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Performance Audit

Tactical Fighter Operations

Department of Defence

Australian National Audit Office

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Australian National
Audit Office

Canberra ACT
26 April 2000

Dear Madam President
Dear Mr Speaker

The Australian National Audit Office has undertaken a performance audit in the Department of Defence in accordance with the authority contained in the *Auditor-General Act 1997.* I present this report of this audit, and the accompanying brochure, to the Parliament. The report is titled *Tactical Fighter Operations.*

Following its tabling in Parliament, the report will be placed on the Australian National Audit Office's Homepage—http://www.anao.gov.au.

Yours sincerely

P. J. Barrett
Auditor-General

The Honourable the President of the Senate
The Honourable the Speaker of the House of Representatives
Parliament House
Canberra ACT

AUDITING FOR AUSTRALIA

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Audit Manager

Anton Müller

Contents

Abbreviations

2FTS	No.2 Flying Training School
ADF	Australian Defence Force
ANAO	Australian National Audit Office
AST OPD	Commander Australian Theatre Operational Preparedness Directive
CAMM	Computer-Aided Maintenance Management
CDF	Chief of the Defence Force
CM(AF)	Career Management (Air Force)
COMAST	Commander Australian Theatre
COMSEC	Communications Security
CPD	Chief of the Defence Force Preparedness Directive
DAO	Defence Acquisition Organisation
DARB	Defence Acquisition Review Board
DCC	Defence Capability Committee
DGTA	Director General Technical Airworthiness
DMC	Defence Management Committee
DPE	Defence Personnel Executive
EAS	Equipment Acquisition Strategy
EW	Electronic Warfare
FEG	Force Element Group
FSPPC	Force Structure Policy and Programming Committee
FYDP	Five Year Defence Program
HUG	*Hornet* Upgrade
IASSF	Integrated Avionics Systems Support Facility
ILS	Integrated Logistics Support
MCS	Major Capability Submission
MLOC	Minimum Level of Capability
OLOC	Operational Level of Capability

PMM	Project Management Methodology
ProMIS	Project Management Information System
PSP	Professional Service Provider
RAAF	Royal Australian Air Force
RFT	Request For Tender
RoE	Rate of Effort
SDSS	Standard Defence Supply System
SPTCOM(AF)	Support Command (Air Force)
TFG	Tactical Fighter Group
TFLMS	Tactical Fighter Logistics Management Squadron
WSLMS	Weapon System Logistics Management Squadron
WSMC	Weapon System Management Committee

Summary and Recommendations

Summary

Background

1. Tactical fighter operations (TFOs) form the basis of Australia's current military capability to ensure air superiority. Air superiority over the Australian territory and maritime approaches is an essential element in Australia's defence strategy.

2. TFOs are carried out by the Tactical Fighter Group (TFG), which is part of the combat forces in Group 4 (Air Force) in the Defence portfolio. In the framework of 22 outputs of the Defence organisation, TFG provides the weapon systems in support of Output 14—Capability for Tactical Fighter Operations.

3. The main weapon systems in TFG are 71 F/A–18 *Hornet* tactical fighter aircraft. TFG also has 26 Macchi MB326 lead-in fighter aircraft, which are to be replaced by 33 Hawk lead-in fighter aircraft by the end of next year. TFG is located at airbases in Williamtown NSW, Tindal NT and Pearce WA. It has 1395 personnel.

4. The audit objectives were to:

- assess whether the resources used to provide the F/A–18 tactical fighter force operational capability are managed cost-effectively; and
- identify areas for improvement in the coordination, planning and practices employed in administration of tactical fighter operations.

Overall conclusions

5. TFOs consume significant resources, with estimated total expenses in 1999–2000 of $785 million and a capital use charge of $505 million. TFG's assets were valued at $2.7 billion.

6. Managing TFOs is a substantial and complex task. Apart from ongoing operations, there has been some substantial capital work in recent years such as the project to re-life the *Hornet* engines to maintain tactical fighter capability. This report proposes a number of measures to achieve greater cost-effectiveness in managing the resources used to provide TFOs. The overall management framework of TFOs would benefit from formal longer-term military preparedness goals for TFG, integration of cost data and greater awareness of the cost of resources used to produce this Defence output.

7. The audit found that TFG met the specific military preparedness requirements in the Chief of the Defence Force Preparedness Directive (CPD), subject to certain qualifications. These relate, firstly, to the need for some deficiencies in the aircraft maintenance management system to be remedied and, secondly, to allow the *Hornet* aircraft to deploy into the full range of operational theatres envisaged in strategic policy, Air Force should monitor the military vulnerability of the aircraft and remedy any identified shortcomings, particularly those relating to levels of technology employed.

8. The specific military preparedness requirements in the CPD have a shorter-term focus. To complement those requirements, TFG has developed its own longer-term goals on the number of serviceable aircraft and fully trained aircrews that have become part of its internal longer-term military preparedness goals. These goals have been derived from the general CPD requirement to maintain professional standards and core skills and TFG's existing composition. They are significantly more demanding and probably more costly than the specific requirements in CPD. TFG has never met these internal goals and has not been required to do so. It would be preferable to develop more realistic longer-term military goals for TFG that are directly linked to Defence's strategic planning.

9. Air Force does not have enough fast-jet pilots. Increasing their number is a major workforce priority. Defence has implemented a range of measures to increase those numbers. However, these measures were not consistently planned or coordinated either by a discrete functional unit with a clearly defined responsibility for outcomes or by other formal structures but instead evolved through various independent and unstructured processes. Air Force has no comprehensive workforce plan or planning model in relation to the fast-jet pilots. As well, they have no formal coordinated strategy to address the fast-jet pilot shortage. A soundly-based, on-going planning model would allow the testing of various parameters such as recruitment targets, training pass rates and retention variations including the assessment of their cost-effectiveness.

10. Responsibility for logistic support of the *Hornets* is dispersed across several functional groups in Defence. Recorded logistic expenditure for the *Hornet* fleet since 1994–95 has been rising at a rate greatly in excess of the increase in activity levels. Recorded logistic costs of the *Hornets* do not include Air Force personnel costs, which are substantial. Information on the components of costs, cost increases and their drivers should be improved to assist those responsible to contain the overall outlays. Integrating all logistic costs would facilitate comprehensive monitoring

and holistic decision-making for the totality of logistic support of TFOs. Comprehensive cost data and continual cost consciousness are necessary to ensure that the *Hornet* fleet is supported cost-effectively and to make informed assessments about the cost-effectiveness of the resources used to support TFOs.

11. The *Hornet* fleet is planned to undergo a complex and expensive series of upgrades over the next eight years to improve its capability. Some of the acquisition projects related to these upgrades have already suffered from project management deficiencies. It is readily apparent that Defence needs to put in place plans to keep these projects on schedule and within budget if TFO outcomes are to be achieved cost-effectively. Further, a well functioning Integrated Avionics Software Support Facility, or alternative mechanisms for updating and testing operational flight programs and to support the Hornet Upgrade Program, will be very important.

12. The ANAO considers that the cost-effectiveness of Defence's management of TFOs could be enhanced by:

- determining a realistic level of military capability to be provided by TFG as a longer-term planning objective and matching the levels of resources provided to TFG to meet that level of capability;
- establishing suitable goals for the implementation of aircraft and airfield battle repair capabilities;
- formulating and implementing a comprehensive workforce plan for TFG with clearly defined management responsibilities as part of a systematic endeavour to gain and retain sufficient numbers of fast-jet pilots;
- identifying and controlling the major cost-drivers in TFOs' logistic expenditure and putting in place a holistic framework for management of TFOs' logistic support, including personnel; and
- putting in place a well functioning Integrated Avionics System Support Facility (IASSF) and planning contingency measures to minimise the risks to the *Hornet* Upgrade Program and the continuing development of the *Hornets'* operational flight programs should IASSF be unable to support them.

Key findings

Military preparedness of the tactical fighters

13. Specific military preparedness requirements for the TFG are derived from the Chief of the Defence Force Preparedness Directive (CPD), the principal Defence document on the military preparedness requirements of the Australian Defence Force. The audit found that TFG met the specific military requirements in the CPD, subject to certain qualifications. These relate, firstly, to the need for some deficiencies in the aircraft maintenance management system to be remedied and, secondly, to allow the *Hornet* aircraft to deploy into the full range of operational theatres envisaged in strategic policy, Air Force should monitor the military vulnerability of the aircraft and remedy any identified shortcomings, particularly those relating to levels of technology employed.

14. The specific military preparedness requirements in the CPD have a shorter-term focus. To complement those requirements, TFG has developed its own longer-term military preparedness goals on the number of serviceable aircraft and fully trained crews that have become part of its internal longer-term military preparedness goals. These goals have been derived from the general CPD requirement to maintain professional standards and core skills and TFG's existing composition. No specific endorsement of those goals has been given by Defence as a whole or by Government. TFG has never met them nor has it been resourced to do so. Given past performance and available resources, it is difficult to consider these goals as realistic. The ANAO considers that Defence should develop more realistic longer-term military goals for TFG which are directly linked to Defence's strategic planning.

Management of the Hornet pilot workforce

15. Effective management of the pilot workforce is important both because of the impact on capability and the high training costs (around $9 million per fast-jet pilot). Air Force does not have enough fast-jet pilots. Increasing their number is a major workforce priority for Defence. Air Force has implemented a range of measures to increase numbers. However, to help ensure a worthwhile return on the substantial investment in fast-jet training, Air Force should give priority to the retention of existing pilots and apply greater rigour in investigating the capability of the training system to produce the required number of pilots.

Air Force has no comprehensive workforce plan or planning model relating to the fast-jet pilots and no formal coordinated strategy to address the fast-jet pilot shortage. A soundly-based, on-going planning model would allow the testing of various parameters such as recruitment targets, training pass rates and retention variations including the assessment of their cost-effectiveness.

16. Defence should seek to achieve the workforce priority of increased numbers of fast-jet pilots on the basis of:

- robust and firm planning targets for the desired number of pilots;
- appropriate recruitment targets and selection processes;
- appropriate research on workforce planning and modelling; and
- agreement on key result areas and measures for recruitment, selection, training and retention.

17. These should be brought together in a TFG workforce plan that makes clear who is responsible for implementing the various elements of the plan as well as ascribing the overall responsibility for implementing, monitoring and evaluating actions contained in the plan.

Logistic support for TFOs

18. Responsibility for logistic support of the *Hornets* is dispersed across the several functional groups in Defence. Logistic expenditure for the *Hornet* fleet since 1994–95 has been rising at a rate greatly in excess of the increase in activity levels. Recorded logistic costs do not include Air Force personnel costs, which are substantial. Bringing together all logistic costs into an integrated management framework would facilitate comprehensive monitoring and holistic decision-making for the totality of logistic support of TFOs. Information on the components of costs, cost increases and their drivers should be improved to assist those responsible to contain overall costs.

19. Greater cost consciousness is necessary to ensure that the *Hornet* fleet is supported cost-effectively. Management should promote efficient and effective use of Commonwealth resources as an integral part of achieving overall outcomes. In TFG this would be assisted by benchmarking all logistics costs of the *Hornets* against those of other Air Force units, and against those of other countries' units that operate *Hornets* or similar fast-jets, and by remedying logistic management information deficiencies in the Standard Defence Supply System and Computer-Aided Maintenance Management.

Major Hornet-related projects

20. The *Hornet* fleet is planned to undergo a complex and expensive series of upgrades over the next eight years to improve its capability. In reviewing the project management of the upgrades, the ANAO found some persistent deficiencies:

- some projects had experienced delays in early stages of project approval and development, when timing apparently did not seem critical to decision-makers, making it difficult to accelerate progress later when timeliness was needed;
- there appeared to be a tendency by the proponents of projects to underestimate the risks in projects, which was partially corrected by the capability development process. A greater emphasis on realistic risk assessment (including contract risk) in original proposals would aid the overall decision-making process; and
- there was only limited consideration of life-cycle costs at the acquisition stage of the *Hornet* Upgrade (HUG) program.

21. Recent acquisition reforms by Defence such as the Standard Project Management Method should help avoid deficiencies of the kind mentioned above. It is readily apparent that Defence needs to put in place plans to keep these *Hornet*-related projects on schedule and within budget if TFO outcomes are to be achieved cost-effectively. Further, a well functioning Integrated Avionics Software Support Facility, or alternative mechanisms for updating and testing operational flight programs and to support the Hornet Upgrade Program, will be very important.

Defence response

22. The ANAO made 11 recommendations to improve TFOs' management. Defence responded positively, agreeing to all recommendations, two with qualifications.

Recommendations

Set out below are the ANAO's recommendations with report paragraph references and an indication of the Defence response. Defence's detailed comments are included in the body of the report. The ANAO considers that Defence should give priority to recommendations No. 2, 4, 5, 9, 10 and 11. Priority recommendations are shown below with an asterisk.

Recommendation No.1 Para. 2.21

The ANAO recommends that, in order to maintain a cogent link between Defence's strategic planning and its military preparedness assessments of the tactical fighter force, Defence include in these latter assessments periodic and comprehensive intelligence assessments relevant to preparedness requirements.

Defence response: Agreed.

***Recommendation No.2 Para. 2.33**

The ANAO recommends that Defence determine a longer-term military preparedness capability for the Tactical Fighter Group (including the requirements for maintaining core skills).

Defence response: Agreed.

Recommendation No.3 Para. 2.46

The ANAO recommends that, in order to meet the Defence need for an aircraft battle damage repair capability in a timely manner, Air Force set achievable implementation targets for the development of this capability.

Defence response: Agreed, with qualification.

***Recommendation No.4 Para. 2.53**

The ANAO recommends that Defence develop an airbase damage repair capability that can be mobilised when needed, particularly on the more vulnerable airbases, and can deal with unexploded ordnance.

Defence response: Agreed.

***Recommendation No.5 Para. 3.13**

The ANAO recommends that the Tactical Fighter Group (TFG) review its definition of Minimum Level of Capability (MLOC) for *Hornet* pilots to ensure it is a useful measure of TFG's ability to meet operational requirements.

Defence response: Agreed.

Recommendation No.6 Para. 3.37

The ANAO recommends that Defence systematically monitor the progress of trainee fast-jet pilots recruited in the 1998 and subsequent recruiting campaigns to help identify strategies to improve the cost-effectiveness of fast-jet pilot recruiting and training.

Defence response: Agreed.

Recommendation No.7 Para. 3.44

The ANAO recommends that Air Force endeavour to raise the pass rates in fast-jet pilot training by:

(a) identifying early Australian Defence Force Academy (ADFA) pilot applicants who do not meet the flying aptitude standards and direct them to other careers;

(b) allowing ADFA cadets to commence pilot training only if they meet the minimum flying aptitude standards; and

(c) making up the shortfall on pilot training courses due to any reduced ADFA component with non-ADFA recruits.

Defence response: Agreed.

Recommendation No.8 Para. 3.66

The ANAO recommends that Defence seek to retain a greater proportion of its fast-jet pilots by:

(a) conducting a full review of the Pilot Retention Bonus scheme, possibly including a survey of past and current pilots, to ascertain how to make such a scheme more effective;

(b) targeting any future bonus to pilots who have completed their Return of Service Obligation, whose retention is operationally necessary and who will contribute to filling an identified shortage; and

(c) considering the use of individual agreements or other special arrangements covering pay and conditions for fast-jet pilots.

Defence response: Agreed.

***Recommendation No.9 Para. 3.72**

The ANAO recommends that Defence coordinate its efforts to acquire and retain sufficient numbers of pilots for the Tactical Fighter Group (TFG) by formulating and implementing a TFG pilot workforce plan to:

(a) identify and approve authoritative figures for the required *Hornet* pilot numbers across the Defence organisation;

(b) set appropriate recruitment targets and selection processes;

(c) guide research on issues affecting the pilot workforce;

(d) facilitate a greater workforce planning and modelling capacity in relation to fast-jet pilots;

(e) identify key result areas and suitable measures for fast-jet pilot recruitment, selection, training and retention; and

(f) allocate responsibility for implementing, monitoring and evaluating actions under the workforce plan to a discrete functional unit within Defence.

Defence response: Agreed.

***Recommendation No.10 Para. 4.33**

The ANAO recommends that Defence:

(a) adopt a more business-like approach to identify the main cost-drivers in the escalation of logistic costs of the Tactical Fighter Group over the last five years, to help contain and reduce overall outlays for the logistic support of the *Hornet* fleet;

(b) put in place a holistic framework for the management of logistics, including associated personnel, to support effectively the tactical fighter aircraft; and

(c) introduce management information systems that enable reliable tracking and analysis of logistic information.

Defence response: Agreed, with qualification.

***Recommendation No.11 Para. 5.46**

The ANAO recommends that, to help ensure a cost-effective upgrade of the *Hornet* aircraft, Defence:

(a) put in place contingency plans to minimise the risks to the *Hornet* Upgrade Program should the Integrated Avionics System Support Facility (IASSF) be unable to support the upgrade; and

(b) settle quickly the likely role of IASSF over the remaining life of the *Hornet*.

Defence response: Agreed.

Audit Findings and Conclusions

1. Introduction

This chapter sets out background information on Tactical Fighter Operations and the Tactical Fighter Group. It also sets out the audit objectives, criteria and methodology.

Tactical Fighter Operations

1.1 Tactical fighter operations (TFOs) form the basis of Australia's current military capability to ensure air superiority. Air superiority over the Australian territory and maritime approaches is an essential element in Australia's defence strategy. The role of air superiority in Australia's military planning is described in Chapter 2 of this report.

1.2 TFOs are carried out by the Tactical Fighter Group (TFG), which is part of the combat forces in Group 4 (Air Force) in the Defence portfolio. In the framework of 22 outputs of the Defence organisation[1], TFG provides the weapon systems in support of Defence's Output 14—Capability for Tactical Fighter Operations. Output 14 provides the F/A–18 *Hornet* tactical fighter force at levels of capability to conduct air-to-air combat and air-to-surface attack, plus associated training aircraft.

1.3 The *Hornet*, operated by the TFG, is the primary weapon system supporting Output 14. The multi-role capabilities of the *Hornet* provide air defence, including both offensive and defensive counter air, maritime and land strike and interdiction as well as offensive air support to ground forces. TFG is to conduct these roles either alone, in conjunction with other Air Force outputs or as part of a joint/combined force. At the end of June 1999, TFG's personnel strength was 1395.

1.4 The main weapon systems in TFG are:

- 71 F/A–18 *Hornet* tactical fighter aircraft;
- 26 Macchi MB326 lead-in fighter aircraft (planned to be withdrawn by December 2000);
- Hawk lead-in fighter aircraft (eight to be in service by 1 July 2000 and 33 by 1 July 2001); and
- three PC–9 forward air control aircraft.

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[1] The Defence organisation comprises the Department of Defence and the Australian Defence Force (Navy, Army and Air Force).

1.5 The Macchi, Hawk and PC–9 aircraft are used for training purposes. A small number of *Hornet* aircraft are assigned to the Air Force Aircraft Research and Development Unit for testing purposes, some to operational conversion training in TFG and the majority to the operational tactical fighter squadrons.

1.6 The functional organisation of TFG comprises:

- Headquarters at Williamtown NSW (No. 81 Wing Headquarters);
- three operational squadrons (No. 3 Squadron and No. 77 Squadron at Williamtown, and No. 75 Squadron at Tindal, Northern Territory);
- one lead-in fighter training squadron (No.76 Squadron at Williamtown);
- one tactical fighter operational conversion unit (No.2 Operational Conversion Unit at Williamtown); and
- one conversion training squadron (No. 79 Squadron at Pearce, Western Australia).

1.7 Table 1 details the 'price' of Output 14 in the Commonwealth budgetary context.

Table 1

Price of Defence Output 14*—1999–2000 (revised estimates)

Category of expenses	*$m*
Military employees	201.1
Civilian employees	46.9
Asset sales	1.0
Expensed assets under construction	37.4
Inventory consumption	92.5
Depreciation	248.6
Suppliers	146.1
Other expenses	11.3
Total expenses	**784.9**
Capital use charge	**504.8**
Total price of Output 14	**1289.7**

*Capability for Tactical Fighter Operations.

Source: Portfolio Additional Estimates Statements 1999–2000, Defence Portfolio, p. 82.

