hiport/Medport HMAS Success Guided Missile Frigates
Existing	Minor	Predominantly Overseas	Low
HMAS Success	TADS	Guided Missile Frigates	TADS
Australian Frigates		TADS	
Medium Trucks Small Arms	Medium Trucks Small Arms		Medium Trucks Small Arms
F-111A P3C Orion C-130H Simulator	F-111A P3C Orion C-130H Simulator	F-111A P3C Orion C-130H Simulator	F-111A P3C Orion C-130H Simulator

Note: Projects are not ranked within categories.

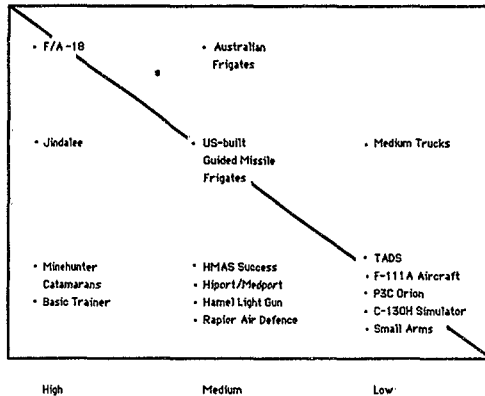
Figure 1.1 Comparison of Project Management Resources and Assessed Risk - Sixteen Projects.

**RESOURCES:**

Large dedicated project team

Smaller project team

Matrix management



**RISK**  
(TECHNOLOGY/COMPLEXITY/DESIGN)

- Notes:
- Risk was measured by reference to:
    - the level of new technology;
    - project complexity (number of elements and time frame); and
    - the level of design effort.
  - Projects on the diagonal were assigned management resources commensurate with the level of risk in the project. Projects lying to the left of the diagonal had insufficient management resources.

Table 1.3 Variations in Total Costs - Sixteen Projects

Project	Initial approved project cost \$m	Current approved project cost \$m	Current estimated total project cost \$m	Sources of variation from initial approved cost	
				(a) economic escalation and exchange rate variations \$m	(b) real cost increases \$m
Tactical Air Defence System (TADS)	14.88 (Jan 79)	21.68 (Mar 83)	21.68	7.50	-0.70
Jindalee: - Stage A	3.40 (Nov 73)	6.20 (J 79)	6.14	1.20	1.54
- Stage B	24.60 (Feb 78)	34.80 (Dec 84)	34.80 (Dec 84)	4.66	5.54
- Phase 1	0.60 (Feb 83)	0.60 (Feb 83)	1.54 (J 85)		0.94
- Phase 2A	0.59 (Dec 83)	0.59 (Dec 83)	0.59 (Dec 83)		
C-130H Simulator	3.79 (Jan 76)	8.80 (May 81)	8.80 (May 81)	2.75	2.26
F-111A Attrition	60.25 (Jan 81)	61.67 (Apr 83)	60.03 (Jul 85)	5.63	-5.85
Basic Trainer - Phase 2	46.00 (Aug 81)	70.00 (Jul 85)	94.80 (Nov 84)		48.80
P3C Orion	242.00 (Oct 81)	402.04 (Mar 84)	411.99 (Apr 85)	129.75	40.24
F/A-18 Fighter	2427.39 (Aug 81)	3396.03 (Dec 82)		1086.00	-177.00
Small Arms: - Phase 1	0.71 (Apr 82)	0.75 (Nov 83)	0.75		0.04
- Phase 2	4.39	4.39 (Apr 84)	5.35	0.96	
Rapier Air Defence	70.70 (Dec 76)	95.52 (Sep 79)	95.80 (Jul 85)	23.78	1.32
Hiport/Medport	24.90 (Jan 77)	26.64 (Dec 84)	31.32 (Jul 85)	4.42	2.00
Medium Trucks	193.320 (Jan 80)	207.399 (Mar 85)	215.899 (Jan 85)	27.132	-4.553
Hamel Light Gun: - Phase 2	12.06 (Apr 83)	15.53 (M 85)	15.64 (Jul 85)	2.58	1.00
- Phase 3	40.00 (Jan 81)	33.22 (Jul 84)	40.34 (Jul 85)	5.56	-5.21
HMAS Success	73.20 (Jan 77)	204.11 (Jan 83)	208.92 (Dec 84)	63.58	72.14
Minehunter Catamaran: - Phase 1	0.50 (J 75)	1.50 (A 81)		0.06	0.94
- Phase 2	69.01 (A 81)	87.95 (O 82)	89.63 (Dec 84)	16.97	3.65
- Phase 2A	13.23 (J 76)	42.81 (A 81)		9.86	19.72
- Phase 2B	25.06 (J 80)	26.20 (A 81)		4.33	-3.19
US-built Frigates	187.00 (Mar 74)	1013.56 (Dec 82)	1013.56 (Dec 82)	496.56	332.00
Australian Frigates	830.00 (Dec 82)	859.06 (Dec 83)		29.06	

Source: Department of Defence, Minutes of Evidence

CHAPTER 2

THE GUIDED MISSILE FRIGATES PROJECT (FFGs 01-04)

Summary of Conclusions

2.1 Overall, the FFG project was partially successful. The ships were delivered broadly within the required time frame but cost considerably more than initially budgeted. The ships entered service minus an integral part of their capability and in the case of the first three, requiring major modifications and retrofits to make them fully meet the RAN's original requirements.

2.2 As part of the United States Navy's FFG acquisition program the project benefited from a number of innovative and positive features of the US Navy's project management. The project, especially the Integrated Logistics Support aspects, may have benefited also from RAN project organisation and staffing arrangements which were superior to those for other contemporary RAN projects.

2.3 Unfortunately, Defence project management suffered a number of significant shortcomings which limited the success of the project:

- (1) The definition and evaluation of the FFG helicopter requirements was protracted and meant that the ships entered service with a large capability gap;
- (2) Departmental management missed possible opportunities to avoid expensive and time-consuming post-delivery modifications to at least the third FFG;
- (3) United States Foreign Military Sales (FMS) contractual and management arrangements did not adequately protect Australia's interest especially in negotiations between the US Navy and the shipbuilder; and
- (4) The level of Australian industry participation (AIP) has been well below target because of the inherent difficulties of securing AIP under US FMS purchases and the unsatisfactory management of this aspect.

2.4 The US Navy's management of the overall FFG program itself has been criticised in the United States Congress for cost increases and the need for major post-delivery modifications to the earlier FFGs.

Figure 1.2 Summary of Project Management Shortcomings - Sixteen Projects

Project	Problem category												
	Project definition	Project planning	Financial programming	Contracting	Australian Industry Participation	Performance reporting	Computer support	Quality assurance	Change order procedures	Government Furnished Equipment/Information	Integrated Logistic Support	Documentation, etc	Project organisation
1. TADS	X	X	X			X				X		X	X
2. Jindalee	X	X						X				X	X
3. C-130H Simulator		X	X			X	X			X		X	X
4 F111A Attrition		X	X	M		X	X			X		X	X
5. Basic Trainer	X	X		X		X	X	X				X	X
6. P3C Orion	X	X	X			X	X	X					
7 F/A-18	X		X										
8. Small arms	X						X					X	
9 Rapiet Air Defence	X	X					X			X		X	X
10. Hiport/Medport	X	X		X		X	X	X				X	X
11 Medium trucks						X	X					X	
12. Hamel light gun	X	X	X			X	X			X		X	X
13. HMAS Success	X	X		X		X	X	X		X		X	X
14. Minehunter Catamarans	X	X		X		X	X			X		X	X
15. US Built Frigates	X		X		X			X				X	
16. Australian Frigates		X						X		X	X		

Source : Volume 2, Chapters 2-17

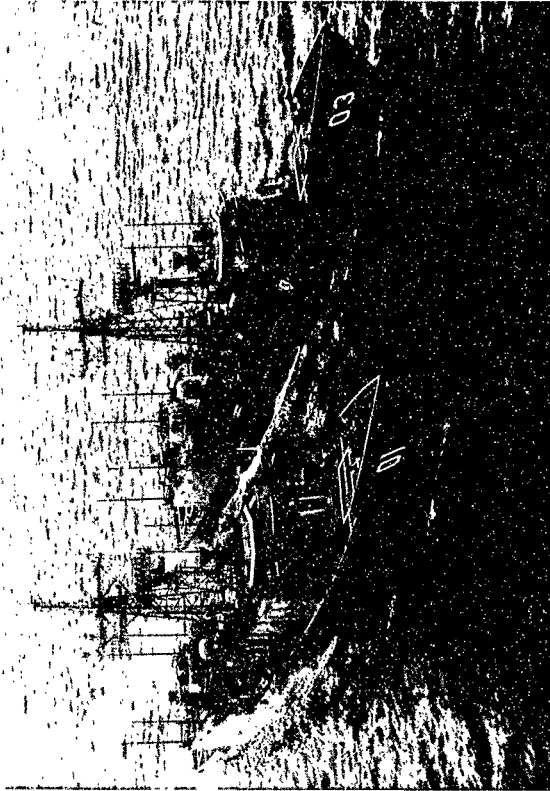


Illustration 2.1 HMAS Adelaide and HMAS Sydney (Guided Missile Frigates FFGs 01 and 03)  
Department of Defence



2.5 The project illustrated particularly well the costs and benefits of US Foreign Military Sales arrangements. The use of FMS may have been unavoidable. However, within an FMS purchase, better contractual and management arrangements could have been negotiated to protect Australia's interests.

#### Project Overview

2.6 The Guided Missile Frigates (FFG 01-04) Project involved the acquisition of four FFG class frigates from Todd Pacific Shipyards Corporation in Seattle under Foreign Military Sales arrangements managed by the United States Navy. The project was nominated by the Department of Defence in response to the Committee's request for six successful Defence equipment projects.

2.7 Until the F/A-18 Project, this project represented Australia's largest peacetime defence equipment acquisition. The project spanned some eleven years from the commencement of detailed evaluation studies in 1973 to the delivery and acceptance of the fourth FFG in July 1984. The currently approved total project cost is \$1,013.56 million (December 1982 prices).

2.8 The project, which was approved by the Government in April 1974, initially comprised the purchase of 2 ships, supporting equipment, training and helicopters to operate on the ships at a total cost of \$187 million (March 1974 prices). In August 1982, the helicopter acquisition was removed from the FFG Project and placed under a separate Navy Destroyer - Utility Helicopter Project. In October 1977 the Government approved the acquisition of a third FFG and in April 1980 the acquisition of a fourth FFG. FFG-01 (HMAS Adelaide) was delivered in November 1980, FFG-02 (HMAS Canberra) was delivered in March 1981, FFG-03 (HMAS Sydney) in January 1983 and FFG-04 (HMAS Darwin) in July 1984. HMAS Darwin recently completed post-delivery trials in the United States. With its arrival in Australia in September 1985 the FFG project is effectively completed.

2.9 The project grew out of the Government's decision in August 1973 to cancel the Australian Light Destroyer (DDL) Project. The DDL Project had been initiated in May 1971 and approved by the previous Government in August 1972. The Project, which aimed to design and build three light destroyers in Australia, was cancelled because of the high cost and technical risk of an Australian design.

2.10 As a United States Foreign Military Sale the acquisition was managed as part of the United States Navy's 54 ship FFG frigate program. The FFG was designed for the US Navy (USN) as a low cost patrol frigate primarily for the protection of convoys, underway replenishment groups and amphibious forces against air, surface and submarine attack.<sup>1</sup> Detailed design of

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1. DMS Market Report, 1984, 'FFG-7'  
US Congress, Joint Economic Committee, Sub-committee on  
Priorities and Economy in Government, 'Economics of Defence  
Procurement: Shipbuilding Claims', Hearings, 3 January  
1979, page 94.

the FFG (then known as the Patrol Frigate) began in May 1973. The lead ship (USS Oliver Hazard Perry) was launched in September 1976 and commissioned in December 1977. The Australian Government signed a Memorandum of Agreement with the United States Government in August 1974 to purchase the FFGs subject to the negotiation of agreed financial and contractual conditions and satisfactory progress with the USN FFG Program. The USN FFG program received production approval from the US Defense Systems Acquisition Review Council (DSARC) in December 1975. A Letter of Offer and Acceptance for the first two FFGs was signed in February 1976. HMAS Adelaide (FFG-01) and HMAS Canberra (FFG-02) were the 17th and 18th FFGs ordered by the USN and amongst the first three FFGs built by Todd Seattle.<sup>2</sup>

2.11 The RAN FFGs differed a little from their sister US Navy ships, most significantly in crew accommodation arrangements reflecting the RAN's different manning structure.<sup>3</sup> Over the course of the project a number of important modifications were introduced. Under the US Navy FFG program these modifications were incorporated in the ships by fiscal year groups.<sup>4</sup> The first three RAN FFGs possessed similar equipment to the early US Navy FFGs ordered prior to 1979 whereas the fourth FFG incorporated a significant number of modifications introduced in 1979 including additional crew accommodation, the Phalanx Close In Weapon System (CIWS), fin stabilisers and stern modifications to allow the operation of the larger LAMPS 111 helicopter and TACTAS towed array sonar.<sup>5</sup> A number of earlier changes such as the fitting of 'Kevlar' ballistic laminate, modifications to the 76 mm gun magazines and modifications to the Mark 92 Fire Control System were made to rectify deficiencies identified in trials of the lead FFG.<sup>6</sup> Others, such as the Phalanx CIWS and LAMPS 111 and TACTAS modifications equipped the FFGs with improved weapon and sensor systems which were still under development when the ship was designed. A superstructure cracking problem which was reported in 1982 also has had to be rectified.<sup>7</sup>

2.12 A number of the later changes such as the Phalanx CIWS and the modifications to the 76 mm gun magazines were made to FFG-03 during construction but major 'retrofits' will have to be made to the first three FFGs. Two Phalanx CIWS are being installed on FFGs 01 and 02, and modifications to overcome the superstructure cracking problem are being implemented. Modifications to the 76 mm gun magazines on FFGs 01 and 02 will be made at some future date as will be the fitting of fin

stabilisers to FFGs 01, 02 and 03 and further improvements of the Mark 92 Fire Control System. The stern modifications to the first three FFGs will be undertaken as part of the helicopter acquisition project. Further modifications to the first three FFGs to provide additional crew accommodation may be required following the RAN's present review of FFG manning.

#### Project Costs

2.13 The cost of the project escalated from a two frigate purchase including helicopters costing \$187 million (March 1974) to a four frigate purchase minus helicopters costing \$1,013.56 million (December 1982). If the current approved costs of the eight helicopters for the four FFGs and the associated modifications to three FFGs are added, the overall project cost of the FFGs and their integral sensor and weapon systems is over \$1,380 million in then year dollars. This figure excludes the cost of the additional approved modifications, for example fitting Phalanx CIWS to FFGs 01 and 02 and fin stabilisers to FFGs 01-03.

2.14 Between 1974 and 1982 the sailaway cost of each of the four frigates (ie the cost of the ship plus on board equipment) increased. The initial estimate in March 1974 was \$83 million each. When the contract was signed in February 1976 that cost had increased to \$148 million. In October 1977, when approval was granted for the third frigate, the cost had further increased to \$164 million. The fourth frigate, which incorporated a number of important modifications, was costed at \$256 million. These figures do not include the cost of helicopters. The unit cost of helicopters rose from an estimated \$2 million each for twelve helicopters (March 1974) to an estimated \$40 million each for eight (January 1984). Details of estimated costs are contained in Table 2.1.

2.15 Some 60 per cent (\$496.56 million) of the increase in total approved FFG project costs was attributed by the Department of Defence to inflation and exchange rate variations. The real increase of about 40 per cent (\$322 million) was accounted for largely by:

- increase from a two ship to a four ship purchase;
- re-estimation of project costs after tenders received;
- ship modifications; and
- additional equipment.

2. DMS Market Report, op cit, page 3.  
3. Joint Committee of Public Accounts, Review of Defence Project Management, Minutes of Evidence, page 1200.  
4. US Congress, Joint Economic Committee, op cit, page 117.  
5. Minutes of Evidence, op cit, pages 1218, 1221-1222.  
6. Department of Defence, RAN FFG Project Progress Report. No 45, (October 1983), paragraph 26.  
Senator Hansard, Question on Notice, 13 October 1982, page 1431.  
7. Department of Defence, RAN FFG Project Progress Report. No 38, paragraphs 5.9-5.11.

TABLE 2.1

## Cost of US-Built FFGs

Approval Date	01	02	03	04
	Adelaide \$m	Canberra \$m	Sydney \$m	Darwin \$m
April 1974	-163.361-			
March 1975	-231.816-			
February 1976	-296.100-			
August 1977	-368.097-			
October 1977			-163.965-	
Jan/Aug 1978		-532.062-		
March 1979		-548.062-		
August 1979		-584.872-		
August 1980		-616.584-		
April 1980				-256.127-
July 1981		-878.700-		
August 1982		-923.038-		
September 1983		-1015.560-		

Adelaide delivered November 1980, Canberra March 1981, Sydney January 1983, Darwin July 1984.

Note: Costs listed above do not include helicopters. The unit cost of the helicopters rose from an estimated \$2 million each for twelve helicopters (April 1974) to an estimated \$40 million each for eight (January 1984).

Source: Minutes of Evidence, op cit, pages 2862-2866

In addition to these increases the grounding of FFG-01 during trials in January 1981 cost \$1.4 million in repairs, and a fire on FFG-03 during construction in January 1982 cost \$6.62 million.

## Schedule

2.16 When the project was approved it was planned that FFG-01 would be delivered in late 1979 and FFG-02 in mid 1980.<sup>8</sup> The contract which was let in February 1976 specified delivery in August 1980 (FFG-01) and December 1980 (FFG-02). The contracted delivery dates were subsequently revised to September 1980 and January 1981 after the ship builder successfully claimed excusable delay for late and defective USN Government Furnished Equipment and USN modifications. In the event FFG-01 was delivered in November 1980 (over one month behind the amended contracted date) and FFG-02 in March 1981 (two months behind the amended contracted date). FFG-03 was initially contracted to be delivered in December 1982. This date was revised to January 1983 after USN modifications were authorised. The January 1982 fire on FFG-03 threatened a 3 to 4 month delay in delivery but the RAN paid an additional \$3.12 million to maintain the scheduled delivery date. FFG-03 was delivered on the contracted date, as amended. The contract for FFG-04 initially specified a delivery date of April 1984 but this was extended to July 1984 following an 11 week strike in US West Coast shipyards between July and September 1983.

## Positive Aspects

2.17 The project exhibited a number of significant positive aspects.<sup>9</sup> In the first place, the RAN benefited from a number of project management innovations introduced by the US Navy in the FFG Program. The lead ship design process was enhanced by:

- . involvement of competitively selected shipbuilders in preliminary design;
- . risk sharing contracts for design and lead ship construction;
- . a two year gap between the lead and follow ship contracts; and
- . an extensive test program prior to the award of the first follow ship contract.

8. Department of Defence, RAN FFG Project Management Plan, Issue No 2, September 1979, Volume 2, Chapter 2, page 8.

9. The following summary is based on:  
US Congress, Joint Economic Committee, op cit, pages 116-121.  
J D Beecher and A R Di Trapani, 'The FFG-7 Guided Missile Frigate - Model for the Future' Naval Engineers Journal, June 1978, pages 93-105.

- 2.18 The construction of the follow ships benefited from:
- . a high level of standardisation in ship design and equipment;
  - . strong change control arrangements, encompassing
    - a 'block approach' to configuration changes to minimise schedule delay,
    - an insistence on a minimum of changes,
    - fully priced, negotiated contract modifications, and
    - price incentives for schedule performance.

- 2.19 Generally, the management of the program was assisted by:
- . strong project organisation in both the US Navy and the shipbuilder; and
  - . continuity of key US Navy personnel.

In turn, the RAN's project management featured:

- . a stronger project organisation than existed in other contemporary Navy projects;
- . increased stability in Project Office staffing; and
- . thorough Integrated Logistic Support (ILS) planning to provide for the through life support of the ships.

#### The Capabilities of the FFG Class Frigates

2.20 Concern has been expressed in the United States about the effectiveness of the FFG Class Frigate. Much of the criticism has focused on the capability limitations imposed by the vessel's initial design to strict cost and weight criteria. According to these sources the FFG suffers from:

- . a limited (shipborne) anti-submarine warfare (ASW) capability;<sup>10</sup>

10. US Congress, Joint Economic Committee, op cit, page 96.  
B R Linder 'FFG7's: Square Pegs?' US Naval Institute Proceedings, June 1983, page 41.

- . a limited anti-air warfare (AAW) capability;<sup>11</sup>
- . vulnerability to so called 'cheap kills' and low level attack;<sup>12</sup> and
- . a restricted growth and modernisation potential.<sup>13</sup>

2.21 The FFG was designed for the US Navy in the early 1970s as a mid ocean escort for replenishment groups, amphibious groups and convoys in a lower level threat environment.<sup>14</sup> The ship's so called 'low mix' capability restricts the FFGs' deployment with front line US Navy aircraft carrier and cruiser battle groups.<sup>15</sup>

2.22 The RAN's operational requirements define a multiplicity of roles for the FFG with primary emphasis on escort protection against air, surface and submarine threats. However, the RAN does envisage independent operations as well as group deployment on escort duties.

2.23 Although the FFG may be a cost effective solution for the US Navy's requirements, the question occurred to the Committee as to whether the FFG was a cost effective solution in the context of the RAN's much smaller scale of operations. The Committee's concern was heightened by an article in the Australian press which seemed to indicate that the FFG may not have been the RAN's preferred choice when it assessed its new destroyer requirements in the early 1970s.<sup>16</sup>

2.24 Some of the capability limitations of the initial FFG design and the early ships, were overcome for the US Navy by the fitting of additional equipment to later ships in the program and by 'retrofitting' the early FFGs. The Committee was concerned to find however that two major modifications, LAMPS 111 and TACTAS were not to be incorporated in the RAN's FFGs, suggesting that the Australian FFGs may be less capable than their American sister ships.

11. B R Linder, op cit, page 41.  
'Wizard Ship Soon to Sail' Bulletin, 19 August 1980.

12. US Congress, Joint Economic Committee; op cit, page 97, 106-107.  
US Congress, House of Representatives Committee on Armed Services, Hearing, (1978 H201-35.12), pages 925-974. See also: US Congress 'Lessons of the Falklands: Summary Report,' February 1983 (1984 H201-3.10), pages 782-854.

13. B R Linder, op cit, page 42.  
US Congress, Joint Economic Committee, op cit, pages 96-97, 104-105.

14. Ibid page 94.  
B R Linder, op cit, pages 38,40.

15. Ibid, pages 38,43.

16. 'On Their Way' the \$1 Billion Ships the Navy Didn't Want' Australian Financial Review, 3 April 1980.

2.25 A major and integral part of the FFGs anti-surface and anti-submarine capability is provided by the on board helicopters. The acquisition of helicopters formed part of the FFG project from the outset. However, the selection of the FFG helicopters proved to be a very protracted business with deferrals and changing RAN requirements. The FFG's helicopters will not be delivered until 1987 seven years after the first RAN FFG was delivered, in smaller numbers than initially envisaged and at a greatly increased cost.

2.26 These three considerations led the Committee to question the adequacy of the RAN's initial definition of its requirements and its evaluation of ship and equipment solutions.

#### The Definition and Evaluation of the RAN's Requirements

2.27 A major criticism levelled against the FFG concerned the ship's anti-submarine warfare (ASW) capability, specifically the short-range of the hull mounted AN/SQS-56 sonar.<sup>17</sup> This sonar was fitted to the first four RAN FFGs but the two FFGs to be built in Australia will be equipped with the later, Australian-design Mulloka sonar which has been optimised for water conditions in the Australian region. On later model and some earlier US Navy FFGs a long-range ASW capability will be provided by the LAMPS 111 helicopters and the TACTAS towed sonar. The RAN decided against fitting the LAMPS 111 and TACTAS systems to its FFGs. Instead of LAMPS 111 the RAN's FFG helicopters will be equipped with Australian designed anti-submarine warfare sensors and a quick response targeting system thereby providing the FFG with a similar long-range ASW capability. The RAN considered that the LAMPS 111 system did not suit the autonomous role defined for its FFG helicopters and was more costly and less capable than the planned Australian system. Because the RAN's concept of operations envisaged autonomous operations by the helicopters it decided not to fit the helicopters with the LINK 11 automatic tactical communications link to the ship. LINK 11 is fitted to the RAN FFGs, DDG Destroyers and RAAF P3C Orions. Processed ASW information will be passed from the helicopters via a special purpose link to the FFG and on, as required, to other Australian Defence Force units via LINK 11. This may restrict the inter-operability of the helicopters with other Australian Defence Forces and US Navy forces.

2.28 TACTAS similarly was assessed not to meet the RAN's particular requirements. However the RAN is evaluating an Australian designed towed array sonar and the FFGs will have provision for the future fitting of a towed sonar. The RAN's FFG helicopters also will have provision for the future fitting of additional ASW sensors and weapons.

2.29 The anti-air warfare (AAW) capability of the FFG also attracted criticism. The performance and reliability of the FFGs Mark 92 Fire Control System (which controls the missile and gun systems) is considered unsatisfactory and there is a limited number of missile guidance channels.<sup>18</sup> Moreover, the ship's two-dimensional search radar has a lesser capability to track aircraft than the three-dimensional search radar fitted to the RAN's older DDG Destroyers.<sup>19</sup> The US Navy is considering a modernisation program to improve the Mark 92 Fire Control System.<sup>20</sup> A superior, phased array radar is available but cost and potential ship stability problems appear to preclude this option.<sup>21</sup> The RAN told the Committee that it considers the overall AAW capability of the FFG (taking into account the helicopter systems) as adequate.

2.30 It has been argued also that the FFG is especially vulnerable to 'low level' attack, ie a limited ability to survive attack by aircraft missiles and smaller ship projectiles,<sup>22</sup> as well as "cheap kills" (ie sensitive electronic and other systems being put out of action by minor fragmentation and shock damage)<sup>23</sup> all of which is increased by limited shipboard systems redundancy.<sup>24</sup> The FFGs vulnerability has been reduced by the fitting of 'Kevlar' ballistic laminate in critical areas and by modifications to the 76 mm gun magazine. (This latter change has not yet been made to the RAN's first two FFGs.)<sup>25</sup> However, it seemed that there were cost and weight limitations on the amount of protection that could be added to the ship.<sup>26</sup> The issue was a difficult one to resolve and the Committee questioned whether the FFG class was any more vulnerable to these threats than other similar modern warships.

2.31 The final major charge made against the FFG concerned the ship's limited modernisation potential. Modernisation or technical development potential seemed particularly important for the RAN FFGs given the ship's long service life and multi-role requirements. The design of the FFG minimised space, weight and stability growth margins. Modernisation potential relates

18. B. R. Linder, *op cit*, page 41.
19. Senate Hansard, Question on Notice, 13 October 1982, page 1431.
20. Bulletin, *op cit*.
21. B R Linder, *op cit*, page 42.
22. Bulletin, *op cit*.
23. US Congress, Joint Economic Committee, *op cit* pages 97, 106.
24. *Ibid* pages 89, 97, 106-108.
25. Department of Defence, RAN FFG Project Progress Report, No 25, (December 1978 - January 1979) paragraph 5.1.8, 'Frigates 'Detection' Restricted', Canberra Times, 8 July 1980.
26. B R Linder, *op cit*, pages 40, 41.
27. Department of Defence, RAN FFG Project Progress Report, *op cit*, paragraphs 5.1.10 - 5.1.11.
28. US Congress, Joint Economic Committee, *op cit*, pages 97,107.

17. US Congress, Joint Economic Committee, *op cit*, page 96.  
B R Linder, *op cit*, page 41.

particularly to the ease of electronics up-date. The growth weight margin for the FFG is 50 tons.<sup>27</sup> There is no future growth weight margin for unplanned future ship characteristics changes.<sup>28</sup> The RAN accepted that the modernisation potential of the FFG is limited but considered that it to be enough for its purposes.

2.32 The Committee concludes that overall, the RAN's FFGs possessed the potential capability to meet the major requirements defined for the ships, namely escort missions in lower level threat environments. The Committee also found no reason to contradict the RAN's assessment that the FFG was a cost effective solution to these requirements. Were the RAN's requirements to change to meeting a higher level threat the potential effectiveness of the FFG may be restricted by the ship's capability and limited weight, size and stability growth margins. Of course, the Committee had neither the brief nor the expertise to question the RAN's assessment of the military threat and its capabilities requirements.

2.33 The overriding concern of the Committee was to ascertain whether the successful implementation of the FFG project was assisted by the adequacy with which the RAN defined its requirements and evaluated the technical solutions. In respect of the assessment of the requirements for the ship and its weapon and sensor systems, the Committee found no evidence to criticise the RAN's performance. In respect of the definition and evaluation of the FFG helicopter requirements on the other hand, the Committee found the RAN's performance open to criticism.

#### The Selection of the FFG Helicopters

2.34 The selection of the FFG helicopter was characterised by a lengthy period to define the aircraft's tasks and the performance requirements for each task as well as a substantial revision of aircraft requirements late in the piece. The helicopters will not be delivered until 1987-1988, some seven to eight years after the first FFG entered service with the RAN, in fewer numbers and at a much greater cost than was initially envisaged.

2.35 The management of the FFG helicopter selection was criticised in the Auditor-General's March 1982 Report which found that:

The time taken to agree the tasks (ie functions) of the armed helicopter and failure to date to agree the precise level of capability required (ie performance requirements for each task) has impacted on the progress of helicopter evaluation and selection and may also impact on the operational capability of the frigates and planning for modifications to the first three vessels, and

27. US Congress, Joint Economic Committee, op cit pages 96, 105.

B R Linder, op cit pages 42-43.

28. US Congress, Joint Economic Committee, op cit, page 96.

use of an intermediate capability helicopter option as the basis for cost estimates will have the effect that the approved estimates of the helicopter procurement are understated if a medium capability helicopter is selected.<sup>29</sup>

2.36 The original Navy Staff Requirement for the FFG helicopter was raised in 1974 and sought a helicopter which had the capability to extend the ship's radar coverage to over the horizon missile targeting, deliver anti-submarine weapons and provide limited fleet utility capabilities. The following chronology of events is based on the Department of Defence submission to the Public Accounts Committee inquiry into the March 1982 Auditor-General's Report, subsequent correspondence with the Department and press reports.<sup>30</sup> The Government's April 1974 decision to purchase two FFGs at an estimated cost of \$187 million included an allowance of \$25 million for twelve helicopters as an integral part of the weapon and sensor systems of the FFG. The helicopter component of the project then appears to have proceeded at a slower pace than the ship component, perhaps because of the shorter lead times envisaged.

2.37 In August 1977 a Request for Proposal was issued to industry and later that year an evaluation team went overseas. The evaluation team made its report in April 1978. This report was followed by supplementary reports on costing (in November 1978) and on timing and capabilities (in April 1979).

2.38 Following consideration of these reports the Department of Defence decided to defer further external evaluation pending the specification of a firm role for the helicopter. The Department's decision was influenced by the early development status of likely aircraft systems and the advantages of commonality with other current helicopter projects, particularly the replacement of the RAN's Wessex helicopters. In August 1979 it was reported that no suitable aircraft were available which met the RAN's requirements, the first FFG would arrive without helicopters and the project had been deferred awaiting the development of new model helicopters. The helicopter acquisition was then estimated to cost \$90 million.<sup>31</sup>

2.39 In November 1980 a revised set of tasks for the FFG helicopters was agreed. The requirement now included additional ASW capability and a short range anti-surface ship capability, although the primary task for the helicopter appeared to remain anti-surface ship surveillance and targeting (ASST).

29. Report of the Auditor-General, March 1982, page 37.

30. The Committee would like to acknowledge the assistance of the Parliamentary Library Legislative Research Service (Defence Group) in preparing the following chronology.

31. 'Frigate to arrive without helicopters' Canberra Times, 25 August 1979.

2.40 In mid 1981 a second overseas evaluation mission was undertaken. The mission's evaluation report concluded that no existing helicopter fully met requirements without considerable further development. In March 1982 the Auditor-General reported that there still appeared to be uncertainty as to the priority accorded to each of the helicopter tasks and that consideration being given to the acquisition of an ASW helicopter carrier was delaying finalisation of the ASW capability to be fitted to the FFG helicopter.<sup>32</sup> The estimated cost of twelve helicopters for a four ship program had risen to \$183.9 million.

2.41 In July 1982 a shortlist of four contenders was announced. However it was stated that no helicopter on offer met the RAN's primary requirements and the three manufacturers were invited to undertake funded studies to define suitable systems for fitting to their aircraft.<sup>33</sup>

2.42 In August 1982 the helicopter selection was removed from the FFG Project and placed under a separate Navy Destroyer/Utility Helicopter Project.

2.43 In March 1983 the Government decided not to replace the aircraft carrier, HMAS Melbourne. This decision firmly shifted the helicopter task priorities towards ASW capabilities.

2.44 In July 1983 it was reported that the helicopter project had bogged down, fourteen to seventeen helicopters (at a cost of over \$300 million) were envisaged,<sup>34</sup> and that the required weapon and sensor fit for the helicopters was still being defined.<sup>35</sup> In November 1983 the Minister for Defence told Parliament that the helicopter assessment would be completed before the end of the 1983/84 financial year.<sup>36</sup>

2.45 In September 1984, the Department's recommendations went to Cabinet. It was reported that over a three week period basic arguments were re-aired in the Cabinet Room.<sup>37</sup> In October 1984 the Government announced its decision in principle to acquire eight Sikorsky S70B helicopters at a total cost of \$368 million including \$51 million for necessary modifications to three FFGs. The Government would later consider the purchase of four additional S70Bs for the two FFGs to be built at Williamstown.

32. Report of the Auditor-General, *op cit*, page 38.

33. Defence News Release No 94/82 'Shortlist announced for new RAN helicopters' 1 July 1982.

34. 'Decision on FFG helicopters bogged down' *Defence Industry* 20 July 1983.

35. 'Helicopters contenders shaping up' *Navy News* 1-15 July 1983.

36. The Hon G D Scholes MP, 'Statement by the Minister for Defence' 3 November 1983.

37. 'Cabinet to grapple with helicopter choice today' *Sydney Morning Herald*, 24 August 1984.

2.46 The length of time taken for the selection of the FFG helicopter may have arisen from weaknesses in the higher Defence decision making process (in terms of securing agreements to requirements) or project management (in terms of the carriage of project definition and evaluation tasks), external 'shocks' (specifically the decision not to replace the aircraft carrier) or reasonable responses to the uncertainties of evolving new technologies. The Department of Defence responded to the Audit Office's criticisms by arguing that the helicopter task definition was lengthy but thorough and that the system capability requirements study was by nature a complex task.<sup>38</sup> The Committee does not accept that agreement to the helicopter's task should have taken from 1974 to 1980 and that the detailed definition of the capabilities of its weapon and sensor systems should have taken from 1977 to 1983.

#### Modifications and Retrofits to the FFGs

2.47 During ship construction changes were made to the original FFG baseline design. Some changes were incorporated during the construction of the first three FFGs but the major changes were incorporated in the fourth ship. 'Kevlar' ballistic laminate was fitted to FFGs 01 and 02. Modifications to the 76 mm gun magazine were made to FFGs 03 and 04 which were also fitted with the Phalanx Close In Weapon System. The fourth FFG incorporated additional crew accommodation, modifications to the gas turbine engines, fin stabilisers and modifications to the stern to accommodate the larger LAMPS 111 helicopters being introduced by the US Navy.<sup>39</sup> Some of these changes were introduced to overcome operational problems detected in trials of the lead FFG ship and others to exploit the benefits of new weapons and sensor systems which became available after the ship was designed. With the major exception of the helicopter modifications, space and weight had been allowed for these modifications in the original FFG design.

2.48 Decisions have been taken to add many of the later modifications incorporated in FFG-04 to the RAN's earlier FFGs. The Phalanx CIWS is being installed on FFGs 01 and 02. At later dates modifications will be made to the 76mm gun magazines on FFGs 01 and 02 and FFGs 01, 02 and 03 will be fitted with fin stabilisers and their sterns modified to accommodate the Sikorsky S70B helicopters recently selected for the FFGs. These post-delivery modifications and retrofits are estimated to cost about \$51 million.<sup>40</sup> The stern modifications are planned to coincide with scheduled refits of the ships. The timing of the other modifications is yet to be decided.

38. *Joint Committee of Public Accounts. Inquiry into the Auditor-General's Report March 1982, Submission by the Department of Defence*, 13 August 1982, paragraphs 9, 10.

39. *Minutes of Evidence, op cit*, pages 1101, 1221-1222.

Department of Defence, *RAN FFG Project Progress report No 45*, (October 1983), paragraph 26.

40. *Minutes of Evidence, op cit*, page 2869.

2.49 In addition superstructure cracking has appeared in the first three RAN FFGs. An FFG class problem of superstructure cracking was reported in February 1982<sup>41</sup> and in HMAS Canberra (FFG-02) in March 1982.<sup>42</sup> A design solution was implemented in FFG-04 (HMAS Darwin) and partial modifications were made to HMAS Canberra and HMAS Adelaide. Further modifications are planned.

2.50 Further modifications to the RAN's first three FFGs may be required also. The RAN is also experiencing difficulty with the heavy workloads placed on the relatively small crews of its three in-service FFGs. It has yet to fully assess the manning requirements of the FFGs.<sup>43</sup> With the arrival of the helicopters further modifications may be required to the first three FFGs to accommodate more crew members. The US General Accounting Office reported in 1979 that some US Navy people believed that FFG manning may not be adequate to the ship's needs.<sup>44</sup> Later FFGs including HMAS Darwin have accommodation for twenty-one additional crew members.

2.51 Project records indicated that the RAN was slow to respond to early advice on stern modifications and the fitting of fin stabilisers. As a consequence the RAN may have lost opportunities to incorporate these changes during ship construction and avoid more costly and time consuming modifications to the ships after they had entered service.

2.52 The FFG was originally designed to operate the smaller Kaman 'Sea Sprite' helicopter fitted with the early model LAMPS 1 system. After the FFG program got under way the US Navy developed the more capable LAMPS 111 system based on the larger and heavier Sikorsky 'Seahawk' helicopter. At the same time the US Navy developed the TACTAS long range ASW towed array sonar. LAMPS 111 and TACTAS required major modifications to the stern of the FFG. The US Navy introduced these modifications to FFGs ordered in 1979 onwards, beginning with the 27th ship.<sup>45</sup>

2.53 The US General Accounting Office criticised the US Navy for not modifying at least some of the 26 earlier FFGs during construction. According to the General Accounting Office:

The US Navy knew, at least as early as September 1976, that the stern would require modification. Despite this, the Navy did not analyse the economic feasibility of incorporating the modified stern into all, or some of the first 26 US FFG-7 frigates during their construction. Nor did the Navy contact the shipyards to

determine whether the stern modification could be incorporated into all, or some, of the first 26 US FFG-7 frigates during construction, and what cost and schedule effect this action might have on the ships involved.<sup>46</sup>

If this was so, US Navy mismanagement affected the first two RAN FFGs which were under construction prior to 1979.

2.54 The RAN also may have been slow to respond and missed a possible opportunity to incorporate these modifications to FFG-03 during its construction. The keel of FFG-03 was laid in January 1980 and the ship was delivered in January 1983, about the same time as the US Navy's 27th FFG which incorporated the modification.<sup>47</sup> In late 1979 it was reported that the RAN Project Office had received a full set of drawings, and a great deal of activity was underway in the US Navy defining the requirements for the use of the Sikorsky helicopters and LAMPS 111 on the FFGs.<sup>48</sup> However the report stated that:

The design information in PMS 399 (the US FFG Project Office) is unavailable to the RAN because of the lack of any stated RAN interest in the Seahawk... If indeed such interest exists for procurement of Seahawk for FFG use, then a formal statement might well enable the free exchange, project to project, of ship design information relating to the Seahawk.<sup>49</sup>

2.55 The decision as to which helicopter to buy, announced in October 1984, was in the view of RAN the 'determinant of modification planning'.<sup>50</sup> Furthermore, the modifications were not incorporated at the time the first three FFGs were ordered.<sup>51</sup> Nonetheless, the modified FFG-04 was ordered in April 1980 well before the decision on the helicopter and before the final decision not to acquire LAMPS 111. Also, the RAN appeared not to hesitate in ordering the Phalanx CWCS for FFG-03 in March 1980, after construction of that ship had commenced.

2.56 The Committee finds it hard not to accept that, since the large Sikorsky helicopter (if not the LAMPS 111 system) was among the competing candidates for the helicopter selection, the sensible decision would have been to follow the US Navy and incorporate modifications ('for but not with' LAMPS 111) at the earliest opportunity. The helicopter modifications to the first three RAN FFGs are estimated to cost about \$51 million and to take between 12 and 13 months (concurrent with regular ship refits). Present planning is that the modification program will commence with HMAS Sydney in 1987, the same year as the first helicopters are expected to be delivered.<sup>52</sup>

41. Department of Defence, RAN FFG Project Progress Report, No 38 (February 1982), paragraphs 5.9 to 5.11.

42. Minutes of Evidence, op cit, page 2725.

43. Ibid, pages 1201-1204.

44. US Congress, Joint Economic Committee, op cit, page 97.

45. Ibid, page 91.

46. US Congress, Joint Economic Committee, op cit page 95.

47. DMS Market Report, op cit.

48. Department of Defence, RAN FFG Project Progress Report, No 29 (October 1979), paragraphs 3.1.63, 4.2.26.

49. Ibid, paragraph 4.2.26.

50. Minutes of Evidence, op cit, page 1219.

51. Ibid, page 1220.

52. Ibid, pages 1223-1224.



2.57 According to project records 'it has always been the RAN intention to fit fin stabilisers in RAN FFGs. Stabilisers were part of the 1974 RAN modification package, and it was then intended that the RAN would 'go it alone' with the stabiliser fit. For various reasons including the USN decision in 1976 to fit stabilisers in FY 79 ships and backfit the rest of the class, the RAN decision was made that 'for planning purposes, RAN FFGs are to be fitted with stabilisers of the selected USN FFG design at the first available opportunity'.<sup>53</sup> Fin stabilisers were fitted to FFG-04 during construction. The Committee remains unsure as to why the RAN was dissuaded from its original intention. Had it not been so at least one expensive retrofit could have been avoided. The fitting of fin stabilisers to the RAN's first three FFGs is estimated to cost \$2 million per ship.<sup>54</sup> No timetable appears to have been set for these modifications.

#### The Use of US Foreign Military Sales Arrangements

2.58 As the Department of Defence submission stated, 'the protection of Australian interests in the acquisition of FFG class ships for the RAN under a US Foreign Military Sales (FMS) Case is complex'.<sup>55</sup> Under the FMS arrangements, the US Navy supervised the construction of the ships under the same controls as were applied to ships for the US Navy.

2.59 The August 1974 Memorandum of Agreement between the Australian and US Governments provided for the protection of Australia's interests and Australian 'visibility' into the US Navy FFG acquisition program by:

- including options for Australian withdrawal should the FFG fail to meet the RAN's requirements or prove unacceptably costly (Australia had decided to buy the FFG before the US Government had agreed to full production of the ship); and
- providing for subsequent agreement to the placement of RAN personnel in the US Navy FFG Program Office.<sup>56</sup>

Up to fourteen RAN personnel were located in the United States, in the Washington US Navy FFG Program Office and at other locations. With the exception of the Assistant Project Manager these personnel occupied US Navy positions within the US Navy Project Office and were responsible to the US Navy FFG Project Manager.

53. Department of Defence, RAN FFG Project Progress Report, No 22 (October 1979) paragraph 3.1.54.

54. Minutes of Evidence, op cit, page 2868.

55. Ibid, page 1107.

56. Ibid, page 1097.

2.60 The United States Navy appeared to adopt a fairly strong approach to Australia's involvement in the project. It expressed its opposition to any formal commitment to prior consultation with Australia before making contractual changes or settling disputes which may have substantially altered Australia's obligations, because such a commitment could cause the United States Navy delay and increase cost.<sup>57</sup>

2.61 The Committee's concern is increased by further reports of the US Navy withholding information or restricting its use, of limited involvement in contract variation negotiations with the shipbuilder, instances of ship modifications made without adequate consultation and shipbuilder performance below Australian standards.

2.62 Early in the project the financial reporting arrangements between the US Navy and the RAN FFG Project Office were reported as follows:

USN policy is not to provide... a cost breakdown any more detailed than Congress requires for USN shipbuilding proposals... less formal methods of achieving Australian accountability requirements were... discussed. As a result it was agreed that Australia should advise the USN of requirements together with supporting reasons... The USN offered its best endeavours either to meet these requirements or to give full explanation why they could not be met and if possible propose alternatives.<sup>58</sup>

However, late in 1977 it was reported that a transfer of control of FMS cases from the USN to the Security Assistance Accounting Centre (SAAC) in the US Department of Defense resulted in the USN being instructed to cease providing financial data to Australia. The report commented, 'Should this situation be allowed to continue, Australian financial oversight of the ship acquisition case (SAAC) would be greatly impaired'.<sup>59</sup> Later that year it was reported that following negotiations between the RAN Chief of Naval Technical Services and the US Chief of Navy Materiel, it was agreed to restore financial information from the US Project Office to the Australian Project Office, provided these reports were subject to review by the USN and the US Department of Defense, that SAAC was recognised as the only official data source for Australia, and that USN Project Office reports were not used by Australia as a basis for questioning SAAC projections of Australia's liability for FMS payments.<sup>60</sup> The implications of these new arrangements were described in a later report (in relation to FFG-04) that Australia 'will be informed that while costs are being constrained, limits cannot be enforced'.<sup>61</sup>

57. Department of Defence, RAN FFG Project Progress Report, No 7, June 1975, Part 1, page 2.

58. Department of Defence, RAN FFG Project Progress Report, No 7, (June 1975).

59. Department of Defence, RAN FFG Project Progress Report, No 18 (June-September 1977), paragraph 5.1.2.

60. Department of Defence, RAN FFG Project Progress Report, No 19 (October-November 1977), paragraph 1.5.

61. Department of Defence, RAN FFG Project Progress Report, No 33 (October 1980), paragraph 1.4.

2.63 The Committee questioned the Department of Defence about the value of this informal access to information when we could not use it to protect our interests. The Department confirmed that the RAN's 'window' on US Navy project information 'used to be in danger of being slammed down quite frequently' because of the US Navy's concern that Australia would use the information, which had not yet acquired any formal status in the USN system, as the basis of formal representations.<sup>62</sup> The Committee was told that one of the problems the Department had had with US Foreign Military Sales (FMS) arrangements over a period of time was reconciling billings received from the US to physical progress. There were very long lags in billings, payments to contractors and the disbursement of money Australia paid.<sup>63</sup> In 1977 the Department was using this informal information,....knowing how the project was actually proceeding...., to question the formal billings that we were getting out of the other part of the system'.<sup>64</sup> In 1981 agreement was reached with the US Government whereby Australia established an interest-bearing bank account for FMS payments with a minimum balance to accommodate differences between the expenditure projections supplied by the Americans and their actual drawdowns and disbursements. This change (together with improvements in US Government accounting systems) appears to have reduced the budgetary problem caused by unpredictable FMS payments.<sup>65</sup> However, it appears that the situation persisted where Australia had little freedom to question what or how much we were being charged.

2.64 In September 1979 the shipbuilder, Todd Pacific, lodged a request with the US Navy for an 'equitable adjustment' to the contract covering the construction of three FFGs including FFGs 01 and 02 of \$US24.4 million claiming late or defective Government Furnished Equipment, documentation changes and modifications.<sup>66</sup> At the subsequent negotiations Australia was accorded observer status only. The price of FFGs 01 and 02 was increased \$14.6 million and the delivery dates were postponed between one half and one month.<sup>67</sup> The Department advised the Committee that it maintained very close monitoring of price variations throughout the contract.<sup>68</sup> Under the terms of the FMS contract the US Navy was required to notify and consult with the RAN FFG Project Office on any shipbuilder claims before negotiations commenced with the contractor and 'to permit the Australian representative to be associated with inquiries and

subsequent actions on asserted claims'.<sup>69</sup> It later came to the Committee's attention that the US General Accounting Office had found that Todd Pacific and a number of other US shipbuilders had been overstatting the escalation costs on shipbuilding contracts by delaying the computation of escalation.<sup>70</sup>

2.65 When 'Kevlar' Ballistic Laminate was fitted to the first two RAN FFGs at an estimated cost of \$US469,148, the RAN inquired why 'the RAN was not consulted prior to the change becoming contractual for RAN ships, as this change is significant in terms of the cost involved'.<sup>71</sup> At the time, changes to the configuration of the RAN FFGs were controlled by the following procedures. Major changes to ship characteristics or changes having significant cost or schedule risk required formal notification to and consultation with the RAN FFG Project Office providing this did not prejudice the timing of US Navy decisions. Minor changes which had the approval of the US Navy FFG Program Office Configuration Control Board were accepted provided the RAN Assistant Project Manager (the resident representative of the RAN FFG Project Office) continued to be a member of the Board. The US Navy Project Manager regarded the Kevlar change proposal as a minor change and expedited the change following agreement with the RAN Assistant Project Manager. As a result of this incident the RAN reviewed the project's change approval process and delegated the RAN FFG Project Director authority to approve changes estimated to cost less than \$500,000.<sup>72</sup> It is not clear how this change tightened the control over minor change proposals.

2.66 On a number of occasions the RAN FFG Project Office reported examples of poor workmanship by the shipbuilder, specifically in relation to lofting and welding.<sup>73</sup> In 1982 a number of defects to the hull of HMS Canberra (FFG-02) were reported during drydocking of the ship for painting.<sup>74</sup> The RAN ships were built to US Navy quality control requirements and quality assurance was the responsibility of the US Navy FFG Program Office. The Department of Defence informed the Committee that the quality of welding during initial ship construction of Todd was a matter of concern and that Todd, for reasons of economy, built to the lower limits of required standards. There were deformities and deficiencies in the quality of finish of the hull of HMS Canberra but these fell within the US Navy standards followed in construction.<sup>75</sup>

62. Minutes of Evidence, *op cit*, pages 1211-1212.

63. *Ibid*, page 1213.

64. *Ibid*, page 1214.

65. See the evidence given by the Department to the Senate Estimates Committee F in May 1979, *Senate Hansard*, 3 May 1979, pages 116-118.

66. Minutes of Evidence, *op cit*, pages 1100, 1116.

67. Department of Defence, *RAN FFG Project Progress Report, No 31* (April 1980), paragraph 5.1.36.

68. Minutes of Evidence, *op cit*, page 1209.

69. Minutes of Evidence, *op cit*, pages 2716-2717.

70. House of Representatives Hansard, Question on Notice, 22 April 1982, page 1845.

71. Department of Defence, *RAN FFG Project Progress Report, No 22*, (April-May 1978), paragraphs 5.1.25-26.

72. Minutes of Evidence, *op cit*, page 2714.

73. Department of Defence, *RAN FFG Project Progress Report, No 18* (July-September 1977) paragraphs 1.11, 4.1.7.

*RAN FFG Project Progress Report, No 19* (October-November 1977) paragraph 5.1.20.

74. *Australian Financial Review*, 22 December 1982.

75. Minutes of Evidence, *op cit*, page 2722, 2724.

2.67 The Chief of Naval Materiel told the Committee that 'the proof of the pudding (was) in how the project worked out and...we got a well managed project and good value for our money'.<sup>76</sup> As it was, the history of the project for the US Navy was not an unqualified success. The US Navy's management of the FFG program was criticised by the US Congress for cost overruns and the need for extensive post-delivery modifications.<sup>77</sup>

2.68 The RAN believed they could better protect Australia's interests by informal participation in the US Navy Program than by formal processes.<sup>78</sup> However, the RAN's strategy was not really tested by events. With the possible exception of the fire aboard HMAS Sydney (FFG-03), the RAN personnel in the US Navy Project Office faced no major specific conflicts of interest.<sup>79</sup> The execution of the project was made relatively straightforward by the RAN's early decision to minimise the number of Australian unique requirements.<sup>80</sup>

2.69 The Committee is concerned with the overall costs and benefits of US FMS purchases. This concern had been expressed already by others.<sup>81</sup> An alternative to an FMS buy of the FFGs may not have been possible. The Committee concludes that following the initial Agreement better arrangements could have been negotiated to protect Australia's interests in subsequent changes to the arrangements.

#### Australian Industry Participation Aspects

2.70 The achievement of a satisfactory level of Australian Industry Participation (AIP) was one of the stated objectives for the project. AIP was to be achieved through:

- acquiring local skills and capability for the through life support of equipment;
- reciprocal purchasing programs; and
- offset work orders.<sup>82</sup>

2.71 The 1974 Memorandum of Agreement with the United States recognised Australia's AIP objectives which had been agreed in a previous Memorandum of Understanding signed in April 1973.<sup>83</sup> Under the 1973 Memorandum of Understanding the United States

76. Minutes of Evidence, op cit, page 1215.

77. US Congress, Joint Economic Committee, op cit, pages 94-95, 99-100, 102-104.

78. Minutes of Evidence, op cit, page 1212.

79. Ibid, pages 1208, 1216.

80. Ibid, page 1200.

81. Parliament of the Commonwealth of Australia, Joint Committee on Foreign Affairs and Defence, 'Australian Defence Procurement' November 1979, page 44.

82. Department of Defence, RAN FFG Project Management Plan, op cit, Volume 1, Chapter 5, page 14 and Chapter 6, page 11.

83. Memorandum of Arrangements Between the United States Government and the Australian Government Relating to the Purchase of Patrol Frigates and Associated Supplies and Services, 30 August 1974, Clause 6 (d).

undertook to use its 'best endeavours' to meet an offsets objective of no more than 25 percent of the value of orders placed in the United States. This requirement was less than the then (and since) offsets target of 30 percent. The onus was on the Australian Government to pursue offsetting orders with US industry and on Australian industry to be competitive.