1.8 The value of assets attributed by Defence to Output 14 as at 30 June 1999 was:

- gross value $5376 million
- written down value $2703 million.

The audit

Audit objectives

1.9 The audit objectives were to:

- assess whether the resources used to provide the F/A–18 tactical fighter force operational capability are managed cost-effectively; and
- identify areas for improvement in the coordination, planning and practices employed in administration of tactical fighter operations.

Audit criteria and methodology

1.10 Audit criteria were developed to address the areas of the military planning framework to guide the development of tactical fighter operations, military effectiveness of TFG, project management of the enhancement to the *Hornet* aircraft, and the logistic and personnel management in support of TFG. A preliminary study for the audit commenced in June 1999. Audit field work was conducted in the Defence Acquisition Organisation, Support Command Australia, Defence Personnel Executive, Air Force Executive and Training sub-groups. TFG units at Williamtown and Tindal were included in the fieldwork. Issues papers were provided to Defence in November and December 1999. Defence's comments on the issues papers were received in December 1999 and February 2000 and taken into account in the preparation of this report.

1.11 The audit utilised the services of Mr John Moten from John Moten & Associates and Mr David Marcus from Origin Consulting to assist in the collection and analysis of information and in the preparation of the audit report. They were selected because of their expertise in related evaluation and review activities.

1.12 The audit was conducted in conformance with ANAO Auditing Standards at an estimated cost to the ANAO at the time of tabling of $342 000.

1.13 There have been no other recent audit reports or major reviews encompassing the full breadth of TFO activities.

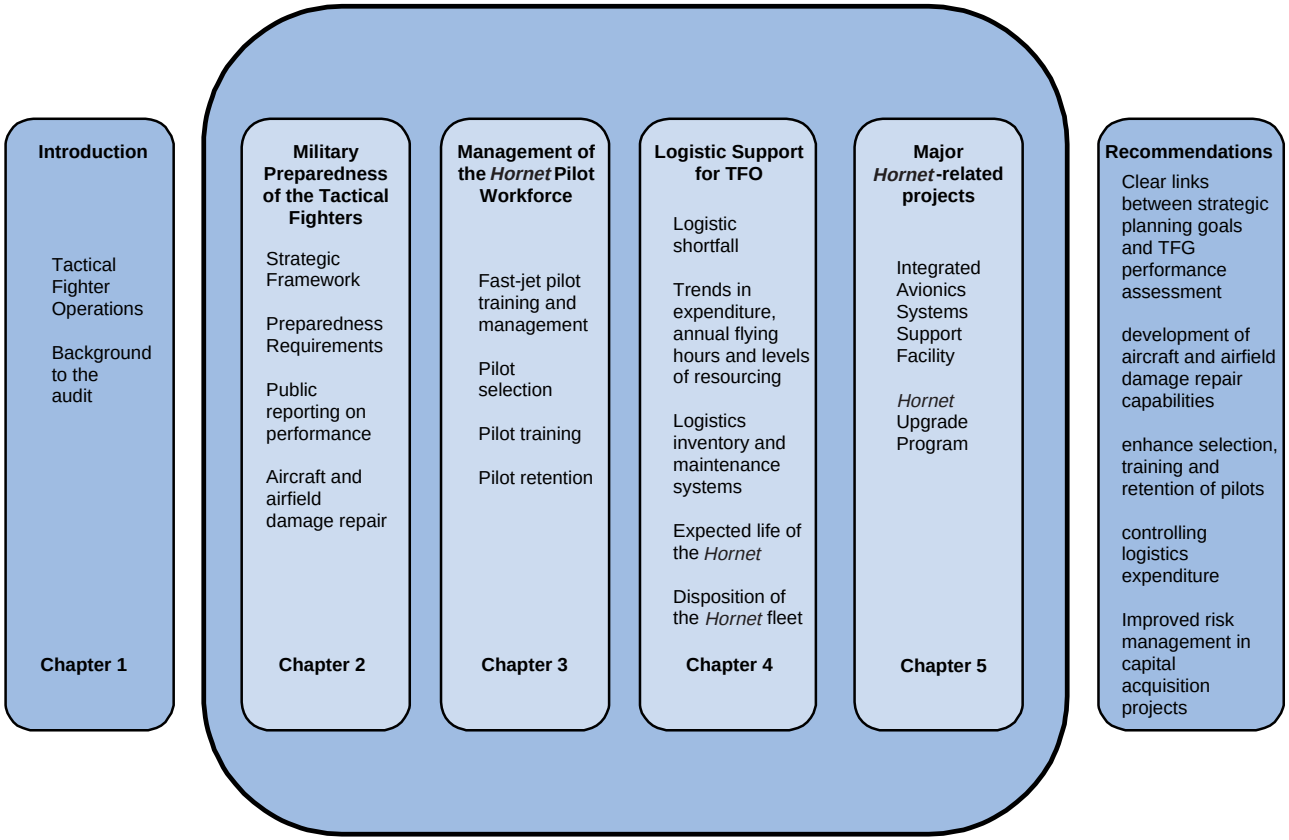
Acknowledgements

1.14 The ANAO wishes to acknowledge the time, effort and expertise contributed by Defence managers and staff to this audit, in particular the contributions of personnel in TFG at Williamtown and Tindal, Support Command Australia in Melbourne and staff from Air Force Executive, the Defence Acquisition Organisation, Defence Personnel Executive and Defence Headquarters in Canberra.

Report structure

1.15 The structure of the report is outlined in Figure 1.

Figure 1
Report structure



2. Military Preparedness of the Tactical Fighters

This chapter reviews the systems and process for setting of military preparedness objectives for Tactical Fighter Operations, the ability of the Tactical Fighter Group to meet these objectives and Defence public reporting on TFG performance. It also addresses preparedness issues related to aircraft and airfield battle damage repair.

Strategic Framework for Tactical Fighter Operations

The Government's national security policy

2.1 The Government's White Paper *In the National Interest: Australia's Foreign and Trade Policy* identified, inter alia, the range of Australia's international security interests. The key components of the Government's strategies for advancing Australia's security interests include the maintenance of a strong national defence capability.[2]

The Government's defence policy

2.2 The Government's Defence White Paper *Australia's Strategic Policy* (*ASP 97*)[3] sets out the Government's planning basis for taking Australia's defence into the 21st century. It contains the strategic policy relating to the *use of armed force* in international affairs, which is a central part of the 'whole-of-nation approach' to national security strategies.

2.3 A fundamental aim of Australia's wider security policy since the 1970s has been the prevention, or defeat, of armed force against Australia or its interests. This aim has been reaffirmed by the Government[4] and constitutes the strategic outcome sought by the Government.[5]

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2 *In the National Interest. Australia's Foreign and Trade Policy, White Paper,* The Hon Alexander Downer, MP, Minister for Foreign Affairs, and The Hon Tim Fischer, MP, Deputy Prime Minister and Minister for Trade, August 1997, p. 37. Also at Senate Hansard 28 August 1997, p. 5954.

3 *Australia's Strategic Policy (ASP 97)*, Minister for Defence, December 1997, Preface, p. iii.

4 *ASP 97*, p. 3 and Media Release MIN 294/99 28 September 1999 by the Minister for Defence, Address at the Australian Defence Studies Centre's *Strategic Update '99* conference.

5 *ASP 97*, p. 8, and *Portfolio Additional Estimates Statements 1999–2000,* Defence Portfolio, p. 2.

Defence of Australia

2.4 The strategic *outcome* is to be achieved through a combination of international measures designed to help shape the strategic environment and the development and, where necessary, the use of Australia's armed forces.

2.5 The development of the armed forces is expected to achieve the military capability to *'prevent an enemy from attacking us successfully in our maritime approaches, gaining a foothold on our territory or extracting political concessions from us through the use of military force*.'

2.6 Consequently, the first task of the Australian Defence Force (ADF) is *'to defend our territory from any credible direct attack without relying on the combat forces of other countries*.' Other tasks to be carried out by the ADF as required are:

- making a military contribution in defence of Australia's regional interests;
- supporting Australia's global interests, including humanitarian and political objectives; and
- assisting the civil community.

Air superiority

2.7 The defence of the nation is based on a maritime concept which '*concentrates on defeating any aggressors in the maritime approaches before they reach our territory*.' Air superiority plays a critical role in this concept, as *'the key to achieving domination of the maritime approaches, to defeat any air attack on Australia, to allow our aircraft to operate against hostile shipping without interference from adversary aircraft, and to protect our ships from hostile aircraft*.'

2.8 Air Force F/A–18 *Hornet* tactical fighter aircraft form the basis of Australia's current military capability in ensuring air superiority. Maintaining that capability is listed as the highest priority within Priority 2 among the four force structure priorities in *ASP 97*. In terms of military readiness, further investment in *Hornet* aircrew is listed as *'among the highest personnel priorities for the ADF*.[6]

Preparedness

2.9 Military preparedness is the ability of a military force to undertake operations in a timely manner (readiness) and to sustain those operations (sustainability).

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6 *ASP* 97, p. 61.

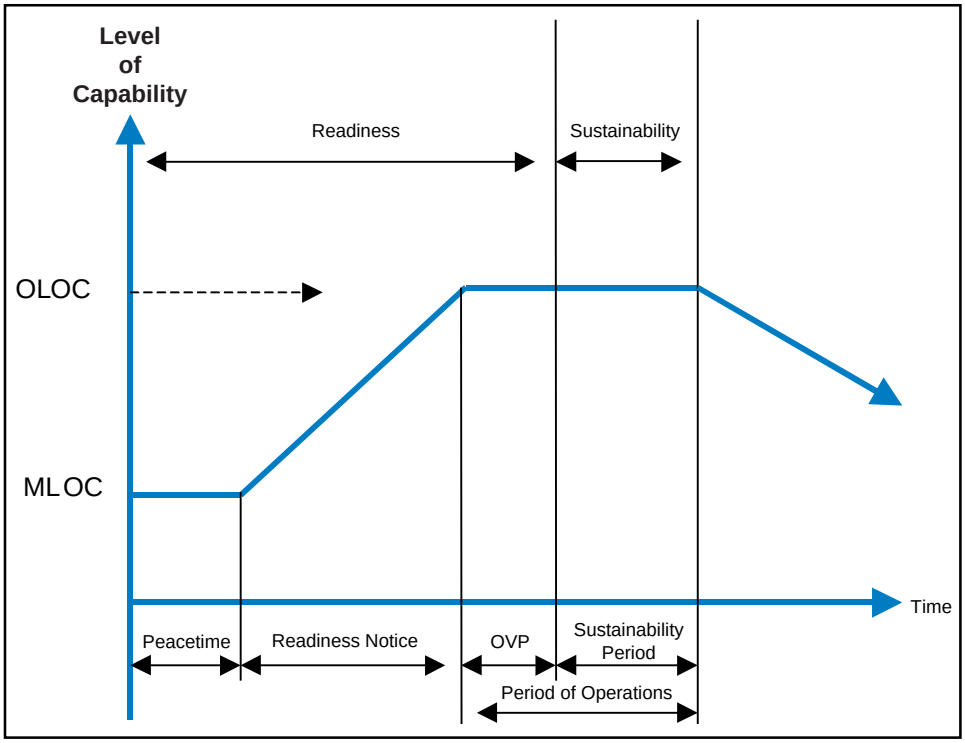
2.10 Readiness requires a specified level of military capability to be reached. Sustainability stipulates the length of time during which that capability is to be maintained and the activity level (tempo of operations). The level of capability of military units varies over and with time. Defence's preparedness doctrine defines three levels of capability:

- *Operational Level of Capability (OLOC)*—the level at which a military unit has the necessary training and the resources to conduct specified operational roles and tasks;
- *Minimum Level of Capability (MLOC)*—the lowest level of capability from which a military unit is able to achieve OLOC within the specified readiness notice (the specified readiness notice is the specified time in which the unit must be capable of being made ready to conduct specified operational roles and tasks); and
- *Present Level of Capability (PLOC)*—the actual level of capability of a military unit at a given time.

2.11 Defence's preparedness doctrine assumes that, on initial deployment, military units cannot expect immediate external logistics support for a period of time. That period of time, during which the unit is largely self-sufficient, is called the Operational Viability Period (OVP). Once external logistics are established to support the deployment, the operation enters into the Sustainability Period. Figure 2 illustrates the relationships between levels of military capability and timeliness.

2.12 In order for a military unit to meet its operational requirements within a specified readiness notice period, its capability should not fall below MLOC. Conversely, maintaining a high level of readiness is unnecessarily resource intensive. To economise on resources in peacetime, a military unit on normal readiness notice would be maintained at MLOC.

Figure 2
Relationships between levels of military capability and timeliness



Source: Air Command Standing Instruction ADMIN1/99 1 February 1999.
OLOC, MLOC and OVP: see text at paragraphs 2.10 and 2.11.

Preparedness requirements

Shorter-term goals: Meeting the serials in the Preparedness Directive

2.13 The Chief of the Defence Force Preparedness Directive (CPD) is the principal Defence document on the military preparedness requirements of the Australian Defence Force. It is not available publicly. Operational requirements of ADF units are derived from CPD. The requirements under successive CPDs can vary significantly over time. The requirements comprise both specific military planning scenarios (known as 'serials') and broader defence requirements. At the time of the audit, preparedness requirements for the Tactical Fighter Group (TFG) were derived from CPD 1998.[7]

[7] The ANAO understands that Air Command had been issued parts of CPD 1999 for planning purposes.

2.14 Performance reporting on TFG used CPD 1998 as the preparedness target.[8] Three of the specific military planning scenarios (serials) in CPD 1998 directly involve the TFG. Planning guidance was that any two of these serials could be activated concurrently. TFG believes that it can meet the preparedness requirements contained in the three relevant serials of CPD 1998. A discussion on this follows.

2.15 On the information provided by Defence to the audit team, TFG has the number of *personnel* (aircrew and logistic maintenance and support staff) and level of training to be able to meet the preparedness requirements of the CPD serials.

2.16 Although *logistic* deficiencies for the *Hornet* fleet have been identified in Defence for many years, it appears that TFG would be able to sustain an increase in tempo (activity level) of the order and for the time periods envisaged in the CPD serials. A shortfall in logistic funding for TFG, identified by Air Force in 1997, is now being eliminated through increased funding over several years. In respect of ordnance, TFG's military planners are confident that existing holdings and resupply arrangements meet the requirements of the CPD 1998 serials.

2.17 The ANAO's review of *Hornet* operational exercise reports confirmed that, by and large, the logistic and ordnance supply arrangements met the requirements of military exercises in the recent past, except for problems associated with the Computer Aided Maintenance Management system (CAMM2) recently introduced in the *Hornet* fleet. (Chapter 4 of this report describes these problems.) For TFG to be confident that it can meet operational requirements, problems associated with CAMM2 would need to be resolved or more human-resource intensive alternatives to that system would have to be used.

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[8] This audit did not review the CPD. The ANAO commented on the CPD and related issues in Audit Report No.17 1995–96 *Management of Australian Defence Force Preparedness* (April 1996). The major findings of that study were as follows:

- Defence's preparedness planning methodology required further development to provide a sound basis for determining preparedness requirements.
- Many preparedness objectives had not been derived in an appropriately rigorous manner and placed insufficient emphasis on force concurrency and requirements for joint Service operations.
- Resource implications of different preparedness states were not fully articulated or understood.
- Management information systems necessary to measure achievement against performance indicators required considerable improvement.

2.18 Provided that problems associated with CAMM2 are resolved, the number of operational aircraft is unlikely to constrain TFG in meeting the CPD 1998 serials. However, Air Force's Capability Assessment Report (internal report) in 1998 stated that there was a critical deficiency in the number of aircraft that were fully mission-capable. Air Force advised the ANAO that the deficiency has since been rectified. However, the Capability Assessment Report pointed to a vulnerability in terms of deploying sizeable numbers of *Hornets* into some operational environments which could be encountered by the aircraft in meeting the CPD serials.

2.19 The Defence Intelligence Organisation has undertaken comparative technology assessments of fighter aircraft. These assessments could assist in monitoring the risks that TFG would encounter in operating in, and against, particular countries. However, these assessments are not comprehensive in covering all countries in our geographic environment and do not address comparative capability against other countries in net quantitative and qualitative terms in a Defence of Australia scenario. To align the preparedness assessment of the *Hornet* fleet more closely with the likely combat environment the aircraft could face, regularly updated intelligence assessments should be used to validate the *Hornets'* relative level of capability and military preparedness in quantitative and qualitative terms, against high priority military planning scenarios.

2.20 TFG's apparent ability to meet the military preparedness requirements set out in the CPD 1998 serials has to be qualified. Firstly, deficiencies in the maintenance management system should be remedied. Secondly, to allow the *Hornet* to deploy into the full range of operational theatres envisaged in strategic policy, Air Force should monitor military vulnerabilities of the aircraft and remedy any identified shortcomings in quantitative and qualitative (eg. levels of technology) terms.

Recommendation No.1

2.21 The ANAO recommends that, in order to maintain a cogent link between Defence's strategic planning and its military preparedness assessments of the tactical fighter force, Defence include in these latter assessments periodic and comprehensive intelligence assessments relevant to preparedness requirements.

Agency response

2.22 Agreed. The Defence Executive conducts quarterly reviews of intelligence assessments. These assessments are considered during the periodic review of Military Response Options, eg. Capability Assessment Reports.

ANAO comment

2.23 At the time of the audit, Defence's assessment of TFG's military preparedness did not show evidence of a systematic and regular incorporation of intelligence assessments related to the requirements to be met by TFG in the CPD. Recommendation No.1 is intended to address this.

Longer-term goals: Maintaining professional standards and core skills

2.24 The specific military preparedness requirements in the CPD have a shorter-term focus. To complement them, TFG has developed its own longer-term military preparedness goals on the number of serviceable aircraft and fully trained crews that have become part of its internal longer-term preparedness goals. These goals have been derived from a CPD-related general requirement to achieve a level of training that maintains professional standards and core skills.[9] Detailed planning on how to achieve this is the responsibility of Commander TFG. Over the past years, planning to meet this requirement has involved defining what is to be delivered by the TFG as its contribution to the Australian war effort in a military conflict that would require extensive use of Australian Defence capabilities.

2.25 The military capability to be provided by TFG has been derived essentially from the size of the *Hornet* fleet and TFG's structure—three operational squadrons and the Operational Conversion Unit (titled 2 OCU)[10]. The TFG preparedness targets specify the number of aircraft and pilots for MLOC and OLOC (see paragraph 2.10).

2.26 Military planning in TFG has assumed that the effort from TFG in a major military engagement by Australia would be three operational fighter squadrons operating at capacity and 2 OCU maintaining conversion training. On this basis, TFG calculated targets for a particular number of serviceable aircraft and a set number of fully trained aircrew. TFG's planning incorporates these goals as part of MLOC.

2.27 No specific endorsement of those goals has been given by Defence as a whole or by Government. Consequently, they are without formal status.

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9 TFG7/12/Air 19 May 1999, paragraph 2.

10 2 OCU teaches pilots to operate the *Hornet* aircraft after their training on the *Macchi* Lead-in-Fighter aircraft.

2.28 TFG has never met, and has never been resourced to meet, these MLOC targets nor does Defence's financial planning provide for them in future years. TFG's actual level of preparedness in terms of numbers and training levels of *Hornet* aircrew since June 1994 has been fluctuating at a level far below MLOC and is unlikely to be much higher in the foreseeable future. In terms of serviceable aircraft, the shortfall against MLOC was 33 per cent in 1999–2000 and was projected to continue at that level for the next three years.

2.29 To reach and maintain MLOC for TFG would involve increasing the *Hornet* rate of effort by 3000 flying hours a year (24 per cent) from the actual 1998–99 and the planned 1999–2000 rates of effort. An increase of this magnitude could be sustained only by a matching supplementation of logistics expenditure and/or maintenance personnel.[11] Given past performance and available resources, it is difficult to consider TFG's longer-term MLOC target as realistic. In view of the large gap between the desired and the actual level of military capability, Defence might consider establishing intermediate goals to be achieved by TFG.