2.72 For most of the duration of the project, responsibility for AIP aspects rested with the Industry Development Branch of the Defence Industry and Materiel Policy Division. The Branch established two positions to manage AIP for the FFG project, one based in Australia and the other in the United States. In 1982 the Industry Development Branch was abolished and its functions and the FFG AIP project staff transferred to the new Department of Defence Support. With the abolition of the Department of Defence Support in December 1984, responsibilities were transferred back to the Department of Defence.<sup>84</sup>

2.73 Orders worth some \$213.2 million have been placed with US firms in connection with the FFG Project and offset obligations totalling \$56.6 million have been obtained from US industry. As at 30 August 1985 however, only about \$16 million in offset orders had been placed with Australian industry.<sup>85</sup> By that time \$10.85 million had been spent on assisting Australian firms to secure offset orders and developing a local support capability.<sup>86</sup>

2.74 The evident lack of success of AIP on the FFG Project is a major concern of the Committee. An Auditor-General's efficiency audit report criticised the administration of the AIP and Offsets Programs by the Departments of Defence and Defence Support. The Audit report found that AIP had been difficult to secure under US Foreign Military Sales (FMS) arrangements.<sup>87</sup> The Audit Office's findings appeared to be confirmed by FFG project records which indicated:

- a lack of interest in AIP by the US Navy especially at the critical stage prior to the Australian decision to proceed;
- numerous barriers to AIP under the FMS contractual arrangements; and
- instances where opportunities for AIP appeared not to have been taken or AIP of questionable value was undertaken.

2.75 In early 1975 it was reported that:

In a letter dated 29 September 1974 ... the (US) Commander Naval Sea Systems Command stated that 'only very limited progress towards meeting the offset

84. Minutes of Evidence, op cit, page 2712.

85. Ibid, pages 1088-1089.

86. Department of Defence, RAN FFG Project Management Plan, op cit, Annex C, Appendix 1.

87. Report of the Auditor-General on Efficiency Audits, Administration of the AIP Program Relating to Overseas Procurement, October 1984, Section 5, pages 67-70.

objectives can be expected by the time of the Australian decision to proceed, and therefore it is suggested that such progress not be planned as a major determinant in the Australian decision'. Whilst this reaction is not unexpected it is apparent that our main negotiating power on AIP will be in the period up to the decision to proceed and actual commitment to the effort should take this into account.<sup>88</sup>

2.76 A subsequent report described the difficulties Australia experienced in persuading the US Navy to take AIP interests seriously and noted that some 25 contractual clauses 'effectively inhibit or prevent manufacture in Australia of .... components for USN as well as RAN ships'.<sup>89</sup>

2.77 In March 1981 Airlines of New Zealand was awarded a period contract to service the LM2-500 gas turbine engines for the RAN's FFGs.<sup>90</sup> Furthermore, an FFG 76mm gun mount was acquired from Oto-Melara. After its initial assembly and testing in Italy it was knocked down and shipped to Australia as components. It was delivered to the Bendigo Ordnance Factory in September 1984 where it was re-assembled and re-tested. The gun mount was to be delivered to Garden Island by September 1985.<sup>91</sup>

2.78 The Department of Defence admitted that 'in this particular project it has been difficult to get offsets (although) it has not really been for want of trying'.<sup>92</sup> Australian industry was faced with the task of getting into a large US program after it had got underway, and competing with established US suppliers.<sup>93</sup> In addition, Australia has always had difficulty in getting the US Government to recognise its offset objectives<sup>94</sup> and continues to attempt to obtain waivers of the various US Congressional obstacles to AIP.<sup>95</sup> Asked what lessons had been learnt from this aspect of the project, the Department suggested:

- putting into place separate deeds of agreement with the major suppliers before a Letter of Offer and Acceptance was negotiated with the US Government (as was done in the F/A-18 Project); and
- paying more attention to AIP objectives in the early stages of projects.

88. Department of Defence, RAN FFG Project Progress Report, No 5, (February 1975), paragraph 1.15.

89. Department of Defence, RAN FFG Project Progress Report, No 11, paragraph 1.5.23.

90. Department of Defence, RAN FFG Project Progress Report, No 31 and following reports.

91. Department of Defence, RAN FFG Project Progress Report, No 43 (October 1983) and following reports.

92. Minutes of Evidence, op cit, page 1231.

93. Ibid, page 1233.

94. Ibid, page 1226.

95. Ibid, page 1232.

The Acting Chief of Capital Procurement told the Committee that 'AIP offsets under FMS programs will always be difficult.... we must do preliminary work with the suppliers before we set ourselves in concrete with the US Government'.<sup>96</sup> The Chief of Naval Materiel added that:

it is not only important to address the question at a very early stage, but ... it is also essential to address the question as an integral part of the aims of the project. We had in the past - and this was an example of it - some division of responsibility in that the project's direct concerns were with, say, getting ships, and the industrial participation side was a sort of associated task but done somewhere else. I am certainly a proponent of assigning the responsibility as part of the project aims from the beginning and having the management of it under the manager of the project in the same way as we are trying to integrate all these responsibilities.<sup>97</sup>

2.79 With respect to the award of the FFG engine maintenance contract to Air New Zealand, the Department told the Committee that discussions had been entered into and proposals received from Australian industry. However, Australian firms were not interested.<sup>98</sup> Air New Zealand was operating a similar engine and could do the work at a much lower cost. As part of the F/A-18 Project, the Commonwealth has since funded the construction of a large engine test facility at the Commonwealth Aircraft Corporation. The engine test cell was completed in June 1984 and the Company has expressed an interest in submitting a proposal when the present period contract expires within a year or two.<sup>99</sup>

2.80 The amount of work on the 76 mm gun mount (the work was costed at \$178,000)<sup>100</sup> was considered necessary by the Department to provide needed knowledge for depot level maintenance of the gun mounts and for the possible future production of the equipment in Australia.<sup>101</sup> The Government has since agreed to the Ordnance Factory Bendigo manufacturing 76 mm gun mounts for the Australian Frigate Project.<sup>102</sup>

#### Project Organisation and Staffing

2.81 For most of the project the RAN FFG Project Office comprised a fairly small dedicated staff of between 13 and 15 persons responsible for Integrated Logistic Support, technical management and finance and administration plus the US based Assistant Project Manager. The Technical Manager had a 'two hatted' responsibility, being responsible to the Project

96. Minutes of Evidence, op cit, page 1239.

97. Ibid, pages 1239-1240.

98. Ibid, pages 1233-1234, 1236.

99. Ibid, pages 1235-1236.

100. Ibid, page 2721.

101. Ibid, pages 1238-1239.

102. Ibid, page 1238.

Director and responsive to the Director-General of Naval Design who reported to the Chief of Naval Technical Services. Responsibility for the FFG Project was shared with other Divisions of the Defence Department whose project staff were responsive but not responsible to the Project Director. Outside the Project Office the FFG Project organisation comprised:

- a Production Manager, responsible for the provision of Australian Government Furnished Equipment to the shipbuilder and under the control of the Director-General of Naval Production in the Naval Technical Services Division;
- an Industrial Development Liaison Officer and a US based Australian Industry Participation (AIP) Liaison Officer who were responsible for AIP aspects of the project and reported to the Assistant Secretary, Industry Development Branch in the Defence Industry and Materiel Policy Division; and
- up to 13 US based personnel who occupied positions in the US Navy FFG Project Office and were responsible to the US Navy FFG Project Manager.<sup>103</sup>

2.82 In contrast to the RAN's relatively weak project management organisation, the US Navy FFG Project Office had a large dedicated staff responsible for technical/design management, production, integrated logistics support and finance, all under the direct control of the US Navy Project Manager.<sup>104</sup>

2.83 Early in 1984, following a 1983 review of Navy project management, the Director-General of Naval Production was transferred from the Chief of Naval Technical Services to the Chief of Naval Materiel and likewise the FFG Production Manager was transferred to the FFG Project Director. By this time however, the FFG Production Manager's tasks had been virtually completed.<sup>105</sup>

2.84 The Chief of Naval Materiel believed that the FFG project did not suffer from aspects of divided control.<sup>106</sup> However, he acknowledged that a Project Director's lack of direct control over the Production Manager was an unsatisfactory arrangement on earlier Australian projects.<sup>107</sup> The Chief of Naval Materiel acknowledged also the advantages of the US Navy FFG project management organisation and said that when the RAN FFG Project Office was established fourteen years ago it was modelled on the American pattern. The RAN FFG project organisation compared favourably with other Navy projects at the time.<sup>108</sup>

103. Minutes of Evidence, op cit, pages 1102-1113.  
Department of Defence, RAN FFG Project Management Plan, Issue 2, September 1979, Volume 1, Chapter 3.

104. Ibid, Chapter 9, page 17.

105. Minutes of Evidence, op cit, page 2712.

106. Ibid, page 1193.

107. Ibid, page 1194.

108. Ibid, pages 1195-1196.

2.85 FFG Project Office staff turnover (an average tenure of 36 months) was well above the Department of Defence target for both service and civilian officers. However, the project's average staff tenure of 21 months was significantly higher than the 17.5 months recorded on the HMAS Success Project.<sup>109</sup>

2.86 Apart from the AIP program there was no evidence that these organisation or staffing deficiencies contributed to the problems discussed previously. Encouragingly, the staffing and organisation of the US Navy FFG Project Office have been translated to the Australian Frigate Project.

109. Minutes of Evidence, op cit, pages 2336-2339.



3.6 Despite the existence of an inter-office management agreement, co-ordination with the former Department of Defence Support was not effective. The decentralised management of the Defence purchasing organisation contributed to Government Furnished Equipment procurement delays. That organisation was unco-operative in the case of certifying Dockyard claims for payment. At last report progress reports to the RAN Project Office on Australian Industry Assistance funding (for AIP) have not been submitted. These difficulties may be resolved as the absorption of the former Department of Defence Support into Defence progresses.

#### Project Overview

3.7 The Australian Frigate Project involves the construction of two FFG Class 7 Guided Missile Frigates at the Williamstown Naval Dockyard, the associated acquisition of shipboard and support equipment and materials from US sources, and the construction of a number of dockyard facilities required for the ship construction program. About one half of the project budget will be spent in Australia. Arrangements are being made to secure additional benefits to Australian industry from the US purchases. The current approved total project cost is \$859.06 million (November 1984).

3.8 Project definition studies commenced in July 1976, and in principle approval to acquire two additional FFG frigates was given in August 1980. The ship construction contract was signed on 15 November 1983 with construction commencing on 4 March 1985. The Department of Defence is planning for FFG-05 to be delivered in 1991 and FFG-06 in 1993. FFG's 05 and 06 will be built largely to the same configuration as FFG-04 (HMAS Darwin) with the major exception of the fittings of the Australian-designed Mulloka sonar.

#### Project Costs

3.9 The Government approved proceeding with the project on October 1983 at a then total cost of \$830 million (December 1982 prices).<sup>1</sup> In November 1984 the approval was increased to \$859.06 million (December 1983), an increase of 3.5 per cent.<sup>2</sup> The increase was largely due to inflation, particularly rises in labour rates and the prices of materials for ship construction (up 5 per cent). A major cost increase was in the shipbuilder procurement and technical support contracts with Todd Pacific which were nearly 30 per cent over estimate.<sup>3</sup>

3.10 The Australian Frigate Shipbuilding Agreement is a 'cost re-imbusement' type contract with provision for escalation following price changes and changes in the approved labour rates

1. Minutes of Evidence, op cit, page 1126.
2. Department of Defence, Australian Frigate Project Status Report, 1.10.84 - 31.12.84, paragraph 5.
3. Minutes of Evidence, op cit, page 2702.

for Government defence facilities.<sup>4</sup> Under joint management arrangements agreed between the Department of Defence and the then Department of Defence Support in November 1983 the parties were to consult about converting the contract to a fixed price basis within four years. Table 3.1 contains a break-down of the current total approved project cost and a comparison with initial approvals.<sup>5</sup>

3.11 The current value of the contract, the Shipbuilder's Work Estimated Target Cost, is \$299.8 million or about 35 per cent of the total approved project cost. Labour costs account for about 74 per cent of the Estimated Target Cost. The procurement of major equipment items from the United States Government under Foreign Military Sales arrangements and shipbuilder support services from Todd Pacific account for \$251.08 million or 29 per cent of total approved project cost.

3.12 In general terms, 13 per cent of the cost of building the frigate is incurred in creating something which can float, 17 per cent in making it capable of movement and 70 per cent in giving it a fighting capability.<sup>6</sup>

#### Project Programming and the Ship Construction Schedule

3.13 Approval of the project appeared to have been deferred on a number of occasions because of concern about progress with the Dockyard reform program and the impact of other Defence acquisition decisions.

3.14 Project definition envisaged that the shipbuilding contract would be finalised in September 1982, fourteen months earlier than realised. Project planning arrangements have been extensively revised. An Equipment Acquisition Strategy document (the thirteenth issue) was not endorsed until September 1982.<sup>7</sup> The Government's in principle decision to build two frigates was conditional on the Williamstown Dockyard establishing its capacity to build the ships to requirements.<sup>8</sup> Management reforms were introduced in January 1982 and a progress report on the Dockyard reform program made in May 1983. Throughout 1982 and 1983 press reports suggested considerable debate within

4. Department of Defence, Australian Frigate Shipbuilding Agreement, dated 25 November 1983, Section J-18.
5. Department of Defence, Department of Defence Support, Joint Management Arrangements, Australian Frigate Project, dated 11 November 1983.
6. Parliamentary Standing Committee on Public Works, Williamstown Naval Dockyard, Minutes of Evidence, page 109.
7. Minutes of Evidence, op cit, pages 2562.
8. For details of the decisions leading to the approval to go ahead with the Williamstown build see Minutes of Evidence, op cit, pages 2816-7.

TABLE 3.1: Variation in Approved Project Cost Estimates - Australian Frigate Project

	Initial Approval \$m	Current Approval \$m	Variation \$m	Escalation \$m	Exchange Fluctuation \$m	Reprogramming Adjustment \$m
Shipbuilder's Work	330.00	352.11	+22.11	+16.77	-0.66	+6.00
Modifications - Ship	33.37	28.60	-4.77	+1.41	-0.18	-6.00
US GFE & Shipbuilder Support	246.76	251.08	+4.32	+3.25	+1.07	
AGFE & Crypto	26.46	30.08	+3.62	+0.79	-0.01	+2.84
Modifications AGFE	3.86	4.07	+0.21	+0.21		
Trials & PSA	15.16	15.75	+0.59	+0.72	-0.13	
Initial Outfits & In-Country Support	71.74	74.17	+2.43	+3.31	-0.88	
Ammunition	10.45	10.75	+0.30	+0.47	-0.17	
Intermediate & Depot Level Support	9.57	9.88	+0.31	+0.45	-0.14	
Australian Industry Assistance	11.89	12.46	+0.57	+0.57		
Other	70.74	70.11	-0.63	+2.86	-0.65	-2.84
TOTAL	830.00	859.06	+29.06	+30.81	-1.75	-

SOURCE: Minutes of Evidence, *op cit*, page 2573

Government as to whether a Williamstown build should proceed.<sup>9</sup> The RAN told the Committee that a United States purchase was a realistic fall back option.<sup>10</sup>

3.15 In April 1982 the then Minister for Defence announced that provision for expenditure on the Australian Frigate Project would be reduced. The reduction and cuts in expenditure on other Defence projects were made to provide funds for the acquisition of HMS Invincible and the early purchase of additional P3C Orion aircraft.

3.16 Continuing uncertainty as to the Dockyard's ability to meet requirements appears to have contributed to a large schedule contingency. Whereas the Shipbuilding Agreement provides for delivery of FFG-05 in February 1990 and FFG-06 in December 1991,<sup>11</sup> Defence informed the Committee that current project planning was based on delivery targets of mid-1991 and mid-1993. The difference between the Shipbuilding Agreement schedule and project planning was the schedule contingency and a provision for possible modifications during ship construction.<sup>12</sup>

3.17 The Australian built FFGs were planned as the initial 'replacements' of the River Class Destroyer Escorts which were then scheduled to be withdrawn from service beginning in the late 1980s. This has now been revised to 1991.<sup>13</sup>

3.18 Construction of the first frigate at Williamstown began, on schedule, on 4 March 1985 with the cutting of steel for the first modular units.<sup>14</sup>

#### Positive Features of the Project

3.19 The Australian Frigate Project displays a number of positive features in the areas of project planning, contracting, contract administration and project organisation. The RAN has attempted to incorporate the innovative and successful aspects of the US Navy FFG program and the lessons learnt in a number of less than successful RAN ship construction projects.<sup>15</sup>

9. See for example: "No Commitment on Destroyers", *Canberra Times*, 4 November 1982, "Naval Program in Serious Doubt", *Canberra Times*, 8 September 1983.

10. *Minutes of Evidence, op cit*, pages 1243-1244.

11. Department of Defence, Australian Frigate Shipbuilding Agreement, *op cit*, Section H.

12. *Minutes of Evidence, op cit*, page 1243.

13. Parliamentary Standing Committee on Public Works, *Minutes of Evidence, op cit*, pages 84-86.

14. *Ibid*, pages 97-98.

15. The principles underlying the planning of the project are set out in the Department of Defence Submission, *Minutes of Evidence, op cit*, pages 1125-1126.



3.20 The acquisition strategy was designed to minimise the recognised risks of a destroyer-type ship construction program at Williamstown. The technical risks were significant since destroyer-type ships had not been built in Australia since 1979 (HMAS Swan) and the FFG class represented a considerable advance in ship technology. Moreover, throughout the 1970s, Williamstown Naval Dockyard (WND) had accumulated a poor record of management and industrial disputation, resulting in cost and schedule overruns on its ship construction and refurbishment work.

3.21 Accordingly, FRGs 05 and 06 were to be built to the same configuration and design base line as the last of the US-built FFGs, HMAS Darwin, with the major exception of the Australian-designed 'Mullocka' sonar. The major equipment items - gas turbines, generators, gear boxes, weapons and sensors - were to be acquired from the United States through US Government Foreign Military Sales arrangements. The subsequent Shipbuilding Agreement set out strict configuration control procedures to manage any future necessary changes to those specifications.

3.22 It was recognised that the strategy had risks. The capability of the Dockyard and the opportunities for further Australian industry participation would be affected by the use of US shipbuilding techniques, Imperial standards and US military specifications.

3.23 An extensive facilities modernisation program had been initiated at the Dockyard in 1974 as part of long-term planning for the replacement of the RAN's Destroyer Escorts in the 1980s.<sup>16</sup> A third phase of this program, oriented to installing facilities specifically required for the Australian Frigate Project, commenced in 1984. The estimated cost of the three stage program, expected to be completed in 1987, is \$58.5 million (in then year dollars).

3.24 The Government's September 1980 decision to build the FFGs at Williamstown Naval Dockyard was conditional upon the Dockyard demonstrating its capacity to build the ships to the RAN's requirements. Following a number of investigations of the management of WND in the late 1970s and early 1980s a number of management reforms were introduced in January 1982. Progress with these reforms was reviewed in 1983. The Government's decision in October 1983 to proceed with construction at Williamstown was again conditional on the conclusion of satisfactory contractual arrangements and formal agreements between the dockyard management and workforce covering a wide range of industrial relations and work practice issues. The 'contractual package' subsequently negotiated laid down a number of further conditions that were to be met before approval would be given for the Dockyard to commence construction of the first frigate.

16. For details see Parliamentary Standing Committee on Public Works, 'Report Relating to the Construction of Facilities for the Australian Frigate Project, Williamstown Naval Dockyard, Victoria, Phase A' (1984) and Report Relating to the Construction of Facilities for the Australian Frigate Project, Williamstown Dockyard, Melbourne - Phase B (1985).

3.25 The US Navy contracts with US shipbuilders for the FFG Program were the model for the Australian Frigate Shipbuilding Agreement. Shipbuilder cost and schedule performance and problem identification reports were included as deliverable items under the contract, and shipbuilder material procurement and quality management were to be subject to close monitoring. At the same time the services of US ship builders were to be sought to assist Williamstown in construction planning, the identification of Australian Industry Participation opportunities and the procurement of US-sourced Contractor Furnished Equipment. Detailed plans (quality, financial, material, data management etc.) were to be completed prior to the contract.

3.26 Finally, a large RAN project organisation was established and the Project Director assigned substantial financial and technical authority. Joint management agreements were negotiated to co-ordinate the activities of the many participants in Australia and the United States. A Project Director was appointed in March 1980, early in the project definition stage. The Project Office, which contains 58 Australia-based positions, was modelled on the US Navy FFG Program Office and comprises specialist staff responsible for construction management, design and configuration control, logistic support, quality management and finance.<sup>17</sup> Following a review of the management of ship construction projects in 1983 the RAN has been making a deliberate effort to improve its project management by 'tightening the project-functional matrix arrangements to enable selected project directors to have additional or further delegated responsibilities'.<sup>18</sup> Project management has benefited also from the continuity of the Project Director and some other key project personnel.<sup>19</sup>

3.27 These project management arrangements have yet to be fully tested. Construction of the first frigate commenced in March 1985 and the project will extend until between 1991 and 1993. Nevertheless, the history of previous projects indicates that the groundwork laid by project definition, planning and contracting will have a critical influence on the project's outcome.

#### Problem Areas

3.28 Notwithstanding the significant improvements incorporated in the Australian Frigate Project, areas requiring further improvement were apparent. The Committee identified several actual or potential problem areas:

- (1) the acquisition strategy, especially the Dockyard reform program;
- (2) delinquent shipbuilder performance;
- (3) the procurement of Government Furnished Equipment;

17. For details see Minutes of Evidence, op cit, page 1151.

18. Department of Defence, Navy Office Temporary Memorandum 57/83, dated 6 September 1983, paragraph 7.

19. Minutes of Evidence, op cit, page 1149.

- (4) the management of Australian Industry Participation aspects of the project;
- (5) project office resources specifically staffing and computer system acquisition; and
- (6) aspects of the involvement of the Office of Defence Production.

#### Williamstown Dockyard Reform Program

3.29 Under the Australian Frigate Shipbuilding Agreement, construction of the first FFG was to commence on 4 March 1985 with the cutting of steel preparatory to the assembly of the first modular units. Approval to 'cut steel' was conditional upon the Dockyard having:

- . its quality management systems qualified to the required standards;
- . contracts for technical and material procurement support in place with Todd Pacific; and
- . commercially based financial management systems in operation.<sup>20</sup>

3.30 By 4 March 1985 WND had not met all of the requirements dealing with quality management systems and the full introduction of new financial management and accounting systems. In addition, the Dockyard had struck difficulties which appeared to place at risk its capacity to meet the agreed construction schedule:

- . the procurement of material and equipment from Australian and United States suppliers was well behind schedule and sustained production of the first batch of unit assemblies was considered by the RAN Project Director to be at risk;
- . indications were that two new facilities under construction would not be completed by the shipbuilder's required dates; and
- . the receipt and storage of Government Furnished Equipment by the shipbuilder was considered unsatisfactory by the Project Director.

20. Australian Shipbuilding Agreement, *op cit*, Section J-89.

3.31 Despite these shortcomings the RAN approved the commencement of construction and 'cut steel' operators commenced on schedule on 4 March 1985.

3.32 The Committee is concerned that the RAN's decision may have been premature, placing the project's cost, schedule and quality objectives at risk by weakening the Dockyard's incentive to perform to requirements. The Committee questions whether WND had been given sufficient time and assistance to improve its performance, and whether the Dockyard reform program itself had gone far enough. Some delay or deferral may have been advisable.

3.33 The RAN was not fully satisfied with Williamstown's progress. However, it considered that the Dockyard had made sufficient progress and its decision did not place the project's objectives at risk. The RAN told the Committee that 'there is a balance to be struck and some of the requirements to be fulfilled are perhaps best accomplished in the climate of a building program...'.<sup>21</sup> The costs of going forward were assessed to be considerably less than the costs of delay.<sup>22</sup>

3.34 The Committee's examination suggested that many difficulties arose from a lack of appreciation by Defence and the Dockyard management of the magnitude of the tasks and of the long lead time of reform.<sup>23</sup> Early project planning had envisaged securing planning assistance from Todd Pacific in the pre-contract period. This did not eventuate. The situation at Williamstown was aggravated by the almost total change of personnel at senior management levels. The new Dockyard management had two years to 'get its act together'. Outside assistance in quality management and purchasing has now been obtained. The Department of Defence acknowledged that 'with hindsight, there would have been benefit to WND through it being given more time and assistance earlier'.<sup>24</sup>

3.35 Other difficulties, especially in material procurement, reflected the limited autonomy of the Dockyard management and the lack of modern commercial practices. The Hawke Report of June 1981 had identified these problem areas and the Government's January 1982 reform program had the stated object of maximising the Dockyard's management autonomy. Nonetheless, the Chief of Naval Materiel told the Committee the Dockyard is 'still not as much under the control of the Dockyard Manager as we would wish. ... We see the need... to get that direct and intimate knowledge of the market into the shipyard and as part of the shipyard organisation. But it is up to the Office of Defence Production to look into these matters and to see what solutions it can bring forward. We have asked it to do that as a matter of urgency'.<sup>25</sup>

21. *Minutes of Evidence, op cit*, page 1244.

22. *Ibid*, page 1254.

23. *Ibid*, page 2690.

24. *Ibid*, page 2689.

25. *Ibid*, page 1270.

## Quality Management

3.36 As part of the contractual package, Williamstown Naval Dockyard was required to have in operation a quality management system that met the requirements of Australian Standard AS 1821 with the exception of certain agreed temporary exclusions. The Dockyard submitted a quality management implementation plan on 30 May 1984 and was required to submit a status report 30 days before the 'cut steel date'.<sup>26</sup> In September 1984 because of slow progress in implementing new systems it was agreed that only those requirements necessary for the commencement of construction would need to be met by the 'cut steel' date.<sup>27</sup>

3.37 Between March 1984 and February 1985 the Office of the Director-General of Naval Quality Control undertook seven audits of the Dockyard's quality management systems. All seven reports submitted unsatisfactory findings. The seventh quality audit report (January/February 1985) found that the Dockyard's quality management had improved significantly, particularly in the development of quality management systems but 'there was little evidence that attempts to implement the systems across all activities concerned with 'cut steel' had been addressed... No plan was available for the development and implementation of the Quality Control system beyond the current 'cut steel' requirements.'<sup>28</sup>

3.38 The fact, that, at the commencement of construction, the shipbuilder's quality management system had not reached the required level, was of particular concern to the Committee in view of the disastrous experience with quality management in some previous RAN ship construction projects. As the first Quality Audit Report stated:

past experience has shown that unless an organisation devotes sufficient resources to the tasks that must be completed to reach the assessment level prior to the contract date, then it is extremely difficult if not impossible for the organisation to achieve the required level after contract date due to day to day work pressures.<sup>29</sup>

3.39 The Dockyard's quality management system consisted of two elements, management procedures and shop floor technical processes. The General Manager of WND told the Committee that the Dockyard had concentrated on implementing quality management procedures which were now substantially complete. The quality process specifications will be introduced progressively through the production cycle. Material will not be released to the next stage until it has been determined that the required quality procedures have been applied effectively. The General Manager

expected that all of the Dockyard's quality management systems would have reached the required standard by the end of 1986.<sup>30</sup>

3.40 The difficulties encountered in bringing the Dockyard's quality management systems up to standard were attributed by the General Manager to the lack of suitable quality management personnel. This situation arose from the fact that when the project's quality management staffing was initially planned, 'it was only considered in terms of steady state operations ... no consideration was taken of the peak load situation which arose in defining procedures, writing them up, approving them and implementing them'.<sup>31</sup> WND is the first Australian Defence establishment to be required to meet the AS 1821 quality management standard and no directly applicable prior experience was available.<sup>32</sup> This situation was aggravated by the time taken to staff the Dockyard's quality management Branch and by the impact of the almost total change of senior management personnel since the dockyard first submitted its bid.<sup>33</sup> At present, three out of the twenty-three positions in the Dockyard's quality branch are unfilled.

3.41 Williamstown has obtained assistance through the secondment of staff from other Defence production establishments, from quality management documentation obtained from Todd Pacific early in 1984, and from a training program conducted by the US Navy in February 1985. Defence acknowledged that 'with hindsight and particularly in view of the task being of greater magnitude than initially anticipated there would have been benefit to WND through it being given more time and assistance earlier'.<sup>34</sup> The Committee will be seeking confirmation that quality management has been raised to the required level.

## Management Information Systems

3.42 Under the Joint Management Agreement and the Shipbuilding Agreement Williamstown was required to implement commercially-based financial management and accounting systems and a Cost/Schedule Control System to monitor cost and schedule variances.

3.43 Commercially-based financial management and accounting systems were to be implemented by July 1984.<sup>35</sup> However implementation fell behind schedule and the systems were not expected to be fully operational until September 1985.<sup>36</sup> At the Quarterly Production Progress Conferences the Project Director complained about the late submission and the unsatisfactory

30. Minutes of Evidence, op cit, pages 1247-1249.

31. Ibid, page 1247.

32. Ibid, page 2690.

33. Ibid, pages 1246-1247, 1255.

34. Ibid, page 2689.

35. Joint Management Agreement, op cit, paragraph 11.10(a).

36. Minutes of Evidence, op cit, page 2685.

26. Australian Frigate Shipbuilding Agreement, op cit, Section J-89.

27. Minutes of Evidence, op cit, page 1245.

28. Department of Defence, Director-General of Naval Quality Assurance, Australian Frigate Project, Audit Report No. 7, March 1985, paragraph 2.

29. Department of Defence, Director-General of Naval Quality Assurance, Australian Frigate Project, Audit Report No. 1, March 1984, paragraph 3.2.

quality of the required cost and budget data.<sup>37</sup>

3.44 According to project records, the Dockyard Cost/Schedule Control System was to be validated prior to the 'cut steel' date in March 1985.<sup>38</sup> The system was demonstrated in March 1984 and implementation was planned for November 1984.<sup>39</sup> Validation was planned for December 1985 when six months operational data would have been accumulated.<sup>40</sup> Although the WND General Manager and the RAW Project Director appear to be satisfied with progress with implementation of the Cost/Schedule Control System,<sup>41</sup> the first performance report was not expected until the quarter ending 30 September 1985. A Performance Measurement Baseline was agreed in July 1985.<sup>42</sup>

3.45 Delays in the implementation of these management information systems seem to have arisen from difficulties in developing the various sub-systems, and in the computerisation of the systems.

3.46 The slow development of cost accumulation and cost performance reporting systems appears to have been responsible for the major difficulties delaying implementation of the required financial management and accounting system.<sup>43</sup> Implementation of the Cost/Schedule Control System appears to have been held up by the time taken to develop material procurement and labour utilisation reporting systems.<sup>44</sup> The reasons for the long time it has taken to develop these systems was not evident to the Committee.

3.47 The WND General Manager indicated that most of the Dockyard's difficulties related to computerisation.<sup>45</sup> The implementation of the Cost/Schedule Control System was delayed one month by unsuitable software.<sup>46</sup> The Dockyard also 'had considerable difficulty in getting suitable software in the market for some quite common-place accounting procedures'.<sup>47</sup> Software acquisition was also complicated by the necessity of having to go through the time-consuming 'Public Service

37. Department of Defence, Australian Frigate Project, Quarterly Production Progress Conference, Agenda Papers, No.1 (April 1984), paragraph 4B, and No.3 (October 1984), paragraphs 2.1-2.2.

38. Department of Defence, Australian Frigate Project, Erection Section Schedule, dated 26 March 1984.

39. Third Quarterly Production Progress Conference, Agenda Papers, *op cit*, paragraph IX.5.4.

40. Minutes of Evidence, *op cit*, page 1249.

41. *Ibid.*, page 1249.

Department of Defence, Australian Frigate Project, Third Project Status Report (14 February 1985), paragraph 7.8.2.

42. Minutes of Evidence, *op cit*, page 2822.

43. Third Quarterly Production Progress Conference, Agenda Paper, *op cit*, paragraph 9.2.

Minutes of Evidence, *op cit*, page 2685.

44. *Ibid.*, page 1250.

45. *Ibid.*, page 1257.

46. *Ibid.*, page 1249.

47. *Ibid.*, page 1250.

process'.<sup>48</sup> Computerisation of the Dockyard's financial management and accounting systems suffered also from a lack of staff resources. The switching over from manual to computerised systems entailed a peak load of data entry and the necessity to operate manual and computerised systems in parallel for a certain period for system validation purposes.<sup>49</sup> Whilst conceding the point about the time-consuming equipment acquisition arrangements, the Committee cannot accept the Dockyard's claims about the difficulty of obtaining or customising suitable software. The peak work load was a predictable problem for management. The Committee will keep a close watch on this aspect.

#### Material Procurement

3.48 Of the 16,000 equipment and material items required to build the Australian Frigates, the shipbuilder is responsible for some 14,000 designated Contractor Furnished Equipment (CFE). Half of the Contractor Furnished Equipment is to be obtained from United States suppliers, the other half from Australian suppliers. The shipbuilder is responsible also for the procurement of a small number of 'Standardised Option Equipment' items (anchor windlass, fire pumps, etc.). Todd Pacific has been contracted to provide materials lists and procurement support services for US-sourced CFE.

3.49 In October 1984 a Williamstown Naval Dockyard contract office was established at Todd's Seattle shipyards to supervise the procurement of US-sourced CFE. With the exception of minor orders (of less than \$10,000 value) for which Williamstown is responsible, procurement of Australian-sourced CFE is arranged through the regional purchasing offices of the Department of Defence (formerly the Department of Defence Support).

3.50 The placement of orders for both United States and Australian-sourced CFE is considerably behind schedule. According to the most recent available project records there were 1374 Australian-sourced and 551 US-sourced delinquent purchase requisitions, 140 of which were considered critical to the 'cut steel' requirements.<sup>50</sup> The Project Director reported that 'whilst material will be available to commence construction, there is some doubt that sufficient material will be available to sustain a continued and orderly production process in the early months. Of the first 14 (assembly) units, approximately 48 per cent of line items were unlikely to be received by the production required dates'.<sup>51</sup>

3.51 The WND General Manager told the Committee that the ordering of about 490 CFE items was behind schedule at the present time.<sup>52</sup> He conceded that this may cause some schedule delay although the major impact was likely to be on cost through the need for rework. However, the General Manager did not foresee any impact on the major dates of the ship construction schedule.<sup>53</sup>

48. Minutes of Evidence, *op cit*, pages 1256-1257.

49. *Ibid.*, page 1257.

50. Third Project Status Report, *op cit*, paragraph 7.4.

51. *Ibid.*, paragraphs 7.4.1-7.4.2.

52. Minutes of Evidence, *op cit*, page 1259.

53. *Ibid.*

3.52 The Dockyard identified factors which had contributed to its difficulties. In the first place, initial projections of the material ordering schedule were too optimistic and 'gave us too long a time to get our act in order'.<sup>54</sup>

3.53 In the second place, the Dockyards Material Division was staffed by ex-Navy Stores people who were 'not, in anybody's definition, experienced material procurers'.<sup>55</sup> The consequence was that WND had 'virtually no knowledge until recently of the administrative lead times between the Dockyard and the Defence Regional Purchasing Offices, and of manufacturing lead times'.<sup>56</sup> Another staffing problem, to which the WND General Manager did not refer, concerned staff shortages in the Technical Services Branch which is responsible, among other things, for assessing tenders. Opposition from Staff Associations had prevented recourse to the use of sub-contractors. Although staff were seconded from elsewhere, Australian Frigate Project work was slowed.<sup>57</sup>

3.54 The third source of difficulty was the processing of Dockyard orders. WND prepares the documentation which is handed to the Defence Regional Purchasing Offices which deal with suppliers. Two sorts of difficulty arose. The Defence Regional Purchasing Office found WND's documentation inadequate or at variance with Australian industry's requirements because it was based on US specifications.<sup>58</sup> Additionally administrative lead times within the Defence Regional Purchasing Office were long. The period between the time an order is raised in the Dockyard and the time that order is placed with a supplier ranges between four and forty weeks.<sup>59</sup> The Committee finds this totally unacceptable. The WND General Manager stated that although the Dockyard is contractually required to act as a commercial shipbuilder, 'in the sense that we have to follow Government procedure ... we cannot possibly behave as a commercial shipbuilder. A commercial shipbuilder certainly can move infinitely faster to place orders, sometimes within days of the main contract being placed. We do not have that facility'.<sup>60</sup> The Chief of Naval Materiel concurred and told the Committee that material procurement 'was still not as much under the direct control of the Dockyard Manager as we would wish... But it is up to the Office of Defence Production to look into these matters and to see what solutions it can bring forward. We have asked it to do that as a matter of urgency'.<sup>61</sup>

54. Minutes of Evidence, op cit, page 1251.

55. Ibid, page 1250.

56. Ibid, page 1251.

57. Department of Defence, Australian Frigate Project, Problem Identification Report No. A (11 November 1984), paragraph 2.

58. Minutes of Evidence, op cit, page 1252.

59. Ibid, page 2683.

60. Ibid, page 1262.

61. Ibid, page 1270.

3.55 Generally, administrative lead times for both Contractor Furnished Equipment and Government Furnished Equipment have been longer for Australian sourced items than for US sourced items.<sup>62</sup> The problems encountered by Australian firms in dealing with US specifications have contributed particularly to delay. Although the PFG's US specifications define performance only, the RAN requires Australian-sourced equipment to meet the same form, space, function and weight as equipment fitted to its four existing PFGs. In practice this requirement has meant that Australian suppliers have had to replicate US manufacturers equipment and licences to do this take time to negotiate.<sup>63</sup> WND has re-scheduled materials requirement dates to the maximum extent to provide a greater opportunity for Australian industry to respond to purchase requisitions.<sup>64</sup> Local sourcing of CFE seems to be a matter of contention between the Dockyard and the Project Office.<sup>65</sup>

3.56 In the Committee's view, the backlog of material orders arose from a lack of attention and expertise within the Dockyard. The situation may have been aggravated by AIP requirements. The Dockyard has recovered some lost ground assisted by the secondment of five staff from the Defence Regional Purchasing Office and the attachment of other staff from Todd Pacific to advise on tender evaluation.<sup>66</sup> The Dockyard's capacity to recover fully and to maintain its procurement schedule is constrained by its reliance on the Defence Regional Purchasing Office. The Dockyard needs experience in dealing directly with industry to accurately schedule requirements, and more control over purchasing activity to reduce administrative lead times.

#### Other Factors Affecting Shipbuilder Performance

3.57 The other matters of concern were slippages in the construction of the Unit Blasting Facility and the Kevlar and Painters' Workshop and the adequacy of storage facilities for Government Furnished Equipment at Willamstown.

3.58 The Unit Blasting Facility was scheduled to be completed by mid July 1985 and the Workshop by mid May 1985. Earlier reported slippages appear to have been reduced to a large extent. The Department of Housing and Construction expected the Unit Blasting Facility to be finished in August 1985 and the

62. Minutes of Evidence, op cit, page 2696.

63. Ibid, pages 1263-1264.

64. Ibid, page 2695.

65. Third Quarterly Production Progress Conference, October 1984, Minutes, paragraph 6.2.4.

66. Minutes of Evidence, op cit, pages 1269-1270.

workshop in July 1985.<sup>67</sup> The Committee questioned these estimates after inspecting the facilities during its visit to Williamstown on 30 July 1985. According to the Dockyard, the delay in completing the Kevlar and Painters' Workshop will have no impact on the ship construction program. The delay in completing the Unit Blasting Facility will require some 'workarounds' - the first unit assemblies will be prepared and painted in the open. No cost or schedule impact was anticipated. This is hard to understand.

3.59 A Defence Working Party reported in November 1984 that no Dockyard warehouses could be stated categorically to comply with the environmental control conditions required for the storage of Government Furnished Equipment. Additional expenditures to install environmental control machinery in the most suitable Dockyard warehouse seem to be required.<sup>68</sup> Dockyard environment control aspects should have been addressed much earlier.

#### Procurement of Australian-Sourced Government Furnished Equipment

3.60 Delays have occurred in the procurement of two items of Government Furnished Equipment (GFE), the Mulloka Sonar and the Mark 75, 76 mm gun mounts. The Mulloka Sonar and the Mark 75 gun mounts are the major items of Australian-sourced GFE. The RAN Project Director is responsible for the provision of GFE although the purchasing authority is the Defence purchasing organisation.

3.61 The contracts for the Mulloka Sonar equipment were scheduled to be placed by July 1984. At last report the contract for the Mulloka electronics has been negotiated but not yet placed, and the contract for the transducer has yet to be negotiated. Both contracts were expected to be awarded by the end of June 1985.<sup>69</sup> The Committee was not able to ascertain the impact of the nearly twelve month delay on the ship construction schedule and the project budget.

3.62 According to Defence, one reason for delay in the Mulloka Sonar contracts was the 'decentralised management' of tendering and contracting arrangements by the Defence Regional Purchasing Offices of the former Department of Defence Support. The placing of the Mulloka electronics contract was affected also by the requirement for additional cost information. The Mulloka transducer contract was further delayed by technical difficulties in 'localising' a US design.<sup>70</sup>

67. Parliamentary Committee on Public Works, Minutes of Evidence 10 February 1984, page 116.

Third Australian Frigate Project Status Report (February 1985) paragraph 14.

68. Naval Dockyard Williamstown, Memorandum, 'Australian Frigate Project - Storage of GFE', dated November 1984.

69. Minutes of Evidence, *op cit*, page 2569.

70. *Ibid.*

3.63 Project records also reported delays in finalising the order for the Mark 75 gun mounts. A request for tenders was issued to the Ordnance Factory Bendigo which responded in June 1984. There followed a protracted evaluation by Defence of the tender response. In the end, the Department rejected Bendigo's proposal on the grounds of price and technical risk and recommended the acquisition of the gun mounts from Oto-Melara, the supplier of the gun mounts to the RAN's first four FFGs.<sup>71</sup> In January 1985 the Minister for Defence rejected the Department's recommendation and directed that the contract be awarded to Ordnance Factory Bendigo.<sup>72</sup> The Department informed the Committee that Bendigo has indicated that it could meet the Dockyard's required dates for delivery of the equipment. The decision will not affect the project budget because the current gun mount cost estimates are based on local procurement.<sup>73</sup>

#### Australian Industry Participation Aspects

3.64 Local construction of the frigates entails a substantial premium in terms of cost and time. The RAN initially assessed the cost premium of local production to be of the order of 30 per cent. This cost differential may be reduced substantially by the depreciation of the Australian dollar.<sup>74</sup> The delivery of the first ship will take seven years from the placing of the order with Williamstown whereas the US Navy FFG program is delivering FFGs about four years after order.<sup>75</sup> Ship construction times at Todd Pacific vary between three to three and a half years compared with five years at Williamstown.<sup>76</sup>

3.65 In addition to the ship construction and Australian-sourced CFE and GFE, provision has been made to obtain Australian Industry Participation (AIP) benefits from United States suppliers. According to the initial project plans these benefits were to be secured through:

- . separate AIP agreements with US suppliers in the case of FMS buys (ie US-sourced GFE); and
- . the inclusion of AIP requirements in commercial contracts with US suppliers in the case of US-sourced CFE.

Under the July 1983 Memorandum of Arrangements with the United States Government the US Government agreed to permit direct commercial contracts between the Australian Government and US industry to the extent that there was no interference with the US Navy's FFG program. To assist Williamstown's AIP effort, Todd

71. Minutes of Evidence, *op cit*, page 2569.

72. Department of Defence, Australian Frigate Project Status Report, (October-December 1984), paragraph 4.

73. Minutes of Evidence, *op cit*, page 2632.

74. A. W. Grazebrook 'Naval Shipbuilding Program Provides Big Opportunities' Pacific Defence Reporter, August 1985, page 30.

75. Minutes of Evidence, *op cit*, page 1276.

76. Parliamentary Committee on Public Works, Minutes of Evidence, 2 May 1985, page 107.

Pacific was contracted to identify AIP prospects, costs and lead times and make recommendations in respect of the sourcing of CFE. This task was completed in June 1984. To date AIP agreements have been finalised with two US suppliers to the Australian Frigate project. Defence would like to negotiate AIP agreements with four to five more.<sup>77</sup>

3.66 Contracts worth \$306.5 million have been placed with overseas suppliers in connection with the Australian Frigate Project, carrying AIP obligations of \$77.3 million. \$12.5 million in Australian Industry Assistance funds has been allocated to the project.<sup>78</sup>

3.67 The project is not of sufficient maturity to assess the achievement of its AIP objectives. However, three aspects of the project's AIP arrangements concerned the Committee:

- the late finalisation of the Memorandum of Arrangements with the US Government;
- the placing of Foreign Military Sales (FMS) contracts before AIP agreements were negotiated with US suppliers; and
- the lack of success in obtaining offsetting orders or other benefits from Todd Pacific in view of the large AIP obligations the Company accumulated in connection with the earlier FFG project.

3.68 Project planning envisaged that a Memorandum of Arrangements would be signed in July 1981 and AIP agreements with US suppliers would be completed by September 1981 in the case of long lead CFE and by July 1982 in the case of other US-sourced GFE, the same time as the acceptance of the respective FMS cases. In the event, the Memorandum was signed in July 1983. The FMS case for the acquisition of long lead US-sourced GFE was accepted in October 1981 and the FMS case for the balance was accepted in October 1983. A recent Auditor-General's Report pointed out that 'to obtain AIP on FMS procurements a separate, prior AIP agreement between the Government of Australia and the contractor must be entered into for the Memorandum of Discussion to be referred to in the Letter of Offer and Acceptance and hence be contractually binding'.<sup>79</sup>

3.69 Defence informed the Committee that the Government's April 1982 decision to reduce expenditure on the Australian Frigate Project removed the urgency of finalising the Memorandum of Arrangements. In any case, the timing of the Memorandum was not critical and the later negotiations secured a better deal for Australia.<sup>80</sup> The Department accepted nonetheless that it would

have been desirable to negotiate AIP agreements with US suppliers earlier. The Chief of Naval Materiel ventured the view that 'there is merit in pursuing these almost independently of any particular program'. The Acting Chief of Capital Procurement argued however that 'very frequently suppliers will not talk to you unless they see an order close at hand'.<sup>81</sup>

3.70 The Department was pessimistic about the prospects for obtaining further AIP from Todd Pacific. Todd had put a lot of effort into trying to achieve offsets in the earlier FFG program.<sup>82</sup> Opportunities for Todd to discharge its obligations 'have virtually disappeared'<sup>83</sup> and the Department had no leverage in the form of a contract in the offing.<sup>84</sup>

3.71 The Committee noted that firm arrangements were achieved in the case of the F/A-18 prior to contract signature, and was not satisfied with the comparatively poor achievements with the negotiation of AIP in this project. It did agree with the opinion of the Chief of Naval Materiel that 'once we entered into the American (FFG) program (in 1976) we should have had a plan to build some of the ships here'.<sup>85</sup> If at the outset the project planners had looked more to the production aspects of a local acquisition, some of the difficulties that have been identified with obtaining material and equipment to US specifications from local suppliers may have been minimised without compromising the project's standardisation objective.<sup>86</sup>

#### 5. Project Management Resources

3.72 The Australian Frigate Project Office has encountered delays in recruiting sufficient staff and in expediting a necessary upgrade of its computerised project management information system. These difficulties arose from slow-moving Departmental procedures and practices which, to the Committee, seem to impose considerable constraints on efficient project management.

#### Staffing of the Project Office

3.73 The Australian Frigate Project organisation consists of 36 central office positions (located in Canberra) and 21 field staff positions (located in Williamstown). The Department's submission pointed out that 'the Australian Frigate project staffing levels are considerably greater than for previous shipbuilding projects reflecting experience gained in the US Navy FFG Program Office and the RAN FFG Project Office and the largely autonomous arrangements established for this project'.<sup>87</sup>

81. Minutes of Evidence, op cit, page 1278.

82. Ibid, page 1288.

83. Ibid, page 1284.

84. Ibid, page 1289.

85. Ibid, page 1291.

86. See the comments of the Chief of Naval Materiel, Ibid, page 1267.

87. Minutes of Evidence, op cit, page 1137

77. Minutes of Evidence, op cit, page 1279.

78. Ibid, pages 2573, 2700.

79. Auditor General

'Report on Efficiency Audit of the Administration of the Australian Industry Participation Program', October 1984, paragraph 5.10, page 68.

80. Minutes of Evidence, op cit, page 1277.

3.74 Unfortunately, staff recruitment has fallen well behind schedule. According to the Department's own submission about 40 per cent of Australia-based positions were vacant including 35 per cent of supervising positions.<sup>88</sup>

3.75 The major cause of the staff shortfall appears to be the slowness of recruitment action for civilian staff within the Department of Defence. The Project Director reported that 'research into the length of time to fill project civilian billets has shown that the mean time from forwarding a request to fill a position to (Assistant Secretary, Civil Personnel), to 'start work' is 6.5 months'.<sup>89</sup>

3.76 The Department told the Committee that the Project Office was currently 15 short of the required 58 Australia-based staff. The civilian staff recruitment delays experienced by the Project Office were about the average for the Department of Defence.<sup>90</sup> The average minimum recruitment time within the Department was nineteen weeks. Security clearances which are required for many project positions can add between four and thirteen weeks.<sup>91</sup> This situation compared unfavourably with the Public Service Board's advice that eight to nine weeks was the minimum 'core' recruitment time under Public Service Act procedures. This indicated some inefficiency in the Department's recruitment procedures.<sup>92</sup> The Department informed the Committee that it was in the process of reviewing its staffing procedures.<sup>93</sup>

3.77 The RAN has considered three ways of overcoming the recruitment delays which had exacerbated the difficulty of getting a project off the ground:

- using a floating group of staff within the Navy Materiel Division;
- employing consultant project management services; and
- commencing recruitment action prior to Government approval of the project, a practice the Department had been reluctant to countenance in the past.<sup>94</sup>

3.78 Early project planning had proposed securing project management assistance from Australian industry. In 1984 the Chief of Naval Materiel established a panel of consultants with relevant expertise in project management. However, the Project Office had been waiting six months for approval to employ consultant services.<sup>95</sup> The Chief of Naval Materiel was unhappy with the requirement that the use of consultancy services had to

88. Minutes of Evidence, op cit, page 1151.

89. Department of Defence, Second Australian Frigate Project Status Report, (October 1984), paragraph 8.2.4.

90. Minutes of Evidence, op cit, page 1300.

91. Ibid, page 1302.

92. Ibid, page 1306.

93. Ibid, page 1302.

94. Ibid, pages 1302-1303, 1308-1309.

95. Ibid, pages 1303-1304.

be approved by a specialist area of the Department which was a 'tedious process'.<sup>96</sup> This requirement appeared to be a matter of Departmental policy since, as the Public Service Board advised the Committee, authority to engage consultants had been delegated from the Board to departments.<sup>97</sup>

#### The PROMASS Computerised Management Information System

3.79 The Australian Frigate project employs a software system called PROMASS (Project Management Support System) as the basis of its management information system. PROMASS provides file listings, correspondence recording, milestone activity monitoring, configuration control and integrated logistics support. A Defence Computer Systems Division User Committee reported in August 1984 that the existing PROMASS system was inadequate in several respects:

- a negligible amount of financial data available from the system;
- insufficient capacity for the Integrated Logistics Support tasks;
- a lack of facility to track configuration changes;
- no on-line facility at the Project Representative's Office at Williamstown; and
- inadequate security.

The User Committee recommended a number of relatively minor enhancements to the existing system including:

- new hardware;
- a financial control software package; and
- on-line facilities at the Dockyard Project Office.<sup>98</sup>

3.80 This relatively minor computer proposal was in the Departmental approval pipeline some fourteen months. The proposal was submitted in March 1984 with the objective of having the PROMASS enhancements in place before Williamstown commenced ship construction.<sup>99</sup> It was reported that the proposal had been subject to three reviews during 1984 and, at one stage, had been deferred pending consideration of a proposed larger PROMASS II system.<sup>100</sup> The PROMASS upgrade proposal was approved in

96. Minutes of Evidence, op cit, pages 1304-1305.

97. Ibid.

98. Department of Defence, Computer Services Division User Committee, Report of the Post-Implementation Review Team on the AFP Promass, August 1984.

99. Minutes of Evidence, op cit, page 2706.

Department of Defence, Third Australian Frigate Project Status Report, (February 1985), paragraph 8.6.3.

100. Ibid, paragraph 8.6.2.



May 1975.<sup>101</sup> It is expected that the enhanced system will be operational by September 1985.<sup>102</sup> The Committee will look for confirmation of this.

3.81 The Committee considered that the difficulties reflect inefficiencies in Departmental procedures. Staff shortages and inadequate computer systems could have been overcome in a more timely fashion if the Project Director had been given more flexibility and authority to engage consultancy services and approve the minor computer system enhancements.

#### 6. Involvement of the Office of Defence Production

3.82 Despite the Joint Management Arrangements between the Department of Defence and the former Department of Defence Support, project documents reported two instances where the Department of Defence Support/Office of Defence Production appeared unco-operative. Late in 1984 the Financial Services Section of the Contracts Administration Branch indicated its intention to withdraw its services of checking costs and certifying claims for payment from Williamstown on the grounds that it did not normally check costs of Defence establishments.<sup>103</sup> Project reports also indicate delays in the submission by the Department of Defence Support of Quarterly Financial Review Progress Reports on Australian Industry Assistance funding for the Australian Frigate Project.<sup>104</sup> These reports were scheduled to commence during the 1984/85 financial year. At last report formal reporting had yet to commence.<sup>105</sup> The Committee has not had the opportunity to raise these matters with the Office of Defence Production.

#### Summary Comments

3.83 The Australian Frigate Project is in the initial stage of construction. The commencement of this phase was contingent on major reforms being implemented at Williamstown Naval Dockyard. In view of clear shortfalls in the upgrade of the WND, for instance in areas such as management information and cost records, it is probable that RAN's decision to proceed was premature.

3.84 The evidence points to the potential for significant cost and possible time overruns unless urgent attention is given to recovering the backlog of material orders through better purchasing arrangements to enable the more efficient modular assembly to proceed as proposed. Quality management control is critical and progress in this area, certainly prior to commencement of construction, has been insufficient.

101. Minutes of Evidence, op cit, page 2706.

102. Ibid, page 1300.

103. Department of Defence, Third Australian Frigate Project Status Report (February 1985) paragraph 4.3.4.

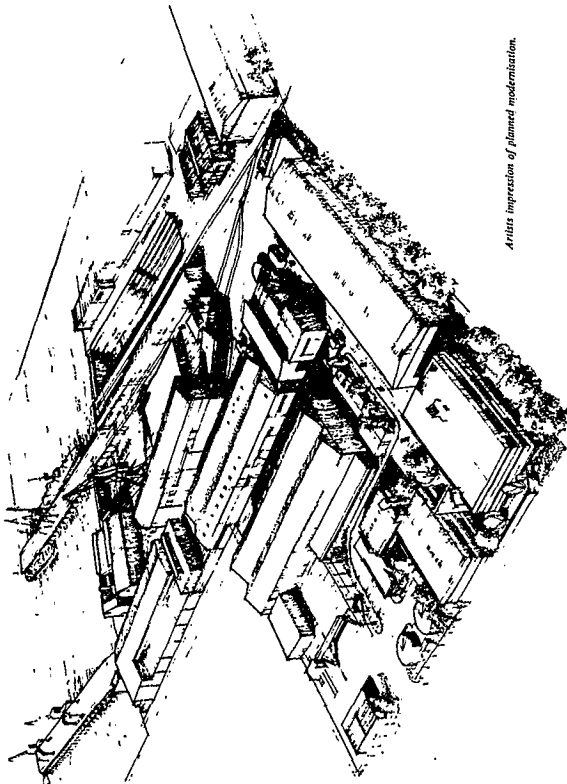
Minutes of Evidence, op cit, page 2566.

104. Department of Defence, Third Australian Frigate Project Status Report (October-December 1984), paragraph 4.3.5.

105. Minutes of Evidence, op cit, page 2620.

3.85 Perhaps the most sensitive area relates to the validity of the schedule of work. Dockyard management appears to be adopting a flexible attitude to work schedules, modifying programs to match the availability of materials and/or facilities. Workarounds and possibly (costly) rework activities may well be needed. Allied to this apparent flexibility in the schedule - an over-generous time contingency - is the very modest progress in management and cost information developed in the Project Office. Delays in staffing and inefficient procurement of computer facilities (particularly the absence of on-line connections between Williamstown and RAN Canberra) reflect poorly on RAN's capacity to control the project during its first couple of years.

3.86 The comparative cost of the Frigate program remains high in comparison to imported US vessels.



*Artist's impression of planned modernisation.*

Illustration 3.2 Williamstown Naval Dockyard, Artist's Impression of Planned Modernisation  
Department of Defence of Support

#### APPENDIX

3.87 After the Government announced its conditional decision to build the FRGs at Williamstown, a committee chaired by Mr Ross Hawke, the Advisory Committee on Management and Operation of Williamstown Naval Dockyard, was set up to advise on managerial, operational and industrial changes required to establish the Dockyard's capacity to build the vessels to requirements.

3.88 The Hawke Report, submitted in June 1981, recommended that:

- (1) WND be managed as a statutory authority by a Board responsible to the Minister for Defence;
- (2) WND be placed on a firm commercial footing, requiring it to tender for ship construction and other work;
- (3) a proven civilian manager be installed as General Manager;
- (4) the structure and capabilities of middle management be strengthened;
- (5) the position and career prospects of frontline supervisors be strengthened by all available measures including a more flexible interpretation of qualification requirements;
- (6) the Board of Management should have specific responsibilities in relation to performance, cost structure and personnel aspects of the Dockyard;
- (7) WND should be freed from Public Service Board staff ceilings and establishment structure controls which were to be replaced by commercially orientated controls;
- (8) management and labour capacity should be reshaped within the current total;
- (9) WND should make regular and extensive use of sub-contractors and to a lesser extent take in regular commercial work;
- (10) WND should have its own procurement, storage and issue capability for all contractor furnished equipment and materials; and
- (11) WND should have its own capability for letting support contracts.106

106. Report of the Advisory Committee on Management and Operation of Williamstown Naval Dockyard, June 1981, paragraphs 9.10-9.11.

3.89 The Hawke Report also recommended that commitment to the frigate program be incremental and subject to a commitment from the workforce to co-operate with management, the achievement of mutually agreed dispute settling procedures and progress with the elimination of certain work practices. The establishment of a full-time high level implementation team was suggested.<sup>107</sup>

3.90 In January 1982 the Government announced that new management arrangements would be introduced at Williamstown and a program of reforms implemented including arrangements to maximise, as practicable, the Dockyard's management autonomy in the manpower, purchasing and financial fields.<sup>108</sup> The proposal for WND to be managed as an independent statutory authority was rejected. Also in January 1982, an advance planning contract between the Australian Frigate Project Director and the General Manager, Williamstown Naval Dockyard was signed outlining financial, material, quality, technical and information management plans required before the actual shipbuilding contract was negotiated.<sup>109</sup> In May 1982 responsibility for the Dockyard transferred to the new Department of Defence Support.

3.91 Mr Hawke undertook a second review in May 1983 to determine progress with the reform program. He reported that the reforms introduced at the Dockyard satisfied the pre-requisites for warship construction and that WND should be capable of building the frigates.<sup>110</sup> Mr Hawke recommended that a new organisational structure be implemented and the Dockyard's financial management changed from a traditional appropriation basis to a trust account operation.<sup>111</sup>

3.92 1983-84 saw the almost total change of senior management personnel at Williamstown.<sup>112</sup> The present General Manager arrived in May 1983.<sup>113</sup> Days lost through industrial disputation and unauthorised absences at the Dockyard in 1983-84 fell to their lowest levels for many years.<sup>114</sup>

107. Report of the Advisory Committee on Management and Operation of Williamstown Naval Dockyard, op cit, paragraphs 9.15-9.16.

108. Minutes of Evidence, op cit, page 1121.

109. Advance Planning Contract Between the Follow-on Destroyer Project Director and the General Manager, Williamstown Naval Dockyard, dated 27 January 1982 (amended 18 June 1983).

110. Parliamentary Standing Committee on Public Works, Construction of Facilities for the Australian Frigate Project; Williamstown Dockyard, Melbourne - Phase B, Minutes of Evidence, pages 7-8.

111. Ibid, pages 91-95.

112. Minutes of Evidence, op cit, page 2688.

113. Ibid, page 1256.

114. Parliamentary Standing Committee on Public Works, op cit, pages 12-13.

3.93 In October 1983 the Government announced its agreement to proceed with construction at WND subject to the satisfactory negotiation of:

- a formally signed agreement by each of the unions at Williamstown, the Australian Council of Trade Unions and management covering a range of industrial relations and work practice issues;
- joint management arrangements between the Department of Defence as the customer and the Department of Defence Support as the supplier; and
- a contract, the Australian Frigate Shipbuilding Agreement.<sup>115</sup>

3.94 On 3 November 1983 an agreement was finalised between WND management, Unions, other workforce associations and the Department of Defence Support. Joint management arrangements between Defence and Defence Support were concluded on 11 November 1983 and the Australian Frigate Shipbuilding Agreement was signed on 25 November 1983.

3.95 The Williamstown reform program seems to have a way to go in one other important area. Industrial disputation and absenteeism are at historically low levels but the commitment of the workforce to the Dockyard management reform program may be limited. The Committee inspected the Dockyard on 30 July 1985 and is concerned with the lack of observance of basic health and occupational safety rules among the workforce. On the other hand, the Dockyard Unions and Staff Associations have expressed dissatisfaction with the priority given to occupational safety and health in the facilities modernisation program.<sup>116</sup>

115. Minutes of Evidence, op cit, page 1122.

116. Parliamentary Standing Committee on Public Works, Minutes of Evidence, op cit, pages 145-170.

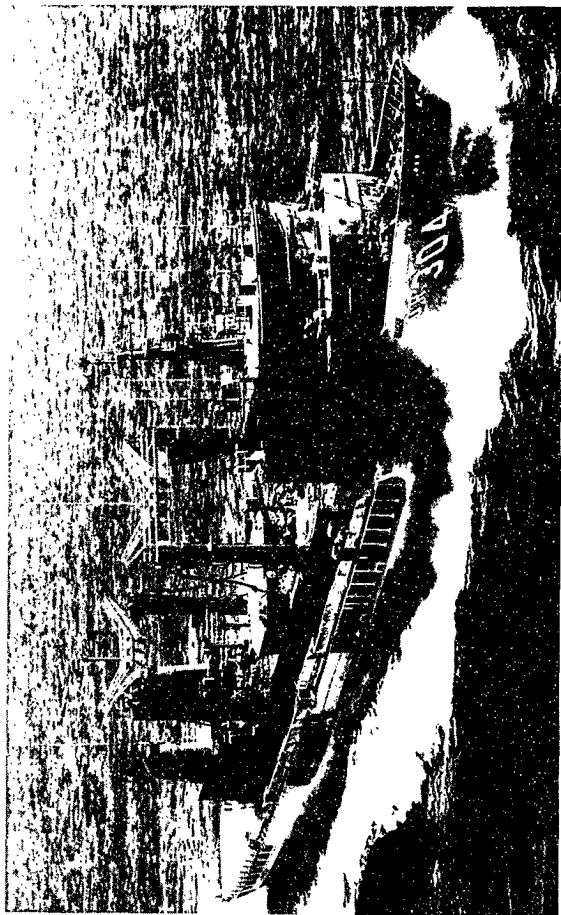


Illustration 4.1

HMAS Success

Department of Defence

## CHAPTER 4

### HMAS SUCCESS

#### Synopsis

HMAS Success, Navy's new fleet underway replenishment ship is intended to replace HMAS Supply. HMAS Success is being constructed by Cockatoo Dockyard Pty Ltd at Cockatoo Island in Sydney. The ship is of French design and is based on the French Navy Petrolier Ravitailleur (PR) Meuse, the second ship of the Durance class. HMAS Success was launched on 3 March 1984 and assessed as 69 per cent complete on 31 March 1984.

The original contract signed with Cockatoo Dockyard specified a fixed price of \$68.4 million and ship delivery by 31 July 1983. At the time of the Committee's examination the latest estimate of total project cost was \$197.41 million and the current million planned acceptance date is February 1986.

The ship was to be built to a French Production Package supplied through Direction Techniques des Constructions Navales. Cockatoo Dockyard found the Production Package to be inadequate for production. This became the basis of a protracted dispute between the Commonwealth and Cockatoo Dockyard. The eventual result of the dispute was renegotiation of the original contract which allowed for a large increase in original cost and extension of ship completion date as well as alteration to a fixed price incentive basis.

The dispute remained unresolved for an unacceptable time and reflected differences between Cockatoo Dockyard and the Commonwealth over matters fundamental to the management of any project. These matters should have been more thoroughly addressed in early project planning, definition and management.

Other problems also arose during construction with the operation of a Cargo Working Party and the approval of Key Australian Build Documents. Problems in both of these areas were at least partly a result of inadequate planning, management and a lack of resources.

The early management organisation created for HMAS Success exacerbated the project's problems. Early quality control and quality assurance arrangements were inadequate and confusing to the contractor. Quality assurance also suffered because of a lack of resources. The lack of resources was attributed in part to prolonged Departmental staffing recruitment procedures.

## Introduction

4.1 HMAS Success (AOR-01) is the Navy's new fleet underway replenishment ship. It is intended to replace HMAS Supply. Its capability will be to provide oil and liquid fuels and some logistic support to ships at sea. HMAS Success, the largest ship built in Australia for the Navy, is being constructed by Cockatoo Dockyard Pty Ltd (previously Vickers Cockatoo Dockyard Pty Ltd) at Cockatoo Island, Sydney.

4.2 HMAS Success is of French design and is based on the French Navy Petrolier Ravitailleur (PR) Meuse, the second ship of the Durance class. Construction is well advanced and the ship was launched on 3 March 1984. At 31 March 1984 it was assessed as 69 per cent complete. Fitting out is continuing with the current acceptance date planned for February 1986.

4.3 The project has a long history. The Navy's initial requirement for a new replenishment ship was expressed in a Naval Staff Requirement on 2 June 1964. This requirement expressed a preference for a somewhat larger ship than HMAS Success (AOR-01) which would have been capable of providing total logistical support to combatant units at sea. Such a capability is represented by the acronym AOE. Cabinet approved procurement of the AOE at an estimated cost of \$20 million in November 1964. However, this ship was withdrawn from the Navy procurement program in October 1965 due to other priorities.

4.4 Navy again sought approval for construction of an AOE in May 1969 at an estimated cost of \$42 million. Cabinet approval for this project was given in July 1969. As a result of technical delays and project re-appraisal the program slipped and was subsequently cancelled in the context of the 1973/74 draft budget considerations. At that stage contract negotiations with Cockatoo Dockyard (Codock) were well advanced and steel had been procured.

4.5 A study of replenishment operations by Navy led to a proposal in June 1974 to acquire a smaller ship, an AOR. On the basis of adopting an existing design, tenders were called for project definition studies in early 1975. In November 1975 Codock advised the then Department of Administrative Services that it was unable to respond to the tender schedule as it was not able to offer an existing design. A contract was let in February 1977 to Direction Techniques des Constructions Navales (DTCN).

4.6 In late 1977 Codock lobbied strongly for the chance to submit a price for the ship construction task. Cabinet approved the project in the 1977/78 Budget and in March 1978 directed that a price be obtained from Codock, in competition with the DTCN offer, for construction in Australia. Codock was asked to tender a fixed price by 15 December 1978 based on the Shipbuilder's Estimating Package (SEP) issued on 29 September 1978. After

negotiations the Minister announced on 23 August 1979 that it was intended to award the contract for construction of AOR-01 to Codock. Following further negotiations the construction contract was signed on 26 October 1979. This contract specified a fixed price of \$68.4 million (November 1979 prices) and ship delivery by 31 July 1983. A contract for the provision of a Production Package (PP) and design services to support the construction of AOR-01 in Australia at a cost of \$2.7 million was signed with the Government of France on 23 October 1979. At the time of the Committee's examination of the project (8 June 1984) the latest estimate of the total project cost was \$197.411 million (January 1983 prices) with a planned acceptance date of February 1986.

### The Committee's Examination

4.7 HMAS Success was the subject of extensive comment in paragraph 5.1 of the Auditor-General's September 1983 Report. It was also one of the projects referred to in the Review of Defence Project Management in that same report.

4.8 The Audit report revealed a number of very serious problems of project management which were considered to adversely affect timely completion of ship construction and project cost. The Auditor-General's comments focused largely on the adequacy of project planning and task definition, contracting and control over production, quality assurance arrangements and excusable delay provisions.

4.9 A submission from the Department addressed the problems experienced with management of the project. The Committee conducted a public hearing with the Department on 8 June 1984. Aspects of management of the project were also addressed in public hearings with the Department on the role and functions of the General Overseer and Superintendent of Inspections, East Australia Area (GOSIEAA) on 22 May 1984 and 8 June 1984. The Committee inspected HMAS Success at Cockatoo Island on 22 May 1984 and held a public hearing with Cockatoo Dockyard Pty Ltd on 30 May 1985.

4.10 The Committee's examination of HMAS Success focused on problems which caused delays and increased cost to the project, and associated management problems.

### Project Progress/Problems

4.11 The major problem associated with the construction of HMAS Success revolved around a protracted dispute between the Commonwealth and Cockatoo Dockyard Pty Ltd (Codock) over differences between original specifications in the Shipbuilder's Estimating Package (SEP) and the Production Package (PP). The PP comprised detailed drawings and specifications for ship construction. It was purchased from Direction Techniques des Constructions Navales (DTCN) and supplied to Codock as Australian Government Furnished Information. The disagreement eventually

resulted in contract renegotiation which at that time extended the acceptance date by about 3 years and changed from a fixed price of \$68.4 million to a fixed price incentive of \$132.8 million (January 1983 prices). The latest value of the contract is \$149.9 million (January 1983 prices). Codock and Navy agree that since renegotiation the project has proceeded much more satisfactorily.

#### Production Package Dispute

4.12 At the time of signing the original contract it was expected that there would be differences between the specification and the PP. Allowance was made in the contract to deal with such differences. Most of the PP was received by Codock in the period December 1979 to July 1980. Upon examination of the PP by Codock significant problems arose '... it soon became apparent that contrary to Codock's expectations the production package did not conform in detail with the ship described in the specification (SEP)'.<sup>2</sup>

4.13 Codock made their first report of differences in February 1980. The number of reports grew rapidly and in September 1980, Codock was advised that the Commonwealth was unable to process individually the many differences that were emerging between the specification and the PP. In November the Commonwealth requested Codock to propose a total package price for all differences whether identified or not. The price was submitted in December 1980 in what became known as the Delta package. The Commonwealth sought to validate this price and this process eventually resulted in submission on 4 December 1984 of a revised price of \$6.5 million for specification/PP differences and an estimate of \$2.5 million for PP deficiencies. There was, however, little advancement towards agreement.

4.14 The Commonwealth received a Production Package Up-date (PPU) from the French in August/September 1981 and this was issued to Codock in February 1982 with the advice that there were 62 known differences within the PPU. Codock claimed a further 58 differences.

4.15 The Committee was concerned about how such a disruptive conflict between the Commonwealth and Codock arose. Defence witnesses were questioned as to why Navy claimed on 20 November 1980 that the PP was generally satisfactory yet two months later virtually reversed that opinion when on 4 February 1980 the Department of Administrative Services wrote to France setting out specific areas where the PP was deficient of expectations. In response a Defence witness stated, '...I will claim full responsibility for the February letter. It set out the detailed critique of the production package. The general statement emanated from another source'.<sup>3</sup> The other source was the Project Office which at that time was manned by two officers. These officers supervised the delivery of the PP and did point out some differences but had no authority to amend data or to

call for data within the PP to be amended, extended or changed. While this supervision appears minimal there was some early recognition of deficiencies within the PP.

4.16 The actual reason for the original acceptance of the PP is evident in the statement that, 'there was no opportunity, given the pace of the program, to do other than accept the French drawings and tracings, the reproducible, in the condition in which they came from the French drawing offices'.<sup>4</sup> It appears that it was not the quality of the PP which initiated its acceptance but the need to obtain something to start with.

4.17 The Auditor-General in his September 1983 Report observed, the Department did not ensure that the French Agency had the necessary detailed design and production documentation and was able to supply it in the timescale anticipated for an Australian build.<sup>5</sup> Evidence of the minimal supervision of the delivery of the PP and the reluctance to delay acceptance for the sake of commencing the project confirms this observation.

4.18 Throughout the dispute over the PP the basis of disagreement between Codock and the Commonwealth became not that there were differences but the extent of differences between the PP and original specification. This was illustrated in evidence before the Committee, 'the Defence view at that stage was that the ship was more complex than had been anticipated, certainly than the contract allowed for, but that the extent of the increment was not as great as seen by Vickers (Codock). To put it in very approximate terms, I suppose we in Defence thought there was a 5 per cent increase in the task and that was the sort of provision we had made from the outset, whereas Vickers (Codock) view was that it was more like 20 per cent'.<sup>6</sup>

4.19 Defence considered that Codock had underestimated the value of its original contract price and was attempting to recover that underestimate against the increased task of the PP. This attitude was reflected in Defence's assessment of the original tender, details of which were supplied to the Committee on a confidential basis. When asked to respond to this allegation Codock stated, 'we quoted specifically for what was described in the shipbuilder's estimating package and we did not seek to use our imagination'.<sup>7</sup> Codock also pointed out that during the tender evaluation process it was asked to '... confirm that no documentation, not originating strictly from the SEP has been used as a basis in the tender enquiries'.<sup>8</sup>

4. Minutes of Evidence, *op cit*, page 306.
5. Auditor-General's, September 1985 Report, page 16.
6. Minutes of Evidence, *op cit*, page 292.
7. *Ibid*, page 2078.
8. *Ibid*, page 2024.

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1. Minutes of Evidence, *op cit*, page 249.  
2. *Ibid*, page 2027.  
3. *Ibid*, page 306.

4.20 The protracted dispute over the adequacy of the PP adversely affected the progress of ship construction. Despite the expression of concern over the 'distressingly long period' taken to resolve the dispute, Defence witnesses attempted to understate the effects on ship production. The Chief of Naval Materiel commented that, '... apart from the diversion of management resources to try to solve the contractual issue, there was no other interruption to work. So the fact that it was taking a long time was disappointing but it did not have a direct impact on the progress of the construction of the ship.'<sup>10</sup>

4.21 Codock's response to Navy's perception of the effects was, 'no, not at all, whilst effort was being put in, certainly it diverted management resources on both sides. In fact one of the unfortunate aspects of the period to 1982 was that we were concentrating more on loss control than on ship production and both parties were keeping one eye over their shoulder at their legal advisers.'<sup>11</sup> Codock also cited specific examples of production processes adversely affected by a diversion of resources to overcome the dispute.<sup>12</sup>

4.22 The Committee agreed with Codock's perception of the effects of the dispute. It found Navy's attitude to the effects of the dispute a naive approach to project management. It is clear that insufficient attention was paid to the specification of the PP and that communications between the Commonwealth and Codock were inadequate. However, Navy appears to have learnt from the situation. Codock observed that, '... the Commonwealth has taken great pains to provide Williamstown, before work commenced, with a very clear understanding of the nature of the information that was coming and the quality of it'.<sup>13</sup> The Committee's examination of the Australian Frigate Project to be constructed by Williamstown Naval Dockyard confirms that observation.

4.23 In explaining delays which occurred in the ship construction program the Department emphasised the impact of time lost through industrial action. At the time of the Committee's hearing this totalled 171 days. However, in a presentation to the Committee at the inspection of HMAS Success, Codock emphasised that production problems and the contract were by far the most important factors in delaying construction of the ship and that industrial disputes were not a major problem. While the Committee considers that 171 days is a very serious matter in any project, the emphasis by Defence was surprising given its relative lack of concern over delays caused by the PP dispute.

9. Minutes of Evidence, op cit, page 296.

10. Ibid, page 296.

11. Ibid, page 2079.

12. Ibid, pages 2079-80.

13. Ibid, page 2085.

4.24 The construction contract contained provision for recourse to an arbitrator. Given the extent of the disagreement the Committee questioned why this did not occur. Both parties while having considered such a course, felt that the dispute was more readily solved through mutual negotiation. Codock also pointed out the difficulty of finding an arbitrator who could have adequately solved the problem.

4.25 Elements of a resolution to the dispute emerged after the Minister and the Department agreed that an approach involving re-estimation and renegotiation against the entire ship construction was the most appropriate approach for resolution.<sup>14</sup> Consequently, Navy produced a revised technical description of the ship, which was first issued on 27 May 1982, and that description was finally agreed on 4 August 1982. This involved some 600 line items of additional cost. However, while the ship had been redefined, the contract remained unaltered.

4.26 In late December 1982 the Commonwealth issued a Contract Acceptance and Purchase Order (CAPO) amendment which deleted the three volumes of the ship specification dealing with the hull, mechanical and electrical arrangements and substituting the agreed technical description of the ship. An interim payment was also made to Codock. On 28 June 1983 the Government approved a new project cost of \$187.3 million covering the renegotiated contract. The contract was finally amended on 5 September 1983.

4.27 During the time over which the production package problems were resolved there were other problems associated with the construction of HMAS Success namely the operation of the Cargo Working Party and certain Key Australian Build Documents.

#### Cargo Working Party

4.28 A Cargo Working Party (CWP) was formed in February 1977 to address problems of cargo handling and stowage on HMAS Success, basic design parameters of the ship. However, the CWP did not meet for the first time until 3 months later on 2 May 1977. There were long breaks in deliberations of the CWP and in late 1982 and 1983 fundamental design parameters of the ship were still being addressed.

4.29 When questioned over the lack of progress of the CWP Defence cited a lack of resources until the middle of 1983. It was pointed out that after the resources were applied, good results were achieved in the latter months of 1983. The lack of resources applied to the CWP is consistent with a general lack of resources applied to the project in its early stages. It was also stated that planning for the cargo requirements was dependent on other Government decisions, such as that taken in respect of HMAS Melbourne, which significantly affected the type of cargo carried.<sup>15</sup> However, another Defence witness indicated that the long period of time the CWP did not meet was not related to the decision regarding HMAS Melbourne.<sup>16</sup>

14. Minutes of Evidence, op cit, page 293.

15. Ibid, page 275.

16. Ibid, page 284.



4.30 A major decision of the CWP was to retain the RAN standard pallet for ammunition and provision pallets on HMAS Success. That decision was clearly justified in light of the need for a versatile and adaptable ammunition stowage system and the fact that the planned adoption of ISO standard commercial provision pallets did not occur in Australia, or generally the world over. Construction and cost penalties resulted from this decision.

4.31 The decision to adopt RAN standard pallet sizes for HMAS Success involved a difference of 600 kilograms in the weight of a single ammunition pallet. The heavier pallets needed a heavier forklift to carry them, and the heavier forklifts required modifications to the ammunition lifts for carrying the forklifts down to the magazines where they move the pallets. The combination of heavier forklifts and pallets exceeded the concentrated load designed for the replenishment deck and the deck had to be strengthened. French stowage arrangements in magazines were also deleted and a FORGEWELD system of flexible, adjustable stowage installed.

4.32 It was the failure of the CWP to think through the implications of the change in the pallet size which concerned the Committee. When questioned as to how such important implications were not appreciated a Departmental witness stated 'it was an oversight. There is no doubt about that.'<sup>17</sup>

4.33 Although there were increased costs and delays (\$150,000 and 10 weeks excusable delay) associated with the CWP decisions it was pointed out by Defence that they were made 'in time' as it was possible to make the modifications in a relatively cheap way because the deck had not at that stage been assembled. The Committee observed that this was more fortuitous than intentional.<sup>18</sup> It remains that the Navy's management of the CWP was unsatisfactory in that it was deprived of resources, very slow in making decisions and did not follow through the major implications of its decision on the ammunition pallets.

#### Key Australian Build Documents

4.34 Problems which arose with Key Australian Build Documents included engine room painting, weight control approval procedures and welding. As a Departmental witness stated, 'there are one or two Key Australian Build Documents which it could be stated are not quite what we would have expected or wanted of them'.<sup>19</sup> A lower than expected standard in these documents resulted in considerable disruption to the project.

4.35 The contract for HMAS Success originally specified the RAN Painting Manual as the basis for painting of the ship. The Department has stated that it now considers this was inadequate for the ship construction contract. The Department identified a lack of resources as the reason for the SEP not being as precise as it should have been in this area.<sup>20</sup> Codock was tasked to

develop a painting scheme. However, the painting schedule was not finally approved by Navy until September 1981, 23 months into the build of HMAS Success.

4.36 In December 1981 Codock was notified that its painting of the engine room was defective. The painting scheme had been agreed by the time this had taken place. Codock stated that this error in painting occurred '... primarily because of an error in the instructions issued to Production by Codock's Technical Department'.<sup>21</sup> Codock sought to have the applied paint approved by means of a concession request but as the Commonwealth considered the paint scheme 'totally inadequate',<sup>22</sup> this was not granted. In the meantime, despite the approved painting schedule, Codock went ahead and laid the main engines and main gearboxes in that space. Ultimately the machinery had to be removed and the area grit blasted and re-painted with the correct paint scheme. This involved a delay of about 8 weeks and a claim by Codock for \$270,000 against the Commonwealth's insurance for bad workmanship.

4.37 The Audit report was critical that the Commonwealth did not give consideration to withholding a milestone payment of \$5.6 million on the original shipping of the main engines and main gearboxes until the painting scheme had been rectified. In evidence Defence outlined that it had sought legal advice and decided that there was not a basis for delaying payment and that payment would not prejudice the ability to have the problem corrected. The Department was questioned whether future contracts would include conditions that unless quality requirements are met milestone payments would not be made. The Department stated, 'that certainly will be examined and I think that if we can do that some course of that nature would be recommended'.<sup>23</sup>

4.38 Key documents, such as an approved painting scheme, clearly must be clarified early in project planning. Codock nonetheless must accept responsibility for incorrect painting of the engine room.

4.39 Weight control procedures were also not approved until 23 months into the build. Weight control procedures refer to a plan by Codock as to how the specified weight control objectives for the ship were to be achieved and how they were to be monitored. Given some of the weight problems the Committee was aware of in HMAS Tobruk, it was concerned that weight control should be given adequate attention. The Committee questioned Defence on the procedures adopted.

4.40 The Department outlined that it had sought a detailed weight breakdown of the construction of the French ship. After this information arrived further weight data were sought. However, in the words of the Department this was all 'taking time'.<sup>24</sup> Discussions with Codock resulted in compromise weight control arrangements which required, '... putting our faith in the

17. Minutes of Evidence, op cit, page 282.

18. Ibid, page 287.

19. Ibid, page 320.

20. Auditor-General's Report, September 1983, page 21.

21. Minutes of Evidence, op cit, page 2044.

22. Ibid, page 315.

23. Ibid, page 323.

24. Ibid, page 324.

constraints built into the French ship'.<sup>25</sup>The constraint to build to the PP therefore became the weight control procedure. Given the state of the PP there must have been considerable risk associated with this course. The Committee was informed on 8 June 1984 that tests after the launching of the ship proved satisfactory '... although it has not been fully agreed by Navy Office, all indications are that the ship will complete within the target light ship weight of 7014 tonnes'.<sup>26</sup>Nevertheless, there was potential risk in this approach and such procedures should be settled very early in project planning.

4.41 The specification of welding standards for HMAS Success as set out in the PP were in accordance with the requirements of the French classification society Bureau Veritas (BV). It called for a welding schedule for the build but when the PP arrived there was little by way of documentary statements. DTCN was asked for more information but the document supplied was virtually the same as the BV rules.<sup>27</sup>Because of the need for a key approval document, Codock submitted this to the Commonwealth which approved it as a Key Build Approval Document for HMAS Success.

4.42 The contract provided for 200 radiographs of welds to be taken for assurance of the required quality. Radiography of welds began in 1981 and revealed a higher defect rate than desirable. Commonwealth concern prompted a major review of all radiography and requests for further testing. However, Codock considered these additional requests excessive. There was difficulty in reaching an agreement about the required standard. The dispute was solved by Codock independently engaging the services of a Sydney based BV surveyor to arbitrate in the dispute. The necessary assurance of weld quality was given by BV after some 400 radiographs were backed up by ultrasonic examination. A BV attestation on 13 January 1984 satisfied all quality requirements for welding. Rectification of the previously identified defective welds has also been deemed satisfactory by BV and no operational restrictions will apply to the ship.

4.43 The conflict over welding standards further illustrates the need for early specification of such key build documents and for close consultation between the Commonwealth and its contractors. This is reflected in comments contained in Codock's submission to the Inquiry, 'the problems which arose with engine room painting and welding would either not have arisen or been more easily resolved had the specified requirements not required interpretation or subjective judgement in application'.<sup>28</sup>

#### Project Management

4.44 The original management organisation created for the HMAS Success project was inadequate for such a large and complex project. The Project Office initially was very small, only two officers, and this contributed to the problems associated with the production package. Lengthy communication channels between

Codock and the Commonwealth contributed to delays in decision making and to conflict. Quality control and quality assurance arrangements also suffered from a lack of resources and were more complex than needed. On-site representation of Defence at Cockatoo Island was inadequate and management arrangements created confusion.

4.45 The inappropriate nature of the project management organisation was illustrated in its inability to deal with early project planning and task definition, to control the contract and production, and to deal with the dispute which arose over the PP. This dispute overwhelmed the original management structure and eventually led to the virtual collapse of the original contract. The complexity of contracting and communication arrangements facing Codock as illustrated in Figure 4.1 aggravated the situation.

4.46 As has been discussed a lack of resources contributed to poor management of the project. Lack of resources adversely affected early project planning and definition, the PP dispute, the operation of the CWP, implementation of quality control and assurance arrangements and problems associated with the project in general.

4.47 Competing demands of other projects contributed to the lack of resources applied to HMAS Success. Defence stated in evidence, 'in retrospect, it is clear that the resources available were not able to be increased as rapidly as the conjunction of those three projects (HMAS Success, HMAS Tobruk and patrol boats) might have required'.<sup>29</sup>This reflects badly on Navy's project planning and co-ordination arrangements. It was also stated that during the early period of the project the

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29. Minutes of Evidence, *op cit*, page 251.

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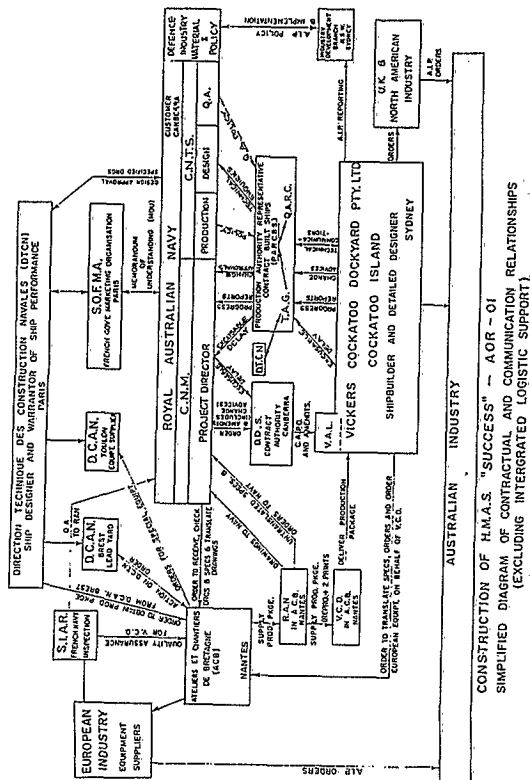
25. Minutes of Evidence, *op cit*, page 324.

26. *Ibid*, page 325.

27. *Ibid*, page 331.

28. *Ibid*, pages 2046-7.

FIGURE 4.1 Contractor's Communication and Contractual Relationships - HMAS SUCCESS



(Source, Minutes of Evidence, p 2065)

Department's overall staff ceiling was being progressively reduced and this adversely affected the availability of staff.<sup>30</sup> Difficulties in recruiting staff were also referred to in relation to the Department's ability to react when resources are needed. The Chief of Materiel stated, 'the main inertial problem that I have seen is sometimes the length of time required to go through the various procedures to recruit to a position, and that type of thing'.<sup>31</sup>

4.48 The Committee took evidence on the continuity of project personnel. The Project Director for HMAS Success has present once since the contract was signed in 1979. However, the present Project Director, a civilian, is the only senior Commonwealth officer who has remained with the project since its inception. The average tenure of both service and civilian personnel is well below the stated target of 3 years. Staff in the Project Office had an average tenure of between 17-18 months while those in the prime functional support area for HMAS Success (Design) had an average tenure of 30.5 months. This sample of project staff was too small to discern any differences between the tenure of civilian and service personnel. The adverse effects of such changes to staffing were expressed by Codock in additional information supplied after the public hearing:

This (changes in project personnel) can place additional workload on the contractor's project team to explain courses of action and the reasoning behind them. In the case of HMAS Success there have been some instances of matters being raised which have previously been decided.

The increased workload brought about by a lack of continuity within project teams must have an adverse affect on efficiency and a consequent influence, indirectly on cost.<sup>32</sup>

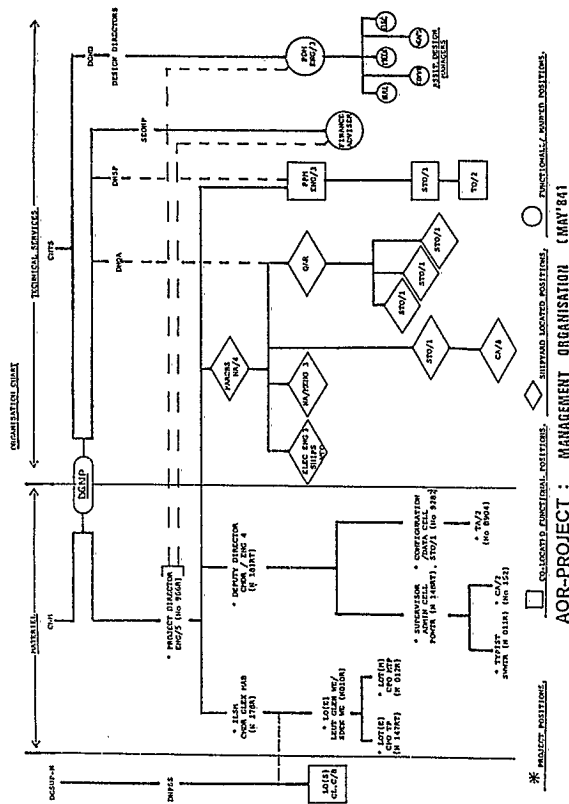
4.49 The project management structure for the HMAS Success project is a matrix organisation based on a project team in Canberra, a team of on-site representatives, and technical support provided from functional organisations within the Department. The main functional support is in ship design provided through the Director General of Naval Design. The Project's current management organisation chart is at Figure 4.2.

30. Minutes of Evidence, op cit, page 255.

31. Ibid, page 261.

32. Ibid, pages 2644-45.

FIGURE 4.2 Management Organisation Chart - HMAS SUCCESS



(Source, Minutes of Evidence, p 248)

4.50 An internal review of the HMAS Success project staffing and management in March 1983 led to a substantial strengthening of the project side of the organisation, as illustrated in Figure 2. The Committee observed that for a project in which design variations were such a vital element, a functionally separate design team appeared to be too remote from the Project Director's control adding unnecessarily to the decision making process.

4.51 In the original project management organisation for HMAS Success quality assurance was carried out by the General Overseer and Superintendent of Inspection, East Australia Area (GOSIEAA). The Production Authority Contract Build Ships (PARCBS) was also represented on-site as the production authority and was responsible for all other aspects of ship production other than quality assurance. When a quality assurance matter needed to be referred beyond GOSIEAA's on-site representative that is, when Codock disputed a judgement, it went through GOSIEAA to the Director of Naval Quality Assurance. However, for production matters PARCBS reported to the Director of Naval Ship Production. As stated by the Director General Naval Production this was, 'a fairly clumsy way of doing business'.<sup>33</sup>

4.52 The initial proposal in August 1979 for quality assurance arrangements for the HMAS Success project attempted to bring GOSIEAA and PARCBS on-site representation together but it was finally decided that separate representation was appropriate. At times this structure was the source of conflicting signals to Codock. It was changed in March 1984 to bring the on-site quality assurance representative under control of PARCBS, and PARCBS was made directly responsible to the Project Director.<sup>34</sup> It took over four years to make a change to the management structure which improved communications between the Contractor and the Commonwealth.

4.53 Quality assurance on HMAS Success also suffered as a result of a lack of resources. Although Codock's quality control systems were assessed as inadequate an on-site quality assurance representative was not appointed until August 1980, ten months after the contract was signed. This delay was attributed to prolonged Departmental staffing and recruitment procedures and difficulty associated with an initial aim of trying to get a single body responsible for all on-site representation.

4.54 Codock's quality control procedures were not finally cleared to AS 1822 standard until October 1983. It is not clear whether there were any specific reasons for this delay. However, Codock stated that it suspected that the Commonwealth's concern over the engine room painting and welding were the principal reasons.<sup>35</sup> Defence witnesses recognised the problems associated with such delay in approval of quality control standards and commented that for all new projects, 'we are insisting that the company be cleared to AS 1822 before we get to the construction point'.<sup>36</sup>

33. Minutes of Evidence, *op cit*, page 342.

34. *Ibid*, page 339.

35. *Ibid*, page 2043.

36. *Ibid*, page 350.

## Conclusion

4.55 The construction of HMAS Success has suffered from large cost increases and long delays. The major cause of these problems was the protracted dispute which arose over the adequacy of the production package supplied from the French. This dispute remained unresolved for an unacceptably long period and reflected differences between Codock and the Commonwealth over matters fundamental to the management of any project. Matters which should have been addressed early in the project, planning definition and management of the project, proved inadequate.

4.56 Other problems arose through poor management of the Cargo Working Party and Key Australian Build Documents. The Cargo Working Party took an unacceptably long time to reach its conclusions and then did not realise the implications of the decisions it made. There was a significant element of luck in the eventual cost outcome of the Cargo Working Party's decisions.

4.57 Key Australian Build Documents were inadequately specified and this led to confusion over construction standards. Specific problems arose with engine room painting and welding. Weight control procedures were also given insufficient attention in project planning.

4.58 The early management organisation created for the project was inadequate and contributed to and exacerbated problems associated with the project. The quality control and quality assurance arrangements were inadequate and confusing to the contractor. There was a general lack of resources applied to the management of the project.

4.59 Since renegotiation of the contract, signed in September 1983, and aided by a review of the management structure in March 1983 the project has been continuing at a more satisfactory pace. Working arrangements between Codock and the Commonwealth are now satisfactory. This was achieved four years after the signing of the original contract.

## CHAPTER 5

### MINEHUNTER CATAMARANS PROJECT

#### Synopsis

The Minehunter Catamarans project will replace Navy's minehunting capability previously provided by the TON Class Minehunters of which only one vessel remains in service. The Minehunter Catamarans are being constructed by Ramsay Fibre Glass Pty Ltd in Australia.

The project is currently in the second of three phases. Phase one involved project definition. Phase two allows for the procurement of three sets of long lead items to be supplied to the contractor as Australian Government Furnished Equipment, construction of a Land Based Magnetic Test Range and construction of two prototype Minehunter Catamaran vessels. Phase three is not yet approved and involves follow on production and the purchase of further longlead items for four additional craft.

The Auditor-General's May 1983 Report commented on a number of unsatisfactory aspects of the project's management. It was again referred to in the review of Defence Project Management in the Auditor-General's September 1983 Report. As a result of these adverse comments the Committee included it in its Defence Project Management Inquiry.

The Minehunter Catamarans project has suffered large cost increases and long delays. The Department of Defence has acknowledged that it underestimated the complexity of the project. Original project costs and schedules did not have an adequate basis and early project planning appeared inadequate.

The original project management organisation for the project suffered from a lack of appropriate resources. Project staff and on-site representation have since been increased.

The Land Based Magnetic Test Range (LBNTR) suffered similar problems to the project as a whole. The Department of Housing and Construction (DHC) which was responsible for construction of the LBNTR underestimated the complexity of the project which resulted in large cost increases and long delays. Inadequate communication between DHC and its client (Defence) contributed to its lack of understanding of the Defence requirements.

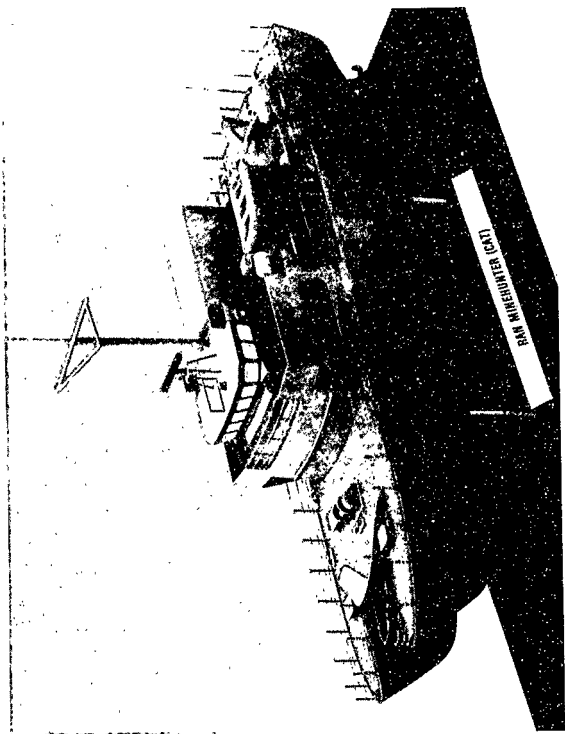


Illustration 5.1

View of Minehunter Catamaran Prototype

Department of Defence

## Introduction

5.1 The Minehunter Catamarans project will replace Navy's minehunting capability which was previously met with the TON Class Minehunters. The TON Class Minehunters were originally purchased in the 1960s and HMAS Curlew is the one remaining vessel in service. The project aims to design and produce in Australia a minehunting vessel of catamaran style and glass reinforced plastic (GRP) construction. Two prototypes are currently under construction at Ramsay Fibreglass Pty Ltd, Newcastle, a subsidiary of Carringtons Slipways Pty Ltd.

5.2 Navy first raised the requirement to replace the TON Class Minehunters in August 1974. The Force Structure Committee (FSC) endorsed this requirement with the direction to examine less costly options to the overseas designs outlined in the original proposal. In 1975 the FSC considered the options of overseas purchase of a British vessel, the Hunt Class minehunter, or the European Tripartite minehunter both of which are of GRP construction and monohull design; or Australian production of GRP Minehunter Catamarans. The FSC recommended the option for local design and construction of the Minehunter Catamarans with the condition that the option of overseas purchase be kept open such that conventional minehunters could be in service if the catamarans were not proved. The Minehunter Catamarans project also involves the construction of a Land Based Magnetic Test Range (LBMTR) at Kingswood, NSW. Also associated with the project is the construction of a degaussing range at Shark Island in Sydney Harbour, and an acoustic range at Jervis Bay but these were not considered as part of the project for the Committee's examination.

5.3 The project has been planned and implemented in three phases:

Phase 1: Project definition;

Phase 2: Procurement of long lead items and Land Based Magnetic Test Range (LBMTR) together with the construction of two prototypes; and

Phase 3: Acquisition of up to three sets of long lead items and construction of up to four production vessels together with spare rotatable pool equipment and full logistic support.

5.4 A sum of \$0.5 million (January 1975 prices) was approved by the Minister for Phase 1 in the context of the 1975/76 Budget considerations and Cabinet approved \$13.2 million (January 1976 prices) for the commencement of Phase 2 on 15 July 1976. Phase 3 has not yet been approved.

5.5 The project originally aimed to produce a total of eight Minehunter Catamarans and to achieve an in-service date of 1983 at a total cost \$60.8 million (August 1975 prices) comprising \$21.0 million for Phases 1 and 2 and \$39.8 million for Phase 3. The latest approved cost figures provided to the Committee were \$1.5 million (August 1981 prices) for Phase 1 and \$88 million (December 1982 prices) for Phase 2. The latest price estimate for Phase 3 was \$144 million (April 1983 prices) for the provision of three sets of long lead items of equipment, four ships and the associated logistical support for these and the two prototypes.<sup>1</sup>

5.6 Delays and cost increases to the Minehunter Catamarans project have been considerable. The project has also achieved little to date in meeting Australia's mine countermeasure capability. At present, Navy's one remaining minehunter provides only a 'token capability which preserves basic skills'.<sup>2</sup> In response to concern expressed over the effect of the project on Australia's capability the Chief of Naval Materiel stated, 'we do have other very limited capabilities and other areas where we are pursuing the development of mine countermeasures, but it is true to say that, at the moment, the capability is small'.<sup>3</sup>

#### The Committee's Examination

5.7 The Minehunter Catamaran project was the subject of unfavourable comment in the Auditor-General's May 1983 Report to the Parliament. In that report Audit outlined its evaluation of the project in regard to:

- establishment of the Land Based Magnetic Test Range;
- procurement of Australian Government Furnished Equipment; and
- activities leading to the hull contract.

#### That Report concluded:

- planning for the project did not sufficiently take into account the uniqueness and complexity of the project;
- shortcomings in project management contributed to the project being 4-5 years behind schedule and to a significant increase in project costs;

1. Minutes of Evidence, op.cit. page 434.

2. Ibid, page 357.

3. Ibid, page 385.

• security systems for classified documentation were inadequate; and

• urgent action by the Department was necessary to correct the fundamental deficiencies identified in the Audit.

5.8 The Minehunter Catamarans project was again referred to in the Defence Project Management Review in the Auditor-General's September 1983 Report to the Parliament.

5.9 As a result of these adverse comments the project was included in the Committee's Defence Project Management Inquiry. A submission from the Department of Defence on the Minehunter Catamarans as part of the Committee's examination of the Auditor-General's May 1983 Report was referred to the Defence Project Management Inquiry.<sup>4</sup> A public hearing with the Department of Defence to examine the project was held on 19 July 1984. The Department of Housing and Construction gave evidence on the LBWTR in a public hearing on 17 May 1985.

#### Project Planning

5.10 In approving the Minehunter Catamarans project the FSC noted that substantial confidence in the success of the project should be attained by 1978, prior to prototype construction. If at that time, the concept was not proven the overseas purchase option could then be pursued. However, the Department appears not to have kept the overseas purchase option sufficiently open.

5.11 It was not discovered until 1980 that a GRP facility was not available in Australia. The Department misjudged both the complexity of the facility required and the availability of such a facility in Australia. In evidence it was stated that, 'it was always felt that some special facilities would be required but that the degree of those special facilities .....was not certain at the time'.<sup>5</sup> It was not discovered until 1980, 2 years after the deadline set by the FSC for consideration of the overseas purchase option, that it would be necessary to construct a separate facility for GRP manufacture of the hulls, thereby adding a significant cost to the project.

5.12 There may be some ambiguity in the minutes of the FSC's consideration of the alternative overseas proposals. A de-classified copy of these minutes was supplied to the Committee. From these minutes a factor in consideration of the overseas and local production options appears to have been the ratio of project costs over the prime equipment costs. These ratios, as stated in the minutes, are 93 per cent for the local production option and 111 per cent for the overseas option. This is noted as a 'significant benefit' of the local option. However,

4. JCPA, Report 232, page 6.

5. Minutes of Evidence, op.cit. page 394.



such a figure appears to have not been considered for one of the overseas craft, the Channel Hunter, and on data from the minutes it may be estimated that the ratio for this craft was 85-87 per cent, less than that stated for the local production option.

5.13 The Department admitted that it had underestimated the complexity of the Minehunter Catamarans project, 'it now appears that the early estimates of timing and cost were overly optimistic'.<sup>6</sup> When questioned as to the reasons for the Department's initial lack of appreciation of the complexity and the uniqueness of the project, the Department referred to the "...limited defence and Australian industry expertise, especially in magnetics and GRP technology".<sup>7</sup>

5.14 The Committee questioned the basis of the original time and cost estimates for the project. The Department's response outlined that an overseas visit highlighted that U.K. costs for mine countermeasure vessels were rising. It was stated that original costs were only of a conceptual nature and that, 'no supportable costings were available for project definition, research and development, design or, indeed, facilities, and the low level of expertise in the magnetics and GRP areas was also a prime cause, I believe, for what are now known to be overly optimistic time and cost estimates perhaps'.<sup>8</sup>

5.15 It was extremely poor judgment that the project was rated only a 'medium technical risk'.<sup>9</sup> That the much greater and increasing cost of overseas alternatives did not alert the Department to its lack of appreciation of the complexity and potential risk of the project suggests negligence. In light of the development of the project the technical and cost risk was clearly understated.

5.16 This factor was reflected in the Auditor-General's criticism of Australian Government Furnished Equipment. For some items of equipment to be supplied to the shipbuilder, construction was progressed ahead of design approval on notional space and weight estimates. The Auditor-General reported that, '..... in regard to one prime item of equipment (that), if the notional item of equipment had not been finally selected the Design Directorate had estimated 135 man weeks of redesign would have been required'.<sup>10</sup> The use of notional equipment was examined by the Committee and, while such practices are not encouraged, it is accepted that in developmental projects such as the Minehunter Catamarans it may be impractical to delay progress until all equipment is finally selected. As it was, of 60

6. Minutes of Evidence, *op cit*, page 378.

7. *Ibid*, page 387.

8. *Ibid*, page 388.

9. FSC Minutes, page 6.

10. Auditor-General's Report May 1983, page 13.

11. Minutes of Evidence, *op cit*, page 419-25.

significant types of notionally selected equipment for this project only three (the anchor winch, steering motors and EM log) did not prove acceptable in practice. The actual equipment supplied in these cases produced net savings of \$220,000 and \$812 for the anchor winch and steering motors respectively and a net increase of \$817,000 to replace the EM log with a doppler log. None of these items contributed to delay in ship construction time.

5.17 In its discussion of notionally selected equipment the Department raised a concern that the Commonwealth's tendering process can inhibit the progress of developmental projects. This problem was highlighted in the Minehunter Catamaran project where, because the Department could not publicise its selection of notional equipment it was forced to 'go out to the shipbuilder with a design that was, at that time not complete'.<sup>12</sup> It was further suggested that the sequential nature of the tendering process made it difficult to develop detailed ship design in a timely manner.

5.18 The Auditor-General also referred to delays in the selection of major equipment which caused the Shipbuilder's Estimating Package to be less definitive than it would otherwise have been. The Department accepted this comment and outlined the development of an update to the design package which had overcome the uncertainty surrounding ship design.

#### Project Management

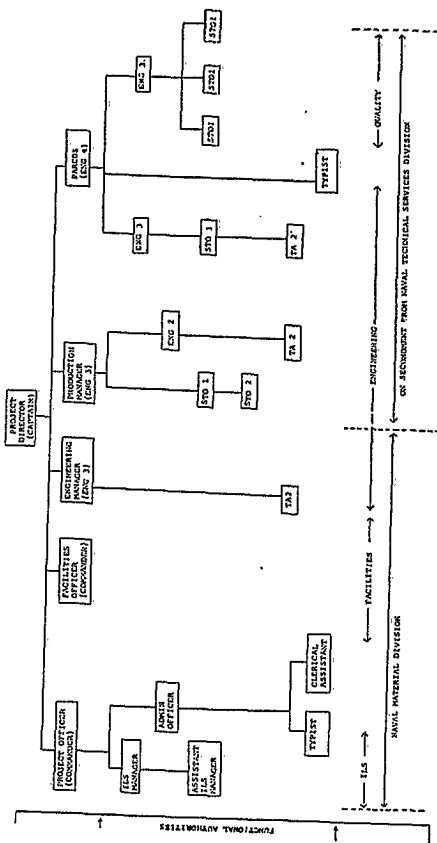
5.19 Project management for the Minehunter Catamarans project is based on a matrix organisation. There is a dedicated project team supplemented as required by personnel from functional areas. The Project Director is currently supported by a Canberra based staff of six Naval and nine civilian personnel. In 1980 there were only three project staff but following an internal review of Navy project management the project staff were increased to the current level of 15 project staff. However, the Project Director stated that, 'within the project team itself, which is established within the Naval Materiel Division, there are a relatively few people dedicated into the project team'.<sup>23</sup> The Project Director is responsible to the Chief of Naval Materiel through the Director General of Naval Production. All on-site management of ship construction activities, including quality assurance, is undertaken by the Production Authority Contract Build Ships (PARCBS) who is responsible to the Project Director. A copy of the project management organisation chart is reproduced in Figure 5.1.

5.20 The Design Management Team, which is controlled by the Design Manager, is not directly responsible to the Project Director. The Design Manager is responsible to the Director General Naval Design. This was surprising for a project in which design, particularly in phase two, is an on-going activity in the development of the project. Despite the lack of an explicit and normal relationship the Department assured the Committee that

12. Minutes of Evidence, *op cit*, page 420.

13. *Ibid*, page 402.

FIGURE 5.1 Project Management Organisation - Minehunter Catamarans



there is a 'very close working relationship' between the Project Director and the Design Management Team.<sup>14</sup> The Project Director attends formal weekly meetings which include the Design Manager.

5.21 Notwithstanding these assurances the Project Director conceded that, '...if we were to establish the project team from square one, as of now, I believe we would be seeking to have the Design Manager responsible to the Project Director'.<sup>15</sup> The Committee believes that this situation must apply for the remainder of the project.