2.30 The Government's main Defence policy document, *ASP 97*, states that:

> *The possession by Australia of the forces needed to defeat any substantial attack on our territory by a regional power is the essential foundation of our wider posture* [p29]
>
> *The capabilities of the ADF will therefore be developed to defeat attacks against Australia, and provide substantial capabilities to defend our regional strategic interests.* [p36]

Conclusion

2.31 At present, TFG's long-term planning and its definition of MLOC are based on its interpretation of the CPD requirement to maintain professional standards and core skills. This interpretation takes as its basis the current fighter force structure and aircraft numbers rather than an assessment of what is likely to be needed. There is no Defence agreed position on what is to be the longer-term capability to be provided in more demanding conflicts by TFOs. Consequently, it is impossible to assess whether TFG meets the CPD requirement to maintain professional standards and core-skills in terms of the military capability to be provided in the longer-term. On its internal goal (MLOC, which is very demanding given past performance and available resources), TFG does not meet the requirement now.

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[11] A detailed discussion of logistic issues is contained in Chapter 4 of this report.

2.32 The definition of TFG's longer-term military preparedness requirement, the longer-term development of the TFG and its resourcing should be guided by an agreed Defence position on the extent of the military contribution to be provided by the TFG in a military emergency. That position should take into account military developments in the areas of likely deployment of the aircraft and the resources which can be marshalled to develop the TFG. Planning how to achieve the required capability should include stretching, but achievable, intermediate goals, taking account of the lead-times required to achieve any major capability improvement.

Recommendation No.2

2.33 The ANAO recommends that Defence determine a longer-term military preparedness capability for the Tactical Fighter Group (including the requirements for maintaining core skills).

Agency response

2.34 Agreed. Tactical Fighter Group has already identified the longer term core skill requirements, which are the basis of the pilot categorisation scheme.

Public reporting on performance

2.35 The *Defence Annual Report 1998–99* commented as follows on Air Force performance relevant to TFG:

> ***Capability for Tactical Fighter Operations***
>
> *The Tactical Fighter Group met all requirements of the Chief of the Defence Force's Preparedness Directive for the provision of capability. Ninety-six percent of the planned flying rate of effort was achieved. The under-achievement was caused primarily by a lack of qualified pilots in F/A–18 squadrons. Nevertheless this year's flying rate was a four per cent increase over the 1997–98 effort. Initiatives have been taken to improve fast-jet pilot numbers.* [p. 213]
>
> ***Maintain a force that is trained, fit and ready to fight***
>
> *Achieved as forecast* [p. 216]
>
> ***Improve the electronic self protection capabilities of RAAF aircraft***
>
> *Not Achieved as Forecast. Projects have been initiated to upgrade the electronic warfare self-protection capability of selected RAAF aircraft. The first elements of these equipment upgrades are currently being installed.* [p. 219]

Increase pilot numbers in operational fast-jet squadrons

*Not Achieved as Forecast. A fighter pilot Recovery Program has been instituted that includes initiatives to improve recruiting and selection processes. The aim is to increase the percentage of pilots graduating from initial pilot training that will be suitable for fast-jet training. A predicted short-term effect of this program has been a temporary decrease in the number of frontline fast-jet pilots, as pilots are diverted to flying train*ing *units to increase training capacity.* [p. 219]

2.36 Audit evidence supported the second, third and fourth paragraphs above. However, in the first paragraph, Defence stated that TFG met all requirements in the CPD for the provision of capability. The ANAO has difficulty reconciling this with TFG's internal assessment that, during the year, it was significantly below MLOC, a goal that TFG derived from the CPD and TFG's existing composition.

2.37 The ANAO notes that TFG in the year in question met the relevant specific shorter-term military preparedness requirements derived from the CPD serials. However, the longer-term preparedness goals implicit in the requirement to maintain core skills have not been agreed by Defence and it is therefore impossible to form a judgement on whether all the CPD requirements relating to capability have been met. Defence's interpretation of the statement on p. 213 of the Annual Report cited above was that the extant force maintained core skills. The ANAO notes that, by implementing Recommendation No.2 (of this audit), Defence would have a set of agreed longer-term preparedness requirements against which TFG's performance could be assessed.

Achieving planned annual hours of flying

2.38 Each year Air Force sets a goal for the number of annual flying hours of its aircraft fleets. Table 2 shows planned and achieved annual hours of flying of the *Hornet* fleet from 1994–95 to 1998–99.

Table 2

Planned and achieved annual hours of flying—*Hornet* fleet

	Planned	*Achieved*	*% difference*
1994–95	11 800	12 147	+ 2.9
1995–96	12 600	12 423	- 1.9
1996–97	13 000	11 747	- 9.6
1997–98	12 000	12 008	+ 0.1
1998–99	13 020	12 457	- 4.3

Source: Compiled by the ANAO from information in Defence Annual Reports

2.39 As an average over the five years since 1994–95, the Air Force *Hornet* fleet achieved 97.4 per cent of its annual planned hours of flying (2.6 per cent under-achievement). This compares well with the record of the United States Air Force, which, across all its aircraft types, achieved 91.6 per cent of its planned hours of flying in the four years from 1995 to 1998 (under-achievement of 8.4 per cent).[12]

2.40 The *Hornet* fleet's annual flying hours has been around 12 000 hours over the last five years, which Defence considers to be largely in line with Air Force planning and operational requirements.

Other preparedness matters

Aircraft battle damage repair

2.41 Preparing for military conflict includes preparation for dealing with damaged aircraft. In war, the time, facilities, personnel and materials used in peacetime maintenance and repair may not be available. Operational imperatives may justify an increased level of risk.

2.42 Air Force acknowledged the need for an Aircraft Battle Damage Repair (ABDR) capability in January 1995 when it approved the development of an ADF ABDR capability and established the ABDR project.

2.43 The need for an ABDR framework and capability is recognised in Air Force's Technical Airworthiness Management Manual (TAMM), issued in February 1996. TAMM describes the responsibilities of operational commanders, maintenance personnel and Logistic Management Squadrons for ABDR. The prescribed framework provides for ABDR technicians and assessors with formal technical training and ABDR engineers with formal ABDR engineering training. TAMM also listed a series of instructions to be issued, including an F/A–18 battle damage repair manual. Defence advised the ANAO that the manual was issued in November 1999.

2.44 In September 1998, a joint Air Command/Support Command Directive set out the required capability and how it would be implemented. The first ADF ABDR instructor training course was delivered in May 1999 at RAAF Base Williamtown. The next course is planned for October 2000. The first TFG ABDR technician course was

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[12] ANAO calculation from information contained in the United States General Accounting Office Report to the Chairman and the Ranking Minority Member, Subcommittee on Defense, Committee on Appropriations U.S. Senate, July 1999, *DEFENSE BUDGET, Observations on the Air Force Flying Hour Program.*

completed in November 1999 and another is planned for February 2000. The first TFG ABDR assessor course is scheduled for March 2000. TFG expects a basic TFG capability to be achieved within a year, with a mature capability being *'at least two years away'*.

2.45 Air Force has acknowledged the need for an ABDR capability for over five years, but progress in developing that capability has been limited. The ANAO considers that Air Force should give the ABDR project greater priority.

Recommendation No.3

2.46 The ANAO recommends that, in order to meet the Defence need for an aircraft battle damage repair capability in a timely manner, Air Force set achievable implementation targets for the development of this capability.

Agency response

2.47 Agreed, with qualification. An Air Command management objective for this year is to *'develop an effective Aircraft Battle Damage Repair capability'*. Tactical Fighter Group has a basic ABDR capability, which is undergoing further development. However, the ABDR capability is competing for scarce engineering and technical resources and remains a lower priority activity.

Airfield damage repair

2.48 During discussions with personnel serving in the *Hornet* squadrons, the audit team encountered a concern arising from a perceived lack of policy, planning, training and equipment for airfield damage repair and unexploded ordnance on and around airfields. The location of operating bases of *Hornet* aircraft in northern Australia suggests a measure of risk of battle damage to airfields and their supporting infrastructure on which effective air operations depend. Both are also at risk from extreme weather events.

2.49 Combat Support Group (CSG) has advised the ANAO that it deploys in support of air operations in the form of Expeditionary Combat Support Squadrons (ECSS). ECSS provide the normal range of support services available at Air Force bases, such as logistics, air loading teams, ground defence, catering and airfield engineering.

2.50 The airfield engineering capability is based on providing reconnaissance, appreciation skills and small-scale, air-transportable airfield infrastructure. In respect of damage or break-down of existing infrastructure, the capability is to provide a *'quick response and make safe'* capability. Recovery (restoration of functionality) would depend on the

resources available at the time from within Defence and the community. No specific arrangements or plans have been made to provide a measure of assurance that appropriate machinery and equipment would be available from within or outside Defence. CSG has advised that training programs are being developed for contingency planning and disaster preparedness for airfield engineering staff.

2.51 The ANAO understands that Australian Defence Headquarters has considered the possibility of an Airfield Damage Repair Squadron to provide a wartime capability for significant recovery and restoration. Progress of this initiative is unknown.

2.52 The ability to restore airbases (airfields and their infrastructure) to operating conditions is essential for the continuation of an effective air effort in war. The Defence capability, including the development of policies, is still in embryonic form and would benefit from an acceleration of effort.

Recommendation No.4

2.53 The ANAO recommends that Defence develop an airbase damage repair capability that can be mobilised when needed, particularly on the more vulnerable airbases, and can deal with unexploded ordnance.

Agency response

2.54 Agreed. Plans are under way to provide Air Force Combat Support Group with an airbase damage repair capability. Operational policy and doctrine will be developed at an Airfield Engineering Project Workshop in March 2000. Specialist engineering plant is currently being procured by Headquarters Air Command and will enable a limited operational capability to be established in Combat Support Group by financial year 2000–01.

Conclusion

2.55 The audit found that TFG, albeit with some qualifications, met the military preparedness requirements contained in the shorter-term, specific military planning scenarios of the Chief of the Defence Force Preparedness Directive (CPD). The qualifications refer firstly, to the need for some deficiencies in the maintenance management system to be remedied. Secondly, to allow the *Hornet* aircraft to deploy into the full range of operational theatres envisaged in strategic policy, Air Force should monitor military vulnerability of the aircraft and remedy any identified shortcomings in quantitative and qualitative (levels of technology) terms.

2.56 From the CPD requirement to maintain professional standards and core skills, TFG itself has developed longer-term targets on the number of serviceable aircraft and fully trained crews that have become part of MLOC. No specific endorsement of those targets has been given by Defence as a whole or by Government. TFG has never met nor has it been resourced to meet those targets. Given past performance and available resources, it is difficult to consider these targets as a realistic goal. The ANAO considers that Defence should develop more realistic military goals to be achieved by TFG.

Hornet in turn-off motion—photo courtesy of the Royal Australian Air Force

3. Management of the *Hornet* Pilot Workforce

This chapter reviews Defence's management of the fast-jet pilot training and pilot management system, pilot recruiting and selection and retention of Hornet pilots.

Introduction

3.1 The Government's defence policy statement, *Australia's Strategic Policy*, states that *'A key constraint on air operations is the availability of aircrew'*.[13] The recent (November 1998) statement by the Government, *Defence: Our Priorities,* stated that a key objective for 1998 and 1999 would be to *'increase pilot numbers in operational fast-jet squadrons'.* Shortages of fast-jet pilots exist in the operational squadrons of both the Tactical Fighter Group (operating the *Hornets*) and the Strike Reconnaissance Group (operating the F–111 strike and reconnaissance aircraft). In accordance with its scope, the audit focused on the *Hornet* pilot workforce.

3.2 Air Force has had difficulties achieving target fast-jet pilot numbers over many years. Shortages of pilots first began to emerge in the mid-1980s, caused mainly by high wastage rates as Air Force pilots took up employment with civilian airlines, and stagnation in recruitment rates. These problems are not unique to Australia. US, Canadian, UK and many European air forces face similar (though generally less severe) shortages, for similar reasons.

3.3 Effective management of fast-jet pilot numbers is important for two reasons. Firstly, the impact on capability—sophisticated weapon platforms such as the *Hornet* require sufficient numbers of skilled pilots to exploit their military potential. Secondly, the training is expensive, at around $9 million per fast-jet pilot. To optimise Defence resources, Air Force should consider training only enough pilots to meet its needs. Those needs should be firmly based and well defined. Once trained, Air Force should gain maximum value from the pilot workforce by endeavouring to retain pilots as long as required.

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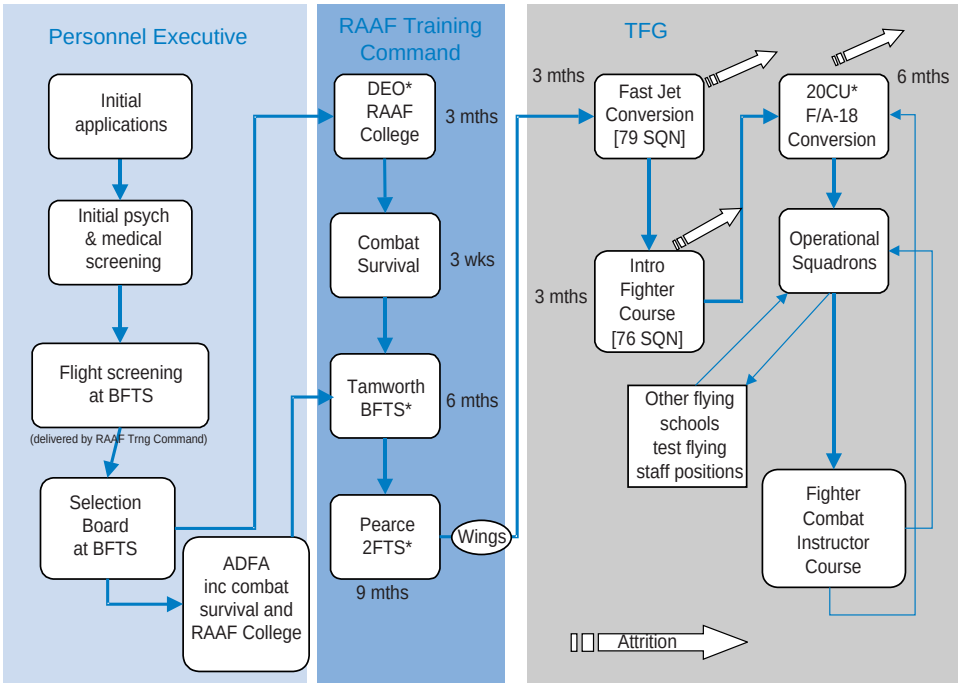
[13] Australia's Strategic Policy (*ASP'97*) p.40.

The fast-jet pilot training and pilot management system

3.4 Fast-jet pilot training and its management are expensive, protracted and complicated. Figure 3 shows the various stages of the training pipeline, which are managed respectively by Defence Personnel Executive (DPE), Air Force Training Command and the TFG itself. The ultimate point of responsibility is the Chief of Air Force. In discussion with various stakeholders, ANAO found there was general consensus that there were significant gaps and management deficiencies within the system.

Figure 3
Simplified flow chart of training for Air Force fast-jet pilots



Source: Prepared by the ANAO from Defence records.

Notes: DEO—Direct Entry Officer
BFTS—Basic Flying Training School, Tamworth
2FTS—No.2 Flying Training School
2OCU—No.2 Operational Conversion Unit

The benchmark for defining shortage—short against what?

3.5 Air Force identifies the shortage of *Hornet* pilots as an issue at several levels. The first level is the most obvious and discussed aspect—a lack of pilots in operational *Hornet* squadrons. As at June 1999 Air Force had about 40 operational pilots[14] in the three *Hornet* squadrons, fewer than the number of aircraft assigned to them. The required number of pilots is not disclosed publicly. It is based on workload analysis to achieve all the requirements of the Chief of the Defence Force Preparedness Directive (CPD). The requirements under successive CPDs can vary significantly over time. The requirements comprise both specific military planning scenarios (known as 'serials') and broader defence requirements. Since at least 1994 TFG has had fewer pilots than required under broader CPD-related requirements. However, TFG advises that it *is* able to meet all current specific tasks listed as serials in the CPD (see Chapter 2). Air Force considers that *Hornet* pilot numbers in operational squadrons will recover gradually and that numbers will be fully restored in 5–7 years. However, previous Air Force projections on expected times of recovery in pilot numbers have been incorrect.

3.6 At the second level, Air Force identifies fast-jet pilot staffing targets for the pilot training system, particularly in the fast-jet training squadrons where experienced pilots are required as instructors. This shortage is considered by Air Force to have three negative effects—it limits the throughput of pilots to operational squadrons; it prevents pro-active 'modelling' (ie. marketing) of a fast-jet career to students; and it can also affect the quality of tuition. The shortage is relatively straightforward to quantify, as the need for instructors is driven by student numbers. Pilot instructor numbers in the *Hornet* No.2 Operational Conversion Unit (2 OCU—where pilots who have graduated from *Macchi* training then learn to fly the *Hornet*) have been growing recently as TFG gives priority to the training role over staffing in operational squadrons. However, there are still shortfalls at No.2 Flying Training School (2FTS)[15] and the *Macchi* squadrons. When *Hornet* pilots are not available, positions are filled by other pilots.

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[14] Evidence by Air Marshal McCormack to the Senate Foreign Affairs, Defence and Trade Legislation Committee, 7 June 1999, Hansard p. 176.

[15] 2FTS is where Air Force and Navy pilots continue their training up to a point where they are ready to enter service or platform specific training (eg. to helicopters, multi-engine aircraft or fast jets).

3.7 The third level where the pilot shortage is identified is within various Air Force and Defence commands and staff positions. For example, it is considered desirable that fast-jet pilots participate in managing a range of equipment acquisition projects affecting TFG and the *Hornet*. It is in this area where Air Force identifies the greatest shortfall of *Hornet* pilots. The shortfall in staff positions accounts for half of the overall shortfall of *Hornet* pilots. However, the rationale for the target number of *Hornet* pilots in staff positions is not clear and can vary according to changes in Defence organisation or activity. The ANAO estimates that, on current trends, the shortage of pilots in staff positions will not be corrected for at least 15 years.

3.8 TFG has serious shortages of *Hornet* pilots, which limit its capability. However,

- TFG is able to achieve its allocated tasks under the current CPD serials;
- in the last few years TFG has achieved an increase, albeit slowly, in the number of pilots in training squadrons (notably 2OCU); and
- the combined number of pilots from operational and training squadrons provide some buffer for short-term contingencies, although training activity may have to be reduced.

Trends in pilot experience and skills levels

3.9 Having sufficient numbers of pilots is not enough in itself—these pilots must be skilled, effective commanders of their aircraft across the military roles required of them. Some data was available on the distribution of pilots by category of skill-level since 1997. This showed that there had been significant variations in experience levels, reflecting variations in retention rates and training throughputs. Experience levels appeared to be recovering slowly. The desired average levels across the squadrons have only occasionally been achieved.

Measurement of pilot capability

3.10 The competence of pilots is an important component of TFG's capability and is carefully monitored as individual pilots complete each component of their training. This individual capability is then summed across the squadrons to show overall levels of TFG competence against a benchmark of Minimum Level of Capability (MLOC). As pilots progress through their training they become capable in an increasing number of operational roles.

3.11 The number of pilot flying hours is set by Air Force at levels which would allow individual pilots to reach required levels of competency within the period of notice. This is a reasonable policy,

ensuring that resources (aircraft numbers and fatigue life) are used judiciously. In 1998–99, achieved flying hours (12 457) for the *Hornets* were less than planned flying hours (13 020) (see Table 2, Chapter 2). TFG considers that, given the number of *Hornet* pilots and their flying requirements, the achieved hours of flying met operational and training requirements.

3.12 TFG has itself derived measures of MLOC for *Hornet* pilots. The MLOC target is a combination of the numbers of pilots and their skill levels. To achieve full MLOC on this measure TFG would need a *full complement* of pilots *all* of whom would have to be capable in *all* roles. This is an extremely demanding target. Even if squadrons were fully staffed, each squadron would receive four new graduate pilots each year who must then continue their training. TFG has *never* achieved *Hornet* pilot MLOC and is currently substantially below the MLOC target. Given the constraints of likely wastage rates and limited flying hours, the MLOC measure gives some indication of TFG performance against a theoretical optimum, but it gives little useful guidance for performance measurement or planning.

Recommendation No.5

3.13 The ANAO recommends that the Tactical Fighter Group (TFG) review its definition of Minimum Level of Capability (MLOC) for *Hornet* pilots to ensure it is a useful measure of TFG's ability to meet operational requirements.