5.22 Agreed Task Statements which outline in detail the specific responsibilities of various participants in projects were not prepared for the Minehunter Catamarans project. Subsequently a new style task plan was introduced but not issued until phase two was well underway. The preparation of Agreed Task Statements could have alerted the Department to its underestimate of the complexity of the project by fixing detailed responsibilities at an earlier stage. The Department did not accept this proposition and claimed that, '... the advice that we sought external to the Department indicated that the way we were going was the right way'.<sup>16</sup> This advice was clearly wrong as events demonstrated. The Department also stated that the new task plan '... is the basis of development of the main construction phase of phase two for the prototype vessels'.<sup>17</sup>

5.23 The level of resources applied to the project, particularly in the early stages, was generally inadequate. The Chief of Naval Materiel stated, '...there was a problem during the time (of tender evaluation) of resources to evaluate and therefore there were problems of maintaining the level of effort and the time schedule that we were attempting to maintain'.<sup>18</sup> Insufficient resources inhibited progress. When questioned over the Departmental administrative costs for the project it was stated that such costs are not available under the normal accounting process.<sup>19</sup> The Department seems to have seriously underestimated the effort needed to manage the project.

5.24 An internal review of project management in Navy attempted to resolve some of these problems and the Department outlined the results of this review which included:

- an increase in project staff to 15;
- a relatively high level of on-site representation at the shipbuilder's yard;
- greater use of computerised management information; and

14. Minutes of Evidence, op cit, page 401.

15. Ibid, page 403.

16. Ibid, page 396.

17. Ibid, page 396.

18. Ibid, pages 426-7.

19. Ibid, pages 434-5.

- a trend towards greater authority for Project Directors.

5.25 The steps taken by Navy for the Minehunter Catamarans project were appropriate. An increase in project management resources will assist in avoiding further delays to the project, strong on-site representation will facilitate an improved management information flow between the shipbuilder and the Department and will assist timely approval of engineering change proposals inevitable in a developmental project such as this.

5.26 Greater use of computer management information systems will also be of benefit to the project. Network planning for the project was initiated in 1982 and this project has employed the use of the computer based packages IFPS and VISION. However, such management information systems appear to be most efficient when they are based on a system employed by the Shipbuilder as is the case in the American Cost/Schedule Control System Criteria (CS<sup>2</sup>) system to be employed on the Australian Frigate Project. As the Minehunter Catamarans shipbuilder already uses computer based scheduling techniques greater emphasis could be placed on developing the shipbuilder's management information systems to meet the needs of both parties.

5.27 Confidentiality of tender documents was raised as a concern in the Auditor-General's May 1983 Report. It appears that at one stage one company chose to submit a revised tender for the minehunting weapons system which may have been influenced to some extent by confidential information acquired on the Department's considerations of the other tenders. In the event the Contracts Authority thought the matter serious enough to call on both tenderers to submit new tenders for re-evaluation.

#### The Land Based Magnetic Test Range

5.28 The Land Based Magnetic Test Range (LBMT) is a specialised requirement of the Minehunter Catamarans Project. It is located at Kingswood, NSW and has been constructed by the Department of Housing and Construction (DHC). A private contractor was responsible for the installation of electronic sensor equipment. The LBMT will be used for testing the magnetic characteristics of equipment to be installed on the Minehunter Catamarans. The facility consists of a trolley mounted on a track, 100 metres in length, raised above the ground which is passed at a constant speed through a magnetic field created by the construction of electric coils along a section of the track. By placing an item on the trolley and passing it through the magnetic field, its magnetic signature can be determined. Very strict tolerances on the physical structure are necessary to ensure the accuracy of measurements required. In the words of the Department, 'the magnetic sensor equipment and instrumentation is very much state-of-the-art and is at the forefront of technical capability'.<sup>20</sup>

5.29 Original plans for the construction of the LBMT envisaged a 2-stage project with preliminary cost estimates of \$50,000 and \$210,000 respectively. The actual cost of Stage 1 was \$46,500 and that for Stage 2 \$290,057. <sup>21</sup> At the completion of Stage two the trolley and haulage system did not meet performance requirements and the range was not able to be handed over to the Department of Defence. The requirements related to magnetic cleanliness and the very strict tolerances for the speed variation of the trolley. Those for magnetic cleanliness were met but sufficient regard was not paid to the tolerance specifications.

5.30 Extensive reconstruction work was necessary to provide a structure to meet the original specifications. This involved demolition of the track already constructed and the design and construction of a new track and track supporting structure. This in turn required a redesign of the haulage system for the trolley. The cost of this construction which was undertaken in two phases was \$836,200 and consisted of:

Phase 1: Short version of the reconstructed track - trials and track verification \$312,500

Phase 2: Extension of length of the track and installation of coils and instrumentation by a private contractor \$523,700

5.31 The total cost of the LBMT (initial plus reconstruction) was \$1,172,800. In addition to the remedial work a further phase is planned to construct an Administration Building and loading dock at a cost of \$700,000. The need for reconstruction significantly delayed the operation of the LBMT which is vital to the progress of the Minehunter project. Original target dates for Phase One and Phase Two were September 1977 and June 1979 respectively. In the public hearing on 17 May 1985 it was stated that the range had just been cleared for production ranging. Due to other delays in the Minehunter Catamarans project those associated with the LBMT were not considered to have an adverse affect on progress of the project as a whole.

5.32 DHC admitted that the principal reason for the failure of its original structure was its own, failure to recognise the need for applied research and development in the design and construction of the range,<sup>22</sup> and that it, 'did not fully appreciate that satisfaction of the performance requirements would require meticulous attention to the design integration of the haulage system, running gear, the track and its supporting structures and the control systems'.<sup>23</sup> DHC agreed in the public hearing that it underestimated the complexity of the project. <sup>24</sup>

21. Minutes of Evidence, op cit, page 1538.

22. Ibid, page 1543.

23. Ibid, page 1539.

24. Ibid, page 1629.

20. Minutes of Evidence, op cit, page 359.

5.33 DHC stated that the original specifications from the Department of Defence were not the cause of its underestimate of the complexity of the LBMTR. However, DHC did suggest that the Defence specification for the track was unsatisfactory for a 6 tonne capacity trolley.<sup>25</sup> DHC also suggested that '...the significance of the performance requirements was not made clear...and, as a result, '... DHC adopted a design and construction approach which was more appropriate to general building and civil engineering work than to a precision instrument'.<sup>26</sup> However, in response to questioning over whether the Department of Defence could have been more thorough in its directions a DHC witness stated that, 'I could not see any criticism which we could pass on to our client (Defence)'.<sup>27</sup> The very strict tolerances specified in the Defence requirements should have alerted DHC to the complexity of the LBMTR.

5.34 An example of DHC's lack of appreciation of the complexity of the range is illustrated in criticism contained in the Auditor-General's May 1983 Report that despite the recognised need to prevent the entry of water to the sensor pit, no soil survey was undertaken. In evidence from the Audit Office, it was discovered that only site inspections were carried out in the first instance because the works were considered by DHC to be of a 'minor nature'. Extensive site testing was carried out prior to the design of remedial work for Stage two, after the complexity of the project had become apparent.

5.35 The major reason why DHC did not adequately appreciate the complexity of the range was because of the relatively low initial financial value of the project. How this could have occurred was explained in evidence, 'the project manager, or his design project leader, may have received a brief and, because of the relatively small amount of money first mentioned, may have taken on the task without necessarily advising his superiors or getting technical advice from a high level within the Department'.<sup>28</sup> The Committee was reassured that as a result of this experience, and DHC's work on the Humpty Doc Naval Communications Transmitting Station, steps had been taken to ensure a more comprehensive review of briefs at a high level when they first come into the Department. DHC also assured the Committee that it now had a much closer relationship with clients which facilitated better information flow and mutual understanding of the requirements of projects.

5.36 After significant problems had been encountered in the construction of the LBMTR, in August 1980, DHC and Navy officers were sent to study a similar range operated by the British Navy at Portland in the UK. It was suggested to DHC that this visit was overdue.

25. Minutes of Evidence, op cit, page 1539.

26. Ibid, page 1540.

27. Ibid, page 1632.

28. Ibid, page 1630.

5.37 In defence of its approach DHC noted that, 'in fact, had the full seriousness of meeting the tolerances been understood from the beginning the solution adopted may well have been more costly than the result finally achieved, due to the probable use of full scale modelling as a precursor to the construction of the final facility'.<sup>29</sup> DHC added in the hearing, 'if we had known of all the problems that they (the British Navy) had had, we would have produced a design which was much more complicated than the final one and would have cost a lot more money because we would have seen the risk and would have tried to design over the top of the risks with a greater factor of safety than we did by progressively going along knocking out the problems'.<sup>30</sup>

5.38 These statements ignore time and quality criteria for judging the success of a project. It is possible that the more expensive approach may have resulted in an outcome of higher quality or greater durability, for example it has been found that the LBMTR track is so sensitive that contamination such as bird droppings or feathers on the track render performance unacceptable. <sup>31</sup> They ignore increased overheads experienced as a result of such delays. This is illustrated in evidence that DHC's approach '...saved money but lost time. I believe the time is not the problem'.<sup>32</sup>

5.39 In light of the problems experienced with the LBMTR the arrangements for quality control and quality assurance practices were examined. DHC was responsible for its own quality control and assurance for the construction aspects of the range. In addition the RAN Research Laboratory (RANRL) and the RAN Trials and Assessing Unit (RANTAU) were present as specialist advisers. For the instrumentation package supplied by a private contractor usual Defence arrangements applied. The quality control procedures of the contractor were assessed before the contract was let and the quality assurance task was delegated to the General Overseer and Superintendent of Inspections. A quality plan was negotiated between the Department of Defence and the Contractor in October 1981. Given the highly sensitive nature of the LBMTR stricter quality control and quality assurance together with more on-site representation would have facilitated better communication between Defence and the other parties involved in construction. It may also have avoided the misunderstanding, particularly by DHC, about exactly what was required.

5.40 When the Department of Defence was questioned over the liaison arrangements with DHC it stated that there were '...ongoing meetings with DHC throughout the construction stage - right from the very beginning', and, 'the monitoring was made

29. Minutes of Evidence, op cit, page 1544.

30. Ibid, page 1633.

31. Ibid, page 1543.

32. Ibid, page 1634.

more intense, if you like, by raising the level of participation of the Department of Housing and Construction and the Department of Defence, when the problems became evident.<sup>33</sup> If liaison was adequate especially in the early stages of the project, it would have been unlikely that DHC would have misunderstood the complexity of the Defence requirements. In the words of a DHC witness, "...if we had had enough sense to ask the right questions, we would have gone to England and looked at theirs."<sup>34</sup>

#### Conclusions

5.41 The Minehunter Catamarans project has suffered large cost increases and delays. This has been largely due to the original underestimate of the complexity of the project. Early project planning did not perceive the risks associated with the project nor was it as thorough as it should have been. Original costings and project schedules were inadequate and alternative options were not properly reviewed as the project progressed. Delays in the selection of major equipment also adversely affected progress.

5.42 The project management organisation was unsatisfactory and insufficient resources were applied in the early stages of the project. The Design Management Team is not formally responsible to the Project Director, although there is a close working relationship. There is a need to incorporate design expertise into the project team, preferably early in project development. The Committee is concerned that Defence has not learnt quickly enough from the experience of complex high technology projects that greater managerial resources are needed for these projects. An amateur approach is inappropriate.

5.43 A definite task plan was not issued until well into the project. Early definition of tasks for the Minehunter Catamarans may have alerted the Department to its underestimate of the complexity.

5.44 The LBMT is vital to the progress of the Minehunter Catamarans project. However, management of the LBMT element of the project suffered similar problems to the project as a whole. DHC, which was responsible for construction, originally underestimated the complexity of the Defence requirements which resulted in extensive remedial work and associated cost increases and delays. Inadequate communication between Defence and DHC contributed to DHC's misunderstanding. Communications between DHC and its clients have improved partly as a result of its experience with the LBMT.

33. Minutes of Evidence, op cit, page 416.

34. Ibid, page 1629.

## CHAPTER 6

### F/A-18 TACTICAL FIGHTER PROJECT

#### Synopsis

On 20 October 1981, after nearly a decade of deliberation by the Government, the Minister for Defence announced the decision to acquire 75 F/A-18 aircraft and associated items at a cost (in August 1981 prices) of \$2,427 million.

The project includes the assembly of 73 of the 75 aircraft in Australia, and associated operational equipment, support including spares, simulators, test equipment and training. The cost was later revised, in August 1983 to \$3,396 million (in December 1982 prices).

The Committee selected this project for examination because it represented a major proportion of annual Defence capital programs from the mid 1980s to 1990, and because of the importance of sound management over such a complex project.

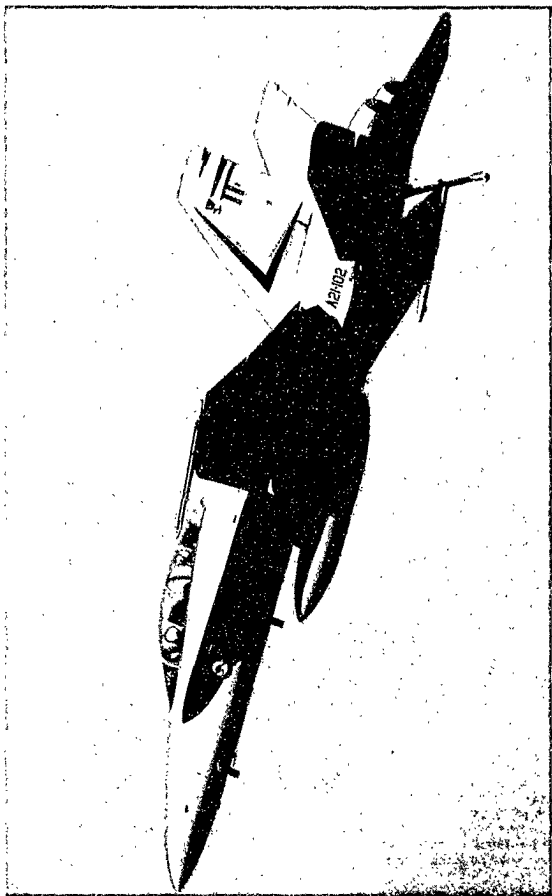
Considerable time elapsed between the initial identification of Air Force requirements for a tactical fighter and the eventual selection of a multi-role aircraft. The change from a simple air-to-air attack role was of interest to the Committee.

The project involves a complex set of relationships between a number of partners - RAAF, United States Navy, US prime contractors, Australian sub-contractors and industry generally.

The range of tasks for project management is large and includes Foreign Military Sales arrangements, a significant investment in Australian Industry Participation with designated tasks in such areas as assembly, engine and radar production, and delegated tasks such as quality assurance.

The Committee was particularly interested in the approach taken by the Air Force to procure spares and ensure adequate follow-on support. The current practice was assessed on its merits and the risks attached to unscheduled future costs in this area generally considered satisfactory. The capacity of the Air Force to record and learn from the operational experience of the first F/A-18 squadron, and to capitalise on the production experience of Australian industry during the 1980s, will be watched with interest.

A large dedicated project management team has been established and its control over and review of aspects of the project is sound. However the Committee is concerned, particularly in view of major price impacts of recent exchange rate variations, that the Government has not received, nor approved, a revised costing for this project. This is long overdue.



A RAAF F/A-18 Tactical Fighter

Department of Defense

## Project Definition

6.1 On 20 October 1981 the Minister for Defence announced the selection of the McDonnell Douglas F/A-18 Hornet as the replacement for the Air Force's Dassault Mirage III-O currently in service.

6.2 That decision culminated detailed consideration over the previous decade by the Air Force of its requirement for a Tactical Fighter Aircraft. The process commenced with the issue of Air Force Staff Requirement (AFSR) 120/74 in August 1971.

6.3 The need for replacement aircraft diminished in 1973 with the Government's decision to refurbish the Mirage, particularly its electronics and weapons systems, to extend its life of type (LOT). Further AFSR (120/81 and 120/82) catering for air-to-air and air-to-surface roles were issued.

6.4 In November 1976 in the White Paper Australian Defence the Government indicated that it was undecided on certain basic issues relating to RAAF's tactical air capability. Nonetheless, Defence at this time issued a Request for Proposals (RFP) for the tactical fighter project. Industry responses, as may be expected, spanned the entire field of tactical airpower which suggested that industry was approached before a preference for a generic type of aircraft had been settled.

6.5 In November 1977 the Defence Force Development Committee (DFDC) met and determined a short-list of six air-to-air aircraft for further detailed evaluation.

6.6 The Minister for Defence, on 7 April 1978, announced that work including 'actively reviewing the strategic need, the financial programming implications ....., the level of air capability appropriate ....., and the phasing by which that capability might be acquired' apparently had been proceeding concurrently. The steps followed, however, suggest that the aircraft available in the market played a major role in influencing decisions on desired Air Force capability. The Government's choice, according to the Minister, settled on an air-to-air tactical fighter because of the 'fundamental importance of this capability' and the prospect of retaining some Mirage IIIs for strike roles.<sup>1</sup>

6.7 A Tactical Fighter Force Policy Mission was established. It visited UK, USA and France and reported to the Government in August 1978. The Minister subsequently announced that four aircraft would be evaluated according to their air-to-air performance. He added that an important consideration remained, that being performance in an air-to-surface role.

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1. Hansard, Repts., 7 April 1978, pages 1224-5.

6.8 A year later in 1979, the Government further reduced the short list to two aircraft, the F-16 and F/A-18, indicating that there were advantages in choosing a single multi-role aircraft. By implication the aircraft excluded in this short-listing process were more specialised than the dual role aircraft remaining.

6.9 In detail the 1979 Government decision involved specific aspects including:

- negotiations based on an initial buy of 25 aircraft, with firm options for a further phased buy up to a maximum of 75 aircraft;
- firm offset contracts to be established concurrently with aircraft purchase;
- substantial Australian industry involvement with the objective of facilitating through-life support; and
- an aim of final selection for initial order by about the end of 1980.<sup>2</sup>

6.10 A large dedicated project team, the Tactical Fighter Project Office (TFPO), was created in January 1980. An evaluation of the F-16 and F/A-18 followed. The Committee noted that both aircraft required development at that stage to match RAAF's requirements. The Defence submission stated that the Defence Source Definition Committee (DSDC) concluded, inter alia, 'that significant risks were attached to both aircraft'.<sup>3</sup>

6.11 Defence went on to state that the Minister in December 1980 'announced the deferral of a decision on type selection because of fundamental reservations in regard to parent-service development programs of both aircraft. The issue of final selection was to remain open pending further development of both aircraft'.<sup>4</sup>

6.12 Intensive work by the TFPO followed on aspects including operations, engineering, structural, AIP and support. Government approval was granted to AIP proposals and a revised Memorandum of Arrangements with the United States Government signed.

6.13 A significant decision bearing on the project was taken in June 1981 with the approval, by the US Secretary for Defense, of full-scale production of the F/A-18 in the fighter role. That decision was used by Defence as an indication that the earlier structural problems in the F/A-18 had been substantially overcome.

6.14 Negotiations followed in the United States on the principal conditions for a Foreign Military Sales (FMS) purchase. The evaluation was processed through the DSDC and the Minister for Defence recommended to Government on the final selection of the aircraft.

6.15 In evidence on 10 August 1984 Air Vice-Marshal Heggen stated:

... to have optimized for a particular role would have increased the number of aircraft types in the inventory and ... the more the overheads. The multi-role aircraft offers the benefits of economies of scale and commonality of support in those roles... from a defence point of view the non-air defence roles were given a very considerable weighting ... while air defence was certainly a major consideration ... other roles were given equal weight.<sup>5</sup>

6.16 The Air Force has been given a wide range of defence roles with a limited number of aircraft. Air-Vice Marshal Heggen commented '...(the F/A-18) is a very versatile aeroplane and these requirements remain, regardless of which aircraft we have on the inventory.'

6.17 The switch from a primary emphasis on an air-to-air role to an equal emphasis on the air-to-air and tactical air-to-ground roles noted the Minister for Defence, in October 1981, was based on an uncertainty about the threat situation to be met over the 20-25 year operational life of the new tactical fighter.

6.18 The Committee observed that the public arguments in favour of the F/A-18 placed emphasis on 'survivability' and 'maintainability', and that US fighter design philosophy with respect to the F/A-18 had sacrificed speed and sophistication for reliability and manoeuvrability.

6.19 Nonetheless, while the F/A-18 may prove to be a cost-effective fighter aircraft, the Committee expresses concern about its effectiveness as an attack aircraft. Australia possesses long and medium range strike capability in the F111 and the Harpoon-equipped P3C Orion. Compared to these aircraft, the F/A-18 appears to have a limited strike range. Additionally, the requirement to provide air-to-ground attack missions in support of Army units did not appear to the Committee to be an efficient use of high cost aircraft.

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5. Minutes of Evidence, op cit, page 570.

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2. Minutes of Evidence, op cit, pages 520-1.

3. IbiD, page 522.

4. IbiD.



## Capability Limitations: Combat Range

6.20 The Committee sought details from Defence on the operational ranges of the F/A-18. In evidence to the Committee, Air Cdre Roser, Director-General (TFPO), stated that the F/A-18 had an interdiction range 'in excess of 450 nautical miles and within United States Navy specifications'.<sup>6</sup>

6.21 This advice was expanded upon in confidential evidence on the range of the F/A-18 in a typical fighter configuration with two Sparrow and two Sidewinder missiles and a 20mm gun, and in an attack role, with two missiles, four bombs and external fuel tanks. Performance parameters are classified under the Memorandum of Arrangements signed with the United States Government.

6.22 Having regard to this confidentiality the Committee obtained evidence on the Air Force bases from which the F/A-18 could be deployed. Air Cdre Roser stated:

...we could deploy the F/A-18 to bases around the coastline... Cairns, Weipa, Gove, Kununurra, Derby, Learmonth, Broome and whatever, and we could operate that aircraft in a publishable radius of action of up to 500 nautical miles out to sea to provide protection to the Royal Australian Navy.<sup>7</sup>

6.23 With three operational squadrons, two at Williamtown, NSW, and one at Tindal, NT, the Committee was interested in the capacity of the RAAF to deploy an operational squadron to bare bases. While details of the deployment requirements remain classified, the Committee was advised that RAAF considered that in addition to the high durability and maintainability of the aircraft, it had the transport capability to move squadrons to bare bases. Some information was also provided on the forward operational bare bases, at Darwin, Derby and Learmonth.

6.24 The Committee received evidence on the RAAF proposal to convert four Boeing 707s to incorporate air-to-air refuelling capabilities. RAAF strongly favoured such capability. However witnesses emphasised that such a facility was not essential for the operational deployment of the F/A-18. The proposal for conversion of the 707s, which is subject to Defence priorities, related to training requirements for the three operational squadrons. High intensity operations will clearly demand a substantial increase in air refuelling capability.

6.25 The overall range of the F/A-18, in its various roles, will be determined by the equipping of non-operational bases to deploy squadrons, and the priority given to creating an adequate air refuelling capability. Decisions on these matters have yet to be taken by Government.

## Scope of the Project

6.26 The F/A-18 project involves the acquisition and introduction into RAAF service of 75 F/A-18 aircraft together with associated operational equipment, support including spares, simulators, test equipment, and training equipment. Included in the project is the development of RAAF Williamtown as a main operating base for the squadrons. The upgrading of Tindal RAAF base for the third squadron is not included in the project budget.

6.27 The acquisition of the aircraft, and much of the associated equipment and support, was arranged under Foreign Military Sales (FMS) procedures. FMS principles are contained in a Memorandum of Arrangements (MOA) between the Australian and United States Governments. Details of the FMS acquisition are covered by a series of Letters of Offer and Acceptance (LOA).

6.28 Table 6.1 provides an indication of the main elements in the project. The financial details were supplied by Defence in March 1985.

6.29 Whilst the majority of the support and training costs are included in the FMS arrangement, some elements remain as commercial contracts. One example is training aids. Two Operational Flight Trainers (OFT) will be acquired under commercial contract from Sperry Corporation. Other training aids similarly contracted include:

- an aircrew cockpit trainer known as 'Hands on Throttle and Stick Training Aid' (HOTASTA);
- a computer-based training system (CBTS) which provides computer aided instruction for air and maintenance crews; and
- six Simulated Aircraft Maintenance Trainers (SAMTs) simulating various aircraft systems and used for training of maintenance personnel.

6.30 FMS procedures have been used for the separately funded procurement of Short Range Air-to-Air Sidewinder missiles and Medium Range Air-to-Air Sparrow Missiles. The approved total cost estimate for both types of missiles is \$78.6 million (at April 1983 prices) and includes both operational and training missiles and, in the case of the Sidewinder missile, a significant maintenance capacity.

6. Minutes of Evidence, *op cit*, page 580.  
7. *Ibid*, page 581.

TABLE 6.1

## F/A-18 Project Costs

Element	Aug 81 \$A m Approval \$1.1484 Exch Rate )	Dec 82 \$A m Approval \$0.8650 Exch Rate )
1. Airframe		
2. Engine	1331.465	1893.0312
3. Alternate Mission Equipment	65.958	110.0534
4. Government Furnished Equipment	2.878	5.652
5. Integrated Logistic Support		
a. Industry Training <sup>1</sup>	3.613	10.361
b. Aircrew Training	0.748	4.945
c. Maint & Tech Training	4.157	6.236
d. Training Equipment <sup>2</sup>	15.588	13.652
e. Ground Support Equip	101.946	163.095
f. Spares/Repair Parts	179.574	273.817
g. Spare Engines	58.656	93.766
h. Interim Support	3.442	5.165
i. Software Support	11.088	16.634
j. Publications	31.894	48.907
k. Contractor Engineering Technical Services	5.871	8.807
6. Follow on Support <sup>3</sup>	11.928	17.895
7. Australian Industry Participation <sup>4</sup> 115.603		84.794
8. Management Services	25.605	23.605
9. Other <sup>5</sup>	491.804	595.167
Total	<u>2,427.396</u>	<u>3,396.030</u>

- 1 Training costs are part of AIP costs at Item 7.
- 2 When estimates were prepared, SAMTS and CBTS were not separately estimated.
- 3 It is not usual practice for follow-on support to be included in Project Cost Estimates. The amount for follow-on support shown in the table is for an initial equity in the USDOD stock of replenishment spares.
- 4 The amount shown for AIP is for plant and equipment purchased by the Commonwealth for use within industry, and for training and other costs funded directly by the Commonwealth.
- 5 The elements listed above do not constitute the entire project.

6.31 Ammunition is also additional to the project. Approximately \$6.2 million has been expended on evaluating tenders for possible local production of 20mm ammunition, and in holding sufficient training stocks during the estimated three years needed to establish local production capability. Evidence presented to the Committee suggested that \$15 million may be needed to equip industry for that task.<sup>8</sup>

6.32 An amount of \$106 million was approved in February 1983 for the construction of new hangars, maintenance, training and aircrew facilities, and accommodation at RAAF, Williamstown, to house two F/A-18 operational squadrons, and the Operational Conversion Unit. Work on these facilities had been substantially completed by June 1985.

## Foreign Military Sales Versus Commercial Purchases

6.33 The Committee investigated whether, compared with other US sales of F/A-18 aircraft particularly to the Canadian Government, the Australian Government chose the most efficient procurement path by acquiring under FMS arrangements.

6.34 Mr F.N. Bennett, then Chief of Capital Procurement, in evidence stated:

... that was a decision made by the then Government after the benefits of the FMS purchase, as against a commercial purchase, had been considered ... By buying through the US authorities we get the benefit of the enormous resources that the US Navy can bring to bear on this - commercial, contractual and technical resources - and the benefit of the elaborate and standing relationships they have with contractors in regard to such matters as the establishment of a reasonable cost, and the detailed investigation of the books of the companies involved, and standard contract negotiating and management practices... We are able to associate our buy directly with the US buy and thereby gain advantages of scale.<sup>9</sup>

6.35 Mr Bennett went on to cite the need in commercial transactions to establish a large procurement team in the United States to undertake detailed project development, contracting negotiations, contract management and other aspects of the project, and the distance between Australia and United States as reasons for not opting for a commercial contract.<sup>10</sup>

8. Minutes of Evidence, op cit, page 612.  
9. Ibid, pages 596-7.  
10. Ibid.

6.36 Air Vice-Marshal Heggen added:

One of the advantages of the FMS in our case is that it better enables us ... to develop an Australian Industry Participation program, and in the selection process the short-listed competitors were required to develop their Australian Industry Participation packages fully .... that degree of development in the assurance that those Australian Industry Participations could be carried through was more assured, we believed, under FMS arrangements, than it would have been commercially. The arrangements were in place before the brand name was announced so that we could continue the development of both proposals in a competitive environment right until the final selection was made.<sup>11</sup>

6.37 Later written evidence on this matter detailed that Australia gained marginally more per aircraft in terms of AIP equivalents than Canada.<sup>12</sup> These figures included two dubious items, which if deleted, indicate that the reverse was true, that is that the Canadian negotiations provided marginally greater benefits than in fact resulted for Australia. The issue of AIP and offsets is taken up in more detail below.

#### Australian Industry Participation (AIP)

6.38 It has been noted that AIP considerations and the transfer of technology to Australian industry figured prominently in the development of the project.

6.39 In 1978 Defence issued, in relation to the F/A-18 project, guidelines for AIP which stated inter alia:

... were to provide in industry the capability to undertake required engineering, maintenance and spares provision support for the aircraft, its systems, equipments and support facilities during the service life of the aircraft, and to establish, maintain or enhance the defence industry capabilities in general and provide a balanced, stable and on-going workload using the opportunities presented by the project.<sup>13</sup>

6.40 The AIP program was established under Deeds of Agreement negotiated by the Australian Government with the prime contractors, McDonnell Douglas for the airframe and associated support, and General Electric Corporation (GE) for the engines.

6.41 The following elements of work have been included in the AIP program:

- Designated Work. McDonnell Douglas, General Electric and their US subcontractors have undertaken to subcontract to Australian industry production tasks directly related to the 75 Australian F/A-18 aircraft and support equipment. The estimated value of this designated work is \$190 million at January 1981 price levels.
- Offset Work. The same US prime contractors have undertaken to implement an offset program amounting in terms of value added by Australian industry to 30 per cent of the imported content of the project cost. Offset work will comprise project related offsets (production of F/A-18 and the GE F404 engine assemblies and components for export to the US) and related technology offsets for export back to the US. Examples of the latter are the manufacture of DC9 and DC10 aircraft components. Eligible offset work is estimated to amount to about \$370 million at January 1981 price levels based on the proposals submitted by the prime contractors McDonnell Douglas and General Electric.
- Third Level Offsets. The prime contractors have also undertaken to pursue offset opportunities in other areas not directly relevant to Defence. Third level offsets are not credited as part of the US prime contractor's 30 per cent offset obligation.<sup>14</sup>

6.42 The most significant activities in the designated work tasks are the final assembly and test of the F/A-18 aircraft by the Government Aircraft Factory (GAF) Avalon, and the assembly and test as well as some manufacture of the GE F404 engine by Commonwealth Aircraft Corporation (CAC) Fishermens' Bend.

6.43 The Committee examined in some detail the anticipated benefit and cost of the AIP program. These matters are discussed under a number of sub-headings.

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14. Minutes of Evidence, op cit, pages 504-5.

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11. Minutes of Evidence, op cit, pages 599-600.

12. Ibid, pages 2469-70.

13. Ibid, page 626.

Industry infrastructure: Commonwealth expenditure

6.44 Defence witnesses gave evidence that under the Deeds with McDonnell Douglas there were obligations which the Commonwealth Government had accepted as a condition of McDonnell Douglas meeting its obligations.<sup>15</sup> These included Commonwealth investment in machinery and plant facilities, that is the tooling and test equipment needed by Australian industry to undertake its designated work obligations. In addition the Commonwealth is to meet costs associated with training needed in Australian industry.

6.45 Estimates by Defence of these costs are detailed in the following Tables 6.2 and 6.3.

6.46 In follow-up evidence on the net cost of AIP to the Commonwealth, the Department of Defence stated that in the F/A-18 program the estimated total value of Commonwealth non-recurring investment in Australian subcontractors for test equipment, technical assistance, data and training was \$153 million (at August 1981 price levels), and for investment in production infrastructure such as plant, machinery and facilities \$62 million. The gross amounts were reduced by \$25 million and \$19 million respectively to arrive at net figures of \$128 million and \$43 million as investment related solely to the AIP program.

6.47 In addition to this Commonwealth net investment of \$171 million, Defence noted that \$22 million of machine rental was waived by the Commonwealth for F/A-18 offset items.

6.48 To this may be added a price premium of \$131 million, the difference between prices for designated work by Australian industry and equivalent US prices.<sup>16</sup>

6.49 Mr Hider, Assistant Secretary TFP, in evidence in support of such Commonwealth expenditure stated:

... we set out to get ... a degree of self-reliance in the support of the F/A-18 ... we are moving our industry into areas of high technology ... The F/A-18 will be delivered by GAF in April (1985). It will be the first fighter aircraft it has delivered since ... 1973 ... the F404 engines that CAC will be producing and delivering ... will be the first new production engines that CAC has delivered since 1972. The F/A-18 radars that Philips in Sydney has already delivered are the first airborne fighter radars that have ever been produced in this country ...<sup>17</sup>

15. Minutes of Evidence, op cit, page 615.

16. Ibid, page 2497.

17. Ibid, page 914-5.

TABLE 6.2 Outlay by Commonwealth on Production Infrastructure - F/A-18 Tactical Fighter Project

Firm	Mach & Plant	\$A m		
		August 1981 Price Levels	January 1985 Price Levels	
		Facilities	Mach & Plant	Facilities
Government Air-craft Factories	14.08	3.72	17.804	19.286
Commonwealth Air-craft Corp	29.23	3.99	26.948	5.850
Hawker de Havilland	5.41		8.267	0.335
Dunlop	1.55		2.431	
Lucas	0.03		0.200	
Godfrey Howden	0.10		0.220	
AEOS		0.275		
British Aero-space Aust	0.97		1.725	
Thorn-EMI L.00		1.466		
Philips, Moorebank	0.45		0.709	
Thomas Electronics	-		0.150	
Normalair Garrett	0.62		0.025	
Philips, Hendon	0.40		0.250	
Morris Productions	0.41		-	
Firm(s) not yet selected for tasks	0.41		0.820	
<hr/>				
Total for categories	54.66	7.71	61.290	25.501
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Total Production Infrastructure		62.37		86.791

Source: Minutes of Evidence, op cit, page 2495.

TABLE 6.3 Outlay by Commonwealth on Industry Training -  
F/A-18 Tactical Fighter Project

Firm	\$A m Aug 1981 Price Levels	\$A m January 1985 Price Levels
Government Aircraft Factories	2.09	4.781
Commonwealth Aircraft Corp	0.63	1.470
Hawker de Havilland	0.31	0.450
Dunlop	-	0.042
Lucas	0.09	0.156
Godfrey Howden	-	0.027
AEOS	-	-
British Aerospace Aust	0.20	1.017
Thorn-EMI	0.67	0.747
Philips, Moorebank	0.45	0.737
Normalair Garrett	-	0.080
Philips, Hendon	-	0.065
Firm(s) not yet selected for tasks		0.076
<b>Total</b>	<b>4.44</b>	<b>9.658</b>

Source: Minute of Evidence, op cit, page 2496.

Designated work: future competitiveness

6.50 The value of designated work for the 75 Australian F/A-18 aircraft and support equipment (at January 1981 prices) was \$190 million. Defence witnesses suggested that it was necessary to select a cross representation of the technologies involved in the F/A-18 and particular parts of the aeroplane and engine were therefore chosen by Government for industry to develop its capability. The aim in the designated work program was to give Australian industry an opportunity to increase its efficiency, and therefore at the end of the project to qualify in the United States market.<sup>1</sup>

6.51 In view of the extent of Commonwealth expenditure on increasing industry capability, and the price premium incurred during the so-called learning curve of Australian production, the Committee investigated the likelihood of Australian industry being able to continue production legally beyond 1990.

6.52 Mr Bennett gave this evidence to the Committee:

During the 1980s the best business opportunity for the Australian firms is to produce original equipment for American aircraft and aircraft being produced by other countries, as well as for our aircraft. That production program will run through until 1990 and this is where most of the business will be - the volume of business will be in original equipment.

Subsequently, we would be hoping and seeking to have arrangements which would enable the Australian firms to participate in sales of replacement parts and consumable stores, not only for our own aircraft, but for US Navy aircraft and other purchases as well. So we will be looking for licensing opportunities for that, and so will the firms themselves.

If the Australian industry becomes seriously uncompetitive in the future, then even we would have to look at the question of where we source our spares as well. We cannot guarantee that we would continue to buy from the Australian industry.<sup>2</sup>

6.53 Under further questioning, Mr Hider, Assistant Secretary TFP, stated that 'once we have established a licensing arrangement that allows us to begin, then those licensing arrangements will work forever ... most licensing arrangements are renegotiable ... if there was some fundamental breakdown in the system'.<sup>20</sup>

18. Minutes of Evidence, op cit, pages 625-6.

19. Ibid, page 630.

20. Ibid, page 632.

6.54 Detailed confidential information on licence rights was supplied to the Committee. That information included a tabulation indicating the relationships between the US prime contractor, (where applicable the US sub-contractor), the Australian sub-contractor, the product or service involved, and the nature and extent of rights available in respect of future spares production, repair and overhaul, and the parties to such arrangements.

6.55 Except for two licences negotiated separately with Smedlow Inc. and Lear Siegler Inc., these licensing rights were established and granted in the Deeds of Agreement with the two prime contractors. They included provision for future spares production.<sup>21</sup>

6.56 In camera evidence was given on the technical rights contained in the General Electrics Deed.<sup>22</sup>

#### Offsets

6.57 AIP Deeds with the two prime contractors require those firms to provide eligible offsets to the value of 30 per cent of the imported content of the F/A-18 aircraft and engines. These obligations are subject to the competitive position of Australian industry. Under FMS arrangements the competitive onus is on Australian industry. Every contract is bid on a yearly basis and, in conformity with US Congressional requirements, the US Government must accept the lowest tender price.

6.58 The Committee took cognisance of this position, and noted that:

- (1) there were within the Deeds carefully prescribed circumstances under which third level offsets could be substituted for eligible offset work; and
- (2) liquidated damages provisions were included under the Deeds in the event that prime contractors, for their own reasons, failed to meet their obligations.

6.59 The clear risk with this aspect of the project is the prospect that economic forces, such as rapid inflation in Australia, will make Australian industry uncompetitive and thereby allow, under the Deeds, the prime contractors to dilute their obligations to make offset purchases. The prospective gain of \$370 million (at January 1981 prices) might not therefore eventuate.

6.60 In later evidence Defence advised that 'by end January 1985 firm eligible offset orders had been placed with Australian firms under the F/A-18 program to a cumulative value of an ... equivalent total of approximately \$A53.6 million'.<sup>23</sup>

#### Workarounds

6.61 Workarounds are manufacturing arrangements which allow a project to proceed without being stopped by a delay in providing, for example, the investment and production infrastructure on time. Mr F.N. Bennett, under questioning retracted his initial evidence that workarounds had not occurred.<sup>24</sup> The particular instance related to establishing a chemical milling facility at the Government Aircraft Factory. Mr Hider acknowledged that 'there is some work which, had the facility been established earlier, would have been accomplished.. it is uncertain whether the negotiations ... with McDonnell Douglas... will be able to retrieve that work load, it may not'.<sup>25</sup>

6.62 The Committee noted that the scheduling of investment, such as the above-mentioned chemical milling facility, clearly has an impact on the success of the AIP arrangements, particularly if designated work had not been performed to time and cost schedules.

#### Industry Involvement in AIP Deeds

6.63 The Committee received representations that some of the initial problems experienced with AIP arose because of the lack of involvement of Australian industry in the negotiations on the Deeds of Agreement with the US prime contractors.

6.64 Defence witnesses gave evidence that the contents of lists contained in the Deeds were based on prior advice from industry as to what could be produced. In addition to industry-wide discussions, the FMS arrangements required McDonnell Douglas and General Electric to solicit Australian industry to satisfy their designated work and offset obligations. The prime contractors were advised that the Government would not be receptive to proposals requiring the Government to duplicate production facilities already existing in Australia. That policy was in accord with the Industry Assistance Commission's Report on the rationalisation of the aircraft industry.

6.65 Discussion of this issue also encompassed the capacity of production facilities established under AIP arrangements to undertake maintenance contracts. The US Navy Project Office has the right to insist that facilities created for the F/A-18 production program are always available for that purpose. Defence witnesses indicated that on-going discussions were proceeding to ensure that production and repair and overhaul programs might be operated by the same sub-contractor, 'if we have people there with the ability to build engines, they must be able to fix them no matter what goes wrong ... there is day-to-day discussion and debate about the best way to handle that repair and overhaul task, as we begin to understand what the repair and overhaul task means in very particular terms'.<sup>26</sup>

21. Minutes of Evidence, op cit, pages 2402-3.

22. Minutes of Evidence, In Camera, pages 119-44.

23. Minutes of Evidence, op cit, page 2489.

24. Minutes of Evidence, op cit, pages 616-7.

25. Ibid, page 617.

26. Ibid, page 652.

6.66 Defence emphasised that the industrial capability created by AIP should be primarily directed towards production for the export market rather than reverting solely to ongoing RAAF maintenance work.<sup>27</sup>

**Timing**

6.67 The initial three aircraft have been delivered to RAAF Williamtown. Two of these were constructed and assembled in St. Louis, Missouri. Assembly at the Government Aircraft Factory, Avalon, which resulted in the delivery of the third aircraft early in 1985, is scheduled to be completed by May 1990. All told 73 aircraft will be delivered from Avalon.

6.68 Flying operations commenced in the United States in February 1985 following the completion of US Navy testing of changes to the configuration. The fighter Operational Conversion Unit (OCU) at Williamtown began operations in May 1985 and in January 1986 will commence the training of air and maintenance personnel to equip the three operational squadrons.

6.69 The three operational squadrons will be activated during 1986, 1987 and 1988 respectively. Tindal, NT, will be the last squadron to be equipped with the F/A-18. A decision on timing is related to the capital program for upgrading the Tindal Base.

**Management of the F/A-18 Project**

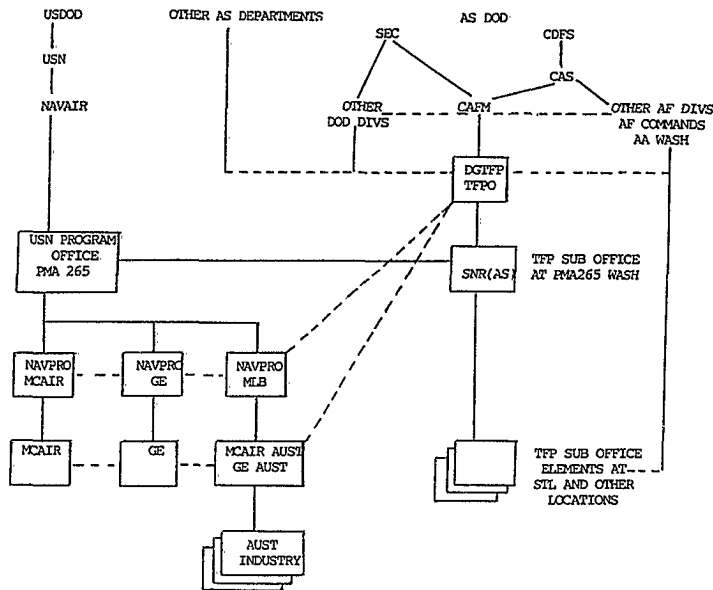
6.70 The management arrangements for the \$3.4 million F/A-18 Project are complex. The relationship between major elements within the management system have been extensively documented and to date the structure appears to be working satisfactorily.

6.71 The Project Management and Acquisition Plan (PMAP) and the Logistic Management Directive (LMD) define the responsibilities of the United States Navy, as the representative of the United States Government, and the functions performed by the Tactical Fighter Project Office (TFPO) and other RAAF and Australian Government organisations. The responsibilities of the prime US contractors, McDonnell Douglas (MCAIR) and General Electric (GE), for implementing AIP, are detailed in these documents as well as separately under AIP Deeds of Agreement negotiated between the Australian Government and MCAIR and GE.

6.72 The basis for the PMAP and LMD, as is customary with FMS arrangements, was the Memorandum of Arrangements signed between the two Governments. Details have been developed in Letters of Offer and Acceptance (LOA).

27. Minutes of Evidence, op cit, pages 653-7.

FIGURE 6.1 : Management Arrangements - F/A-18 Tactical Fighter Project



(Source, Minutes of Evidence, p 542)





6.73 The initial eight LOAs covered:

- the 75 aircraft;
- Alternate Mission Equipment;
- long lead spares and support equipment;
- spare engines;
- technical publications and data;
- familiarisation training; and
- program management services by the US Navy

6.74 A further 17 LOAs have been accepted covering other aspects of the Project.

#### RAAF Management

6.75 RAAF maintains central responsibility for managing the Project. That responsibility, vested in the Chief of Air Force Materiel (CAFM), has been devolved as follows:

- CAFM retains overall responsibility for introduction of the aircraft into service;
- Tactical Fighter Project Office (TFPO) being responsible for implementation, and acting as a co-ordinator of Australian Government activities;
- TFPO Sub-office in Washington being responsible for all activities associated with the Project in the United States; the staff are collocated with the F/A-18 Project Management Office established by the US Navy; and
- A Project Procurement Team Leader (PPTL) and TFPO Sub-office at St. Louis, work to the TFPO Sub-office, Washington, on functions relating to spares assessment and procurement.

6.76 Consultation is maintained between the TFPO and other Divisions within Air Force and Defence Central which carry functional responsibilities.

#### United States Navy (USN)

6.77 The USN F/A-18 Project Management Office exercises project management for the United States Navy and FMS customers. USN responsibilities include:

- implementation of all LOAs;
- provision of contracting services;
- management of FMS logistic support;
- contract administration in United States and Australia through Naval Plant Representative Offices (NAVPROS); and
- responding as requested to Australian requests.

#### Australian Industry Participation Program

6.78 Under the AIP Deeds the two prime contractors, MCAIR for the aircraft and GE for the engine, have established subsidiary companies in Australia to meet their obligations.

6.79 AIP activities are:

- monitored by the TFPO; Defence Industry and Materiel Policy Division (DIMP) exercising policy overview;
- supported by the Office of Defence Production; and
- oversights by the Melbourne NAVPROS.

#### Williamstown Facilities

6.80 Detailed management of the facilities program is the responsibility of a Department of Housing and Construction project manager working to an Interdepartmental Steering Committee.

#### Management Review

6.81 Periodic review of the Project is required and undertaken as Major Programme Management Reviews (PMR) each six months with the participation of the USN, RAAF, the US prime contractors and main Australian sub-contractors.

6.82 Progress with AIP is formally reviewed every three months. The two major Australian subsidiaries of the prime contractors have also incorporated stringent monitoring arrangements which have assisted to resolve manufacturing problems.

6.83 Regular management meetings also occur in Washington and St. Louis. Numerous reports are prepared as a result of the review process. The major ones issued by the TFPO include:

- (1) Executive Review Reports
  - bi-monthly reports to senior Departmental executives; and
- (2) Progress Reports
  - six monthly comprehensive reports.

6.84 The Committee concludes that the structure of management, and management review and reporting, appears appropriate to the tasks involved in the F/A-18 project.

#### Management Costs

6.85 The Memorandum of Arrangements limited the cost of US Navy project management services to 3 per cent of the cost of project items contracted before 31 December 1983. Defence advised that the 3 per cent was a standard cost of all FMS purchases, and that the Memorandum was written to protect against the eventuality that that rate may be increased.

6.86 Mr Hider expanded on this cost as follows:

there are two ingredients in ... the total cost of management. The 3 per cent administrative surcharge ... is applied on the purchase of all hardware items ... Beyond that there is a particular dedicated management effort for which we pay a direct cost....On the present estimates \$US89 million is the estimated actual total cost for project management services in respect to the F/A-18 acquisition committed thus far through FMS. That includes purchase of 75 aeroplanes, but there are some elements of the program which would be committed further in time and it is not certain yet whether they would be committed through FMS or not. If they were committed to FMS it would vary our estimation of that \$US89 million.<sup>28</sup>

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28. Minutes of Evidence, *op cit*, page 599.

6.87 The Committee sought from Defence witnesses whether, in their view, the \$US89 million may have been better spent in direct negotiations with the prime contractors, with the added advantage of having more Australians directly involved in the management of the project. The response was incomplete, suggesting that the issue was not given a great deal of consideration during deliberations on the benefits and cost of FMS purchases.<sup>29</sup>

#### Contractual Arrangements

6.88 Letters of Offer and Acceptance, which give effect to the arrangements expressed in the MOA, form the basis of contracts accepted to date to the value of \$US2,518.6 million.

6.89 In accordance with FMS procedures, the US Navy has been required to execute contracts for the 75 Australian aircraft and associated supplies and services on the same terms as obtained for its own purchases. Negotiation and consultation on these matters are maintained between the US Navy and the TFPO.

6.90 The contractual mechanism used in the Australian contracts accord with standard USN contracting procedures and include:

- initial stand-alone advance acquisition contracts which are definitive in all detail except price, and provide long lead funding for the next annual procurement;
- annual procurement of a proportion of Australia's total purchase to coincide with planned manufacturing schedules, followed by;
- execution of definitive contracts for each financial year's procurement which then subsumes the advanced acquisition contract.

6.91 Contractual arrangements for AIP have been executed separately between the Australian Government and the US prime contractors MCAIR and GE through the AIP Deeds. The US prime contractors negotiate purchase orders with Australian subcontractors either directly or through their US subcontractors. The Deeds carry penalty provisions for non-performance of AIP commitments.

6.92 Some contracts for the provision of machinery, plant facilities, fuel, and training of industry personnel are let directly by the Australian Government to fulfil Australia's commitments under the AIP Deeds.

6.93 Under cover of an audit agreement, DOD Financial Services Section personnel perform cost investigations on Australian subcontractors on behalf of USN. These cost investigations provide USN with information for definitive contract negotiations for the Australian program.

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29. Minutes of Evidence, *op cit*, page 601.

6.94 An aspect which interested the Committee was the delegation of quality assurance aspects, vested in the US Navy, to the Australian Director-General of Quality Assurance-Air Force for co-production work in Australia. Defence advised that formal delegations for 23 of the 46 AIP tasks had been granted. Many of the other tasks by their nature were not subject to quality assurance.

6.95 Figure 6.4 outlines the contractual inter-relationships between the four major partners in the Project.

6.96 Changes to FMS contracts for the F/A-18 aircraft and associated equipment can occur through Engineering Change Proposals (ECPs).

6.97 Detailed procedures for the management of ECPs was provided by Defence.<sup>30</sup> The number of ECPs initiated since December 1981 was commented on by Group-Captain Giles, Director Engineering, TFPO:

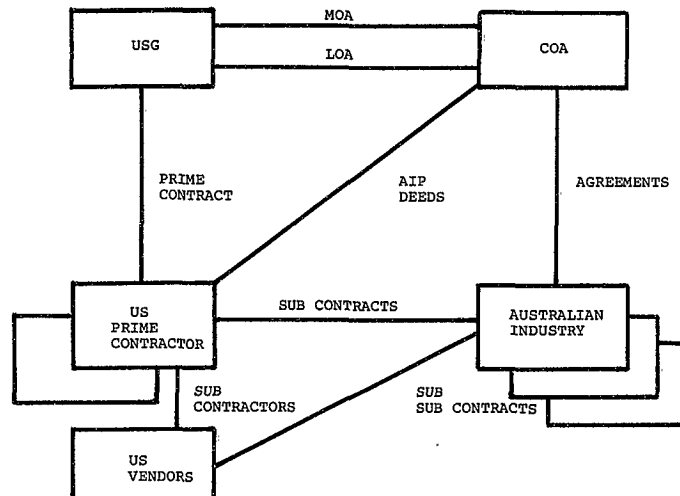
These ECPs ... have come into effect since the aircraft selection was announced...the contractual situation was not particularly relevant to our decision to start accepting ECPs. There was a configuration baseline identified at the time of the original signing of the letters of offer and acceptance and we subsequently required that we examine all subsequent changes with relevance and applicability to our aircraft and make decisions as to whether we wanted to keep our configuration tracking with the US Navy or not...the number approved by the US Navy or by the RAAF, since the selection, is 95. All but two of those were initiated by the US Navy, MCAIR or McDonnell Douglas.

The estimated cost of those 95 ECPs is \$A16.81 million for the whole fleet.<sup>31</sup>

30. Minutes of Evidence, op cit, pages 548-54.

31. Ibid, pages 941-3.

FIGURE 6.4 : F/A-18 Program - Contractual Inter-relationships



(Source, Minutes of Evidence, p 544)

6.98 Group-Captain Giles provided information on the handling of the ECPs, including the time taken to process a request received from US Navy or prime contractors.<sup>32</sup>

6.99 Defence subsequently advised that in addition to the 95 ECPs mentioned above, 75 ECPs applicable to the F404 engine and relevant to the RAAF F/A-18 aircraft were developed by GE, introduced by US Navy, and accepted by the RAAF.<sup>33</sup>

#### Spares and Follow on Support

6.100 The Committee examined closely the question of the acquisition of spares and follow-on support provision for the life of the aircraft. The Acting Chairman put the proposition in these terms:

I have heard of other cases of aircraft where we have had to wait an indeterminate period to get bits and pieces because the manufacturer has closed down, or we have had to get parts made specially... we have had to buy long term spares or wait a long time to have all aircraft fully operational, or to have the stock of spares required. Now I do not want us to get into a similar situation with these aircraft.<sup>34</sup>

6.101 Several issues emerged from the evidence. First, whilst substantial capability within Australian industry was being developed under AIP arrangements for the production of the aircraft, there would be difficulties in industry producing spares at the same time. A capacity to make spare parts would be available following the completion of the production phase.<sup>35</sup>

6.102 Second, there were a number of items 'for which there is no current capability in Australia or prospect for it to be economically introduced'. Extra stocks for the following items will be held:

- several hydraulic servo and solenoid valves;
- optical assemblies in the Flight Director System;
- gyroscopes and accelerometers in the Inertial Navigation System; and
- several electronic devices such as radio frequency amplifiers and detectors, oscillators, power dividers, phase comparators and wave guides from the Radar and Fire Control Systems.

32. Minutes of Evidence, op cit, page 944.

33. Ibid, page 2500.

34. Ibid, page 631.

35. Ibid, page 626-7.

6.103 Third, a three-year assessment period is used. Air Vice-Marshal Heggen commented:

Part of the logic of this three years is that we have found with experience that we need to provide ourselves with a three-year lead time to enable the normal repositioning system to establish a data base that will allow us to replenish at a rate which is appropriate to the actual usage rate. So with every capital equipment project we buy a three-year supply of spares on the assessment that we make without having the experience of operating that piece of equipment. So it is an assessed period of time that we allow ourselves to bring the running system up to speed.<sup>36</sup>

6.104 Fourth, procurement of spares will be phased being bought as each squadron is activated. Spares being procured now are confined to the first F/A-18 squadron being formed at Williamstown.<sup>37</sup>

6.105 Fifth, a support definition team established in St. Louis in February 1982 had to be increased within a year by ten officers in order to complete its report on time, that is the dimensions of the task were originally under-estimated. Air Cdre Roser outlined the nature of that report which became available in January 1984:

It was, in fact, a management system introduced to enable us to get greater visibility on the logistic support requirements, particularly with respect to automatic test and support equipment. It will show for each aircraft system that has to be maintained what support equipment is necessary... It will identify for those areas where long term support is not available what interim support is required.

Acting Chairman: Has the deferral of support expenditure created significant problems for the interim support of the Operational Conversion Unit and the first operational squadron?

Air Cdre Roser: No, it has not created any problem for the OCU. There could possibly be a problem with the first operational squadron... interim support was always part of our project support management... financial constraints have forced (us) to increase that interim support.<sup>38</sup>

36. Minutes of Evidence, op cit, page 632.

37. Ibid, page 633.

38. Ibid, page 635.

6.106 In later evidence, Group-Captain Giles commented as follows:

I should comment on where we are now in establishing more accurately what our supportability situation is going to be. We have progressively... acquired a better understanding of what our needs are and support in every area. Over the recent months we have tasked the team in St. Louis to perform a detailed study, using the most current data, of the supportability costs for the whole project, including not only outright costs but also the progressive expenditure requirements necessary to support the squadrons as they are activated...

The configuration management plan is a document which we developed during a project phase to hand on to our running support system to direct it on how the configuration of the aircraft, all its ancillary systems, support systems and documentation, are maintained...

..(the) formal issue of the initial maintenance plan for the aircraft is imminent... we have project maintenance plans in existence now which we are using for planning purposes and, in the main, maintenance allocation judgements have been made... some of these will change as we gain better experience.<sup>39</sup>

6.107 In relation to these matters Defence witnesses cited a number of factors bearing on support arrangements:

- . information on the maintainability of the F/A-18 has improved and pointed to lower requirements than at first had been anticipated;
- . the slow build-up of aircraft (22 by the end of 1986) was an advantage;
- . an important consideration in developing a facility for placing work between industry and Service was to retain competition in industry; and
- . generally there was a two-year lead time in acquiring ground support equipment.

6.108 Air Vice-Marshal Heggen commented:

Ground support equipment, in our terminology is the equipment at the maintenance unit required to support the aircraft and its systems. The ground support equipment that industry needs to do overhauls of the engine and airframe will already have been in place because it was necessary for the manufacture.<sup>40</sup>

6.109 GAF and CAC have been selected for depot maintenance of the airframe and engine respectively.

#### Financial and Cost Aspects

6.110 The Committee expresses concern over a number of financial aspects relating to the F/A-18 Tactical Fighter Project. These are discussed under the following sub-headings.

#### Approved Costs

6.111 On 20 October 1981 the Minister for Defence approved the selection of the F/A-18 at an estimated project cost of \$2,427.396 million.

6.112 The Committee noted that the approval, based on August 1981 prices, used an exchange rate then applicable of \$A1 = \$US1.1484.

6.113 In August 1983 the Government approved a revised project cost (in December 1982 prices) of \$3,396.030 million. The increase of \$968.634 million over the October 1981 approval was stated by Defence as being due to:

- . economic escalation: \$308.443 million; and
- . exchange rate variation: \$777.638 million.<sup>41</sup>

6.114 Under questioning, Mr Hider observed, in relation to economic escalation:

... very specifically, the term economic escalation is taken to mean those normal forces of inflation which appear in terms of cost of labour, costs of materials... in the context... of the movement of project cost estimates... economic escalation really boils down to labour and material costs.<sup>42</sup>

39. Minutes of Evidence, op cit, pages 927-30.

40. Minutes of Evidence, op cit, pages 645-6.

41. Ibid, pages 526-7.

42. Ibid, page 583.

6.115 The Committee was not persuaded that the economic escalation, that is higher labour and material costs, should be described by Defence in terms of a net real reduction in project costs.<sup>43</sup> For that to be accurate all prospective labour and material costs would have had to be re-worked and compared with the general rate of inflation over the period August 1981 to December 1982.

6.116 With respect to exchange rate variations, Mr Hider commented:

If we saw any significant event or circumstance that would call into question the soundness of the most recently approved project cost estimate we would be bound to present a new project cost estimate to the Government for its consideration and approval.<sup>44</sup>

6.117 Certainly, the general devaluation of the \$A by 32 per cent between August 1981 and December 1982 was a significant event. The Committee was puzzled why the further decline in the \$A during 1985, should not equally be described as significant. That decline will add at least \$A700 million to the project. Equally perplexing was the statement that 'an up-to-date breakdown of the estimated costs cannot be provided until the revised total project cost is approved'.<sup>45</sup>

6.118 Defence has delayed seeking such an approval. A three year delay in updating project costs is unacceptable. There can be little doubt that in current price levels, and possibly in real terms also, the project cost is considerably in excess of the \$A3.4 million approved in August 1983. No information was provided on the price indices used to measure whether there has been a real price change.

#### Unit Costs of F/A-18 Aircraft

6.119 The Committee sought information on possible reductions since October 1981 in the unit 'fly away' costs of the F/A-18 aircraft. Defence indicated that costs have fallen for the US Navy acquisition as follows:

FY 1982	\$US 22.5 million per aircraft
FY 1983	\$US 20.8 million per aircraft
FY 1984	\$US 20.2 million per aircraft. <sup>46</sup>

6.120 Any assessment of the impact of these economies on the total project cost is affected by the designated project work carried out in Australia, and whether the FMS arrangements ensure that the apparent advantages evidenced by the above figures are passed on in the Australian contracts. Little information was provided to the Committee on these matters. Clearly a revised project cost should account for such apparent cost changes.

#### Financial Payments under FMS Arrangements

6.121 Initial estimates under the FMS arrangements for periodic payments were very wide of the mark, and the Committee sought more details as to the method of payment for the Project.

6.122 Mr Bennett provided information on the standing arrangements for FMS whereby a trust fund, controlled by the Australian Government, is maintained at an agreed level in the United States. Quarterly payments are made from the trust fund on the basis of actual expenditure on this and other FMS projects.<sup>47</sup>

6.123 The Committee expressed concern that the shift of payments from the early period of the Project will increase the project cost, in current year terms, because of the general weakening of the \$A.

6.124 The Committee sought evidence from the Department that it was adequately monitoring the rate of progress on work schedules undertaken by the prime contractors to see whether there were serious over-estimation of forecast payment schedules.

Mr McLeay: ...Have you set up a mechanism to ensure that when future letters of agreement are drawn up, you are more accurately able to assess what the US Government's estimates of cash flows are?

Mr F.N. Bennett: As I said, these matters have been placed under intensive management by the US authorities and for that-

Mr McLeay: No, I am asking what you have done. You have told me they put it under intensive -

Mr F.N. Bennett: That action has resulted from the actions that we undertook in representing these matters to the US authorities ... I do not have any reason to believe that there has been any detriment to this program, or other Defence programs, by the fact that we have had the opportunity to make some of the payments later than was originally envisaged.

Mr McLeay:...So... a difference of about \$200 million in the estimates, which is going to cause some considerable lumpiness...what effect will that have on the programming of payments within the Defence Department?

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47. Minutes of Evidence, op cit, page 589.

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43. Minutes of Evidence, op cit, page 527.

44. Ibid, page 583.

45. Ibid, pages 2465-6.

46. Ibid, page 587.

Mr F.N. Bennett:... we have made clear to the United States authorities that we do not believe that we should be faced with lumpiness in our program as a result of differences between their estimates of the rate of payments and the actual bills that came in.<sup>48</sup>

6.125 Financial monitoring and cost control is the responsibility of the US Navy as project managers. The Committee expressed concern as to the performance of the US Navy Project Office in this respect during the early years of the Project.

#### Financial Liability for Defects

6.126 At the time the Government made its decision to acquire the F/A-18 aircraft there were aspects of its design and performance which, following initial operations by other air forces, continued to be subject to further development.

6.127 The Committee sought information from Defence on how aircraft defects, such as the reported tail fin cracks and wing flutter oscillations (impacting on missile aiming under certain configurations), were handled within the contractual arrangements.

6.128 The issue is complicated by the prime contractors using Australian sub-contractors for assembly of the airframe and engines. Defence witnesses described in some detail the role of the Air Force Quality Assurance Branch in identifying defective or discrepant items, and the warranties in force protecting the Government Aircraft Factory. Those warranties were incorporated in the contracts.<sup>49</sup>

6.129 Air Cdre Roser in later evidence noted:

McDonnell Douglas has publicly stated, in response to requirements laid on it by the US Navy, that it will bear the cost of the modifications to strengthen those tail attachments points. In the case of those aircraft where cracks have occurred that will mean repairs... McDonnell Douglas will meet the cost of those modifications.<sup>50</sup>

6.130 The Committee gained a qualified assurance that there would be no renegotiation of price should modifications to the design be necessary and undertaken at the direction of the US Navy prior to acceptance of the aircraft.<sup>51</sup> The Committee noted

48. Minutes of Evidence, op cit, pages 594-5.

49. Ibid, pages 604-8.

50. Ibid, page 667.

51. Ibid, pages 669-72.

press comment in October 1985 concerning fatigue life of the wing attachment bulkhead, and statements from Defence officers concerning their confidence in the strength and coverage of the warranties.<sup>52</sup>

6.131 Air Vice-Marshal Heggen, in evidence on the wing oscillations, suggested ... 'we want to see them eliminated, but they do not impose operational constraints on us'. Air Cdre Roser added that the US Defense Department gave its final clearance for the aircraft to operate in the attack role in March 1983.<sup>53</sup>

6.132 It was apparent to the Committee that differences existed between the RAAF and the US Navy on the issue of service lifetime. RAAF required a greater service life and durability than reported of the US Navy, seeking fatigue testing for four simulated lifetimes. The following exchange illustrates the concern:

Mrs Mayer: So when the original decision was made, the database on which you made that decision you regarded as being sufficient for making decisions about an operational life.

Mr F.N. Bennett: Yes.

Mrs Mayer: Even though basically the evidence was 10-year evidence.

Air Cdre Roser: We are not talking about the whole of the aircraft having a life of 10 years. We are confident that the aircraft has a fatigue life that will last the 20 to 25 years that we are looking at. There are certain components .. we would like to have tested with greater stringency so that we have a better feel for what the life of those components may be ...<sup>54</sup>

6.133 Until more up-to-date project costs are available it is difficult for the Committee to be certain that the Government will not bear additional financial burdens as a result of the process of modifications to design during production. Certainly the cost efficiency of retro-fits should be available as an alternative course of action.

52. National Times, October 18-24, 1985.

53. Minutes of Evidence, op cit, page 675.

54. Ibid, pages 679-80.



Illustration 7.1 A RAAF F3 Orion Long Range Maritime Patrol Aircraft  
Department of Defence



## CHAPTER 7

### ADDITIONAL P3C ORION AIRCRAFT PROJECT

#### Synopsis

During the late 1970s the Air Force examined options to modernise the Orion aircraft used in long range maritime patrol roles. The project was aimed at acquiring an aircraft as common as possible to the existing P3C (purchased in 1978), with Barra Anti Submarine Warfare System and production changes developed since that time. This project was one of six selected by the Committee for examination.

The decision to acquire ten new P3C Orions from Lockheed was precipitated by an offer to accept ten P3B Orions as trade-in items under a commercial contract, and by an initial low tender price.

The price offered by Lockheed was revised upwards by some 25 per cent following a reduction in its production run. Government approval for the purchase and associated equipment modifications was given in June 1982 for an estimated cost of \$362 million.

Equipment requirements were well known and apart from the integration of sonic processors by Commonwealth Aircraft Corporation, contracts could be let on either a firm (to Lockheed) or fixed (to Marconi) price basis.

Oversight of quality assurance aspects of the aircraft production was sub-contracted to the US Navy. A RAAF Resident project team was also stationed at the Lockheed plant. A possible weakness of that team was its under-staffing during the initial year of the project, particularly in the area of contracts administration. Australian inexperience with commercial contracts in the United States may have led to a less favourable final costing.

The value of Australian Industry Participation (AIP), to be achieved by 1996, is \$US80.7 million - approximately one-third the value of the contract with Lockheed.

Acquisition and fitting of sonic processors has proceeded on schedule. To date the new Orion aircraft have also been delivered on schedule.

An important element in the project may be support equipment, in particular spares which are unique to the new aircraft. That aspect could have been under-resourced during early stages of the project.

Of note too was the impact of the unprogrammed large initial payment to Lockheed on the then priorities established in the FYDP. The benefit/cost of 'windows of opportunity' were not readily identified by Defence.

## Introduction

7.1 The Air Force has employed Lockheed Orion P3B and P3C aircraft for nearly twenty years in a Long Range Maritime Patrol (LRMP) role. The P3C aircraft acquired in the late 1970s have also been equipped for Anti Submarine Warfare (ASW) roles. As a result of the latter role, with its high level of technology in avionics, extensive support facilities at the Edinburgh base have been built up.

## Project Definition

7.2 During the late 1970s the Air Force commenced an examination of possible modernisation of the aging P3B fleet, including an extension of their Life of Type (LOT). An Equipment Acquisition Strategy was issued in July 1980 following consideration of the proposal, in April 1979, by the Force Structure Committee (FSC).

7.3 In 1981 the modernisation proposal was costed at \$158 million. The Committee noted in evidence by Air Vice Marshal Heggen, Chief of Air Force Materiel that, compared to the option of acquisition, modernisation would result in a potential savings of \$82 million.<sup>1</sup>

7.4 However, early in 1981 Lockheed made an offer to supply ten new P3C Orions and to buy back ten existing P3B aircraft for a total cost of \$US215 million. The trade-in allowance for each P3B aircraft was to be \$US6 million.

7.5 Because it was not possible to incorporate trade-in arrangements under Foreign Military Sales (FMS) arrangements a decision was taken to obtain the aircraft through an 'off-the-shelf' commercial buy. The offer of an agreed trade-in valuation for the P3B aircraft influenced such a decision.

7.6 During these deliberations, the United States Government because of budgetary restrictions announced a curtailment of US Navy purchase of the P3C aircraft. The lower US Navy order involved a reduced production level and a possibility that the production line would be closed in 1983. Pressure consequently was brought on the RAAF to increase its purchasing rate from Lockheed. Negotiations followed on the terms of possible purchase with the Government approving, in June 1982, the acquisition program for the Orion P3C aircraft.

1. Minutes of Evidence, *op cit*, pages 717-18.

## 7.7 The Government approval involved the following:

Acquisition from Lockheed of 10 P3C Orions, including the trade-in of 10 P3B aircraft.	\$US269.0m \$A258.0m (May 1982 exchange rates)
Acquisition of 10 sets of Barra (ASW) Sonics Processors and support equipment from Marconi Avionics, UK.	\$31.0m
Integration of the Sonic Processor by Commonwealth Aircraft Corporation	\$7.7m
Procurement of Government Furnished Equipment, modifications and support equipment from various US and Australian sources	\$58.5m
Project management	\$1.5m
Contingency	\$5.0m
	<hr/> \$A361.7m

7.8 The contract between the Commonwealth and Lockheed was and still remains the largest value commercial contract entered into on behalf of the RAAF by Defence.

7.9 The procurement was broadly defined as an aircraft as common as possible to the existing P3C (acquired in 1978), with a Barra ASW system and production changes which had been developed since that time. Equipment requirements were well-known and, apart from the integration of the sonic processors, contracts could be let on either a firm or fixed price basis.

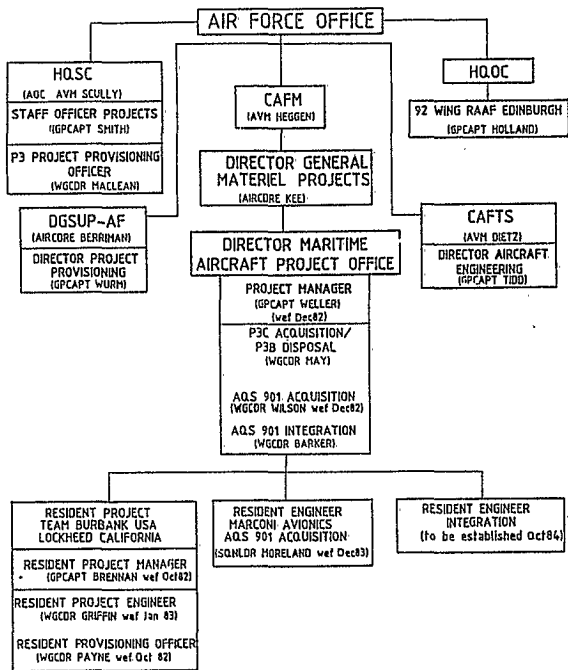
## Project Management Organisation

7.10 The organisation for project management illustrates two well-established principles followed by RAAF, that of matrix management with the Project Director drawing on functional areas, and the inclusion of resident project teams at the contractors' sites to represent Commonwealth interests in the areas of contract, project management, engineering, quality control and integrated logistic support.

7.11 The structure is as outlined in Figure 7.1.

7.12 Management functions, responsibilities and interfaces have been well-documented in the Project Management Acquisition Plan (PMAP) and appear to be working adequately. In terms of project scheduling the three procurements listed above are required to be co-ordinated so that the proposed in-service date of the P3C Orion aircraft of October 1986 can be met. The delivery of the first aircraft was received on schedule in November 1984.

Figure 7.1: Management Organisation - P3C Orion Aircraft Project



PROJECT AIR 72

(Source: Minutes of Evidence, page 714)

#### Contract Administration

7.13 The commercial contract with Lockheed had a firm price of \$US269 million, which at the time of contract signature was equivalent to \$A258 million.

#### Contractor Performance

7.14 A Contract Administration Officer (CAO) was established as part of the resident project team at Burbank, USA, to oversight Lockheed's production. The responsibilities and authority of the project team were specified through the issue of Terms of Reference. The Contracts Administration Officer has particular regard to financial and production milestones specified in the contract.

7.15 Opposite Defence's CAO is a management staff from the US Navy procured to undertake quality assurance aspects of subcontractors with respect to sub-assembly, aircraft components and piece parts. The estimated cost of those services was \$800,000 for the life of the contract.<sup>2</sup>

7.16 Subsequent to the signing of the contract, RAAF accepted 21 contract change proposals. The changes were primarily non-financial in nature, serving to amplify or clarify clauses in the contract. Two significant financial changes involved the supply and fit of an improved auxiliary power unit and turbine inlet temperature gauges. Each of these Engineering Change Proposals (ECP) were accepted on the basis of improved performance and reliability, and a proportional financial offset negotiated.

7.17 The Committee noted that the position of Contracts Administrator was not permanently filled until 12 months after the resident team at Burbank had been established. Contract administration required a high level of management effort during the early phases of the project, and project team members, particularly the Resident Project Director, were re-assigned from other important tasks.

7.18 Two quotations from the reports prepared by the Resident Project Manager are pertinent in this regard:

The commercial nature of this project would appear to have been under-estimated in respect of the management effort involved in soliciting, negotiating and processing orders to the (US Government) Tender Board stage. The formulation and agreement of terms and conditions, particularly Australian industry participation, pricing and terms of payment acceptable to a vendor, the RAAF and the Tender Board has been both lengthy and tedious,<sup>3</sup> and

2. Minutes of Evidence, op cit, page 739.

3. Department of Defence, Additional P3C Orion Project, Resident Project Manager Burbank, Project Progress Report No 9, paragraph 41(b).

in relation to a sponsored conference on procurement:

the meeting provided parties with an appreciation of the problems involved in contract negotiations in the US, and the statutory viewpoint taken by the Washington Tender Board regarding contractual negotiation ... while the sensible application of basic RAAF guidelines will normally result in effective procurement, there can be no doubt that the lack of formal training can reduce the potential for significant cost savings ... reductions as high as 20 to 30 per cent are not uncommon, nor unexpected in the US commercial environment.<sup>4</sup>

#### Aircraft Acquisition and P3B Trade-in

7.19 With respect to the P3B trade-in, aircraft were handed to Lockheed at about six week intervals commencing in mid-1984. Early in 1984 one P3B was damaged in a ground fire at Edinburgh, SA, and was not available as a full trade-in item. The P3B fleet will be reduced to 15 by June 1985. During 1984 Lockheed inquired whether P3B spares could be procured with the trade-in aircraft. Due to the large area of commonality between P3B and P3C aircraft, and the need to ensure the continued airworthiness of the remaining P3B aircraft, RAAF was not willing to take up the offer.

7.20 The value of Australian Industry Participation (AIP) to which Lockheed is obliged to achieve by 1996 is \$US80.7 million. Progress will be monitored by biannual reports from Lockheed.

#### AQS-901 Sonics Terminal Equipment

7.21 Because of a Memorandum of Understanding (MOU) between the Governments of Australia and the United Kingdom, the latter Government was responsible for the negotiation and management of the contract associated with the procurement from Marconi Avionics, UK, of the AQS-901 Sonics Terminal Equipment. Spares needed for the additional P3C avionics were included in the contract valued at \$36 million. Contract management meetings convened by the United Kingdom Government were held regularly.

7.22 The Maritime Aircraft Project Office (MAPO) maintains direct liaison between the designated Project Director for the P3C project and a resident project engineer located at the Marconi plant.

#### Integration of AQS-901 Sonic Processors

7.23 A contract was signed on 10 May 1984 between the Commonwealth and the Commonwealth Aircraft Corporation Ltd (CAC) for the installation of the AQS-901 Sonic Processor and Ancillary Modifications into the 10 additional P3C aircraft.

4. Resident Project Manager Burbank, Project Progress Report No 3, paragraph 33.

7.24 The installation work on the initial aircraft was completed in mid-August 1985, with the final installation being ready by September 1986. The contract price of \$6.525 million is based on firm manhours and a fixed quantity of material, with the contract specifying areas of cost variation. Progress payments are being made on the basis of the contractor, CAC, achieving specified performance milestones.

7.25 The contract requires regular reports from CAC including work breakdown listings and associated PERT charts. A RAAF Resident Engineer has been established at CAC in line with the practice followed at Marconi and Burbank.

7.26 Management of the integration phase of the project has followed the standard matrix model involving (five) RAAF authorities with responsibilities for engineering and operational aspects, GFE, contract administration, support and Technical matters. As with other RAAF projects a Local Technical Committee has been established to resolve issues. That Committee is overlaid by a regular Project Review by agencies concerned meeting as each Major Technical Milestone is achieved.

#### Procurement of Spares and Other Support Equipment

7.27 The cost of support equipment (spares, technical publications, training and ground support equipment) represents some 12 per cent of the total project cost.

7.28 Defence advised the Committee that an Integrated Logistic Support (ILS) cell, modelled on Headquarters Supply Command in which engineering and supply personnel work on the definition and procurement of support requirements, was established in the Resident Project Team at Burbank.

7.29 An important project objective is to acquire aircraft as common as possible to the existing P3Cs held by the RAAF. Accordingly priority in aircraft support was given to the identification and procurement of unique items. A report from the Resident Project Office indicated that the equipment configuration definition task was hampered by 'the lack of computer support for processing the myriad of listings', and the reluctance of Lockheed to provide such details to a customer.

7.30 The Committee noted three aspects of the support element of the project:

- (1) the emphasis on 'commonality' may well have been excessive in the light of component obsolescence since the original purchase of P3C Orions in 1978. By the end of October 1983, the Resident Office had approved 365 Class II Engineering Changes to incorporate currently available components;

- (2) budgetary constraints bear heavily on the procurement of support equipment. There was evidence that the phasing of procurement may have compromised optimum economic purchasing arrangements, making this area an inefficient link in capital procurement; and
- (3) the omission in the prime contract for procurement of spares and support equipment relating to the Orion aircraft. Evidence given to the Committee indicated that Defence believed that 'rather than contracting with Lockheed for spares at a particular price, we are able to exploit the opportunities for buying by examining the options of direct commercial buy from the supplier, or through the US Navy co-ordinating those buys with US Navy buys'.<sup>5</sup>

7.31 Following the hearing Defence provided the following figures on estimated and actual expenditure on spares and support equipment.<sup>6</sup>

	82/83	83/84	84/85	85/86	86/87	87/88
Est. (\$Am)	Nil	6.807	17.07	14.247	5.251	Nil
Actual	Nil	7.640	01.959	(as at 31 Dec 1984)		

#### Contract Price

7.32 The Committee was concerned that Australia finally accepted a contract price which was 25 per cent greater than originally quoted and an earlier and shorter delivery timetable for the P3C aircraft. In response to these concerns Defence suggested:

- the delivery schedule was determined by the need by Lockheed to maintain an adequate (9) annual rate of production;
- the shorter delivery period enabled RAAF to phase out more quickly the costly P3Bs;
- the final contract was below the tender price;

5. Minutes of Evidence, op cit, page 727.

6. Ibid, page 2451.

a waiver of research and development costs for the Orion amounting to \$US6 million was won; and

- that Lockheed's initial unit cost quotation was based on a more economic production rate: this had been cut by at least 12 aircraft per year by US Navy.<sup>7</sup>

#### Quality Assurance

7.33 An aspect of the implementation of the contract was the monitoring of quality assurance at the Lockheed plant in Burbank. Evidence given by Defence indicated that RAAF quality assurance specialists were part of the Resident Project Team, and provided routine surveillance during the assembly of the Orion aircraft at one-sixth the cost which was to have been charged by the US Navy.<sup>8</sup>

7.34 Resident Project Team Reports also pointed to the relatively 'unsatisfactory' quality control exercised by the company, and the suggestion that the assembly schedule timetable overruled quality aspects. The evidence indicated that, as a consequence of RAAF measures during the assembly of the Orions, and the contractual power of the Quality Assurance Representative to reject items or components not meeting defined standards, the US Navy revised its approach to monitoring quality assurance at Lockheed plants.

7.35 The US Naval Plant Representatives Office (NAVPRO) management staff were engaged to enhance quality assurance of sub-contractors. Defence advised the Committee that more attention subsequently was being given by NAVPRO to the pre-assembly stages of production.<sup>9</sup>

#### Summary

7.36 In summary the procurement of the additional 10 P3C Orion aircraft has progressed according to schedule and should be completed by the due date of November 1986.

7.37 Final expenditure will be subject to the impact of the major devaluation of the \$A. Defence indicated, in August 1984, that a then \$38 million increase was largely due to exchange rate variations, and to possible contract price variations for installation of the Barra Sonic Processors obtained from Marconi Avionics, UK. The firm and fixed contract prices, being struck in overseas currencies, are clearly subject to the effects of exchange rate changes.

7.38 The management of the project, which is essentially acquisition of a known product, may have been complicated by the complexities of the commercial contract with Lockheed. Accordingly, the absence of a permanent Contracts Administration Officer for twelve months at the commencement of the project was

7. Minutes of Evidence, op cit, page 2453.

8. Ibid, page 735.

9. Ibid, page 2453.

a serious defect in the management. Resident Project Teams, with the limited but economical assistance of management services from the US Navy, appear to have adequately controlled aspects such as quality assurance, and specific support equipment.

## CHAPTER 8

### BASIC PILOT TRAINER AIRCRAFT PROJECT

#### Summary of Findings

8.1 The Basic Trainer Project was selected by the Committee as an example of a local design and development project. During the course of the inquiry it was examined by the Auditor-General.

8.2 The project is a significant one for the Australian aerospace industry which had not designed a military aircraft for some decades and for the RAAF which wanted a local design capability to provide spares, modifications and other engineering support for its aircraft.

8.3 Of the sixteen projects examined by the Committee, the Basic Trainer Project is one of the least successful. When the Committee examined the project in April and May 1985 design and development was thirteen months behind schedule and the estimated total project cost had more than doubled in nominal terms.

8.4 Following a government review the project has been restructured around revised RAAF requirements. A revised local design and development proposal was assessed against the licensed manufacture of an overseas aircraft design. In December 1985 the Government announced that it had selected the Swiss-designed Pilatus PC-9 as the new basic trainer for the RAAF.

8.5 The schedule and cost overruns were the direct result of:

- delays in commencing detailed design work while the sub-contractors brought their procedures up to the required standard;
- frequent design changes (iterations) by industry to produce design solutions which complied with the RAAF's specifications;
- additional work required by the large number of (minor) specification changes which arose out of the RAAF's assessment of the aircraft mockup; and
- the limited ability of either the RAAF or the AAC to agree to time or cost saving design options.

The sources of many of these difficulties lay with the AAC and its sub-contractors; specifically:

- industry's lack of recent aircraft design experience in general and its lack of experience in design to military specifications in particular; which
- caused industry to substantially under-estimate the magnitude of the design and development task,



Illustration 8.1

Model of the Wamira (A1.0) Basic Pilot Trainer Aircraft

Australian Aircraft Consortium Pty Ltd

- meant that industry took some time to bring its procedures up to the standards required before the RAAF would allow detailed design to commence, and
- reduced industry ability to subsequently make reliable estimates of the work required to complete design and development; and
- management problems within the AAC which made it difficult for the AAC to
  - co-ordinate the design effort, and
  - monitor the performance of its sub-contractors.

8.6 Notwithstanding industry's contribution, the Committee believed that the RAAF should take ultimate responsibility for the project's lack of success. In the first place, the RAAF's definition and evaluation of its requirements was inadequate with the result that the project was compromised at the outset by ill-considered and conflicting objectives, bad timing and poor estimates. Second, RAAF project management arrangements were not commensurate with the known risks of local design and development in which industry had no recent experience.

8.7 Project definition failed to examine satisfactorily:

- (1) the continuing justification for the RAAF's undergraduate pilot training concept as well as other options for meeting its training requirements;
- (2) the conflicting implications of the parallel ancillary project objectives of developing local design expertise which could be applied to meet the RAAF's overall aircraft support needs and of producing an aircraft with significant overseas sales prospects to sustain this expertise;
- (3) the service life of the existing basic trainer fleet and the timing of the project; and
- (4) industry's estimates to establish before the contract the AAC's capability to undertake the task to the time and cost proposed.

8.8 The subsequent project management arrangements suffered several serious shortcomings:

- (5) control over the project was divided between the Air Force Materiel and Technical Services Divisions which not only made project co-ordination difficult and frustrated the contractor but also allowed technical considerations to drive the project insufficiently constrained by cost and schedule considerations;



- (6) changes in key project personnel and limited on-site representation led to conflicting interpretations of RAAF requirements and administrative delays;
- (7) rigid and demanding RAAF design control procedures generated excessive additional design work thereby contributing to schedule slippages; and
- (8) little priority was given to implementing project management information systems which could have identified schedule and cost overruns and allowed the RAAF to take timely corrective action.

8.9 In the Committee's judgement, the project was overloaded from the outset with the multiple objectives of designing a robust trainer which would reduce the RAAF's training costs, developing local expertise in design to military specifications and providing opportunities for follow on sales for industry. The resulting demanding aircraft specification and the RAAF's insistence on strict compliance with military specifications appear to have produced an aircraft design whose complexity threatens high production costs and limited overseas sales prospects. Adequate project definition studies may have identified the penalties of meeting these requirements in full and suggested more cost effective options. Unfortunately, industry impatience and government statements of support for a local design provided irresistible pressure to get the project going as quickly as possible. The difficulties which subsequently befell the project were the result of RAAF and industry inexperience with designing an aircraft to military specifications. Industry under-estimated the magnitude of the design task but the RAAF added to industry's difficulties by its unrealistically rigid design control procedures. The weak project management arrangements which the RAAF adopted ensured that narrow technical considerations drove the project.

8.10 In a supplementary submission to the Committee on recent project developments Defence appears to have acknowledged the shortcomings of its project management arrangements. With respect to the future management of a restructured project, the Department stated that:

...Air Force office will retain a project office which will act as the focal point for all project activities. Responsibilities will be clearly assigned to minimise management difficulties at the interfaces, and to pursue the Commonwealth's interest in a thoroughly business-like manner. Any reorganisation of the project office will aim to ensure timely, open communications procedures and decision making.<sup>1</sup>

1. Minutes of Evidence, *op cit*, pages 2847-8.

## Project Overview

8.11 The Basic Pilot Trainer Aircraft project involves the acquisition of an aircraft to replace the existing CTM trainer which is expected to reach the end of its service life in the early 1990s. The project was approved by the Government in December 1981 on the basis of an Australian design called the Wamira or A-10. In June 1982 a contract was signed with the Australian Aircraft Consortium (AAC) for the detailed design, construction and flight testing of a prototype aircraft prior to the approval of full production. Because of schedule slippages and escalating costs in the design and development of the Wamira, the Government decided in July 1985 to reduce work on the Wamira and invite tenders from two overseas manufacturers and Hawker de Havilland Australia which in August 1985 took over the AAC and the management of the Wamira design and development. Tenders which closed on 16 September 1985 were received from Hawker de Havilland and Pilatus of Switzerland. Before work on the Wamira was cut back the AAC had estimated there was some nine months work remaining before the first flight of the first prototype aircraft.

8.12 On 16 December 1985 the Government announced its decision to acquire the Pilatus PC-9 aircraft. Sixty-nine aircraft would be built in Australia under licence with production commencing in mid-1986 and continuing into the 1990s. Hawker de Havilland was expected to be prime contractor for the manufacture of the PC-9.

8.13 The RAAF formulated demanding performance, durability and maintenance requirements for its new basic trainer. The RAAF wanted:

- a trainer aircraft which more closely met the needs of its undergraduate pilot training concept;
- an aircraft with a long service life and a low total life time cost;
- an aircraft with an expandable role capability, for example, as a forward air control aircraft; and
- a project which would
  - equip the Australian aerospace industry with an advanced design capability, and
  - offer good prospects for follow-on orders from overseas sales.<sup>2</sup>

2. Minutes of Evidence, *op cit*, pages 1427-8.

Department of Defence, *Air Force Staff Target 5044*, dated 25 May 1979, Annex A.  
 Department of Defence, *Air Force Staff Requirement 5044*, dated 22 October 1979, Annex A.

8.14 The RAAF initially required 64 (later revised to 69) aircraft to be delivered from mid 1986 when the "life of type" of the existing CT4 trainer was then expected to be reached. The life of type of the CT4 has since been revised to 1990.<sup>3</sup>

8.15 A RAAF requirement for a new basic trainer aircraft was raised in October 1978.<sup>4</sup> In July 1979 the Australian Aircraft Industry Study Group (AISG) commenced a funded feasibility study. The AISG report (July 1980) found that no available trainer design met the RAAF's requirements and recommended local design, development and production and the formation of a consortium comprising the members of the AISG to do the work. A Development Cost Plan and Detailed Development Specification was submitted in May 1981. (This first phase of the project cost \$4.3 million). In December 1981 the Government agreed to the local design, development and production of a basic trainer aircraft at a total project cost of \$155 million (August 1981 prices). In June 1982 a contract was signed with the Australian Aircraft Consortium (AAC) for aircraft design and development (Phase Two). Political events in Afghanistan had a direct bearing on Government support for the project.

8.16 Phase Two was to be managed by AAC with the bulk of the design and all manufacture being performed under agreed work sharing arrangements by the three main sub-contractors (and members of the consortium), the Government Aircraft Factory (GAF), Commonwealth Aircraft Corporation (CAC) and Hawker de Havilland (HDH). The contract, which was negotiated on a cost reimbursement basis, was for a price of \$35.9 million. The overall cost of Phase 2 was estimated at \$46 million (August 1981). Under the contract, phase 2 was to be completed in April 1987. The schedule adopted at the time of the contract signature provided for the completion of an aircraft mockup by December 1983, roll out of the first prototype aircraft by December 1984 and the first flight by February 1985.<sup>5</sup>

8.17 When the Committee examined the project in April and May 1985, design and development work had slipped some thirteen months behind schedule and the estimated cost of completing phase 2 had more than doubled. The first flight of the first prototype aircraft was then planned for March 1986.<sup>6</sup> The estimated cost of phase 2 had risen to \$94.8 million and the estimated total project cost to \$313.2 million (December 1984 prices). To March 1985, approximately \$43 million had been spent on the project.<sup>7</sup>

3. Department of Defence, Major Equipment Proposal, Project Air 5044, 23 October 1978, paragraphs 8.12,14-16,29. Minutes of Evidence, op cit, page 1426.

4. A detailed chronology of events is included at Annex D to the Department's submission, Ibid, pages 1451-2.

5. Contract between the Commonwealth of Australia and the Australian Aircraft Consortium Pty Ltd for the Design and Development of the Basic Training Aircraft for the RAAF, dated 4 June 1982, section 16. Minutes of Evidence, op cit, page 1437-8.

6. Ibid, page 1438.

7. Ibid, pages 1429, 1434, 1437, 1474.

8.18 The significant real cost increases and schedule slippages between 1983 and 1984 led to the establishment in October 1984 on an inter-department committee (IDC) to assess whether continuation of the project was justified at the predicted cost. The IDC reported in June 1985, several months late.<sup>8</sup> The IDC estimated the direct costs of the project to be in excess of \$350 million, and concluded that there was little scope for cost reduction under the existing management and contractual arrangements.

8.19 In July 1985 the Government directed Defence to quickly conduct a competition between a revised Wamira proposal and collaborative proposals from Shorts UK and Pilatus of Switzerland based on the licensed manufacture of overseas designs. Financial approval for Phase 2 was increased to \$70 million but industry activity levels were reduced to ensure funds would last until December 1985. Spending rates for the project are running at half those of earlier in the year. At last report the AAC had estimated that design to the current specification was 90 per cent complete.<sup>9</sup>

8.20 In December 1984 the Australian Audit Office conducted an audit of the Basic Trainer Aircraft project. The Auditor-General's Report, which was tabled in Parliament on 16 April 1985, was critical of Department of Defence management of the project. Audit found that the significant cost overruns and schedule slippages stemmed from poor estimates of project costs and under-evaluation of industry's ability to undertake the task. Project implementation suffered from the absence of effective monitoring and control over sub-contractor performance. Audit did not accept Defence's view that the continuing cause for delay and increased cost was the failure of AAC and its main sub-contractors to perform work for which the consortium had contracted.<sup>10</sup>

8.21 The Committee took evidence on the project from the Department of Defence at a hearing on 24 April 1985 and from the AAC at a hearing on 20 May 1985. Defence re-asserted the view it had put to the Audit Office that the cost and schedule overruns were principally the result of the Australian aerospace industry's poor initial estimations and its limited design management capability - deficiencies which the Department attributed to the industry's lack of current design experience. The AAC accepted that some responsibility for the cost increases and delays lay with industry but argued that inefficient Defence project management arrangements and the RAAF's determination to control and approve every element of the project in extreme detail added significantly to costs and time scales.

8. Minutes of Evidence, op cit, page 1452.

9. Ibid, page 2847.

10. Report of the Auditor-General, April 1985, pages 11-17.

## Phase 1: Project Definition

8.22 Many of the difficulties which have befallen the Basic Trainer project stem from inadequacies and omissions in the initial definition and evaluation of the project. The Committee found a number of shortcomings in the project definition studies which preceded Phase 2:

- 1) the RAAF did not review its existing undergraduate pilot training concept until Phase 1 had been effectively completed;
- 2) other cost saving options for meeting the RAAF's training requirements were not examined;
- 3) the original life of type estimates for the existing trainer fleet, on which project planning was based, were inadequate;
- 4) the funded industry definition studies significantly under-estimated the cost, time-scale and technical risks of local design, development and production and were not subjected to sufficiently rigorous evaluation before approval was sought to proceed with Phase 2; and
- 5) industry estimates of the overseas sales prospects of a local design were based on market research and appear to be very optimistic.

## The RAAF's Undergraduate Pilot Training Concepts

8.23 A major factor in the development of the RAAF's requirement for a new basic trainer aircraft was the aim to acquire an aircraft that more closely satisfied the RAAF's undergraduate pilot training needs. The current training concept, which was endorsed by the Chief of Air Staff in September 1978, calls for a basic training phase of 100 hours on a propeller driven aircraft and an advanced phase of 100 hours on a jet aircraft.<sup>11</sup> Because of performance limitations, the existing CT4 basic trainer is used for only the first 60 hours of student flight time. The remaining 140 hours is conducted on the Macchi MB326H advanced trainer. The resulting cost of training a student to 'wings' standard was considered unnecessarily high. The operating cost of a typical trainer of the type envisaged was estimated to be one half to one third that of an advanced trainer of the Macchi type. Further savings in training costs could be achieved by the likely culling of the majority of unsuitable students during the basic phase.<sup>12</sup>

11. Minutes of Evidence, op cit, page 1427-8.  
Department of Defence, Air Force Staff Target 5044, dated 25 May 1979, Annex A.  
Department of Defence, Air Force Staff Requirement 5044, dated 22 October 1979 Annex A.
12. Department of Defence, Final Report to the Force Structure Committee on the Exploratory Study for Replacement Air Trainers, dated 18 September 1980, paragraphs 6-9.

While the replacement basic trainer would have to possess sufficient performance to meet a 100 hour basic training phase, its overall performance requirements would be determined by two further considerations:

- the future possible need to adopt a 'stream' training concept (whereby students would be streamed from basic training to operational training eg, helicopters, transport aircraft, etc); and
- the present need for a forward air control capability.<sup>13</sup>

8.24 Early in the project it was reported that the objectives and costs of the RAAF's undergraduate pilot training would be reviewed after the results of the then current studies of replacements for the basic and advanced trainers were known.<sup>14</sup> When it considered the Aircraft Industry Study Group Report in March 1981, the Defence Force Structure Committee asked the RAAF to complete a re-examination of its undergraduate pilot training philosophy before a commitment was sought to the commencement of Phase 2.<sup>15</sup>

8.25 The RAAF told the Committee that this study had been completed and it had found that the existing training concept was more flexible than a 'streaming' concept, given the numbers of pilots trained.<sup>16</sup>

8.26 The Committee has not seen the report of the review of the RAAF's training philosophy. It is surprised however that a review of RAAF undergraduate pilot training concepts was not undertaken at the commencement of project definition.

## Other Cost Saving Training Options

8.27 The Committee is unable to find in the project records any analysis of alternatives to a new aircraft acquisition. The designer of the CT4 aircraft has been reported as stating that the airframe and wings of the CT4 has a long remaining life and the aircraft could be upgraded (by installation of a new engine and re-design of the tail plane) to meet the RAAF's basic trainer aircraft performance requirements for about \$400,000 each.<sup>17</sup> The option does not appear to have been explicitly considered when the Government re-structured the Basic Trainer Project in July 1985.

13. Final Report to Force Structure Committee, op cit, paragraphs 11-12.
14. Ibid, paragraph 2(b), second part.
15. Department of Defence, Minutes of Force Structure Committee Meeting, 31 March 1981, paragraph 29.
16. Minutes of Evidence, op cit, pages 1462-3.
17. "RAAF 'should recycle jet trainer'" Australian, 9 September 1985.

## Life of Type of the Existing Trainer

8.28 The RAAF's initial proposal for a new basic trainer (October 1978) was based on an assessment that the end of the service life (life of type) of the existing CT4 trainer would be reached in mid 1986.<sup>18</sup> In October 1979 when the RAAF's detailed requirements were issued to industry, the life of type of the CT4 had been re-assessed at mid 1988. This assessment was conditional upon full fatigue testing of the CT4 air frames and the acquisition of an additional 14 CT4s. Subsequent planning and major project milestones were based on a required in-service date for the new trainer of mid 1988.<sup>19</sup> The Department of Defence submission stated that 14 additional CT4 aircraft were acquired in 1981 and 'more recent fatigue testing now puts the estimated fleet life of type at about 1990'.<sup>20</sup> Present RAAF planning envisages deliveries of the new trainer aircraft commencing in late 1987 and completing in 1990 a year behind schedule.<sup>21</sup>

8.29 The RAAF told the Committee that full fatigue testing of the CT4 commenced in June 1983, independent of the Basic Trainer project, and had not been completed.<sup>22</sup> The extension of the life of type of the CT4 had cost nothing to date in terms of additional maintenance or modifications.<sup>23</sup> Any shortfall of CT4's below requirements could be met by life of type extensions or by the acquisition of additional CT4s.<sup>24</sup>

8.30 The Committee is concerned that the planning of the project is based on no firm data about the service life of the existing basic trainer fleet. The current estimated service life of the CT4 is 8,000 hours which will be reached at current rates of effort in 1990. However, an extension to 8,000 hours may involve additional costs in terms of maintenance and repairs.<sup>25</sup>

8.31 The postponement of the replacement of the existing CT4 fleet from 1988 to 1989 may incur financial penalties. In addition to the possible life of type extensions to the CT4, additional CT4 aircraft may be required after 1988 if current attrition rates continue.<sup>26</sup> There are also the savings foregone by the continued high use of the Macchi advanced trainer aircraft. The RAAF estimated that the likely savings in direct operating costs were between \$1 and \$2 million per annum.<sup>27</sup>

8.32 The consequent relaxation of project deadlines may have removed pressure on the RAAF to expedite the completion of the project and itself contributed to the schedule and cost overruns in Phase 2.

## Project Estimates

8.33 The Aircraft Industry Study Group feasibility study found that no existing aircraft design fully met the RAAF's requirements, an Australian design was feasible and the associated technical risks were low. The AISG Report estimated that local design, development and production would cost \$103.3 million at June 1980 prices (\$30 million or 30 per cent more than the licensed production of an overseas design). A prototype aircraft could be flight tested in late 1983 and the first production aircraft completed in early 1986. The report also concluded that overseas sales prospects for the aircraft were very good.<sup>28</sup>

8.34 Although the RAAF supported the Study group's recommendations it considered the initial cost estimates were inadequate and the proposed implementation schedule optimistic.<sup>29</sup> The RAAF also considered that there was 'a not inconsiderable degree of risk' attaching to the project and that the 'risk in predicting development and production schedules and hence costs was equally as important as technical risk and must be assessed as real and moderate'. Moreover, 'insufficient data was available from Phase 1 to support a fully reasoned judgement as to the extent to which the indigenous proposal would satisfy (requirements) ... Assessment cannot be made until the Detailed Development Specification and the Development Cost Plan for the indigenous proposal are received from industry and are analysed within the Department of Defence ... Deferral of the Phase 2 target date (from July 81) to December 1981 may be the more appropriate course. This would allow deliberate and thorough consideration of the competing options without necessarily introducing significant delays to the in-service date of the aircraft.'<sup>30</sup>

28. Trainer Aircraft Feasibility Conceptual Study, Final Report, Volume 1 - Executive Summary, June 1980.

29. Department of Defence, Report on the AISG Feasibility Study, September 1980, paragraphs 16, 21.

30. Department of Defence, Major Equipment Proposal, Project Air 5044, Issue No 4, March 1981, paragraphs, 22, 23, 44, 45, and 47.

18. Department of Defence, Major Equipment Proposal, Project Air 5044, dated 23 October 1978, paragraphs 8, 12, 29.

19. Department of Defence, Air Force Staff Requirement, 5044, dated 22 October 1979, paragraphs 1-7.

20. Minutes of Evidence, op cit, page 1426.

21. Department of Defence, Project Management and Acquisition Plan, issued September 1984, paragraphs 1-4  
Minutes of Evidence, op cit, page 1458.

22. Ibid, pages 1453-4.

23. Ibid, page 1458.

24. Ibid, page 1459.

25. Ibid, page 1460-1.

26. Ibid, page 2682.

27. Ibid, page 1462.

8.35 At the Defence Force Structure Committee (FSC) meeting in March 1981 the RAAF argued that a decision on Phase 2 be deferred until all Phase 1 studies had been received and evaluated. The FSC agreed however to include Phase 2 in the 1981-82 Budget.<sup>31</sup> On 1 December 1981 the Government agreed to the Australian design, development and production of a basic trainer aircraft at a total estimated cost of \$155 million (August 1981 prices). This figure was based on the RAAF's own update of the AISG estimates.

8.36 There was no agreed Development Cost Plan at the time Government approval to Phase 2 was sought. The initial Development Cost Plan issued in July 1980 was not accepted by the RAAF. Two variations were prepared by industry with the final variation being issued in May 1982 just prior to the finalisation of the Phase 2 contract in June 1982.<sup>32</sup>

8.37 In his April 1985 Report, the Auditor-General observed that 'there was a lack of firm financial information relating to the Australian design, development and production of a trainer aircraft at the time of project approval and this could have impacted upon consideration of other options'. Defence responded that 'the estimates included in the Development Cost Plan (DCP) and used by the Department were the best available at the time .... It was inappropriate to delay proposals pending an exhaustive review of the DCP by Air Force Office as this would have delayed the project by some six months.' The Auditor-General concluded that 'project costs should have been subject to a more rigorous review by the Department because of industry's inexperience in this type of work and the unique relationship between the Commonwealth, AAC and the main sub-contractors'.<sup>33</sup>

8.38 The Department of Defence told the Committee that it would have been unusual to go to Government for approval with a project so well defined that it had a formal Development Cost Plan.<sup>34</sup> Moreover, the Department did not enter the contract until it had an agreed cost plan.<sup>35</sup>

8.39 The Committee was not convinced that the best available estimates were adequate for going to the Government for approval. The subsequent refinement of the Development Cost Plan, which in any case delayed the contract date six months, did not improve the quality of the estimates. RAN equipment acquisition guidelines suggest that cost estimates with a confidence level of less than  $\pm 20$  per cent are not an acceptable basis of government decision and costings of between  $\pm 10$  and  $\pm 15$  per cent confidence levels are required for tender assessment and contract negotiation purposes.<sup>36</sup>

8.40 The Chief of Air Force Materiel acknowledged that among the lessons learned from the subsequent difficulties with the project was 'the need for some independent assessment of proposals approved by industry, that is, proposals offered outside the normal open tendering process'. Furthermore, 'we should as a matter of course implement some form of audit upon potential contractors to ensure that they have the expertise, the management organisation, the right staffing and facilities in order to provide some degree of assurance that they are capable of undertaking the task within the time and cost they are proposing'.<sup>37</sup>

#### Overseas Sales Prospects

8.41 The industry feasibility study also assessed the prospects for overseas sales of the Wamira as very favourable. However, industry's estimates were based on simple projections of the total world basic trainer aircraft market.<sup>38</sup> The assignment did not take into account the suitability for other air forces of the RAAF specifications to which the aircraft was designed nor the likely prospects for offshore procurement. For these reasons the Committee considers that industry's initial estimates of the Wamira's overseas sales prospects were very optimistic. The likely relatively high unit cost of the aircraft and difficulties encountered in aircraft design and development may have reduced sales prospects further. However, in July 1985 it was reported that Australia had signed a Memorandum of Understanding with China to investigate the possible co-production of the Wamira.<sup>39</sup>

#### Phase 2

8.42 Because of its concern about the industry's capability to meet the demanding requirements to cost on time, the RAAF insisted on the application of strong management control in Phase 2.<sup>40</sup> The contract signed in June 1982 provided for strict design and configuration control procedures and demanding project performance reporting requirements. Despite these contractual arrangements, Phase 2 slipped behind schedule and project cost estimates increased.

37. Minutes of Evidence, *op cit*, page 1514.

38. Trainer Aircraft Feasibility Conceptual Study, *op cit*.

39. Military Technology, July 1985, Page 121.

40. Letter from Chief of Air Force Materiel to General Manager, Government Aircraft Factory, dated 19 August 1981.

31. Department of Defence, Minutes of the FSC Meeting, 31 March 1981, paragraph 9.

32. Minutes of Evidence, *op cit*, pages 1478-80.

33. Report of the Auditor-General, *op cit*, page 12.

34. Minutes of Evidence, *op cit*, page 1478.

35. *Ibid*, page 1479-80.

36. Defence Instructions (Navy), Technical, 66-1 (issue 1/78, March 1978), Annex C.

8.43 The causes of the schedule and cost overruns are complex and are the subject of continuing disagreement between the RAAF and the AAC. The following analysis is based on information provided by the AAC, augmented by RAAF project records.

#### Schedule Slippages

8.44 According to the Department's submission, Phase 2 was 13 months behind the contract schedule as measured by the prospective date of the flight of the first prototype aircraft.<sup>41</sup> The slippage was the outcome of an eight month delay in the commencement of detailed design and a subsequent five month delay in actual design work.

8.45 Detailed design was scheduled to commence in June 1982 but did not commence until February 1983.<sup>42</sup> The eight month delay was caused by a six month delay in the issue by the RAAF of design approval to the sub-contractors and a two month delay in the commencement of the issue to the sub-contractors of detailed design documents by the AAC. The issue of sub-contractor design approval was delayed because of the time taken by the sub-contractors to 'get their procedures up to scratch' and supply the necessary documentation to the RAAF.<sup>43</sup> According to the AAC, the delay reflected the effort required to re-establish design development expertise in industry and the standards required by the RAAF.<sup>44</sup> The RAAF declined an AAC proposal to run the design approval process in parallel with the commencement of detail design work.<sup>45</sup>

8.46 The issue of the detailed design documents (DDD's) took eight months, one month longer than expected, and the bulk of the DDD's were issued towards the end of the period.<sup>46</sup> Priority was given to structural rather than system design which the AAC considered 'a rule of operation in a design and development exercise'.<sup>47</sup>

41. Minutes of Evidence, op cit, pages 1437-8.

42. Ibid, 1767.

43. Ibid, 1768.

44. Ibid, pages 1767-9.

45. Ibid, page 1793.

46. Ibid, page 1768.

47. Ibid, pages 1769-70.

8.47 In May 1985, 80 per cent of the design of the aircraft was complete but only two out of the thirty-five structural design packages and none of the estimated fifteen system packages had been accepted by the AAC from its sub-contractors. Two of the contractual major technical milestones had slipped substantially. The Cockpit Mockup Conference to establish the specification for the cockpit was scheduled for June 1983 but was not finalised until August 1984, a fourteen month slippage. The Installation and Access Conference to establish agreement on equipment installation and access for aircraft maintenance purposes was scheduled for July 1983 but was not finalised until April 1985, a twenty-one month slippage.<sup>48</sup>

8.48 The estimated five month slippage in detailed design work seems to be the outcome of two types of factors:

- (1) additional time taken to arrive at design solutions acceptable to the RAAF, ie 'design iterations', and
- (2) additional work caused by changes in the specifications especially those which followed the RAAF's assessments of the aircraft mock up.