Agency response

3.14 Agreed. Tactical Fighter Group currently maintains a management strategy that allows Chief of Defence Force Preparedness Directive guidance to be achieved by ensuring that components of capability meet acceptable preparedness over the full range of *Hornet* employment options. As a corporate planning goal, Air Force intends to conduct a review of Minimum Level of Capability/Operational Level of Capability requirements across all Force Element Groups.

Action taken to address the shortfall

3.15 Against the background of high wastage of pilots in operational squadrons, varying experience levels and continuing inability to fully staff the squadrons, Air Force has taken a range of 'recovery', 'get well' or 'health' actions. However, these individual initiatives do not constitute a specific plan or coordinated process for addressing pilot shortages.

3.16 Major initiatives commenced in 1994 when Air Force agreed a range of actions including:

- increasing pilot training throughput and associated flying hours;
- investigating the possibility of training Air Force pilots overseas;
- investigating the use of foreign *Hornet* pilots (particularly from Canada);
- identifying pilots in other parts of Air Force who may be suitable for fast-jets and encouraging them to move to TFG; and
- reassessing whether the training system, particularly basic training, could produce sufficient fast-jet candidates who could subsequently graduate to operational squadrons.

3.17 At this time Air Force also agreed to develop a long-term manning plan for the TFG, but the ANAO found no evidence of such a plan.

3.18 A review of general pilot recruitment, training and retention issues was undertaken in 1995 and another specifically on fast-jet pilots in 1996. Despite being sanguine about the problem (*'…no drastic action needs to be taken…'*) these reviews are referred to as the source of some recent changes, such as the current pilot recruitment campaign. The overall Defence pilot training system (ie. for all pilots, not just fast-jet pilot pilots) was reviewed in 1997–98.

3.19 The Air Force initiatives to improve fast-jet pilot numbers could have been enhanced by a workforce plan for fast-jet pilots (including procedures for estimating the number and quality of pilot recruits needed to re-stock squadrons) and a clear organisational focus for coordinating action on fast-jet pilots. Responsibilities have been diffused across a range of functions and levels and the actions taken have been evaluated only partially, late or not at all.

3.20 Responsibility for remedying the problem of the shortage of fast-jet pilots is held formally by the Chief of Air Force, as capability manager. However day-to-day management of the range of issues involved is diffused across Defence Personnel Executive, Training Command and Tactical Fighter Group. Relationships between these bodies are generally good, but there is scope for more coordinated management and for a more formal approach to setting goals and monitoring performance toward those goals. As one Air Force review of pilot training put it *'…accountability for non-performance…is almost impossible to assign.'*

Pilot recruitment and selection

3.21 Pilot *recruitment* is the process of seeking and processing inquiries and applications from the general public. Pilot *selection* is the process of choosing the best of these applicants in order to offer positions in the Air Force as pilot trainees, either as direct entry officers (DEO) or by completing a degree course at the Australian Defence Force Academy (ADFA). A student who has completed a degree course at ADFA may then enter the pilot training stream. DEOs undergo three months training at RAAF College before commencing pilot training. The DEO route thus brings recruits into the pilot training stream (and ultimately operational squadrons) much more quickly.

Recruitment difficulties

3.22 The Defence Force Recruiting Organisation is responsible for recruiting pilots against targets set by Workforce Planning area of Defence Personnel Executive. Table 3 shows that four of the last five annual targets have not been achieved. Overall, the cumulative target was missed by around 10 per cent. Targets are only set for the broad category of 'pilots'. There are no specific targets for fast-jet pilots (or other types of pilots).

Table 3

Defence recruitment of general pilots

Year	*Target number*	*Achieved number*
1994–95	78	77
1995–96	100	81
1996–97	71	86
1997–98	82	60
1998–99	91	77
Total	**422**	**381**

Source: Defence records

3.23 Defence has identified the following reasons for the difficulty in meeting pilot recruitment quotas:

- the lack of specific, targeted pilot recruitment campaigns;
- increased competition with other industries as the economy grows;
- the reluctance by applicants to commit to Defence employment for 10 years or more as required by the pilot 'return of service'[16] obligation; and
- strict physical criteria for pilots.[17]

3.24 The above factors have led Defence to conclude that only around five per cent of the target age groups are eligible and even possibly interested in a pilot career in Defence.

3.25 It has proved difficult for Defence to attract a sufficient pool of suitable applicants and then identify potential fast-jet pilots within that pool. A variety of tests are applied to applicants; Air Force is conducting research to identify particular characteristics that suggest ultimate success as a fast-jet pilot.

Air Force research into quality of recruits

3.26 Air Force had been concerned about the fast-jet aptitude of students commencing fast-jet training since at least 1990 when problems emerged in the training of F–111 pilots. In 1994, the pass rate of fast-jet pilots (the ratio of pilots who complete the entire fast-jet training stream) fell to less than 50 per cent. Figure 4 shows fast-jet training pass rates since 1991.

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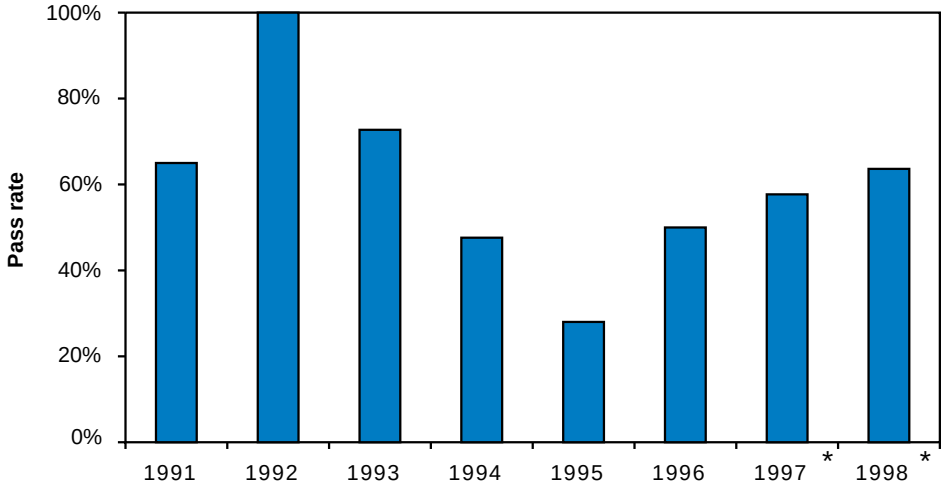
[16] A return of service obligation is a compulsory period of service that is imposed in recognition of the training investment by Air Force in personnel. The major ROSO is that following completion of general flying training. This ROSO is now 10 years. For ADFA graduates the ROSO is effectively over 14 years (taking into account their period at ADFA).

[17] These criteria particularly apply to height, weight and eyesight of applicants.

Figure 4

Proportion of fast-jet trainee pilots who complete training



Source: Defence records

Note: Pass rates for 1997 and 1998 are estimates

3.27 Air Force research found that:

- the decline in pass rates coincided with the move to reliance on the PC9 aircraft as sole initial training platform[18];
- factors that predicted success in initial pilot training do not correlate with success in fast-jet training—the greater the level of previous flying experience, the less successful students were in fast-jet training;
- younger pilots do better than those aged 26 or over at commencement of pilot training; and
- pilots unlikely to succeed in fast-jet training because of particular personal qualities and training problems were allowed to proceed to fast-jet training.

3.28 The research was conducted in 1998 and 1999. The 1998 research concluded that Defence should:

- target a younger population;
- lower the maximum age for pilot trainees;
- allow pilot applicants to apply only once;
- revise the test battery to reintroduce some tests removed previously;
- discourage potential applicants from undertaking flying training prior to joining the RAAF;

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[18] The PC9 is a turbo-propeller aircraft. Previously training was undertaken on a mix of turbo-propeller and jet (Macchi) aircraft.

- make recruiters more cautious in accepting pilot applicants with previous flying experience (as their test scores will be inflated);
- select for fast-jet training only pilots who graduate in the top half of their general pilots course and give preference to those in the top 30 per cent; and
- not allow pilots to commence fast-jet training if they were over the age of 23.

3.29 In 1998 the Deputy Chief of Air Force and the Head of Defence Personnel Executive sponsored a study of fast-jet pilot recruiting and selection. The study report confirmed that pilot selection processes were poorly managed, uncoordinated and, most importantly, failed to produce sufficient numbers of suitable entrants (ie. those who would succeed at fast-jet training). It recommended a range of changes to pilot recruitment and selection including:

- running a specialised marketing campaign to attract a larger pool of applicants;
- changing the selection criteria for pilots;
- centralising flight screening and assessment;
- facilitating inter-service secondment and transfer of junior pilots; and
- investigating changes to training syllabus and staffing.[19]

3.30 It was in the context of this study that debate emerged over the recruiting practices of the Defence Force Recruiting Organisation (DFRO). Each year DFRO, which is a tri-Service organisation, was given recruitment target numbers for pilots. Once these targets were reached, DFRO ceased marketing and recruiting pilots. Air Force's concern was that this resulted in the successful applicants being the 'first 100' rather than the 'best 100' and that greater selectivity should be applied.

3.31 Defence issued revised selection criteria for fast-jet pilots in May 1999. The major changes were as follows:

- a note was inserted into the criteria referring to research showing that older applicants (25 years old or more) did less well in fast-jet training. However, the mandatory ceiling in the criteria remained at 27.5 years at the commencement of training;
- civilian flying qualifications were not to be considered an advantage; and
- a change to the education requirements.

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[19] Final Report of the Aircrew Selection Task (Oct. 1998) p.13.

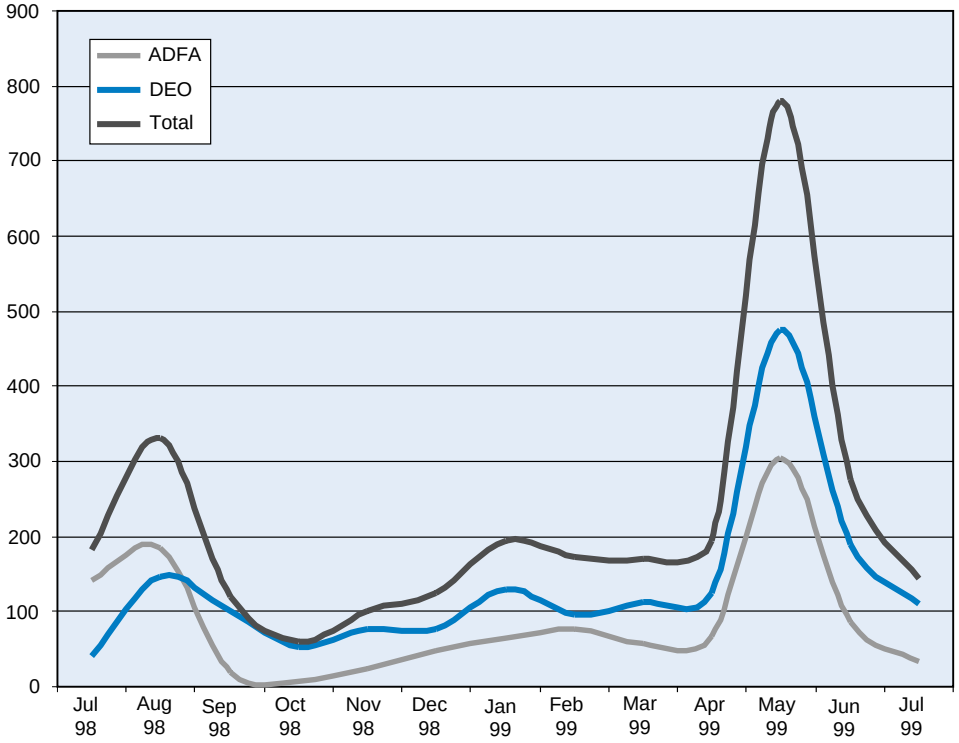
3.32 In 1998 Defence agreed to commit $2.5 million in 1998–99 and $4 million p.a. thereafter to develop and run a pilot recruitment campaign and establish a centralised facility for screening pilot recruits.

Impact of the new recruiting campaign

3.33 The recruiting campaign commenced in May 1999 and comprised television and cinema advertising. The aim of the campaign was to improve the quality of pilot recruits by enlarging the pool of applicants, thus allowing Defence to be more selective in choosing recruits. Defence recruiting effort for pilots is highly seasonal, as recruiting effort is linked to ADFA intakes. Figure 5 shows Air Force pilot enquiries and Figure 6 the number of applications from July 1998 to July 1999. Both figures reflect the recruiting campaigns undertaken in 1998 and 1999 in marked peaks in enquiries and applications.

Figure 5

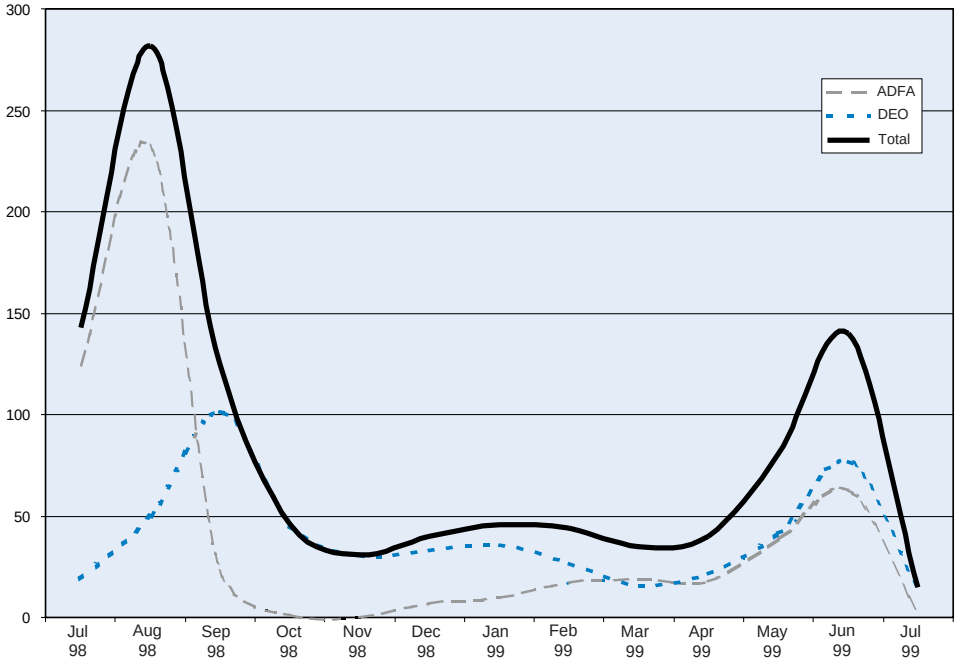
RAAF pilot enquiries received July 1998–July 1999



Source: Defence Force Recruiting Organisation

Figure 6

RAAF pilot applications received July 1998–July 1999



Source: Defence Force Recruiting Organisation

3.34 Despite the broader and more costly 1999 campaign, the overall number of applications received was significantly lower than in the previous year. The reasons for this decline have not yet been fully explored by Defence. The timing of the campaign launches may be a factor. The 1998 campaign was carried out later in the calendar year than the 1999 campaign. The later periods of the year may offer a more responsive applicant base in schools and tertiary institutions. Defence considers that the pilot recruiting campaigns are part of a long-term strategy. Its effect on increasing the potential pool of applicants should be analysed over the long-term.

3.35 Air Force has compared the quality of the 1998 and 1999 applicants by comparing performance in various tests and assessments. The result is shown in Table 4. There was a slight improvement in the distribution of applicants. The proportion of all applicants in the two highest bands—Highly Suitable and B1—rose from 8.7 per cent to 9.7 per cent. However, the improvement was relatively small and Defence is not yet able to conclude that it was a result of the recruiting campaign.

3.36 Even if the change was significant, it will take several years for the improvement in recruits to flow through into better trainees and a higher graduation rate. Of the 53 pilots categorised in the two highest bands in 1999, only around 10 will be selected to enter pilot training at the next basic flying course (four are run each year). Their results at these entry tests indicate that only one or two extra pilots will graduate to convert to fast-jet squadrons as a result of the campaign. Continuous monitoring will be needed to assess the cost-effectiveness of the pilot recruiting campaigns.

Table 4

Air Force recruit pilot suitability ratings: 1998 and 1999 applicants

Suitability	*ADFA*		*Direct Entry*		*Total*	
	1998 applicants % of total	*1999 applicants % of total*	*1998 applicants % of total*	*1999 applicants % of total*	*1998 applicants % of total*	*1999 applicants % of total*
Highly Suitable	3.1	3.0	6.0	8.5	4.5	4.6
B1	3.1	3.3	5.4	9.2	4.2	5.1
B2	10.5	9.6	9.5	16.2	10.0	11.6
B3	26.7	28.3	28.3	28.2	27.5	28.3
Unsuitable	56.6	55.7	50.8	38.0	53.7	50.4
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Department of Defence, *A Comparison of current Pilot Suitability Ratings with those in 1998* (Defence Research Group, Defence Force Psychology Organisation) August 1999.

Recommendation No.6

3.37 The ANAO recommends that Defence systematically monitor the progress of trainee fast-jet pilots recruited in the 1998 and subsequent recruiting campaigns to help identify strategies to improve the cost-effectiveness of fast-jet pilot recruiting and training.

Agency response

3.38 Agreed.

Management of the selection process

3.39 Once a pool of applicants (in effect a short-list) is selected by DFRO, they are passed to the Air Force Career Management Branch of Defence Personnel Executive (DPE) for final assessment. The processes for assessment include flight screening to assess basic flying aptitude at a central facility in Tamworth. After screening is completed each applicant is assessed and given a final mark, termed a 'Selection Index' (SI) measured as a score out of 18. Those with a sufficient SI are offered

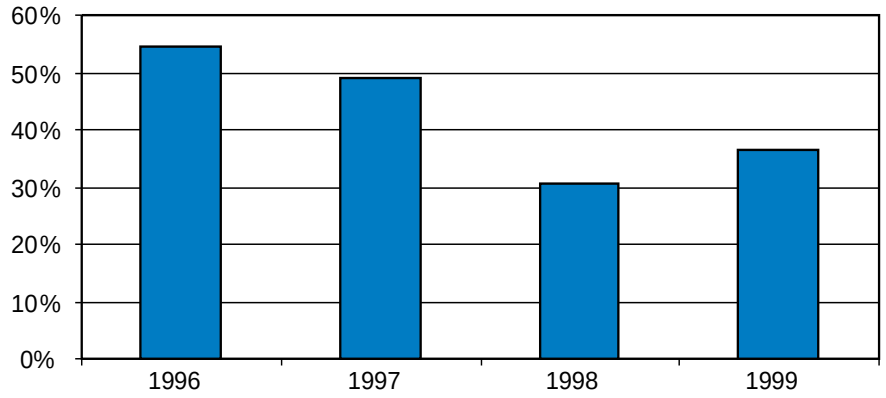
positions to train as pilots. Those with an SI of 15 or higher have the best chance to achieve a high standard in general pilot training. The ANAO found that in recent years:

- direct entry officer (DEO) entrants were required to have an SI of 13 or higher in order to enter training, but ADFA candidates had been accepted with an SI of 12 or less in order to fill places at ADFA; and
- in the 1996 ADFA intake, only 12 of 43 cadets met the (DEO) SI minimum of 13, and the cut-off was lowered to allow a total of 22 cadets to continue (the remainder transferred specialisation or resigned).

3.40 Figure 7 shows the trends in the proportion of ADFA intakes who fall below an SI of 12 (which is itself lower than the DEO cut-off of SI 13).

Figure 7

Proportion of ADFA trainee pilot intakes with selection index (SI) below 12



Source: Defence records

Note: See paragraphs 3.39 and 3.40

3.41 Figure 7 indicates that the proportion of sub-standard applicants has declined since 1996. The trainees enter No.2 Flying Training School 3 years after entry to ADFA. The 1996 intake entered 2FTS in 1999 and the 1997 intake will enter in 2000. As a result, the ADFA 2FTS training courses starting in 2000 would have over half of the participants below the DEO entry standard. Air Force Career Management considers that comparatively few may perform well enough at 2FTS to be suitable to train for fast jets. Normally 2FTS courses consist solely of either ADFA graduates or DEO entrants. However, in response to the potential performance problems mentioned above, the ADFA graduates are to spread across several courses intermingled with DEO trainees, thereby diluting the impact on pass rates of individual courses.