8.49 The main design areas which experienced a large number of design iterations were:

- cockpit air-conditioning;
- seat configuration;
- under-carriage design; and
- overall design to meet structural life, maintainability and weight requirements.<sup>49</sup>

In the case of the cockpit air-conditioning, the AAC believed the RAAF's requirements could not be met.<sup>50</sup>

8.50 The major source of slippage in detail design work was the considerable additional work required by the large number of specification changes. Most of these changes, which were individually of a minor nature, arose out of the mockup assessments associated with the Cockpit Mockup Conference and the Installation and Access Conference. According to the AAC, the Cockpit Mockup Conference resulted in changes to improve cockpit vision which required an additional two months design work and in changes to improve cockpit layout which required another 'several

48. Minutes of Evidence, op cit, pages 1771, 1786.

49. Ibid, page 1783.

50. Ibid, page 1777.

months' additional work. 51 The impact of the design changes which were required to improve maintenance aspects following the Installation and Access Conference was more difficult to quantify but was probably in the order of four to five months additional work. 52 The AAC had expected that the mockup conferences would record required changes which would be incorporated later in the detailed design. However, the RAAF insisted on the incorporation of design changes in the mockup before the conferences were finalised.53

8.51 Two other design changes had schedule impacts namely the changes to passenger seating and the deferral of the crash worthy seat requirement. The AAC's decision to re-locate the fuel tanks from the wings to the fuselage to improve the aircraft's aerobatic performance had some unanticipated consequences for passenger seating. The subsequent design development took some months to complete. 54 The RAAF required a crashworthy seat for the aircraft. After lengthy design development the AAC persuaded the RAAF to drop the requirement for the time being to save further cost and delay. 55

8.52 The RAAF took a number of actions to contain these schedule slippages:

- providing technical and programming assistance to AAC;
- re-scheduling activities to run in parallel (design, assembly of the first prototype and structural testing are now running in parallel); and
- accepting some design compromises.56

However the Department's submission stated that 'these efforts have not been wholly successful'.57

51. Minutes of Evidence, op cit, pages 1778, 1787.

52. Ibid, page 1787.

53. Ibid, pages 1785-6.

54. Ibid, page 1510.

55. Ibid, pages 1512, 1778.

56. Ibid, pages 1437-8.

57. Ibid, page 1440.

#### Cost Increases

8.53 Between December 1981 and December 1984 the estimated cost of Phase 2 doubled in money terms. Table 8.1, based on the Contract Funding Reports compiled by the AAC, details the variations in Phase 2 cost estimates between 1982 and 1984.

8.54 The table suggests that the under-estimation of the time required to complete design and development work was the major factor contributing to the increase in Phase 2 cost estimates. Estimated design and development costs, which now account for just over a half of Phase 2 costs, increased \$28.918 million or over 60 per cent of the increase in total Phase 2 cost estimates. The estimated design and development manpower requirements, which now represent over 60 per cent of total Phase 2 manhour requirements, accounted for nearly 80 per cent of the increase in total Phase 2 manhour requirements.

8.55 The Committee had no objective data on which to calculate the cost impact of the schedule slippages discussed earlier. The AAC provided some estimates of its own which indicated that about 75 per cent of the increase in Phase 2 cost estimates represented re-estimations and design iterations and the remaining 25 per cent related to additional work arising from design changes and other tasks imposed by the RAAF.

#### Contributing Factors

8.56 The foregoing analysis suggested a number of factors which may have contributed to schedule slippages and cost increases in addition to the under-estimation problems discussed in the previous section:

- (1) the difficulty experienced in reconciling the conflicting ancillary project objectives of the development of export sales potential and the development of local design capability;
- (2) divided management responsibilities between technical and other aspects of the project;
- (3) the RAAF's design approval procedures;
- (4) the AAC's technical expertise and management systems; and
- (5) the RAAF's and AAC's inability to obtain early warning of cost and schedule overruns and to take timely corrective action.

TABLE 8.1

Variations in Phase 2 Cost and Manhour Estimates -  
Basic Pilot Trainer Aircraft Project

	June 1982 Contract (December 1981 approval)	December 1983 CER	December 1984 CER
	Million Manhours	Million Manhours	Million Manhours
Design and Development	20,990	819,265	49,908
Manufacture	17,154	485,646	671,179
Others*	9,550	46,814	14,750
Total	47,694	1,351,725	94,809

162

\* Testing, AAC administration, machinery and equipment, general support

SOURCE: Australian Aircraft Consortium Contract Funding Report December 1983  
Contract Funding Report December 1984

### Conflicting Project Objectives

8.57 The task of designing a trainer aircraft to the RAAF's requirement was made difficult by the parallel pursuit of other project objectives by the RAAF and the AAC. In addition to the acquisition of a suitable aircraft, the RAAF wanted to re-establish a local military aircraft design capability to meet its overall aircraft support needs; for example, in aircraft modifications and spares manufacture. The RAAF chose to pursue this objective by writing into its requirements, the application of military specifications and approval procedures.<sup>58</sup> Another major objective of the project was the development of export sales to defray design and development costs and to sustain the industry's acquired design capabilities. Design to military specifications itself was regarded as contributing to the marketability of the aircraft.<sup>59</sup> As aircraft design and development got under way however these parallel objectives of marketability and the development of design expertise came into conflict.

8.58 The conflict between these dual ancillary objectives was most evident in the varying interpretations given to the contractual specifications. The AAC told the Committee that its understanding was that the specification was a target which would not be met to the full letter of the law.<sup>60</sup> The AAC seemed prepared to compromise the specification when 100 per cent compliance threatened to affect cost, schedule and the marketability of the design. The RAAF, the AAC argued, was insisting on strict compliance with the specification (even when non-compliance would have no significant influence on the RAAF's aircraft performance requirements) with insufficient regard for cost and schedule effects.<sup>61</sup> The RAAF told the Committee that they were in a situation of designing an aeroplane to specification but not regardless of cost. They added however that 'undue compromise of the specification...would contribute to defeating the purpose of the project'.<sup>62</sup> The RAAF had accepted some design compromises to overcome cost and schedule overruns but this had not been wholly successful.<sup>63</sup> The RAAF doubted whether any further specification compromises would have achieved substantial savings since the source of the problem was, in their view, industry's limited design management capability.<sup>64</sup> Unfortunately neither the RAAF nor the AAC had had any recent experience in designing aircraft to military specifications.

58. Minutes of Evidence, op cit, pages 1474-5.

59. Ibid, page 1470.

60. Ibid, page 1775.

61. Ibid, page 1796.

62. Ibid, page 1483.

63. Ibid, pages 1438, 1440.

64. Ibid, page 1492.





8.62 The RAAF accepted that under these project management arrangements there was a risk that technical requirements might be imposed without sufficient regard to cost and schedule implications.<sup>68</sup> It considered however that the risk that 'technicalities will drive the rest in isolation' was minimised by the liaison arrangements between Air Force Technical Services Division and the Project Director and with the AAC via the local Technical Committees.<sup>69</sup>

8.63 The Committee took the view that these organisational arrangements did not ensure the adequate involvement of the Project Director in the vetting of technical changes nor effective liaison with the AAC. Further evidence of the project's weak co-ordination arrangements was provided by the fact that, although a draft was circulated in June 1982, the Project Management and Acquisition Plan was not finalised until September 1984.<sup>70</sup> According to Defence records, the issue of the document was delayed because of continual changes in the structure of the project within the AAC and the Air Force Project Office and the lack of urgency to issue the plan because adequate design control measures were considered to be provided in the Phase 2 contract and other documents.<sup>71</sup>

#### RAAF Design Approval Procedures

8.64 The Committee was concerned to ascertain whether:

- the RAAF may have adopted an unnecessarily rigid assessment of design solutions, by being insufficiently prepared to allow compromises to the specification and applying time-consuming formal change order procedures to relatively minor design change proposals; and
- the design approval process itself may have aggravated cost overruns and schedule slippage by delaying the expedition of design work and imposing additional work on contractors.

8.65 The Basic Trainer specification comprised the performance specifications stated in the Air Force Staff Requirement and the engineering solutions agreed between industry and the RAAF at the time of contract. The AAC told the Committee that they had anticipated that these engineering solutions could be modified as required.<sup>72</sup> However, all specification changes are subject to formal Engineering Change Proposal (ECP)

procedures which have been the cause of delays in some cases.<sup>73</sup> AAC project progress reports indicated that the large number of specification changes hampered the development of a configuration control baseline and made it difficult for the AAC to control the design.<sup>74</sup> The RAAF also accepted that there were administrative delays associated with specification changes (ECP processing times varied between days and months) but denied that they had incurred any significant cost or schedule penalties. Additional RAAF personnel were placed on the contractor's premises to shorten the time lags.<sup>75</sup>

8.66 The RAAF's design approval process is supposed to work as follows. Potential design contractors are assessed to ascertain whether they have the capability to design to the RAAF's requirements. Once a firm has been awarded Design Approved Contractor status it is given the 'green light' to formulate design solutions to the RAAF's requirements until certain agreed review points (major technical milestones) are reached or until unsatisfactory design solutions become evident to the RAAF. At specified intervals the design solutions are firmed up by the contractor (called 'chilling') and vetted by the RAAF Design Approval Authority to ensure they comply with the specification and are adequately documented (called 'freezing').<sup>76</sup>

8.67 According to the AAC, the RAAF interfered with the design process to an unreasonable degree instead of allowing the AAC to proceed with design and development as quickly as possible.<sup>77</sup> The RAAF had required a great deal more detail in the mockup assessments than AAC had envisaged and had insisted on design details being incorporated in the mockup before the assessments were signed off.<sup>78</sup> The AAC had assumed that changes arising from the mockup assessments would be recorded and later incorporated in detailed design work. The mockup assessments kept turning up additional RAAF requirements according to AAC project progress reports. To recover some of the schedule slippage the RAAF had agreed to re-schedule design and other Phase 2 activities to run in parallel.<sup>79</sup>

73. Minutes of Evidence, op cit, page 1797.

74. Australian Aircraft Consortium, Monthly Progress Reports, Executive Overview, February-June 1984.

75. Minutes of Evidence, op cit, pages 1491-2.

76. Ibid, pages 1506-7.

77. Ibid, page 1793.

78. Ibid, pages 1774, 1793-4.

79. Ibid, pages 1437-8.

68. Minutes of Evidence, op cit, page 1492.

69. Ibid, pages 1494, 1506.

70. Ibid, pages 1431-2.

71. PAC file C7/1, Annex P to AF84/16578 Pt 1 (5).

72. Minutes of Evidence, op cit, pages 1776-7.

8.68 The AAC also told the Committee that design and development work was frustrated on some occasions by the limited technical expertise of RAAF personnel at the working level. This meant that local technical decisions were sometimes taken without regard to their ramifications in other technical areas.<sup>80</sup>

8.69 The Committee had no expertise to assess what design control systems are appropriate to a project of this nature. It acknowledged also that some of the industry's complaints may have reflected their reluctance in accepting the RAAF's tight technical control requirements. Nonetheless, the RAAF's control procedures seemed unduly rigid. In particular, the Committee questioned:

- . the requirement to subject changes to specification engineering solutions to formal Engineering Change Proposal procedures; and
- . the importance accorded the mockup assessments, in particular:
  - the level of detail required for the mock up assessment, and
  - the apparent insistence on changes being incorporated in the mockup before the assessment was closed off.

The importance that was given to getting the design right at the start seemed unwarranted when it was likely that the aircraft design would have to go through various modifications between initial design, prototype testing and production approval.<sup>81</sup>

#### The AAC's Management Systems

8.70 The difficulties which befell Phase 2 may also reflect shortcomings within the AAC itself. Industry's technical inexperience has been discussed. Unfortunately, the Committee did not have the opportunity to examine the AAC's management arrangements in satisfactory detail.

80. Minutes of Evidence, op cit, page 1799.

81. Ibid, pages 1794-5.

8.71 The RAAF was unhappy with the performance of the AAC's management. The Chief of Air Force Materiel told the Committee that were the RAAF to begin the project again, he doubted whether the RAAF would have advocated a consortium approach. There were advantages in having a prime contractor who could be held accountable and legally responsible.<sup>82</sup> He was critical of the lack of a commercial or competitive approach in the Australian aerospace industry and suggested that the project had shown up the deficiencies of cost re-imburement type contracts.<sup>83</sup>

8.72 Project records indicate that the Department of Defence was concerned with a number of aspects of the AAC:

- . the consortium arrangements generally;
- . inter-face problems between the AAC and its sub-contractors; and
- . the efficiency of the allocation of work between the sub-contractors under the agreed work sharing arrangements.

#### Project Performance Monitoring and Control Systems

8.73 Another major difficulty appears to have been the inability of the AAC or the RAAF to identify potential cost and schedule overruns and take timely corrective action.

8.74 The RAAF believed that the major factor contributing to the project's difficulties was the AAC's inability to conceive of the total design task and provide advice 'sufficiently early to enable the customer to make decisions as to design options and the cost implications of these design options'.<sup>84</sup> 'That (the AAC) has not been able to do that is a feature of the state of design management capability within the (Australian) aerospace industry'.<sup>85</sup>

8.75 The AAC told the Committee that it had been able to offer design options which could reduce costs. The RAAF had not considered the AAC's proposed cost savings as worthwhile, believing that 'a minimal saving in Phase 2 (is) not worthwhile (and) perhaps detrimental in terms of the in-service cost of the aircraft'.<sup>86</sup>

82. Minutes of Evidence, op cit, page 1514.

83. Ibid, page 1513.

84. Ibid, pages 1485, 1493.

85. Ibid, page 1484.

86. Ibid, page 1802.

8.76 As slippages developed early in Phase 2, details were not available to the Department through the Cost and Schedule Control System (CS<sup>2</sup>) and the AAC could not confirm the extent of the slippages.<sup>87</sup> Although a new CS<sup>2</sup> software system was introduced in March 1984, the CS<sup>2</sup> still does not permit either the RAAF or the AAC accurate assessment of project performance.

8.77 Under the contract the AAC was required to implement a Cost and Schedule Control System to provide a detailed monthly reporting of cost and schedule variations in each of the design and development work packages.

8.78 The Auditor-General's March 1985 Report criticised the Department's handling of this aspect of the project:

- implementation of project networking systems was required by the RAAF prior to the contract but the requirement was subordinated to the objective of expediting commencement to Phase 2;
- the contract provided for the review of the AAC's CS<sup>2</sup> in August/October 1982. The review concluded that the initial system met requirements but subsequent reports were unsatisfactory; and
- shortcomings in the initial CS<sup>2</sup> were identified as early as April 1983 but remedial action was not effected until early 1984.<sup>88</sup>

The Auditor-General found that 'effective management reporting systems would have enabled the Department to have overall control and would have facilitated timely advice on project status... Prompt identification of project slippage would have enabled the Department to take timely corrective action in reviewing its requirements or assisting where design iterations were required'.<sup>89</sup>

8.79 Defence conceded that, with hindsight, Phase 1 did not fully address project reporting requirements but disputed that the absence of reliable information on sub-contractor performance had resulted in cost and schedule overruns.<sup>90</sup>

87. Report of the Auditor-General, April 1985, page 13.

88. Ibid, pages 13, 14.

89. Ibid, page 14.

90. Ibid, page 14.

8.80 The Committee's examination of the AAC's CS<sup>2</sup> indicated that the system still suffered the following limitations:

- the Budgeted Cost of Work Scheduled is reported on a cumulative basis and not on a monthly basis meaning that the cost and schedule variations cannot be identified for each reporting period; and
- the Work Breakdown Structure and hence the Budgeted Cost of Work Scheduled cannot be easily updated or amended as new work packages are introduced.

The new ARTEMIS software package which was introduced in March 1984 seems simply to have provided a more detailed breakdown of cost and schedule variances and offered an improved report format all at a reduced cost.

8.81 According to the Department's submission, the Cost and Schedule Reports have limited use as control documents because the work packages have been restructured so often by industry design iterations.<sup>91</sup>

8.82 The RAAF told the Committee that the AAC's system was adequate for the purpose. It questioned the accuracy and consistency of the AAC's estimates. 'The deficiency lies in the ability of the contractor to identify the work that has to be done and to properly arrange that in, say, a PERT network method, in order to apply the cost and schedule system that is ARTEMIS.'<sup>92</sup> The AAC stated that they were able to estimate work that has to be done and these estimates were updated every six months. Networks were updated on the computer system.<sup>93</sup>

8.83 The Committee found that the AAC's Cost and Schedule Control System required more development before it could be used as an effective management tool by the AAC and the RAAF Project Office. Improvements to the system should have been given more priority than they appear to have been accorded. The Committee acknowledges the control problems caused by the industry's inexperience but disagrees with Defence's argument that more timely and accurate performance data would not have reduced cost overruns and schedule slippages.

91. Minutes of Evidence, op cit, pages 1439, 1445.

92. Ibid, page 1487.

93. Ibid, pages 1803-4.

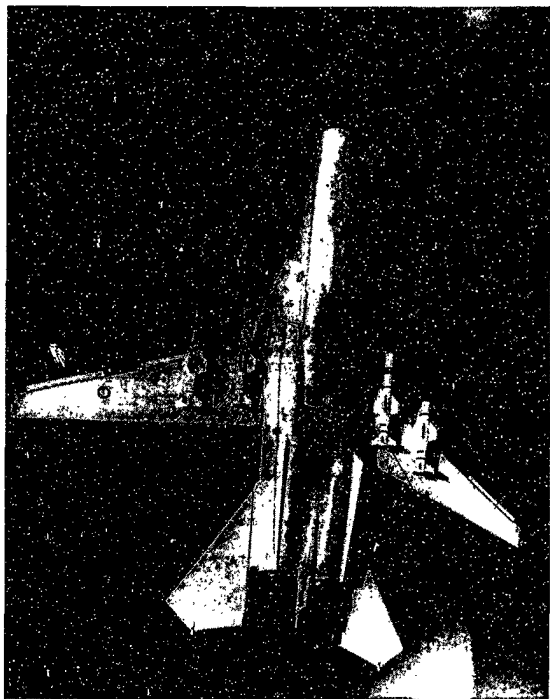


Illustration 9.1 A RAAF F-111C Strike Aircraft

Department of Defence

## CHAPTER 9

### F-111A ATTRITION AIRCRAFT PROJECT

#### Synopsis

This project, to acquire four replacement aircraft from the USAF, and to modify, refurbish and support these aircraft to standards applying within the RAAF Strike Reconnaissance Force, will be substantially completed within the approved cost of \$61.672 million. The project was nominated by the Air Force.

Replacement of the four F-111C aircraft lost between April 1977 and August 1979 was undertaken using Foreign Military Sales arrangements, which included wing tip extensions and heavy undercarriage systems which are now to be fitted to the aircraft in Australia. Other major modifications were undertaken by the USAF prior to hand-over.

A feature of the project was the control exercised by two resident RAAF project officers at the USAF Base in Sacramento of work performed and its costing levels. During this stage evidence of unacceptable levels of wing fatigue appeared in the third aircraft, and deliveries of the final two aircraft were delayed by nine months because of a contractual dispute.

Modifications to be introduced in Australia are not expected to be completed until 1986 some three years following delivery of the fourth aircraft.

Important management documents such as the Staff Requirement and Project Management and Acquisition Plan were issued late, and the Equipment Acquisition Strategy not at all. Relatively poor attention was given in these documents to spares support or to the latter stages of the modifications. Management has not been complicated.

The opportunity to buy the F-111A aircraft was contingent on an agreement by the USAF to offer existing aircraft to Australia. When that offer was made it involved a significant initial payment of \$50 million which at the time had not been included in the budget. The impact of that payment on the priority items in the FYDP is not known.

## Introduction

9.1 The RAAF Strike Reconnaissance Force (SRF) was equipped in 1973 with 24 F-111C aircraft. This number was sufficient to equip two squadrons but did not include reserves against attrition.

9.2 Options for the purchase of reserve or attrition aircraft were not utilised prior to September 1976, at which time General Dynamics ceased its production of F-111 aircraft. The RAAF suffered the loss of four aircraft between April 1977 and August 1979.

9.3 The objectives of this project were to acquire four replacement aircraft from the USAF, and to modify, refurbish and support the acquired aircraft to standards applying to the existing squadron.

9.4 The timing of certain management aspects of this project was contingent on the agreement, in June 1980, by the USAF to offer replacement aircraft. In February 1981, the Government agreed that four F-111A aircraft should be acquired with associated modifications, refurbishment and support, at an estimated project cost of \$60.3 million (January 1981 prices).

## Project Development

9.5 The combination of high attrition rates for the F-111C aircraft during the initial five years and lengthy maintenance downtime resulted in a reduction in both aircraft availability and the planned Life-of-Type (LOT) of the SRF. Major Equipment Proposals (MEP) from 1974 were successively raised in the process of defining the replacement F-111 aircraft.

9.6 An Air Force Staff Requirement was issued in August 1980 following the agreement in June 1980 by the USAF to offer replacement aircraft, and the subsequent Defence Force Development Committee (DFDC) in principle endorsement of the proposed acquisition.

9.7 The Staff Requirement defined the essential operational requirements for the aircraft as follows:

- (a) to have the same radar/visual strike and all-weather operations as the F-111C;
- (b) modifications/refurbishing to give the same operational life (or LOT) as the existing F-111C;
- (c) to have the same avionics as the F-111C; and
- (d) to be able to be supported by existing RAAF maintenance and supply systems.

9.8 In August 1980 RAAF sought a US Foreign Military Sales (FMS) Letter of Offer and Acceptance (LOA). Included in that request was a specification that a RAAF team conduct an on-site audit and configuration survey of the four aircraft on offer from the USAF.

9.9 The terms of the LOA covered:

- sale of the four USAF F-111A aircraft on an 'as is, where is' basis;
- conversion to F-111C configuration as far as possible;
- refurbishing to RAAF engineering standards; and
- cold-proof load testing (CPLT), that is, stressing the aircraft to maximum aerodynamic loads under cold conditions to assure structural integrity.

9.10 The LOA also covered procurement of F-111C wing tip extension and heavy undercarriage systems which subsequently were agreed to be fitted to the aircraft in Australia following delivery.

9.11 The contract did not include provision for support equipment although some funds were allocated to the purchase of common modifications for the SRF fleet.<sup>1</sup>

9.12 In September 1980, United States Congress approved the sale of four F-111A aircraft under the terms of the LOA. The Committee sought evidence from Air Vice-Marshal Heggen, Chief of Air Force Materiel, on the basis for decisions by Defence on the number of replacement aircraft needed to maintain a viable SRF capability. He responded in these terms:

The strategic situation ... is one factor. The other factors are the experience we have had with the aircraft, and the greater knowledge and statistical data we have on attrition losses to be expected.<sup>2</sup>

9.13 Given that four aircraft of the existing fleet have been converted for reconnaissance purposes and a further four are normally in the maintenance cycle, the Committee gathered from Defence that an operational number of 16 strike aircraft was deemed viable.

1. Minutes of Evidence, op cit, pages 444-45.  
2. Ibid, page 469.

9.14 The Committee Secretariat was advised of action taken to reduce the rate of further F-111C losses. Such action included redesign of bleed air ducts, fitting of bird impact resistant windscreen, and a revision of aircrew training procedures for wet runway operations.

9.15 The acquisition of four aircraft, in line with a revised attrition rate for the mature stage of the fleet, was said to ensure that a viable F-111 strike force could be operated until the year 2000.

#### Project Arrangements

9.16 Air Force Materiel Division assumed responsibility for the project in 1977 and assigned a Project Director and Project Manager for project implementation. The key management document, the Project Management and Acquisition Plan (PMAP), was issued in November 1981. The delay concerned the Committee.

9.17 Details of the management structure for the project are as shown in Figure 9.1.

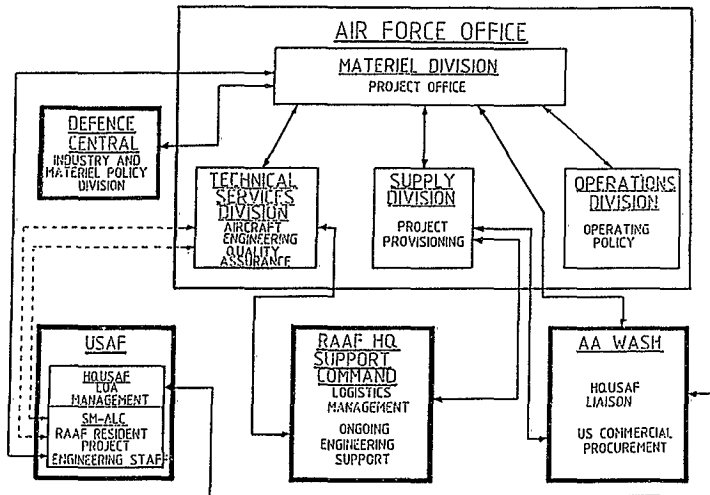
9.18 The structure illustrates well how in matrix management systems the supporting functional authorities respond to the needs of the project. The functional areas concerned being Technical Services Division, Supply Division, with support also provided by the Air Attache, Washington, and two RAAF functional commands.

9.19 In addition, two resident project positions (RPE) were established at the USAF Sacramento Air Logistics Centre (SM-ALC) to monitor the conversion and refurbishment of the aircraft. These two experienced F-111 engineers were responsible for detailed progress reports, including reporting on the achievement of major milestones and on significant problems when encountered.

9.20 They also enabled the RAAF to assess the manhours and materials charged to each aircraft during the conversion stage, and to ensure that USAF modifications and technical orders were complied with thereby exercising quality assurance control.

9.21 Ownership of the four F-111As passed to the Commonwealth in July 1981 prior to the conversion, refurbishment and cold-proof load testing. SM-ALC was designated by USAF as the implementation agency and subsequently issued a Depot Maintenance Project Directive incorporating RAAF specifications of work to be undertaken. In view of the detail contained in the USAF document, no separate schedules were prepared by the RAAF.

FIGURE 9.1: Management Organisation - F/A-18 Attrition Aircraft Project



(Source, Minutes of Evidence, page 451)



9.22 In its submission, Defence considered that the project could be managed by the combination of:

- resident RAAF staff at the implementing agency in Sacramento; and
- regular interaction between the Project Manager and Air Force Technical Services Staff.<sup>3</sup>

9.23 Air Vice-Marshal Heggen noted in particular:

The United States Air Force employed networking and milestone techniques of management and monitoring, as did our resident project officer in the United States. That was seen as providing sufficient visibility in monitoring ... The resident project manager was reporting regularly ... at a rate of a little less than one a month ... to the project manager.<sup>4</sup>

9.24 It was during this stage that cold-proof load testing on the wing of the third F-111 revealed unacceptable levels of fatigue. Work on modifications to both the third and fourth aircraft was subsequently halted pending resolution of the question of financial liability for these repairs. The dispute arose over an assurance given by the USAF, during the on-site RAAF audit of the aircraft, that the particular aircraft had a remaining airframe life of 14 years. In June 1982, the USAF agreed to the repair at no cost to the RAAF. The Letter of Offer and Acceptance was subsequently amended to take into account such work.

9.25 The Committee notes the critical importance of the day-to-day scrutiny by the resident RAAF project engineers of work undertaken by United States military authorities under Foreign Military Sales contracts, and the need for careful selection and training of such project staff.

9.26 Prior to December 1982 there were no formal project management review meetings in Australia. The first such meeting took place in December 1982 corresponding with the delivery of the last F-111A to Australia. This meeting was primarily concerned with the transfer of follow-on support for the aircraft from the project office to technical areas within the RAAF.

9.27 The Committee expresses some concern that although the original proposal was for all modifications to be completed in United States, the fitting of wing tip extensions and the heavier undercarriage were in fact deleted from the contract and are yet to be completed in Australia, the former as part of routine major maintenance cycles.

3. Minutes of Evidence, op cit, page 447.

4. Ibid, page 477.

9.28 Air Vice-Marshal Heggen stated the position as follows:-

... The original plan was that all modifications should be done by the United States Air Force, the fitment of those items, on the understanding that the wing tip extensions and the undercarriage items were available from United States stock. In the event, that proved not to be so ... When that was recognised, the Letter of Offer and Acceptance was amended ... (the fitment was) divorced from the foreign military sales element of the project.<sup>5</sup>

9.29 This action resulted in an increase in cost of \$2.732 million. Air Vice-Marshal Heggen in evidence to the Committee stated:

There were no other sources of wingtip extensions and the manufacturers of the components for those wingtip extensions were those who provided them to General Dynamics during manufacture ... The increase in cost was attributable to the need to buy the components and manufacture the wingtip extensions. In other words ... because of the very small production runs and the need for suppliers to reactivate their production, the cost of those four sets of wingtip extensions was higher than had been earlier anticipated.<sup>6</sup>

9.30 The Committee notes that such modifications would not be completed until 1986. Defence witnesses assured the Committee that the delay had relatively little impact on the operations of the aircraft.

9.31 The Committee also noted that following the refurbishment of the aircraft in United States, a re-assessment of engine support spares was undertaken, and that additional common modification kits were also added to the contract.

9.32 Defence witnesses before the Committee admitted that with hindsight these matters - the availability of wingtip extensions, additional spares requirements - should have been identified at an earlier stage. Air Vice-Marshal Heggen noted:

... there was an additional cost involved. That has delayed the completion of the project but has not delayed the bringing of those aircraft into operational use ... but they are not fully modified, so there are certain limitations by comparison with the F-111C.<sup>7</sup>

5. Minutes of Evidence, op cit, page 473.

6. Ibid, page 475.

7. Ibid, page 480.

9.33 In response, the Committee sought closer attention by Defence to the validation of the terms of FMS contracts.

#### Financial History

Year	Budget	Project Approval	Expenditure
80-81	Nil	\$60.300m (Jan 81)	\$50.677m
81-82	\$2.212m	\$60.300m (Jan 81)	\$ 0.034m
82-83	\$2.964m	\$58.120m (Sept 82)	\$ 3.559m
83-84	\$3.924m	\$61.672m (Apr 83)	\$ 0.006m
84-85	\$2.398m		

9.34 In May 1981 the Minister for Defence approved acceptance of the USAF Letter of Offer and Acceptance incurring an expenditure of \$51.769 million (Jan 81 prices) for the FMS element of the project. This approval did not include provisions for RAAF assessed spares support, nor for avionics modifications.

9.35 A revised project cost of \$58.120 million was approved in September 1982. This approval included provision for spares and common modifications, and adjustments for real increase, escalation and currency fluctuations. It deleted requirement for avionics developmental modifications.

9.36 A further revision to \$61.672 million (Apr 83 prices) was approved in July 1983 by the Minister for Defence to cover real price increases to the cost of wingtip extensions and exchange rate variations.

9.37 A financial review of the FMS component at the end of 1983 resulted in a savings of approximately \$0.1 million. By May 1984 payments of \$54.151 million (US\$60.036 million) had been made to the USAF. Outstanding expenditure was estimated at \$2.8 million against the FMS, and \$3.2 million for spares and common modification requirements.

9.38 Total expenditure appears to be possible within the current project approval of \$61.672 million (Apr 83 prices), or a cost overrun of 2.27 per cent. The most recent RAAF/USAF review of LOA costs was in February 1984. The Committee noted that an element in the efficient execution, in terms of cost and timing, of the FMS contract was the incorporation within that arrangement of management services conducted by the USAF. The resident RAAF project officers on site at the Sacramento base played an essential role in monitoring the financial and engineering aspects of the acquisition.

#### General Comments

9.39 The Committee generally agreed with the Defence that the F-111A acquisition could be cited as 'successful' for reasons such as:

- the purchase through (US Foreign Military Sales) arrangements of existing in-service aircraft eliminated much of the production and delivery uncertainty normally associated with development and manufacturing projects;
- continuing close management and monitoring of project requirements and activities by the resident RAAF project officers;
- the significant visibility of and ability to closely supervise USAF activities afforded by the on-site project personnel, and the effective management relationship developed with USAF authorities; and
- close technical scrutiny of work done and assessment of relevant billings to ensure all charges were valid.

9.40 Notwithstanding the likelihood that the project will be completed close to its initial estimates, there were a number of features noted by the Committee which to an extent counter-balanced the success, viz:

- the intended capability, dependent on wingtip and under-carriage modifications, will not be completed until at least 1986 some three years after delivery of the last aircraft;
- the conversion modifications undertaken in US were delayed by 9 months because of a contractual dispute;
- important management documents, the Staff Requirement and Project Management and Acquisition Plan, were issued very late, and an Equipment Acquisition Strategy was not issued;
- the FMAP gave insufficient attention to the latter stages of modification, or to spares support;
- formal review machinery was weak; and
- the decision to acquire the four F-111A aircraft was apparently made in response to the unexpected offer from the USAF, and the very substantial initial payment could have impacted on other RAAF projects in the FYDP.

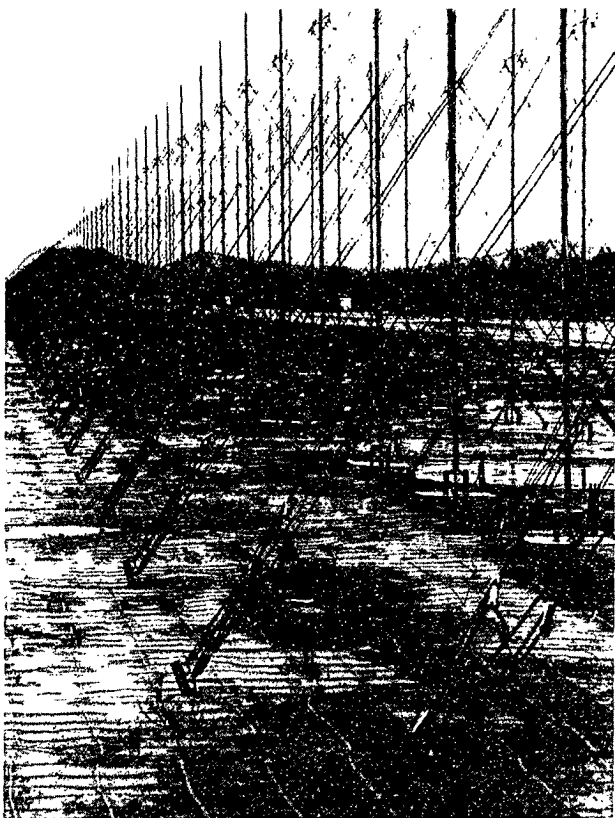


Illustration 10.1 Jindalee Project - Section of the Receiving  
Station Antenna Array

Department of Defence

## CHAPTER 10

### JINDALEE OVER THE HORIZON RADAR PROJECT

#### Synopsis

Jindalee is a program of research into over-the-horizon-radar (OTHR) with a view to establishing the feasibility of using the system for surveillance of the northern approaches to Australia. The project was selected by the Committee for examination.

The project has progressed at a measured pace through two major research Stages - Stage A providing a low-power narrow fixed beam radar, and Stage B the design and development of an experimental radar operating over a wide arc. With the successful commissioning of Stage B, studies were commenced on specifications and design work for conversion of the experimental radar to a mature OTHR surveillance system.

A decision whether to convert the proto-type to an operational system is not expected until late 1985 or early 1986 following further Service Evaluation Trials.

Approvals for Stage A were \$3.4 million (November 73 prices) and Stage B \$24.6 million (February 78 prices). Actual expenditure has been \$33.54 million with price increases and equipment modifications largely accounting for the overrun. Relatively minor expenditure has been committed in anticipation of conversion to an operational system.

Control of the research project has been vested in the Defence Science and Technology Organisation (DSTO). A matrix management model with a Project Manager and Director has been used throughout Stages A and B. However, the conversion Stage is seen to require stronger centralised management, and considerable attention has been given to appropriate structures and to management information systems. The latter include PERT/CPM and Cost/Schedule Control Systems (CS<sup>2</sup>).

Overall the timing of the project has slipped. Certain of the delays such as processing contracts and staffing procedural problems directly added to the cost of the project. Design and other technical problems were also encountered, and the resolution of these have delayed final evaluation of the experimental system.

## Introduction

10.1 Project Jindalee is a program of research into long-range radar, known as over-the-horizon-radar (OTHR), with a view to establishing the feasibility of using the system for surveillance of the northern approaches to Australia. The proposal has advanced to the stage where it may be close to being operationalised.

10.2 The initial program (Stage A) provided for a low-power narrow fixed beam radar to scan a track used regularly by international air traffic en route to and from Singapore. Cost estimates for Stage A were \$3.4 million (1973 prices). On completion of Stage A in December 1978 expenditure had totalled \$6.2 million. Data obtained from this feasibility study led to the development of proto-type radar, with features such as a steerable beam, to demonstrate the capability of OTHR to provide air and maritime surveillance.

10.3 Stage B, which commenced with design approvals in August 1977, was given Cabinet approval on 17 May 1978 with an estimated cost of \$24.6 million. The main object of Stage B is to design and develop an experimental radar which could operate over a wide arc.

10.4 With the successful commissioning of Stage B, a project definition study was completed leading to specifications and design work for conversion of the experimental radar to a mature OTHR surveillance system.

10.5 A Service Evaluation Trial was subsequently held in April 1984. The technical problems encountered, such as inadequate computing power, high transmission noise, and operator complexity, were considered (by the Jindalee Steering Committee) as sufficiently serious to delay a decision for conversion of the proto-type to an operational system. A further Service Evaluation Trial is scheduled for late 1985 or early 1986.

10.6 Phase 2B of the Jindalee project, the conversion to an operational system, is not now expected to be completed until the late 1980s.

## Project Management for the Research Phases

10.7 It is normal practice in Research and Development (R & D) projects such as Jindalee for the Defence Science and Technology Organisation (DSTO) to carry out the initial developmental work. The more advanced engineering developments required at later stages are normally transferred to industry.

10.8 During the early stages of the research Air Force was closely involved with DSTO to ensure that operational needs were adequately addressed. Industry skills and resources are also introduced as soon as practicable. With the later stage of transferring developed technology to industry, appropriate project management arrangements become a major issue.

10.9 Stage A was based on a Development Cost Plan (DCP) which provided broadly for a 4 tiered project management structure at the then Weapons Research Establishment, Salisbury, South Australia, viz:

- (1) the R & D Authority: responsibility for executing the R & D was vested in the Superintendent Electronics as Project Officer;
- (2) the R & D Co-ordinating Authority: responsibility for co-ordinating the electronic and engineering support, and for preparing progress reports to the Jindalee Executive Authority Review (JEARC), was vested in the Deputy Director, Applied Physics;
- (3) the R & D Executive Authority: responsibility for annual reports to the R & D Policy Authority vested in Controller R & D as Chairman of JEARC; and
- (4) the R & D Policy Authority: vested in the Chief Defence Scientist.

10.10 Notwithstanding the difficulty of separating specific costs associated with a research project from the generalised functions of the Weapons Research Establishment, Stage A largely followed the DCP. Four new tasks were added by JEARC into the project adding \$1.12 million and 15 months to the research. Technical problems (\$0.42 million), inflation and currency changes (\$1.086 million) also contributed to a final expenditure some 80 per cent greater than the 1973 cost estimates. Operational studies of OTHR potential in surveillance and air-space control continued during Stage A in the Central Studies Establishment, DSTO.

10.11 In March 1978, four years after the commencement of Stage A the Defence Force Development Committee (DFDC) endorsed Stage B and established a Jindalee Steering Committee. The Chief of Air Force Operations (CAFOF) was appointed chairman of the Steering Committee. Executive authority over the project was in turn vested in the Jindalee Monitoring Group with the Controller Projects and Analytical Studies (CPAS) as chairman. Technical detail and costs were brought together at this point.

## DSTO Control over the Jindalee Project

10.12 In evidence to the Committee Defence stated that the 'main control technique employed was tight scheduling of all experimental activities coupled with frequent progress review meetings'.<sup>1</sup> Network planning was not used largely due to the organisation and central location of project staff in Adelaide.

1. Minutes of Evidence, op cit, page 1039.

## Government Approval and Initial Contracts

10.13 In May 1978 Cabinet approved Stage B at an estimated cost of \$24.6 million (Feb 78 prices) to be spread over six years. Approval had been granted some six months earlier for commitments relating to site facilities near Alice Springs. These facilities were completed by October 1980, four months behind schedule.

10.14 Tenders closed in August 1979 for the Development, Operation and Maintenance (DOM) contract. However, the Defence Source Definition Committee, on the information then available, was unable to select the contractor. In March 1980 the DSDC selected Amalgamated Wireless (Australia) Ltd (AWA) as the contractor and a contract was signed in May 1980. The delay in letting the contract appeared to have contributed to cost increases.

10.15 By January 1982, delays had amounted to 15 months, and a revised Stage B Outline Program was submitted to the Jindalee Monitoring Group. The factors behind the slippage were identified as staffing procedural problems (six months), design/manufacturing problems and delays in processing contracts (nine months).<sup>2</sup>

10.16 Quality Assurance measures for materials supplied by AWA were applied, on behalf of Electronics Research Laboratory (ERL), by Advanced Engineering Laboratory. In general 'good commercial standards' were applied rather than military specification standards.

## Commissioning of the Experimental Radar

10.17 In April 1982 a minimum system, tested at Salisbury, was delivered to the Jindalee site. The minimum system, half the proposed transmitter and receiver apertures, was sufficiently representative of the complete system to enable valid radar commissioning to proceed. The actual scanning of both transmitter and receiver beams through a wide angle was finally achieved by December 1982, three months behind schedule. Technical problems of mutual coupling stemmed from the low frequencies used. The latter problem was overcome in April 1983.

10.18 Further data was built up during 1983 leading to a Jindalee Service Evaluation Trial (JSET) in early April 1984 during which an assessment was made of the operational potential of Jindalee Stage B. Problems encountered during that trial led the Jindalee Steering Committee to agree to further development and trials before a decision was taken on conversion to an operational system. These trials are scheduled for late 1985 or early 1986.

10.19 By mid 1984 \$27.409 million had been expended on Stage B. Total expenditure since its commencement as a R & D project was \$33.545 million.

2. Minutes of Evidence, op cit, pages 1039-40.

## Conversion to an Operational OTHR

10.20 Joint Staff Requirement (JSR) 13, 'A Requirement for an Over-the-Horizon Surveillance Radar and Data Dissemination System' was issued on 1 August 1983.

10.21 The Staff Requirement was preceded by a Major Equipment Proposal (MEP). Jindalee was included in the Defence's FYDP in November 1981 but Government approval for funds, estimated at a further \$34 million, has been twice deferred pending satisfactory Service Evaluation Trials.

10.22 In order to transfer the OTHR technology to industry and identify engineering options for conversion to an operational system, industry studies were designated for three further phases.

10.23 Project definition studies were undertaken by AWA and Computer Sciences of Australia (CSA) between October 1983 and October 1984. Defence noted that the aims of the AWA studies were to:

- review the capabilities of the existing Jindalee Stage B Experimental System;
- identify the deficiencies in Jindalee Stage B in meeting the requirements of the Australian Defence Forces, as set out in JSR 13; and
- prepare a minimum conversion program for Jindalee Stage B, with budget estimates, to achieve a basic operations capability.<sup>3</sup>

The aims of the CSA system studies were to:

- identify the capability of the existing Stage B radar computing system;
- review the requirements for future system software development; and
- produce a proposal for radar system software and computer hardware suitable to meet Stage B conversion requirements...consistent with minimum technical risk and...the constraints of minimal change to the present computing system.<sup>4</sup>

10.24 These studies cost \$0.285 million compared to an approval of \$0.6 million. Further phased studies have been scheduled between mid 1984 and mid 1985 to prepare specifications and design work, including computer systems, for the conversion of the experimental OTHR to an operational system. The studies were delayed by the need for further trials in the experimental Stage B.

3. Minutes of Evidence, op cit, pages 1043-4.

4. Ibid, page 1045.

### Management of the Jindalee Project

10.25 During the pre-conversion stages a Project Manager and Director have had responsibility for management, using Air Force Project Directive 4/48 as the main management document.

10.26 The management arrangement is a matrix organisation with the manager calling on the services and advice of functional areas. The Jindalee Project Officer and two RAAF OTHR engineers are stationed at the Defence Research Centre, Salisbury.

10.27 The Project Officer provides direct interface between the R & D Scientists and the Air Force, and reports to the Director-General Operational Requirements-Air Force on operational and air surveillance aspects. The two RAAF engineers report to the Director of Telecommunications Engineering on system hardware and software. Figure 10.1 outlines the organisation.

10.28 The conversion stage is seen by RAAF as requiring stronger centralised management systems and a Jindalee Conversion Management Office has been proposed. The management organisation is outlined in Figure 10.2.

10.29 Industry has proposed that management of this phase could be contracted out. Defence is at present evaluating this proposal to see whether there is relevant experience in the commercial area and the additional direct costs involved. Specifically, Defence noted the following.

- The conversion management system proposed has been successfully used within industry on similar projects.
- The approach is to establish the most effective organisation and then employ comprehensive management procedures capable of measuring project achievement in respect of performance, quality, cost and time.
- The management method used is based on a closed-loop method of control and contains the following essential factors:
  - critical assessment of all project factors by a central project group led by the project manager with full authority;
  - careful design and review of the organisation for management and the establishment of efficient communications within the organisation;
  - compilation of plans for all work. These plans form part of the project documentation;

FIGURE 10.1 : Management Organisation - Jindalee Project

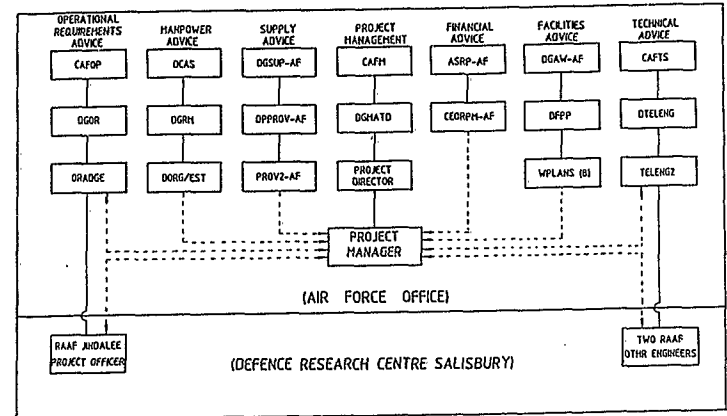
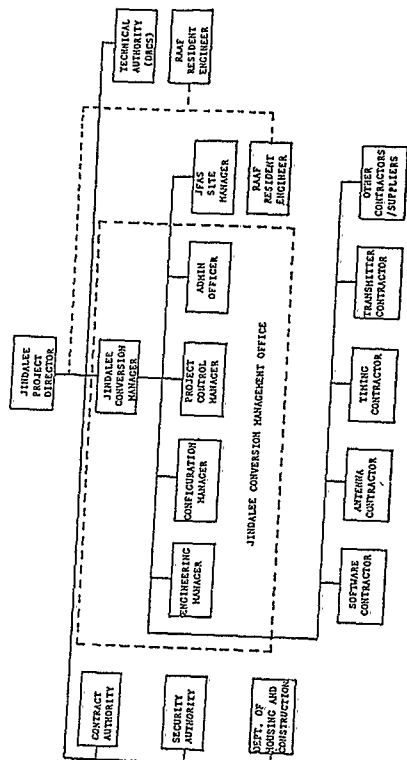


FIGURE 10.2 : Proposed Management Organisation - Jindalee Project



- regular and frequent reviews of progress data related to the datum plans, and rapid flow of information to appropriate management authorities;
- promulgation of decisions throughout the project organisation, following assessment of all related factors; and
- checks to ensure that the decisions so promulgated are put into action and have the desired effect.

The management procedures necessary to implement a closed-loop control system involve the definition of the project requirements in terms of plans and specifications, and the measurement and control of project progress in relation to these requirements in terms of performance, configuration quality, schedule and cost.<sup>4</sup>

10.30 Major planning documents such as the Equipment Acquisition Strategy and Project Management and Acquisition Plan have yet to be issued for the conversion phase.

10.31 Defence in later evidence advised that PERT/CPM and the United States Department of Defense Cost/Schedule Control System (CS<sup>2</sup>) in association with computer software packages, will be used. It noted the rationale for these management tools as follows:

PERT is particularly relevant to projects involving research and development, and design work, where the duration of project activities are uncertain and unpredictable. A PERT network will display for all participants how each activity depends on the others. The network will provide the Project Director with a method of monitoring the progress of the project, for forecasting the effects of snags on the project as a whole, and for deciding which activities should have priority for resources. The action necessary to avoid a crisis can be taken in plenty of time, resources are better utilised, completion dates can be predicted with confidence and, more importantly, achieved.

CPM will focus attention on the most critical aspects of the project, and will be used principally in the construction phases of the project such as facilities, and antenna manufacturing, which will dictate future availability of project elements. For example, the delivery of computers will depend on the availability of buildings, however, to avoid

Source, Minutes of Evidence, page 1066.

1. Minutes of Evidence, op cit, pages 2426-7.



delays, computers must be ordered in advance. The question becomes, when is the most appropriate time to order the computers and to budget for payment. CPM will provide this type of information.

The US Defense Department Cost Reporting system details guidelines for ensuring contractors can fulfil their requirements to report progress and cost information necessary to compile overall PERT and CPM reports.<sup>6</sup>

6. Minutes of Evidence, op cit, pages 2427-8.

## CHAPTER 11

### TACTICAL AIR DEFENCE SYSTEM (TADS)

#### Synopsis

The Tactical Air Defence System project involved acquiring data processing equipment, air-to-ground communications, and support for mobile radar units.

The Auditor-General examined this project in 1983 noting the escalation in cost and the then serious slippage in completing the project.

Initial approval for the project was given in August 1975. However several later Government decisions impinged on that approval and delayed the completion of signing of contracts until mid 1981.

The prime contract for the provision of data processing and communications equipment was awarded to Westinghouse US. That contract was affected by cost increases due to labour and material prices, and to equipment modifications initiated by the contractor through the introduction of fibre-optic technology.

This modification contributed to a major slippage in delivery - from 22 months to an estimated 45 months - and directly to increased costs. The improved technology was considered important by Defence. Final expenditure of \$ 21.7 million on the project represented an overrun of 46 per cent. Price escalation and exchange rate variations contributed all but \$0.6 million of the increase. Locally provided support equipment and facilities have been provided largely within approved cost levels.

Defence used a matrix management system for control over the project following formal approval. A significant element in the management was the processing of engineering change proposals (ECPs) which, as indicated above, involved improved technology. Management by a small dedicated team, which might have included Technical Services, may have expedited this project in a more cost effective way.

## Introduction

11.1 The Tactical Air Defence System (TADS) project involves the acquisition of data processing, air-to-ground communications and support facilities for a radar unit, the radar unit having been purchased as a separate project. The TADS facility will complement fixed installations at Williamtown and Darwin RAAF bases.

11.2 In conjunction with the radar, the TADS equipment will provide a mobile 'air defence early warning/ground controlled interception' facility to detect unscheduled aircraft within approximately 30km radius and direct interception. It is the automatic computer-assisted functions of the full TADS System, and the mobility envisaged by air, road or sea to forward operational or exercise areas, which form the value of the project.

## Project Definition

11.3 TADS began as a discrete project in October 1973 when a Major Equipment Proposal (DEP) was raised. Project approval was given in August 1975.

11.4 In May 1977, the Government approved the amalgamation of TADS with two associated radar projects, and the whole was designated Project RECAP. That amalgamation was based on an expectation of equipment standardisation and cost savings. In December 1978 the Defence Force Development Committee (DFDC) deferred the TADS element of RECAP on the basis of revised total project costs, financial programming pressures and relative equipment acquisition priorities.

11.5 In the context of the Defence Budget of 1979/80, \$14.88 million (Jan 79 prices) was approved for the project. Prices were subsequently revised in mid 1981 and approval raised to \$17.0 million (May 1981 prices).

11.6 On 3 July 1981 a contract was signed for \$A12.022 million with Westinghouse Electric Australia Ltd (WEAL) for the supply of the six TADS cabins. Work to be done in US by Westinghouse, Baltimore totalled \$US10.086 million. The contract required delivery for final acceptance by 3 May 1983.

## Procurement Strategy - Tendering

11.7 The Committee notes that having purchased radar sensors and digital target extractors (DTE) under Foreign Military Sales (FMS) arrangements for project RECAP, it appeared that Westinghouse was in a preferred position when tenders were called for TADS. Six companies involved in RECAP were invited to tender. Tender processes took 10 months.

11.8 The protection of Commonwealth interests in the tender evaluation of the offer from Westinghouse apparently was limited to an assessment, by a US Air Force analyst, of the fairness and reasonableness of the direct cost component of the earlier Westinghouse tender under the previous RECAP project.<sup>1</sup>

11.9 The Committee accordingly held some reservations as to the adequacy of measures taken in the tender evaluation process to contain costs. These factors may have contributed to the subsequent escalation in the price.

## Project Management Philosophy

11.10 Air Vice-Marshal Heggen, Chief of Air Force Materiel, in evidence provided the following statement:

Matrix style management is more economical in terms of manpower resources. It is not ideal. The ideal situation is dedicated project teams with the necessary authority to manage the projects. My Division ... does not have authority to make decisions in all the various other functional areas of Air Force Office ... Whilst I manage the projects I manage the implementation of the policies of the other divisions ... The difficulties that it involves arises from the fact that many of the individuals involved in the project have responsibilities to their functional heads as well as to my project manager or myself.

I am not suggesting this is an inappropriate system ... the task of the matrix manager is to co-ordinate the efforts of all those individuals in the various functional divisions, to manage them within the context of his particular project. There is nothing unusually difficult about the way Air Force implement matrix management.<sup>2</sup>

11.11 Air Vice-Marshal Heggen added that when Project Offices are established they are implemented as a form of matrix management since 'although certain delegations may be given to a project team, in general, the policy matters in those functional divisions rest with them.'<sup>3</sup> He concluded with 'we are responsible for managing the project and making it work and driving it to cost and schedule. To do that we must influence and marshal the resources of other divisions with support of the Chief of the Air Staff and the chiefs of those other divisions. Provided we put in place a management structure that defines those responsibilities, then it is a manageable situation.'<sup>4</sup>

1. Minutes of Evidence, op cit, page 120.

2. Ibid, pages 123-5.

3. Ibid, page 126.

4. Ibid, page 127.

11.12 The management structure for the TADS project is set out in Figure 11.1.<sup>5</sup>

11.13 A project director and project manager were appointed to the Project Office. A draft Equipment Acquisition Strategy was issued in August 1979. In place of the normal Project Management and Acquisition Plan (PMAP), documents dealing with RECAP (Air Force Project Directive No. 4-76/77) and the contract (particularly the network planning chart outlining financial, management control, production and logistics schedules) were deemed adequate by Defence as defining management lines of control.

11.14 The Committee observes that the viability of the preferred management system depends on timely flows of information and a corresponding management or executive authority to act on such information.

#### Management Information

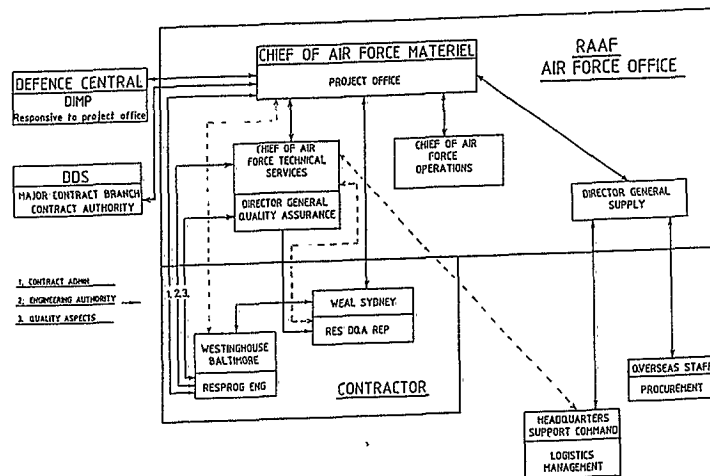
11.15 The contract with Westinghouse Baltimore, US, required that a program evaluation and review technique/critical path monitoring (PERT/CPM) system be used. The Australian-based company (WEAL), however relied on quarterly progress reports with milestone charts, and bar graphs for each major activity or event.

11.16 Additional information included a Quality Control Plan (QCP) for management/control of the quality of supplied items. The Director-General Quality Assurance - Air Force (DSQA - AF) was required to give his consent to each ECP. Resident Air Force quality assurance representatives resolved matters on a local basis at both the Baltimore US and Willawood NSW plants. Formal examination of issues of a technical or contractual nature were handled by Local Technical Committee (LTC) meetings at which relevant authorities were represented. A substantial share of the work load of the LTC was to examine Engineering Change Proposals (ECP).

11.17 On aspects of quality assurance, Mr Bennett, Director-General, Quality Assurance, RAAF, explained:

Quality assurance is normally geared to whatever management system the project manager decides to introduce...only at times when those management systems show that the project is falling behind schedule is there reason for querying the particular quality assurance application...(the resident quality assurance representative) has to handle them within his own capability within the plant, or else if they impacted into project schedule or project cost, or if they required an engineering decision then they would be referred to the (project office)... In this case the manufacture and installation in Australia was being done against what has been referred to as the running system.<sup>6</sup>

FIGURE 11.1: Management Organisation - Tactical Air Defence System



(Source, Minutes of Evidence p 101)

5. Minutes of Evidence, op cit, page 101.

6. Ibid, page 134-5.

11.18 Mr Bennett indicated that the contractor was required to operate a quality control system in accordance with Australian Standards, in this instance AS 1822 covering manufacture and installation. The Quality Assurance area monitored, by random sampling, the contractor's performance to verify whether the quality control plan was effective. Resolution of matters, as far as possible, were attempted at the contractor's plant via local technical committee meetings.<sup>7</sup>

11.19 Changes in engineering specifications were specified in an Engineering Change Proposal (ECP). ECPs are then considered within the matrix arrangement by operational, technical, financial and project authorities, and if accepted referred to the contract authority for amendment of the contract.

11.20 In later evidence from Defence on the management information systems, the following comments were made:

...clause 10.2 of the contract does not specifically require the contractor to provide the actual PERT/CPM chart, but to make available to the Project Director such standard contractual information and data in order that the Project Director may convert it to a PERT/CPM chart for Departmental use. The contractor has provided the bar charts referred to and these charts, together with the information presented at Working Group and Local Technical Committee meetings, satisfied the requirements of the Project Director for normal contract progress monitoring. In addition, the contractor is required to advise the Project Director in advance, through quarterly Reports, when milestones may not be achieved. This information was considered sufficient for the Project Director to maintain adequate control over the progress of the contract.<sup>8</sup>

11.21 The Committee examined these information flows expressing doubt whether information was sufficiently inter-related to ensure timely and sound management responses by the Project Office.

#### Cost Escalation and Project Slippages

11.22 On 27 May 1983 the Minister approved an increase in the project cost of \$4.683 million based on price increases of \$4.08 million and a real increase of \$0.603 million due to performance improvement modifications. The revised cost of TADS was \$21.683 million, or some 46 per cent greater.<sup>9</sup>

7. Minutes of Evidence, *op cit*, pages 136-7.

8. *Ibid*, page 2418.

9. *Ibid*, page 103.

11.23 Project acceptance dates slipped from 3 May 1983 at the time of the contract, to 28 June 1984 to incorporate design changes relating to fibre optic cables (June 1982), and a further minor delay of 3 weeks to incorporate transport pallets (April 1984). A final acceptance date of 16 July 1984 represented a change from a 22 month period to 36 1/2 months, or 66 per cent longer. Defence acknowledged during the hearings that it was unlikely that the July due date would be met.<sup>10</sup> It later revised this noting that quality assurance testing would lead to acceptance and full operations in April 1985.<sup>11</sup> In brief a 23 month slippage.

11.24 The latter delay was said to be related to fibreoptics technology. Fibre optic cables resulted in weight and stowage savings as well as allowing a greater distance separation of individual cabins. Westinghouse was also affected by the commercial failure of a principal subcontractor used for development of circuit-boards.

11.25 The Committee notes that maintenance supply items, ground support equipment and piece parts have, in part, also been delayed by the progress of the project. Non-contract support requirements despite the delays have been contained with the approved costs.

#### General Comments

11.26 There were aspects of the contract which caused concern. The revised contract comprised two elements viz \$A 3.804 million for work done by WEAL, and \$US 12.972 million for work performed by Westinghouse in US. The latter had been revised by price escalation in the cost of labour and materials. Equipment modifications, principally the fibre optic cables, contributed to major slippages in the contract and its resultant cost revisions.

11.27 The level of Australian Industry Participation (AIP) at 33 per cent was considered adequate in view of the limited quantity of materials involved, and as it would be uneconomic to manufacture the specialised technology in Australia. The then Department of Defence Support considered there was modest technological transfer to WEAL as a result of the contract.

11.28 It might be assumed from the major slippage in the project that Defence exercised insufficient control over progress. Project modifications contributed to delays - details were not provided as to whether the fibre optic cable modification was thoroughly examined from an economic as well as a technical viewpoint - and it is apparent that the Project Office did little more than respond to changes initiated via the contractor as a result of redesign and testing.

10. Minutes of Evidence, *op cit*, page 92.

11. *Ibid*, page 2421.

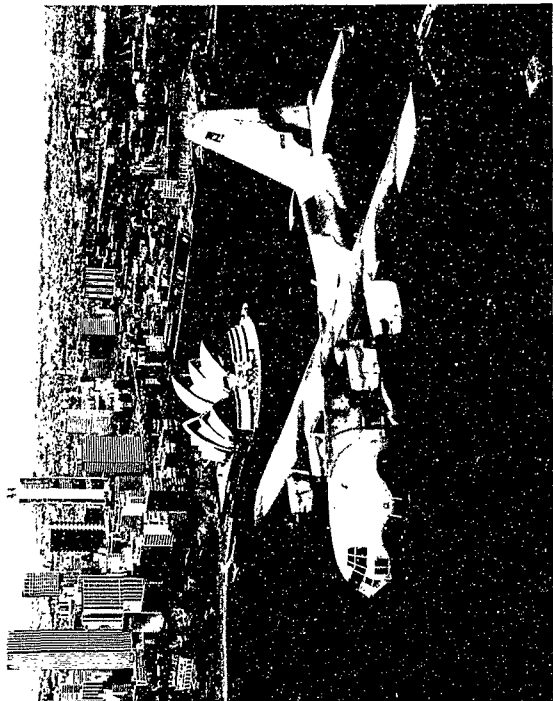


Illustration 12.1

A RAAF C130H Transport Aircraft

Department of Defence

## CHAPTER 12

### C-130H SIMULATOR PROJECT

#### Synopsis

This project, nominated by Defence for examination by the Committee, involved a relatively straightforward acquisition of an air crew training simulator suitable for the fleet of C-130H Hercules transport aircraft brought into service in 1978.

The project was progressed relatively quickly from the initial Major Equipment Proposal to inclusion in the FYDP. Ministerial approval for the project, at \$6.710 million, was given in September 1979. Expenditure on the project however was to increase by 31 per cent despite achieving a firm price basis for the prime contract.

The major sources of real cost increase were in the areas of Engineering Change Proposals (ECPs) (\$0.3 million), investment in AIP infrastructure (\$0.288 million), and a significant under-provision for spares and ground support equipment (\$1.191 million).

An unexpected reprogramming of USAF orders for C 130 simulators threw into relief certain unsatisfactory assumptions on which design specifications had been defined in the contract, and added 3 months to the delivery schedule due to the combination of a need for strengthened quality assurance procedures and numerous ECPs. The delayed USAF order also impacted on the cost of spares and support equipment. A dockyard accident added a further 7 1/2 months to delivery.

A feature of the project's management was the retention of the principal specialist during the project cycle. To some extent this factor helped to counter deficiencies in project definition and planning. A Project Management Acquisition Plan was not prepared. The authority of a resident project manager/engineer at the contractor's plant to expedite matters in relation to the project did contribute to the achievement of quality standards and, discounting the unforeseen events mentioned above, substantial delivery on time.

With a final project approval of \$8.798 million (July 1981 prices) and expenditure to end June 1984 of \$7.891 million, this project falls outside the category of major projects covered by the Committee's terms of reference. Nonetheless its history does illustrate many issues pertinent to sound project management.

## Introduction

12.1 In 1978 the RAAF replaced its C130A Hercules transport aircraft with an updated C-130H version. The C-130H flight simulator is designed to train and exercise RAAF C-130H pilots and flight engineers, in normal and emergency procedures, through the operational envelope of the C-130H aircraft.

12.2 The simulator comprises an integral cockpit and instructor-operator station mounted on a six-degrees-of-freedom motion system and incorporating a two-window single-channel computer-generated-image (CGI) visual system and associated computer and peripheral equipment. The simulator provides a highly accurate facsimile of the RAAF C-130H aircraft cockpit which, together with visual, motion and aural cues presents a very realistic training environment for students. This allows the ground-based simulator to replace expensive flying training in the aircraft, and also allows for some training in the handling of major emergencies which cannot be practised realistically in the aircraft without compromising safety.

12.3 The project involved in essence the replacement of an outmoded flight simulator with a model which accorded with the newly acquired C-130H aircraft. At the time of contract the RAAF simulator was to be a production follow-on to ten USAF C-130H simulators. However, in the event, USAF program slippages resulted in the RAAF simulator being the first down the production line. Significant configuration differences between the RAAF and USAF simulators resulted in unexpected new design effort.

## Project Development

12.4 The C-130H simulator project began in March 1976 when a Major Equipment Proposal (Form DP1) was raised for the purpose of bidding the project into the Five Year Defence Programme (FYDP). The estimated cost was \$3.790 million (January 1976 prices) with an in-service date of May 1980 proposed.

12.5 The importance of early introduction of the simulator to permit economical and efficient crew training was recognised by the RAAF. As indicated above, the initial timing shows an in-service date some two years out-of-phase with the introduction of the C-130H aircraft. This lag in timing was further extended during the course of the project, in large part for reasons outside Defence's control.

12.6 Government approval for the project was provided in the context of the 1976/77 Budget, and an Air Force Staff Requirement (AFSR 120/91) endorsed in March 1977. In May 1977, Departmental approval was given to issue a combined Request for Proposals (RFP) for both the C-130H simulator and the P3C Operational Flight Trainer (OFT) to take advantage of economy of scale and commonality aspects. However, the difference in the timings for these two projects and the assessed lack of significant advantage in a combined procurement, resulted in the C-130H simulator project progressing in advance of the P3C OFT project.

12.7 Proposals from CAE (Canada) and Singer-Link (USA) were received and evaluation completed in December 1978. Financial constraints on the Defence program led to a deferral of consideration until May 1979 at which time both companies were asked to resubmit proposals. Subsequently the Singer-Link proposal was recommended and Ministerial approval to proceed to contract was granted in September 1979.

12.8 The history of the project, in particular the unforeseen initial run on the production line, the loss of USAF experience for assessing quality control systems, and the inflationary impact on meeting spares requirements, caused Air Vice-Marshal Heggen to comment:

We have learned a great deal about project definition from this project in other words, how to define the extent of the project and how to comprehend all the various elements that go into a project. While these errors and omissions, and the correction of those errors and omissions, are evident in this project, they are lessons from which we have learned and they have influenced the procedures that we have in place, as well as the practices for project definition.... We have not had either the expertise or the means of properly comprehending the extent of the project or forecasting or predicting the way in which the project should be managed.<sup>1</sup>

12.9 On 9 November 1979 a commercial contract was signed with the Singer Company-Link Flight Simulation Division of Binghamton, New York, for the supply of the C-130H flight simulator and associated equipment and services at a cost of \$US 5.758 million. The Ministerial approval, in August 1979 prices, was \$A6.710 million.

## Project Acquisition

12.10 The contract scheduled delivery in September 1982. A number of factors delayed its introduction and commissioning until August 1983. As mentioned, it was envisaged that the RAAF would benefit from follow-on production to the USAF C-130H simulator order. This did not eventuate due to slippages in the USAF program, and a considerable design effort was required by the contractor to accommodate configuration differences between the RAAF and USAF simulators. Three months slippage resulted.

12.11 A further 7-1/2 months slippage resulted from an accident which occurred during loading at the New York harbour. The cockpit assembly was returned to the contractor who undertook the necessary repairs at no cost to the Commonwealth. Subsequently, the simulator was shipped to Australia and installed at RAAF Richmond in April 1983. Formal acceptance and commissioning into service took place in August 1983.

1. Minutes of Evidence, op cit, page 782.

## Project Management

12.12 Following the determination of the initial requirements, Air Force Operations Division transferred in March 1977 management responsibility to the Air Force Materiel Division. Management of the Project has remained within that Division throughout its implementation. A Project Director and Project Manager were given direct responsibility for the tendering and source selection processes.

12.13 A notable feature of this project has been the continuity of management experience. The specialist project engineer from Air Force Technical Service who participated in the initial project definition phase, also participated in the development of the Engineering Specifications, and in the evaluation, source selection and contract negotiations. Subsequently he was assigned as the Resident Project Manager/Engineer at the contractor's plant and was responsible for the immediate interface between the contractor and the RAAF. On completion of the manufacturing activities he was transferred as Project Director for all RAAF simulator projects.

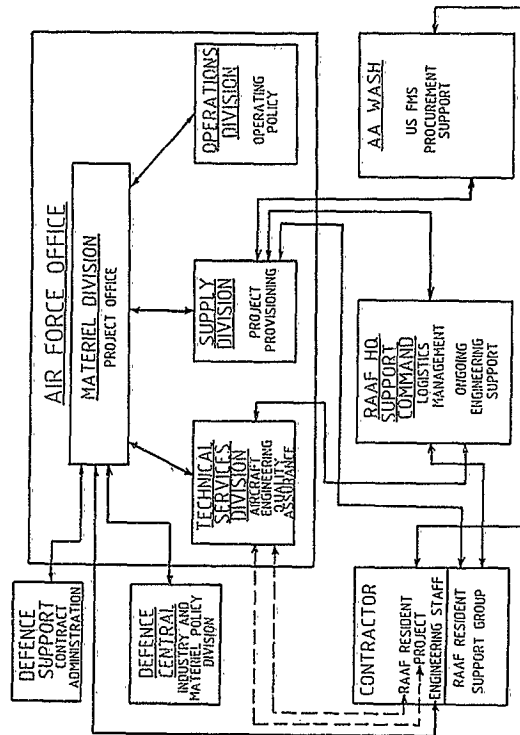
12.14 Figure 12.1 shows the matrix management structure which operated.

12.15 In November 1980, one year following the signing of the contract, a Logistics Management Directive (LMD) was issued. The stated intention of the LMD was 'to give policy guidance and instruction for the provision of long term technical and supply support for the C-130H Simulator'. The contract incorporated specifications which were based on a belief that the RAAF and USAF simulators were similar in design. Group Capt. Webber commented as follows:

....what we were expecting to obtain in the way of documentation for the RAAF C-130H simulator was copies of the technical data packages that would be provided to the USAF with additional information being provided as an add-on package, showing the differences between the USAF Simulator and our own. As a result of the program ending up following the RAAF program, rather than leading it, much of the documentation did not exist at the time and we then had to negotiate with the company to ensure that we received an adequate documentation package with our simulator. Out of this particular exercise it became quite clear to us that we should have defined our requirements much more clearly and should not have made the assumption that we would be a follow-on program to a USAF program.<sup>2</sup>

12.16 RAAF relied on the contract, the staff procedures developed in the course of the contract, and the LMD to set out an effective management arrangement. No Project Management and Acquisition Plan (PMAP) was issued. With hindsight and the experience of more recent projects, Air Vice-Marshal Heggen acknowledged that a PMAP should have been issued.<sup>3</sup>

FIGURE 12.1 Management Organisation - C-130H Simulator Project



(Source, Minutes of Evidence, p 752)

2. Minutes of Evidence, op cit, page 773.

3. Ibid, page 770.



## Design Approval and Quality Assurance

12.17 The RAAF resident project manager/engineer at the contractor's plant, as mentioned above, had had close prior involvement with the development of the specifications and other pre-contract work. Relatively little of the design modifications required by the RAAF configuration necessitated referral back to the Design Approval Authority in Canberra, and the resident engineer was able to expedite, through Local Technical Committee meetings, many of the approvals. Group Capt. Webber in evidence stated, 'most of the design queries or concerns or difficulties that arose during this contract were solved on site'.<sup>4</sup>

12.18 Quarterly Progress Reports from the Resident Project Manager included quality assurance, supply, and technical aspects. Because of the unexpected sequencing of the RAAF simulator as the first production run, aspects of quality assurance had to be strengthened. Sqn. Ldr. Weight observed:

It was not until we got into the plant that we found out the configuration of the United States Air Force simulator that Link was basing our product on was significantly different from our device. As a result of that, when Singer was letting the subcontractors, I and the quality assurance representative insisted on more significant quality assurance provisions in those subcontractors than were in the original prime contract on the basis that we ultimately had to accept those subcontractor items.<sup>5</sup>

12.19 Under further questioning, Sqn. Ldr. Weight indicated that in tendering for the RAAF C-130H simulator, the prime contractor assumed that because production would follow the 10 simulators ordered by USAF, provision was not made for quality assurance in the RAAF contract:

....it was only through direct representation to senior Link management that we got any company quality assurance at all. The best that it would give at the end of the program was just overseeing. There was no direct involvement. In essence, it was our quality assurance representative who did the majority of the quality assurance on our simulator.<sup>6</sup>

12.20 It is reasonably clear that the contract specifications as to quality control procedures and standards, and RAAF quality assurance, were inadequate to cover the contingency which happened. To the credit of the project, remedial action was taken including successful negotiations with the Australian subcontractor EMI. EMI was responsible for development of computer databases used for producing visual images. One further aspect relating to quality assurance was the incorporation by the subcontractor of aircraft test data obtained during the in-service testing following installation at RAAF Richmond in April 1983.

4. Minutes of Evidence, op cit, page 767.

5. Ibid, page 770.

6. Ibid, page 771.

12.21 Approved Engineering Change Proposals (ECP) contributed \$US 273,470 to an increased contract price.

## Spares and Support Equipment

12.22 A prominent feature of this project was the relatively poor initial estimates and costing of spares and support equipment. Deficiencies in this area led to an increase in the cost of the project by \$ 1.191 million.<sup>7</sup>

12.23 Defence witnesses in explaining this situation pointed to a dearth of valid information, other than manufacturer's claims, on which to base sound estimates for maintenance spares and ground support equipment requirements, to the intention by RAAF to break away from sourcing spares from prime contractors and therefore the attempt to seek competitive quotations in the market, and to a general practice in the RAAF not to forward purchase spares until new equipment had been thoroughly tested and in use. They also suggested that the financial penalties of acquiring stocks in advance of requirements were large, citing a 10 per cent p.a. (discounted cash flow) rate as a basis for this view. However, it is clear that the delay in reaching an adequate and comprehensive picture of these requirements was serious due to the rapid inflation which impacted on equipment during the period of acquisition.<sup>8</sup>

## Financial Management

12.24 At the time the project was included in the FYDP it had (in January 1976 prices) an estimated cost of \$ 3.790 million. That cost rose to \$ 6.710 million (in August 1979 prices) by the time the approval had been granted by the Minister.

12.25 Three further cost elements were to impact on the approval - \$ 1.191 million for spares and ground support equipment, \$ 288,000 Government assistance to Australian industry for the Australian Industry Participation obligation (of \$ 1.560 million) by the prime contractor, and approximately \$ 300,000 (actual, \$ US 273,470) for approved engineering change proposals (ECPs). Given that the final approval for the project was \$8.798 million in July 1981, cost escalation and possible exchange rate variations played a relatively small part in the project cost increase of 31 per cent over two years. The project was substantially under-costed.<sup>9</sup>

12.26 Nonetheless expenditure control appeared to be sound. The commercial contract, apart from the approved EDPS, was at a firm price of \$ US8.758 million. The contract required the supplier to advise of the achievement of contract milestones and submit claims for payment to the Resident Project Manager for validation.

7. Minutes of Evidence, op cit, page 781.

8. Ibid, pages 775-6, 783-4.

9. Ibid, page 781.

## Concluding Comments

12.27 In evidence to the Committee, Air Vice-Marshal Heggen commenting on the favourable influence of continuity of key personnel on this project stated:

...We look for broadly based professionals in our officers. However, that does not mean that we do not have regard to the need to promote in people the skills of project management. There is a deliberate policy, in Air Force at least, for people to follow a career path which is project related ...10

12.28 There is little doubt that this element of continuity ameliorated to some extent the shortcomings which appeared in this project. The C-130H Simulator was commissioned into service approximately 11 months behind schedule with expenditure rising steeply over the acquisition period by 31 per cent. While it is true that events, such as the reprogramming of the USAF order for 10 simulators and the dockyard accident, were outside the control of the Department of Defence, the errors of judgement in relation to quality assurance procedures and, almost certainly, spares assessment and the unanticipated cost of Australian Industry participation for the subcontractors pointed to the incomplete managerial skills then applied to procurement.

10. Minutes of Evidence, op cit, page 762.

## CHAPTER 13

### ARMY MEDIUM TRUCK PROJECT

#### Synopsis

This project, which provides for the acquisition of a fleet of 4 and 8 tonne trucks to replace Army's obsolete 2-1/2 and 5 tonne International fleet, was nominated by Defence as a successful project.

The procurement commenced with an evaluation of vehicles by the Trials Directorate of the Defence Science and Technology Organisation (DSTO) and user evaluation by the Army School of Transport, Puckapunyal. Assessment was sound within stated objectives but did not cover in detail considerations relating to the capability within Australian industry to support or expand the fleet. Commonality between military and civilian trucks was an important factor particularly in assessing the service cost of the vehicles over their expected 10 year life.

The evaluation was protracted and led to a delay in gaining approval for contracts for the 940 8 tonne and 1295 4 tonne vehicles at a total cost of \$193.32 million. Both suppliers provided high Australian content, offset purchases and a substantial commitment to civilian support infrastructures.

Monitoring of the production phase by Contract Progress Committees and Production Teams, which included maintenance personnel, was effective. A number of problems arose and were rectified. An unresolved problem remains with respect to towing light guns. There was also a sharp escalation in the cost of maintenance publications.

The project will be substantially completed within approved cost and at adequate production and performance levels. The project is not complex and the policy of commonality simplified support systems. The range of military modifications was also kept to a minimum. Project management aspects, including definition of requirements, were sound.



Illustration 13.1

Army Unimog UL 1700 L 4 Tonne Truck

Department of Defence

## Introduction

13.1 The Medium Truck Project provides for the acquisition of a fleet of 4 and 8 tonne trucks to replace the Army's obsolete 2-1/2 and 5 tonne International fleet.

13.2 The 4 tonne vehicle, in forward areas of operation, will be the basic troop/cargo carrier or gun tractor. The larger 8 tonne vehicle will supplement these roles and be used for carriage of cargo, such as ammunition and fuel direct from support bases into areas of operation. All trucks will have an 'off-road' capability.

13.3 The 8 tonne trucks are fitted with the same major assemblies (engines, transmissions, etc) as commercial counterparts, as well as being fitted with special features to meet military requirements. In addition, specially configured vehicles - water/fuel tankers, gun tractors, cargo with crane, bitumen distributors, dump tipper, concrete mixer, recovery vehicles - are included in the fleet.

## Project Definition

13.4 Army Staff Requirements (ASR) Nos 63.20 (April 1976) and 63.30 (July 1976) specified that the vehicle should have a repair and support organisation throughout Australia and should be expected to remain in continuous commercial production, without significant design changes, during the service life of the vehicles.

13.5 In December 1976 an Equipment Acquisition Strategy (EAS) was issued. The EAS was later modified in November 1979. The proposal involved three phases, as follows:

- (1) acquisition of a number of vehicles for evaluation purposes;
- (2) initial procurement primarily for Field Force Units; and
- (3) follow-on procurement for Army Reserve Units and other regular Army units

13.6 Delivery of the 4 tonne vehicles was to commence in 1980/81 and for the 8 tonne vehicles in 1981/82.

13.7 Ministerial approval was granted on 6 February 1977 for procurement of vehicles under Phase 1 of the plan. The total cost of \$1.048 million for Phase 1 was to be spread over three financial years.



Illustration 13.2 Army Mack RN6866 RS 8 Tonne Truck

Department of Defence

## Tenders

13.8 A briefing was held in Melbourne in early 1977 with representatives of 31 world-wide companies to explain Army requirements and call tenders for evaluation vehicles. In November 1976 the Defence Source Definition Committee (DSDC) developed the procurement philosophy for this project, emphasising commonality between military and civilian truck usages in Australia. This approach was spelt out in the EAS.

13.9 By August 1977 tenders had been received from 15 companies. Government approval for the evaluation phase was contained in the 1977/78 Budget. On 17 January 1978 the Minister for Defence approved the purchase of 15 evaluation vehicles, three each of five types. Orders for the evaluation vehicles were eventually placed in November 1978 for delivery in April 1979, representing a seven month slippage from the date proposed in the EAS.

## Testing

13.10 Evaluation of the vehicles was undertaken by the Trials Directorate of the DSTO. The objectives of the trials were cited as:

- . to establish characteristics and performance of vehicles in accordance with the ASR;
- . to identify short-comings, advantages and implications of service use;
- . to assess relative costs over whole of life; and
- . to determine if the vehicles were air portable in RAAF C-130 aircraft.

The essential characteristics of the vehicles were to be:

- . reliability;
- . economy of manpower;
- . ease of maintenance;
- . conformity with State road laws;
- . mobility;
- . ergonomics; and
- . engine characteristics and engine suppression (for radios).<sup>1</sup>

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1. Major P.D. Handel, Australian Army Medium Truck Replacement Programme, Jane's Defence Weekly, 11 February 1984, pages 195-201.

13.11 User evaluation was undertaken by a special purpose unit from the Army School of Transport at Fuckapunya. The unit clocked up 50,000 kms on each vehicle before completing the trials in April 1980. The assessment was sound, within the framework described above. However, in terms of establishing or building a capability within Australian industry to support or expand the fleet in a Defence emergency, a different set of considerations are required and may not have been considered during the trials. The protracted evaluation procedures resulted in a program slippage of 12 months.

13.12 Additional evaluation trials were conducted in 1981 on major components sourced from Australia.

#### Approval

13.13 Following the completion of the trials, Government approval, within the context of the 1980/81 Budget, was granted for production vehicles in Phase 2 for a total cost of \$193.32 million.

13.14 The Project Management Acquisition Plan (PMAP) was issued in July 1980. Endorsement of brand selection by the Defence Source Definition Committee (DSDC) followed. The selected vehicles, the Mercedes Benz Unimog ULL700 L 4 tonne truck and the Mack RM 6866 RS 8 tonne, had been assessed as superior in terms of performance, reliability, maintainability and net cost of operations over a 10 year operating life.

13.15 On 2 April 1981 the Minister for Defence approved an expenditure of \$97.159 million for 940 8 tonne vehicles from Mack (Australia). Approval of the 4 tonne vehicles was delayed by Government negotiations to divert trade from the European Economic Community. The Minister subsequently approved on 9 November 1981 expenditure of \$66.44 million for 1,295 vehicles from Mercedes Benz (Australia).

13.16 Contracts were signed with Mack (Australia) in June 1981 and with Mercedes Benz (Australia) in November 1981. Delivery dates for the 8 tonne trucks were to commence in March 1982 and be completed by June 1986; for the 4 tonne trucks to commence in November 1982 for completion in June 1987.

13.17 Mercedes Benz offered a 43 per cent Australian content, with offset purchases up to 5 years after the last Unimog is produced to bring Australian Industry Participation (AIP) up to 100 per cent of the value of purchases. Mack offered 63 per cent AIP and a \$12 million co-production package. Both suppliers provided a substantial commitment to civilian support infrastructures.

#### Project Management

13.18 The Army during the evaluation stage adopted a matrix management arrangement. Major-General Taylor, Chief of Army Materiel, described the matrix management approach in these terms:

In simple terms, matrix management is used in the early days of a project when you are working up to define the limits of the project. It is flexible. It enables you to use the other inputs and resources that are necessary to run the project. It involves minimum cost on manpower... Basically, it is using the existing infrastructure... Drawing (on) already established resources. They already have their own supervisory arrangements. So what you simply do is use those facilities, link them together through perhaps a Project Management and Acquisition Plan and establish a part time team... As the project gathers steam, gathers funding, gathers difficulty and complexity, that is the time when, if the project is large enough, you start dedicating specific resources to it, and that is when you go into project management teams.<sup>2</sup>

Mr Bennett, Chief of Capital Procurement, added these comments:

It is really a question of the degree to which resources are dedicated to the project and the degree to which we draw on resources from outside the project team. Even in large projects at advanced stages where we have dedicated project teams there will in most cases, I believe, still be a need to use matrix management in order to draw on resources which are not incorporated within the project teams because it would not be economic to dedicate them entirely to that particular project.<sup>3</sup>

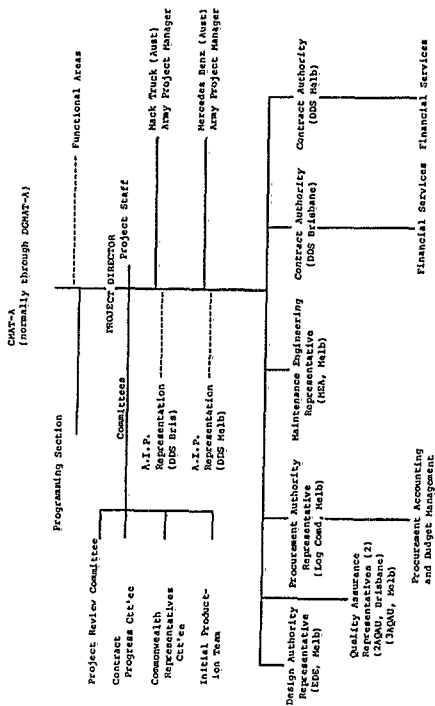
#### Project Management for Phase 2

13.19 With the commencement of Phase 2, procurement of production vehicles, project management moved to a dedicated project management team under the direction of a project director.

13.20 The project organisation is outlined in figure 13.1.4

2. Minutes of Evidence, op cit, pages 814-5.
3. Ibid, page 815.
4. Ibid, page 802.

FIGURE 13.1: Management Organisation - Army Medium Truck Project



(Source, Minutes of Evidence, page 802)

13.21 The strengths of this organisation were cited by Army as:

- representatives from key areas of responsibility are appointed and are responsive to an appointed Project Director, though operating under the supervision of their own functional areas;
- lines of responsibility and communication are identified and operate effectively;
- there is an acceptable matching of responsibility and authority to ensure that decision-making within the project is quick and effective, mindful of the continuously moving production lines. This is particularly evident in such areas as creating working groups, approving modifications and initiating trials; and
- the Project Director is appointed as both Defence and Army project director and is required to satisfy both the Departmental and the Service requirements. Departmental staff are available for consultation and assistance.<sup>5</sup>

13.22 The Committee questioned witnesses as to the Army's strategy for preparing staff to undertake the role of project director. The approach outlined incorporated a one year Masters degree course in logistics at Shrivenham, England and a dual streaming in posting officers. Lt. Col. Copley stated:

One of the important functions of a project manager is not only on the procurement side, but also to ensure satisfactory introduction of equipment into service. So, if you do not maintain credibility from the service point of view and maintain your Service expertise, then that side of project management can fall flat.<sup>6</sup>

13.23 The Committee expressed reservations as to the preparedness of project directors to effectively manage a complex procurement program and, in particular, the potential effects of staff changes during such programs. Department of Defence witnesses affirmed the viability of co-ordinated matrix operations and its review and management information systems to cope with project management issues involved in the Medium Truck Project.

13.24 As noted the 8 tonne trucks had identical major assemblies to commercial counterparts. The fleet of specially configured vehicles required little design work although some

5. Minutes of Evidence, op cit, page 792.

6. Ibid, page 826.



assembly re-design was seen to be necessary. These vehicles were subjected to engineering and user trials and, where necessary, modified before production approval was given. These tests were progressively undertaken during 1982 and 1984.

#### Performance Monitoring

13.25 As a procurement program, performance monitoring was multi-faceted. The PMAP specified that the Quality Assurance Authority (QA Authority) have on-site representation during the currency of the contract. Three QA inspectors worked at the contractors' assembly plants. Initially they experienced problems with the contractors' quality control (QC) systems. These were eventually rectified to comply with Australian Standards (AS 1822), in the case of Mercedes Benz in October 1981 and Mack in August 1982.

13.26 The main system committee for performance monitoring was the Contract Progress Committee (CPC) which met at 6-12 week intervals. That Committee included the contractor's project manager and key Commonwealth personnel including the contract, procurement and quality assurance authorities. The Project Director convened and chaired these meetings.

13.27 In addition, an Initial Progress Team, consisting of representatives of the contractor's project office, Engineering Development Establishment, QA Authority and the Maintenance Engineering Agency, provided the means to discuss modifications, for instance to design, directly with contractors.

13.28 The Committee was satisfied that these monitoring arrangements allowed for adequate responses by the Project Director, noting the incorporation of on-going service and maintenance perspectives within the process.

13.29 Witnesses cited a number of related benefits arising from this monitoring of the production line. Lt. Col. Copley stated:

There have been problems that were traced back to the quality control system not working in those areas as well as it ought to have worked... the cases that have been quoted were wheel rims - sections of wheel rims, not the main rim itself - which were seen to be splitting. That was a problem which did not occur in our evaluation vehicles because we were using foreign wheel rims. The Australian vehicle had Australian wheel rims which were developed for the truck and so I suppose they were going through an initial problem of introduction into service, from the production

line and from the user's point of view. The problems which occurred were detected within the first 70 or 80 vehicles. We now have nearing 1,000 vehicles all in all, so they were detected quite early. The contractors and their sub-contractors traced them to quality control problems, which have been rectified.<sup>7</sup>

13.30 The monitoring system had the potential to permit progressive modifications to be introduced to the production line to improve the effectiveness of the vehicles. A number of relatively minor problems emerged during the initial period of the production run - paint, brake calliper failure, clutch bearings, transfer case heating, tailgates on dump trucks, crane failure - and were dealt with within the monitoring system outlined above.

#### Commonality

13.31 This concept was of considerable interest to the Committee. The arguments in favour related to vehicles in a similar size range since there were clear difficulties in achieving a large amount of commonality between vehicles of different sizes.

13.32 The Committee noted that modifications were introduced to ensure that both the 8 and 4 tonne trucks used the same tyres and for the wheels to be made by the same company. Spare parts for the major assemblies - engines, transmissions and differentials - were common to commercial counterparts. The contracts required that following delivery of the last vehicles spare part service support be provided for 10 years. It is also noted that notwithstanding the range of configurations in the 8 tonne fleet, there was a general commonality of parts within that fleet.

#### User Problems

13.33 The Committee noted that following the introduction of the Mack 8 tonne trucks, there was considerable dissatisfaction with the ride quality for troops. The matter was being approached via different seating materials as well as design modifications to reduce overheating of the transfer case.

13.34 An unresolved problem concerned the compatibility of the truck design with the requirement to tow the 105 mm light gun. The problem was identified prior to the delivery of the light gun. No final decision has been taken as to where modifications, if any, will be taken.

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7. Minutes of Evidence, op cit, page 846.

## Publications

13.35 Mercedes Benz has a policy that adequate training aids are made available to agencies involved with the servicing and maintenance of its vehicles. In April 1983, some 17 months after the contract was signed and 5 months following the initial delivery of vehicles, the RAEME Training Centre was presented with a number of full-scale training aids. The penetration of similar training aids throughout its service dealers was not known.

13.36 A notable failure in this context was the delays involved and cost escalation (by 77 per cent) of handbooks, maintenance manuals and repair part lists. The Committee noted that the resolution of this issue remained unsatisfactory in that cost over runs are likely. The contract authorities need to ensure that tighter provisions are included in contracts to avoid repetition of this case.

## In-Service Evaluation

13.37 Following the initial introduction of the vehicles, field units undertook further trials relating to long distance reconnaissance (1,200 km range) and the incorporation of mortar locating radar. Modifications to fuel tanks and other structures were made to a number of the fleet.

## Conclusions

13.38 The project management of the Medium Trucks Project has been sound. In the initial stage of evaluating vehicles a matrix management system operated. On completion of this stage and the letting of contracts for procurement of 940 8 tonne and 1295 4 tonne vehicles, a relatively small project team was established. It worked in accordance with tasks and functions outlined in the Project Management Acquisition Plan.

13.39 Evaluation of test vehicles was technically sound. A number of key factors, particularly the response time needed by civilian support structures to effect repairs and maintenance, and an assurance of long-term stability of design with its associated guarantee of parts over the life span of the vehicle, appeared also to be given weight in the assessment. The question of commonality between fleets of different sized trucks was considered of less importance than commonality between military and civilian counterparts. This factor was implicit in the assessment of the service cost of the vehicles over their expected 10 year life.

13.40 Monitoring of the production phase was effective in the use of Contract Progress Committees and Initial Production Teams. Inbuilt into these were maintenance personnel whose involvement appeared to have clear benefits.

13.41 The Committee noted the general absence of sophisticated management information systems and the relatively infrequent use of the Project Review Committee as a means of drawing sensitive issues to the attention of senior staff. Reference considered these to be largely unwarranted because of the nature of the procurement program. Nonetheless, adherence to the general principles of sound management do appear to be necessary even with relatively straight-line projects such as this one.

13.42 A number of problems arose which affected scheduled production rates by the contractors. The most serious of these were detected early in the contract and rectified via the performance monitoring system committees. A problem with towing light guns could result in a re-appraisal of the latter project. Integration of the two re-equipment programs might have been better timed. Finally, there was a relatively steep escalation of the cost of publications relating to vehicle maintenance.

13.43 The Committee is generally satisfied that the management of this project, which has lived within its approved cost parameters, has been sound.

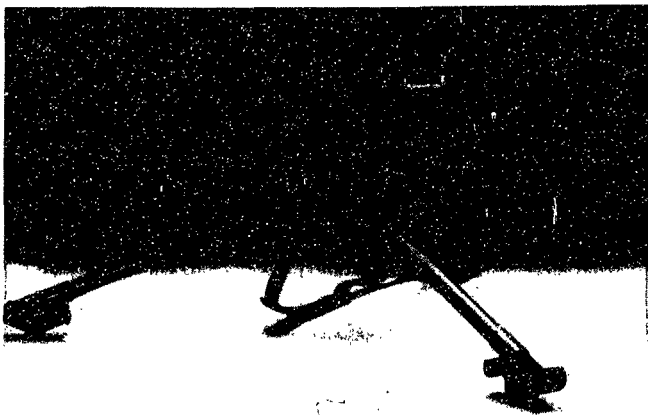


Illustration 14.1 Herstal Minimi 5.56mm Light Support  
Machine Gun

Fabrique Nationale Herstal SA



Illustration 14.2 Steyr AUG-A1 Rifle

Steyr-Daimler-Puch AG

## CHAPTER 14

### SMALL ARMS REPLACEMENT PROJECT

#### Synopsis

This project, with a cost estimated in October 1981 of \$112 million, has not yet received Government approval for its full development. It aims to replace the Army's current inventory of small arms with a new family of small arms comprising a rifle, light support machine gun, and general support machine gun. The project was selected by the Committee for examination.

Expenditure commenced in December 1982 with Departmental approval for the evaluation of 5.56mm rifles and light machine guns. The evaluation, costing in the order of \$0.755 million, was completed in mid 1985.

Within the context of the 1983-84 Budget, financial approval was given for the acquisition of 676 7.62mm general support machine guns at a cost of \$4.4 million. The remaining elements of the project, local production of ammunition, and local manufacture of the light support machine gun and rifle, are currently under intensive examination and development. Government approval for these stages has not yet been sought.

The project has experienced a lengthy lead-up and, following the 1980 decision by NATO on its small arms, a surprisingly extended period of evaluation, testing and feasibility assessment. Dedicated project staff were appointed in May 1983. Considerable detailed work on the project, including completion of a Project Management Acquisition Plan (PMAP), and more accurate and current estimates of the cost of Phases 2,4 and 5, are now due to allow this project to be adequately assessed by Government.

## Introduction

14.1 The project aims to replace the Army's current inventory of small arms - weapons of up to 30mm calibre - with a new 'family of small arms' comprising a rifle, light support machine gun, and a general support machine gun.

14.2 The project stems from the age and increasing cost of maintaining weapons at present in use by the Army. Much of the existing weaponry has been in use since the 1960s with deficiencies known for a considerable time.

14.3 The project is composed of five broadly sequenced phases:

- 1) evaluation of short listed individual weapons (rifles) and light support machine guns;
- 2) development of Australian designed 5.56mm ammunition leading to local production capability;
- 3) procurement of the 7.62mm general support machine gun;
- 4) procurement of the light support machine gun including government manufacturing plant and equipment for rebuild capacity; and
- 5) procurement of rifle including provision of government manufacturing plant, and equipment for rebuild capacity.

14.4 Priority has been given to phases 1 and 3. Government approval has not yet been given to phases 2, 4 and 5, and the detail of these may change with time. Estimated costs in October 1981 were \$112 million. This estimate has yet to be tested by accurate information on the cost of Australian manufacture of the armaments.

## Background

14.5 Current in-service individual weapons are the 7.62mm L1A1 rifle, the sub-machine gun 9mm FI and the 5.56mm M16 AI rifle. These weapons were introduced into service in 1959, 1965 and 1966 respectively. In the light machine gun area three weapons, the 7.62mm L2A2, the 7.62mm M60 and the 7.62mm L4A4 were introduced into service in 1960, 1961 and 1970 respectively. The 7.62mm M60 is also used in the general support role.

14.6 The Committee noted deficiencies in the current inventory of small arms, which include:

- . technological obsolescence;
- . lack of component commonality;
- . decreasing operational capability, particularly of the M60; and
- . escalating cost of maintenance

## Project Definition

14.7 The Committee expressed concern over the manner in which Defence has approached the re-equipment of the Army's infantry battalions with small arms.

14.8 Following the experience of Australian Defence Forces in Vietnam, it was apparent that major deficiencies in small arms needed close attention. The Committee was not convinced by Defence's statement that action was delayed by the need to take account of a NATO study, nor impressed by the further delay of some two years following the completion of that study in 1980.

14.9 Lt-Col. Everett, Project Director, Small Arms Replacement Project, in evidence to the Committee made these statements:

We first recognised the requirement in the very early 1970's that we would have to replace our current family of small arms. The decision was made then not to proceed because NATO was doing a study on what calibre should be adopted for the next family of small arms. The NATO decision was made in early 1980. The Army then set up its own committee and did a study on the future of the family of small arms post-1985. We believed at that stage that the weapons that we had in service could be kept in service until 1985, at least. As a result of that study, in September 1982, the recommendation was made for a new family of small arms and the calibres we adopted were the new NATO calibres.

14.10 NATO made its decision in 1980 on the calibre for small arms. Twelve months later the Army established a study group to define its needs. That study group took a further sixteen months essentially to endorse the NATO decision of 1980.

14.11 In response to the apparent delay to defining Army's needs, Major-General Taylor, Chief of Materiel, stated

1. Minutes of Evidence, op cit, page 879.

that 'we did not predict with great precision the time at which the machine-guns would wear out'.<sup>2</sup> He added that Army had noted within NATO that the Federal Republic of Germany had not accepted the recommended calibre of 5.56mm, observing in passing '...we were pushed by overseas events in the sense of not being able to get going soon enough'.<sup>3</sup>

14.12 NATO's decision to remain with a 7.62mm calibre general purpose machine-gun, and for a second standards small arms calibre of 5.56mm based on the specifications of a Belgian round known as SS109, clarified the direction which the Army had to follow to maintain long-standing agreements with the US, UK and Canada on standardisation or commonality of arms.

14.13 Lt-Col. Everett noted:

Until the middle of 1982 we had not defined what family of small arms we required, where we wanted to have the 5.56, what it would replace and where we needed the 7.62. So really our starting point was not until mid 1982. That is when we defined the requirements of the 5.56 rifle, the light machine-gun and the 7.62 machine-gun.<sup>4</sup>

14.14 The Committee believe that such decisions could have been made either in principle in anticipation of the 1980 NATO's recommendation, or more expeditiously following NATO's decision. A decision on specifications is seen by the Committee as quite distinct from budgetary approval.

14.15 Mr Bennett, then Chief of Capital Procurement, Department of Defence acknowledged:

..It may be true that units were at risk, but that assumes that there were not alternative options that could have been followed in the event of a real contingency arising. In fact, of course, no such did arise which created a difficulty.<sup>5</sup>

14.16 With respect to general support machine-guns, evidence was presented that due to the lack of operational capability during the early 1980s, an urgent interim measure was taken to re-equip the Operational Defence Force (ODF) with the general purpose machine-gun MAG 58, pending finalisation of that phase of the small arms replacement project.

14.17 This action was consistent with the then Government's view that the most likely involvement by the Defence Forces would be a low level contingency. Accordingly the priority was to ensure that the ODF had adequate capability notwithstanding the relative deficiencies elsewhere in the Army.

14.18 An Army Staff Requirement (ASR) 48.8 Small Arms Post-1985 was endorsed on 8 September 1982. The ASR stated that the small arms were required to:

- provide adequate firepower over an effective range;
- be technologically simple;
- be logistically undemanding; and
- be manufactured in Australia.

14.19 The Committee is interested in the timing of key documents integral to project management. On the basis of documentation provided to the Secretariat, it appears that the Equipment Acquisition Strategy (EAS) was initially drafted in October 1981 anticipating by nine months the Army Study Group report which was concluded in July 1982. Defence stated that issue one of the EAS was agreed to in October 1983.<sup>6</sup>

14.20 No Project Management Acquisition Plan (PMAP) was prepared for the small arms project.

14.21 Prior to endorsement of the EAS, Deputy Secretary C, Department of Defence, approved in December 1982 the evaluation (phase 1) of 5.56mm rifles and light machine guns, at an estimated cost of \$0.713 million (August 1982 prices). Tenders were called and had closed, assessment undertaken and initial documentation prepared for the Defence Source Definition Committee (DCDC) prior to the endorsement of the EAS.

14.22 In addition Ministerial approval had been given in the context of the 1983/84 Budget to phase 3 of the project, the acquisition of 676 7.62mm general support machine guns. The Committee was not persuaded that the apparent departure from sequential planning in fact represents an effective response by the Army to a possible priority situation. The need for replacement action for the general support machine gun had been long apparent.

14.23 Restricted tenders were called in January 1984. Defence stated that 'it had been established by previous weapon evaluations that (Fabrique Nationale Herstal, Belgium and the Ministry of Defence, United Kingdom) were the only sources of supply of a weapon capable of satisfying operational requirements'.<sup>7</sup> Tenders closed in late April and a source evaluation report was completed in July. Ministerial approval was granted for expenditure of \$4.4 million.

6. Minutes of Evidence, op cit, page 869.

7. Ibid, page 873.

2. Minutes of Evidence, op cit, page 880.

3. Ibid, page 881.

4. Ibid, page 884.

5. Ibid, page 886.

#### Phase 1 Evaluation of Small Arms

14.24 In January 1984 the Minister for Defence approved the source selection for evaluation of two rifles and one light machine gun as follows:

- . Steyr 5.56mm AUG Rifle (Austria);
- . Colt 5.56mm M16 A2 Rifle (United States); and
- . Herstal 5.56mm MINIMI Light Machine Gun (Belgium).

14.25 In evidence, Major-General Taylor acknowledged that the timing excluded two other weapons, French and British, which were not as well placed for evaluation, and that Australian firms tendering for evaluation had been rejected. Between February and March 1984 evaluation weapons were purchased for a cost of \$0.223 million and trials commenced in May. Current financial approval for the evaluation phase is \$0.755 million (November 1983 prices).

14.26 Lt-Col. Everett described the trials in these terms:

...break the trials into two segments. One is the user trial by Headquarters 6 Brigade ..(which) will look at what a soldier can achieve with those weapons. They are looking at the ergonomics of the weapons, the compatibility with current equipment and also the vehicles that we have and whether there will be any follow-on modifications. In addition they are recording breakages and...the establishment of our whole of life cost of the weapon and...what size spare parts bill we will need to maintain those weapons while they are in service....and the engineering trial. The first component is the adverse conditioning trial where the weapons will be fired in adverse conditions, like hot/dry, hot/wet and sandy. The second requirement is to put the rifles through an endurance cycle which is representative of the life we want out of the rifle components, in this case the barrels. Throughout that testing they will ensure that the weapon can retain the degree of accuracy that we require and will document wear on components so we can come up with our whole life cost for all of that weapon whilst it is in service.<sup>8</sup>

14.27 Defence witnesses indicated that source selection of the rifle was expected in July 1985.<sup>9</sup>

8. Minutes of Evidence, op cit, pages 898-900.

9. Ibid, page 898.

#### Local Manufacture of Small Arms

14.28 An important aspect of the project is the assessment of industrial capacity for local manufacture of approximately 83,000 rifles and 4,000 light machine guns. Witnesses suggested that it was likely that the Defence's small arms factory at Lithgow would be the prime contractor for such work with commercial industry providing components. Some 90 private firms had been contacted in this study of industry's capability to participate.

14.29 A decision on phases 4 and 5, to establish local manufacturing capability, is to be taken in the context of the 1985/86 budget, a slippage of some 12 months on the original timing. Production phases are not likely to commence until 1989/90.

#### Local Manufacture of Ammunition

14.30 Evidence provided to the Committee indicated that the developmental cost of locally designed ammunition was \$80,000 considerably less than \$0.4 million to buy an existing design.<sup>10</sup> Locally designed ammunition would follow NATO specifications and therefore be inter-changeable with other ammunition.

14.31 In April 1982 the Engineering Development Establishment was given the task of developing an Australian designed 5.56mm ammunition. By May 1984 an Initial Development Team had been set up to identify material requirements and availability, and to assess the technology involved. Approval to proceed with phase 2 of the project is dependent on endorsement by the Defence Force Structure Committee, and subsequent approval for funds in the 1985/86 Budget.

14.32 A further aspect of the project is the Army's wish to establish a rebuild capacity for the family of small arms. Tooling for such capacity, which will provide an alternative to the manufacturer's ability to perform the task, is also likely to be set up in Lithgow at an estimated cost of \$35,000.

#### Project Management

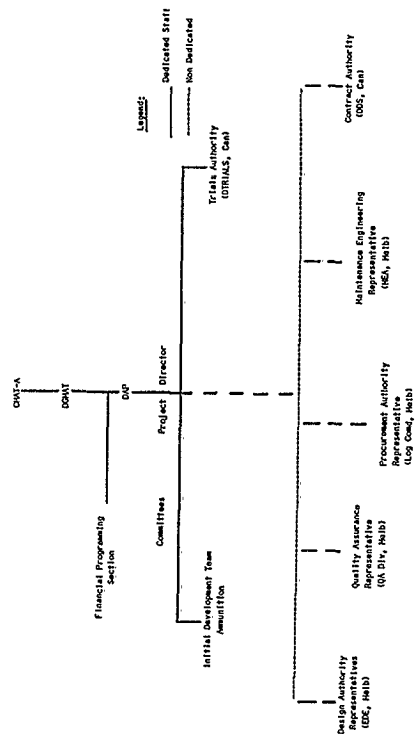
14.33 The Committee notes that notwithstanding the initial estimate of \$112 million for the small arms replacement project, project management may have been slow to emerge from the relatively weak project co-ordinator situated in the Ammunition and Light Armament Section of Materiel Branch to a dedicated project director appointed in May 1983 to manage the future evaluation trials of phase 1 of the project as well as progressing the other phases.

10. Minutes of Evidence, op cit, page 893.

14.34 The latter appointment has a managerial relationship with other areas of Army as shown in the Figure 14.1. Those relationships should be clearly defined in the PMAP, which as mentioned, has yet to be issued. Indeed without endorsement of the PMAP it is problematic whether the Project Director is suitably empowered to progress the project through the important phases of establishment of local manufacturing capacity and production of armaments.

14.35 The Committee notes the apparent absence of proposals for detailed management information systems which would enable senior management to monitor progress. The project appears to have weaknesses which have the potential to lead to further inefficiencies in terms of slippages in time.

FIGURE 14.1 : Management Organisation - Small Arms Replacement Project



(Source, Minutes of Evidence, p 877)



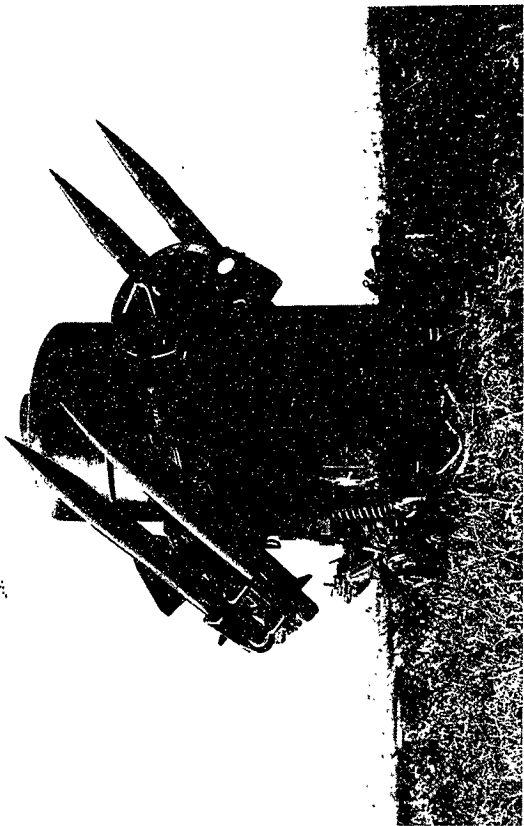


Illustration 15.1 Missile Launcher, Rapier Air Defence Weapon System

British Aerospace

## CHAPTER 15

### RAPIER AIR DEFENCE WEAPON SYSTEM

#### Synopsis

This project has provided Army with a mobile low level close-in guided weapon air defence system. Approval to acquire the system was granted in August 1975, with 20 Optical and 10 Blindfire units coming into service in December 1980 and 1981 respectively. The project had been examined by Audit in 1983.