3.42 Air Force has since changed the recruiting procedures by requiring ADFA and DEO applicants to meet the same Selection Index level. However, it has decided to offer all ADFA cadet pilots currently completing their studies an opportunity to enter pilot training, although some are unlikely to pass. There are significant resource costs to this decision, and it may delay the restoration of pilot numbers in fast-jet squadrons by reducing the overall quality of the trainee pool. The ANAO recognises that Defence has made a substantial investment in and commitment to ADFA cadets. Given the priority of restoring numbers of fast-jet pilots Air Force could take stronger action to ensure that the quality of pilot trainees is as high as possible. This may require precluding cadets with a low SI from entering pilot training and instead offering them non-flying positions at the completion of their studies.

3.43 This would allow Air Force to fill vacancies so created on pilot courses with DEO entrants who meet the minimum SI. The ANAO also notes suggestions made by pilots in the performance audit of retention of military personnel[20] that tactical fighter pilots undertake their university degree after two (or more) flight postings, which would allow them to fly aircraft for a greater proportion of their peak flying capability period. This would also avoid a large up-front investment in personnel who may not succeed in the pilot training system, and would help to shorten the period required for Air Force to increase the number of *Hornet* pilots, by reducing the time taken for pilot trainees to be brought to operational squadrons. Air Force might consider the suggestion in the development of its strategies on increasing fast-jet pilot numbers.

Recommendation No.7

3.44 The ANAO recommends that Air Force endeavour to raise the pass rates in fast-jet pilot training by:

(a) identifying early Australian Defence Force Academy (ADFA) pilot applicants who do not meet the flying aptitude standards and direct them to other careers;

(b) allowing ADFA cadets to commence pilot training only if they meet the minimum flying aptitude standards; and

(c) making up the shortfall on pilot training courses due to any reduced ADFA component with non-ADFA recruits.

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[20] See ANAO Audit Report No.35 1999–2000 *Retention of Military Personnel*, paragraph 2.27.

Agency response

3.45 Agreed. The issues identified by the ANAO have been addressed, however, the performance of these measures will continue to be monitored. The same standard will continue to apply to both ADFA and Direct Entry Officers and where a shortfall in suitable ADFA cadets exists, the difference will be made up with Direct Entry applicants.

Hornet pilot training

The training system

3.46 As indicated in Figure 3, the training system for fast-jet pilots is lengthy and complex. It can take between two and a half and three years to complete training to a point where pilots can be selected to enter an operational squadron. After recruitment and initial ADFA or RAAF College training, recruits move through:

- basic flying training at the Basic Flying School, Tamworth, for six months;
- advanced flying training at No.2 Flying Training School (2FTS) at RAAF Base Pearce, Western Australia for nine months. Once having completed this training a student is granted 'Wings' and moves on to specialised training;
- Lead-in Fighter conversion training at 79 Squadron at RAAF Base Pearce for three months on *Macchi* aircraft (soon to be the *Hawk*);
- Introductory Fighter Combat training at 76 Squadron at RAAF Base Williamtown for three months on *Macchi* (soon to be the *Hawk*);
- conversion to the *Hornet* at 2 Operational Conversion Unit (2OCU) at RAAF Base Williamtown for six months; and
- entry to an operational *Hornet* Squadron at RAAF Base Williamtown or RAAF Base Tindal.

3.47 Responsibility for training fast-jet pilots is shared between two major entities—Air Force Training Command is responsible for basic flying up to exit from 2FTS and granting of 'Wings', and TFG is responsible for training on all jets from Macchi conversion through to entry to operational squadrons. F–111 pilots diverge after completing the Introductory Fighter Course at 76 Squadron and undertake operational conversion in an active F–111 squadron. *Hornet* pilots move to 2OCU for their conversion training.

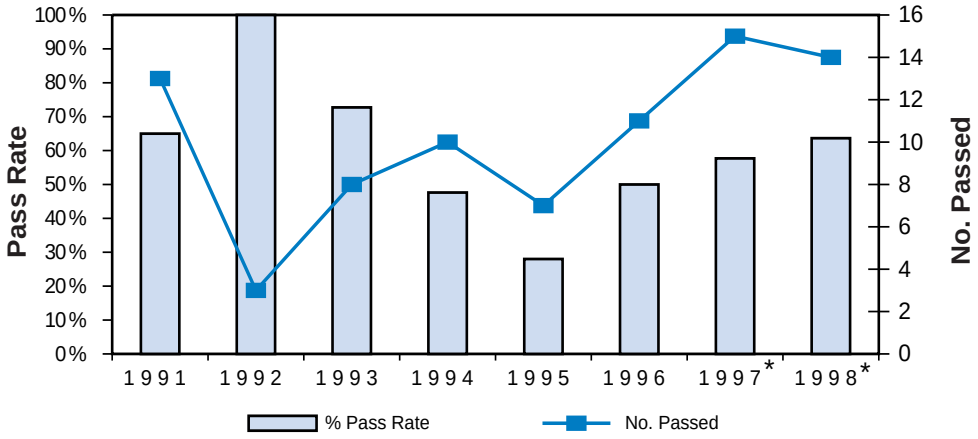
3.48 Once *Hornet* pilots commence operational flying, their training continues, first in an operational squadron and then, for some of them, in Fighter Combat Instruction at 2OCU, followed by further training to become flight instructors.

Issues in training

3.49 The major challenge faced by Air Force has been to graduate enough fast-jet pilots to 'restock' the *Hornet* squadrons. As mentioned above, Air Force took steps in 1994 to do this, mainly by increasing the number of pilots going from 2FTS into the fast-jet stream. This met with only limited success at significant cost. Figure 8 shows the proportion and number of trainee pilots who pass the Air Force fast-jet training course each year. The figures for 1997 and 1998 are only partially available. They assume that all remaining students will graduate, which is an optimistic assumption.

Figure 8

Proportion and number of trainee pilots who pass Air Force's fast-jet training course



Source: Defence records

* see paragraph 3.49.

3.50 Figure 8 shows that the pass rates in recent years have been rising, although they have been significantly lower than those achieved in the early 1990s. One adverse effect of the low pass rates is that pilots who are unsuccessful in fast-jet training are then posted to other squadrons. This has contributed to an excess of pilots in areas such as maritime reconnaissance.

3.51 The ANAO was unable to obtain pass rate data specific to *Hornet* pilots for training prior to the *Hornet* Operational Conversion Unit (2 OCU). Data for graduation from 2 OCU is shown at Table 5. Of note in this table is the variation in pass rates and that, in the five years since 1995, 50 pilots have graduated and entered operational *Hornet* squadrons, an average of 10 per year. Current Air Force planning assumes an input of 12 pilots per year.

Table 5

Number of pilots passing and pass rates at *Hornet* operational conversion training

*Course**	*Students entering**	*Numbers Passed*	*Pass Rate %*
1/1995	8	8	100
2/1995	8	7	88
1/1996	7	6	86
2/1996	6	4	67
1/1997	9	6	67
1/1998	8	6	75
2/1998	10	5	50
1/1999	9	8	89
Total	**65**	**50**	**77**

Source: Defence records

NB: 2OCU *Hornet* conversion courses are held three times every two years, hence there is no 2/97 and 2/99 course.

* Some courses include foreign pilots. Numbers in this table only include RAAF pilots.

Defence reviews of pilot training

3.52 Since 1995 Air Force has conducted several reviews of the general pilot training system. The broad themes of the review findings relevant to fast-jet pilots are discussed below.

- **Long-term training requirement**. The general pilot training system (ie. 2FTS) needs to produce around 20 fast-jet suitable pilots per year, and at least 12 of these need to pass fast-jet training to maintain the *Hornet* and F–111 squadrons.
- **Mix of ADFA and direct entry recruits**. Air Force has adopted a practice of a 50:50 mix between the two recruiting streams in order to ensure a strong share of ADFA graduates while taking advantage of the shorter lead-time to operational service for direct entry trainees.
- **The need for better data and workforce planning**. A continuing theme in the reviews has been the need for better data on pilots—their characteristics, path through the training system and success rates. The ANAO found evidence of differing accounts of even simple measures such as the number graduating from 2FTS each year. The lack of reliable planning information, and in particular the failure to integrate such information into a workforce planning and forecasting system, is a major problem.
- **The training syllabus**. A possible change being considered is pilot 'streaming' to defer granting 'Wings' to a pilot until after fast-jet aptitude has been shown. (Paragraph 3.43 supports this.)

3.53 Given the fine balance between supply and demand for fast-jet pilots, Air Force needs to be able to predict likely training outcomes as early as possible. The ANAO acknowledges that projecting the results for one sub-set of pilot trainees for fast-jet flying would be difficult, but 'best' estimates and statistical modelling could help guide useful workforce planning. The lack of such forecasts is symptomatic of an uncoordinated approach to pilot workforce planning.

3.54 Training fast-jet pilots is expensive. It is also difficult to predict precise training outcomes. However, the ANAO considers that the fast-jet pilot training system could be made more predictable and stable with improvements to data management and overall organisation. The training system has undergone many changes in recent years, and is about to undergo further changes with the introduction of the *Hawk* lead-in fighter aircraft and possibly streaming of fast-jet pilots. It will be important for Air Force to manage these changes without reducing throughput of pilots. There is generally good communication between elements of the training system at the staff level, but higher-level structures could foster better outcomes through a more integrated approach.

Retention of fast-jet pilots

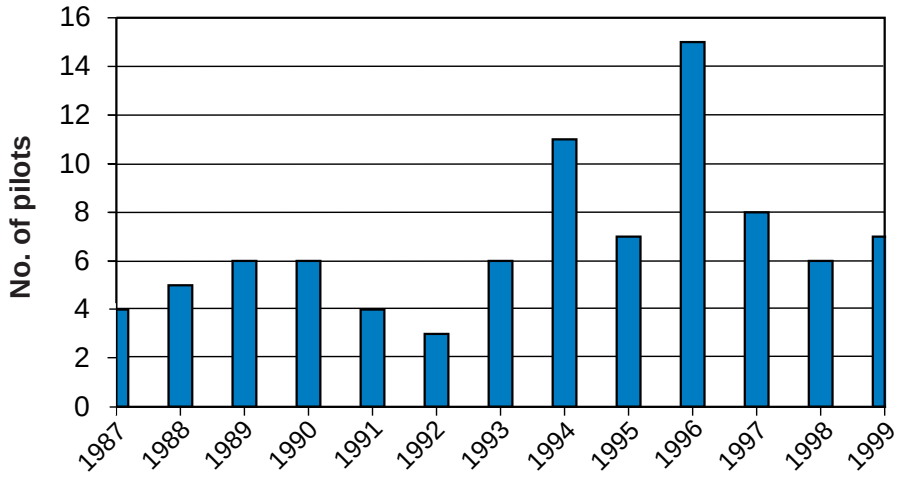
Retention trends and workforce planning

3.55 It was repeatedly stated in Defence and Air Force documents that a major cause of the shortage of fast-jet pilots was high wastage rates. In 1994, for example, TFG lost over 20 per cent of its pilots. However, it was difficult for the ANAO to obtain continuous figures on *Hornet* pilot wastage rates. This was mainly because Defence has not identified fast-jet pilots specifically in its personnel management system. It was relatively straightforward to identify pilots who resigned from fast-jet squadrons, but difficult to identify fast-jet pilots who left from other parts of Defence. Figure 9 summarises available data on wastage[21] of *Hornet* pilots from TFG squadrons.

[21] Resignations, transfers and deaths.

Figure 9

Wastage of Hornet pilots from TFG squadrons



Source: Defence records.

Figures include resignations, transfers and deaths.

3.56 The variability in wastage rates highlights a major difficulty faced by Air Force when planning the fast-jet pilot workforce. It is impossible to produce large numbers of new pilots quickly to replace those lost in a year of high wastage. Hence there is an emphasis on producing a steady number, sufficient, over time, to replace those lost. Numbers lost since 1997 are considered moderate.

3.57 A pilot's initial return of service obligation (ROSO—see paragraph 3.23) of 10 years from Wings (ie. graduation from 2FTS) is a major influence on resignations and overall workforce numbers. As fast-jet pilots spend the first year after Wings undertaking conversion and other training, this effectively gives nine years flying before their ROSO expires. The ROSO was increased from 8 to 10 years in 1991. The resignation rates of fast-jet pilots in the first few years after ROSO are quite high. One benefit of the ROSO is that it gives stability to junior pilot numbers (Flight Lieutenant and below). However, the high wastage post-ROSO makes it difficult to achieve the Air Force's global target for fast-jet pilots, which requires larger numbers of senior (Wing Commander and above) pilots.

Drivers of wastage

3.58 The major drivers of wastage are similar to those for most Defence military personnel and are summarised below. This list is partly taken from a series of pilot focus groups conducted as part of an Air Force study of the impact of the current Pilot Retention Bonus.

- **The posting cycle.** Generally, Air Force officers can expect to be posted (transferred) every 2–3 years, often to a different unit, location and sometimes role. Postings to training, desk or policy positions are less attractive to pilots and tend to prompt them to leave the Air Force.
- **Career paths**. Fast-jet pilots generally want to maximise their flying time, and are reluctant to take up a promotion if it requires or implies less flying.
- **Attractiveness of other careers and pay**. The Air Force pay system has only limited flexibility to respond to market pressures that affect specific types of personnel, such as fast-jet pilots.
- **Perceptions of poor career management**. Pilots can express preferences for particular postings but not all preferences can be satisfied. Pilots felt the career management system did not focus sufficiently on their development needs.
- **Return of service obligations (ROSO)**. ROSO is applied when pilots convert to fast-jets from another stream, or undertake other training.
- **Limited flying hours**. ANAO found evidence that the current restrictions on TFG flying hours are a factor in pilot wastage. An experienced pilot will fly an average of 175 hours per year, or a little under four hours per week.

3.59 Air Force is reviewing its career management system in the light of these concerns. Resolution of some issues (such as increasing the number of flying hours) has significant resource and operational implications.

Air Force action—the Pilot Retention Bonus

3.60 The current Pilot Retention Bonus scheme (PRB) was introduced in 1996 in response to high wastage rates in the pilot ranks (including fast-jet pilots) and has cost $32 million since inception.[22] It replaced an earlier bonus scheme that operated from 1988 to 1994. The scheme is available to experienced pilots who have completed their ROSO or are within two years of completing it. The ANAO notes that in some Air

[22] Advice from Defence Personnel Executive.

Force Groups there is an excess of pilots, many of whom are eligible for the PRB. The PRB can be repaid and has been characterised as a 'free-loan' that pilots can take up, invest and refund (the remaining portion of the bonus) at little net cost to the pilot.

3.61 The PRB was to expire in December 1999. It is continuing pending decisions on the development of a replacement scheme. The Director of Career Management (Air Force) within the Defence Personnel Executive commissioned an investigation into the PRB and has stated that *'...preliminary findings by my staff indicate that the PRB in its current form is not an effective retention tool.'*[23] The PRB is a tri-Service initiative, and effecting any changes would require substantial effort.

3.62 Air Force Career Management is investigating alternatives to the PRB. A model under consideration is a 'commitment bonus' that would attempt to encourage pilots to stay longer by paying the same amounts as the PRB provides, but with payment at the end, rather than at the commencement, of a contracted period.

Other options to improve Hornet pilot retention

3.63 One option discussed in Defence, but not taken up, is the use of individual agreements with fast-jet pilots. Such agreements would allow additional remuneration to pilots as well as facilitating additional requirements, such as to serve in particular positions for agreed periods. They could have the advantage of allowing payments to be targeted to particular pilots (rather than broad categories), limited to specific groups where there are shortages of pilots and allow greater recognition of individual circumstances. The concept of such agreements poses challenges for the traditional remuneration processes in the three Services—and this appears to be the reason they have not been taken up. However, when faced with shortages of particular personnel caused by the employment market, the Services should be able to consider such individual approaches or treating particular segments of the workforce as a specialist employment stream.

3.64 Air Force also has the *Aircrew Specialisation Option,* which is a scheme for pilots to forgo promotion in order to continue operational flying. The scheme has had low take-up and is considered by pilots to offer few advantages. Air Force has recently changed the criteria for the scheme and advised that take-up rates are improving.

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[23] Minute from DGCM(AF) to DGPPEC of 30 June 1999 *Proposed replacement of pilot retention bonus (PRB).*

3.65 High wastage rates are the major cause of the fast-jet pilot shortage. Defence has introduced some initiatives to try to control wastage but they have not been effective. Until recently, Defence's rigid personnel system has provided little scope to respond flexibly to market pressures. To try to retain fast-jet pilots who would otherwise leave, Defence could seek pilots' views on the PRB as part of a broader review of the Bonus. Consideration should also be given to using individual agreements or particular arrangements for jet-pilots as a specialist employment stream. Individual agreements could be negotiated between the pilots, their Commanding Officer and Air Force Career Management and could involve greater remuneration in exchange for service commitments and also subsume the Aircrew Specialisation Scheme.

Recommendation No.8

3.66 The ANAO recommends that Defence seek to retain a greater proportion of its fast-jet pilots by:

(a) conducting a full review of the Pilot Retention Bonus scheme, possibly including a survey of past and current pilots, to ascertain how to make such a scheme more effective;

(b) targeting any future bonus to pilots who have completed their Return of Service Obligation, whose retention is operationally necessary and who will contribute to filling an identified shortage; and

(c) considering the use of individual agreements or other special arrangements to cover pay and conditions of fast-jet pilots.

Agency response

3.67 Agreed.

Conclusion

3.68 Increasing fast-jet pilots is major workforce priority for Defence. Defence has taken a range of measures to increase fast-jet pilot numbers, but:

- the measures were not consistently planned, implemented or coordinated either by a discrete functional unit or other formal structures but instead evolved through various independent processes; and
- Air Force has no comprehensive workforce plan or planning model of the fast-jet pilots and no formal coordinated strategy to address the fast-jet pilot shortage. A soundly-based, on-going planning model would allow the testing of various parameters such as recruitment targets, training pass rates and retention variations including the assessment of their cost-effectiveness.

3.69 There are also questions about the degree of severity of the shortage. TFG Squadron establishment has changed over time, as have the operational requirements of TFG (see Chapter 2). Refining the operational expectations of TFG is an essential prerequisite to setting a goal for fast-jet pilot numbers.

3.70 Achieving increases in the numbers of fast-jet pilots depends largely on a combination of managing retention rates and increasing pilot trainee numbers and their pass rates. Air Force has taken action to address the fast-jet pilot shortage in a number of areas. However, to help ensure a worthwhile return on the substantial investment in fast-jet pilot training (about $9 million per pilot), Air Force should give priority to the retention of existing fast-jet pilots and apply greater rigour in investigating the capability of the training system to produce the required number of pilots.

3.71 Effective management of the pilot workforce is important both because of the impact on capability and the high training costs. The Government, Defence and Air Force have identified the goal of fully staffing *Hornet* squadrons as a major priority. Achieving this goal should proceed on the basis of:

- robust and firm planning targets for the desired number of pilots;
- appropriate recruitment targets and selection processes;
- research on workforce planning and modelling; and
- agreement on key result areas and measures for recruitment, selection, training and retention.

These need to be brought together in a TFG workforce plan that makes clear who is responsible for implementing the various elements of the plan. Overall responsibility for implementing, monitoring and evaluating actions contained in the plan should be allocated to a discrete functional unit.

Recommendation No.9

3.72 The ANAO recommends that Defence coordinate its efforts to acquire and retain sufficient numbers of pilots for the Tactical Fighter Group (TFG) by formulating and implementing a TFG pilot workforce plan to:

(a) identify and approve authoritative figures for the required *Hornet* pilot numbers across the Defence organisation;

(b) set appropriate recruitment targets and selection processes;

(c) guide research on issues affecting the pilot workforce;

(d) facilitate a greater workforce planning and modelling capacity in relation to fast-jet pilots;

(e) identify key result areas and suitable measures for fast-jet pilot recruitment, selection, training and retention; and

(f) allocate responsibility for implementing, monitoring and evaluating actions under the workforce plan to a discrete functional unit within Defence.

Agency response

3.73 Agreed.

Hornet head-on view—photo courtesy of the Royal Australian Air Force

4. Logistic Support for Tactical Fighter Operations

This chapter reviews the management by Defence of logistic support for TFOs, including the identification of logistic shortfalls, trends in logistic costs, management of inventory and maintenance systems, the expected life of the Hornet aircraft and the disposition of the Hornet fleet.

Logistics shortfalls

4.1 Military aircraft are heavily dependent on logistics, including maintenance (servicing and repairs) and the supply of fuel, parts and armaments, to sustain operations. Logistic support has to be commensurate with the desired level of activity of the aircraft fleet. This has been recognised by Air Force for many years.

4.2 Air Force advised the ANAO that, after introduction of the *Hornets* into service and during the early years of operation, logistic resources were provided by the capital acquisition project office and were relatively plentiful. When responsibility for logistics was transferred to Air Force, logistic costs were more readily identified and logistic allocations had to be bid for as part of annual budgets. Air Force also notes that the starting point of the ANAO analysis of logistic expenditure on the *Hornets* was around eight years after introduction of the majority of the aircraft fleet when the 'honeymoon' period of reduced support costs due to newness of the equipment ceased. Since 1994, reporting in Air Force on the operational preparedness of the tactical fighters persistently identified logistic shortfalls against the criteria for operational preparedness: OLOC and MLOC.[24] Air Force concern about these shortfalls is reflected in bids for increased logistic funding for the *Hornets* since 1994.

4.3 In that year, planning was undertaken for a TFG pilot 'get well' proposal to increase the rate of effort (annual hours of flying) of the *Hornet* fleet from the 1993–94 base of 11 800 to 12 165 in 1994–95, 12 660 in 1995–96 and 13 000 in each subsequent year. The additional logistic resources (equipment and spares, and repair and overhaul) required to meet this increased rate of effort (excluding fuel and assuming constant usage of armaments) were estimated to be $1 million in 1994–95, $4 million in 1995–96 and $4.25 million in each subsequent year.

[24] These terms are defined at paragraph 2.10.

4.4 In 1994 Air Force concern about the inability to meet its interpretation of the requirements of CPD[25] led to a thorough reassessment of logistic support requirements and the necessary funding by Air Force and Support Command Australia. In 1995 Air Force developed the 'Baseline Project' to give a better estimate of logistic costs. Its major shortcoming lay in projecting logistic costs for one year only.

4.5 Developed in 1997, 'Baseline 2' could be applied to each year of the Five Year Defence Program by creating a costed listing of logistic products and services necessary to support a given rate of effort ('Baseline') and non-recurring items (Specific Purpose Requirements).

Trends in logistic expenditure

4.6 Table 6 shows logistic expenditure by Defence for the *Hornets* from 1994–95 to 1998–99 and the allocation for 1999–2000. The amounts are expressed in constant prices to show changes in 'real' terms. The table shows that logistics expenditure for the *Hornets* increased substantially in 1995–96, 1996–97 and 1997–98, with abatement of the rate of increase in the next year. (See also paragraph 4.16.)

Table 6
Hornet annual logistic expenditure

Expenditure Item	*$m (in 1998–99 prices)*[1]					
	1994–95	*1995–96*	*1996–97*	*1997–98*	*1998–99*	*1999–00*[2]
Spares Replacement Expenditure	28.275	31.071	48.488	49.349	49.949	44.323
Repair and Overhaul	17.738	22.276	22.082	25.968	29.806	29.665
Fuel Expenditure	19.566	21.824	21.778	18.988	16.256	19.682
Hornet Logistics Baseline	**65.579**	**75.171**	**92.348**	**94.305**	**96.011**	**93.670**
*Redirected Admin Savings[5]	-	-	-	15.100	3.970	-
*Logistics Funding Shortfall[3,5]	-	-	-	-	20.000	29.000
F404 Engines[4]	-	-	-	-	3.000	-
Total Logistics Expenditure	**65.579**	**75.171**	**92.348**	**109.405**	**122.981**	**122.670**
Real Change From 1994–95	**-**	**+14.6%**	**+40.8%**	**+66.8%**	**+87.5%**	**+87.1%**
Real Change From Year to Year		**+14.6%**	**+22.9%**	**+18.5%**	**+12.4%**	**-0.3%**

Source: Prepared by the ANAO from information provided by Defence

Notes:

1. Excludes expenditure on Defence logistic support personnel and capital equipment projects.
2. Current Additional Estimates allocation.
3. Allocated in 1998–2002 and 1999–2003 FYDP Reviews and funded from DRP reinvestment funds.
4. Funded by transfer of funds from Air Force to Support Command Australia (Air Force). Total expenditure on re-lifing of the F404 engines is estimated by Defence to be in the order of $80 million since 1996.
5. Information on the application of these items was unavailable at the time of preparing this audit report.

[25] See paragraph 2.13.

Trends in *Hornet* rate of effort

4.7 Table 7 shows the annual flying hours by the *Hornet* fleet achieved from 1994–95 to 1998–99 and planned for 1999–2000. The *Hornet* rate of effort is planned to plateau at 13 000 flying hours in 1999–2000. Tables 6 and 7 show that logistic expenditure on the *Hornets* this year (1999–2000) is expected to be 87.1 per cent more in real terms than in 1994–95, but flying hours are expected to be only seven per cent more. This is reflected in an increase in *Hornet* logistic expenditure per flying hour over that time period, as shown in Figure 10.

Table 7

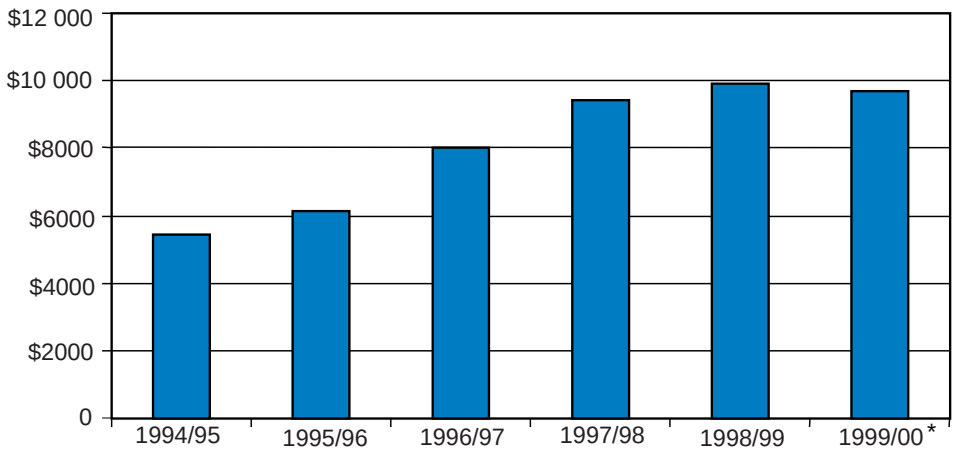
***Hornet* Rate of effort (annual flying hours)**

Year	*1994–95*	*1995–96*	*1996–97*	*1997–98*	*1998–99*	*1999–2000*
Flying hrs.	12 147	12 423	11 747	12 008	12 457	13 000 (planned)
Change from 1994–95		+ 2.3 %	- 3.4 %	- 1.1 %	+ 2.5 %	+ 7.0 %
Change from year to year		+ 2.3 %	- 3.4%	+ 2.2 %	+ 3.7%	+ 4.4 %

Source: Compiled by the ANAO from information in Defence Annual Reports and Portfolio Budget Statements 1999–2000—Defence Portfolio

Figure 10

Hornet Logistic Expenditure[#] per Flying Hour



Source: Derived by the ANAO from Tables 6 and 7.

[#]Expenditure in 1998–99 prices

*estimate based on planned hours of flying

4.8 Recorded logistic expenditure on the *Hornets* is expected to fall from $122.7 million in 1999–2000 to:

- $112.4 million (a reduction of about eight per cent) in 2000–01;
- $107 million in 2001–02; and
- $100 million in 2002–03.

Cost trends

4.9 Air Force stated that, from 1993–94, the logistics budget came under considerable pressure owing to the convergence of:

- the rising cost of maintaining and sustaining increasingly complex new and replacement equipment;
- the rising cost of maintaining and sustaining aging aircraft; and
- the increased pressure on fleet availability rates associated with capital upgrade projects that take aircraft off-line for endorsed capability upgrades.

4.10 The effects of the above factors on logistic costs are difficult to quantify. Defence considers that there are cost increases associated with aircraft aging and fatigue repair of about four percent per annum. This is in line with cost trends identified by the US Navy's Naval Aviation Maintenance Office for a range of aircraft, over a ten-year period. However, over the last five years, the logistic expenditure for the Air Force *Hornets* has risen by a much higher percentage. Air Force stated that about half of the increased expenditure was due to the engine recovery effort and that increases were also due to a maturing of the deeper maintenance requirements of repairable items. The ANAO considers that Defence should analyse the logistic costs and identify major and persistent factors underlying the rise in logistic expenditure.

Effect of increased logistic funding

4.11 A shortage of serviceable engines for the *Hornets* reached critical levels after the manufacturer reduced the expected life of engine components in September 1996. An engine recovery plan commenced in July 1997. Although specific allocations were made to remedy the F–404 engine problem, the actual amounts spent cannot be separated readily from other logistic expenditure. Informal estimates by Defence put the expenditure for the F–404 engines at $80 million since 1996. The number of serviceable engines reached acceptable levels by mid-1999, which is reflected in a drop in the incidence of F–404 engine cannibalisation in the order of 85 per cent (from a peak of 29 a quarter to 5 a quarter in mid-1999).

4.12 The ANAO investigated whether the rise in *Hornet* logistic expenditure resulted in specific logistic problems actually being resolved over time. Except for the F–404 engines, no direct link between increased funding and the resolution of specific logistic problems could be established. In a case study, the ANAO found that out of eight significant logistic problems identified by TFLMS in mid-1994, six had been resolved completely or largely at the time of the audit fieldwork. Of the remaining two, one (nose wheel shimmy) requires significant resources to fix properly; the other (deterioration of windscreens) was awaiting the results of technical evaluation.

4.13 Although some significant logistic problems have been largely resolved over time, their resolution (excepting the F–404 engines) cannot be directly linked to the increases in logistic expenditure. ANAO notes that the long-term trend (taken from March 1994 to the end of 1999) for the number of serviceable aircraft has remained virtually constant.

Trends in sourcing of logistic support

Local and overseas expenditure

4.14 Table 8 compares local and overseas logistic expenditure from 1994–95 to 1998–99 by the Tactical Fighter Logistics Management Squadron[26] (the bulk of total logistic expenditure in Table 6). There has been little increase in local expenditure but overseas expenditure has increased substantially. No thorough analysis of the underlying causes for this trend had been undertaken by Defence.

Table 8

Local and overseas expenditure[#] by Tactical Fighter Logistic Management Squadron (TFLMS).

Year	*1994–95 $m*	*1995–96 $m*	*1996–97 $m*	*1997–98 $m*	*1998–99 $m*
Local expenditure	17.974	8.455	13.456	14.077	19.226
Overseas expenditure*	29.467	43.266	55.150	74.799	92.165
Total expenditure	47.441	51.721	68.606	88.876	111.391
Overseas expenditure as % of total expenditure	**62.1%**	**83.7%**	**80.4%**	**84.2%**	**82.7%**

Source: Compiled by the ANAO from information provided by Defence

[#]Actual expenditure unadjusted for price and exchange movements

* includes purchases under the US Foreign Military Sales program

[26] The Tactical Fighter Logistics Management Squadron (TFLMS) is part of Support Command Australia (Air Force). It is located at RAAF Williamtown and provides the Tactical Fighter Group with logistic support services, including technical advice, managing aircraft systems, contracting and purchasing, and engineering support.

4.15 The sourcing of Defence logistic support is important in terms of cost-control, reliability of supply, lead-times, self-reliance, Australian industry development and Australia's balance of payments. Knowing the reasons for changes in sourcing is a step towards understanding the cost drivers of the annual logistic expenditure for the *Hornets*, which now exceeds $100 million. It would also help in predicting future expenditure and controlling it.

Need to manage all logistics costs

4.16 The total cost per flying hour of the *Hornet*, estimated by Air Force for cost-recovery purposes, is $51 631.[27] For another air force that operates *Hornets*, the cost per flying hour is of the order of $21 000 (total financial costs of the capability in 1998, divided by the number of flying hours, with no depreciation and capital use charges). Comparison with that air force's aircraft is difficult unless all relevant parameters are identical. That air force's aircraft were of a different model, configuration and size, and were relatively new. In addition, the geography, demographics and infrastructure were different to Australia's. Nevertheless, the ANAO considers that the magnitude of difference between the two costs indicates that Air Force would benefit from benchmarking its *Hornet* costs against those of other operators of *Hornet* or similar fast-jets. This should of course take account of differences between the fleets but would help to identify better practices and opportunities to contain costs.

4.17 Expenditures shown in Table 6 and Figure 10 do not include the cost of Air Force personnel contributing to maintenance and repair tasks in TFG. There were 1009 such personnel in July 1999. These personnel fall largely under the Air Combat Forces (part of Group 4 in the Defence Group structure) and Support Command Australia (Air Force) (Group 6). These costs (although included in Table 1) are not treated as part of the logistic support system costs. The ANAO estimates that the cost of this workforce amounts to approximately $75 million a year.[28] This is a substantial addition to the recorded expenditure in Table 6. The ANAO considers that, bringing together all logistic costs into an integrated management framework, would facilitate comprehensive monitoring and holistic decision-making for the totality of logistic support of TFOs.

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[27] Department of Defence, Hornet Weapon System Plan, September 1999, Hornet Flying Hour Cost Recovery Rate.

[28] Based on Department of Defence Ready Reckoner of Personnel Costs and Related Overheads, Full Recovery Costs of $75 000 a year average cost per staff.

4.18 A Program Evaluation report on the Air Force Logistics Support Sub-Program commented that:

> *Efficient and cost-effective management of an integrated logistic system can only be achieved within a framework of clearly defined responsibility/accountability parameters, reinforced by effective performance measures and cost attribution. In this context, the separating out, and different treatment, of a major element—personnel—from materiel and other logistic support only serves to confuse and complicate the picture.*[29]

Responding to ANAO's query about action taken on that evaluation report comment, Defence advised that a review of Support Command began in January 2000 to assess the progress of current reforms and determine the way ahead. The scope of the review has been expanded to include the potential amalgamation of Support Command and the Defence Acquisition Organisation. Defence expects the outcome of this review by 30 June 2000.

Seeking best value options for logistic expenditure

4.19 The ANAO notes that an integrated and transparent logistic framework, including personnel, is all the more important in the light of the Government's policy for Defence to *'be totally dependent on industry for future support'*.[30] An effective framework should be established by Defence to help evaluate the total benefits and costs of different options to provide logistic support. In particular, there needs to be transparency to assess cost-effectiveness in any outsourcing of logistic support and the personnel cost savings achieved and sustained as a result. Air Force commented that, because the *Hornet* had a core war-fighting role, the degree of industry involvement was necessarily limited by policy and legal requirements and obligations. Where appropriate, industry involvement had been pursued. This involvement was under constant review.

4.20 To ascertain and give effect to the optimal logistic support solution, the totality of savings and costs to the Commonwealth need to be transparent to, and be taken into account by, Defence decision-makers. This is especially important for TFG as a major Defence capability. Such a framework would assist in Air Force containing the long-term costs of logistic support to the TFG. At present, logistics costs appear to be understated. The present arrangements seem inconsistent with the need to

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[29] Inspector-General, Department of Defence, Air Force Logistics Sub-Program, Program Evaluation, January 1998, paragraph 329.

[30] Senator the Hon Eric Abetz, Parliamentary Secretary to the Minister for Defence, Media Release PARLSEC 349/99 of 1 December 1999, *Defence Parliamentary Secretary addresses Australian Defence Industry Network.*

manage in a way that promotes efficient and effective use of Commonwealth resources.[31] Recommendation No.10 is directed to addressing these issues.

Management of inventory and maintenance systems

Standard Defence Supply System

4.21 Efficient logistics also depend on management information systems that provide accurate information on what equipment and items are held, where they are held and what their values are. Defence relies heavily on the Standard Defence Supply System (SDSS) to provide that information. An earlier ANAO report[32] commented that there were deficiencies in SDSS, including data inaccuracies, and that it was not user-friendly. The Program Evaluation report mentioned above also drew attention to these deficiencies. Both reports made recommendations to improve data integrity and functionality of SDSS.

4.22 Fieldwork in the audit of Tactical Fighter Operations and recent work by the Defence Management Audit Branch showed that these problems persist. Defence advised that a number of initiatives have been taken to resolve problems related to SDSS. It is not known when these initiatives are to be completed.

Computer-Aided Maintenance Management

4.23 The Computer-Aided Maintenance Management (CAMM) system was intended to record aircraft operations and serviceability status and to forecast maintenance needs. It entered service in 1979. CAMM was complemented by the Maintenance Activity Analysis and Reporting System (MAARS), which also entered service in 1979 as a database for recording aircraft and components maintenance and repair history.

4.24 CAMM2 is to replace both CAMM and MAARS. Defence has advised that CAMM2 was first trialed with the Caribou aircraft (at 38 Squadron) in 1994, then on the *Macchi* aircraft in TFG and finally on the *Hornets* in 1999. The ANAO understands that CAMM2 was not able to cope with the complexity and volume of the requirements of logistic management of the *Hornets*. At times, the system is unstable. As a result,

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[31] Section 44 of the *Financial Management and Accountability Act 1997* requires the Chief Executive of an agency to manage in a way that promotes efficient, effective and ethical use of Commonwealth resources.

[32] ANAO Audit Report No.5 1997–98 *Performance Management of Defence Inventory* (October 1997).

flying operations have at times been severely affected. Remedial work has been started and Defence has advised that payments of the order of $2.8 million to the contractor have been withheld, pending rectification of problems. At the time of audit fieldwork, TFG's operational units had to continue maintaining a manual system to ensure that aircraft could be released for flights when required.

Hornet life of type

4.25 When the *Hornets* were introduced into service in 1985, the planned life of type (LOT) of the Air Force *Hornet* aircraft was 2010–2015. Air Force took effective action when monitoring of aircraft fatigue showed that, on the severe usage patterns of that time, the aircraft would not last until the planned withdrawal dates. Fatigue management initiatives were put in place in 1987. With refinements in the monitoring of airframe fatigue in the fleet through the Airframe Service Life Monitoring Program and strict fatigue management practices, the LOT of the *Hornet* fleet in 1994 was put at around 2023, with an assumed rate of effort of the whole fleet of 12 600 flying hours a year.

4.26 Air Force, with the assistance of DSTO and international collaboration, continues to monitor and test fatigue damage to the *Hornets*. Latest assessments point to a likely withdrawal of the aircraft at about the time envisaged in the original LOT.

4.27 However, the ANAO understands that the US Navy is studying the feasibility of doubling the expected life for its *Hornets* from 6000 to 12 000 hours an airframe for its F/A–18D–models (and to 10 000 hours for the C–model). This could be an option for Air Force to consider, since it would greatly enhance the useful life of its *Hornet* aircraft and therefore the return from improvements made under the Australian *Hornet* Upgrade Program (HUG).[33] The ANAO was advised that Air Force continues to closely monitor the fatigue life of the *Hornet*. Air Force expects to undertake major structural refurbishment on a large portion of the *Hornet* fleet to achieve the planned withdrawal dates of 2012–2015. Any extension beyond those dates would require further substantial investment in additional structural refurbishment. The ANAO notes that the other major factor in considering retirement timing was the operational capability provided by the aircraft, in particular capability relative to other regional capabilities.