Australian involvement with the system commenced in 1964 during its development by British Aerospace. Assessment of its capability, however, spanned seven years prior to the decision to proceed with acquisition.

Management of the project during the production phase was handled by a Project Co-ordinator. He depended on major aspects of performance monitoring being undertaken by a resident Army Project Officer in London and contractual aspects by the Australian High Commission. Quality assurance was delegated to UK authorities. Regular liaison meetings in London were supplemented by Project Management Meetings in Canberra.

While production was achieved on time, expenditure escalated by 30 per cent. Of that increase equipment modifications, particularly for the Base Repair Facility at Salisbury, accounted for approximately 10 per cent; the remaining 90 per cent arose from price increases and exchange rate variations.

An objective of the project, to achieve local production of missiles, has not progressed as envisaged. Major problems were encountered with the Troy rocket motor. It is likely that resolution of the technical issues may be completed in 1985 although this is by no means certain.

Other problems were experienced with automatic test equipment for the Repair Base Facility. Australian developed computer software proved to have less capability than specified by the project.

In part in line with the continuous development of the Rapier System, the Government approved in 1983 a further \$11.4 million to acquire and fit modifications to upgrade and extend the service life of the Optical Rapier units. That work is expected to be completed in 1988.

## Introduction

15.1 This project aimed to replace World War II Bofor guns with a mobile low level close-in guided weapon air defence system. Government approval to the selection of the Rapier System was given in August 1975 and the Optical and Blindfire units came into service in December 1980 and 1981 respectively.

### Rapier Air Defence Weapons System

15.2 The surface-to-air guided weapon system project consists of 20 Optical fire units for daylight fair weather operation and 10 Blindfire or radar tracking fire units for night or poor weather operation. Missiles, towing vehicles, maintenance and training equipment, spares and the establishment of a Base Repair facility were included in the project.

### Project Definition and Evaluation

15.3 Australian involvement in the British Aerospace Rapier project began in March 1964 with Government agreement to collaborate in the development of the system, and the subsequent attachment of Australian military and scientific personnel to the UK Rapier Project team.

15.4 A low level air defence capability requirement (Weapons Equipment Policy Statement 12/4) was formulated by the Army in June 1966. Trials of Rapier equipment, and evaluation studies of the Rapier and other systems commenced in July 1968 and continued to early 1975. Notwithstanding an Army Design Establishment Study concluding in December 1972 in favour of the Rapier, studies were continued until 1975 to embrace alternative air defence systems.

### Expenditure

15.5 Approval to acquire the Rapier System was granted in August 1975.

15.6 Expenditure on the project totalled \$92.7 million some 30 per cent above initially approved costs. A further \$11.4 million was approved in 1983 to acquire and fit modifications to upgrade and extend the in-service life of the Optical Rapier.

15.7 Defence provided the following explanation for the increase of \$24.853 million in the approved cost of the project:

a. Increases	\$m
(1) UK escalation	15.695
(2) AUST escalation	1.792
(3) Exchange Rate Variation	6.145
(4) Modifications and Additional Equipment	3.773 (Note 1)
(5) Additional Freight Costs	0.177
b. Reductions	
(1) Costs	-1.637 (Note 2)
(2) Refinement of Requirements	-0.992 (Note 3)
Sub Total	-2.629
Total	24.853

Note 1. This increase was for modifications, additional equipment and repair parts, not initially forecast, but became necessary as a result of UK Army experience with Rapier during that period. Details are:

a. Modifications	\$0.250 m
b. Additional Repair Parts	\$1.133 m
c. Additional Equipment for the Base Repair Facility	\$2.390 m

Note 2. This amount represents a reduction in the funds, included in the initial approval in 1975, to provide establishment costs for Australian Industry Participation.

Note 3. Refinement of requirement for miscellaneous support equipment components \$0.992 million.<sup>1</sup>

15.8 The Committee expressed concern that contractual arrangements appeared to allow the major escalation in cost to be passed to the Australian Government. With production items of this nature it should be within the means of Defence to negotiate firm prices. This has been done in projects such as the P3C Orion.

### Slippage in Schedule

15.9 Delays occurred in the delivery of support equipment and the provision of locally manufactured items. Details of

1. Minutes of Evidence, op cit, pages 2551-2.

delays for the power units were listed in the final Project Milestone Report dated 30 June 1980 shown below.

Activity	Program Date	Actual Date	Variation (months)
First optical system equipment available for RAEME training	March 79	July 79	-4
RAA training commenced on optical systems	June 79	Nov 79	-5
First practice firings	Sept 79	Feb 80	-5
Blindfire tests commenced	Oct 79	June 80	-8
All Australian power supply units delivered	Oct 79	April 80	-6

15.10 Problems were encountered, and substantially still remain, in qualifying locally manufactured rocket motors for Rapier missiles. In 1979 \$0.5 million was allocated to develop the techniques to provide locally produced motors for missiles. Expenditure had doubled by 1984 without the expected success.

15.11 Mr Hayes, Project Officer, Rapier Project, provided this evidence:

It is extremely complex not only in the composition of the motor but also in its build - the configuration, if you like. It was technology that we did not have in Australia and it has been a learning process with the normal errors that one might expect in high technology. We believe we had resolved the problem until we took it into the next phase of evaluation, only to find that the problem would show up on the odd occasion. It is a configuration of the motor. The Troy rocket motor contains effectively two motors in one body. The normal method of having two motors is to put them end to end, which could result in a Rapier missile having to be 10-foot long instead of 5-foot long. What we do is wrap inside the motor body itself one motor and then insert down the inside of that the boost motor. So it is a new and complex technique that we use. We also have to seal those motors extremely efficiently

to the body itself because, if there are any gaps between the body and the actual propellant, high spots appear as far as pressures are concerned and you have problems with your motor.

Bearing in mind that it is a circular motor, one tries to keep the burning pattern reasonably constant. Therefore, we have to slip in various types of rubberised slots just to keep the motor turning pattern constant as it burns out towards the outside. One of our major problems was in bonding those slots. We had the knowledge, but it was the application of the techniques which was beating us. We believe now - and we have effectively had confirmation by qualification - that we have beaten the problem.<sup>2</sup>

15.12 The Committee was satisfied that such experience was not unique to Australian industry and thus did not reflect adversely on project management aspects. Certainly additional financial resources may have assisted to speed up resolution of the problem.

15.13 Difficulties were also encountered in the capability of locally developed software for the automatic test equipment. The Rapier Base Repair Facility at Salisbury contains automatic test equipment requiring software development. Defence in evidence acknowledged that the automatic testing had been less than complete and that manual testing was required for 'the other 25 per cent'.<sup>3</sup> The balance of 75 per cent automatic and 25 per cent manual testing was considered by the Army to be adequate. This issue was related to control exercised in testing specifications.

15.14 Mr Hayes provided this evidence on the difficulties faced by the Base Repair Facility:

The calibration aspect is basically setting up your manual test equipment to ensure that what it is doing for you is correct. We are using RF areas in Rapier that we have not used in Australia before in any of the Services. We were having problems in establishing areas where the equipment we used to test those frequencies had the capability of calibrating our test equipment. Normally test equipment has to be calibrated over six months or on an annual basis to ensure that the test equipment itself is working correctly. We did not have that facility in Australia and that is what we were seeking.... all in all, that calibration aspect can be divorced completely from the situation in the base repair facility where our problem was the data package

2. Minutes of Evidence, *op cit*, pages 1407-9.  
3. *Ibid*, page 1404.

updates to ensure that the drawings that we had correctly reflected the standard of the equipment that we were using.<sup>4</sup>

15.15 Defence witnesses provided some evidence that notwithstanding the initial problems experienced in the Base Rapier Facility, with the consequential delays and backlogs, the maintenance facility was now operating smoothly. Some details were available on the technical committees relating to the Troy motor manufacturing capability and the missile assembly. Relevant areas of Defence including design, quality assurance and technical services are represented on such committees.

#### Upgrade of the Rapier System

15.16 In August 1983 the Minister for Defence approved the adoption of a newly developed update package for the Rapier. The advantages of the update were cited as:

- . overcoming all of the recognised limitations of the Rapier System;
- . gaining extension of support from British Aerospace, UK, from 1989 to 1995; and
- . extending the in-service life of the Rapier to year 2000.

15.17 The supply and fitting of the modifications will be completed by the end of 1988.

15.18 The Committee examined closely the timing of this decision in the light of the in-service dates of the initial Optical equipment in 1980. Advice was first provided to the Army in October 1980 that the UK would make an offer for the supply and fit of the modification package. A UK negotiating team visited Australia in late 1981. Field trials were subsequently held prior to the decision to make a retro-fit upgrade in August 1983.

15.19 The Committee notes that British Aerospace had developed a number of versions of the Rapier, and that the Army had subsequently formulated a staff requirement for a self-propelled air defence system. The approved upgrade was designed to improve the performance of the Identification Friend or Foe System particularly in the presence of Electronic Counter Measures, and generally the efficiency and maintainability of the system as a whole.

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4. Minutes of Evidence, op cit, page 1406.

#### Management aspects

15.20 Following Government approval of the project in August 1975 a Project Co-ordinator was appointed. The Project Co-ordinator depended very much on timely responses from specialist functional areas - design, maintenance, finance and supply.

15.21 A resident Army Project Officer was established in London in March 1977 specifically to maintain liaison with British Aerospace on aspects affecting supply and delivery from the United Kingdom. Contractual aspects were handled by the Purchasing Officer, Australian High Commission, London.

15.22 Regular liaison meetings were held in the UK during the production phase. The Committee noted that quality assurance was delegated to the Electronic Quality Directorate UK Ministry of Defence. Few problems were actually experienced in the acquisition of the prime fire units which were delivered on schedule.

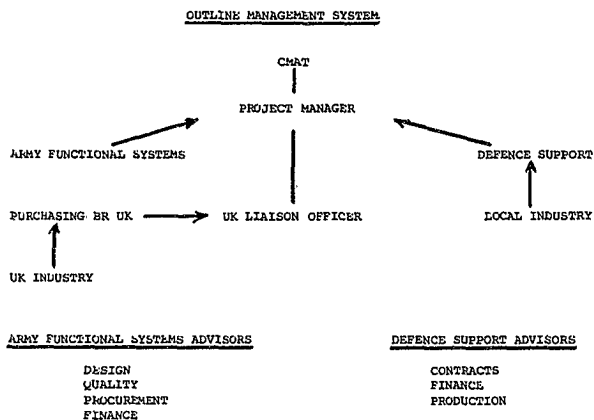
15.23 Between 1977 and 1982 Project Management Meetings were held in Canberra, usually at two monthly intervals, to review milestone reports and project procedures and ensure that costs remained within approvals. Relevant areas of Army and Defence were represented.

15.24 Figure 15.1 outlines this arrangement.<sup>5</sup>

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5. Minutes of Evidence, op cit, page 1389.

FIGURE 15.1 : Management Organisation - Rapier Project



PROJECT HAMEL : 105mm CLOSE SUPPORT WEAPON SYSTEM

Synopsis

This project, which aims to replace existing light artillery weapons with the UK 105mm Light Gun, ancillary equipment and longer range Abbot Mark 2 ammunition, has been progressed through a sequence of phases. As at April 1984 it was estimated to cost \$240.067 million. That figure is subject to Government decisions on four important phases. The project was selected by the Committee for examination.

The Committee notes with concern the extended period of twelve years between the initial Ministerial announcement and the now expected delivery date of 1988 for locally manufactured guns. Major problems arose in expediting the evaluation, and subsequently with design package and material issues relating to light gun production. The latter have largely been settled and production is likely to proceed on schedule.

The delays added to the cost of local manufacture, mainly in the area of labour and material costs, and through licensing and exchange rate variations.

The project originally involved parallel development and manufacture of the light guns and Mark 2 ammunition. The latter has been deferred for three, possibly four years, in part because of lack of preparedness by Defence, and will necessitate importing stocks of ammunition. There is little risk that the required stocks of ammunition will not be available.

Management and review processes have also identified additional costs, including provision of new explosive store houses, additional gun storage facilities, and a higher than expected cost of establishing the manufacturing capability for the gun.

Management processes evolved in March 1983 from a relatively weak project co-ordination to a large inter-related matrix management structure. That structure now has had a reasonable opportunity to restore the project to its proposed timetable and so avoid further cost penalties brought about by delays. Management information systems may need to be strengthened to achieve this aim.

(Source, Minutes of Evidence, p 1389)



Illustration 16.1

Hamel 105mm Close Support Weapon

Department of Defense

## Introduction

16.1 Project Hamel aims to replace the Australian Army's 105mm light weight close support artillery weapons (the US M2A2 Howitzer and the Italian L5 Pack Howitzer) with the UK 105mm Light Gun together with its ancillary equipment and the longer range Abbot Mark 2 ammunition.

16.2 The project involves the manufacture at the Office of Defence Production ordnance factories of the gun, with deliveries to the Army commencing in 1988, and the Mark 2 ammunition, with deliveries commencing in 1991. The estimated cost of the project is over \$240 million (at April 1984 prices).

16.3 The Army's existing close support artillery weapons have range and weight limitations and the Mark I ammunition is outmoded. The UK 105mm Light Gun meets the Army's requirements for a new close support artillery weapon.

## Project Phasing

Project Hamel is being progressed in seven phases as follows:

1	Evaluation	Completed	\$ 0.131 m
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### Guns

2	Industry development and pre-production of two guns	Commenced 1981/2	\$15.531 m
3	Main production of guns for Regular Army units	Approved 84/85 Budget	\$44.386 m
4	Follow-on production of guns for Army Reserve Units and reserve stock	For approval 1986/87	\$54.990 m

### Ammunition

2a	Industry development and pre-production of ammunition	For approval 1985/86	\$ 9.032 m
3a	Main production of ammunition for Regular Army units	For approval 1986/87	\$112.894 m
4a	Follow-on production of ammunition for Army Reserve units and reserve stocks	For approval 1990/91	\$ 3.429 m
Total estimated cost (not yet approved)			\$240.393 m



## Phase 1 Weapon Evaluation

16.4 Initial trials during 1969/70, of the UK prototype light gun and two US 105mm guns, concluded that with the existing M1 ammunition these guns offered only marginal gains over then in-service 105mm field guns.

16.5 Commencing in 1971 and concluding in December 1974 with the issue of Army Materiel Requirement 40/1/1, Army defined its specifications for 105mm field guns.

16.6 In April 1975 Ministerial approval was given for trials of the prototype US XM204 Howitzer firing an extended range version of the M1 ammunition. Feasibility industry studies of Australian production of the UK Light Gun (firing Abbott ammunition), and the US Howitzer, were carried out during 1976-1979.

16.7 The Defence Trials Report on the US Howitzer was completed in September 1977. However, further consideration on source selection was deferred until May 1979 at which time a Final Report on the Feasibility of Australian Production had been completed.

16.8 In early 1981, technical data packages were purchased from the US to augment and verify information contained in the Australian manufacturing studies.

16.9 Subsequently the Defence Science and Technology Organisation (DSTO) submitted, in March 1981, the engineering section of the Artillery Weapon System Evaluation Project.

16.10 Following this report, and assessment by the Chief of the General Staff's Advisory Committee, the Defence Operational Requirements Committee (DORC) examined in June 1981 the Army's submission for the replacement 105mm field gun. Issue One of the Equipment Acquisition Strategy (EAS) for Project Hamel was endorsed by the Defence Source Definition Committee (DSDC) in July 1981.

16.11 On 27 November 1981 the Minister approved selection of the UK Light Gun.

16.12 The Committee sought evidence from Defence for the extended period of evaluation. Lt-Col Burke, Project Director, Project Hamel provided this comment:

There are four basic reasons: The first was the unavailability of weapons; the second was lack of information; the third was concurrent studies; and the final one was the scope of the study.

It was not until 1976-77 that we managed to get a US gun, mainly because it was still very much in the development stage until then, so we were unable to conduct a trial until that time. Although both the contenders had been tested earlier in the piece, the information from both the US and the UK was not readily available to us, mainly because both guns, when they did their trials, were prototypes and necessarily the home countries were loth to release detailed information until they had settled on their design. The UK gun trial was in 1969 originally, but the improvements and the modifications to it were difficult to get through. The US gun virtually came out of its final testing and straight into trial in Australia, and we were not privy to that information until November 1979.

On the concurrence study side, in conjunction with looking at the weapons systems themselves - the guns and their ammunition - there was also a joint working party between the Department of Defence and now, Defence Support, looking at the feasibility of Australian manufacture of both these weapons. This was a necessary input to the option study being conducted by our design authority. That information came through gradually as money was approved for overseas visits for the teams to go and have a look.

The final one was the scope of the study. In 1980 the design authority was asked to widen its terms of reference and address the possibility of three further things: Firstly, modifying the XM204 - the American gun - to overcome some operational shortcomings which we had identified in our trials in 1976; secondly, improving the current M1 US system of ammunition which we had, to see if we could improve its range and lethality; and, finally, perhaps modifying the UK light gun design to improve its performance or simplify its manufacturing processes. All these factors put together with the priority of being able to get into the financial program for bringing equipment into service, caused that delay from 1975 to 1981.<sup>1</sup>

16.13 Major-General Taylor, Chief of Army Materiel, acknowledged that the introduction of the 105mm close support field gun had been delayed by five years due to the lengthy evaluation period.<sup>2</sup>

1. Minutes of Evidence, op cit, pages 995-6.

2. Ibid, page 998.

16.14 Licensing agreements for the Australian manufacture of the UK Light Gun, and Mark 2 Abbott ammunition, were signed in London on 21 December 1981.

**Phase 2 : Industry Development and Pre-Production of Guns**

16.15 The 1976-79 feasibility studies investigated in general terms the capacity of Australian industry to manufacture both the UK Light Gun and the US Howitzer. Design, manufacturing and technical data on the UK Light Gun, comprising 5,000 drawings and 52 volumes, were progressively received between January 1982 and mid 1983.

16.16 On examination the Department found that the Design Data Package supplied under the manufacturing license agreement did not correctly reflect current build standards of UK guns. Amendments and other changes to cater for Australian manufacturing procedures involved approximately 80 man-weeks of pattern work.

16.17 A procurement order for two pre-production guns was raised in March 1982 for delivery in June 1985. Advice provided by Defence indicates that progress against the Production and Delivery Plan is satisfactory, with the critical item (the cradle) being four weeks ahead of schedule.<sup>3</sup>

16.18 The original approval of \$13.266 million (August 1981 prices) was subsequently amended in July 1983 to \$15.531 million (March 1983 prices)

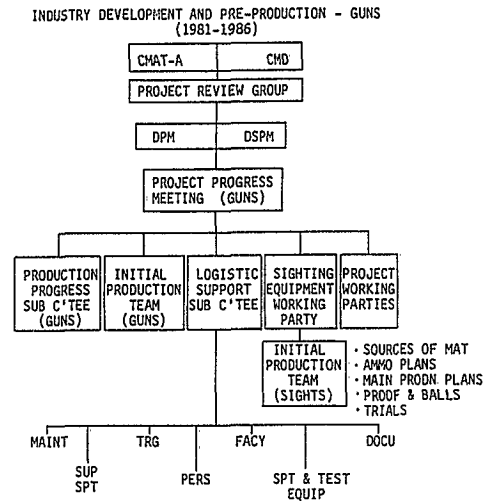
**Phases 3, 4, 2A, 3A and 4A**

16.19 A modified EAS outlining the revised staging of the project was approved by the Defence Source Definition Committee (DSDC) in July 1983. The Project Management and Acquisition Plan (PMAP) was issued in September 1983. The PMAP outlined a project management structure based on dedicated management teams in Defence and the then Defence Support, nominated project officers in each functional area, a Project Review Group, and a series of formal project progress meetings and project working parties. See Figure 16.1.

16.20 Precursors of the PMAP included draft arrangements originally promulgated in September 1981 and negotiated into a management agreement between the two Departments in September 1982. The need was felt at that time to carefully define working relationships between the two Departments. The PMAP has come to be considered as a (pilot) model for the definition of such relationships. As is noted in the diagram, as the project develops the PMAP and the related management structure will be reviewed and updated.

3. Minutes of Evidence, op cit, page 977.

FIGURE 16.1 : Management Organisation - Project Hamel



(Source, Minutes of Evidence, p 987)

16.21 It is too early in the development of the project to ascertain whether the review processes - the six monthly Project Review Group, the two monthly Project Progress Meetings, Production Progress Sub-Committee, Initial Production Team, and Logistics Support Sub-Committee - are able to expedite the project, or whether the various committees impede executive action by dedicated staff.

16.22 The Committee notes that approval for phase 3, the main production of guns was given in the context of the 1984/85 budget. The initial cost of \$40 million (April 1984 prices) has subsequently been revised to \$44.386 million. Defence has stated that the production is considered generally to be satisfactory, and that planned first issues of guns to Regular Army Units are likely to occur, on target, in 1988.

16.23 The Committee notes that problem areas had arisen. These related to:

- 1) the sourcing of long term supply of STA60 steel plate: evidence given to the Committee indicated that since 1979 local production capacity had been lost;<sup>4</sup>
- 2) a shortfall in dedicated project staff in the Engineering Design Establishment to complete pattern amendments, which impacted on both timing of orders and quality context standards being defined; and
- 3) obtaining licensing rights to the dual-sight-carrier from a UK manufacturer: negotiations were complicated by the mandatory purchases of components to the value of 19 Light Guns as part of the Licensing Agreement signed in December 1981.

16.24 On the latter aspect, the Committee was informed that the Licensing Agreement meant that approximately two-thirds of the components needed for phase 3 were to be manufactured locally.<sup>5</sup>

16.25 A further area related to the Logistics or Facilities Study which had, contrary to earlier advice, identified the need for new explosive store houses for Mark 2 ammunition (estimated cost, \$10.5 million) and additional gun storage facilities for Army Reserve Units (estimated cost, \$1.015 million). Witnesses indicated that these costs might be reduced in the final refinement of the requirements for facilities.<sup>6</sup>

16.26 The Committee acknowledges that Defence, with the advantage of a lengthy period to evaluate and identify problems associated with the Light Gun, had managed to control most aspects of its production. Major-General Taylor, Chief of Army Material, put it this way:

4. Minutes of Evidence, *op cit*, page 1012.  
5. *Ibid*, page 1018.  
6. *Ibid*, page 1020.

.. when you have time, and good weapons in service, we could afford to go slow and be 99 per cent accurate ... we have a gun we know all about so it is a developed item ... (what is the minimum period under which it could be developed?) ... programming will probably push it up to seven years in the first place, but one with this degree of complexity could not be done in under four years with the manpower constraints that I have... given a free hand with manpower, I still do not think you would get it much below three ... the British took nine years to bring it into service and even then fairly extensive modifications went on in the early years to catch up, as they learnt from user experience ... If we have to manufacture in Australia you have to add at least two years.<sup>7</sup>

16.27 Lt-Col Burke, Project Director, Project Hamel added these comments:

.. the British had no idea, when they developed it, that anyone else in the world was going to make it. They did not have a sales package ... Once we had signed the agreement, they had to go to the design establishments and get their design drawings, register, bind and record them; and then prepare quality assurance documentation and manufacturing process data ... in the licensing agreement it was recognised that it would take up to 18 months for this data to be provided ... the factories then would have a minimum of two years in order to be in production.<sup>8</sup>

16.28 Dr Stals, Assistant Controller, Projects, then Department of Defence Support, suggested that a check on developing local production capability was the need to obtain Government approval for funding.<sup>9</sup> Nonetheless, because Defence had proposed to use the Government ordnance factories as prime contractors the Committee considers these delays to be over-stated. It was possible that with the information now available from the technical data the risks of local manufacture were greater than had been anticipated.

16.29 Indeed, in May 1984 estimates by the Project Progress Committee indicate that the cost of establishing a gun manufacturing capability had been under-estimated by more than \$2 million. Defence identified the sources of this increase as follows:

With the exception of \$103,000, all variations were attributable to:

7. Minutes of Evidence, *op cit*, pages 1022-4.  
8. *Ibid*, pages 1023-4.  
9. *Ibid*, page 1024.

- (a) price variations for the additional provision for an increase in the Defence Munitions Manhour Rate from \$11.80 to \$17.00 per hour effective 1 July 1983;
- (b) escalation of costs under the terms of the Agreement with the UK Ministry of Defence for the purchase of licences, technical data, and materials;
- (c) escalation of Australian materials; and
- (d) exchange variations between the pound sterling and the Australian dollar for the purchases mentioned above.

The \$103,000 real increase resulted from previously unquantifiable requirements for establishing the gun manufacturing capability. These were additional tooling, drawing and QA costs and provision for license fees for the dual sight carrier.<sup>10</sup>

#### Delays to Local Production of Ammunition

16.30 During its initial stages, the project proposal incorporated parallel development and manufacture of the Light Guns with Mark 2 ammunition. A series of deferrals, from the 1982-83 budget to the 1985-86 budget, for the development and local manufacture of the ammunition, has placed these two areas out-of-phase.

16.31 Defence put the view that the apparent problem of non-sequencing was offset by:

- the purchase, under licensing agreement, of 15,000 rounds of ammunition; and
- the design of the UK gun which permitted existing stocks of MK1 ammunition to be used, particularly for training purposes.

16.32 The Committee was informed that the initial postponement from 1982-83 to 1984-85 was due to financial constraints imposed by the Government. Nonetheless Defence was not in a position at the latter date to gain financial approval apparently because the necessary costing review had not been completed by the Defence Industry Policy Committee.

10. Minutes of Evidence, op cit, page 24368.

16.33 There will be two clear implications of the possible failure to obtain financial approval in 1985-86, that is:

- 1) 50,000 rounds of ammunition will need to be procured overseas; and
- 2) the Production and Delivery Plan for the High Explosive (HE) ammunition will need to be compressed by one year to meet the deadline of 1991. Delivery of White Phosphorous (WE) ammunition was not scheduled until 1993.

16.34 Broadly, Defence considered that because of availability of the ammunition from Britain, and the apparent absence of material and component constraints on Australian production, there were no inherent problems with the procurement and production of MK2 Abbot ammunition. No approvals have yet been granted for these phases of the project.

#### Management Aspects

16.35 The Committee notes the lengthy and complicated negotiations during 1981-83 between the Department of Defence and the then Department of Defence Support, involving:

- Munitions Division;
- Ordnance Factory, Maribyrnong;
- Ordnance Factory, Bendigo;
- Engineering Design Establishment, Maribyrnong;
- Army Materiel Branch;
- Army QA;
- LOG Command; and
- Industry Strategy Branch

to finalise management arrangements. The Project Director was appointed to the project in March 1983.

#### Concluding Comments

16.36 This project has evolved from a lengthy evaluation phase (1975-81) with relatively weak project co-ordination, to a large inter-related matrix management structure involving a dedicated project team working in consultation with a number of functional areas and within a context of regular review and reporting. The Project Director was appointed in March 1983 prior to approval for the local manufacture of guns and in anticipation of the production of ammunition.

16.37 The integrated management structure has ensured that the project progresses with a minimum of technical risk. There is a prospect that local production of guns will be on target.

16.38 This is not the case with ammunition where there has been a slippage of three years due in part to financial constraints and also to delays in finalising costing proposals. Re-scheduling of delivery dates will impose some cost burdens should overseas procurement be required to bridge at least one or two years.

16.39 The complexity of the project largely resides in the large number of bodies, lead times and sequences involved. It is apparent to the Committee that the dedicated staff were largely dependent on the responsiveness of other areas in expediting progress, and that many delays may have been imposed by the system itself.

16.40 Management information systems, such as a computer based Gantt Chart for the Production and Delivery Plan, have been used for phase 2 (and apparently for phase 3). Milestone reporting has been the normal method of review. This area may be insufficiently geared to the demands of the project.

16.41 Staffing constraints contributed to substantial delays in completing design and pattern amendments, and almost certainly in the assessment of Australian manufacturing capacity.

## CHAPTER 17

### HIPORT/MEDPORT PROJECT - MOBILE RADIO TERMINALS

#### Synopsis

The Hiport/Medport is a joint Army/Air Force project aimed to meet Service requirements for long and medium range transportable communications capability to support a force deployed in the field. All told 24 medium-powered and 7 high-powered mobile radio terminals are to be built (largely) in Australia.

The initial Staff Requirement was raised in 1970 by the Air Force. Subsequently a joint submission was raised in October 1975 envisaging in-service dates of 1980 and 1981.

Prior to the letting of the contract, in September 1978, the Department progressed through Invitations to Register Interest, briefings for industry, and funded Project Definition Studies. Notwithstanding these processes the Department seriously under-estimated the complexity of the project and its associated technical risk.

The contract with Racal Electronics Pty Ltd was on a fixed price, but due to terms in the contract which allowed the Army to introduce design changes, a revision of performance specifications, and particularly time-consuming design approval and test specifications approval processes exacerbated by poor initial estimates of the number of drawings involved, there has been extended disputation over the contract. Both cost and time amendments have been agreed to.

There were other aspects of poor planning including the purchase of production items prior to the finalisation of build standards.

Management, based on a multi-layered matrix organisation, has proved unsatisfactory in a number of respects, including the multiplicity of contact points with the Contractor. Overall the Project Co-ordinator has had poor control over the progress of the project. Approval costs have increased by 46 per cent and in-service delivery dates extended on several occasions. The renegotiated completion date for Hiport of September 1986 may not be achieved. The revised schedule for Medport delivery is expected to be met.



### Transportability

- Transport aircraft
- Medium lift helicopter
- 2.5-5.0 tonne truck depending on size of station
- Mobilisers or trailers
- Railway
- Sea freight
- Skids and high lift jack dollies (local manoeuvring)



Illustration 17.1 Medport Mecumim Powered Mobile Radio Terminal

Kacal Electronics Pty Ltd

## Introduction

17.1 The Hiport/Medport project is a joint project satisfying Army and Air Force requirements for the provision of long and medium range transportable communications capability to support a force deployed in the field. It will provide Army with 24 medium powered mobile radio terminals (Medport) and 3 high powered mobile radio terminals (Hiport), and Air Force with 4 Hiport terminals. Procurement is being managed by the Army.

17.2 Medport will provide Army with mobile radio terminals to improve its tactical intra-theatre communications capability. The Medport terminal (TRC-F2) is a short to medium range, high frequency, radio terminal assembled inside a small, screened, metal shelter.

17.3 Hiport will enable a deployed joint force headquarters, or single service Army formation headquarters, to communicate with the Defence Communications Network (DEFCOMMNET) and to subordinate formations. The Air Force version will provide trunk communications from a theatre of operations to DEFCOMMNET in support of RAAF base deployments.

17.4 Hiport will provide three versions of terminals. Details of the uses of these terminals are set out below:

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Type	No.	Service	Description and Remarks
17.TRC-F1	2	Army	A medium to long range high frequency radio assembled inside a large screened metal shelter. Joint service terminal to be manned by Army.
	1	Joint Service	
TRC-807	2	Air Force	Provides facilities same as TRC-F1 but slightly different equipments used which enable it to be remote controlled from the A/F TRC-808. One to be used for contingency/maintenance.
TRC-808	2	Air Force	Provides a communications centre which enables the preparation, transmission and reception of messages required to manage RAAF strike and transport aircraft.  One to be used for contingency/maintenance.

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17.5 The Hiport element also provides for the procurement of a conversion kit which will facilitate interchangeability between the two versions, the TRC-807 and TRC-F1.

17.6 The terminals are being constructed by Rascal Electronics Pty Ltd in Sydney. The contract is fixed price and allows for the production of an initial item of each type of equipment, testing and when approved by the Commonwealth, final production of subsequent items. The revised Project Management and Acquisition Plan (PMAP), issued on 6 December 1984, outlines 5 phases of the Hiport/Medport project:

- Phase 1: System design and initial item manufacture.
- Phase 2: A, B, selected C and Design tests - leading to provisional production release.
- Phase 3: Completion of remaining Build Design Tests.
- Phase 4: Production, Acceptance and Delivery.
- Phase 5: Issue and introduction into service.

#### Background

17.7 The RAAF first raised a Staff Requirement for Hiport terminals in 1970. Further studies were undertaken to ascertain whether any other Services had an application for the equipment. It was found that Army had a similar requirement and a joint Army/Air Force submission was raised in February 1975 and agreed in October 1975. Army raised and approved its Staff Requirement for Medport in December 1975. During 1975/76 a draft Equipment Acquisition Strategy and an Invitation to Register Interest were issued. A briefing to industry was held on 11 and 12 March 1976, and proposals for a Commonwealth funded Project Definition Study were received from companies.

17.8 In June 1977 three companies (Rascal Electronics Pty Ltd, Hawker de Havilland Aust Pty Ltd and Siemens Industries Ltd) were contracted to conduct funded Project Definition Studies. This number was increased to four in July 1977 when another company (Collins Radio Company) asked to be included at no cost to the Commonwealth. The Project Definition Study contracts closed on 18 January 1978.

17.9 The Minister for Defence approved the project on 18 August 1978 at a cost of \$17.989 million and a contract negotiating directive was issued by Chief of Army Materiel. The Hiport/Medport contract was signed with Rascal Electronics Pty Ltd on 21 September 1978. The value of the contract was \$13.39 million. The latest project cost approved by the Minister, in December 1984, is \$26.309 million, an increase of 46 per cent.

17.10 The Staff Requirements stated that it was necessary to have the Hiport terminals in service 'as soon as possible but not later than 1980' and the Medport terminals in service 'as soon as possible but not later than 1980/81'. The original contract envisaged completion of the project by April 1983. In advice to the Committee on 5 June 1985 the Department stated that Medport was nearing completion of Phase 3 with certification of its final build standard likely in May 1985, and Hiport was in the late stages of Phase 1, system design and initial item manufacture.

#### The Committee's Examination

17.11 The Auditor-General commented on a number of unsatisfactory matters in relation to the Hiport/Medport project in his March 1982 Report. It was also mentioned in the Review of Defence Project Management contained in the Auditor-General's September 1983 Report.

17.12 The Hiport/Medport project was examined by the Committee as part of its examination of the Auditor-General's March 1982 Report. As part of that Inquiry the Committee received a submission on the project from the Department of Defence, dated 13 August 1982. The Committee sought further information from the Department of Defence on 30 August 1982 and a supplementary submission, dated 15 September, was provided. Report 222 of the Public Accounts Committee (tabled on 7 December 1983) outlined that examination and notified the Committee's intention to pursue its examination in the Defence Project Management Inquiry.

17.13 The Committee held a public hearing with the Department of Defence to examine the project on 15 April 1985. Because of time constraints a significant number of questions were subsequently answered by the Department in writing.

17.14 The Committee's examination of the Hiport/Medport project focused on problems associated with contract difficulties, project management organisation and planning and project definition.

#### Contract Difficulties

17.15 The Committee addressed a number of aspects of the Hiport/Medport project which were related to the operation of the contract. These included design changes, approval of design drawings, testing specifications, early commitment to purchase production items and Australian Industry Participation (AIP).

#### Design Changes

17.16 The large quantity of design changes initiated by the Commonwealth caused delays to the project by creating a significant amount of additional work for the contractor. The Committee asked the Army Chief of Materiel whether the design changes were excessive. He acknowledged... 'In terms of the initial contract, yes they are, I think that is part of the history and nature of the project.'

1. Minutes of Evidence, *op cit*, page 1333.



17.17 On 6 December 1984 the Army Project Coordinator advised all other Commonwealth personnel associated with the project that, 'no further real moneys would be expended on the project except for spare parts and any further amendments to the designs would only be incorporated at a later date and as an in-service modification were it agreed at that time'.<sup>2</sup> The Committee took the view that this statement implied that further design changes were likely to be incorporated after the Hiport/Medport equipment was in service. Departmental witnesses stated that this was simply the process of sealing the design prior to production approval. However, the Army Chief of Materiel stated, 'I can say categorically that there will be design changes after it is introduced into service'.<sup>3</sup> These changes were likely to be few in the early years of the project but in time there could be major changes to the equipment as a response to factors such as changing operational doctrine and better equipment becoming available.

17.18 Typical of the design changes which caused problems for the contractor, and delays to the project, was the Commonwealth's request for a new layout for equipment racks for Medport terminals after drawings, test documentation and some manufacture had been completed.

17.19 There have also been significant delays in agreeing to the pallet configuration concept for carriage of the Hiport terminals on Mercedes-Benz trucks. At the time of the hearing the pallet design was recognised as an outstanding project design activity and on the critical path for the project. Further delays will extend the end date of the project.

17.20 The Committee expressed its concern that it had taken two years from when the Unimog truck was approved (in September 1982) to present the preferred amendments to carry Hiport to the contractor. It is not clear why an actual in-service truck was necessary to design a Hiport pallet. It is also noted in evidence that partly because the design of the pallets had not been reached a safe system of high lift jacks for loading and unloading of Hiport terminals on to the truck had not been developed.

17.21 Problems also arose over the contract requirement that specifications (Annex H to the contract) were to be updated to incorporate approved drawings and tests which reflected the final approved build for Medport. It was intended that the specification would be totally reviewed. A draft review was provided to the contractor who disputed the material to be included in the specification. Subsequently, negotiations with the contractor resulted in substantial agreement on revised specifications.<sup>4</sup>

2. Minutes of Evidence, *op cit*, page 1331.

3. *Ibid*, page 1332.

4. *Ibid*, page 2458.

17.22 A number of design changes are also related to the Department's under-estimate of the complexity of the Hiport/Medport project. It was seen as a straight forward purchasing exercise. However, it included significant design development of the initial item. The Department did not adequately assess the risk associated with the project. Indeed there was inconsistency in the Department's assessment. The Department stated that the project was 'one of the first involving major integration and installation in Australia of a communications system'.<sup>5</sup> By contrast the Major Equipment Submissions envisaged little technical risk and that no individual equipment development would be entered into.

#### Design Drawing Approval

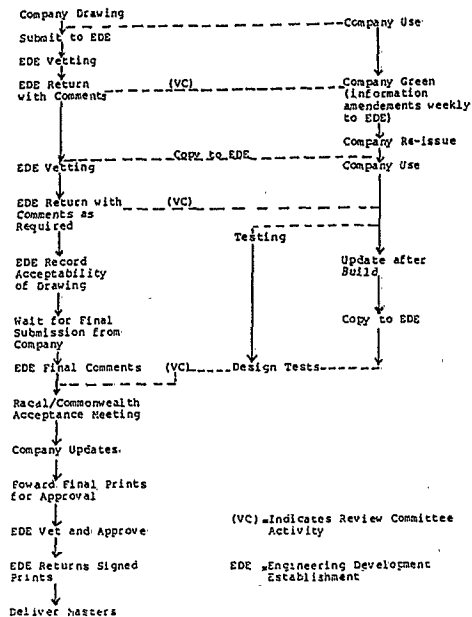
17.23 The contract stipulated that design drawings of equipment would be submitted to the Commonwealth for approval before initial items were cleared for production. Prior to the commencement of any initial item of equipment supplies and services the Contractor shall produce and deliver to the Design Authority for approval drawings delineating the design and manufacture of the item'.

17.24 The Auditor-General's March 1982 Report noted that design drawing approvals had been a source of constant disputation between the Commonwealth and the contractor. The design approval procedures set out in the contract were complex and have been revised in order to gain a more workable framework. Review procedures remain complex. The latest drawing approval procedures, outlined in the PMAP of 6 December 1984, are detailed in Figure 17.1.

17.25 The Department responded to problems associated with drawing approval procedures by forming a Design Review Committee. Involvement of the Committee in that process is indicated on the diagram by (VC). It can be seen that the main impact of the Drawing Review Committee was to avoid disputation between the Commonwealth and the Contractor at vital stages of the approval process rather than actually simplifying the process itself. In order to allow timely progression of projects such procedures should be as uncomplicated. This was not the case for Hiport/Medport, and the situation was further exacerbated by poor planning and an inappropriate management situation.

5. Minutes of Evidence, *op cit*, page 1314.

FIGURE 17.1 : Drawing Approval Flow - Hiport/Medport Project



17.26 The Commonwealth underestimated the number of drawings which were to be submitted by the Contractor. The Department mentioned its original expectation of the number of drawings to be submitted for approval: 'At the contract award, there were no estimates available of the number of drawings involved, certainly from a contractor'.<sup>6</sup> It was surprising that for a project where drawing approval was important to *timely progress*, the early project planning did not contain an estimate of the likely workload associated with drawing approval. 'In the first year or two, the contractor provided estimates of roughly 650 in total.'<sup>7</sup> In fact the actual number of drawings submitted for the project will be 2,400 comprising 1,400 for Medport and 1,000 for Hiport.

17.27 The inability of the Department to cope with the number of drawings led to the approval of 501 drawings of the Medport package which had not been vetted by the engineering development Establishment (EDE), the design approval authority. These drawings were part of a package of 1,174 drawings of which only 101 were found approvable. It concerned the Committee as to why they were approved without vetting, and if such a low proportion were satisfactory what confidence could be placed in them.

17.28 These questions were not able to be answered in the public hearing and were taken on notice by the Department. In later evidence it was stated that, 'The Drawings were approved without vetting because of an insufficient number of government engineers to complete design quality assurance inspection tasks in a timeframe that would not delay the contractor'.<sup>8</sup> It was further stated that the shortage of resources was due to '... a peak workload demand on Hiport/Medport at that time due to the need to examine a significant number of Contractor initiated changes to test specifications and drawings already vetted' and 'pressure from the Contractor to respond to submissions apart from the unvetted drawings'.<sup>9</sup> The Committee believed that the additional resources to adequately vet the drawings should have been found. If necessary, recourse may have been made to outside consultants.

17.29 The Department stated that despite its approval of unvetted drawings considerable confidence could be placed in them. One of the reasons stated was, 'the Company's own findings during construction caused them to initiate a significant number of drawing changes'.<sup>10</sup> This confirms that a proportion of the drawings approved were unsatisfactory and serves to cast doubt on other areas where the Company did not make changes. Sufficient confidence therefore cannot be placed in the unvetted drawings.

6. *Minutes of Evidence, op cit*, page 1341.

7. *Ibid*, page 1341.

8. *Ibid*, page 2730.

9. *Ibid*, page 2730.

10. *Ibid*, page 2731.

## Testing Specifications/Requirements

17.30 The contract allowed that prior to the commencement of manufacture of any other item, the initial item shall be tested in accordance with the Contractor's test specifications, which are subject to approval of the Design Authority. The approval process for test specifications is substantially the same as that for design drawings and suffered from similar problems. The Auditor-General noted in his March 1982 Report that the Hiport/Medport contract proved to include unrealistic time scales for testing and caused problems in the interpretation of testing requirements which contributed to delays in the project.

17.31 Problems arose in the interpretation of the contract clause relating to performance of certain tests resulting in disagreements between the Contractor and the Commonwealth over the interpretation of testing requirements. The problems were related to the adequacy of the specifications in the contract and an underestimate of work that would be necessary for timely approval of the test specifications. In late 1981 a committee of representatives agreed that in spite of problems with detailed interpretations of the test requirements and other aspects which could be resolved within working procedures, the contract itself did not require amendment. The Testing Specifications Committee was established in December 1981 as a result of agreement between the Commonwealth and the Contractor. It consisted of a small number of working level representatives to resolve any further disputes that might occur. However a further dispute occurred in April 1983 when Racal raised a claim for a two year extension in the contract delivery date and consideration of adjustment to the contract price on the basis that testing was taking a longer time than initially budgeted. This claim was rejected by the Commonwealth. A further claim was made on the basis of a change in the scope of the contract. This claim was also rejected on 7 March 1984. Racal then detailed a third claim which requested an extension to the contract dates and payment for increased manhours. Negotiations on this basis resulted in an agreement between the two parties with an increase in project cost of \$3.5million and a change in contract dates of completion to September 1986.

17.32 In the Auditor-General's March 1982 Report it was noted that very early in the project, before the contract was placed, the Army Chief of Materiel and the Defence Source Definition Committee (DSDC) noted that there were inadequate allowances for testing times in the successful tender and recognised that timescales under the contract were unrealistic. Department witnesses were questioned as to what action was taken in response to this advice.

17.33 In later evidence supplied to the Committee it was stated that:

Extensive research of project resources has failed to locate any documentation which explains in detail the internal Departmental considerations. The recollections of officers involved at the time of contract negotiations with Racal Electronics are that no detailed review of the testing timetable was conducted prior to contract signature. This lack of action appears to have been as a consequence of the pressures applied by limited tender validity. After subsequent detailed examination of the proposal, Army concluded that there was sufficient 'fat' in the tenderer's overall program to cater for this shortfall.<sup>11</sup>

17.34 It is of concern that the advice of the Chief of Army Materiel, the officer ultimately responsible for the project, and the DSDC was not acted upon. The judgement that there was sufficient excess contained in the contractor's proposals for testing and trials proved incorrect. Allowances for testing and trials were still underestimated in the contract negotiations.

17.35 In relation to test specifications the Auditor-General's March 1982 Report was also critical of the Department's omission of resonance search and dwell vibration testing. In August 1980, 2 years after the contract had been let, test specifications in the contract, which were based on United States vibration testing standards, were found not to contain a full range of resonance search and dwell testing. The Department was unaware of amendments to the US vibration standards to the requirement for resonance search and dwell testing. The Department accepted that there was no justification for its failure to notice that such an amendment had been made.<sup>12</sup> In the public hearing Departmental witnesses attempted to explain the omission in terms of a lack of advice from US of changes to the standards. The Committee does not in any way accept this explanation.

17.36 The omission of the resonance search and dwell testing is a further illustration of poor planning in the project. When contract specifications are based on overseas standards, those standards must be closely monitored for change. Partly as a result of this incident the date and issue number of all specifications are now detailed in Defence contracts.

17.37 The Department also acknowledged that in omitting the full series of tests the Commonwealth faced a greater level of risk associated with its confidence in the adequacy of the equipment. However, a combination of the fact that a form of resonance testing was still a feature of the test program, together with the high cost (\$2million) sought by the contractor

11. Minutes of Evidence, op cit, page 2731.

12. Ibid, page 1312.

for the reinstatement of the test and forecast of further project delays (6-12 months), led the Department to conclude that it was more cost effective to accept the level of risk.

#### Early Commitment to Purchase Production Items

17.38 The Auditor-General was critical that the contract provided for significant expenditure to be incurred on production items before the initial assembly was satisfactorily tested and accepted, for example 'approximately \$11.7million (84 per cent) of the major equipment value of \$13.9million was liable for payment prior to final acceptance of the initial items'.<sup>13</sup> As of 5 June 1985, with Medport nearing completion of initial item testing and with Hiport late in the earlier stages of system design and initial item manufacturer, 63.1 per cent of the December 1977 price of individual deliverable items within the contract had been paid to the contractor.

17.39 Related to the Auditor-General's concern over premature expenditure was the Department's assessment of risk involved in the project. The Department's underestimate of various aspects of the project and the associated risk have already been outlined. The Auditor-General noted that significant development of the initial item was involved in the project and drew attention to previous reports (Report 137 and 150) of the Public Accounts Committee in which it was concluded that for projects which contained significant development of a new item of equipment, a prototype should be developed and thoroughly tested prior to giving a commitment for production.

17.40 The Department did not accept that this project, even in hindsight, embodied such technical risk as to necessitate the development of prototype. The Department also noted in its submission of 15 September 1982 that, 'testing of prototypes would have taken a significant period and the contractor would have suffered a long period of inactivity for the highly skilled technical staff assembled for the project'.<sup>14</sup> Yet, 16 lines later in the same submission the Department states, 'Had a separate prototype contract been used in this project ... there would be very little variation in the level of equipment testing either sought or accepted by the Commonwealth'.<sup>15</sup> In later advice the Department suggested that the tender system inhibited the use of prototype contracts:

With Hiport/Medport, the Department considers that the use of a separate formal contract for development of a prototype may have reduced some of the problems being experienced with the project but that the overall effect would have been less satisfactory. Development of a prototype without a firmly priced production option would have necessitated a further tendering activity for the production items.<sup>16</sup>

13. Auditor General's Report, March 1982, page 22.

14. Minutes of Evidence, op cit, page 1313.

15. Ibid, page 3.

16. Minutes of Evidence, op cit, page 2734.

17.41 It is clear that the Department underestimated the complexity of the project and it may have made a commitment to purchase production items too early. More adequate project planning and definition early in the project would have created less risk in the development of the project.

17.42 The AIP element of the project has been successful. The Department advised that, subject to confirmation from the Regional Purchasing Branch in Sydney, it would appear that a significantly greater than 60 per cent level of AIP had been achieved.

#### Project Management Organisation

17.43 Management of the project is detailed in the Project Management and Acquisition Plan (PMAP). The Department's submission states that the PMAP was 'last reviewed on 6 December 1984'.<sup>17</sup> This was only its second issue. While it is not considered desirable to change the PMAP for a project regularly, in light of the changes to procedures originally outlined in the Hiport/Medport project the lack of formal revision was surprising.

17.44 The Department's submission describes the project management as a 'multi-level management system'<sup>18</sup> consisting of project contact officers forming the project team and a Higher Level Management Committee to provide middle level management coordination and control. The Higher Level Management Committee is a Standing Committee which provides an intermediate level of project coordination on behalf of the Chief of Army Materiel.

17.45 Superimposed on this structure is the Project Co-ordinator whose responsibility is to progress and implement the acquisition of Hiport/Medport. In association with the Project Co-ordinator other organisations identified in the PMAP which have predominant responsibilities are:

- Contract Authority - Major Contracts Branch, Office of Defence Production;
- Defence Industry and Materiel Policy Division (DIMP) - for Resource coordination and industry policy;
- Design Authority - Engineering Development Establishment; and
- Quality Assurance Authority - Director General Army Quality Assurance under control of HQ Logistics Command which also has responsibilities for supply/support functions;

17. Minutes of Evidence, op cit.

18. Ibid.



17.48 The Committee was concerned that the project management organisation for the Hiport/Medport project created confusion for the Contractor in having to deal with a number of contact points rather than through one single point who could then redirect the matter to the appropriate agency. In the public hearing the Committee put the proposition to Departmental witnesses that a single Commonwealth point of contact would be more effective both in terms of ease for the contractor and in ensuring control by the leader of the project team. It was agreed, 'Yes, I think you are probably right.'<sup>19</sup> It was also stated that the Hiport/Medport contract needed to be viewed as a 1977 contract and that in later projects the Department has been '.... tending to reduce the number of points of contact between contractors and the Department, and to centralise more in the Project Director, ....'<sup>20</sup> It was further stated that, '.... the role in Army of the Project Co-ordinator has been considerably strengthened in that period'.<sup>21</sup> The Committee encourages Army to pursue the cause of strengthening the role of the project co-ordinator and creating a stronger project team under his control. The Contractor did not make a submission to the Committee but this approach was confirmed in a letter to the Committee which stated that, 'the most significant changes by the Commonwealth seen by Racal (Australia) to improve project management, concerned the Army management of the Engineering Development Establishment and the appointment of a Project Director for the management of more recent Army Projects.'

17.49 There was also the possibility that the Project Co-ordinator in the Hiport/Medport project may have suffered from an incomplete knowledge of what was occurring. The Army Chief of Materiel stated that:

It does not matter that he does not know what is going on, as long as it does not impact on his flow chart, his PERT diagram, or on his cost or on his timings. But he would expect to be told at the six-weekly or two-monthly meetings, that if something significant had happened he would be advised, and he normally would be, unless dropped copies of correspondence, and things like that happened.

For the sake of co-ordination and of minimising the potential for confusing or conflicting information being transmitted to contractors, Project Co-ordinators should be aware of all aspects of the project for which they have responsibility.

17.50 The major instruments of project management for the Hiport/Medport project are Contract Progress Meetings and the Contractor's PERT diagram. Contract Progress Meetings between the Commonwealth and contractor representatives are held at 6 weekly intervals and chaired by the Project Co-ordinator. The Contractor's PERT diagram is a requirement of the contract and is the major common progress and planning document. Other principal documents for this project include: Quality Control Plan, Technical Practice Procedures, Contractor's Progress Reports and the Engineering Support Plan.

19. Minutes of Evidence, *op cit*, page 1355.

20. *Ibid*.

21. *Ibid*.

17.51 The Contractor's PERT diagram is the major common progress and planning document for the project. Revisions of the PERT are prepared by the Contractor in conjunction with the Design Authority and the Project Coordinator. Apart from requiring the Contractor to update PERT, the contract does not state further uses for the PERT. Some confusion arose in a Commonwealth meeting in February 1985 as to which logic or set of underlying assumptions the Contractor was using for its PERT. After meetings with the Contractor it was established that the Contractor had reverted to an earlier logic established on 30 May 1984. It is of concern that confusion could occur over such an important planning document.

17.52 The Department should make the maximum possible use of Contractor information systems but if this is to occur, the Commonwealth's requirements must be clearly spelt out in the contract, as well as responsibility for changes and advice between the Contractor and the Commonwealth. In this case it appeared as though the confusion arose out of the Contractor not taking notice of discussions with the Commonwealth over the PERT logic and that the Commonwealth had to simply accept the Company's decision.<sup>22</sup>

#### Conclusions

17.53 The Auditor-General concluded in his March 1982 Report that 'the Hiport/Medport project illustrated the need to strengthen the processes of project definition and project management as there have been significant problems with interpretation of testing requirements coupled with extensive time slippages'.<sup>23</sup> The Department responded that experience gained through this project has led to a much greater emphasis being placed on associated aspects of projects, such as project management. It claimed that for its more complex projects it now invests large amounts of time and money in expanded project definition studies, which include the management side of the project, and that this has reduced the possibility of unforeseen difficulties of the type appearing in this project. Such studies will not have the desired results unless the results of such studies are reflected in project contracts.

17.54 Significant problems arose in the Hiport/Medport project as the contract did not allow for the volume of design changes, design drawings, and changed test specifications required for the project. The appropriateness of the type of contract, and the Commonwealth's premature commitment to purchase production items, was questionable. The management organisation contributed to the problems associated with the project.

22. Minutes of Evidence, *op cit*, page 1361.

23. Auditor-General's March 1982 Report, page 23.