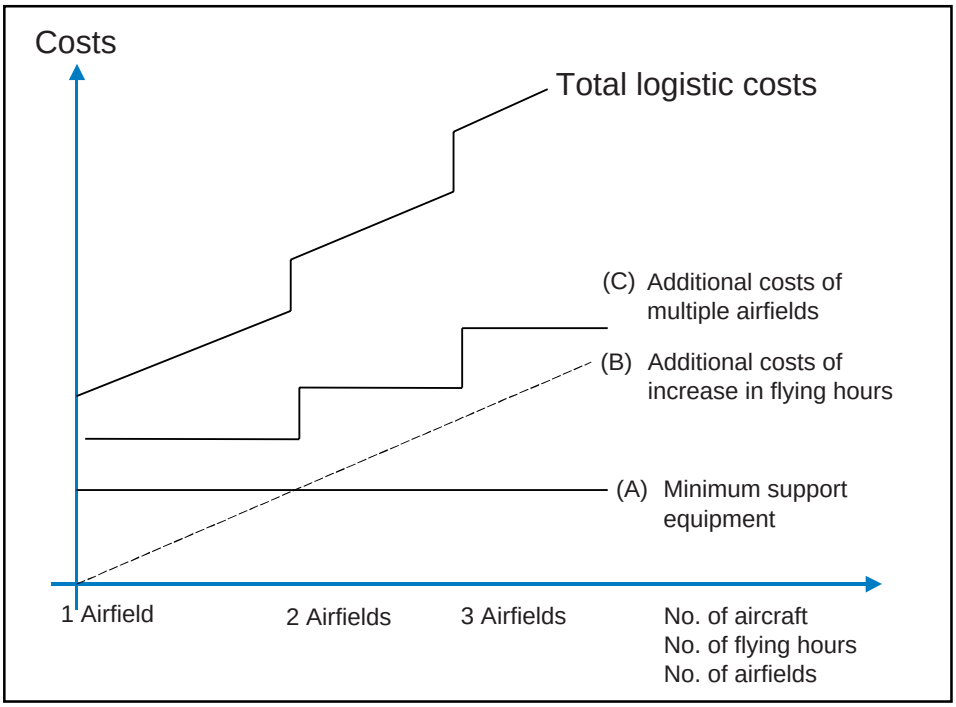
[33] See chapter 5.

Disposition of the Hornet fleet

4.28 *Hornets* are permanently located at Williamtown and Tindal airbases, with deployments to other airfields, including bare bases, as required.

4.29 Figure 11 shows a model of logistic costs used by the Swiss Government[34] to portray the composition of total logistic costs in their parliamentary process of acquiring tactical fighters. It shows three main components of total logistic costs represented by Lines (A), (B) and (C). Line (A) represents fixed logistic support equipment necessary to support the aircraft, irrespective of the number of aircraft to be maintained. Line (B) rises proportionally to the number of flying hours and comprises largely parts and repairable items. Line (C) shows the effect of the number of operating airfields, each one of which requires investments to be able to operate and maintain aircraft. Each airfield requires investments in maintenance support equipment that is to some extent duplicative and adds to capital and on-going costs.

Figure 11
Composition of logistic costs



Source: Swiss Government document

[34] The Swiss Air Force also operates *Hornets*.

4.30 The deployment posture adopted for the Australian *Hornet* fleet involves an operational squadron at a permanent airfield at Tindal, located in the geographic area critical in Defence of Australia and Regional Interest contingencies, but with the disadvantages of greater exposure to possible attack and distance from major civilian infrastructure support. Williamtown in NSW hosts two operational *Hornet* squadrons and the Operational Conversion Unit. 'Pack-up' kits allow the *Hornets* to use the Air Force 'bare bases' in northern Australia when those bases are required to provide initial logistic support. This helps to reduce the costs of the option of operating from multiple airfields.

4.31 The deployment posture adopted by Defence for the *Hornets* seems sensible. It tends to contain the capital and operating costs incurred in meeting strategic requirements to operate from multiple airfields.

Conclusion

4.32 Responsibility for logistic support of the *Hornet* is dispersed across several functional groups in Defence. Recorded logistic expenditure for the *Hornet* fleet since 1994–95 has been rising at a rate greatly in excess of the increase in activity levels. Recorded logistic costs do not include Air Force personnel costs, which are substantial. Information on the components of costs, cost increases and their drivers should be improved to assist in containing the overall outlays. Bringing together all logistic costs into an integrated management framework would facilitate comprehensive monitoring and holistic decision-making for the totality of logistic support of TFOs. Information on the components of costs, cost increases and their drivers should be improved to assist those responsible to contain overall costs. Greater cost consciousness is necessary to ensure that the *Hornet* fleet is supported cost-effectively. Management should promote efficient and effective use of Commonwealth resources as an integral part of achieving overall outcomes. In TFG this would be assisted by benchmarking all logistics costs of the *Hornets* against those of other Air Force units, and against those of other countries' units that operate *Hornets* or similar fast-jets, and by remedying logistic management information deficiencies in SDSS and CAMM.

Recommendation No.10

4.33 The ANAO recommends that Defence:

(a) adopt a more business-like approach to identify the main cost-drivers in the escalation of logistic costs of the Tactical Fighter Group over the last five years, to help contain and reduce overall outlays for the logistic support of the *Hornet* fleet;

(b) put in place a holistic framework for the management of logistics, including associated personnel, to support effectively the tactical fighter aircraft; and

(c) introduce management information systems that enable reliable tracking and analysis of logistic information.

Agency response

4.34 Agreed, with qualification. The introduction of an accrual accounting framework will enable all the costs supporting the capability to be readily identified. The format of a suggested 'holistic framework' for the management of logistics would need to be defined, however, the concept that all logistic elements that support tactical fighter operations should be under one group is not supported.

ANAO comment

4.35 The ANAO agrees that it may not be necessary to place all logistic elements in support of TFG into one group to achieve cost-effective logistic support. However, management decisions concerning logistic support need to be made in a management framework that is comprehensive and transparent. It should include reliable costing information, and show and take into account all significant long-term costs and benefits of various support options; that is, costs for Defence civilian and Service personnel, facilities, contractor support, storage and equipment and spares.

Hornets in formation flight—photo courtesy of the Royal Australian Air Force

5. Major *Hornet*-related Projects

This chapter reviews the management of two Hornet-related capital acquisition projects, the Integrated Avionics System Support Facility and the Hornet Upgrade Program.

Introduction

5.1 The ANAO recently reported on the management of major equipment acquisition projects in Defence.[35] This chapter draws on that report and other sources to make comments on Defence's management of two major *Hornet* projects—the *Integrated Avionics Systems Support Facility* (IASSF) and the *Hornet Upgrade Program* (HUG). IASSF is close to completion, after long delays. HUG has recently commenced its active phase, with aircraft fleet modifications for Phase 1 due to start in 2000. The Australian *Hornet* fleet is expected to have 12–15 years life remaining.

5.2 The cost of the approved components of HUG is over $1.5 billion.[36] This is a substantial investment. In order to maximise the value from this investment it is essential that upgraded aircraft are delivered on schedule so that their enhanced capability is available for as long as possible. Given the stages of the projects, the ANAO focused on general management of the projects rather than a detailed technical assessment.

5.3 The projects are managed by the Defence Acquisition Organisation (DAO) with Air Force input. Table 9 shows the contract status and costs of IASSF and HUG projects.

Table 9
Hornet Related Major Equipment Projects

Project Number	*Project Description*	*Contract Signature*	*Project Approval $m*	*Current Approval $m*
Air 15	Integrated Avionics System Support Facility	Dec 1991	43.2	68.4
Air 5376	*Hornet* Upgrade Phase 1/2C	June 1999	140.2	261.0
Air 5376	*Hornet* Upgrade Phase 2	Awaiting signature	1300.0	1324.0
	Totals		**1483.4**	**1653.4**

Source: Defence records

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[35] ANAO Audit Report No.13 1999–2000 *Management of Major Equipment Acquisition Projects—Department of Defence* (October 1999).

[36] Defence is also considering further upgrades to the *Hornet*, but has not yet sought approval from the Government for them.

Integrated Avionics Systems Support Facility (IASSF)

The role of Operational Flight Programs (OFPs)

5.4 Aircraft technology and capability are increasingly dependent on computer software. The Air Force's previous fighter aircraft (the *Mirage*) had no complex computerised systems. The *Hornet* has many, and its avionics comprise two general-purpose computers and a range of other digital processors embedded in a variety of sensors, displays and controllers (eg Stores Management Processor). These various components and systems are brought together and integrated by the Operational Flight Program (OFP) software.

5.5 The *Hornet* OFP has been updated regularly during its life. The US Navy, which has a fleet of *Hornet*s, has commissioned a series of updates of the OFP. These updates have been necessary to incorporate new technologies, new weapon systems, and to improve performance generally. Although there are significant similarities between the USN and the Australian *Hornets*, the Australian aircraft are a unique combination of platform, weapons systems and communications environment. Hence, an Australian version of each upgrade of the OFP is necessary. This export version has some US functionality deleted. Since the *Hornet*'s introduction, these updates of the OFP have cost some $66 million (about $4.7 million per annum).

5.6 There have been problems with the update process. As the US Navy does not have an Australian *Hornet* on which to test software, serious faults have emerged in the software that were not apparent until the OFP was loaded into an Australian aircraft. Defence advised that there is an Air Force engineer in the US to minimise these faults, but the officer has little visibility of the testing because of access restrictions, problems in the laboratory environment and the unique Australian *Hornet* configuration. The faults in the OFP were rectified in US facilities and new versions loaded into the aircraft. Furthermore, the Australian OFP has embedded in it many segments not relevant to Australian aircraft. As software 'space' is at a premium, this can limit the capacity to incorporate Australia-specific items or facilities.

5.7 Air Force advised the ANAO that this has not been a problem to date but is certainly an issue for the future as the Air Force configuration diverges further from the USN, particularly if Air Force relies on patches rather than rewrites. The space problem has already affected the USN and forced them to update computer hardware and data transmission wiring to provide more memory and throughput. Air Force has had to follow these updates to maintain a common host environment for the OFP. Finally, when smaller enhancements are desired, these have to be

queued into the main US Navy OFP update process where Air Force has little control over priorities. In summary, the Air Force is dependent for a key part of the *Hornet's* capability on an expensive and protracted software development process overseas.

Origin of the Integrated Avionics Support Systems Facility (IASSF)

5.8 The importance of the OFP was recognised when the *Hornet* was purchased. As part of the original project to buy the *Hornet* (Project Air 15), provision was made for an *Integrated Avionics System Support Facility* (IASSF). The intended role of IASSF was to provide the Air Force with an indigenous capability to develop updates to OFPs and perform system tests and integration for selected aircraft systems including:

- a systems engineering laboratory;
- a software development environment for the Mission Computer, Stores Management Set and Communication System Control Set OFPs;
- a Radar OFP Patch capability (subsequently waived due to intellectual property access and cost issues—now included as part of a project establishing a radar evaluation facility for the *Hornet* under Phase 2 of HUG);
- on-line data capture and analysis tools; and
- off-line data reduction and analysis tools.

5.9 It is unclear from the documentation available in Defence whether IASSF was intended to replace completely the need for USN-built updates, or merely provide a local capacity for modification of the OFP. This uncertainty is continuing. TFG's view is that this had been under debate since inception of the project, for good reason. Ultimately it would depend on a cost/benefit analysis based on Air Force configuration divergence and availability of USN support. However, this would primarily affect the number of people employed on IASSF, not the capability or capacity of IASSF. IASSF's role will be influenced in particular by the USN's plans for future OFPs.

5.10 The USN recently committed to introduce the *Hornet* 'E/F' model, known as the *Super Hornet*. When these new aircraft are introduced, the USN is expected to downgrade its support for the current C/D models in a similar manner to the reduction in support provided for the A/B models when the C/D were introduced. If this were to occur, Air Force would be forced to rely on an Australian capacity for upgrades up to the end of the Australian *Hornet's* life in 2015 or seek to contract with the USN and Boeing. Defence would then have to pay for the full development costs of an Australian unique OFP.

5.11 Canada and Spain also have facilities similar to IASSF. Air Force advised that, while these facilities do a similar job to IASSF, their systems are not as integrated and thus are more workforce dependent. Air Force has already established a more limited support facility for the F–111. Air Force advised the ANAO that the F–111 facility has less automation and poorer data presentation, but the OFPs are in a higher order language and Air Force has intellectual property and supporting documentation. Air Force also advised that the F–111 facility was able to support the same level of change and testing as IASSF can for the *Hornet*.

5.12 The computer language in the *Hornet* is antiquated. It is based largely on 'machine code' rather than more modern modular languages. This makes errors in software coding more likely, harder to correct and also limits the pool of expertise available, as software engineering has moved on considerably.

Project progress

5.13 IASSF has had a long and difficult history. Defence records on IASSF are incomplete, particularly for the early phases of the project. There were delays in committing to the project. The first *Hornet* arrived in Australia in 1985 but a contract was not let for IASSF until 1992. The original expected cost was around $37 million (in April 1988 prices). Defence planned for the project to be completed in 1993. By the time the contract was let this expected completion date had slipped to 1995. The project was awarded to EASAMS Australia Limited on the basis of a fixed price contract. The contract was subsequently novated to GEC Marconi Systems (GMS) in October 1995 when GMS purchased EASAMS. GMS is now part of BAe Systems.

5.14 The project is now five years late. The original contract price in December 1991 prices was $43.2 million. Price variations of $7.44 million and contract changes valued at $2.8 million have resulted in a current contract value of $53.45 million in December 1998 prices. Liquidated damages paid by the contractor are being used to fund Y2K remediation work and offset future upgrade costs.

5.15 There have been prolonged difficulties with the project due to:

- an underestimation of the complexity of the task and the level of effort required;
- continually optimistic estimates of completion times;
- a poor relationship between the contractor and Defence's Project Office, particularly during the early phases of the project;
- the impact of a fixed price contract on contractor flexibility; and
- high levels of technical complexity and risk in the project.

5.16 In anticipation of the project being completed, the IASSF Project Office was closed in December 1997, with the responsibility for project closure and some of the workforce transferred to RAAF Base Williamtown to be on-site with the contractor during the final stages of development. At that stage all of the hardware was on site, the contractor was planning for completion by end 1998 and staffing at Williamtown was increasing. Subsequent progress was less than expected. During this period several staff resigned, including the on-site Project manager. The Project Office was re-established in early 1999 and since then a number of corrective steps have been taken to improve project management, including:

- changes in project personnel and reporting arrangements;
- changes in contractor personnel; and
- greater adherence to and planning for acceptance milestones.

5.17 These changes appear to be having an uncertain impact. IASSF passed a Test Readiness Review (by DAO and the contractor) in October 1999 and was approved to commence preparing for acceptance testing. Defence advised the ANAO that final acceptance testing commenced in late December 1999 and was progressing to plan. Acceptance of IASSF was expected in May 2000.

Relation to Hornet Upgrade Program

5.18 When IASSF was originally established it was expected that it would allow Air Force to model and test the introduction of new hardware and software (verification and validation or 'V and V') before actually modifying any aircraft, and thus help avoid costly re-work. The *Hornet* is about to undergo a major upgrade (HUG) in which IASSF could have played a very important role. IASSF will now not be ready in time to support the first phase of HUG, adding to the schedule risk and costs of that upgrade. The implications of this are discussed below.

5.19 The current contract specification requires IASSF to be able to test and modify version 89C of the OFP. The aircraft is already using a later version (91C) of the OFP, which will in turn be superseded when HUG-modified aircraft move to version 13C. As part of HUG Phase 1 Defence planned to upgrade IASSF to this latest version of the software so it could assist in the HUG project. Due to the delays in IASSF this is not possible and Defence now plans to:

- accept IASSF at an 89C version (ie. as specified under the original contract);
- focus on providing an IASSF facility for an enhancement to the *Hornet* known as the Airborne Combat Manoeuvring Instrumentation (ACMI) pod in 2000 to test its capacities; and
- subsequently upgrade IASSF to the 13C OFP in 2001.

5.20 The latter two stages in IASSF's development are funded separately from the current contract. IASSF is likely to require on-going funding of $5 million a year[37]. This is in addition to the contribution the Air Force will continue to make to the USN's OFP development, and the purchase cost of each OFP (around $20 million per OFP). The likely OFP software costs in the five years to 2004 are summarised in Table 10.

Table 10
Likely OFP Software Costs—Five years to 2004

Component	*Total costs ($m)*
IASSF ($5 million a year)	25
OFP (15C, 17C, 19C) purchase and incorporation costs	60–90
Maintenance contribution to USN (based on $3.5 million p.a.)	17.5
Total	**100–130**

Source: Defence

Future plans for IASSF

5.21 The longer-term role for IASSF is unclear. Defence is re-appraising the business case for the facility (along with that for other ground systems for the *Hornet*). The purpose of the re-appraisal is to quantify the infrastructure cost of establishing/modifying these facilities and the cost to staff and maintain them. The re-appraisal will also assess the likely range and level of operational requirements on IASSF once the *Hornet* upgrade is completed.

Hornet Upgrade Program (HUG)

Origin of project

5.22 The first of the Air Force's *Hornet* aircraft was delivered in 1985. At that time it was one of the most advanced fighter aircraft in the world and gave Air Force a clear capability superiority in the region. The Air Force *Hornets* are now about 15 years old, with a design that dates back about 30 years, and no longer enjoy such clear superiority.

5.23 During the early 1990s Defence was faced with the question of whether to replace the *Hornet* with a more advanced aircraft, or upgrade it with more advanced and reliable systems and weapons to restore its relative capability. Air Force decided to upgrade the aircraft, mainly for the following reasons:

- there was no replacement available that would give it the 'quantum leap' sought. Any replacement aircraft available at that time would

[37] Presentation by PDDC 9 Sep 99, '*Hornet Upgrade Project Ground Support Systems*'.

soon be superseded by the next generation of aircraft such as the Eurofighter, the F22–Raptor or the Joint Strike Fighter. The large investment in new aircraft could therefore be of limited long-term benefit;

- most of the capability gaps identified could be rectified by upgrades to various components and weapons, many of which were available 'off the shelf' from suppliers; and
- the strategic outlook did not justify the replacement of the aircraft.

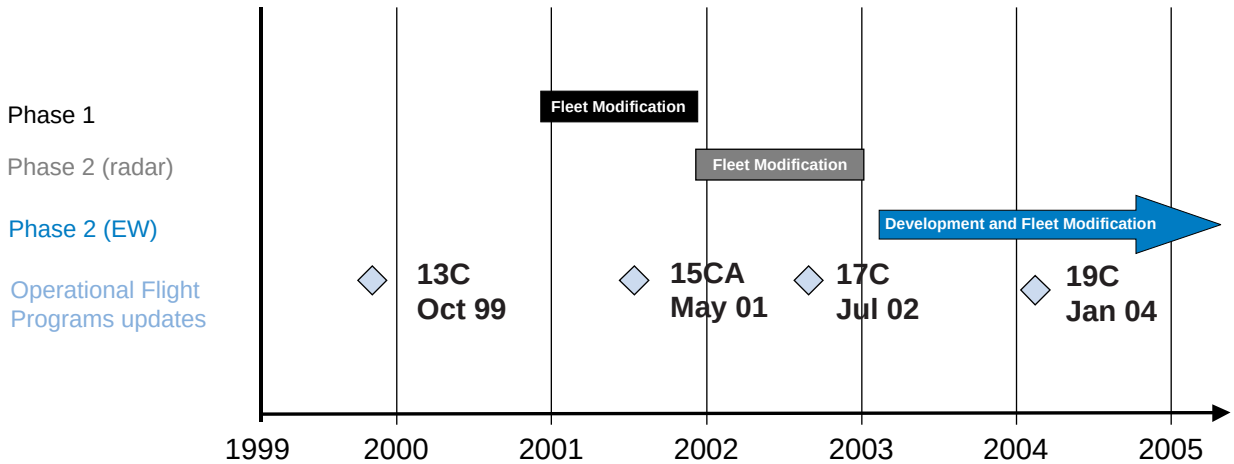
5.24 Accordingly Defence began planning for an upgrade of the *Hornet* that would broadly bring it into line with the latest model F–18 being flown by the US Navy. The approved upgrades will not extend the *Hornet* life, which is limited by fatigue in the airframe. Phase 3 of HUG would incorporate structural upgrades but has not yet been approved. Defence advised the ANAO that these upgrades were to ensure that the planned withdrawal dates would be achieved. There would be potential to extend the life of the aircraft beyond the current Life of Type.

Components of HUG

5.25 The approved components of HUG are to be implemented in two phases. The planned timing of the project is shown in Figure 12. Phase 1 of HUG was considered to be a relatively low-risk improvement to the *Hornet*'s:

- voice communications (to improve their resistance to jamming);
- Identify Friendly-Foe system (IFF) and an on-board interrogator transponder;
- inertial navigation system;
- software for the radar warning receivers;
- computers and internal aircraft electronics to support the new Phase 1 systems;
- radars (approved as part of Phase 2, but separated and brought forward to immediately follow Phase 1); and
- updated operational flight program (OFP).

Figure 12
Overview of HUG Phases and Operational Flight Programs (OFPs)



Source: Defence records

Notes:

Operational Flight Program updates are forecast updates for the aircraft software (see paragraphs 5.3–5.5)

Phases 1 and 2: see paragraphs 5.25 and 5.26. The radar upgrade was brought forward from Phase 2 and included in Phase 1.

5.26 Phase 2 of HUG is a relatively more developmental upgrade of the *Hornet*'s:

- electronic warfare (EW) systems;
- air-to-air data communications links;
- cockpit displays and digital map and weapons control system;
- helmet mounted cuing system to support new Within Visual Range (WVR) missiles (transferred from Project AIR5400); and
- updated OFP.

Acquisition strategy and risk management

5.27 Controlling risk is a central element of managing major equipment acquisitions. The ANAO report on the management of Defence's major equipment acquisition projects[38] reported that the Defence Acquisition Organisation (which manages the HUG project) was proposing to introduce a new standard project management method (SPMM) and a project management information system (ProMIS) to improve risk management of projects. SPMM and ProMIS are used in the management of the HUG projects. ProMIS includes standard reporting and risk modules that record identified risks. Managers are required to identify risks, identify their consequences across various domains (cost, schedule and product) and develop treatment strategies. Project managers then use ProMIS to ensure that treatment strategies have been developed and implemented.

5.28 Phase 1 of HUG was considered, overall, to have low technical risk, as most of the equipment is or will soon be installed in the US Navy's fleet of *Hornet*s. However, TFG have schedule concerns, particularly because of the short time available to rectify any major fault with the Air Force version of the 13C OFP. Phase 2 was acknowledged to have higher levels of risk. The US Navy operates mainly the later C/D model *Hornet*. Australia's aircraft is the earlier A/B model and the Phase 2 equipment has not previously been installed into this model aircraft.

5.29 Defence assumed that Air Force would be able to incorporate US experience in its upgrades. However, due to delays in the US Navy programs, Phase 2 of the HUG will be the lead aircraft integration program and will be incorporating some systems in advance of the US Navy. This increases the technical and cost risks of the upgrades. The original documentation portrayed the project as low to moderate risk, but over time this changed. Phase 2 is now described as having *'…medium to high schedule and cost risks that are based on technical and management uncertainties with the acquisition strategy.'*

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[38] ANAO Audit Report No.13 1999–2000 *Management of Major Equipment Acquisition Projects—Department of Defence* (October 1999).

5.30 The HUG project office held a risk mitigation workshop in mid-1999, in conjunction with Boeing, to identify risks and treatment strategies. The project office subsequently developed a risk management plan for Phase 1 of HUG that was incorporated into ProMIS.

Progress of HUG

5.31 The implementation of HUG Phase 1 was delayed for over a year, following two developments. First, the US Navy decided not to upgrade its *Hornet* A/B models, but only to upgrade the later C/D models. This meant that Australia would have to fund all of the engineering and design work for the upgrade to the early model. Second, McDonnell Douglas Aerospace (MDA), the original manufacturer of the *Hornet*, notified Defence that it would not participate in a competitive tender for the work or act as subcontractor in the project. In the light of this, Defence decided that a new Equipment Acquisition Strategy (EAS) was required and decided to sole-source the project to MDA. Defence assessed this strategy as having an overall low to medium risk. During this time MDA was acquired by the Boeing Corporation.

5.32 Boeing's subsequent response to the request for quotation required substantial work by Defence to clarify 19 significant areas of at least partial non-compliance which were eventually resolved. During the final contract negotiation phase, Boeing raised concerns about the liability it would carry under the contract for the work done and this further delayed contract negotiations. The contract was signed with Boeing pending final resolution of this issue.

5.33 HUG (particularly Phase 2) has been the subject of prolonged debate and changing guidance on its priority. Defence was concerned to ensure that the upgrade program was linked to the plans for the aircraft's replacement. An initial, more cautious phased approach was followed by direction to accelerate key parts of the project. This in turn was followed by a reduction in budget and deferral of some elements into future years as a result of over-commitments in the Defence capital equipment budget. There were also significant delays in some stages of the decision-making process. For example, the Equipment Acquisition Strategy for Phase 2 took seven months to be approved.

Project governance

5.34 A variety of bodies are now responsible for overseeing the project. As part of moves to improve capability management within Air Force, each Force Element Group (in this case Tactical Fighter Group) has a *Weapons System Management Committee* (WSMC). The WSMC is responsible for developing a weapons system master plan, which sets out the current status of the system (in the case of TFG, the *Hornet*, the Lead-in Fighter and with input to the PC–9 on Forward Air Control) and plans for its management. The *Hornet* WSMC is chaired by Commander TFG and receives regular reports on progress on HUG and IASSF. The Director of Tactical Fighter Systems Project Office (who manages the HUG Project) is also a member of the WSMC.

5.35 The *Project Board* is a body established under the recently introduced standard project management methodology (SPMM) in DAO. Each major project is expected to have such a Board. The role of these Boards is to monitor the project business case to ensure its validity in the light of the performance of the project and changes in external factors, to consider all major project plans and resources and to clear key documents prior to delegate approval. The HUG Project Board comprises senior officers from TFG, DAO and Capability Staff from Defence Headquarters. It has met twice and has considered issues such as the project quality plan.

5.36 Within DAO the *Defence Acquisition Review Board* (or DARB) was established in 1998 to monitor the progress of all major projects currently managed by DAO. HUG was recently considered by DARB, who were concerned at the acquisition approach taken in the project and commenced a review of it. The DARB review broadly endorsed the direction in the project and considered that the project schedule, although ambitious, was achievable provided that the project office would be given additional resources. Defence advised the ANAO that a senior management team reviewed the project acquisition strategy and endorsed the acquisition strategy developed by the project office to accommodate funding constraints.

Reporting (including performance measures, Key Result Areas)

5.37 DAO is in the process of introducing a range of reporting and quality assurance enhancements. Variations in schedule and costs are tracked and, if the project moves outside agreed parameters, exception reports must be submitted. The Project Office must also prepare weekly issues reports, which are sent to the head of DAO, and a monthly standing report to the head of Aerospace Systems.

Staffing issues

5.38 Both HUG and IASSF have had staffing problems. Estimating the scale of the project management task is difficult. Circumstances will inevitably change and require adjustments to resourcing. DAO must also deal with competing demands from all of its projects for staff and administrative support. In the case of HUG, the project office regularly identified the need for:

- more general project staff;
- greater legal resourcing for contract negotiations as the project office was entering into more contracts than expected; and
- more technical staff, particularly staff who were skilled in electronic warfare matters.

5.39 The project office has used contract personnel (known as 'professional service providers' (PSPs). A PSP costs (in direct dollar terms) around twice the equivalent public service or military personnel. The perception that PSPs are expensive could also reflect the fact that project offices do not bear all costs of their staff (such as superannuation, workers compensation and so on). In line with DAO practice the project office also used project funds, rather than DAO salary funds, to pay for some of the PSPs. In the earlier audit report mentioned at the beginning of this chapter, the ANAO noted that DAO's expenditure on PSPs had increased from $21.6 million in 1997–98 to an estimated $31 million in 1998–99 and that the practice of including these costs as part of total payments on projects obscures the cost of PSPs. [39]

5.40 The arrangements for staffing project offices are unwieldy. In part this reflects: broader Defence funding arrangements; the allocation of staff in terms of numbers rather than budgets; and, in particular, the split between project and administrative costs such as salary dollars for personnel.

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[39] Audit Report No.13 1999–2000 *Management of Major Equipment Acquisition Projects—Department of Defence* paragraph 5.19.

Current project status—cost, schedule and capability

5.41 The ANAO reviewed Defence records on the approval and progress of the HUG projects. Current cost estimates for both Phases of HUG are listed at Table 11. The upgrade is a major investment by Defence. In total, the current approved cost is over $1.6 billion or around $22 million per aircraft. If a projected further phase is approved, the total cost will come to about $2.9 billion, or over $40 million per aircraft. Defence records show that:

- HUG is currently within budget—though some elements of Phase 2 are likely to be re-costed in 2000, when final tenders are received for Phase 2;
- HUG Phase 1 is likely to be 12–18 months late, but elements of HUG Phase 2 have been advanced by up to five years, in response to a direction to accelerate the project. This acceleration has increased the cost and timing risks, as a result of an aggressive schedule; and
- at this stage, both Phases of HUG are expected to deliver the original requested capability. This may also be reviewed in the light of costs for Phase 2.

Table 11

Estimated Costs of the *Hornet* Upgrade Program (HUG)

Project Stage	*Amount $m (December 1998 prices)*
HUG Phase 1	
Phase 1–Initial Approval (December 1995)	140.2
Phase 2C–Transferred Approval	+50.8
Transfer to Air 5391 ALR2002	-7.0
Transfer from Phase 2	+35.4
Price & Exchange Updates	+32.3
Various Real Increases	+ 9.4
Phase 1–Current Approval (December 1998)	**261.1**
HUG Phase 2	
Phase 2–Initial Approval	1300.0
Transfer to Phase 1	-35.4
Transfer of Sub-phases	+59.3
Phase 2–Current Approval (December 1998)	**1323.9**
Total HUG Costs	**1585.0**

Source: Defence records

Life-cycle costs

5.42 The ANAO found that there was inadequate regard in the HUG projects for the costs that would be incurred in maintaining the enhancements over their life-time ('life-cycle costs'). At the project approval stage for Phase 1 in 1994, Defence estimated minimal change to logistical and other support costs. Defence advised that a broad assessment had been made that cost decreases expected as a result of improved reliability of new systems would be likely to be offset by increased repair costs resulting from increased system complexity. At the acquisition stage, life cycle costs were discussed but the Equipment Acquisition Strategy did not include any estimates of costs beyond an initial 3-year period in which costs of logistical support are funded by the DAO project office. There were no estimates of the life-cycle costs to be funded later by other program areas in Defence, notably Air Force and Support Command Australia. Defence advised that Net Personnel and Operating Costs (NPOC), identifying the variations in support costs from the current aircraft configuration to the upgraded configuration, have now been determined for Phase 1 of HUG. NPOC for Phase 2 was being developed as Phase 2 aircraft systems were selected.

5.43 An ANAO report[40] drew attention to the significance of life-cycle costs in relation to initial capital costs of Defence major equipment projects and indicated concern that Defence planning for such projects did not adequately take account of life-cycle costs. The report made various recommendations that Defence largely agreed to implement. The Joint Committee of Public Accounts and Audit recently indicated its support for the ANAO report.[41] Even at this stage of the HUG program, Defence should ensure that life-cycle costs are estimated from the best available information and that funding provision is made in Defence budgeting.

Conclusion

5.44 The *Hornet* fleet is planned to undergo a complex and expensive series of upgrades over the next eight years to improve its capability. In reviewing these, the ANAO found some persistent deficiencies:

- some projects had experienced delays in early stages of project approval and development, when timing did not seem critical, making it difficult to accelerate progress later when this was needed;
- there appeared to be a tendency by the proponents of projects to underestimate the risks in projects, which was partially corrected by

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[40] Audit Report No.43 1997–98 *Life-cycle Costing in Defence* (May 1998).

[41] Joint Committee of Public Accounts and Audit *Report No.370 Defence life cycle costing, Commonwealth guarantees, indemnities and letters of comfort*, pp. 2–11 (November 1999).

the capability development process. A greater emphasis on realistic risk assessment (including contract risk) in original proposals would aid the decision-making process; and

- there was limited consideration of life-cycle costs at the acquisition stage of HUG.

5.45 General issues of Defence's management of major equipment projects and life-cycle costing in Defence have been considered in the ANAO's recent reports on those topics. The acquisition reforms such as the Standard Project Management Method (SPMM) referred to in the former ANAO report should help avoid deficiencies of the kind mentioned above. The ANAO does, however, have a particular concern that Defence needs to put in place plans to upgrade and test OFPs and to keep HUG on schedule and within budget should IASSF not become functional. Defence should agree the role of IASSF quickly to ensure it is a cost-effective investment.

Recommendation No.11

5.46 The ANAO recommends that, to help ensure a cost-effective upgrade of the *Hornet* aircraft, Defence:

(a) put in place contingency plans to minimise the risks to the *Hornet* Upgrade Program should the Integrated Avionics System Support Facility (IASSF) be unable to support the upgrade; and

(b) settle quickly the likely role of IASSF over the remaining life of the *Hornet*.

Agency response

5.47 Agreed. IASSF is currently undergoing acceptance testing, with final acceptance expected in April 2000. Contingency plans have been developed to protect the *Hornet* upgrade schedule should IASSF acceptance be delayed. A study into the role of IASSF over the remaining *Hornet* Life of Type is currently under way.

Canberra ACT
26 April 2000

P. J. Barrett
Auditor-General

Appendix

Appendix 1

Performance audits in Defence

Set out below are the titles of the ANAO's previous performance audit reports on the Department of Defence and the Australian Defence Force (ADF) tabled in the Parliament in the last five years.

Audit Report No.8 1995–96
Explosive Ordnance (follow-up audit)

Audit Report No.11 1995–96
Management Audit

Audit Report No.17 1995–96
Management of ADF Preparedness

Audit Report No.26 1995–96
Defence Export Facilitation and Control

Audit Report No.28 1995–96
Jindalee Operational Radar Network Project [*JORN]*

Audit Report No.31 1995–96
Environmental Management of Commonwealth Land

Audit Report No.15 1996–97
Food Provisioning in the ADF

Audit Report No.17 1996–97
Workforce Planning in the ADF

Audit Report No.27 1996–97 *Army Presence in the North*

Audit Report No.34 1996–97
ADF Health Services

Audit Report No.5 1997–98
Performance Management of Defence Inventory

Audit Report No.34 1997–98 *New Submarine Project*

Audit Report No.43 1997–98
Life-cycle Costing in Defence

Audit Report No.2 1998–99
Commercial Support Program

Audit Report No.17 1998–99
Acquisition of Aerospace Simulators

Audit Report No.41 1998–99
General Service Vehicle Fleet

Audit Report No.44 1998–99
Naval Aviation Force

Audit Report No.46 1998–99
Redress of Grievances in the ADF

Audit Report No.13 1999–2000
Management of Major Equipment Acquisition Projects

Audit Report No.26 1999–2000
Army Individual Readiness Notice

Audit Report No.35 1999–2000
Retention of Military Personnel

Audit Report No.37 1999–2000
Defence Estate Project Delivery

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Series Titles

Titles published during the financial year 1999–2000

Audit Report No.39 Performance Audit
Coordination of Export Development and Promotion Activities Across Commonwealth Agencies

Audit Report No.38 Performance Audit
Coastwatch
Australian Customs Service

Audit Report No.37 Performance Audit
Defence Estate Project Delivery
Department of Defence

Audit Report No.36 Performance Audit
Home and Community Care
Department of Health and Aged Care

Audit Report No.35 Performance Audit
Retention of Military Personnel
Australian Defence Force

Audit Report No.34 Performance Audit
Construction of the National Museum of Australia and the Australian Institute of Aboriginal and Torres Strait Islander Studies

Audit Report No.33 Performance Audit
Business Entry Program
Department of Immigration and Multicultural Affairs

Audit Report No.32 Performance Audit
Management of Commonwealth Non-primary Industries

Audit Report No.31 Performance Audit
Administration of Tax Penalties
Australian Taxation Office

Audit Report No.30 Examination
Examination of the Federation Cultural and Heritage Projects Program

Audit Report No.29 Performance Audit
The Administration of Veterans' Health Care
Department of Veterans' affairs

Audit Report No.28 Audit Activity Report
Audit Activity Report July to December 1999
Summary of Outcomes

Audit Report No.27 Performance Audit
Risk Management of Individual Taxpayers Refunds
Australian Taxation Office

Audit Report No.26 Performance Audit
Army Individual Readiness

Audit Report No.25 Performance Audit
Commonwealth Electricity Procurement
Australian Greenhouse Office
Commonwealth Scientific and Industrial Research Organisation
Department of Defence
Department of Finance and Administration

Audit Report No.24 Performance Audit
Commonwealth Management and Regulation of Plasma Fractionation
Department of Health and Aged Care

Audit Report No.23 Performance Audit
The Management of Tax Debt Collection
Australian Taxation Office

Audit Report No.22 Performance Audit
Weather Services in the Bureau of Meteorology
Department of the Environment and Heritage

Audit Report No.21 Financial Statement Audit
Audits of the Financial Statements of Commonwealth Government Agencies for the Period Ended 30 June 19999.

Audit Report No.20 Performance Audit
Special Benefits
Department of Family and Community Services
Centrelink

Audit Report No.19 Performance Audit
Aviation Safety Compliance
Civil Aviation Safety Authority

Audit Report No.18 Performance Audit
Electronic Service Delivery, including Internet Use, by Commonwealth Government Agencies

Audit Report No.17 Performance Audit
Commonwealth/State Housing Agreement
Department of Family and Community Services

Audit Report No.16 Performance Audit
Superannuation Guarantee
Australian Taxation Office

Audit Report No.15 Performance Audit
Management of Australian Development Scholarships Scheme
Australian Agency for International Development (AusAID)

Audit Report No.14 Performance Audit
Commonwealth Debt Management

Audit Report No.13 Performance Audit
Management of Major Equipment Acquisition Projects
Department of Defence

Audit Report No.12 Financial Control and Administration Audit
Management of Contracted Business Support Processes

Audit Report No.11 Performance Audit
Financial Aspects of the Conversion to Digital Broadcasting
Australian Broadcasting Corporation
Special Broadcasting Service Corporation

Audit Report No.10 Financial Statement Audit
Control Structures as Part of Audits of Financial Statements of Major Commonwealth Agencies for the Period Ended 30 June 1999

Audit Report No.9 Performance Audit
Managing Pest and Disease Emergencies
Agriculture, Fisheries and Forestry—Australia

Audit Report No.8 Performance Audit
Managing Data Privacy in Centrelink
Centrelink

Audit Report No.7 Financial Control and Administration Audit
Operation of the Classification System for Protecting Sensitive Information

Audit Report No.6 Audit Activity Report
Audit Activity Report January–June 1999
—Summary of Outcomes

Audit Report No.5 Performance Audit
IP Australia—Productivity and Client Service
IP Australia

Audit Report No.4 Performance Audit
Fraud Control Arrangements in Education, Employment, Training and Youth Affairs

Audit Report No.3 Performance Audit
Electronic Travel Authority
Department of Immigration and Multicultural Affairs

Audit Report No.2 Financial Control and Administration Audit
Use of Financial Information in Management Reports

Audit Report No.1 Performance Audit
Implementing Purchaser/Provider Arrangements between Department of Health and Aged Care and Centrelink
Department of Health and Aged Care
Centrelink

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Management of Occupational Stress in Commonwealth Agencies	Dec 1998
Security and Control for SAP R/3	Oct 1998
Selecting Suppliers: Managing the Risk	Oct 1998
New Directions in Internal Audit	Jul 1998
Life-cycle Costing (in Audit Report No.43 1997–98)	May 1998
Controlling Performance and Outcomes	Dec 1997
Management of Accounts Receivable	Dec 1997
Protective Security Principles (in Audit Report No.21 1997–98)	Dec 1997
Public Sector Travel	Dec 1997
Audit Committees	Jul 1997
Core Public Sector Corporate Governance (includes Applying Principles and Practice of Corporate Governance in Budget Funded Agencies)	Jun 1997
Administration of Grants	May 1997
Management of Corporate Sponsorship	Apr 1997
Return to Work: Workers Compensation Case Management	Dec 1996
Telephone Call Centres	Dec 1996
Telephone Call Centres Handbook	Dec 1996
Paying Accounts	Nov 1996
Performance Information Principles	Nov 1996
Asset Management	Jun 1996
Asset Management Handbook	Jun 1996
Managing APS Staff Reductions —supplementary Better Practice Principles in Audit Report No.49 1998–99	Jun 1996